Appendix D

Phase 2 OU1 Data Summary Reports and Supporting Information

Reporting Limits and Detection Limits for Volatile Organic Compounds

CDM Smith. ***Q4 2020 Data Summary Report Groundwater Sampling Event, 700 South 1600 East PCE Plume, Salt Lake City, Utah.***

CDM Smith. ***Q1 2021 Data Summary Report Groundwater Sampling Event, 700 South 1600 East PCE Plume, Salt Lake City, Utah.***

CDM Smith. ***Data Summary Report Phase 2 2020 Drilling Investigation, 700 South 1600 East PCE Plume, Salt Lake City, Utah.***

CDM Smith. ***Plan for Surface Water Sampling and Flow Measurement Technical Memorandum, 700 South 1600 East PCE Plume, Salt Lake City, Utah.***

CDM Smith. ***Plan for Soil Vapor Probe Sampling and Indoor Air Sampling at Buildings 6 and 7 Technical Memorandum, 700 South 1600 East PCE Plume, Salt Lake City, Utah.***

CDM Smith. ***2021 Source Area Soil Gas and Indoor Air Sampling Data Summary Report, 700 South 1600 East PCE Plume, Salt Lake City, Utah.***

CDM Smith. ***2021 East Side Springs Vapor Intrusion Lines of Evidence Data Summary Report, 700 South 1600 East PCE Plume, Salt Lake City, Utah.***

CDM Smith. ***Aquifer Testing Analysis Technical Memorandum, 700 South 1600 East PCE Plume, Salt Lake City, Utah.***

CDM Smith. ***Summer 2021 Air Sampling Event Quality Control Summary Report, 700 South 1600 East PCE Plume, Salt Lake City, Utah.***

CDM Smith. ***Winter 2022 Air Sampling Event Quality Control Summary Report, 700 South 1600 East PCE Plume, Salt Lake City, Utah.***

Reporting Limits and Detection Limits for Volatile Organic Compounds

Source: CDM Smith. 2020d. *Phase 2 Remedial Investigation Work Plan, Operable Unit 1, 700 South 1600 East PCE Plume, Salt Lake City, Utah*. Prepared for U.S. Army Corps of Engineers.

Table 2-3. Project Laboratory (EMAX Laboratories, Inc.) – Target Analytes and Reporting Limits – Volatile Organic Compounds in Soil

Quality Assurance Project Plan, Remedial Investigation 700 South 1600 East PCE Plume, Salt Lake City, Utah

Analyte	CAS Number	Method	Screening Level	Lowest Screening Level Value (mg/kg)[a]	Laboratory RL (mg/kg)	Laboratory MDL (mg/kg)
1,1,1-Trichloroethane	71-55-6	SW8260C	Protection of Groundwater MCL-SSL (DAF=20)	1.4	0.005	0.001
1,1,2,2-Tetrachloroethane	79-34-5	SW8260C	Protection of Groundwater SSL (DAF=20)	0.0006[b]	0.005	0.001
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	76-13-1	SW8260C	Protection of Groundwater SSL (DAF=20)	510	0.005	0.001
1,1,2-Trichloroethane	79-00-5	SW8260C	Protection of Groundwater SSL (DAF=20)	0.0018[b]	0.005	0.001
1,1-Dichloroethane	75-34-3	SW8260C	Protection of Groundwater SSL (DAF=20)	0.016	0.005	0.001
1,1-Dichloroethene	75-35-4	SW8260C	Protection of Groundwater MCL-SSL (DAF=20)	0.05	0.005	0.001
1,2,3-Trichlorobenzene	87-61-6	SW8260C	Protection of Groundwater SSL (DAF=20)	0.42	0.005	0.001
1,2,4-Trichlorobenzene	120-82-1	SW8260C	Protection of Groundwater SSL (DAF=20)	0.674	0.005	0.001
1,2,4-Trimethylbenzene	95-63-6	SW8260C	Protection of Groundwater SSL (DAF=20)	1.6	0.005	0.001
1,3,5-Trimethylbenzene	108-67-8	SW8260C	Protection of Groundwater SSL (DAF=20)	1.7	0.005	0.001
1,2-Dibromo-3-Chloropropane	96-12-8	SW8260C	Protection of Groundwater SSL (DAF=20)	0.000029[b]	0.005	0.001
1,2-Dibromoethane (EDB)	106-93-4	SW8260C	Protection of Groundwater SSL (DAF=20)	0.000042[b]	0.005	0.001
1,2-Dichlorobenzene	95-50-1	SW8260C	Protection of Groundwater SSL (DAF=20)	5.9	0.005	0.001
1,2-Dichloroethane	107-06-2	SW8260C	Protection of Groundwater SSL (DAF=20)	0.00097[b]	0.005	0.001
1,2-Dichloropropane	78-87-5	SW8260C	Protection of Groundwater SSL (DAF=20)	0.0056	0.005	0.001
1,3-Dichlorobenzene	541-73-1	SW8260C	NA	NA	0.005	0.001
1,4-Dichlorobenzene	106-46-7	SW8260C	Protection of Groundwater SSL (DAF=20)	0.0092	0.005	0.001
2-Butanone (Methyl Ethyl Ketone)	78-93-3	SW8260C	Protection of Groundwater SSL (DAF=20)	23	0.02	0.005
2-Hexanone	591-78-6	SW8260C	Protection of Groundwater SSL (DAF=20)	0.18	0.02	0.005
4-Methyl-2-pentanone	108-10-1	SW8260C	Protection of Groundwater SSL (DAF=20)	28	0.02	0.005
Acetone	67-64-1	SW8260C	Protection of Groundwater SSL (DAF=20)	58	0.02	0.005

Table 2-3. Project Laboratory (EMAX Laboratories, Inc.) – Target Analytes and Reporting Limits – Volatile Organic Compounds in Soil

Quality Assurance Project Plan, Remedial Investigation 700 South 1600 East PCE Plume, Salt Lake City, Utah

Analyte	CAS Number	Method	Screening Level	Lowest Screening Level Value (mg/kg)[a]	Laboratory RL (mg/kg)	Laboratory MDL (mg/kg)
Benzene	71-43-2	SW8260C	Protection of Groundwater SSL (DAF=20)	0.0047[b]	0.005	0.001
Bromochloromethane	74-97-5	SW8260C	Protection of Groundwater SSL (DAF=20)	0.42	0.005	0.001
Bromodichloromethane	75-27-4	SW8260C	Protection of Groundwater SSL (DAF=20)	0.00073[b]	0.005	0.001
Bromoform	75-25-2	SW8260C	Protection of Groundwater SSL (DAF=20)	0.018	0.005	0.001
Bromomethane	74-83-9	SW8260C	Protection of Groundwater SSL (DAF=20)	0.038	0.01	0.002
Carbon Disulfide	75-15-0	SW8260C	Protection of Groundwater SSL (DAF=20)	4.8	0.005	0.001
Carbon Tetrachloride	56-23-5	SW8260C	Protection of Groundwater SSL (DAF=20)	0.0035[b]	0.005	0.001
Chlorobenzene	108-90-7	SW8260C	Protection of Groundwater SSL (DAF=20)	1.1	0.005	0.001
Chloroethane	75-00-3	SW8260C	Protection of Groundwater SSL (DAF=20)	120	0.005	0.001
Chloroform	67-66-3	SW8260C	Protection of Groundwater SSL (DAF=20)	0.0012[b]	0.005	0.001
Chloromethane	74-87-3	SW8260C	Protection of Groundwater SSL (DAF=20)	0.097	0.005	0.001
cis-1,2-Dichloroethene	156-59-2	SW8260C	Protection of Groundwater SSL (DAF=20)	0.021	0.005	0.001
cis-1,3-Dichloropropene	10061-01-5	SW8260C	Protection of Groundwater SSL (DAF=20)	0.0034[b]	0.005	0.001
Dibromochloromethane	124-48-1	SW8260C	Protection of Groundwater SSL (DAF=20)	0.0046[b]	0.005	0.001
Dichlorodifluoromethane (Freon 12)	75-71-8	SW8260C	Protection of Groundwater SSL (DAF=20)	6.1	0.005	0.001
Ethylbenzene	100-41-4	SW8260C	Protection of Groundwater SSL (DAF=20)	0.034	0.005	0.001
Isopropylbenzene	98-82-8	SW8260C	Protection of Groundwater SSL (DAF=20)	15	0.005	0.001
Methyl Acetate	79-20-9	SW8260C	Protection of Groundwater SSL (DAF=20)	82	0.005	0.0015
Methyl Tert-Butyl Ether	1634-04-4	SW8260C	Protection of Groundwater SSL (DAF=20)	0.064	0.005	0.001
Methylene Chloride	75-09-2	SW8260C	Protection of Groundwater MCL-SSL (DAF=20)	0.026	0.01	0.0025

Table 2-3. Project Laboratory (EMAX Laboratories, Inc.) – Target Analytes and Reporting Limits – Volatile Organic Compounds in Soil

Quality Assurance Project Plan, Remedial Investigation 700 South 1600 East PCE Plume, Salt Lake City, Utah

Analyte	CAS Number	Method	Screening Level	Lowest Screening Level Value (mg/kg)[a]	Laboratory RL (mg/kg)	Laboratory MDL (mg/kg)
m,p-Xylene	108-38-3 and 106-42-3	SW8260C	Protection of Groundwater SSL (DAF=20)	3.8	0.01	0.0025
o-Xylene	95-47-6	SW8260C	Protection of Groundwater SSL (DAF=20)	3.8	0.005	0.001
Styrene	100-42-5	SW8260C	Protection of Groundwater MCL-SSL (DAF=20)	2.2	0.005	0.001
Tetrachloroethene	127-18-4	SW8260C	Protection of Groundwater MCL-SSL (DAF=20)	0.046[b]	0.005	0.001
Toluene	108-88-3	SW8260C	Protection of Groundwater SSL (DAF=20)	14	0.005	0.001
trans-1,3-Dichloropropene	10061-02-6	SW8260C	Protection of Groundwater SSL (DAF=20)	0.0034[b]	0.005	0.001
trans-1,2-Dichloroethene	156-60-5	SW8260C	Protection of Groundwater SSL (DAF=20)	0.62	0.005	0.001
Trichloroethene	79-01-6	SW8260C	Protection of Groundwater SSL (DAF=20)	0.0035[b]	0.005	0.001
Trichlorofluoromethane (Freon 11)	75-69-4	SW8260C	Protection of Groundwater SSL (DAF=20)	66	0.005	0.0011
Vinyl Acetate	108-05-4	SW8260C	Protection of Groundwater SSL (DAF=20)	1.7	0.005	0.0013
Vinyl Chloride	75-01-4	SW8260C	Protection of Groundwater SSL (DAF=20)	0.00013 [b]	0.005	0.0014

[a] Lowest of: (1) RSLs for residential exposure or (2) SSLs for groundwater protection using a DAF of 20 and soil saturation level. RSLs corresponding to an excess lifetime cancer risk of 1×10^{-6} and a hazard quotient of 1 were used (EPA November 2019).

[b] Because of the low screening level for this analyte, the RL is greater than the screening level. However, soil screening would be used in a source investigation in which the RL would be an acceptable limit.

DAF References: *Soil Screening Guidance: User's Guide* (EPA 1996) and *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites* (EPA 2002b)

Notes:
CAS = Chemical Abstracts Service
DAF = dilution attenuation factor
MCL = maximum contaminant level
MDL = method detection limit
mg/kg = milligrams per kilogram
NA = not applicable
RL = reporting limit
RSL = regional screening level
SSL = soil screening level

Table 2-6. Project Field Screening Method (HAPSITE) – Target Analytes and Reporting Limits – Volatile Organic Compounds in Air and Water

Quality Assurance Project Plan, Remedial Investigation 700 South 1600 East PCE Plume, Salt Lake City, Utah

Analyte	CAS Number	Method	Screening Level[a]	Lowest Screening Level Value (µg/m³)[a]	Method RL (µg/m³)
Air					
cis-1,2-Dichloroethene	156-59-2	HAPSITE	EPA RSL	NA	1
Tetrachloroethene	127-18-4	HAPSITE	EPA RSL	11	1
Trichloroethene	79-01-6	HAPSITE	EPA RSL	0.48[b]	1
Analyte	**CAS Number**	**Method**	**Screening Level**	**Screening Level Value (µg/L)[b]**	**Method RL (µg/m³)**
Water					
cis-1,2-Dichloroethene	156-59-2	HAPSITE Headspace Analyzer	EPA MCL	70	5
Tetrachloroethene	127-18-4	HAPSITE Headspace Analyzer	EPA MCL	5	5
Trichloroethene	79-01-6	HAPSITE Headspace Analyzer	EPA MCL	5	5

[a] EPA RSL, Resident Air, November 2019, screening levels were based on a target excess lifetime cancer risk of 1×10^{-6} and a hazard quotient of 1.

[b] Because of the low screening level for this analyte, the RL is greater than the screening level. However, the HAPSITE provides screening level data only, and measurements will be confirmed by definitive analysis.

Notes:
µg/m³ = micrograms per cubic meter
µg/L = micrograms per liter
CAS = Chemical Abstracts Service
EPA = U.S. Environmental Protection Agency
MCL = maximum contaminant level
RL= reporting limit
RSL = regional screening level

Table 2-7. Project Laboratory (Eurofins Air Toxics, LLC) – Target Analytes and Reporting Limits – Volatile Organic Compounds in Air

Quality Assurance Project Plan, Remedial Investigation 700 South 1600 East PCE Plume, Salt Lake City, Utah

Analyte	CAS Number	Air Method	Screening Level[a]	Lowest Screening Level Value (µg/m³)[a]	Laboratory RL (µg/m³)	Laboratory MDL (µg/m³)
Laboratory Analytical Parameters (SUMMA®)						
1,1,1-Trichloroethane	71-55-6	Modified TO-15	EPA RSL	5,200	0.11	0.033
1,1,2,2-Tetrachloroethane	79-34-5	Modified TO-15	EPA RSL	0.048[b]	0.14	0.045
1,1,2-Trichloroethane	79-00-5	Modified TO-15	EPA RSL	0.18	0.11	0.033
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	76-13-1	Modified TO-15	EPA RSL	5,200	0.77	0.15
1,1-Dichloroethane	75-34-3	Modified TO-15	EPA RSL	1.8	0.081	0.027
1,1-Dichloroethene	75-35-4	Modified TO-15	EPA RSL	210	0.040	0.032
1,2,4-Trichlorobenzene	120-82-1	Modified TO-15	EPA RSL	2.1[b]	3.7	1.3
1,2,4-Trimethylbenzene	95-63-6	Modified TO-15	EPA RSL	63	0.49	0.11
1,2-Dibromoethane	106-93-4	Modified TO-15	EPA RSL	0.0047[b]	0.15	0.024
1,2-Dichlorobenzene	95-50-1	Modified TO-15	EPA RSL	210	0.60	0.11
1,2-Dichloroethane	107-06-2	Modified TO-15	EPA RSL	0.11	0.081	0.015
1,2-Dichloropropane	78-87-5	Modified TO-15	EPA RSL	0.76	0.46	0.11
1,2-Dichlorotetrafluoroethane (Freon 114)	76-14-2	Modified TO-15	NA	NA	0.14	0.041
1,3,5-Trimethylbenzene	108-67-8	Modified TO-15	EPA RSL	63	0.49	0.098
1,3-Butadiene	106-99-0	Modified TO-15	EPA RSL	0.094[b]	0.22	0.048
1,3-Dichlorobenzene	541-73-1	Modified TO-15	NA	NA	0.60	0.21
1,4-Dichlorobenzene	106-46-7	Modified TO-15	EPA RSL	0.26	0.12	0.068
1,4-Dioxane	123-91-1	Modified TO-15	EPA RSL	0.56	0.36	0.19
2-Butanone (Methyl Ethyl Ketone)	78-93-3	Modified TO-15	EPA RSL	5,200	1.5	0.30
2-Hexanone	591-78-6	Modified TO-15	EPA RSL	31	2.0	0.52
2-Propanol (Isopropyl alcohol)	67-63-0	Modified TO-15	EPA RSL	210	1.2	0.14
3-Chloropropene (Ally chloride)	107-05-1	Modified TO-15	EPA RSL	0.47[b]	1.6	0.57
4-Ethyltoluene	622-96-8	Modified TO-15	EPA RSL	NA	0.49	0.11
4-Methyl-2-pentanone	108-10-1	Modified TO-15	EPA RSL	3,100	0.41	0.1
Acetone	67-64-1	Modified TO-15	EPA RSL	32,000	2.4	0.4
Alpha-Chlorotoluene (Benzyl chloride)	100-44-7	Modified TO-15	EPA RSL	0.057[b]	0.52	0.1
Benzene	71-43-2	Modified TO-15	EPA RSL	0.36	0.16	0.094
Bromodichloromethane	75-27-4	Modified TO-15	EPA RSL	0.076[b]	0.67	0.24
Bromoform	75-25-2	Modified TO-15	EPA RSL	2.6	1.0	0.24
Bromomethane	74-83-9	Modified TO-15	EPA RSL	5.2	1.9	0.34

Table 2-7. Project Laboratory (Eurofins Air Toxics, LLC) – Target Analytes and Reporting Limits – Volatile Organic Compounds in Air

Quality Assurance Project Plan, Remedial Investigation 700 South 1600 East PCE Plume, Salt Lake City, Utah

Analyte	CAS Number	Air Method	Screening Level[a]	Lowest Screening Level Value (µg/m³)[a]	Laboratory RL (µg/m³)	Laboratory MDL (µg/m³)
Carbon disulfide	75-15-0	Modified TO-15	EPA RSL	730	1.6	0.27
Carbon tetrachloride	56-23-5	Modified TO-15	EPA RSL	0.47	0.12	0.058
Chlorobenzene	108-90-7	Modified TO-15	EPA RSL	52	0.46	0.12
Chloroethane	75-00-3	Modified TO-15	EPA RSL	10,000	0.13	0.02
Chloroform	67-66-3	Modified TO-15	EPA RSL	0.12	0.098	0.028
Chloromethane	74-87-3	Modified TO-15	EPA RSL	94	1.0	0.025
cis-1,2-Dichloroethene	156-59-2	Modified TO-15	EPA RSL	NA	0.079	0.028
cis-1,3-Dichloropropene	10061-01-5	Modified TO-15	EPA RSL	0.70	0.45	0.091
Cumene (isopropylbenzene)	98-82-8	Modified TO-15	EPA RSL	420	0.49	0.076
Cyclohexane	110-82-7	Modified TO-15	EPA RSL	6,300	0.34	0.093
Dibromochloromethane	124-48-1	Modified TO-15	EPA RSL	NA	0.85	0.26
Dichlorodifluoromethane (Freon 12)	75-71-8	Modified TO-15	EPA RSL	100	0.099	0.025
Ethylbenzene	100-41-4	Modified TO-15	EPA RSL	1.1	0.087	0.057
Ethanol	64-17-5	Modified TO-15	EPA RSL	NA	0.94	0.2
n-Heptane	142-82-5	Modified TO-15	EPA RSL	420	0.41	0.14
Hexachlorobutadiene	87-68-3	Modified TO-15	EPA RSL	0.13[b]	5.3	1.8
n-Hexane	110-54-3	Modified TO-15	EPA RSL	730	1.8	0.2
m,p-Xylene	108-38-3 and 106-42-3	Modified TO-15	EPA RSL	100	0.17	0.1
Methylene Chloride	75-09-2	Modified TO-15	EPA RSL	100	0.69	0.1
Methyl tert-butyl ether	1634-04-4	Modified TO-15	EPA RSL	11	0.36	0.031
o-Xylene	95-47-6	Modified TO-15	EPA RSL	100	0.087	0.019
Propylbenzene	103-65-1	Modified TO-15	EPA RSL	1,000	0.49	0.12
Styrene	100-42-5	Modified TO-15	EPA RSL	1,000	0.42	0.046
Tetrachloroethene	127-18-4	Modified TO-15	EPA RSL	11	0.14	0.026
Tetrahydrofuran	109-99-9	Modified TO-15	EPA RSL	2,100	1.5	0.59
Toluene	108-88-3	Modified TO-15	EPA RSL	5,200	0.19	0.057
trans-1,2-Dichloroethene	156-60-5	Modified TO-15	EPA RSL	NA	0.40	0.03
trans-1,3-Dichloropropene	10061-02-6	Modified TO-15	EPA RSL	0.70	0.45	0.11
Trichloroethene	79-01-6	Modified TO-15	EPA RSL	0.48	0.11	0.073
Trichlorofluoromethane (Freon 11)	75-69-4	Modified TO-15	EPA RSL	NA	0.56	0.12
Vinyl Chloride	75-01-4	Modified TO-15	EPA RSL	0.17	0.026	0.02

Table 2-7. Project Laboratory (Eurofins Air Toxics, LLC) – Target Analytes and Reporting Limits – Volatile Organic Compounds in Air

Quality Assurance Project Plan, Remedial Investigation 700 South 1600 East PCE Plume, Salt Lake City, Utah

Analyte	CAS Number	Air Method	Screening Level[a]	Lowest Screening Level Value (µg/m³)[a]	Laboratory RL (µg/m³)	Laboratory MDL (µg/m³)
Laboratory Analytical Parameters (Passive Sampler Radiello 130)						
1,1,1-Trichloroethane	71-55-6	Modified TO-17	EPA RSL	5,200	0.053	0.014
1,2-Dichloroethane	107-06-2	Modified TO-17	EPA RSL	0.011[b]	0.043	0.014
1,4-Dichlorobenzene	106-46-7	Modified TO-17	EPA RSL	0.26	0.065	0.024
2-Butanone (Methyl Ethyl Ketone)	78-93-3	Modified TO-17	EPA RSL	5,200	0.042	0.017
4-Methyl-2-pentanone	108-10-1	Modified TO-17	EPA RSL	3,100	0.099	0.032
Benzene	71-43-2	Modified TO-17	EPA RSL	0.36	0.17	0.12
Carbon tetrachloride	56-23-5	Modified TO-17	EPA RSL	0.47	0.049	0.015
Chlorobenzene	108-90-7	Modified TO-17	EPA RSL	52	0.049	0.017
Chloroform	67-66-3	Modified TO-17	EPA RSL	0.12	0.044	0.017
Cyclohexane	110-82-7	Modified TO-17	EPA RSL	6,300	0.061	0.02
Ethanol	64-17-5	Modified TO-17	EPA RSL	NA	0.32	0.094
Ethyl Acetate	141-78-6	Modified TO-17	EPA RSL	73	0.17	0.11
Ethylbenzene	100-41-4	Modified TO-17	EPA RSL	1.1	0.049	0.019
n-Heptane	142-82-5	Modified TO-17	EPA RSL	420	0.057	0.02
n-Hexane	110-54-3	Modified TO-17	EPA RSL	730	0.050	0.02
m,p-Xylene	108-38-3	Modified TO-17	EPA RSL	100	0.047	0.034
Methyl tert-butyl ether	1634-04-4	Modified TO-17	EPA RSL	11	0.051	0.02
Naphthalene	91-20-3	Modified TO-17	EPA RSL	0.083[b]	0.13	0.051
o-Xylene	95-47-6	Modified TO-17	EPA RSL	100	0.051	0.018
Propylbenzene	103-65-1	Modified TO-17	EPA RSL	1,000	0.058	0.021
Styrene	100-42-5	Modified TO-17	EPA RSL	1,000	0.054	0.031
Tetrachloroethene	127-18-4	Modified TO-17	EPA RSL	11	0.056	0.014
Toluene	108-88-3	Modified TO-17	EPA RSL	5,200	0.045	0.016
Trichloroethene	79-01-6	Modified TO-17	EPA RSL	0.48	0.048	0.02

[a] EPA RSL, Resident Air, November 2019, screening levels were based on a target excess lifetime cancer risk of 1×10^{-6} and a hazard quotient of 1.

[b] Because of the low screening level for this analyte, the RL is greater than the screening level. However, this analyte is not a known COPC for the site.

Notes:

µg/m³ = micrograms per cubic meter

COPC = constituent of potential concern

EPA = Environmental Protection Agency

MDL = method detection limit

RL= reporting limit

RSL = regional screening level

Table 2-8. Project Laboratory (EMAX Laboratories, Inc.)– Target Analytes and Reporting Limits – Volatile Organic Compounds in Water (Groundwater/Surface Water)

Quality Assurance Project Plan, Remedial Investigation 700 South 1600 East PCE Plume, Salt Lake City, Utah

Analyte	CAS Number	Method	Screening Level	Screening Level Value (µg/L)[a]	Laboratory RL (µg/L)	Laboratory MDL (µg/L)
Laboratory Analytical Parameters						
1,1,1-Trichloroethane	71-55-6	SW8260C	EPA MCL	200	1	0.1
1,1,2,2-Tetrachloroethane	79-34-5	SW8260C	EPA RSL	0.076[b]	1	0.11
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	76-13-1	SW8260C	EPA RSL	10,000	1	0.15
1,1,2-Trichloroethane	79-00-5	SW8260C	EPA MCL	5	1	0.1
1,1-Dichloroethane	75-34-3	SW8260C	EPA RSL	2.8	1	0.1
1,1-Dichloroethene	75-35-4	SW8260C	EPA MCL	7	1	0.1
1,2,3-Trichlorobenzene	87-61-6	SW8260C	EPA RSL	0.7[b]	1	0.15
1,2,4-Trichlorobenzene	120-82-1	SW8260C	EPA MCL	70	1	0.15
1,2,4-Trimethylbenzene	95-63-6	SW8260C	EPA RSL	56	1	0.11
1,3,5-Trimethylbenzene	108-67-8	SW8260C	EPA RSL	60	1	0.12
1,2-Dibromo-3-Chloropropane	96-12-8	SW8260C	EPA MCL	0.2[b]	2	0.25
1,2-Dibromoethane	106-93-4	SW8260C	EPA MCL	0.05[b]	1	0.103
1,2-Dichlorobenzene	95-50-1	SW8260C	EPA MCL	600	1	0.1
1,2-Dichloroethane	107-06-2	SW8260C	EPA MCL	5	1	0.1
1,2-Dichloropropane	78-87-5	SW8260C	EPA MCL	5	1	0.1
1,3-Dichlorobenzene	541-73-1	SW8260C	NA	NA	1	0.11
1,4-Dichlorobenzene	106-46-7	SW8260C	EPA MCL	75	1	0.1
2-Butanone (Methyl Ethyl Ketone)	78-93-3	SW8260C	EPA RSL	5,600	20	2.5
2-Hexanone	591-78-6	SW8260C	EPA RSL	38	20	2.5
4-Methyl-2-pentanone	108-10-1	SW8260C	EPA RSL	6,300	20	2.5
Acetone	67-64-1	SW8260C	EPA RSL	14,000	20	2.5
Benzene	71-43-2	SW8260C	EPA MCL	5	1	0.1
Bromochloromethane	74-97-5	SW8260C	EPA RSL	83	1	0.11
Bromodichloromethane	75-27-4	SW8260C	EPA MCL	80	1	0.1
Bromoform	75-25-2	SW8260C	EPA MCL	80	1	0.15
Bromomethane	74-83-9	SW8260C	EPA RSL	7.5	1	0.16
Carbon Disulfide	75-15-0	SW8260C	EPA RSL	810	1	0.25
Carbon Tetrachloride	56-23-5	SW8260C	EPA MCL	5	1	0.1
Chlorobenzene	108-90-7	SW8260C	EPA MCL	100	1	0.1
Chloroethane	75-00-3	SW8260C	EPA RSL	21,000	1	0.27
Chloroform	67-66-3	SW8260C	EPA MCL	80	1	0.1
Chloromethane	74-87-3	SW8260C	EPA RSL	190	1	0.15
cis-1,2-Dichloroethene	156-59-2	SW8260C	EPA MCL	70	1	0.1
cis-1,3-Dichloropropene	10061-01-5	SW8260C	EPA RSL	0.47[b]	1	0.1

Table 2-8. Project Laboratory (EMAX Laboratories, Inc.)– Target Analytes and Reporting Limits – Volatile Organic Compounds in Water (Groundwater/Surface Water)

Quality Assurance Project Plan, Remedial Investigation 700 South 1600 East PCE Plume, Salt Lake City, Utah

Analyte	CAS Number	Method	Screening Level	Screening Level Value (µg/L)[a]	Laboratory RL (µg/L)	Laboratory MDL (µg/L)
Dibromochloromethane	124-48-1	SW8260C	EPA MCL	80	1	0.1
Dichlorodifluoromethane (Freon 12)	75-71-8	SW8260C	EPA RSL	200	1	0.15
Ethylbenzene	100-41-4	SW8260C	EPA MCL	700	1	0.1
Isopropylbenzene (Cumene)	98-82-8	SW8260C	EPA RSL	450	1	0.1
Methyl acetate	79-20-9	SW8260C	EPA RSL	20,000	2	0.25
Methyl Tert-Butyl Ether	1634-04-4	SW8260C	EPA RSL	14	1	0.13
Methylene chloride	75-09-2	SW8260C	EPA MCL	5	2	0.5
m,p-Xylene	108-38-3 and 106-42-3	SW8260C	EPA RSL	190	2	0.21
o-Xylene	95-47-6	SW8260C	EPA RSL	190	1	0.1
Styrene	100-42-5	SW8260C	EPA MCL	100	1	0.25
Tetrachloroethene (PCE)	127-18-4	SW8260C	EPA MCL	5	1	0.15
Toluene	108-88-3	SW8260C	EPA MCL	1,000	1	0.1
trans-1,3-Dichloropropene	10061-02-6	SW8260C	EPA RSL	0.47[b]	1	0.11
trans-1,2-Dichloroethene	156-60-5	SW8260C	EPA MCL	100	1	0.1
Trichloroethene	79-01-6	SW8260C	EPA MCL	5	1	0.1
Trichlorofluoromethane (Freon 11)	75-69-4	SW8260C	EPA RSL	5,200	1	0.15
Vinyl Acetate	108-05-4	SW8260C	EPA RSL	410	2	0.25
Vinyl Chloride	75-01-4	SW8260C	EPA MCL	2	1	0.12

[a] If an MCL is set for the analyte, the screening level is the MCL. Otherwise, the screening level is the RSL for tap water. RSLs corresponding to an excessive lifetime cancer risk of 1×10^{-6} and a hazard quotient of 1 were used (EPA November 2019).

[b] Because of the low screening level for this analyte, the RL is greater than the screening level. However, this analyte is not a known constituent of potential concern for the site.

Notes:
µg/L = micrograms per liter
CAS = Chemical Abstracts Service
EPA = U.S. Environmental Protection Agency
MCL = maximum contaminant level
MDL = method detection limit
RL = reporting limit
RSL = regional screening level

Table 2-9. Project Laboratory (EMAX Laboratories, Inc.) – Target Analytes and Reporting Limits – 1,4-Dioxane in Water (Groundwater/Surface Water)

Quality Assurance Project Plan, Remedial Investigation 700 South 1600 East PCE Plume, Salt Lake City, Utah

Analyte	CAS Number	Method	Screening Level	Screening Level Value (µg/L)[a]	Laboratory RL (µg/L)	Laboratory MDL (µg/L)
1,4-Dioxane	123-91-1	SW8270SIM-low	EPA RSL	0.46	0.4	0.21

[a] If an MCL is set for the analyte, the screening level is the MCL. Otherwise, the screening level is the RSL for tap water. RSLs corresponding to an excessive lifetime cancer risk of 1×10^{-6} and a hazard quotient of 1 were used (EPA November 2019).

Notes:
µg/L = micrograms per liter
CAS = Chemical Abstracts Service
EPA = U.S. Environmental Protection Agency
MCL = maximum contaminant level
MDL = method detection limit
RL = reporting limit
RSL = regional screening level

FINAL Data Summary Report
Q4 2020 Groundwater Sampling Event

CONTRACT NO.: W912DQ-18-D-3008
DELIVERY ORDER NO.: W912DQ19F3048

700 South 1600 East PCE Plume Site
Salt Lake City, Utah

U.S. Army Corps of Engineers
Kansas City District

Department of Veterans Affairs
Veterans Health Administration Salt Lake City
Health Care System

September 30, 2021

CDM Smith

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Acronyms and Abbreviations

bgs	below ground surface
CDM Smith	CDM Federal Programs Corporation
DO	dissolved oxygen
DSR	data summary report
EPA	U.S. Environmental Protection Agency
ESS	East Side Springs
IDW	investigation-derived waste
MCL	maximum contaminant level
mg/L	milligrams per liter
mL/min	milliliters per minute
NTU	nephelometric turbidity unit
ORP	oxidation-reduction potential
OU	operable unit
PCE	tetrachloroethene
Q1-2021	first quarter 2021
Q2-2021	second quarter 2021
Q3-2020	third quarter 2020
Q4-2020	fourth quarter 2020
QAPP	quality assurance project plan
RI	remedial investigation
RSL	regional screening level
SOP	standard operating procedure
TCE	trichloroethene
TOC	total organic carbon
UDEQ	Utah Department of Environmental Quality
VAMC	Veterans Affairs Medical Center
VHA	Veterans Health Administration
VOC	volatile organic compound
ZIST	zone isolation sampling technology
µg/L	micrograms per liter
µg/m^3	micrograms per cubic meter

Section 1
Introduction

Under the U.S. Army Corps of Engineers, Kansas City District Contract No. W912DQ-18-D-3008, Task Order No. W912DQ19F3048, CDM Federal Programs Corporation (CDM Smith) was directed to perform a remedial investigation (RI) for Operable Unit (OU) 1 of the 700 South 1600 East Tetrachloroethene (PCE) Plume Superfund Site in Salt Lake City, Utah. CDM Smith prepared this data summary report (DSR) to present the results of the fourth quarter 2020 (Q4-2020) groundwater monitoring event as part of the RI field characterization activities.

1.1 Background

The Salt Lake City Healthcare System George E. Wahlen Veterans Affairs Medical Center (VAMC) is in Salt Lake City, Utah (**Figure 1**). PCE contamination was first identified in groundwater in 1990 at the nearby Mt. Olivet Cemetery irrigation well during the Salt Lake City Department of Public Utilities routine monitoring. This led to the U.S. Environmental Protection Agency (EPA) and Utah Department of Environmental Quality (UDEQ) involvement at the Site and the preliminary determination that the source of PCE in groundwater was the historic dry-cleaning facility located at the VAMC. The Veterans Health Administration (VHA) operated a part-time dry-cleaning operation that used PCE over a 6-year period in the late 1970s and early 1980s. During this period, dry cleaning residuals were disposed in the sanitary sewer. A PCE groundwater plume is present beneath the VAMC property and in areas hydraulically downgradient, extending to the East Side Springs (ESS) neighborhood. In addition, elevated concentrations of PCE in soil gas and subslab vapor (up to 20,000 micrograms per cubic meter [µg/m^3]) have been observed adjacent to VAMC Buildings 6 and 7 (location of the VAMC dry-cleaning facility) (Jacobs 2019).

1.2 Purpose and Scope

The purpose and scope of this DSR is to describe the work conducted and present the analytical and field data collected during the Q4-2020 groundwater monitoring event. Recommendations for improvements for future sampling events are also included.

Section 2
Field Sampling Activities

The following sections outline the field sampling activities that were completed during the Q4-2020 sampling event, which occurred from December 7 to 18, 2020.

2.1 Groundwater Sampling

The Q4-2020 groundwater monitoring event included collecting samples at 37 existing wells and 6 newly installed wells (MW-13L, MW-36, MW-37S/D, and MW-38S/D). Several wells have multiple screened intervals so 66 samples were expected to be collected. All monitoring wells (including previously abandoned wells) are shown on **Figure 1,** and location data and well construction details are presented in **Table 1**. The sampling activities were conducted in accordance with the Phase 2 OU1 Quality Assurance Project Plan (QAPP) (CDM Smith 2020a) and the Phase 2 OU1 RI Work Plan (CDM Smith 2020b).

Several groundwater wells are in the public right-of-way and require traffic control and special work requirements be implemented when accessing the wells. The associated traffic control permit and location-specific plans from Salt Lake City Division of Transportation are attached (**Appendix A**). Field forms associated with this event, including the field logbook pages, water level measurement recordings, and sample purge forms, are included in **Appendix B**.

2.1.1 Synoptic Water Level Measurement

Prior to sampling activities, synoptic water levels were collected on December 7 and 8, 2020 from 66 wells following procedures outlined in Standard Operating Procedure (SOP) 1-6, *Groundwater Level Measurement* (CDM Smith 2020a). Manual water level measurements were recorded for the wells from the northern edge of the casing using electronic water level meters. At artesian well MW-14D, the pressure reading on the gauge was recorded and converted to feet above the top of casing. At artesian well MW-17D, a standpipe was installed, and the water level was recorded. Water levels are presented in **Table 2**.

The collection of water level measurements in monitoring wells with dedicated Zone Isolation Sampling Technology (ZIST) pumps requires pulling the pump and allowing the water to equilibrate in the well casing. ZIST pumps provide isolation of the screen by creating a seal in the well casing when the pump is properly seated in the well screen dock. To collect water level measurements, the pumps were pulled about 1 foot out of the receiver in the well casing for approximately 3 hours to allow the water level to equilibrate following pump removal. After verifying that water levels had stabilized, the water level measurement was recorded manually, and the pump was properly reseated.

The following wells have dedicated ZIST pumps:

- MW-03RA/B/C/D
- MW-08C

- MW-23A/B/C
- MW-25A/B/C
- MW-26A/B/C/D
- MW-29A1/B/C
- MW-30C
- MW-31A1/B/C
- MW-32B1/C1
- MW-34A1/B1/C1/D1

2.1.2 Groundwater Sampling Procedures

All wells were sampled following project-specific SOP 6-2, *Low-Stress (Low-Flow) Groundwater Sampling* (CDM Smith 2020a) procedures. All wells were sampled using dedicated pumps except MW-14D.

Prior to collecting groundwater samples with low-flow sampling techniques, each well was purged to remove a minimum volume, which was calculated prior to the event. The minimum purge volume is three times the total amount of stagnant water in the pump and tubing. Low-flow groundwater sampling includes purging the well at a rate typically less than 500 milliliters per minute (mL/min) and with minimal drawdown (less than 0.3 feet) to ensure that the water sampled is representative of the formation surrounding the screened interval and not of the stagnant water column. If the drawdown exceeds 0.3 feet, the stagnant water column is contributing to the purge water and the minimum purge volume must be recalculated. Once the minimum purge volume was removed and water quality parameters stabilized as described in SOP 6-2, samples were collected.

At MW-14D, a permanent valve and gauge were previously installed to assist in controlling the artesian flow at the well. During sampling, the team opened the valve to maximum capacity and noted the flow rate as grab samples were collected for field parameter analysis. The flow rate decreased considerably over the purging period, from an initial flow of approximately 1,800 mL/min to 300 mL/min.

MW-17D has been observed to be seasonally artesian; therefore, a permanent threaded connection was previously attached to the well head to plug the well. As a result, the dedicated bladder pump is not permanently deployed in the well and is only used to sample the well when conditions are not artesian. During the sampling event, water was not free flowing from MW-17D; therefore, the dedicated bladder pump was used to sample the well.

[1] ZIST wells that were constructed without a pump receiver

All groundwater sampling was completed according to the project-specific SOP 6-2, *Low-Stress (Low-Flow) Groundwater Sampling* (CDM Smith 2020a), with the exception of deviations outlined in Section 2.4. Field documentation of sampling procedures are provided in **Appendix B**.

2.1.3 Sample Analysis

The water quality parameters were analyzed continuously while purging with the use of a flow-through cell. The following parameters were recorded for each well:

- Dissolved oxygen (DO)
- Oxidation-reduction potential (ORP)
- pH
- Temperature
- Conductivity
- Turbidity

In addition to the field parameters, samples were collected from each well for the following analyses (**Table 3**):

- Volatile organic compounds (VOCs) by EPA Method SW8260C
- Total metals (unfiltered) by EPA Method SW6020A/SW7470A
- Alkalinity by EPA Method SM2320B
- Anions (sulfate, chloride) by EPA Method E300.0
- Dissolved gases (methane, ethane, ethene) by RSK-175
- Total organic carbon (TOC) by EPA Method SW9060A
- Nitrate and nitrite by EPA Method SM4500-NO3E
- Ferrous iron (measured in the field using a HACH 8146)

Samples were collected from the following wells for 1,4-dioxane by EPA Method 8270D:

- MW-26B
- MW-30RA/B
- MW-34A
- MW-36
- MW-37S/D

- MW-38S/D

All samples were submitted to EMAX Laboratories Inc. in Torrance, California. The analytical results are discussed in Section 3. Laboratory data are included in **Appendix C**. Field quality control samples were collected, including field duplicates, matrix spike/matrix duplicates, trip blanks, and field blanks, and are discussed in the Quality Control Summary Report in **Appendix C**.

Not all samples were able to be collected as planned as further discussed in Section 2.4. The completeness for the number of samples planned to be collected versus the number of samples collected was 97%, thus exceeding the 90% project data goal. The achievement of the completeness goals for the data provides sufficient data for project decisions. Sample results meet the data quality objectives presented in the RI Work Plan (CDM Smith 2020b).

2.2 Transducer Data Collection

Transducer data were downloaded from 16 groundwater wells during the Q4-2020 groundwater monitoring event. Data from the December 2020 download date back to September 2020. **Table 2** presents the date, time, and location of transducer data downloads during Q4-2020. Hydrographs were prepared from the transducer downloads and are presented in **Appendix D**. A drop in water level due to groundwater sampling activities can be seen in the hydrograph for MW-13D and MW-14S. No other inconsistencies are observed in the hydrographs, and the data are useable for the purposes of monitoring groundwater elevations. The transducer data will be evaluated for seasonal and annual trends as well as potential variations due to anthropogenic usage and presented in the RI report.

2.3 Decontamination and Investigation-Derived Waste

All nondedicated equipment used during the groundwater sampling event was decontaminated following the procedures outlined in SOP 4-5, *Field Equipment Decontamination at Nonradioactive Sites* (CDM Smith 2020a). Nondedicated equipment used during this event were electronic water level meters. Investigation-derived waste (IDW) was handled per SOP 2-2, *Guide to Handling Investigation-Derived Waste* (CDM Smith 2020a). All decontamination water and purge water were containerized at their source and transferred to the holding tanks at the VAMC. These tanks will be emptied as needed by a certified IDW disposal company.

2.4 Deviations from the Quality Assurance Project Plan

The following QAPP deviations occurred during the Q4-2020 sampling event:

- Purge parameter stabilization criteria for turbidity (either less than 10 nephelometric turbidity unit [NTU] or less than 50 NTU and within 10 percent) were not met at MW-03RB/D, MW-25A, and MW-29B prior to the collection of groundwater samples. Turbidity at two of these locations (MW-03RD and MW-29B) was less than 50 NTU, but not within 10 percent. Turbidity at the other two locations (MW-03RB and MW-25A) was stable within 10 percent, but slightly above 50 NTU. No analytical result bias for dissolved VOCs, including chlorinated compounds (EPA 2005), is anticipated to result from turbid water samples. This deviation does not affect DQOs or data usability. As all other purge

parameter stabilization criteria was met there is no expected impact upon data quality at these locations.

- As MW-13S was purged dry, a sample was collected the next day once sufficient recharge was observed without meeting purge parameter stabilization. This is an accepted deviation in the low-flow groundwater sampling SOP, and there is no impact upon data quality at this location.

- There was insufficient water to collect a groundwater sample from MW-12S. As this location has been successfully sampled in the past, there is no significant impact to the groundwater plume delineation data quality objective.

- Due to a high amount of sediment, groundwater samples for VOCs were collected from MW-13L without collecting purge and geochemical parameters after the minimum purge volume had been met. This location will be further developed prior to Q1-2021 groundwater sampling. As a VOC sample was collected, there is no significant impact to the groundwater plume delineation data quality objective. As groundwater samples for geochemical analyses will be collected during the Q1-2021 event, there is no significant impact to the natural attenuation data quality objective.

- Due to difficulties with the ZIST sampling systems, a consistent flow of water to the surface could not be sustained during purging at several locations (MW-26C/D, MW-34B/C). At these locations, visible sediment was observed on the ZIST Panacea pump porous media filters. These locations will be developed prior to Q1-2021 groundwater sampling.

    - At MW-26C and MW-34B/C groundwater samples for VOCs were collected without collecting purge and geochemical parameters after the minimum purge volume had been met. As VOC samples were collected, there is no significant impact to the groundwater plume delineation data quality objective. As groundwater samples for geochemical analyses will be collected during the Q1-2021 event, there is no significant impact to the natural attenuation data quality objective.

    - At MW-26D no groundwater samples were collected. As a VOC sample was collected during the Q3-2020 event, there is no significant impact to the groundwater plume delineation data quality objective. As groundwater samples for geochemical analyses will be collected during the Q1-2021 event, there is no significant impact to the natural attenuation data quality objective.

1

Section 3
Groundwater Monitoring Results

Groundwater monitoring results from the Q4-2020 event, specifically groundwater elevations and analytical results, are presented below.

3.1 Groundwater Elevations

Measured groundwater elevations are presented in **Table 2** and on the potentiometric groundwater surface maps (**Figures 2** and **3**). Vertical gradients were calculated using the approach described by EPA (EPA 2016). The potentiometric groundwater contours were developed from manual groundwater elevation measurements collected during the synoptic event on December 7, 2020, and separate measurements collected on December 6, 2020. The following discusses the groundwater elevation evaluations.

Based on the observed piezometric heads, the subsurface was divided into the following hydraulic zones:

- Perched Zone: This zone is situated above the water table; it exhibits significantly higher piezometric heads than what is observed at other wells. The only wells that exhibit this feature are MW-06 (screened 100 to 130 feet below ground surface [bgs]) and MW-29A (screened 120 to 130 feet bgs). Perched head data have not been contoured.
- Shallow Aquifer Zone: This zone extends to approximately 220 feet bgs at VAMC Building 7 and gets shallower to the west as the ground surface dips. The shallow aquifer zone is contoured (using a 10-foot-contour interval) on **Figure 2**.
    - Flow directions are generally east to west, with horizontal gradients approximately 0.014 feet/foot along the 2,500 feet between MW-24 and MW-34. Over the next 1,000 feet between MW-34 and MW-18, the horizontal gradients are approximately 0.012 feet/foot. Between MW-13S and MW-14S (approximately 500 feet), horizontal gradients are an order of magnitude higher, at approximately 0.12 feet/foot.
- Deep Aquifer Zone: This zone sits below approximately 260 feet bgs at VAMC Building 7 and gets shallower to the west as the ground surface dips. The deep aquifer zone heads are contoured on **Figure 3**.
    - Flow directions are generally east to west. Horizontal gradients between MW-23C and MW-34C are approximately 0.002 feet/foot, and 0.013 feet/foot between MW-34C and MW-13L.
    - Piezometric heads at MW-03RB/C/D show that heads are approximately 18 feet lower than in the shallow aquifer zone situated approximately 40 feet above. These steep vertical gradients are indicative of hydraulic separation between the shallow and deep aquifer zones; likely because of the presence of a semi-confining unit between 220 and 260 feet bgs.

- Heads at MW-03RC/D are nearly identical despite spanning nearly 35 vertical feet of the aquifer. This likely indicates the lack of significant aquitard units within the deep aquifer zone.

- Intermediate Zone: This zone sits between the shallow and deep aquifer zones (approximately 220 to 260 feet bgs) at wells near VAMC Building 7 including MW-23B, MW-25B, MW-26B, MW-29C, and MW-30A. The zone is characterized by heads that are slightly lower than those in the shallow aquifer zone. It is unclear how laterally extensive this zone is and whether it is bounded by lower permeability units. Head data from this unit have not been contoured.

Vertical gradients, which are typically strongly downward on-site, dissipate along the east to west groundwater flow path. While MW-34C/D and MW-32C are estimated to be screened in the deep aquifer zone, there is little distinction in heads between MW-34C/D and MW-32C and the shallow aquifer zone at MW-34A/B and MW-32A/B. West of MW-34, vertical head gradients shift upwards, with artesian conditions present in the deeper portions of the shallow aquifer zone at wells MW-17D and MW-14D, just east of the fault. These two wells were reclassified as shallow aquifer zone wells following the installation and measurement of MW-13L into the deep aquifer zone, where heads are lower than in the shallow aquifer zone. Groundwater trends at this location will continue to be monitored and evaluated. West of the fault, the vertical head differences, and therefore, the distinction between the shallow and deep aquifer zones, are not present.

3.2 Groundwater Analytical Results

Analytical results from the Q4-2020 groundwater monitoring event are presented below.

3.2.1 Volatile Organic Compounds

Groundwater samples were collected and analyzed for VOCs. **Table 4** presents the concentrations of detected VOCs compared to the EPA maximum contaminant levels (MCLs) or regional screening levels (RSLs) for tap water (for compounds without an established MCL). Detections are presented as bolded values and exceedances of the MCL or RSL are presented as highlighted values. Additionally, the approximate extent of PCE in groundwater, and results for PCE and trichloroethene (TCE) are shown in **Figure 4**. This figure also presents the projected fault traces (Davis 1983, Personius 2009) and the monitoring well transect lines.

A total of 64 samples were collected for VOC analysis. Of those, PCE exceeded the MCL (5 µg/L) in 18 samples, with concentrations ranging from 5.7 to 220 µg/L. The highest concentrations of PCE were detected in MW-02 (220 µg/L), MW-01S (160 µg/L), and MW-03RB (170 µg/L). PCE was detected at concentrations less than 5 µg/L in 18 samples and was not detected (concentrations less than the reporting limit of 1 µg/L) in 28 samples. PCE was nondetect or below the MCL in MW-01D, MW-03RD, MW-08B/C, MW-16D, MW-29B/C, and MW-34C/D, indicating a possible vertical boundary for the PCE plume in these locations. PCE was nondetect or below the MCL in MW-05R, MW-06, MW-23A/B/C, MW-24, MW-25, MW-26, MW-27, and MW-28, bounding the plume to the east. PCE was nondetect or below the MCL in MW-17S/D, MW-21, MW-22, MW-31A/B/C, and MW-36, providing a southern plume boundary. PCE was nondetect or below the MCL in MW-12S/D, MW-15S/D, and MW-37S/D, bounding the plume to the west. PCE was

nondetect at MW-30RA/RB/C, MW-32A/B/C, and MW-38S/D, bounding the plume to the north (**Figure 4**).

TCE was detected at concentrations below the MCL (5 µg/L) in 24 samples of the 64 samples collected and exceeded the MCL at MW-14S (6.7 µg/L). Low-level (less than 4 µg/L) detections of cis-1,2-dichloroethene were observed in 16 samples, with the highest detection at MW-14S (1.9 µg/L). There were no detections of vinyl chloride.

3.2.2 1,4-Dioxane

Analytical results for 1,4-dioxane are presented in **Table 4**. Because no MCL is established for 1,4-dioxane, results are screened against the RSL of 0.46 µg/L (EPA 2020). Concentrations of 1,4-dioxane greater than the RSL were observed in the field duplicate for MW-36 (3.1 J µg/L), however; 1,4-dioxane was not detected in the parent sample for MW-36. This suggests that the 1,4-dioxane detection in the field duplicate is likely an erroneous result and will be resampled during the Q2-2021 event. There were no other detections of 1,4-dioxane.

3.2.3 General Chemistry

Total (unfiltered) metal concentrations provide information on the general chemistry of groundwater (i.e., salinity), and redox conditions (i.e., redox sensitive metals such as arsenic). Analytical results for total (unfiltered) metals are presented in **Table 5**. The highest observed concentrations of redox sensitive metals were as follows:

- Concentrations of arsenic greater than 1 µg/L were observed at MW-02, MW-04, MW-05R, MW-06, MW-13S, MW-16S, MW-18, MW-19, MW-20S/D, MW-21, MW-24, MW-25A, MW-27, MW-28, and MW-29A/C
- Concentrations of iron greater than 500 µg/L were observed at MW-13S, MW-19, MW-23A, MW-30C, and MW-31C.
- Concentrations of manganese greater than 500 µg/L were observed at MW-13S, MW-23A, MW-31C, and MW-36.

DO, ORP, sulfate, nitrate, ferrous iron, and methane are geochemical parameters that can be used to evaluate redox conditions. Reductive dechlorination of PCE to TCE and cis-1,2-dichloroethene generally occurs under iron-reducing to sulfate-reducing conditions, while complete dechlorination to ethene and ethane generally occurs under sulfate-reducing to methanogenic conditions (EPA 2006). Conditions are considered aerobic when DO is greater than 0.5 mg/L, iron-reducing when ferrous iron is greater than 0.5 mg/L, and methanogenic when methane is greater than 1 mg/L (EPA 2006). As presented in **Table 6**, high DO (greater than 0.5 mg/L) suggest that groundwater conditions at the site are generally aerobic. Low ferrous iron (less than 1.0 mg/L), low methane (less than 3.6 µg/L), and high sulfate (74 to 216 mg/L) in most wells further support the observation that conditions are generally aerobic (**Table 6**). Conditions are locally anaerobic at MW-03RD (negative ORP, low DO, and detectable methane), MW-05R (negative ORP, high ferrous iron, detectable methane), MW-23A (negative ORP, high ferrous iron, detectable methane, ethane and ethene), and MW-31C (negative ORP, high ferrous iron, detectable methane, ethane, and ethene).

Chloride concentrations ranged from 47.9 mg/L (MW-34D) to 462 mg/L (MW-08A). Alkalinity ranged from 219 mg/L (MW-08A) to 405 mg/L (MW-37S). TOC was generally less than 2 mg/L except for MW-03RA (2.32 mg/L), MW-03RB (2.28 mg/L), MW-03RC (3.2 mg/L), MW-03RD (9.06 mg/L), MW-08C (3.98 mg/L), and MW-16D (2.88 mg/L).

Section 4
Summary

This report presents the results from the Q4-2020 groundwater monitoring event. Further analysis and evaluation of these results will be presented in the RI report.

Groundwater flow directions are generally east to west. There are four distinct hydraulic zones in the subsurface: perched, shallow aquifer zone, deep aquifer zone, and intermediate zone. There is a hydraulic separation between the shallow and deep aquifer zones, likely because of the presence of a semi-confining silt/clay unit. The lateral extent of the perched and middle zones are unclear. Vertical gradients, which are typically strongly downward on-site, dissipate along the east to west groundwater flow path towards MW-34. West of MW-34, vertical head gradients generally shift upwards in the deeper portions of the shallow zone aquifer, with artesian conditions present in wells MW-17D and MW-14D, just east of the fault. West of the fault, vertical head differences and the distinction between the shallow and deep aquifer zones are not present.

The significant amount of new piezometric head data collected has allowed for the more refined understanding of groundwater flow directions, gradients, and vertical head differences described above. This hydraulic framework, notably the separation of the aquifer into two distinct hydraulic zones, will be incorporated into the conceptual site model and compared to the other datasets collected from the wells, including lithologic and water quality data. Further refinements to the zonation of the system may be necessary upon review of the conceptual site model and will be incorporated into future reports.

PCE was nondetect or below the MCL in MW-01D, MW-03RD, MW-08C, MW-16D, MW-29B/C, and MW-34C/D, providing a possible vertical extent for the PCE plume in these locations. PCE was nondetect or below the MCL in MW-05R, MW-06, MW-23A/B/C, MW-24, MW-25, MW-26, MW-27, and MW-28, bounding the plume to the east. PCE was nondetect or below the MCL in MW-17S/D, MW-21, MW-22, MW-31A/B/C, and MW-36, providing a southern plume boundary. PCE was nondetect or below the MCL in MW-12S/D, MW-15S/D, and MW-37S/D, bounding the plume to the west. PCE was nondetect at MW-30RA/RB/C, MW-32A/B/C, and MW-38S/D, bounding the plume to the north (**Figure 4**). The highest concentrations of PCE were detected in MW-02 (220 µg/L), MW-01S (160 µg/L), and MW-03RB (170 µg/L). The highest TCE concentration was observed in MW-14S (6.7 µg/L) (**Figure 4**). Along with VOCs, samples were collected for the determination of general chemistry including, ORP, DO, metals, sulfate, nitrate/nitrite, chloride, alkalinity, TOC, ferrous iron, and dissolved gases. These data were used to determine that the redox conditions at the site are generally aerobic. The observation of aerobic conditions and low concentrations of degradation daughter products suggest that degradation of PCE at the Site is limited. Further evaluation of plume delineation, concentrations trends, and attenuation will be presented in the RI report.

Section 5
References

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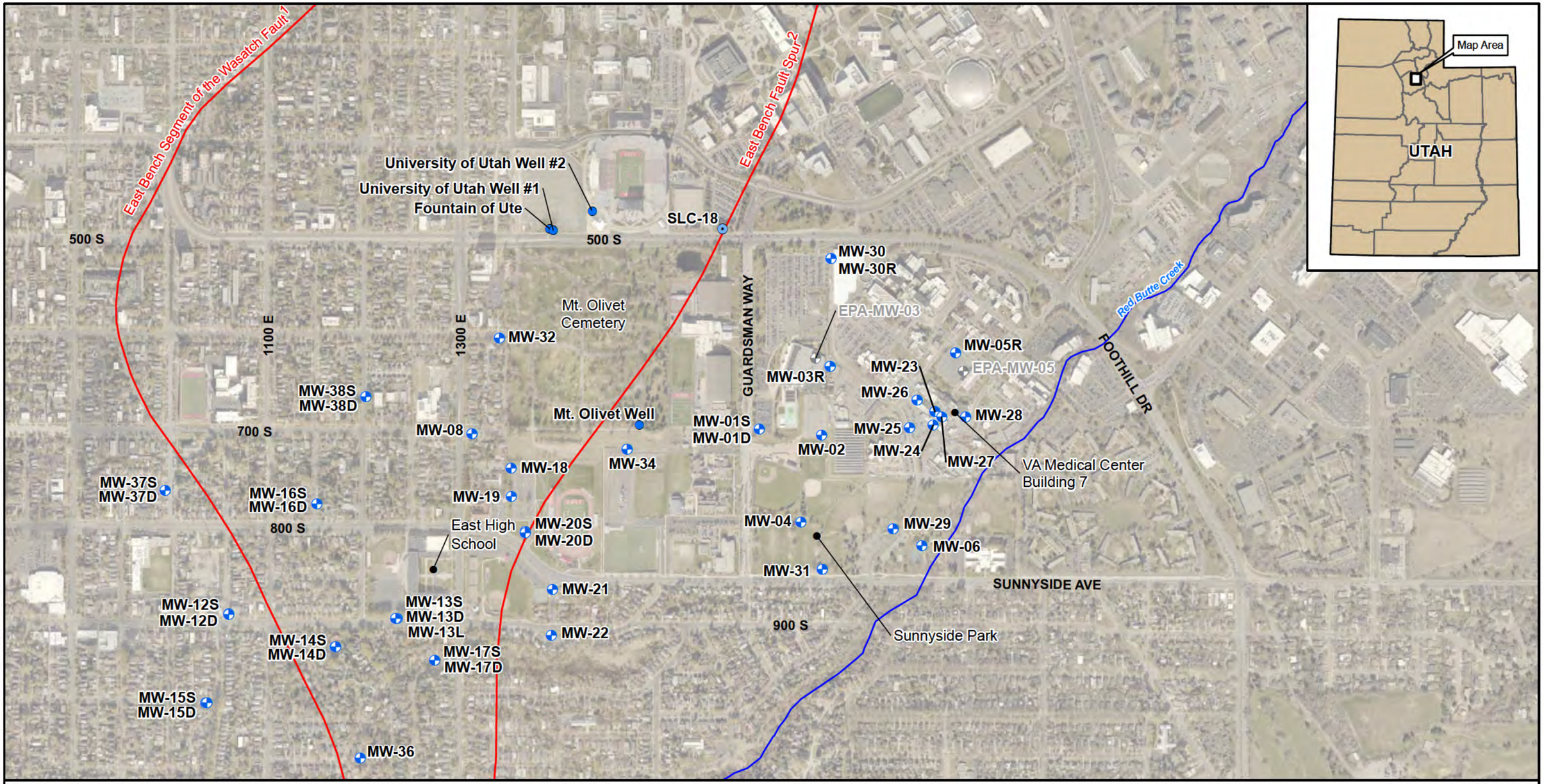
Personius, S.F. and W.E. Scott. 2009. Surficial Geologic Map of the Salt Lake City Segment and Parts of Adjacent Segments of the Wasatch Fault Zone, Davis, Salt Lake, and Utah Counties, Utah.

Figures



Legend

- Monitoring Well
- Abandoned Monitoring Well
- Drinking Water Supply Well
- Irrigation Well
- Landmark
- Red Butte Creek
- Fault Line

Notes:
(1) Location of University of Utah Well #1 is approximate; well is located less than 100 feet east of Fountain of Ute.
(2) Proposed monitoring wells MW-07, MW-09, MW-10, MW-11, MW-33, and MW-35 were not installed.

OU = operable unit
PCE = tetrachloroethene
VHA = Veterans Health Administration

[1] Davis, F.D. 1983. Geologic Map of the Central Wasatch Front, Utah. Utah Geological and Mineral Survey. Map 54-A – Wasatch Front Series. May.
[2] Personius, S.F. and Scott, W.E. 2009. Surficial Geologic Map of the Salt Lake City Segment and Parts of Adjacent Segments of the Wasatch Fault Zone, Davis, Salt Lake, and Utah Counties, Utah

N W E S

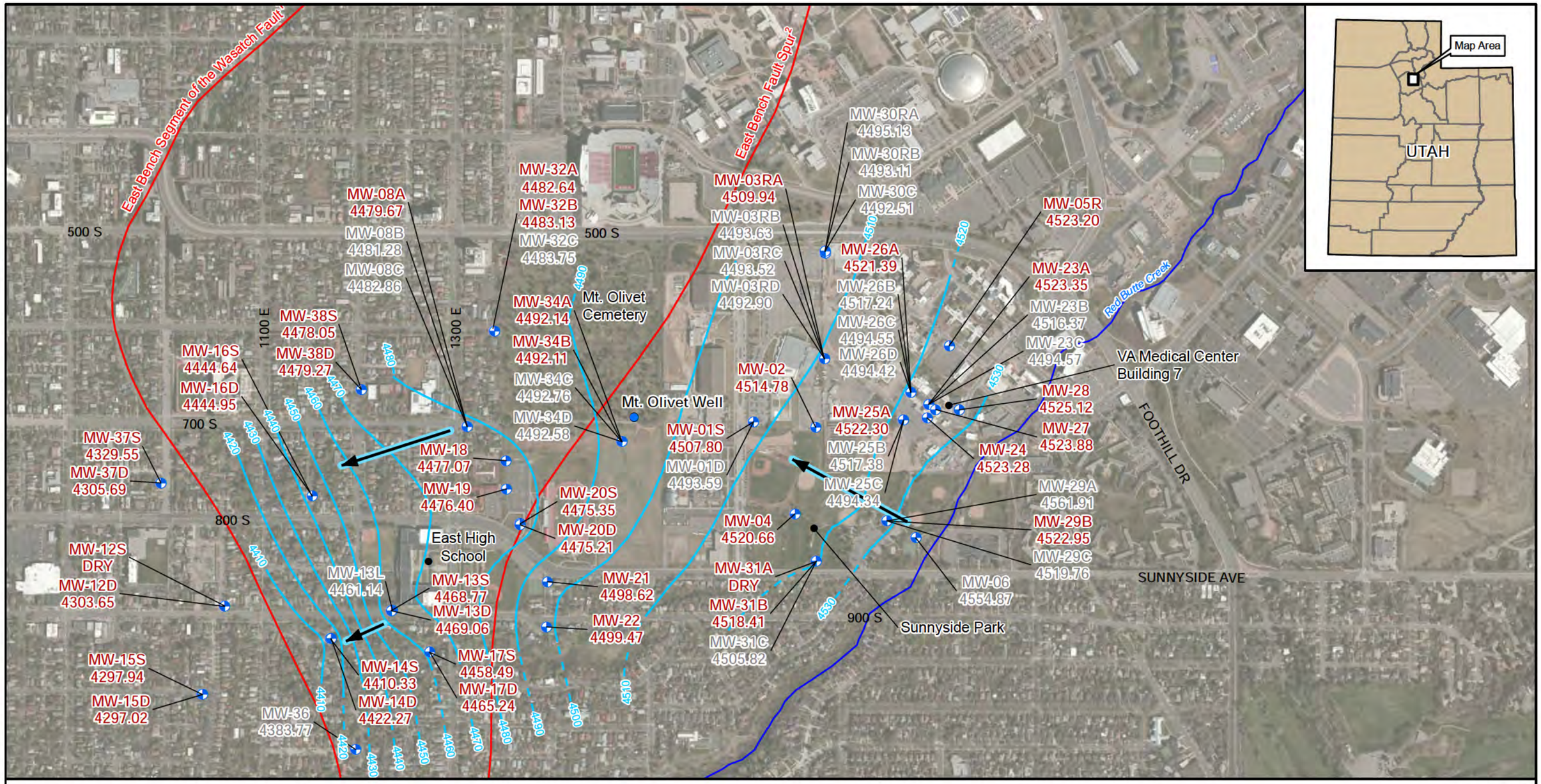
0 500 1,000 Feet

CDM Smith

Figure 1
Site Location Map

Q4 2020 Data Summary Report
OU1 700 South 1600 East PCE Plume
Salt Lake City, Utah

File Path: J:\238824_VA_Medical_Salt_Lake\MXD\Sampling_2020\DSR_2020Q4\Fig1_DSR_SiteMap.mxd WAGNERA 4/6/2021



Legend
- Monitoring Well
- Irrigation Well
- Landmark
- Red Butte Creek
- Fault Line
- Groundwater Contour
- Dashed Line - Inferred Extent
- Groundwater Flow Direction

Notes:
- All ground surface elevations in feet amsl
- Measurements taken December 6th through 8th 2020.
- Water levels shown in grey were not used for the generation of the potentiometric contours and are shown for information only
- Water level values for MW-14S/D and MW-17S/D were averaged during contouring.

[1] Davis, F.D. 1983. Geologic Map of the Central Wasatch Front, Utah. Utah Geological and Mineral Survey. Map 54-A – Wasatch Front Series. May.
[2] Personius, S.F. and Scott, W.E. 2009. Surficial Geologic Map of the Salt Lake City Segment and Parts of Adjacent Segments of the Wasatch Fault Zone, Davis, Salt Lake, and Utah Counties, Utah

amsl = above mean sea level
OU = operable unit
VHA = Veterans Health Administration

N W E S

0 500 1,000 Feet

CDM Smith

Figure 2
Potentiometric Groundwater Surface Map - Shallow Aquifer

Q4 2020 Data Summary Report
OU1 700 South 1600 East PCE Plume
Salt Lake City, Utah

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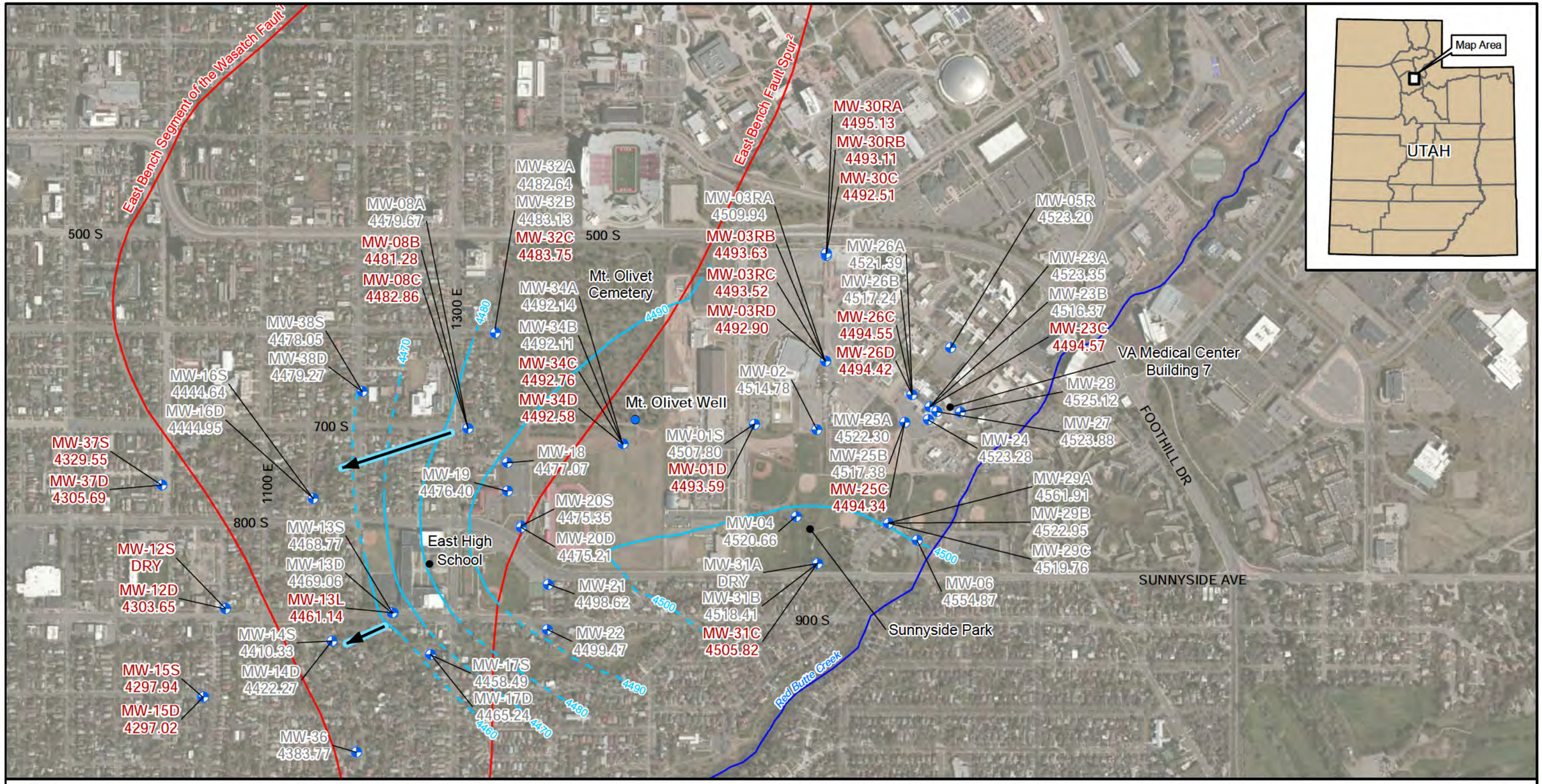

Legend
- Monitoring Well
- Irrigation Well
- Landmark
- Red Butte Creek
- Fault Line
- Groundwater Contour
- Dashed Line - Inferred Extent
- Groundwater Flow Direction

Notes:
- All ground surface elevations in feet amsl
- Measurements taken December 6th through 8th 2020.
- Water levels shown in grey were not used for the generation of the potentiometric contours and are shown for information only

amsl = above mean sea level
OU = operable unit
VHA = Veterans Health Administration

[1] Davis, F.D. 1983. Geologic Map of the Central Wasatch Front, Utah. Utah Geological and Mineral Survey. Map 54-A – Wasatch Front Series. May.
[2] Personius, S.F. and Scott, W.E. 2009. Surficial Geologic Map of the Salt Lake City Segment and Parts of Adjacent Segments of the Wasatch Fault Zone, Davis, Salt Lake, and Utah Counties, Utah

N W E S

0 500 1,000 Feet

CDM Smith

Figure 3
Potentiometric Groundwater Surface Map - Deep Aquifer

Q4 2020 Data Summary Report
OU1 700 South 1600 East PCE Plume
Salt Lake City, Utah

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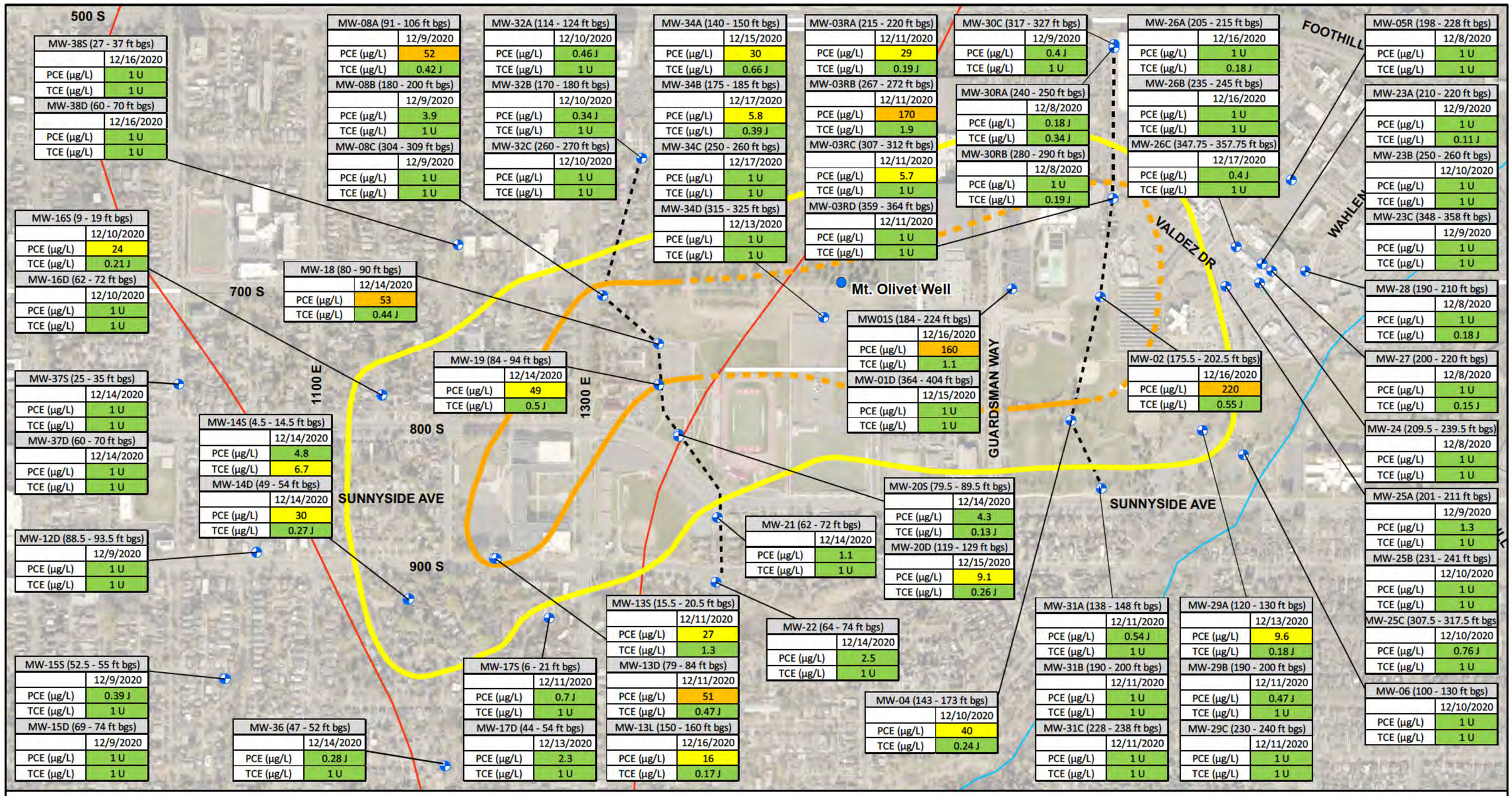

Figure 4
Q4 2020 Groundwater PCE and TCE Results and Approximate Extent of PCE in Groundwater

Q4 2020 Data Summary Report
OU1 700 South 1600 East PCE Plume
Salt Lake City, Utah

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Tables

Table 1
Monitoring Well Survey Data and Construction Details

Location	Sample Interval	Y Coordinate (Utah State Plane, ft)[1]	X Coordinate (Utah State Plane, ft)[1]	Surface Elevation (ft amsl)[2]	Top of casing elevation (ft amsl)[2]	Total Well Depth (ft bgs)	Screen Start (ft bgs)	Screen End (ft bgs)	Pump Depth (ft bgs)	Pump Type
MW-01S	-	7443663.78	1544832.82	4665.50	4664.80	224	184	224	204	Solinist bladder pump
MW-01D	-				4664.80	404	364	404	384	Solinist bladder pump
MW-02	-	7443618.23	1545346.65	4685.76	4685.24	205.5	175.5	202.5	195	Solinist bladder pump
MW-03R	A	7444184.94	1545418.19	4698.74	4698.12	223	215	220	215	ZIST/Gas - with reciever
	B				4697.90	275	267	272	267	ZIST/Gas - with reciever
	C				4697.92	315	307	312	307	ZIST/Gas - with reciever
	D				4697.93	367	359	364	359	ZIST/Gas - with reciever
MW-04	-	7442902.88	1545176.20	4657.20	4656.85	173	143	173	160	Solinist bladder pump
MW-05R	-	7444293.27	1546450.38	4738.25	4737.99	230	198	228	222	Solinist bladder pump
MW-06	-	7442705.05	1546174.37	4679.13	4678.66	134	100	130	128	Solinist bladder pump
MW-08	A	7443625.54	1542467.21	4540.36	4539.81	106	91	106	99	Solinist bladder pump
	B				4539.77	200	180	200	190	Solinist bladder pump
	C				4539.68	312	304	309	304	ZIST/Gas - with reciever
MW-12S	-	7442144.27	1540464.18	4360.35	4360.03	65	50	60	60	Solinist bladder pump
MW-12D	-	7442139.2	1540464.27	4360.40	4360.07	95	88.5	93.5	90	Solinist bladder pump
MW-13S	-	7442104.9	1541844.99	4483.26	4482.93	22	15.5	20.5	19	Solinist bladder pump
MW-13D	-	7442104.65	1541840.18	4482.93	4482.62	90	79	84	82	Solinist bladder pump
MW-13L	-	7442106.298	1541851.01	4483.67	4483.23	160	150	160	155	Solinist bladder pump
MW-14S	-	7441871.55	1541340.04	4415.96	4415.69	15	4.5	14.5	12	Solinist bladder pump
MW-14D	-	7441874.22	1541345.22	4416.45	4415.93	65	49	54	NA	Artesian
MW-15S	-	7441412.92	1540276.55	4347.65	4347.35	65	52.5	55	54	Solinist bladder pump
MW-15D	-	7441412.63	1540283.39	4347.99	4347.72	95	69	74	72	Solinist bladder pump
MW-16S	-	7443049.27	1541188.74	4455.19	4454.83	20	9	19	16.0	Solinist bladder pump
MW-16D	-	7443052.83	1541188.80	4455.32	4454.84	73	62	72	67	Solinist bladder pump
MW-17S	-	7441761.45	1542156.28	4465.51	4465.18	22	6	21	20	Solinist bladder pump
MW-17D	-	7441762.17	1542159.83	4465.86	4465.69	70	44	54	NA	Artesian/Solinst bladder pump
MW-18	-	7443344.52	1542789.74	4559.06	4558.76	110	80	90	88	Solinist bladder pump
MW-19	-	7443109.99	1542791.56	4557.51	4557.16	110	84	94	89	Solinist bladder pump
MW-20S	-	7442822.74	1542905.98	4558.92	4558.61	90.8	79.5	89.5	88	Solinist bladder pump
MW-20D	-	7442813.21	1542905.39	4558.46	4558.19	150	119	129	124	Solinist bladder pump
MW-21	-	7442343.24	1543130.25	4563.57	4563.32	80	62	72	70	Solinist bladder pump
MW-22	-	7441969.31	1543122.59	4563.06	4562.72	120	64	74	72	Solinist bladder pump
MW-23	A	7443809.38	1546280.59	4712.47	4711.80	222	210	220	210	ZIST/Gas - with reciever
	B				4711.77	262	250	260	250	ZIST/Gas - with reciever
	C				4711.69	360	348	358	348	ZIST/Gas - with reciever
MW-24	-	7443698.74	1546266.48	4709.77	4709.19	250	209.5	239.5	211	Solinist bladder pump
MW-25	A	7443676.94	1546071.97	4703.04	4702.02	213	201	211	201	ZIST/Gas - with reciever
	B				4702.09	243	231	241	231	ZIST/Gas - with reciever
	C				4702.07	320	307.5	317.5	308	ZIST/Gas - with reciever
MW-26	A	7443907.17	1546132.96	4713.25	4712.29	217	205	215	205	ZIST/Gas - with reciever
	B				4712.55	247	235	245	235	ZIST/Gas - with reciever
	C				4712.51	327	315	325	315	ZIST/Gas - with reciever
	D				4712.50	360	347.75	357.75	348	ZIST/Gas - with reciever
MW-27	-	7443766.76	1546337.14	4712.61	4712.34	220	200	220	210	Solinist bladder pump
MW-28	-	7443764.76	1546532.92	4712.80	4712.54	210	190	210	204	Solinist bladder pump
MW-29	A	7442845.95	1545935.59	4679.35	4678.46	132	120	130	128	ZIST/Gas - w/o reciever
	B				4678.45	202	190	200	190	ZIST/Gas - with reciever
	C				4678.68	242	230	240	230	ZIST/Gas - with reciever
MW-30	RA	7445055.62	1545425.12	4722.89	4722.60	252	240	250	245	Solinist bladder pump
	RB	7445055.62	1545425.12	4722.89	4722.36	294	282	292	285	Solinist bladder pump
	C	7445073.45	1545424.98	4723.07	4721.92	329	317	327	317	ZIST/Gas - with reciever
MW-31	A	7442512.47	1545351.52	4655.22	4654.27	150	138	148	138	ZIST/Gas - w/o reciever
	B				4654.39	202	190	200	190	ZIST/Gas - with reciever
	C				4654.35	230	228	238	228	ZIST/Gas - with reciever
MW-32	A	7444416.40	1542692.62	4566.22	4565.67	126	114	124	119	Solinist bladder pump
	B				4565.63	182	170	180	170	ZIST/Gas - w/o reciever
	C				4565.59	272	260	270	260	ZIST/Gas - w/o reciever
MW-34	A	7443498.84	1543745.66	4623.61	4623.09	152	140	150	148	ZIST/Gas - w/o reciever
	B				4622.71	187	175	185	175	ZIST/Gas - w/o reciever
	C				4622.63	262	250	260	250	ZIST/Gas - w/o reciever
	D				4622.58	327	315	325	315	ZIST/Gas - w/o reciever
MW-36	-	7440955.06	1541547.17	4429.01	4428.49	52	47	52	50	Solinist bladder pump
MW-37S	-	7443160.46	1539938.63	4348.36	4348.00	35	25	35	30	Solinist bladder pump
MW-37D	-	7443160.46	1539938.63	4348.36	4347.97	70	60	70	65	Solinist bladder pump
MW-38S	-	7443931.79	1541593.58	4498.56	4497.64	37	27	37	32	Solinist bladder pump
MW-38D	-	7443931.79	1541593.58	4498.56	4497.80	70	60	70	65	Solinist bladder pump

Notes:
[1] X/Y Coordinates measured using NAD 83 State Plane Coordinate System
[2] Elevations measured using NAVD 88 vertical datum

Acronyms:
amsl = above mean sea level
bgs = below ground surface
ft = feet
w/o = without
ZIST = Zone Isolation Sampling Technology

Table 2
Groundwater Elevations and Transducer Locations and Download Dates

Location	Screen Start (ft bgs)	Screen End (ft bgs)	Top of Casing Elevation (ft amsl)[1]	Aquifer Zone	Water Level Measurement Date and Time	Water Level Depth (ft btoc)	Water Level Elevation (ft amsl)[1]	Direction of Gradient[2]	Vertical Gradient[2]	Transducer Download Date and Time
MW-01S	184	224	4664.80	Shallow	12/7/20 16:26	157.00	4507.80	down	0.08	12/7/20 16:30
MW-01D	364	404	4664.80	Deep	12/7/20 16:15	171.21	4493.59			12/7/20 16:30
MW-02	175.5	202.5	4685.24	Shallow	12/7/20 16:05	170.46	4514.78	-	-	-
MW-03R	215	220	4698.12	Shallow	12/7/20 13:15	188.18	4509.94	down	0.29	-
	267	272	4697.90	Deep	12/7/20 13:20	204.27	4493.63			-
	307	312	4697.92	Deep	12/7/20 13:25	204.40	4493.52			-
	359	364	4697.93	Deep	12/7/20 13:30	205.03	4492.90			-
MW-04	143	173	4656.85	Shallow	12/7/20 17:00	136.19	4520.66	-	-	12/7/20 17:00
MW-05R	198	228	4737.99	Shallow	12/7/20 9:47	214.79	4523.20	-	-	12/7/20 10:00
MW-06	100	130	4678.66	Perched	12/7/20 14:45	123.79	4554.87	-	-	12/7/20 16:00
MW-08	91	106	4539.81	Shallow	12/8/20 11:35	60.14	4479.67	up	0.01	-
	180	200	4539.77	Shallow	12/8/20 11:38	58.49	4481.28			-
	304	309	4539.68	Deep	12/8/20 11:40	56.82	4482.86			-
MW-12S	50	60	4360.03	-	12/7/20 12:29	DRY	DRY	--	--	-
MW-12D	88.5	93.5	4360.07	-	12/7/20 12:51	56.42	4303.65			-
MW-13S	15.5	20.5	4482.93	Shallow	12/6/20 10:50	14.16	4468.77	down	0.06	-
MW-13D	79	84	4482.62	Shallow	12/6/20 10:55	13.56	4469.06			12/6/20 11:00
MW-13L	150	160	4483.23	Deep	12/6/20 11:00	22.09	4461.14			
MW-14S	4.5	14.5	4415.69	Shallow	12/7/20 16:25	5.36	4410.33	up	0.25	12/7/20 16:30
MW-14D*	49	54	4415.93	Shallow	12/8/20 11:03	-6.34	4422.27			-
MW-15S	52.5	55	4347.35	-	12/7/20 12:07	49.41	4297.94	down	0.05	-
MW-15D	69	74	4347.72	-	12/7/20 11:46	50.70	4297.02			12/7/20 12:00
MW-16S	9	19	4454.83	Shallow	12/7/20 13:18	10.19	4444.64	up	0.01	-
MW-16D	62	72	4454.84	Shallow	12/7/20 13:16	9.89	4444.95			12/7/20 13:30
MW-17S	6	21	4465.18	Shallow	12/8/20 11:14	6.69	4458.49	up	0.18	-
MW-17D	44	54	4465.69	Shallow	12/7/20 16:14	0.45	4465.24			-
MW-18	80	90	4558.76	Shallow	12/7/20 13:53	81.69	4477.07	-	-	-
MW-19	84	94	4557.16	Shallow	12/7/20 14:04	80.76	4476.40	-	-	-
MW-20S	79.5	89.5	4558.61	Shallow	12/7/20 14:19	83.26	4475.35	down	0.00	12/7/20 14:30
MW-20D	119	129	4558.19	Shallow	12/7/20 14:33	82.98	4475.21			12/7/20 14:30
MW-21	62	72	4563.32	Shallow	12/7/20 15:10	64.70	4498.62	-	-	12/7/20 15:00
MW-22	64	74	4562.72	Shallow	12/7/20 15:26	63.25	4499.47	-	-	12/7/20 15:30
MW-23	210	220	4711.80	Shallow	12/7/20 10:55	188.45	4523.35	down	0.21	-
	250	260	4711.77	Intermediate	12/7/20 11:07	195.40	4516.37			-
	348	358	4711.69	Deep	12/7/20 11:15	217.12	4494.57			-
MW-24	209.5	239.5	4709.19	Shallow	12/7/20 12:10	185.91	4523.28	-	-	-
MW-25	201	211	4702.02	Shallow	12/7/20 12:20	179.72	4522.30	down	0.27	-
	231	241	4702.09	Intermediate	12/7/20 12:26	184.71	4517.38			-
	307.5	317.5	4702.07	Deep	12/7/20 12:40	207.73	4494.34			-
MW-26	205	215	4712.29	Shallow	12/7/20 12:50	190.90	4521.39	down	0.26	-
	235	245	4712.55	Intermediate	12/7/20 12:55	195.31	4517.24			-
	315	325	4712.51	Deep	12/7/20 13:00	217.96	4494.55			-
	347.75	357.75	4712.50	Deep	12/7/20 13:05	218.08	4494.42			-
MW-27	200	220	4712.34	Shallow	12/7/20 11:25	188.46	4523.88	-	-	-
MW-28	190	210	4712.54	Shallow	12/8/20 10:15	187.42	4525.12	-	-	-
MW-29	120	130	4678.46	Perched	12/8/20 15:57	116.55	4561.91	down	0.06	-
	190	200	4678.45	Shallow	12/8/20 15:30	155.50	4522.95			-
	230	240	4678.68	Intermediate	12/8/20 15:53	158.92	4519.76			-
MW-30	240	250	4722.60	Deep	12/7/20 14:28	227.47	4495.13	down	0.01	-
	282	292	4722.36	Deep	12/7/20 14:20	229.25	4493.11			-
	317	327	4721.92	Deep	12/7/20 14:08	229.41	4492.51			-
MW-31	138	148	4654.27	Shallow	12/7/20 14:40	DRY	DRY	--	--	-
	190	200	4654.39	Shallow	12/7/20 16:45	135.98	4518.41			-
	228	238	4654.35	Deep	12/7/20 14:55	148.53	4505.82			-
MW-32	114	124	4565.67	Shallow	12/8/20 9:52	83.03	4482.64	-	0.00	-
	170	180	4565.63	Shallow	12/8/20 9:55	82.50	4483.13			-
	260	270	4565.59	Deep	12/8/20 10:00	81.84	4483.75			-
MW-34	140	150	4623.09	Shallow	12/7/20 14:20	130.95	4492.14	-	0.01	--
	175	185	4622.71	Shallow	12/7/20 15:05	130.60	4492.11			12/7/20 15:00
	250	260	4622.63	Deep	12/7/20 15:15	129.87	4492.76			12/7/20 15:00
	315	325	4622.58	Deep	12/7/20 15:20	130.00	4492.58			12/7/20 15:30
MW-36	47	52	4428.49	-	12/7/20 17:15	44.72	4383.77	-	-	-
MW-37S	25	35	4348.00	-	12/7/20 17:05	18.45	4329.55	down	0.91	-
MW-37D	60	70	4347.97	-	12/7/20 17:02	42.28	4305.69			-
MW-38S	27	37	4497.64	Shallow	12/7/20 0:00	19.59	4478.05	up	0.03	-
MW-38D	60	70	4497.80	Shallow	12/7/20 0:00	18.53	4479.27			-

Notes:
[1] Elevations measured using NAVD 88 vertical datum
[2] Direction and magnitude of vertical gradient is calculated between shallow and deep aquifers in paired/nested wells
*Water level measured using pressure gauge, converted to height above top of casing (head [ft] = pressure [psi] x 2.31)

Acronyms:
amsl = above mean sea level
bgs = below ground surface
btoc = below top of casing
ft = feet
- = not applicable
psi = pounds per square inch

Table 3
Groundwater Sampling Analytes

Analysis	Method	Sample Container	Number of Containers	Preservative
VOCs	EPA Method SW8260C	40 mL VOA	3	HCl to pH < 2, 4°C (±2°C)
1,4-Dioxane	EPA Method SW8270D	1 L amber glass	2	4°C (±2°C)
Dissolved Gases	EPA Method RSK-175	40 mL VOA	3	HCl to pH < 2, 4°C (±2°C)
Total Metals (unfiltered)	EPA Method SW6020A/SW7470A	250 mL HDPE	1	HNO_3 to pH < 2, 4°C (±2°C)
Alkalinity[1]	EPA Method SM2320B	1L HDPE	1	4°C (±2°C)
Anions (sulfate, chloride)	EPA Method E300.0	125 mL HDPE	1	4°C (±2°C)
TOC	EPA Method SW9060A	250 mL amber glass	1	H_2SO_4 to pH < 2, 4°C (±2°C)
Nitrate and Nitrite as Total Nitrogen	EPA Method SM4500-NO3E	125 mL HDPE	1	H_2SO_4 to pH < 2, 4°C (±2°C)

[1] Anions and Alkalinity are collected in the same container

Notes:
°C = degrees Celcius
EPA = U.S. Environmental Protection Agency
HCl = hydrochloric acid
HDPE = high density polyethylene
HNO_3 = nitric acid
H_2SO_4 = sulfuric acid
L = liter
mL = milliliter
TOC = total organic carbon
VOA = volatile organic analysis vial
VOCs = volatile organic compounds

Table 4
1,4-Dioxane and Detected VOC Analytical Results

		Location	MW-01D	MW-01S	MW-02		MW-03RA	MW-03RB	MW-03RC	MW-03RD
		Sample Name	MW01D-GW121520	MW01S-GW121620	MW02-GW121620	FD01-GW121620	MW03RA-GW121120	MW03RB-GW121120	MW03RC-GW121120	MW03RD-GW121120
		Sample Date	12/15/2020	12/16/2020	12/16/2020	12/16/2020	12/11/2020	12/11/2020	12/11/2020	12/11/2020
Analyte	Screening Level	Unit	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
1,4-Dioxane	0.46[b]	µg/L	NS	NS	NS	NS	NS	NS	NS	NS
1,1,1-Trichloroethane	200[a]	µg/L	*1 U*	**0.13 J**	*1 U*	*1 U*	*1 U*	**0.12 J**	*1 U*	*1 U*
1,1-Dichloroethane	2.8[b]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
1,1-Dichloroethene	7[a]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	**0.11 J**	*1 U*	*1 U*
Benzene	5[a]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	**0.2 J**
Bromodichloromethane	80[a]	µg/L	*1 U*	**0.41 J**	**0.36 J**	**0.38 J**	**0.5 J**	**0.49 J**	**0.17 J**	*1 U*
Carbon Tetrachloride	5[a]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Chloroform	80[a]	µg/L	**0.18 J**	**4.2**	**3.9**	**4**	**5.1**	**3.5**	**1.3**	**0.15 J**
Chloromethane	190[b]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
cis-1,2-Dichloroethene	70[a]	µg/L	*1 U*	**0.56 J**	**0.43 J**	**0.44 J**	*1 U*	**1.2**	*1 U*	*1 U*
Tetrachloroethene	5[a]	µg/L	*1 U*	**160**	**220**	**210**	**29**	**170**	**5.7**	*1 U*
Toluene	1000[a]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Trichloroethene	5[a]	µg/L	*1 U*	**1.1**	**0.55 J**	**0.6 J**	**0.19 J**	**1.9**	*1 U*	*1 U*
Trichlorofluoromethane	5200[b]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*

Notes:

[a] Screening level is EPA MCL

[b] Screening level is EPA Tap Water RSL (target cancer risk 1 x 10-6, hazard quotient = 1)

Highlight indicates values greater than screening level

Bold indicates detected values

Italics indicates nondetected values

Acronyms:

VOC = volatile organic compound

µg/L = microgram per liter

EPA = U.S. Environmental Protection Agency

MCL = maximum contaminant level

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U = Analyte was not detected at the associated value, which is the reporting limit

Table 4
1,4-Dioxane and Detected VOC Analytical Results

Location			MW-04		MW-05R		MW-06	MW-08A		MW-08B
Sample Name			MW04-GW121020	FD02-GW121020	MW05R-GW120820	FD05-GW120820	MW06-GW121020	MW08A-GW120920	FD03-GW120920	MW08B-GW120920
Sample Date			12/10/2020	12/10/2020	12/8/2020	12/8/2020	12/10/2020	12/9/2020	12/9/2020	12/9/2020
Analyte	Screening Level	Unit	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
1,4-Dioxane	0.46[b]	µg/L	NS	NS	NS	NS	NS	NS	NS	NS
1,1,1-Trichloroethane	200[a]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	**0.64 J**	**0.65 J**	*1 U*
1,1-Dichloroethane	2.8[b]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
1,1-Dichloroethene	7[a]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	**0.19 J**	**0.18 J**	*1 U*
Benzene	5[a]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Bromodichloromethane	80[a]	µg/L	**0.36 J**	**0.38 J**	**0.35 J**	**0.37 J**	**0.39 J**	**0.57 J**	**0.6 J**	**0.19 J**
Carbon Tetrachloride	5[a]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Chloroform	80[a]	µg/L	**4.2**	**4.1**	**6.4**	**6.3**	**2.7**	**4.3**	**4.8**	**1.6**
Chloromethane	190[b]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
cis-1,2-Dichloroethene	70[a]	µg/L	**0.15 J**	**0.15 J**	*1 U*	*1 U*	*1 U*	**0.23 J**	**0.26 J**	*1 U*
Tetrachloroethene	5[a]	µg/L	**40**	**38**	*1 U*	*1 U*	*1 U*	**52**	**53**	**3.9**
Toluene	1000[a]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Trichloroethene	5[a]	µg/L	**0.24 J**	**0.22 J**	*1 U*	*1 U*	*1 U*	**0.42 J**	**0.42 J**	*1 U*
Trichlorofluoromethane	5200[b]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*

Notes:

[a] Screening level is EPA MCL

[b] Screening level is EPA Tap Water RSL (target cancer risk 1 x 10-6, hazard quotient = 1)

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Table 4
1,4-Dioxane and Detected VOC Analytical Results

		Location	MW-08C		MW-12D		MW-13D		MW-13L		MW-13S		MW-14D		MW-14S		MW-15D	
		Sample Name	MW08C-GW120920		MW12D-GW120920		MW13D-GW121120		MW13L-GW121620		MW13S-GW121120		MW14D-GW121420		MW14S-GW121420		MW15D-GW120920	
		Sample Date	12/9/2020		12/9/2020		12/11/2020		12/16/2020		12/11/2020		12/14/2020		12/14/2020		12/9/2020	
Analyte	Screening Level	Unit	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,4-Dioxane	0.46[b]	µg/L	NS		NS		NS		NS		NS		NS		NS		NS	
1,1,1-Trichloroethane	200[a]	µg/L	*1*	*U*	*1*	*U*	**0.39**	**J**	**0.41**	**J**	**0.17**	**J**	**0.42**	**J**	*1*	*U*	*1*	*U*
1,1-Dichloroethane	2.8[b]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	**0.11**	**J**	*1*	*U*	*1*	*U*	*1*	*U*
1,1-Dichloroethene	7[a]	µg/L	*1*	*U*	*1*	*U*	**0.15**	**J**	**0.18**	**J**	*1*	*U*	**0.17**	**J**	*1*	*U*	*1*	*U*
Benzene	5[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Bromodichloromethane	80[a]	µg/L	*1*	*U*	**0.53**	**J**	**0.22**	**J**	**0.11**	**J**	*1*	*U*	**0.26**	**J**	*1*	*U*	**0.11**	**J**
Carbon Tetrachloride	5[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Chloroform	80[a]	µg/L	**0.17**	**J**	**6.1**		**1.7**		**1.6**		**1.1**		**1.9**		**0.18**	**J**	**3.9**	
Chloromethane	190[b]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
cis-1,2-Dichloroethene	70[a]	µg/L	*1*	*U*	*1*	*U*	**0.27**	**J**	**0.41**	**J**	**0.2**	**J**	**0.26**	**J**	**1.9**		*1*	*U*
Tetrachloroethene	5[a]	µg/L	*1*	*U*	*1*	*U*	**51**		**16**		**27**		**30**		**4.8**		*1*	*U*
Toluene	1000[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Trichloroethene	5[a]	µg/L	*1*	*U*	*1*	*U*	**0.47**	**J**	**0.17**	**J**	**1.3**		**0.27**	**J**	**6.7**		*1*	*U*
Trichlorofluoromethane	5200[b]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*

Notes:

[a] Screening level is EPA MCL

[b] Screening level is EPA Tap Water RSL (target cancer risk 1 x 10-6, hazard quotient = 1)

Highlight indicates values greater than screening level

Bold indicates detected values

Italics indicates nondetected values

Acronyms:

VOC = volatile organic compound

µg/L = microgram per liter

EPA = U.S. Environmental Protection Agency

MCL = maximum contaminant level

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Table 4
1,4-Dioxane and Detected VOC Analytical Results

Location			MW-15S		MW-16D		MW-16S		MW-17D		MW-17S		MW-18		MW-18		MW-19	
Sample Name			MW15S-GW120920		MW16D-GW121020		MW16S-GW121020		MW17D-GW121320		MW17S-GW121120		MW18-GW121420		FD06-GW121420		MW19-GW121420	
Sample Date			12/9/2020		12/10/2020		12/10/2020		12/13/2020		12/11/2020		12/14/2020		12/14/2020		12/14/2020	
Analyte	Screening Level	Unit	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,4-Dioxane	0.46[b]	µg/L	NS		NS		NS		NS		NS		NS		NS		NS	
1,1,1-Trichloroethane	200[a]	µg/L	*1*	*U*	*1*	*U*	**0.36**	**J**	*1*	*U*	*1*	*U*	**0.61**	**J**	**0.6**	**J**	**0.57**	**J**
1,1-Dichloroethane	2.8[b]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
1,1-Dichloroethene	7[a]	µg/L	*1*	*U*	*1*	*U*	**0.11**	**J**	*1*	*U*	*1*	*U*	**0.12**	**J**	**0.14**	**J**	**0.19**	**J**
Benzene	5[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Bromodichloromethane	80[a]	µg/L	*1*	*U*	**0.1**	**J**	**0.25**	**J**	**0.2**	**J**	*1*	*U*	**0.24**	**J**	**0.24**	**J**	**0.22**	**J**
Carbon Tetrachloride	5[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Chloroform	80[a]	µg/L	**3.1**		**1.8**		**6**		**2**		**1.2**		**2.4**		**2.4**		**2.2**	
Chloromethane	190[b]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
cis-1,2-Dichloroethene	70[a]	µg/L	*1*	*U*	*1*	*U*	**0.15**	**J**	*1*	*U*	*1*	*U*	**0.23**	**J**	**0.21**	**J**	**0.28**	**J**
Tetrachloroethene	5[a]	µg/L	**0.39**	**J**	*1*	*U*	**24**		**2.3**		**0.7**	**J**	**53**		**56**		**49**	
Toluene	1000[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Trichloroethene	5[a]	µg/L	*1*	*U*	*1*	*U*	**0.21**	**J**	*1*	*U*	*1*	*U*	**0.44**	**J**	**0.43**	**J**	**0.5**	**J**
Trichlorofluoromethane	5200[b]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*

Notes:

[a] Screening level is EPA MCL

[b] Screening level is EPA Tap Water RSL (target cancer risk 1 x 10-6, hazard quotient = 1)

Highlight indicates values greater than screening level

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Acronyms:

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µg/L = microgram per liter

EPA = U.S. Environmental Protection Agency

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Table 4
1,4-Dioxane and Detected VOC Analytical Results

Location			MW-20D		MW-20S		MW-21		MW-22		MW-23A		MW-23B		MW-23C		MW-24	
Sample Name			MW20D-GW121520		MW20S-GW121420		MW21-GW121420		MW22-GW121420		MW23A-GW120920		MW23B-GW121020		MW23C-GW120920		MW24-GW120820	
Sample Date			12/15/2020		12/14/2020		12/14/2020		12/14/2020		12/9/2020		12/10/2020		12/9/2020		12/8/2020	
Analyte	Screening Level	Unit	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,4-Dioxane	0.46[b]	µg/L	NS		NS		NS		NS		NS		NS		NS		NS	
1,1,1-Trichloroethane	200[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
1,1-Dichloroethane	2.8[b]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
1,1-Dichloroethene	7[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Benzene	5[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	**0.13**	**J**	*1*	*U*	*1*	*U*	*1*	*U*
Bromodichloromethane	80[a]	µg/L	**0.24**	**J**	**0.16**	**J**	*1*	*U*	**0.32**	**J**	**0.32**	**J**	**0.62**	**J**	*1*	*U*	**0.48**	**J**
Carbon Tetrachloride	5[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Chloroform	80[a]	µg/L	**1.8**		**1.5**		**2.7**		**2.2**		**5.8**		**8.2**		*1*	*U*	**6.8**	
Chloromethane	190[b]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
cis-1,2-Dichloroethene	70[a]	µg/L	**0.15**	**J**	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Tetrachloroethene	5[a]	µg/L	**9.1**		**4.3**		**1.1**		**2.5**		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Toluene	1000[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	**0.2**	**J**	*1*	*U*	*1*	*U*	*1*	*U*
Trichloroethene	5[a]	µg/L	**0.26**	**J**	**0.13**	**J**	*1*	*U*	*1*	*U*	**0.11**	**J**	*1*	*U*	*1*	*U*	*1*	*U*
Trichlorofluoromethane	5200[b]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*

Notes:

[a] Screening level is EPA MCL

[b] Screening level is EPA Tap Water RSL (target cancer risk 1 x 10-6, hazard quotient = 1)

Highlight indicates values greater than screening level

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Italics indicates nondetected values

Acronyms:

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µg/L = microgram per liter

EPA = U.S. Environmental Protection Agency

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NS = not sampled

RSL = regional screening level

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J = Result is estimated

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Table 4
1,4-Dioxane and Detected VOC Analytical Results

		Location	MW-25A		MW-25B		MW-25C		MW-26A		MW-26B		MW-26C		MW-27		MW-28	
		Sample Name	MW25A-GW120920		MW25B-GW121020		MW25C-GW121020		MW26A-GW121620		MW26B-GW121620		MW26C-GW121720		MW27-GW120820		MW28-GW120820	
		Sample Date	12/9/2020		12/10/2020		12/10/2020		12/16/2020		12/16/2020		12/17/2020		12/8/2020		12/8/2020	
Analyte	Screening Level	Unit	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,4-Dioxane	0.46[b]	µg/L	NS		NS		NS		NS		*0.41*	*U*	NS		NS		NS	
1,1,1-Trichloroethane	200[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	**0.1**	**J**	*1*	*U*
1,1-Dichloroethane	2.8[b]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
1,1-Dichloroethene	7[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Benzene	5[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	**0.11**	**J**	*1*	*U*	*1*	*U*
Bromodichloromethane	80[a]	µg/L	**0.47**	**J**	**0.63**	**J**	**0.4**	**J**	**0.47**	**J**	**0.63**	**J**	**0.35**	**J**	**0.48**	**J**	**0.39**	**J**
Carbon Tetrachloride	5[a]	µg/L	*1*	*U*	*1*	*U*	**0.11**	**J**	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Chloroform	80[a]	µg/L	**6.2**		**7.6**		**2.8**		**5.7**		**8**		**3.3**		**6.1**		**4.6**	
Chloromethane	190[b]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
cis-1,2-Dichloroethene	70[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Tetrachloroethene	5[a]	µg/L	**1.3**		*1*	*U*	**0.76**	**J**	*1*	*U*	*1*	*U*	**0.4**	**J**	*1*	*U*	*1*	*U*
Toluene	1000[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	**0.19**	**J**	*1*	*U*	*1*	*U*
Trichloroethene	5[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	**0.18**	**J**	*1*	*U*	*1*	*U*	**0.15**	**J**	**0.18**	**J**
Trichlorofluoromethane	5200[b]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*

Notes:

[a] Screening level is EPA MCL

[b] Screening level is EPA Tap Water RSL (target cancer risk 1 x 10-6, hazard quotient = 1)

Highlight indicates values greater than screening level

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Italics indicates nondetected values

Acronyms:

VOC = volatile organic compound

µg/L = microgram per liter

EPA = U.S. Environmental Protection Agency

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Table 4
1,4-Dioxane and Detected VOC Analytical Results

		Location	MW-29A		MW-29B		MW-29C		MW-30RA		MW-30RB		MW-30C		MW-31A		MW-31B	
		Sample Name	MW29A-GW121320		MW29B-GW121120		MW29C-GW121120		MW30RA-GW120820		MW30RB-GW120820		MW30C-GW120920		MW31A-GW121120		MW31B-GW121120	
		Sample Date	12/13/2020		12/11/2020		12/11/2020		12/8/2020		12/8/2020		12/9/2020		12/11/2020		12/11/2020	
Analyte	Screening Level	Unit	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,4-Dioxane	0.46[b]	µg/L	NS		NS		NS		*0.42*	*U*	*0.42*	*U*	NS		NS		NS	
1,1,1-Trichloroethane	200[a]	µg/L	*1*	*U*	**0.14**	**J**	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
1,1-Dichloroethane	2.8[b]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
1,1-Dichloroethene	7[a]	µg/L	*1*	*U*	**0.11**	**J**	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Benzene	5[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Bromodichloromethane	80[a]	µg/L	**0.52**	**J**	**0.5**	**J**	**0.49**	**J**	**0.62**	**J**	**0.68**	**J**	**0.43**	**J**	**0.36**	**J**	**0.47**	**J**
Carbon Tetrachloride	5[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Chloroform	80[a]	µg/L	**6.4**		**4.7**		**3.9**		**6.6**		**5.8**		**5**		**2.7**		**3.5**	
Chloromethane	190[b]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
cis-1,2-Dichloroethene	70[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Tetrachloroethene	5[a]	µg/L	**9.6**		**0.47**	**J**	*1*	*U*	**0.18**	**J**	*1*	*U*	**0.4**	**J**	**0.54**	**J**	*1*	*U*
Toluene	1000[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Trichloroethene	5[a]	µg/L	**0.18**	**J**	*1*	*U*	*1*	*U*	**0.34**	**J**	**0.19**	**J**	*1*	*U*	*1*	*U*	*1*	*U*
Trichlorofluoromethane	5200[b]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	**0.19**	**J**	**0.28**	**J**	**0.23**	**J**	*1*	*U*	*1*	*U*

Notes:

[a] Screening level is EPA MCL

[b] Screening level is EPA Tap Water RSL (target cancer risk 1 x 10-6, hazard quotient = 1)

Highlight indicates values greater than screening level

Bold indicates detected values

Italics indicates nondetected values

Acronyms:

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µg/L = microgram per liter

EPA = U.S. Environmental Protection Agency

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Table 4
1,4-Dioxane and Detected VOC Analytical Results

		Location	MW-31C	MW-32A	MW-32B	MW-32C	MW-34A	MW-34B	MW-34C	MW-34D
		Sample Name	MW31C-GW121120	MW32A-GW121020	MW32B-GW121020	MW32C-GW121020	MW34A-GW121520	MW34B-GW121720	MW34C-GW121720	MW34D-GW121320
		Sample Date	12/11/2020	12/10/2020	12/10/2020	12/10/2020	12/15/2020	12/17/2020	12/17/2020	12/13/2020
Analyte	Screening Level	Unit	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
1,4-Dioxane	0.46[b]	µg/L	NS	NS	NS	NS	*0.46 U*	NS	NS	NS
1,1,1-Trichloroethane	200[a]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	**0.14 J**	*1 U*	*1 U*
1,1-Dichloroethane	2.8[b]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
1,1-Dichloroethene	7[a]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Benzene	5[a]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Bromodichloromethane	80[a]	µg/L	*1 U*	**0.25 J**	**0.11 J**	*1 U*	**0.35 J**	**0.24 J**	*1 U*	*1 U*
Carbon Tetrachloride	5[a]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Chloroform	80[a]	µg/L	**0.72 J**	**4.5**	**1.7**	**0.89 J**	**2.6**	**1.9**	*1 U*	*1 U*
Chloromethane	190[b]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	**0.19 J**	**0.64 J**	*1 U*
cis-1,2-Dichloroethene	70[a]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	**0.3 J**	**0.5 J**	*1 U*	*1 U*
Tetrachloroethene	5[a]	µg/L	*1 U*	**0.46 J**	**0.34 J**	*1 U*	**30**	**5.8**	*1 U*	*1 U*
Toluene	1000[a]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Trichloroethene	5[a]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	**0.66 J**	**0.39 J**	*1 U*	*1 U*
Trichlorofluoromethane	5200[b]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*

Notes:

[a] Screening level is EPA MCL

[b] Screening level is EPA Tap Water RSL (target cancer risk 1 x 10-6, hazard quotient = 1)

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Acronyms:

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µg/L = microgram per liter

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Table 4
1,4-Dioxane and Detected VOC Analytical Results

Location			MW-36		MW-37D	MW-37S		MW-38D	MW-38S
Sample Name			MW36-GW121420	FD07-GW121420	MW37D-GW121420	MW37S-GW121420	FD04-GW121420	MW38D-GW121620	MW38S-GW121620
Sample Date			12/14/2020	12/14/2020	12/14/2020	12/14/2020	12/14/2020	12/16/2020	12/16/2020
Analyte	Screening Level	Unit	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
1,4-Dioxane	0.46[b]	µg/L	*0.42 UJ*	**3.1 J**	*0.42 U*	*0.45 U*	*0.44 U*	*0.45 U*	*0.42 U*
1,1,1-Trichloroethane	200[a]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
1,1-Dichloroethane	2.8[b]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
1,1-Dichloroethene	7[a]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Benzene	5[a]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Bromodichloromethane	80[a]	µg/L	*1 U*	*1 U*	*1 U*	**0.11 J**	**0.11 J**	*1 U*	*1 U*
Carbon Tetrachloride	5[a]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Chloroform	80[a]	µg/L	**0.79 J**	**0.77 J**	**0.7 J**	**2.2**	**2.1**	**2.4**	**3**
Chloromethane	190[b]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
cis-1,2-Dichloroethene	70[a]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Tetrachloroethene	5[a]	µg/L	**0.28 J**	**0.28 J**	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Toluene	1000[a]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Trichloroethene	5[a]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Trichlorofluoromethane	5200[b]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*

Notes:

[a] Screening level is EPA MCL

[b] Screening level is EPA Tap Water RSL (target cancer risk 1 x 10-6, hazard quotient = 1)

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Table 5
Metals Analytical Results

Location		MW-01D	MW-01S	MW-02		MW-03RA	MW-03RB	MW-03RC	MW-03RD
Sample Name		MW01D-GW121520	MW01S-GW121620	MW02-GW121620	FD01-GW121620	MW03RA-GW121120	MW03RB-GW121120	MW03RC-GW121120	MW03RD-GW121120
Sample Date		12/15/2020	12/16/2020	12/16/2020	12/16/2020	12/11/2020	12/11/2020	12/11/2020	12/11/2020
Analyte	Unit	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Aluminum	µg/L	**36.6 J**	*100 U*	*100 U*	*100 U*	*100 U*	**234**	**70.3 J**	**114**
Antimony	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Arsenic	µg/L	*1 U*	*1 U*	**1.44**	**1.43**	**0.72 J**	**0.656 J**	**0.603 J**	**0.341 J**
Barium	µg/L	**24**	**57.9**	**86.4**	**85.6**	**71.7**	**41.1**	**26.5**	**32.3**
Beryllium	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Cadmium	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Calcium	µg/L	**134000**	**152000**	**172000**	**173000**	**182000**	**144000**	**125000**	**134000**
Chromium	µg/L	**1.29**	*1 U*	**3.08**	**2.84**	**1.83**	**1.56**	**1.25**	**1.03**
Cobalt	µg/L	**0.269 J**	**0.317 J**	**0.414 J**	**0.406 J**	**0.189 J**	**0.334 J**	*1 U*	**0.569 J**
Copper	µg/L	*2 U*	*2 U*	**0.749 J**	**0.671 J**	*2 U*	*2 U*	*2 U*	*2 U*
Iron	µg/L	*100 U*	*100 U*	*100 U*	*100 U*	**67.9 J**	**329**	**134**	**273**
Lead	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Magnesium	µg/L	**35500**	**52600**	**60100**	**59300**	**62900**	**49700**	**38800**	**40100**
Manganese	µg/L	*1 U*	**1.05**	*1 U*	*1 U*	**20**	**85.6**	**7.57**	**214**
Mercury	µg/L	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*
Nickel	µg/L	*1 U*	*1 U*	**1.5**	**1.45**	**4.29**	**1.85**	**0.753 J**	**8.98**
Potassium	µg/L	**2230**	**2340**	**2740**	**2780**	**2620**	**2030**	**1940**	**2200**
Selenium	µg/L	**1.28**	*1 U*	*1 U*	*1 U*	**0.81 J**	**1.06**	**1.08**	**0.879 J**
Silver	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Sodium	µg/L	**37900**	**79700**	**147000**	**148000**	**99300**	**35000**	**26900**	**52000**
Thallium	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Vanadium	µg/L	**1.32**	**2**	**2.36**	**2.39**	**1.7**	**2.1**	**2**	**0.669 J**
Zinc	µg/L	*20 U*	**21.3**	*20 U*	*20 U*	*20 U*	**5.04 J**	**6.31 J**	**12.5 J**

Notes:

Bold indicates detected values

Italics indicates nondetected values

Acronyms:

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Table 5
Metals Analytical Results

Location		MW-04		MW-05R		MW-06	MW-08A		MW-08B	MW-08C
Sample Name		MW04-GW121020	FD02-GW121020	MW05R-GW120820	FD05-GW120820	MW06-GW121020	MW08A-GW120920	FD03-GW120920	MW08B-GW120920	MW08C-GW120920
Sample Date		12/10/2020	12/10/2020	12/8/2020	12/8/2020	12/10/2020	12/9/2020	12/9/2020	12/9/2020	12/9/2020
Analyte	Unit	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Aluminum	µg/L	*100 U*	*100 U*	**59.7 J**	*100 U*	*100 U*	**58.2 J**	**55.3 J**	**57.7 J**	**78.9 J**
Antimony	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Arsenic	µg/L	**1.3**	**1.39**	**1.05**	**1.04**	**1.8**	*1 U*	*1 U*	*1 U*	*1 U*
Barium	µg/L	**50**	**51.5**	**73**	**74.2**	**61.3**	**86.1**	**86.1**	**34.4**	**45**
Beryllium	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Cadmium	µg/L	*1 U*	*1 U*	**0.171 J**	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Calcium	µg/L	**142000**	**141000**	**165000**	**167000**	**126000**	**188000**	**189000**	**135000**	**113000**
Chromium	µg/L	**2**	**2.11**	**0.646 J**	**0.681 J**	**1.45**	**0.948 J**	**0.99 J**	**1.12**	**0.834 J**
Cobalt	µg/L	**0.496 J**	**0.512 J**	**0.635 J**	**0.437 J**	**0.608 J**	**0.599 J**	**0.537 J**	**0.427 J**	**0.784 J**
Copper	µg/L	**2.97**	**2.85**	**2.16**	*2 U*	**1.5 J**	*2 U*	*2 U*	*2 U*	*2 U*
Iron	µg/L	*100 U*	*100 U*	*100 U*	*100 U*	**27.8 J**	*100 U*	*100 U*	*100 U*	**345**
Lead	µg/L	**0.254 J**	**0.279 J**	*1 U*	*1 U*	**0.197 J**	*1 U*	*1 U*	*1 U*	*1 U*
Magnesium	µg/L	**47200**	**48200**	**63800**	**63100**	**40200**	**72500**	**72800**	**43400**	**38000**
Manganese	µg/L	*1 UJ*	**3.23 J**	**1.56**	*1 U*	**1.83**	**9.14**	**7.98**	**2.81**	**212**
Mercury	µg/L	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*
Nickel	µg/L	**2.15**	**2.17**	**0.438 J**	**0.529 J**	**6.56**	**0.599 J**	**0.703 J**	**0.308 J**	**2.55**
Potassium	µg/L	**2320**	**2390**	**2710**	**2750**	**2060**	**2830**	**2850**	**2030**	**2140**
Selenium	µg/L	**0.655 J**	**0.752 J**	*1 U*	*1 U*	**0.761 J**	*1 U*	**1**	**1.07**	**1.02**
Silver	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	**0.19 J**	*1 U*	*1 U*	*1 U*	*1 U*
Sodium	µg/L	**112000**	**112000**	**60900**	**61900**	**70900**	**93500**	**93900**	**34500**	**29000**
Thallium	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Vanadium	µg/L	**2.66**	**2.76**	**2.04**	**2.09**	**2.87**	**1.79**	**1.81**	**1.79**	**0.598 J**
Zinc	µg/L	**11 J**	**11.6 J**	*20 U*	*20 U*	**8.22 J**	*20 U*	*20 U*	*20 U*	**6.03 J**

Notes:

Bold indicates detected values

Italics indicates nondetected values

Acronyms:

µg/L = microgram per liter

Q = qualifier

J = Result is estimated

U = Analyte was not detected at the associated value, which is the reporting limit

Table 5
Metals Analytical Results

Location		MW-12D		MW-13D		MW-13S		MW-14D		MW-14S		MW-15D		MW-15S		MW-16D		MW-16S	
Sample Name		MW12D-GW120920		MW13D-GW121120		MW13S-GW121120		MW14D-GW121420		MW14S-GW121420		MW15D-GW120920		MW15S-GW120920		MW16D-GW121020		MW16S-GW121020	
Sample Date		12/9/2020		12/11/2020		12/11/2020		12/14/2020		12/14/2020		12/9/2020		12/9/2020		12/10/2020		12/10/2020	
Analyte	Unit	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Aluminum	µg/L	**230**		**54.1**	**J**	**948**		*100*	*U*	**730**		**118**		**233**		**92.2**	**J**	**221**	
Antimony	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Arsenic	µg/L	*1*	*U*	**0.728**	**J**	**1.59**		**0.705**	**J**	**0.537**	**J**	*1*	*U*	*1*	*U*	**0.743**	**J**	**1.18**	
Barium	µg/L	**55.6**		**45.4**		**83.9**		**46.6**		**73.7**		**47.6**		**63.8**		**31.7**		**61.8**	
Beryllium	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Cadmium	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	**0.14**	**J**	*1*	*U*	*1*	*U*	*1*	*U*
Calcium	µg/L	**148000**		**144000**		**192000**		**145000**		**155000**		**168000**		**169000**		**123000**		**152000**	
Chromium	µg/L	**2.8**		**5.47**		**6.74**		**0.949**	**J**	**1.28**		**1.74**		**4.98**		**2.49**		**3.12**	
Cobalt	µg/L	**0.424**	**J**	**0.185**	**J**	**3.46**		*1*	*U*	**0.649**	**J**	**0.641**	**J**	**0.523**	**J**	**0.408**	**J**	**0.494**	**J**
Copper	µg/L	*2*	*U*	*2*	*U*	**3.81**		*2*	*U*	*2*	*U*	**0.525**	**J**	**0.54**	**J**	**0.761**	**J**	**0.863**	**J**
Iron	µg/L	*100*	*U*	**132**		**925**		**29.5**	**J**	**283**		*100*	*U*	*100*	*U*	**117**		**85.6**	**J**
Lead	µg/L	*1*	*U*	*1*	*U*	**3.09**		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	**0.14**	**J**	**0.12**	**J**
Magnesium	µg/L	**49600**		**53200**		**83400**		**53200**		**54400**		**67300**		**76000**		**43600**		**59100**	
Manganese	µg/L	**2.02**		**1.37**		**987**		**1.93**		**90**		**5.26**		**1.67**		**1.2**		**1.2**	
Mercury	µg/L	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*
Nickel	µg/L	**1.15**		**3.85**		**78.6**		**0.363**	**J**	**1.47**		**1.22**		**2.36**		**0.717**	**J**	**0.76**	**J**
Potassium	µg/L	**2860**		**2550**		**4310**		**2530**		**3340**		**3920**		**4440**		**2100**		**2670**	
Selenium	µg/L	**1.77**		**0.869**	**J**	**0.416**	**J**	**0.91**	**J**	**1.98**		**2.64**		**2.46**		**1.06**		**0.829**	**J**
Silver	µg/L	**0.113**	**J**	**0.101**	**J**	**0.213**	**J**	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Sodium	µg/L	**82000**		**56700**		**127000**		**60300**		**94400**		**138000**		**174000**		**32000**		**75900**	
Thallium	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Vanadium	µg/L	**1.91**		**1.88**		**1.28**		**1.79**		**0.577**	**J**	**1.42**		**1.56**		**1.76**		**1.91**	
Zinc	µg/L	*20*	*U*	*20*	*U*	**15.7**	**J**	**20.4**		*20*	*U*	**6.72**	**J**	*20*	*U*	*20*	*U*	*20*	*U*

Notes:

Bold indicates detected values

Italics indicates nondetected values

Acronyms:

µg/L = microgram per liter

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Table 5
Metals Analytical Results

Location		MW-17D		MW-17S		MW-18		MW-18		MW-19		MW-20D		MW-20S		MW-21		MW-22	
Sample Name		MW17D-GW121320		MW17S-GW121120		MW18-GW121420		FD06-GW121420		MW19-GW121420		MW20D-GW121520		MW20S-GW121420		MW21-GW121420		MW22-GW121420	
Sample Date		12/13/2020		12/11/2020		12/14/2020		12/14/2020		12/14/2020		12/15/2020		12/14/2020		12/14/2020		12/14/2020	
Analyte	Unit	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Aluminum	µg/L	**94.1**	**J**	**89.5**	**J**	*100*	*U*	*100*	*U*	**48.6**	**J**	**67.2**	**J**	*100*	*U*	**153**		**25.8**	**J**
Antimony	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Arsenic	µg/L	**0.728**	**J**	**0.181**	**J**	**1.16**		**1.22**		**1.76**		**1.49**		**1.01**		**1.16**		**0.828**	**J**
Barium	µg/L	**69.3**		**99.4**		**96.3**		**100**		**79.9**		**43.1**		**46.6**		**115**		**66**	
Beryllium	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Cadmium	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Calcium	µg/L	**156000**		**153000**		**165000**		**166000**		**167000**		**105000**		**107000**		**128000**		**156000**	
Chromium	µg/L	**1.14**		**1.77**		**1.41**		**1.46**		**6.99**		**5.05**		**1.4**		**16.7**		**1.51**	
Cobalt	µg/L	**0.205**	**J**	**0.355**	**J**	**0.383**	**J**	**0.409**	**J**	**0.758**	**J**	**0.422**	**J**	**0.218**	**J**	**0.314**	**J**	*1*	*U*
Copper	µg/L	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	**1.04**	**J**	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*
Iron	µg/L	**111**		**63.5**	**J**	**207**		**221**		**1050**		**414**		*100*	*U*	**277**		**88.8**	**J**
Lead	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	**0.0708**	**J**	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Magnesium	µg/L	**55900**		**58200**		**64000**		**66800**		**64500**		**35000**		**34800**		**48100**		**56500**	
Manganese	µg/L	**22**		**14.7**		**5.89**		**4.89**		**8.33**		**8.25**		**1.19**		**2.11**		**2.57**	
Mercury	µg/L	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*
Nickel	µg/L	**0.456**	**J**	**5.36**		*1*	*U*	*1*	*U*	**7.34**		**5.64**		**1.08**		**12.3**		**0.349**	**J**
Potassium	µg/L	**2800**		**3760**		**3220**		**3350**		**3140**		**2140**		**2210**		**2800**		**2730**	
Selenium	µg/L	**0.879**	**J**	**0.792**	**J**	*1*	*U*	**1.03**		**0.862**	**J**	*1*	*U*	*1*	*U*	**0.641**	**J**	**0.875**	**J**
Silver	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	**0.287**	**J**	*1*	*U*	*1*	*U*	**0.104**	**J**	*1*	*U*
Sodium	µg/L	**107000**		**152000**		**98600**		**99500**		**94000**		**44600**		**67200**		**156000**		**108000**	
Thallium	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Vanadium	µg/L	**1.68**		**0.367**	**J**	**1.97**		**2.08**		**3.1**		**2.59**		**1.84**		**2.93**		**2.05**	
Zinc	µg/L	**6.54**	**J**	*20*	*U*	*20*	*U*	**6.72**	**J**	**6.56**	**J**	**5.06**	**J**	*20*	*U*	*20*	*U*	*20*	*U*

Notes:

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Acronyms:

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Table 5
Metals Analytical Results

Location		MW-23A		MW-23B		MW-23C		MW-24		MW-25A		MW-25B		MW-25C		MW-26A		MW-26B	
Sample Name		MW23A-GW120920		MW23B-GW121020		MW23C-GW120920		MW24-GW120820		MW25A-GW120920		MW25B-GW121020		MW25C-GW121020		MW26A-GW121620		MW26B-GW121620	
Sample Date		12/9/2020		12/10/2020		12/9/2020		12/8/2020		12/9/2020		12/10/2020		12/10/2020		12/16/2020		12/16/2020	
Analyte	Unit	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Aluminum	µg/L	**94.7**	**J**	**142**		**35.7**	**J**	**57.4**	**J**	**165**		**74.1**	**J**	**154**		*100*	*U*	*100*	*U*
Antimony	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Arsenic	µg/L	**1**		**0.785**	**J**	**0.374**	**J**	**1.26**		**1.28**		**0.738**	**J**	**0.71**	**J**	*1*	*U*	*1*	*U*
Barium	µg/L	**93.1**		**53**		**25.7**		**72**		**74**		**53.1**		**30.1**		**77**		**59.2**	
Beryllium	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Cadmium	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Calcium	µg/L	**157000**		**149000**		**135000**		**160000**		**164000**		**150000**		**115000**		**165000**		**147000**	
Chromium	µg/L	**0.666**	**J**	**0.915**	**J**	**0.722**	**J**	**12.8**		**1.57**		**0.885**	**J**	**1.19**		*1*	*U*	*1*	*U*
Cobalt	µg/L	**1.17**		**0.307**	**J**	**0.618**	**J**	**0.515**	**J**	**0.3**	**J**	**0.289**	**J**	**0.202**	**J**	**0.983**	**J**	**0.763**	**J**
Copper	µg/L	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	**0.91**	**J**	*2*	*U*	*2*	*U*	**2.08**		**0.601**	**J**
Iron	µg/L	**1190**		**226**		**102**		*100*	*U*	**273**		**98.9**	**J**	**203**		**52**	**J**	*100*	*U*
Lead	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	**0.17**	**J**	*1*	*U*
Magnesium	µg/L	**56400**		**51700**		**42700**		**58200**		**59500**		**52500**		**38500**		**55100**		**49000**	
Manganese	µg/L	**867**		**107**		**252**		**23.5**		**23.7**		**94.9**		**32.5**		**211**		**132**	
Mercury	µg/L	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*
Nickel	µg/L	**9.17**		**3.46**		**6.18**		**3.44**		**23.8**		**1.44**		**4.53**		**24.5**		**2.29**	
Potassium	µg/L	**3410**		**2010**		**2150**		**2440**		**2580**		**2100**		**2010**		**2710**		**2160**	
Selenium	µg/L	**0.587**	**J**	**0.83**	**J**	**1.08**		*1*	*U*	**0.922**	**J**	**0.852**	**J**	**1.09**		*1*	*U*	*1*	*U*
Silver	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Sodium	µg/L	**126000**		**42400**		**28600**		**113000**		**103000**		**38000**		**24900**		**138000**		**44200**	
Thallium	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Vanadium	µg/L	**1.15**		**1.97**		**1.26**		**2.47**		**2.99**		**1.9**		**2.34**		*1*	*U*	**1.27**	
Zinc	µg/L	**5.71**	**J**	**25.6**		**10**	**J**	**13.1**	**J**	**15.2**	**J**	*20*	*U*	*20*	*U*	**53.1**		**8.07**	**J**

Notes:

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Table 5
Metals Analytical Results

Location		MW-27		MW-28		MW-29A		MW-29B		MW-29C		MW-30RA		MW-30RB		MW-30C		MW-31A	
Sample Name		MW27-GW120820		MW28-GW120820		MW29A-GW121320		MW29B-GW121120		MW29C-GW121120		MW30RA-GW120820		MW30RB-GW120820		MW30C-GW120920		MW31A-GW121120	
Sample Date		12/8/2020		12/8/2020		12/13/2020		12/11/2020		12/11/2020		12/8/2020		12/8/2020		12/9/2020		12/11/2020	
Analyte	Unit	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Aluminum	µg/L	*100*	*U*	**36.4**	**J**	*100*	*U*	**134**		**25.9**	**J**	*100*	*U*	*100*	*U*	*100*	*U*	*100*	*U*
Antimony	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Arsenic	µg/L	**1.54**		**1.58**		**1.7**		**0.637**	**J**	**1.1**		*1*	*U*	*1*	*U*	*1*	*U*	**0.932**	**J**
Barium	µg/L	**73.9**		**92.9**		**69.7**		**54.1**		**34.4**		**90.6**		**73.3**		**81.9**		**50.7**	
Beryllium	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Cadmium	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Calcium	µg/L	**163000**		**176000**		**131000**		**157000**		**143000**		**176000**		**176000**		**168000**		**121000**	
Chromium	µg/L	**8.3**		**1.75**		**0.908**	**J**	**0.883**	**J**	**0.664**	**J**	**0.553**	**J**	**0.587**	**J**	**0.319**	**J**	**0.685**	**J**
Cobalt	µg/L	**0.547**	**J**	**0.687**	**J**	**0.164**	**J**	**0.86**	**J**	**0.127**	**J**	**0.677**	**J**	**0.821**	**J**	**1.51**		**0.208**	**J**
Copper	µg/L	*2*	*U*	*2*	*U*	**0.519**	**J**	*2*	*U*	**1.92**	**J**	*2*	*U*	**0.552**	**J**	*2*	*U*	**2.4**	
Iron	µg/L	*100*	*U*	**199**		*100*	*U*	**303**		**29.8**	**J**	*100*	*U*	*100*	*U*	**938**		**25.1**	**J**
Lead	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Magnesium	µg/L	**58000**		**62200**		**45400**		**54800**		**51400**		**69400**		**68100**		**60900**		**43000**	
Manganese	µg/L	**3.08**		**17.8**		**2.2**		**320**		**5.38**		**98.9**		**112**		**414**		**31.1**	
Mercury	µg/L	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*
Nickel	µg/L	**5.52**		**4.93**		**5.82**		**2.86**		**1.16**		**1.39**		**1.28**		**2.78**		**2.16**	
Potassium	µg/L	**2530**		**2610**		**2290**		**2430**		**2030**		**2830**		**2660**		**2940**		**2110**	
Selenium	µg/L	*1*	*U*	*1*	*U*	**0.654**	**J**	**0.899**	**J**	**1.12**		*1*	*U*	*1*	*U*	*1*	*U*	**0.654**	**J**
Silver	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Sodium	µg/L	**133000**		**162000**		**96800**		**42900**		**32700**		**68000**		**58300**		**61200**		**75700**	
Thallium	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Vanadium	µg/L	**2.6**		**2.28**		**3.05**		**1.53**		**2.53**		**0.758**	**J**	**1.18**		**0.405**	**J**	**1.91**	
Zinc	µg/L	*20*	*U*	**5.94**	**J**	**12.1**	**J**	**5.6**	**J**	**11.5**	**J**	**14.3**	**J**	**13.9**	**J**	**8.32**	**J**	**18.5**	**J**

Notes:

Bold indicates detected values

Italics indicates nondetected values

Acronyms:

µg/L = microgram per liter

Q = qualifier

J = Result is estimated

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Table 5
Metals Analytical Results

Location		MW-31B	MW-31C	MW-32A	MW-32B	MW-32C	MW-34A	MW-34D	MW-36	
Sample Name		MW31B-GW121120	MW31C-GW121120	MW32A-GW121020	MW32B-GW121020	MW32C-GW121020	MW34A-GW121520	MW34D-GW121320	MW36-GW121420	FD07-GW121420
Sample Date		12/11/2020	12/11/2020	12/10/2020	12/10/2020	12/10/2020	12/15/2020	12/13/2020	12/14/2020	12/14/2020
Analyte	Unit	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Aluminum	µg/L	**95.5 J**	*100 U*	**37.1 J**	*100 U*	*100 U*	*100 U*	*100 U*	*100 U*	**27.3 J**
Antimony	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Arsenic	µg/L	**0.71 J**	**0.667 J**	**0.911 J**	**0.412 J**	**0.409 J**	*1 U*	**0.307 J**	**0.71 J**	**0.697 J**
Barium	µg/L	**29.7**	**37**	**67.7**	**27.8**	**21.2**	**50.3**	**27.1**	**135**	**136**
Beryllium	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Cadmium	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Calcium	µg/L	**145000**	**132000**	**142000**	**124000**	**113000**	**123000**	**115000**	**150000**	**151000**
Chromium	µg/L	**0.743 J**	*1 U*	**1.38**	**1.13**	**1.46**	**1.82**	**0.78 J**	**0.26 J**	**0.275 J**
Cobalt	µg/L	**0.257 J**	**1.22**	**0.651 J**	**0.199 J**	**0.144 J**	**0.288 J**	**0.295 J**	**2.46**	**2.49**
Copper	µg/L	**0.576 J**	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*
Iron	µg/L	**137**	**819**	**384**	*100 U*	**28.6 J**	*100 U*	*100 U*	**105**	**109**
Lead	µg/L	*1 U*	*1 U*	**0.0504 J**	*1 U*	*1 U*	**0.3 J**	*1 U*	**0.104 J**	**0.109 J**
Magnesium	µg/L	**49000**	**41900**	**54800**	**44400**	**42200**	**42000**	**37100**	**45900**	**46700**
Manganese	µg/L	**25.9**	**526**	**92**	**27.7**	**24.7**	**28.5**	**148**	**778**	**790**
Mercury	µg/L	*0.5 U*	*0.5 U*	**0.845**	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*
Nickel	µg/L	**1.33**	**1.93**	**1.37**	**3.58**	**5.72**	**1.38**	**2.56**	**8.74**	**9.01**
Potassium	µg/L	**2030**	**2190**	**2810**	**2060**	**2000**	**2160**	**1850**	**3480**	**3540**
Selenium	µg/L	**1.22**	**0.788 J**	**0.833 J**	**1.03**	**1.12**	*1 U*	**1.03**	**0.798 J**	**0.823 J**
Silver	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Sodium	µg/L	**33100**	**34900**	**82300**	**31900**	**28500**	**54400**	**26700**	**118000**	**118000**
Thallium	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Vanadium	µg/L	**1.93**	*1 U*	**1.73**	**1.4**	**1.46**	**1.59**	**1.06**	**0.963 J**	**1.01**
Zinc	µg/L	*20 U*	*20 U*	*20 U*	**6.19 J**	*20 U*	*20 U*	*20 U*	**225**	**224**

Notes:

Bold indicates detected values

Italics indicates nondetected values

Acronyms:

µg/L = microgram per liter

Q = qualifier

J = Result is estimated

U = Analyte was not detected at the associated value, which is the reporting limit

Table 5
Metals Analytical Results

Location		MW-37D	MW-37S		MW-38D	MW-38S
Sample Name		MW37D-GW121420	MW37S-GW121420	FD04-GW121420	MW38D-GW121620	MW38S-GW121620
Sample Date		12/14/2020	12/14/2020	12/14/2020	12/16/2020	12/16/2020
Analyte	Unit	Result Q	Result Q	Result Q	Result Q	Result Q
Aluminum	µg/L	*100 U*	*100 U*	*100 U*	**29.4 J**	**44.9 J**
Antimony	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Arsenic	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Barium	µg/L	**59.3**	**48.4**	**48.5**	**45.6**	**67.5**
Beryllium	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Cadmium	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Calcium	µg/L	**183000**	**176000**	**181000**	**132000**	**141000**
Chromium	µg/L	*1 U*	*1 U*	*1 U*	**1.68**	**1.75**
Cobalt	µg/L	**1.08**	**0.463 J**	**0.454 J**	**1.03**	**0.65 J**
Copper	µg/L	*2 U*	*2 U*	**1.4 J**	**0.689 J**	*2 U*
Iron	µg/L	**61.1 J**	**67.7 J**	**73.5 J**	**59.5 J**	**112**
Lead	µg/L	*1 U*	*1 U*	*1 U*	**0.144 J**	**0.107 J**
Magnesium	µg/L	**70200**	**82700**	**86100**	**49400**	**55000**
Manganese	µg/L	**175**	**17**	**17.1**	**106**	**71.1**
Mercury	µg/L	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*
Nickel	µg/L	**2.72**	*1 U*	*1 U*	*1 U*	**1.49**
Potassium	µg/L	**4150**	**4250**	**4270**	**2590**	**3010**
Selenium	µg/L	**2.14**	**2.43**	*2.45*	*1 U*	*1 U*
Silver	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Sodium	µg/L	**108000**	**205000**	**212000**	**50000**	**89000**
Thallium	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Vanadium	µg/L	**1.15**	**1.44**	**1.44**	**1.47**	**1.47**
Zinc	µg/L	**423**	**5.05 J**	**11.2 J**	**5.34 J**	**9.37 J**

Notes:

Bold indicates detected values

Italics indicates nondetected values

Acronyms:

µg/L = microgram per liter

Q = qualifier

J = Result is estimated

U = Analyte was not detected at the associated value, which is the reporting limit

Table 6
General Chemistry Analytical Results and Field Parameters

Location		MW-01D	MW-01S	MW-02		MW-03RA	MW-03RB	MW-03RC	MW-03RD	MW-04	
Sample Name		MW01D-GW121520	MW01S-GW121620	MW02-GW121620	FD01-GW121620	MW03RA-GW121120	MW03RB-GW121120	MW03RC-GW121120	MW03RD-GW121120	MW04-GW121020	FD02-GW121020
Sample Date		12/15/2020	12/16/2020	12/16/2020	12/16/2020	12/11/2020	12/11/2020	12/11/2020	12/11/2020	12/10/2020	12/10/2020
Analyte	Unit	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Nitrate/Nitrite[1]	mg/L	**3.88**	**2.68**	**3.38**	**3.42**	**2.44**	**2.56**	**2.46**	**2.05**	**2.4**	**2.22**
Chloride	mg/L	**101**	**270**	**437**	**439**	**329**	**158**	**77.9**	**80.2**	**241**	**241**
Sulfate	mg/L	**152**	**101**	**88.8**	**90.9**	**94.8**	**107**	**158**	**197**	**96.2**	**102**
Ethane	µg/L	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*
Ethene	µg/L	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	**0.52 J**	*2 U*	*2 U*
Methane	µg/L	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	**0.49 J**	*2 U*	*2 U*
Alkalinity[2]	mg/L	**271**	**274**	**294**	**295**	**285**	**239**	**226**	**264**	**298**	**293**
Total Organic Carbon	mg/L	**0.882 J**	**0.723 J**	**0.855 J**	**0.842 J**	**2.32**	**2.28**	**3.2**	**9.06**	*1 U*	*1 U*
Dissolved Oxygen	mg/L	**7.53**	**9.5**	**9.59**	NS	**6.67**	**3.38**	**6.88**	**0.72**	**6.79**	NS
Ferrous Iron	mg/L	**0.22**	**0.12**	**0.08**	NS	**0.88**	**0**	**0**	**0.13**	**0**	NS
ORP	mV	**97.7**	**171.8**	**80.9**	NS	**69.1**	**-24.8**	**83.9**	**-88.4**	**127.5**	NS
pH	su	**7.02**	**7.02**	**6.98**	NS	**6.73**	**7.16**	**6.99**	**7.3**	**7.16**	NS
Specific Conductance	mS/cm	**0.525**	**0.682**	**0.912**	NS	**1.488**	**0.954**	**0.786**	**0.868**	**1.57**	NS
Temperature	deg C	**12.4**	**12.5**	**12.5**	NS	**10.9**	**11.2**	**11.6**	**11.9**	**11**	NS
Turbidity	NTU	**0.51**	**2.17**	**0**	NS	**6.78**	**64.2**	**31**	**31.6**	**2.31**	NS

Notes:
Bold indicates detected values
Italics indicates nondetected values
[1] Nitrate and Nitrite as total Nitrogen
[2] Total Alkalinity as calcium carbonate

Acronyms:
deg C = degrees Celsius
ORP = oxidation reduction potential
mg/L = milligram per liter
µg/L = microgram per liter
mS/cm = millisiemens per centimeter
mV = millivolts
NTU = nephelometric turbidity unit
NS = not sampled
su = standard units
Q = qualifier
J = Result is estimated
J+ = Result is estimated, biased high
U = Analyte was not detected at the associated value, which is the reporting limit

Table 6
General Chemistry Analytical Results and Field Parameters

Location		MW-05R		MW-06	MW-08A		MW-08B	MW-08C	MW-12D	MW-13D	MW-13S
Sample Name		MW05R-GW120820	FD05-GW120820	MW06-GW121020	MW08A-GW120920	FD03-GW120920	MW08B-GW120920	MW08C-GW120920	MW12D-GW120920	MW13D-GW121120	MW13S-GW121120
Sample Date		12/8/2020	12/8/2020	12/10/2020	12/9/2020	12/9/2020	12/9/2020	12/9/2020	12/9/2020	12/11/2020	12/11/2020
Analyte	Unit	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Nitrate/Nitrite[1]	mg/L	**3.71**	**3.78**	**1.33**	**4.58**	**4.27**	**2.86**	**2.03**	**3.15**	**4.55**	**2.25**
Chloride	mg/L	**307**	**278**	**142**	**462**	**450**	**165**	**70.6**	**294**	**202**	**369**
Sulfate	mg/L	**121**	**117**	**107**	**102**	**109**	**149**	**191**	**174**	**100**	**107**
Ethane	µg/L	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*
Ethene	µg/L	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*
Methane	µg/L	**0.46 J**	**0.56 J**	*2 U*	**0.34 J**	**0.36 J**	*2 U*	**0.4 J**	*2 U*	*2 U*	**3.6**
Alkalinity[2]	mg/L	**293**	**293**	**277**	**219**	**220**	**225**	**228**	**255**	**251**	**359**
Total Organic Carbon	mg/L	**1.06**	**1.11**	*1 U*	**0.588 J**	**0.665 J**	**0.67 J**	**3.98**	**0.928 J**	**0.758 J**	**1.35**
Dissolved Oxygen	mg/L	**5.66**	NS	**3.04**	**3.99**	NS	**2.66**	**1.58**	**4.97**	**5.5**	**8.16**
Ferrous Iron	mg/L	**1.02**	NS	**0.43**	**0.02**	NS	**0**	**0.58**	**0**	**0**	**0.59**
ORP	mV	**-3.5**	NS	**115.1**	**-72.5**	NS	**-77.2**	**-113.5**	**7.9**	**21.1**	**136.6**
pH	su	**7.04**	NS	**7.46**	**6.89**	NS	**7.15**	**7.28**	**7.09**	**7.07**	**7.05**
Specific Conductance	mS/cm	**1.52**	NS	**1.223**	**2.248**	NS	**1.307**	**1.071**	**1.42**	**1.38**	**2.1**
Temperature	deg C	**13.9**	NS	**10.9**	**12.2**	NS	**12.3**	**12**	**13.9**	**12.7**	**13.5**
Turbidity	NTU	**0.2**	NS	**3.26**	**6.03**	NS	**2.49**	**27.2**	**3.62**	**6.27**	**48.9**

Notes:
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[2] Total Alkalinity as calcium carbonate

Acronyms:
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ORP = oxidation reduction potential
mg/L = milligram per liter
µg/L = microgram per liter
mS/cm = millisiemens per centimeter
mV = millivolts
NTU = nephelometric turbidity unit
NS = not sampled
su = standard units
Q = qualifier
J = Result is estimated
J+ = Result is estimated, biased high
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Table 6
General Chemistry Analytical Results and Field Parameters

Location		MW-14D		MW-14S		MW-15D		MW-15S		MW-16D		MW-16S		MW-17D		MW-17S		MW-18		
Sample Name		MW14D-GW121420		MW14S-GW121420		MW15D-GW120920		MW15S-GW120920		MW16D-GW121020		MW16S-GW121020		MW17D-GW121320		MW17S-GW121120		MW18-GW121420		FD06-GW121420
Sample Date		12/14/2020		12/14/2020		12/9/2020		12/9/2020		12/10/2020		12/10/2020		12/13/2020		12/11/2020		12/14/2020		12/14/2020
Analyte	Unit	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Nitrate/Nitrite[1]	mg/L	**4.14**		**0.948**		**7.28**		**7.04**		**2.85**		**2.16**		**4.92**		**2.62**		**5.04**		**4.76**	
Chloride	mg/L	**193**		**253**		**380**		**412**		**98.5**		**239**		**240**		**299**		**370**		**353**	
Sulfate	mg/L	**102**		**118**		**162**		**167**		**137**		**90.7**		**114**		**122**		**104**		**98.9**	
Ethane	µg/L	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*
Ethene	µg/L	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*
Methane	µg/L	**0.19**	**J**	**0.28**	**J**	**0.51**	**J**	*2*	*U*	*2*	*U*	*2*	*U*	**0.18**	**J**	*2*	*U*	*2*	*U*	*2*	*U*
Alkalinity[2]	mg/L	**255**		**278**		**300**		**326**		**242**		**275**		**310**		**329**		**281**		**288**	
Total Organic Carbon	mg/L	**0.684**	**J**	**1.75**		**1.45**		**1.66**		**2.88**		*1*	*U*	**1.08**		**1.35**		**0.577**	**J**	*0.68*	**J**
Dissolved Oxygen	mg/L	**6.19**		**0.92**		**4.06**		**4.87**		**6.29**		**5.07**		**4.77**		**1.32**		**6.65**		NS	
Ferrous Iron	mg/L	**0.34**		**0.14**		**0.78**		**0**		**0.49**		**0.37**		**0.11**		**0.61**		**0**		NS	
ORP	mV	**200.4**		**83.4**		**22.8**		**78.6**		**111.1**		**195.1**		**117.8**		**-3**		**60.6**		NS	
pH	su	**7.13**		**6.97**		**6.94**		**6.88**		**7.31**		**7.1**		**6.99**		**7.08**		**6.87**		NS	
Specific Conductance	mS/cm	**1.379**		**1.25**		**1.9**		**2.047**		**1.093**		**1.531**		**1.628**		**1.89**		**1.517**		NS	
Temperature	deg C	**11.9**		**9.3**		**13.4**		**13.4**		**11.9**		**12**		**11.7**		**9.5**		**11.3**		NS	
Turbidity	NTU	**2.77**		**11.6**		**17.2**		**7.58**		**5.5**		**5.72**		**37.1**		**14.4**		**6.56**		NS	

Notes:

Bold indicates detected values

Italics indicates nondetected values

[1] Nitrate and Nitrite as total Nitrogen

[2] Total Alkalinity as calcium carbonate

Acronyms:

deg C = degrees Celsius

ORP = oxidation reduction potential

mg/L = milligram per liter

µg/L = microgram per liter

mS/cm = millisiemens per centimeter

mV = millivolts

NTU = nephelometric turbidity unit

NS = not sampled

su = standard units

Q = qualifier

J = Result is estimated

J+ = Result is estimated, biased high

U = Analyte was not detected at the associated value, which is the reporting limit

Table 6
General Chemistry Analytical Results and Field Parameters

Location		MW-19		MW-20D		MW-20S		MW-21		MW-22		MW-23A		MW-23B		MW-23C		MW-24		MW-25A	
Sample Name		MW19-GW121420		MW20D-GW121520		MW20S-GW121420		MW21-GW121420		MW22-GW121420		MW23A-GW120920		MW23B-GW121020		MW23C-GW120920		MW24-GW120820		MW25A-GW120920	
Sample Date		12/14/2020		12/15/2020		12/14/2020		12/14/2020		12/14/2020		12/9/2020		12/10/2020		12/9/2020		12/8/2020		12/9/2020	
Analyte	Unit	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Nitrate/Nitrite[1]	mg/L	**3.84**		**5.39**		**4.54**		**3.99**		**1.47**		**0.953**		**2.22**		**1.22**		**2.3**		**1.78**	
Chloride	mg/L	**330**		**111**		**106**		**322**		**282**		**314**		**208**		**53.7**		**346**		**307**	
Sulfate	mg/L	**103**		**87.5**		**88.8**		**74.2**		**128**		**104**		**92.9**		**202**		**109**		**110**	
Ethane	µg/L	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	**0.69**	**J**	*2*	*U*	**0.33**	**J**	*2*	*U*	*2*	*U*
Ethene	µg/L	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	**0.88**	**J**	**0.32**	**J**	**0.77**	**J**	*2*	*U*	*2*	*U*
Methane	µg/L	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	**1.7**	**J**	**0.33**	**J**	**0.89**	**J**	*2*	*U*	*2*	*U*
Alkalinity[2]	mg/L	**263**		**243**		**290**		**268**		**297**		**295**		**273**		**240**		**271**		**289**	
Total Organic Carbon	mg/L	*1*	*U*	**0.361**	**J**	**0.539**	**J**	**1.01**		**1.05**		**1.3**		**0.916**	**J**	*1*	*U*	**1.2**		*1*	*U*
Dissolved Oxygen	mg/L	**6.18**		**8.76**		**4.35**		**7.69**		**6.78**		**3.82**		**3.63**		**3.76**		**5.3**		**2.01**	
Ferrous Iron	mg/L	**0.12**		**0.04**		**0.22**		**0.16**		**0.24**		**1.32**		**0.11**		**0**		**0.04**		**0.08**	
ORP	mV	**14.6**		**16.4**		**67.9**		**50.8**		**86**		**-65.3**		**74.8**		**15.1**		**-2.8**		**-71.1**	
pH	su	**6.9**		**7.17**		**6.99**		**6.97**		**6.92**		**6.98**		**7.07**		**7.25**		**7.04**		**7.01**	
Specific Conductance	mS/cm	**1.439**		**0.475**		**0.881**		**1.804**		**1.718**		**1.758**		**1.13**		**0.646**		**1.66**		**2.016**	
Temperature	deg C	**12.3**		**11.9**		**11.3**		**12.5**		**12.2**		**11.5**		**14**		**9.4**		**14.1**		**10.9**	
Turbidity	NTU	**13.2**		**8.52**		**3.07**		**8.51**		**7.75**		**33.6**		**36.2**		**19.7**		**1.16**		**52.4**	

Notes:

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[1] Nitrate and Nitrite as total Nitrogen

[2] Total Alkalinity as calcium carbonate

Acronyms:

deg C = degrees Celsius

ORP = oxidation reduction potential

mg/L = milligram per liter

µg/L = microgram per liter

mS/cm = millisiemens per centimeter

mV = millivolts

NTU = nephelometric turbidity unit

NS = not sampled

su = standard units

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Table 6
General Chemistry Analytical Results and Field Parameters

Location		MW-25B		MW-25C		MW-26A		MW-26B		MW-27		MW-28		MW-29A		MW-29B		MW-29C		MW-30RA	
Sample Name		MW25B-GW121020		MW25C-GW121020		MW26A-GW121620		MW26B-GW121620		MW27-GW120820		MW28-GW120820		MW29A-GW121320		MW29B-GW121120		MW29C-GW121120		MW30RA-GW120820	
Sample Date		12/10/2020		12/10/2020		12/16/2020		12/16/2020		12/8/2020		12/8/2020		12/13/2020		12/11/2020		12/11/2020		12/8/2020	
Analyte	Unit	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Nitrate/Nitrite[1]	mg/L	**2.26**		**2.68**		**2**		**2.37**		**2.05**		**2.47**		**3.99**		**2.11**		**4.01**		**3.12**	
Chloride	mg/L	**183**		**77.2**		**369**		**211**		**459**		**455**		**195**		**198**		**143**		**352**	
Sulfate	mg/L	**94.9**		**120**		**95.7**		**89.4**		**115**		**113**		**96.9**		**120**		**113**		**88.9**	
Ethane	µg/L	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*
Ethene	µg/L	*2*	*U*	**0.76**	**J**	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*
Methane	µg/L	*2*	*U*	**0.61**	**J**	**0.17**	**J**	**0.25**	**J**	*2*	*U*	*2*	*U*	*2*	*U*	**0.33**	**J**	*2*	*U*	**0.18**	**J**
Alkalinity[2]	mg/L	**276**		**249**		**302**		**278**		**294**		**286**		**302**		**266**		**268**		**245**	
Total Organic Carbon	mg/L	**0.982**	**J**	**0.941**	**J**	**1.53**		**1.16**		**0.762**	**J**	**0.832**	**J**	**0.743**	**J**	**0.672**	**J**	**0.6**	**J**	**0.764**	**J**
Dissolved Oxygen	mg/L	**2.2**		**4.24**		**4.46**		**3.47**		**5.32**		**5.6**		**7.6**		**1**		**5.15**		**6.43**	
Ferrous Iron	mg/L	**0**		**0.04**		**0**		**0.28**		**0.12**		**0.05**		**0.02**		**0.2**		**0.22**		**0**	
ORP	mV	**-83.5**		**-77.8**		**14.2**		**185.1**		**-0.1**		**-16.4**		**142.9**		**-61.4**		**85.9**		**70.5**	
pH	su	**7.11**		**7.24**		**6.92**		**7.01**		**7.07**		**7.12**		**6.96**		**7.1**		**6.89**		**7.01**	
Specific Conductance	mS/cm	**1.045**		**0.752**		**1.97**		**0.622**		**1.83**		**1.91**		**0.958**		**1.059**		**0.978**		**1.568**	
Temperature	deg C	**9.6**		**11.2**		**12.7**		**14.9**		**15.4**		**13.8**		**5.1**		**8.5**		**10**		**13.6**	
Turbidity	NTU	**18.2**		**23.1**		**7.7**		**4.69**		**0.8**		**0.52**		**0.84**		**35.2**		**6.64**		**7.15**	

Notes:
Bold indicates detected values
Italics indicates nondetected values
[1] Nitrate and Nitrite as total Nitrogen
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Acronyms:
deg C = degrees Celsius
ORP = oxidation reduction potential
mg/L = milligram per liter
µg/L = microgram per liter
mS/cm = millisiemens per centimeter
mV = millivolts
NTU = nephelometric turbidity unit
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Table 6
General Chemistry Analytical Results and Field Parameters

Location		MW-30RB		MW-30C		MW-31A		MW-31B		MW-31C		MW-32A		MW-32B		MW-32C		MW-34A		MW-34D	
Sample Name		MW30RB-GW120820		MW30C-GW120920		MW31A-GW121120		MW31B-GW121120		MW31C-GW121120		MW32A-GW121020		MW32B-GW121020		MW32C-GW121020		MW34A-GW121520		MW34D-GW121320	
Sample Date		12/8/2020		12/9/2020		12/11/2020		12/11/2020		12/11/2020		12/10/2020		12/10/2020		12/10/2020		12/15/2020		12/13/2020	
Analyte	Unit	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Nitrate/Nitrite[1]	mg/L	**3.42**		**2.22**		**1.33**		**1.92**		**1.61**		**2.34**		**2.67**		**2.84**		**4.39**		**2.06**	
Chloride	mg/L	**350**		**324**		**154**		**124**		**82.8**		**247**		**101**		**59.4**		**171**		**47.9**	
Sulfate	mg/L	**93**		**93.8**		**111**		**157**		**216**		**107**		**142**		**164**		**98.3**		**148**	
Ethane	µg/L	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	**2.9**		*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*
Ethene	µg/L	*2*	*U*	**0.44**	**J**	*2*	*U*	*2*	*U*	**0.59**	**J**	*2*	*U*	*2*	*U*	**0.67**	**J**	*2*	*U*	**0.35**	**J**
Methane	µg/L	**0.96**	**J**	**0.86**	**J**	*2*	*U*	*2*	*U*	**4.6**		**0.18**	**J**	**0.18**	**J**	**0.3**	**J**	*2*	*U*	**0.34**	**J**
Alkalinity[2]	mg/L	**265**		**265**		**287**		**257**		**224**		**275**		**246**		**238**		**252**		**252**	
Total Organic Carbon	mg/L	**0.662**	**J**	**1.42**		**1.03**		**0.996**	**J**	**1.75**		**0.587**	**J**	**0.474**	**J**	**0.42**	**J**	**0.837**	**J**	**0.925**	**J**
Dissolved Oxygen	mg/L	**6.22**		**2.92**		**6.13**		**6.69**		**1.05**		**7**		**5.6**		**5.64**		**6.17**		**5.05**	
Ferrous Iron	mg/L	**0.06**		**0.64**		**0.07**		**0.03**		**1.14**		**0.27**		**0**		**0.06**		**0.17**		**0**	
ORP	mV	**35.7**		**-50**		**120.7**		**65**		**-121.1**		**26.2**		**-49.5**		**-10.5**		**-4.9**		**76.6**	
pH	su	**7**		**7.08**		**7.07**		**6.94**		**7.12**		**7.01**		**7.02**		**7.14**		**7.16**		**7.08**	
Specific Conductance	mS/cm	**1.508**		**1.028**		**0.904**		**1.237**		**1.109**		**1.495**		**1.083**		**0.706**		**1.33**		**0.909**	
Temperature	deg C	**13.6**		**13.6**		**6.8**		**10.7**		**10.5**		**12.2**		**12.4**		**8**		**10.6**		**12.8**	
Turbidity	NTU	**4.47**		**7.27**		**3.4**		**22.1**		**4.49**		**11.2**		**1.52**		**3.57**		**1.03**		**6.04**	

Notes:

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Acronyms:

deg C = degrees Celsius

ORP = oxidation reduction potential

mg/L = milligram per liter

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Table 6
General Chemistry Analytical Results and Field Parameters

Location		MW-36		MW-37D	MW-37S		MW-38D	MW-38S
Sample Name		MW36-GW121420	FD07-GW121420	MW37D-GW121420	MW37S-GW121420	FD04-GW121420	MW38D-GW121620	MW38S-GW121620
Sample Date		12/14/2020	12/14/2020	12/14/2020	12/14/2020	12/14/2020	12/16/2020	12/16/2020
Analyte	Unit	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Nitrate/Nitrite[1]	mg/L	**1.58**	**1.51**	**3.07**	**6.42**	**6.29**	**3.51**	**4.21**
Chloride	mg/L	**225**	**215**	**295**	**451**	**439**	**173**	**257**
Sulfate	mg/L	**132**	**131**	**199**	**199**	**198**	**136**	**104**
Ethane	µg/L	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*
Ethene	µg/L	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*
Methane	µg/L	**0.47 J**	**0.45 J**	**1.1 J**	*2 U*	*2 U*	**0.25 J**	*2 U*
Alkalinity[2]	mg/L	**339**	**349**	**343**	**405**	**403**	**255**	**271**
Total Organic Carbon	mg/L	*1 U*	**1.24**	**1.36**	**1.74**	**0.908 J**	**0.35 J**	**0.89 J**
Dissolved Oxygen	mg/L	**0.87**	NS	**4.28**	**5.53**	NS	**7.69**	**5.98**
Ferrous Iron	mg/L	**0.12**	NS	**0**	**0**	NS	**0.14**	**0.12**
ORP	mV	**-80.5**	NS	**-36.7**	**52.8**	NS	**147.8**	**56.2**
pH	su	**7.23**	NS	**7.02**	**6.82**	NS	**6.96**	**6.93**
Specific Conductance	mS/cm	**0.913**	NS	**1.14**	**1.477**	NS	**1.281**	**1.63**
Temperature	deg C	**12.3**	NS	**13.8**	**12.4**	NS	**12.5**	**13.4**
Turbidity	NTU	**6.87**	NS	**6.94**	**2.96**	NS	**13.6**	**15.9**

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[1] Nitrate and Nitrite as total Nitrogen
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Appendix A

Salt Lake City Division of Transportation Traffic Control Permit

Traffic Control Permit

Salt Lake City Community and Neighborhoods
Division of Transportation
349 South 200 East #150
Salt Lake City, Utah 84111
Telephone (801) 535-6630
E-Mail TechPermit@slcgov.com

Permit # TRN2020-02332

Organization Name: Wasatch Environmental
Address: 2410 W California Ave SALT LAKE CITY, UT 84104
Contact Person: EMMA ROTT Phone: 4062413259 Cell: 406-551-5169
Barricade Company: Barricade Phone:

WORK SHALL COMPLY WITH PART 6 OF THE 2009 MUTCD.
PERMITS MUST BE EXTENDED 24 HOURS IN ADVANCE OF EXPIRATION.
IF THE TRAFFIC CONTROL PERMIT IS ALLOWED TO EXPIRE, A NEW PERMIT, AND AN ADDITIONAL FEE WILL BE REQUIRED.
CLOSURES ON A DIFFERENT STREET THAN LISTED WILL REQUIRE AN ADDITIONAL TRAFFIC CONTROL, AND ENGINEERING PERMIT.
THE ORGANIZATION ISSUED THE TRAFFIC CONTROL PERMIT SHALL BE RESPONSIBLE FOR ALL BARRICADE PLACEMENT AND MAINTENENCE.
AN ADDITIONAL PERMIT FROM SLC ENGINEERING MAY ALSO BE REQUIRED.
SHALL MAINTAIN ACCESS TO ALL PROPERTIES.
SHALL INFORM BUSINESSES & RESIDENTS OF PROJECT & DURATION.
SHALL COORDINATE WITH BUSINESSES & RESIDENTS AFFECTED.
SHALL OBTAIN A PERMIT FOR ALL PARKING METERS OR OTHER RESTRICTED PARKING MADE UNAVAILBABLE TO THE PUBLIC.
TRAFFIC CONTROL PERMITS ARE NOT VALID UNTIL PAID IN FULL.
CHANGES TO PERMIT MAY BE REQUIRED AND MADE UPON REVIEW and/or COMPLAINT.

Project Name / Description: Sampling ground water wells for the VA at various locations.
General Work Type: Staging Specific Work Type: Barricade
City Project # Public Way Permit #
Special Event Permit # Block Party Permit #

Closure Type	*On Street Name*	*From Number*	*To Number*	*Side of Street*
Street	**Elizabeth St.**	**785 S**	**785 S**	**E**

Start Date	*End Date*	*Full Road Closure?*	*Barricade Manual Fig #*	*Description*	*Special Requirements*
11/30/2020	12/18/2020	No	TA-6	TESTING GROUND WATER NOT DRILLING OR TRENCHING	SHALL MAINTAIN ACCESS TO ALL PROPERTIES AND COORDINATE WITH RESIDENTS AND BUSINESSES AFFECTED. WORK HOURS SHALL BE BETWEEN 9AM & 4PM. MAY WORK FROM 6PM TO 6AM.

Closure Type	*On Street Name*	*From Number*	*To Number*	*Side of Street*
Street	**McClelland St.**	**900 S**	**900 S**	**E**

Start Date	*End Date*	*Full Road Closure?*	*Barricade Manual Fig #*	*Description*	*Special Requirements*
11/30/2020	12/18/2020	No	TA-6	TESTING GROUND WATER NOT DRILLING OR TRENCHING	SHALL MAINTAIN ACCESS TO ALL PROPERTIES AND COORDINATE WITH RESIDENTS AND BUSINESSES AFFECTED. WORK HOURS SHALL BE BETWEEN 9AM & 4PM. MAY WORK FROM 6PM TO 6AM.

Approved By: Jacob Fenton Issue Date: 9/14/2020

Closure Type	On Street Name	From Number	To Number	Side of Street
Street	Alpine Place	1150 E	1150 E	E

Start Date	End Date	Full Road Closure?	Barricade Manual Fig #	Description	Special Requirements
11/30/2020	12/18/2020	No	TA-6	TESTING GROUND WATER NOT DRILLING OR TRENCHING	SHALL MAINTAIN ACCESS TO ALL PROPERTIES AND COORDINATE WITH RESIDENTS AND BUSINESSES AFFECTED. WORK HOURS SHALL BE BETWEEN 9AM & 4PM. MAY WORK FROM 6PM TO 6AM.

Closure Type	On Street Name	From Number	To Number	Side of Street
Street	Gilmer Dr	1280 E	1280 E	S

Start Date	End Date	Full Road Closure?	Barricade Manual Fig #	Description	Special Requirements
11/30/2020	12/18/2020	No	TA-6	TESTING GROUND WATER NOT DRILLING OR TRENCHING	SHALL MAINTAIN ACCESS TO ALL PROPERTIES AND COORDINATE WITH RESIDENTS AND BUSINESSES AFFECTED. WORK HOURS SHALL BE BETWEEN 9AM & 4PM. MAY WORK FROM 6PM TO 6AM.

Closure Type	On Street Name	From Number	To Number	Side of Street
Street	14th E	Sunnyside Ave	Sunnyside Ave	W

Start Date	End Date	Full Road Closure?	Barricade Manual Fig #	Description	Special Requirements
11/30/2020	12/18/2020	No	TA-6	TESTING GROUND WATER NOT DRILLING OR TRENCHING	SHALL MAINTAIN ACCESS TO ALL PROPERTIES AND COORDINATE WITH RESIDENTS AND BUSINESSES AFFECTED. WORK HOURS SHALL BE BETWEEN 9AM & 4PM. MAY WORK FROM 6PM TO 6AM.

Closure Type	On Street Name	From Number	To Number	Side of Street
Street	Belmont Ave	McClelland St.	McClelland St.	S

Start Date	End Date	Full Road Closure?	Barricade Manual Fig #	Description	Special Requirements
11/30/2020	12/18/2020	No	TA-6	TESTING GROUND WATER NOT DRILLING OR TRENCHING	SHALL MAINTAIN ACCESS TO ALL PROPERTIES AND COORDINATE WITH RESIDENTS AND BUSINESSES AFFECTED. WORK HOURS SHALL BE BETWEEN 9AM & 4PM. MAY WORK FROM 6PM TO 6AM.

Closure Type	On Street Name	From Number	To Number	Side of Street
Street	University St.	700 S	700 S	S

Start Date	End Date	Full Road Closure?	Barricade Manual Fig #	Description	Special Requirements
11/30/2020	12/18/2020	No	TA-6	TESTING GROUND WATER NOT DRILLING OR TRENCHING	SHALL MAINTAIN ACCESS TO ALL PROPERTIES AND COORDINATE WITH RESIDENTS AND BUSINESSES AFFECTED. WORK HOURS SHALL BE BETWEEN 9AM & 4PM. MAY WORK FROM 6PM TO 6AM.

Approved By: Jacob Fenton

Issue Date: 9/14/2020

Closure Type	*On Street Name*	*From Number*	*To Number*	*Side of Street*
Street	**600 S**	**1300 E**	**1305 E**	**N**

Start Date	*End Date*	*Full Road Closure?*	*Barricade Manual Fig #*	*Description*	*Special Requirements*
11/30/2020	12/18/2020	No	TA-6	TESTING GROUND WATER NOT DRILLING OR TRENCHING	SHALL MAINTAIN ACCESS TO ALL PROPERTIES AND COORDINATE WITH RESIDENTS AND BUSINESSES AFFECTED. WORK HOURS SHALL BE BETWEEN 9AM & 4PM. MAY WORK FROM 6PM TO 6AM.

Closure Type	*On Street Name*	*From Number*	*To Number*	*Side of Street*
Street	**HERBERT AVE**	**1177 E**	**1183 E**	**N**

Start Date	*End Date*	*Full Road Closure?*	*Barricade Manual Fig #*	*Description*	*Special Requirements*
11/30/2020	12/18/2020	No	TA-6	TESTING GROUND WATER NOT DRILLING OR TRENCHING	SHALL MAINTAIN ACCESS TO ALL PROPERTIES AND COORDINATE WITH RESIDENTS AND BUSINESSES AFFECTED. WORK HOURS SHALL BE BETWEEN 9AM & 4PM. MAY WORK FROM 6PM TO 6AM.

Closure Type	*On Street Name*	*From Number*	*To Number*	*Side of Street*
Street	**1200 E**	**647 S**	**649 S**	**E**

Start Date	*End Date*	*Full Road Closure?*	*Barricade Manual Fig #*	*Description*	*Special Requirements*
11/30/2020	12/18/2020	No	TA-6	TESTING GROUND WATER NOT DRILLING OR TRENCHING	SHALL MAINTAIN ACCESS TO ALL PROPERTIES AND COORDINATE WITH RESIDENTS AND BUSINESSES AFFECTED. WORK HOURS SHALL BE BETWEEN 9AM & 4PM. MAY WORK FROM 6PM TO 6AM.

Approved By: Jacob Fenton

Issue Date: 9/14/2020

Appendix B
Field Forms

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12-15-20 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** —

Well ID: MW-01D **Purging/Sampling Device:** Compressed gas/MP-10H **Pump depth (ft bgs):** 384

Initial Static Water Level (feet btoc): 171.03 **Analytical Parameters:** VOCs, Metals, Mercury, Anions, ~~TDS~~ 12/27 Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 171.03 **QC Samples Collected:** None

Purge Start Time: 1330 **Ferrous Iron (mg/L):** 0.22 **Allowable Drawdown (ft):** 0.3

Sample Time: 1510 **Controller Settings: Recharge:** 25 secs **Discharge:** 14 secs **Pressure:** 165 psi

Samplers' Signatures: [signature] **Cycles Per Minute:** 0.65

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1335	171.05	12.6	7.28	503	9.59	51.7	4.40	305	
1347	171.05	12.3	7.07	522	7.89	70.4	1.87	200	UP TO 280 mL/MIN
1400	171.10	12.5	7.06	524	7.54	79.0	1.25	240	
1410	171.11	12.3	7.05	522	7.62	84.7	1.38	—	ISSUE W/MP-10. SWAP W/
1442	171.03	12.4	7.03	527	7.53	92.8	0.76	300	25# CONTROLLER
1447	171.03	12.3	7.04	525	7.59	94.2	1.26	280	STOP @ 1446 RESUME @ 1437
1456	171.03	12.9	7.03	531	7.40	95.4	1.28	275	SWITCH NITROGEN TANK @ 1455
1500	171.03	12.4	7.03	526	7.57	96.6	0.57	275	
1503	171.03	12.4	7.02	525	7.53	97.7	0.51	275	MIN PURGE REACHED.
									TOTAL PURGED: ~ 4.5 GAL

48 lb

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 16 secs **Discharge:** 14 secs
Pressure: 180 psi **Cycles Per Minute:** 2 **Flow Rate:** 300 mL/min

Screened Interval: 364-404 ft bgs **Minimum purge volume:** 3.1 gallons

140 on 25off

1.8

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑ Simultaneous Purge Allowed: ■

39 20 LC

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** ~~12/15/20~~ 12/16/20

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** ~~0.0~~ 0.1 **(Vented to)** ~

Well ID: MW-01S **Purging/Sampling Device:** Compressed gas/MP-10H **Pump depth (ft bgs):** 204

Initial Static Water Level (feet btoc): ~~156.55~~ 156.90 **Analytical Parameters:** VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA 3c 12/22

Final Water Level (feet btoc): 156.95 **QC Samples Collected:** None

Purge Start Time: 1020 **Ferrous Iron (mg/L):** 0.12 **Allowable Drawdown (ft):** 0.3

Sample Time: 1100 **Controller Settings: Recharge:** 15 secs **Discharge:** 10 secs **Pressure:** 100 psi

Samplers' Signatures: **Cycles Per Minute:** 2.17

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1025	156.95	12.3	7.10	678	17.60	152.7	10.5	200	
1035	156.93	12.6	7.03	683	10.24	153.9	3.43	240	
1045	156.95	12.6	7.02	684	9.54	164.2	3.39	240	
1050	156.95	12.5	7.02	683	9.52	171.3	2.88	240	MEW PURGE
1055	156.95	12.5	7.02	682	9.50	171.8	2.17	240	
									TOTAL PURGED ~ 2.5 GAL.

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 10 secs **Discharge:** 20 secs

Pressure: 180 psi **Cycles Per Minute:** 2 **Flow Rate:** 150 mL/min 30

Screened Interval: 184-224 ft bgs **Minimum purge volume:** 1.6 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12-16-20 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.1 **(Vented to)** —

Well ID: MW-02 **Purging/Sampling Device:** Compressed gas/MP-10H **Pump depth (ft bgs):** 195

Initial Static Water Level (feet btoc): 170.70 **Analytical Parameters:** VOCs, Metals, Mercury, Anions, ~~TDS~~ Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 170.76 **QC Samples Collected:** Field Duplicate FD01-GW (1235)

Purge Start Time: 1150 **Ferrous Iron (mg/L):** 0.08 **Allowable Drawdown (ft):** 0.3

Sample Time: 1230 **Controller Settings: Recharge:** 20 secs **Discharge:** 10 secs **Pressure:** 100 psi

Samplers' Signatures: **Cycles Per Minute:** 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1155	170.75	12.2	7.05	910	28.36	-35.2	11.0	240	
1200	170.54	12.5	7.02	912	11.65	21.3	1.84	240	
1205	170.71	12.5	7.01	913	10.28	43.9	1.24	240	
1210	170.70	12.3	6.99	913	9.96	57.8	0.43	240	
1215	170.70	12.5	6.99	913	9.78	67.0	0.61	240	MIN. PURGE
1218	170.70	12.5	6.98	911	9.62	74.0	0.01	240	
1221	170.70	12.5	6.98	914	~~9.60~~	78.4	0.00	240	
1224	170.70	12.5	6.98	912	9.59	80.9	0.00	240	TOT. PURGED: 2.5 GAL

24

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 8 secs **Discharge:** 22 secs
Pressure: 100 psi **Cycles Per Minute:** 2 **Flow Rate:** 200 mL/min

Screened Interval: 175.5-202.5 ft bgs **Minimum purge volume:** 1.5 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12/11/20

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** 0.0

Well ID: MW-03RA **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 215

Initial Static Water Level (feet btoc): NA **Analytical Parameters:** VOCs, Metals, Mercury, Anions, TDS/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): NA **QC Samples Collected:** None

Purge Start Time: 0940 **Ferrous Iron (mg/L):** 0.38 **Allowable Drawdown (ft):** NA

Sample Time: 1105 **Controller Settings: Recharge:** 80 secs **Discharge:** 10 secs **Pressure:** 115 psi

Samplers' Signatures: B Carreon **Cycles Per Minute:** 0.67

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
0950	NA	10.4	7.20	1490	7.99	203.8	3.5	90	
1000	NA	10.8	6.77	1491	5.77	87.4	30.9	100	
1017	NA	10.9	6.73	1486	6.50	85.5	27.9	90	
1029	NA	11.0	6.72	1486	6.59	78.9	19.4	100	~67 mL/min ~45 min purge
1035	NA	11.0	6.72	1485	6.58	75.9	20.1	100	Min purge met
1038	NA	11.1	6.72	1488	6.59	74.8	16.2	100	
1054	NA	11.2	6.72	1502	6.67	71.7	11.7	100	
1058	NA	11.3	6.73	1502	6.61	70.7	9.63	100	
1101	NA	10.9	6.73	1490	6.65	69.3	7.03	100	
1104	NA	10.9	6.73	1488	6.67	69.1	6.78	100	~2 gal purged

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 80 secs **Discharge:** 20 secs
Pressure: 120 psi **Cycles Per Minute:** _____ **Flow Rate:** <120 mL/min

Screened Interval: 215-220 ft bgs **Minimum purge volume:** 0.8 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12/4/20 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** 0.0

Well ID: MW-03RB **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 267

Initial Static Water Level (feet btoc): NA **Analytical Parameters:** VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): NA **QC Samples Collected:** None

Purge Start Time: 0905 **Ferrous Iron (mg/L):** 0.10 **Allowable Drawdown (ft):** NA

Sample Time: 1050 **Controller Settings: Recharge:** 80 secs **Discharge:** 30 secs **Pressure:** 130 psi

Samplers' Signatures: [signature] **Cycles Per Minute:** 0.5

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/~~min~~ cycle)	Comments
0910	NA	11.7	6.87	~~975~~	0.82	-55.9		150	
0925	NA	11.7	7.14	943	4.17	-13.6	34.4	150	
0940	NA	11.7	7.13	949	4.10	-11.6	83.0	150	
0945	NA	11.5	7.14	947	4.04	-12.2	86.5	150	
0950	NA	11.7	7.14	946	4.03	-12.4	86.3	150	Min purge met
1000	NA	11.1	7.17	951	4.06	-16.5	76.0	150	
1016	NA	11.6	7.15	948	3.90	-18.5	70.2	150	
1030	NA	11.8	7.14	947	3.79	-20.6	67.5	150	
1042	NA	11.9	7.14	944	3.57	-22.9	62.8	150	
1045	NA	11.9	7.14	949	3.56	-24.4	61.2	150	
1048	NA	11.2	7.16	954	3.38	-24.8	64.2	150	~3.25 gal purged

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 80 secs **Discharge:** 30 secs
Pressure: 130 psi **Cycles Per Minute:** _____ **Flow Rate:** 150 mL/~~min~~ cycle

Screened Interval: 267-272 ft bgs **Minimum purge volume:** 0.9 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☑ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12/11/20 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** 0.0

Well ID: MW-03RC **Purging/Sampling Device:** ZIST/Compressed gas (Be 12 fit) **Pump depth (ft bgs):** 307

Initial Static Water Level (feet btoc): NA **Analytical Parameters:** VOCs, Metals, Mercury, Anions, TDS/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): NA **QC Samples Collected:** None

Purge Start Time: 1145 **Ferrous Iron (mg/L):** 0.00 **Allowable Drawdown (ft):** NA

Sample Time: 1310 **Controller Settings: Recharge:** 80 secs **Discharge:** 28 secs **Pressure:** 120 psi

Samplers' Signatures: B Carreon **Cycles Per Minute:** 0.5

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min) cycle	Comments
1157	NA	11.2	7.16	782	2.80	53.7	72.6	200	
1241	NA	11.7	6.99	782	7.06	76.6	49.7	200	Min purge met
1245	NA	11.6	6.99	784	7.03	77.9	48.8	200	
1250	NA	11.6	6.99	786	7.01	79.4	43.7	200	
1303	NA	11.7	6.99	784	6.90 (2 cycles)	82.6	30.0	200	
1306	NA	11.7	6.99	785	6.83	83.1	30.0	200	
1309	NA	11.6	6.99	786	6.88	83.9	31.0	200	~3 gal purged

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 80 secs **Discharge:** 34 secs
Pressure: 130 psi **Cycles Per Minute:** _____ **Flow Rate:** 150 mL/min

Screened Interval: 307-312 ft bgs **Minimum purge volume:** 1.1 gallons ~4.2 L

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12-11-20 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** 0.0

Well ID: MW-03RD **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 359

Initial Static Water Level (feet btoc): NA **Analytical Parameters:** VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): NA **QC Samples Collected:** None

Purge Start Time: 1240 **Ferrous Iron (mg/L):** 0.13 **Allowable Drawdown (ft):** NA

Sample Time: 1405 **Controller Settings: Recharge:** 80 secs **Discharge:** 40 secs **Pressure:** 140 psi

Samplers' Signatures: [signature] **Cycles Per Minute:** 0.5

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/~~min~~ cycle)	Comments
1247	NA	9.3	7.18	865	0.85	-59.3	21.4	170	WATER DRAINING DOWN
1258	NA	11.6	7.43	885	1.00	-134.2	374	175	WOW AFTER EACH CYCLE.
1306	NA	11.1	7.35	902	0.97	-145.4	268	175	PULL PUMP @ 1305, REPLACE
1320	NA	11.8	7.28	881	0.95	-128.6	59.8	200	FILTER & SPRING. RE INSTAL
1325	NA	11.3	7.26	877	0.98	-124.2	34.3	200	PUMP & ~~FOR~~ RESUME PUMPING (1325)
1330	NA	12.0	7.23	871	0.92	-119.8	22.2	200	
1335	NA	12.1	7.21	870	0.96	-115.7	18.5	200	TURBIDITY SLUG @ 1258
~~1340~~	~~NA~~	11.9	7.30	868	0.72	-88.4	31.6	~~200~~	1340 WATER BACK FLOWING AGAIN
									USE READING BEFORE AS
									FINAL READING
									RANDOMLY BEGAN WORKING
									AGAIN. WELL SAMPLE IMMEDIATELY
									DUE TO PROBLEMS.
									~1.6 gal pumped

57 min

TEN PURGED

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 80 secs **Discharge:** 40 secs
Pressure: 145 psi **Cycles Per Minute:** _____ **Flow Rate:** 225 mL/min

Screened Interval: 359-364 ft bgs **Minimum purge volume:** 1.3 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12/10/20

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.1 **(Vented to)** ~~

Well ID: MW-04

Purging/Sampling Device: Compressed gas/MP-10 **Pump depth (ft bgs):** 160

Initial Static Water Level (feet btoc): 136.19

Analytical Parameters: VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 136.15

QC Samples Collected: Field Duplicate FD02-GW

Purge Start Time: 1200

Ferrous Iron (mg/L): 0.00 **Allowable Drawdown (ft):** 0.3

Sample Time: 1250 FD 1255

Controller Settings: Recharge: 16 secs **Discharge:** 14 secs **Pressure:** 100 psi

Samplers' Signatures:

Cycles Per Minute: 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1203	136.20	11.3	7.33	1567	6.05	47.8	17.6	250	
1208	136.21	11.4	7.30	1573	6.54	70.6	3.46	250	
1213	136.21	11.2	7.26	1574	6.65	87.6	2.50	250	
1218	136.21	11.5	7.24	1573	6.54	95.2	2.06	250	
1223	136.21	11.1	7.22	1570	6.62	102.0	1.38	250	
1228	136.21	11.2	7.20	1569	6.60	108.5	1.58	250	min purge met
1232	136.21	11.2	7.19	1574	6.67	113.5	2.20	250	
1238	136.18	11.0	7.18	1570	6.78	118.7	6.79	250	
1243	136.19	11.0	7.16	1570	6.63	124.5	2.16	250	
1244	136.17	11.0	7.16	1570	6.79	127.5	2.31	250	
1250	Sample								Total purged: 2.5gal
1255	Field	Duplicate							

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 16 secs **Discharge:** 14 secs
Pressure: 100 psi **Cycles Per Minute:** 2 **Flow Rate:** 350 mL/min

Screened Interval: 143-173 ft bgs **Minimum purge volume:** 1.4 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume Date: 12/8/20

OVM: FID ☐ PID ■ In Casing (ppm): (Initial) 0.0 (Vented to) —

Well ID: MW-05R Purging/Sampling Device: ~~QED MP10~~ MP10 / Grag Pump depth (ft bgs): 222

Initial Static Water Level (feet btoc): 214.89 Analytical Parameters: VOCs, metals, anions, alkalinity, chloride/nitrate, TOC, MEEA

Final Water Level (feet btoc): 214.91 QC Samples Collected: FD05-GW120820 1640

Purge Start Time: 1526 Ferrous Iron (mg/L): 1.02 Allowable Drawdown (ft): 0.3

Sample Time: 1635 Field Dup 1640 Controller Settings: Recharge: 30 secs Discharge: 10 secs Pressure: 165 psi

Samplers' Signatures: Cycles Per Minute: 1.5

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/~~min~~) mpc	Comments
1530	214.90	14.1	7.30	1.51	6.45	-21.0	1.90	180.	
1535	214.90	13.9	7.07	1.53	6.43	-15.0	1.90	180	
1540	214.90	13.7	7.05	1.53	5.63	-12.6	0.52	180	
1545	214.90	13.8	7.04	1.53	5.47	-10.0	0.43	180	
1550	214.90	13.6	7.03	1.53	5.49	-8.7	0.43	180	
1555	214.90	13.6	7.03	1.52	5.50	-7.3	0.33	180	
1600	214.90	13.5	7.02	1.52	5.56	-6.3	0.27	180	
~~1605~~	Stopped purge, ran out of compressed gas								
~~1610~~ 1620	214.90	13.4	7.03	1.51	5.60	-3.3	0.23	180	
~~1615~~ 1625	214.90	14.2	7.04	1.52	5.53	-3.8	0.28	180	
~~1620~~ 1630	214.90	13.9	7.04	1.52	5.66	-3.5	0.20	180	
1635	Sample								
1640	Field Duplicate								2.2 gal purged total

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 30 secs Discharge: 10 secs
Pressure: 165 psi Cycles Per Minute: _____ Flow Rate: _____ mL/min
Screened Interval: 198-228 ft bgs Minimum purge volume: 1.9 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12/10/20 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** ____

Well ID: MW-06 **Purging/Sampling Device:** Compressed gas/MP-10 **Pump depth (ft bgs):** 128

Initial Static Water Level (feet btoc): 118.81 **Analytical Parameters:** VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 118.75 **QC Samples Collected:** None

Purge Start Time: 1348 **Ferrous Iron (mg/L):** 0.43 **Allowable Drawdown (ft):** 0.3

Sample Time: 1415 **Controller Settings: Recharge:** ____ secs **Discharge:** ____ secs **Pressure:** ____ psi

Samplers' Signatures: [signature] **Cycles Per Minute:** ____

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1350	118.79	11.1	7.65	1208	5.04	118.6	5.79	200	
1355	118.79	10.9	7.49	1222	3.84	119.2	9.80	200	
1400	118.79	11.0	7.47	1224	3.29	117.5	6.47	200	
1405	118.79	11.0	7.46	1224	3.15	116.4	4.94	200	min purge met
1410	118.79	10.9	7.46	1223	3.04	115.1	3.26	200	
1415	Sample								
									Total purged: 2.7 gal

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 15 secs **Discharge:** 15 secs
Pressure: 80 psi **Cycles Per Minute:** 2 **Flow Rate:** 350 mL/min

Screened Interval: 100-130 ft bgs **Minimum purge volume:** 1.2 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12/9/20

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 ppm (QC 12/9) **(Vented to)** 0.0 ppm (QC 12/9)

Well ID: MW-08A

Purging/Sampling Device: Compressed gas/Solinist **Pump depth (ft bgs):** 99

Initial Static Water Level (feet btoc): 60.15

Analytical Parameters: VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA (QC 12/9)

Final Water Level (feet btoc): 60.15

QC Samples Collected: Field Duplicate FD03-GW 0800

Purge Start Time: 1020

Ferrous Iron (mg/L): 0.02 **Allowable Drawdown (ft):** 0.3

Sample Time: 1045

Controller Settings: Recharge: 13 secs **Discharge:** 17 secs **Pressure:** 55 psi

Samplers' Signatures: B Carreon RSK

Cycles Per Minute: 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1035	60.15	12.2	6.84	2248	4.24	-80.5	5.28	200	Min purge met.
1038	60.15	12.3	6.86	2244	4.07	-75.2	5.98	200	
1041	60.15	12.2	6.89	2248	3.99	-72.5	6.03	200	Purged ~1.5 gal
1045	Sample								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: **Vent:** 13 secs **Drive:** 17 secs
Pressure: 60 psi **Cycles Per Minute:** 3 **Flow Rate:** 300 mL/min

Screened Interval: 91-106 ft bgs **Minimum purge volume:** 0.8 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume Date: 12/9/20

OVM: FID ☐ PID ■ In Casing (ppm): (Initial) 12/9 BC 0.0 ppm (Vented to) BC 12/9 0.0 ppm

Well ID: MW-08B

Purging/Sampling Device: Compressed gas/Solinist Pump depth (ft bgs): 190

Initial Static Water Level (feet btoc): 58.42

Analytical Parameters: VOCs, Metals, Mercury, Anions, BC 12/9 TDS/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): _____

QC Samples Collected: MS/MSD

Purge Start Time: 1110

Ferrous Iron (mg/L): BC 12/9 ~~0.02~~ 0.00 Allowable Drawdown (ft): 0.3

Sample Time: 1135

Controller Settings: Recharge: 10 secs Discharge: 10 secs Pressure: 75 psi

Samplers' Signatures: S Carrera TSR

Cycles Per Minute: 3

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1115	58.42	12.4	7.20	1303	2.79	-90.2	3.58	200	
1120	58.42	12.3	7.18	1309	2.82	-85.4	3.06	300	
1125	58.42	12.3	7.15	1309	2.74	-79.7	2.35	300	
1130	58.42	12.3	7.15	1307	2.66	-77.2	2.49	300	min purge met Purged ~2gal
1135	Sample								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Vent: 10 secs Drive: 10 secs

Pressure: 90 psi Cycles Per Minute: 3 Flow Rate: 400 mL/min

Screened Interval: 180-200 ft bgs Minimum purge volume: 1.5 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12/9/20 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 ppm (QC 12/9) **(Vented to)** 0.0 ppm (QC 12/9)

Well ID: MW-08C **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 304

Initial Static Water Level (feet btoc): NA **Analytical Parameters:** VOCs, Metals, Mercury, Anions, ~~TDS~~ (QC 12/9)/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): NA **QC Samples Collected:** None

Purge Start Time: 1210 **Ferrous Iron (mg/L):** 0.58 **Allowable Drawdown (ft):** NA

Sample Time: 1330 **Controller Settings: Recharge:** 22 secs **Discharge:** 15 secs **Pressure:** 85 psi

Samplers' Signatures: B Carreon **Cycles Per Minute:** ~1.6

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/~~min~~ cycle)	Comments
1220	NA	12.5	7.69	1015	1.31	-234.6	177	250	
1230	NA	12.2	7.32	1061	1.66	-137.2	343	150	Increasingly turbid.
~~1240~~ 1245 (QC 12/9)	NA	12.1	7.31	1074	1.74	-124.6	58.8	150	Min purge vol met.
1248	NA	12.2	7.36	1069	1.71	-122.9	47.3	150	
1300	NA	12.1	7.29	1072	1.65	-118.2	37.9	150	
1315	NA	12.1	7.30	1072	1.60	-115.7	35.3	150	
1318	NA	12.1	7.29	1075	1.65	-115.0	33.1	150	
1321	NA	12.0	7.28	1072	1.60	-113.9	26.8	150	
1324	NA	12.0	7.28	1076	1.61	-114.0	26.6	150	
1327	NA	12.0	7.28	1071	1.58	-113.5	27.2	150	~4 gal purged
1330	~~NA~~	12K Sample							

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 22 secs **Discharge:** 15 secs 160 mL/cycle
Pressure: 85 psi **Cycles Per Minute:** 1.6 **Flow Rate:** ~~160 mL/min~~
Screened Interval: 304-309 ft bgs **Minimum purge volume:** 1.1 gallons = ~4.2 L

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12-9-20 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** ——

Well ID: MW-12D **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** 90

Initial Static Water Level (feet btoc): 56.13 **Analytical Parameters:** VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 56.15 **QC Samples Collected:** None

Purge Start Time: 1330 **Ferrous Iron (mg/L):** 0.00 **Allowable Drawdown (ft):** 0.3

Sample Time: 1400 **Controller Settings: Recharge:** 16 secs **Discharge:** 14 secs **Pressure:** 55 psi

Samplers' Signatures: [signature] **Cycles Per Minute:** 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1330	56.15	14.1	7.14	1.44	2.34	4.4	13.2	400	
1335	56.15	14.0	7.14	1.42	5.16	9.8	12.4	400	
1340	56.15	14.0	7.16	1.42	5.01	9.0	10.5	325	min purge met
1345	56.15	13.9	7.10	1.42	4.91	8.5	9.24	325	
1350	~~55~~ 56.15	14.0	7.09	1.42	4.93	8.0	4.88	325	
1355	56.15	13.9	7.09	1.42	4.97	7.9	3.62	325	
1400	Sample								
									Total purged: 2.5 gal

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 16 secs **Discharge:** 14 secs
Pressure: 55 psi **Cycles Per Minute:** 2 **Flow Rate:** 300 mL/min

Screened Interval: 88.5-93.5 ft bgs **Minimum purge volume:** 0.7 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12-16-20 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.1 **(Vented to)** —

Well ID: MW-13L **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** 160 (temp)

Initial Static Water Level (feet btoc): 17.25 16.94 **Analytical Parameters:** VOCs, 1,~~4-Dioxane, Metals, Mercury, Anions, TDS/Alkalinity, Nitrate/Nitrite, TOC, MEEA~~

Final Water Level (feet btoc): 16.96 **QC Samples Collected:** ~~Field Duplicate FD04-GW~~ 3C 12/22

Purge Start Time: 1432 **Ferrous Iron (mg/L):** — **Allowable Drawdown (ft):** 0.3

Sample Time: 1645 **Controller Settings: Recharge:** 20 secs **Discharge:** 10 secs **Pressure:** 120 psi ~200mL/min

Samplers' Signatures: [signature] **Cycles Per Minute:** 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
									TURBIDITY TOO HIGH TO
									READ. NO PARAMETERS
									TAKEN. ONLY GRAB
									SAMPLE FOR VOCs TAKEN.
									5 GAL. PURGED IN
									~90 MIN.

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: _____ secs **Discharge:** _____ secs

Pressure: _____ psi **Cycles Per Minute:** _____ **Flow Rate:** _____ mL/min

Screened Interval: 150-160 ft bgs **Minimum purge volume:** 1.2 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐

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GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12/11/20 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.1 **(Vented to)** ~~—~~

Well ID: MW-13D **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** 82

Initial Static Water Level (feet btoc): ~~13.31~~ MP 13.73 **Analytical Parameters:** VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): ~~13.35~~ MP 13.93 **QC Samples Collected:** None

Purge Start Time: 1125 **Ferrous Iron (mg/L):** 0.00 **Allowable Drawdown (ft):** 0.3

Sample Time: 1210 **Controller Settings: Recharge:** _____ secs **Discharge:** _____ secs **Pressure:** _____ psi

Samplers' Signatures: _____ **Cycles Per Minute:** _____

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1125	13.73	12.9	7.12	1.37	4.41	23.2	20.1	200	
1130	13.94	13.0	7.10	1.39	5.56	21.2	14.7	200	
1135	13.92	12.7	7.08	1.33	5.23	20.5	16.9	150	
1140	13.93	12.9	7.08	1.38	5.22	20.5	16.4	150	min purge
1145	13.92	12.6	7.08	1.39	5.46	20.0	10.4	150	
1150	13.93	12.9	7.08	1.35	5.30	20.2	11.3	150	
1155	13.92	12.8	7.08	1.39	5.47	19.9	7.35	150	
1200	13.92	12.7	7.08	1.39	5.53	20.3	4.31	150	
1205	13.94	12.7	7.07	1.38	5.50	21.1	6.27	150	
1210	Sample								Total purged: 3.2 gal.

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 20 secs **Discharge:** 10 secs
Pressure: 40 psi **Cycles Per Minute:** 2 **Flow Rate:** 250 mL/min

Screened Interval: 79-84 ft bgs **Minimum purge volume:** 0.7 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12/10/20 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** _____

Well ID: MW-13S **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** 19

Initial Static Water Level (feet btoc): 14.03 **Analytical Parameters:** VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 15.51 **QC Samples Collected:** None

Purge Start Time: 1537 **Ferrous Iron (mg/L):** 0.59 **Allowable Drawdown (ft):** 0.3

Sample Time: 0925 **Controller Settings: Recharge:** 54 secs **Discharge:** 6 secs **Pressure:** 18 psi

Samplers' Signatures: _____ **Cycles Per Minute:** 1

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1538	14.36	12.0	8.76	1515	4.58	100.9	73.5	70	
1543	14.55	10.5	7.73	2083	1.96	116.7	53.3	30	
1548	14.62	10.4	7.53	2128	1.27	93.5	34.9	25	
1553	14.84	12.4	7.29	2148	0.88	-49.9	33.5	75	
1558	15.16	13.5	7.14	2149	0.55	-66.2	16.3	75	min purge met
1603	15.37	14.4	7.02	2138	0.49	-57.2	11.0	75	
1608	16.13	14.8	7.00	2161	0.55	-40.1	16.7	300	
1613	16.55	~~14.9~~ MD							Hit the top of the pump
Returned @ 0830 12/11/20				Total Recharge WL at 14.03'					
0921	14.75	13.5	7.05	2210	8.16	136.16	48.9	100	
0925	Sample								Total purged: ~1 gal

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 54 secs **Discharge:** 6 secs
Pressure: 18 psi **Cycles Per Minute:** 1 **Flow Rate:** 50 mL/min

Screened Interval: 15.5-20.5 ft bgs **Minimum purge volume:** 0.4 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12-14-20 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** 0.0

Well ID: MW-14D **Purging/Sampling Device:** Artesian/Open Valve **Pump depth (ft bgs):** NA

Initial Static Water Level (feet btoc): N/A **Analytical Parameters:** VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): N/A **QC Samples Collected:** None

Purge Start Time: 1008 **Ferrous Iron (mg/L):** 0.34 **Allowable Drawdown (ft):** NA

Sample Time: 1035 **Controller Settings: Recharge:** — secs **Discharge:** — secs **Pressure:** — psi

Samplers' Signatures: [signature] **Cycles Per Minute:** —

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1009	—	8.5	7.22	1370	5.27	182.4	7.00	1800	
1014	—	12.2	7.11	1369	3.99	27.6	2.69	1200	MIN PURGE
1019	—	12.6	7.10	1384	5.29	20.7	3.07	500	
1122	—	11.8	7.13	1384	6.05	202.6	3.96	600	
1028	—	12.3	7.12	1381	6.11	201.1	2.61	600	
1032	—	11.9	7.13	1379	6.19	200.4	2.77	300	
1035	SAMPLE								7.5 GAL. PURGED

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: NA **Discharge:** NA

Pressure: NA **Cycles Per Minute:** NA **Flow Rate:** 300-500 mL/min

Screened Interval: 49-54 ft bgs **Minimum purge volume:** 0.4 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12-14-20 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** 0.0

Well ID: MW-14S **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** 12

Initial Static Water Level (feet btoc): 5.32 **Analytical Parameters:** VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 7.88 **QC Samples Collected:** None

Purge Start Time: 0917 **Ferrous Iron (mg/L):** 0.14 **Allowable Drawdown (ft):** 0.3

Sample Time: 1050 **Controller Settings: Recharge:** 56 secs **Discharge:** 4 secs **Pressure:** 10 psi

Samplers' Signatures: K D M **Cycles Per Minute:** 1

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
0922	5.73	10.2	7.12	1141	17.91	131.3	38.3	~~5.73~~ 60	
0940	6.22	9.9	6.72	1219	11.7	112.1	13.0	50	
0950	6.36	8.5	6.90	1177	1.26	109.9	15.5	50	
1000	6.53	9.6	6.93	1234	1.05	102.8	13.1	60	
1010		9.6	6.95	1242	1.02	98.5	12.6	60	MIN. PURGED
1020	6.85	9.2	6.96	1249	1.00	95.2	11.8	60	
1029	6.96	9.1	6.96	1248	0.96	91.5	11.3	60	
1032	7.06	9.4	6.96	1249	0.94	87.7	12.5	60	
1042	7.22	9.4	6.96	1253	0.91	84.6	12.5	60	
1045	7.24	9.3	6.97	1250	0.92	83.4	11.6	60	
									~1.5 GAL. PURGED

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 56 secs **Discharge:** 4 secs
Pressure: 20 psi **Cycles Per Minute:** 1 **Flow Rate:** 50 mL/min

Screened Interval: 4.5-14.5 ft bgs **Minimum purge volume:** 0.7 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume Date: 12/9/20 OVM: FID ☐ PID ■ In Casing (ppm): (Initial) 0.0 (Vented to) —

Well ID: MW-15S Purging/Sampling Device: MP-50 Pump depth (ft bgs): 54

Initial Static Water Level (feet btoc): 49.35 Analytical Parameters: VOCs, Metals, Mercury, Anions, ~~TDS~~Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 49.42 QC Samples Collected: None

Purge Start Time: 1050 Ferrous Iron (mg/L): 0.00 Allowable Drawdown (ft): 0.3

Sample Time: ~~1145~~ 1200 Controller Settings: Recharge: 8 secs Discharge: 12 secs Pressure: 30 psi

Samplers' Signatures: Cycles Per Minute: 3

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1050	49.45	11.0	7.31	1911	5.03	-67.9	31.1	~105	
1055	49.45	12.3	7.40	2019	4.73	-26.3	94.3	~150	
1100	49.45	13.3	7.38	2049	4.68	17.6	88.8	~150	
1105	49.45	13.4	7.39	2046	4.86	38.8	60.5	225	
1110	49.45	13.4	7.41	2049	4.85	48.6	44.3	195	
1115	49.45	13.3	7.46	2047	4.90	48.0	34.3	195	
1120	49.45	13.3	7.53	2050	4.91	63.2	~~3.17~~ 3.9	195	min purge met
1125	49.41	13.3	7.18	2048	4.91	65.4	17.2	195	
1130	49.42	13.4	6.99	2048	4.88	67.5	14.3	195	
1135	~~49.42~~	13.4	6.92	2050	4.90	70.5	13.5	195	
1140	49.42	13.4	6.90	2048	4.89	72.9	12.1	195	
1145	49.42	13.5	6.89	2049	4.87	75.0	9.82	195	
1150	49.44	13.4	6.89	2049	4.89	76.6	8.46	195	
1155	49.40	13.4	6.88	2047	4.87	78.6	7.58	195	TOTAL PURGE VOLUME: 3.5g

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 8 secs Discharge: 12 secs
Pressure: 30 psi Cycles Per Minute: 3 Flow Rate: 275 mL/min

Screened Interval: 52.5-55 ft bgs Minimum purge volume: 0.5 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume Date: 12/9/20 OVM: FID ☐ PID ■ In Casing (ppm): (Initial) 0.1 (Vented to) —

Well ID: MW-15D Purging/Sampling Device: MP-50 Pump depth (ft bgs): 72

Initial Static Water Level (feet btoc): 50.65 Analytical Parameters: VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 50.71 QC Samples Collected: None

Purge Start Time: 1117 Ferrous Iron (mg/L): 0.78 Allowable Drawdown (ft): 0.3

Sample Time: 1225 Controller Settings: Recharge: 11 secs Discharge: 9 secs Pressure: 35 psi

Samplers' Signatures: Cycles Per Minute: 3

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1117	50.65	8.2	7.25	1.75	6.60	178.2	3.17	15	water line still warming up
1122	50.65	8.6	7.09	1.86	4.94	133.2	12.8	25	
1127	50.64	8.7	7.00	1.88	4.16	99.4	22.9	30	
1132	50.64	9.1	7.01	1.90	3.87	81.1	19.3	30	upped pressure to 40 psi
1137	50.65	12.9	6.99	1.85	3.58	73.9	29.8	250	
1142	50.73	13.2	6.94	1.90	3.42	62.6	39.1	60	
1147	50.70	13.1	6.92	1.87	3.63	56.1	34.7	270	
1152	50.70	13.4	6.93	1.89	3.73	47.7	31.6	270	min purge met
1157	50.70	13.8	6.94	1.89	3.83	38.7	29.6	270	
1202	50.71	13.4	6.94	1.90	3.99	34.6	23.4	270	
1207	50.70	13.3	6.94	1.90	4.00	30.9	21.7	270	
1212	50.70	13.3	6.94	1.90	4.02	26.8	17.7	270	
1217	50.70	13.4	6.94	1.90	4.19	23.9	18.5	270	
1220	50.70	13.4	6.94	1.90	4.06	22.8	17.2	270	Total purged ~ 3.2 gal

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 11 Discharge: 9
Pressure: 35 Cycles Per Minute: 3 Flow Rate: 275 mL/min

Screened Interval: 69-74 ft bgs Minimum purge volume: 0.6 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12/10/20 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** —

Well ID: MW-16S **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** 16

Initial Static Water Level (feet btoc): 11.19 **Analytical Parameters:** VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 11.42 **QC Samples Collected:** None

Purge Start Time: 0900 **Ferrous Iron (mg/L):** 0.37 **Allowable Drawdown (ft):** 0.3

Sample Time: 0930 **Controller Settings: Recharge:** 25 secs **Discharge:** 5 secs **Pressure:** 18 psi

Samplers' Signatures: [signature] **Cycles Per Minute:** 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
0905	11.48	12.2	7.11	1531	5.75	191.2	12.5	150	
0910	11.42	11.9	7.09	1530	5.24	191.9	10.5	150	min purge met
0915	11.45	11.9	7.10	1535	5.29	192.5	8.73	150	
0920	11.48	12.0	7.11	1529	4.97	193.9	6.28	150	
0925	11.48	12.0	7.10	1531	5.07	195.1	5.72	150	
0930	Sample								Total purged: 2 gal

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 25 secs **Discharge:** 5 secs
Pressure: 18 psi **Cycles Per Minute:** 2 **Flow Rate:** 300 mL/min

Screened Interval: 9-19 ft bgs **Minimum purge volume:** 0.2 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12/10/20 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** _____

Well ID: MW-16D **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** 67

Initial Static Water Level (feet btoc): 9.81 **Analytical Parameters:** VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 9.91 **QC Samples Collected:** None

Purge Start Time: 1008 **Ferrous Iron (mg/L):** 0.49 **Allowable Drawdown (ft):** 0.3

Sample Time: 1045 **Controller Settings: Recharge:** 20 secs **Discharge:** 10 secs **Pressure:** 25 psi

Samplers' Signatures: _____ **Cycles Per Minute:** 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1010	9.90	11.2	7.69	1022	1.404	38.0	5.77	150	
1015	9.91	11.9	7.50	1093	6.05	63.9	7.73	150	
1020	9.90	11.9	7.43	1093	6.25	83.8	5.20	150	
1025	9.91	12.0	7.38	1093	6.30	95.7	3.61	150	min purge met
1030	9.91	11.9	7.35	1095	6.34	101.9	3.89	150	
1035	9.91	11.9	7.33	1094	6.28	108.2	4.09	150	
1040	9.91	11.9	7.31	1093	6.29	111.1	5.50	150	
1045	Sample								
									Total purged 2.5 gal

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 20 **Discharge:** 10
Pressure: 25 **Cycles Per Minute:** 2 **Flow Rate:** 200 mL/min

Screened Interval: 62-72 ft bgs **Minimum purge volume:** 0.6 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12/13/20 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.1 (no 50) **(Vented to)** —

Well ID: MW-17D **Purging/Sampling Device:** ~~Artesian/Open Valve~~ **Pump depth (ft bgs):** NA

Initial Static Water Level (feet btoc): 1.56 (TD Survey) **Analytical Parameters:** VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 1.55 **QC Samples Collected:** None

Purge Start Time: 1330 **Ferrous Iron (mg/L):** 0.11 **Allowable Drawdown (ft):** NA

Sample Time: 1620 **Controller Settings: Recharge:** 12 secs **Discharge:** 8 secs **Pressure:** 30 psi

Samplers' Signatures: [signature] **Cycles Per Minute:** 3

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1330	1.60	9.5	7.72	1557	4.23	146.0	800<	300	Water looks like chocolate milk
1335	1.60	10.8	7.33	1609	3.41	95.5	800<	300	and turbidity is overrange.
1340	1.61	11.1	7.22	1611	3.50	93.6	800<	300	
1345	1.56	11.2	7.16	1619	3.40	101.7	600	300	min purge reached
1350	1.61	11.3	7.12	1614	3.65	105.0	800<	300	
1355	1.60	11.4	7.09	1615	3.54	107.3	800<	300	
1400	1.61	11.4	7.09	1620	4.10	108.9	800<	300	
1405	1.64	11.5	7.07	1620	4.20	111.4	851	300	1st real NTU reading.
1410	1.66	11.4	7.06	1624	4.37	~~111.4~~ 111.9	554	300	
1415	1.64	11.5	7.04	1625	4.45	112.3	435	300	
1420	1.63	11.4	7.05	1623	4.50	114.0	323	300	
1425	1.65	11.4	7.04	1627	4.53	115.7	239	300	
1430	1.61	11.5	7.02	1626	4.57	116.0	205	300	Total purged 18 gal
1435	1.63	11.5	7.04	1625	4.66	116.7	169	300	

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: NA/12 **Discharge:** NA/8
Pressure: NA/30 psi **Cycles Per Minute:** NA/3 **Flow Rate:** 300 mL/min

Screened Interval: 44-54 ft bgs **Minimum purge volume:** 0.4 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: ~~700S 1600E~~ PCE Plume Date: 12/13/20

Well ID: MW-17D

Initial Static Water Level (feet btoc): _____ (after pump install)

Final Water Level (feet btoc): _____

Purge Start Time: _____

Sample Time: _____

Samplers' Signatures: _____

OVM: FID ☐ PID ■ In Casing (ppm): (Initial) _____ (Vented to) _____

Purging/Sampling Device: ~~HDPE 0.25 gallon bailer~~ MO 1/4

Analytical Parameters: ~~BTEX, MTBE, PAH, JET-A~~ MO 1/4

QC Samples Collected: _____

Sample Number: _____

Controller Settings: Recharge: _____ secs Discharge: _____ secs Pressure: _____ psi

Cycles Per Minute: _____

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1440	1.62	11.5	7.03	1626	4.48	116.7	124	300	
1445	1.65	11.6	7.02	1629	4.65	116.7	112	300	
1450	1.67	11.5	7.01	1627	4.50	117.6	101	300	
1455	1.61	11.6	7.01	1625	4.64	118.1	91.0	300	
1500	1.62	11.5	7.00	1626	4.71	118.6	75.8	300	
1505	1.62	11.5	7.00	1624	4.55	118.5	85.2	300	
1510	1.63	11.6	7.00	1625	4.58	117.6	67.5	300	
1515	1.61	11.5	7.00	1630	4.72	117.9	63.1	300	
1520	1.61	11.5	7.00	1628	4.68	117.9	55.4	300	
1525	1.63	11.6	7.00	1628	4.72	118.3	52.6	300	
1530	1.63	11.6	7.00	1627	4.62	118.6	53.2	300	
1535	1.62	11.6	6.99	1625	4.63	118.5	51.8	300	
1540	1.62	11.7	6.99	1628	4.63	118.4	46.5	300	
1545	1.62	11.6	6.99	1626	4.49	118.4	48.1	300	

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	± 1° C	DO	± 10 %
pH	± 0.1 pH unit	ORP	± 10mV
Conductivity	± 10 %	Water Level	± 0.1 foot
		Turbidity	< 50 NTU

Ferrous Iron (mg/L): _____

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume Date: 12/13/20

Well ID: MW17D

Initial Static Water Level (feet btoc): _____ (after pump install)

Final Water Level (feet btoc): _____

Purge Start Time: _____

Sample Time: _____

Samplers' Signatures: _____

OVM: FID ☐ PID ■ In Casing (ppm): (Initial) _____ (Vented to) _____

Purging/Sampling Device: ~~HDPE 0.25 gallon bailer~~ MD 1/4

Analytical Parameters: ~~BTEX, MTBE, PAH, JET-A~~ MD 1/4

QC Samples Collected: _____

Sample Number: _____

Controller Settings: Recharge: _____ secs Discharge: _____ secs Pressure: _____ psi

Cycles Per Minute: _____

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1550	1.61	11.6	6.99	1627	4.69	115.4	42.6	300	
1555	1.62	11.6	6.99	1626	4.67	118.1	42.1	300	
1600	1.62	11.7	6.99	1625	4.70	117.5	37.4	300	
1605	1.65	11.6	6.99	1628	4.76	118.3	36.3	300	
1610	1.61	11.7	6.99	1628	4.77	117.6	37.1	300	

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	± 1° C	DO	± 10 %
pH	± 0.1 pH unit	ORP	± 10mV
Conductivity	± 10 %	Water Level	± 0.1 foot
		Turbidity	< 50 NTU

Ferrous Iron (mg/L): _____

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12/11/20 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.2 **(Vented to)** _____

Well ID: MW-17S **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** 20

Initial Static Water Level (feet btoc): 10.63 **Analytical Parameters:** VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 9.96 **QC Samples Collected:** None

Purge Start Time: 1313 **Ferrous Iron (mg/L):** 0.61 **Allowable Drawdown (ft):** 0.3

Sample Time: 1510 **Controller Settings: Recharge:** 55 secs **Discharge:** 5 secs **Pressure:** 14 psi

Samplers' Signatures: _____ **Cycles Per Minute:** 1

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1315	6.82	9.2	7.20	1.54	3.84	4.2	32.8	75	
1320	6.94	9.0	7.14	1.89	2.26	-0.3	37.5	50	
1325	7.07	9.1	7.10	1.57	1.60	-0.9	33.9	50	
1330	7.22	9.2	7.12	1.88	1.52	-2.7	26.2	50	
1335	7.35	9.4	7.12	1.88	1.34	-3.3	24.1	50	
1340	7.48	9.5	7.12	1.88	1.24	-4.4	21.7	50	
1345	7.66	9.5	7.12	1.88	1.32	-4.4	15.6	50	
1350	7.69	9.3	7.11	1.88	1.30	-4.2	13.1	50	
1355	7.78	9.5	7.11	1.88	1.23	-4.4	14.1	50	
1400	7.89	9.5	7.11	1.88	1.27	-4.7	14.0	50	
1405	8.08	9.4	7.11	1.89	1.35	-4.7	13.8	50	
1410	8.21	9.3	7.10	1.89	1.37	-3.9	13.1	50	
1415	8.29	9.3	7.10	1.89	1.40	-3.8	14.1	50	Total purged
1420	8.31	9.2	7.09	1.88	1.31	-3.2	13.0	50	purged ~1.8 gal

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 55 secs **Discharge:** 5 secs
Pressure: 18 psi **Cycles Per Minute:** 1 **Flow Rate:** 50 mL/min

Screened Interval: 6-21 ft bgs **Minimum purge volume:** 0.6 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12/11/20 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** 0.0

Well ID: MW-17S ~~MD~~ continued **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** 60

Initial Static Water Level (feet btoc): 6.63 **Analytical Parameters:** VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 9.96 **QC Samples Collected:** None

Purge Start Time: 1313 **Ferrous Iron (mg/L):** See Pg1 **Allowable Drawdown (ft):** 0.3

Sample Time: 1510 **Controller Settings: Recharge:** ~~49~~ 55 secs **Discharge:** ~~11~~ 5 secs **Pressure:** ~~45~~ 18 psi

Samplers' Signatures: See Pg1 **Cycles Per Minute:** 1

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1425	8.51	9.4	7.10	1.88	1.30	-3.4	14.0	50	
1430	8.52	9.3	7.09	1.89	1.36	-2.8	12.5	50	
1435	8.72	9.4	7.09	1.89	1.30	-2.7	13.5	50	
1440	8.78	9.4	7.09	1.89	1.31	-2.9	14.0	50	
1445	8.92	9.5	7.09	1.89	1.27	-3.1	14.4	50	
1450	9.08	9.6	7.10	1.88	1.30	-3.0	14.6	50	
1455	9.20	9.5	7.09	1.88	1.26	-3.2	14.7	50	
1500	9.25	9.5	7.08	1.89	1.32	-3.0	14.4	50	
1510	Sample								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 49 secs **Discharge:** 11 secs
Pressure: 45 psi **Cycles Per Minute:** 1 **Flow Rate:** 60 mL/min

Screened Interval: 50-60 ft bgs **Minimum purge volume:** 0.5 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12-14-20

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** 0.0

Well ID: MW-18 **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** 88

Initial Static Water Level (feet btoc): 81.59 **Analytical Parameters:** VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 81.60 **QC Samples Collected:** Field Duplicate ~~FD05-GW~~ FD06-GW (1505)

Purge Start Time: 1427 **Ferrous Iron (mg/L):** 0.00 **Allowable Drawdown (ft):** 0.3

Sample Time: 1500 **Controller Settings: Recharge:** 19 secs **Discharge:** 11 secs **Pressure:** 48 psi

Samplers' Signatures: [signature] **Cycles Per Minute:** 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1428	81.60	12.2 ~~72.0~~	~~72.0~~	1548	20.59	37.8	45.0	240	
1435	81.60	11.6	6.93	1521	8.32	38.0	24.0	200	
1440	81.60	11.7	6.90	1520	7.38	45.4	9.17	200	MIN. PURGE
1443	81.60	11.5	6.89	1516	7.21	49.7	6.40	200	
1446	81.60	11.5	6.88	1520	6.89	53.9	8.08	200	
1450	81.60	11.4	6.88	1517	6.78	57.8	8.35	200	
1453	81.60	11.3	6.87	1517	6.65	60.6	6.56	200	
									7.5 GAL PURGED

6.65 per CK

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 18 secs **Discharge:** 12 secs

Pressure: 50 psi **Cycles Per Minute:** 2 **Flow Rate:** 200 mL/min

Screened Interval: 80-90 ft bgs **Minimum purge volume:** 0.7 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12-14-20 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** 9.0

Well ID: MW-19 **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** 89

Initial Static Water Level (feet btoc): 81.11 **Analytical Parameters:** VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 81.11 **QC Samples Collected:** ~~Field Duplicate FD06-GW~~

Purge Start Time: 1300 **Ferrous Iron (mg/L):** 0.12 **Allowable Drawdown (ft):** 0.3

Sample Time: 1340 **Controller Settings: Recharge:** 20 secs **Discharge:** 10 secs **Pressure:** 50 psi

Samplers' Signatures: **Cycles Per Minute:** 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1305	81.11	10.9	6.88	1354	3.98	8.4	86.8	~~300~~	
1310	81.11	12.3	6.93	1440	5.31	11.2	41.8	300	MAX PURGE
1315	81.11	12.6	6.92	1429	5.40	13.0	21.9	300	
1318	81.11	12.4	6.91	1427	7.02	14.7	18.4	250	
1321	81.11	12.5	6.91	1434	6.31	15.4	17.9	250	
1324	81.11	12.4	6.90	1436	6.54	14.8	16.2	250	
1328	81.11	12.4	6.90	1436	6.31	13.7	13.4	220	
1331	81.11	12.4	6.90	1442	6.25	14.1	14.6	220	
1334	81.11	12.3	6.90	1439	6.18	14.6	13.2	220	~2.5 CASE PURGED

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 18 secs **Discharge:** 12 secs
Pressure: 55 psi **Cycles Per Minute:** 2 **Flow Rate:** 200 mL/min

Screened Interval: 84-94 ft bgs **Minimum purge volume:** 0.7 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12/5/20 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** 0.2

Well ID: MW-20D **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** 124

Initial Static Water Level (feet btoc): ~~82.70~~ 82.94 **Analytical Parameters:** VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 82.95 **QC Samples Collected:** None

Purge Start Time: 1120 **Ferrous Iron (mg/L):** 0.04 **Allowable Drawdown (ft):** 0.3

Sample Time: 1235 **Controller Settings: Recharge:** 21 secs **Discharge:** 9 secs **Pressure:** 55 psi

Samplers' Signatures: [signature] **Cycles Per Minute:** 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1125	82.95	11.9	7.24	480.7	18.30	133.7	67.9	160	
1135	82.96	12.2	7.18	481.1	9.71	47.5	42.7	160	
1145	82.96	12.3	7.17	480.9	9.24	27.3	35.5	160	
1150	83.00	12.3	7.17	479.3	8.88	11.3	23.5	160	DESH. 9.0 RECH. 21 / TEMPURGE
1155	83.01	11.9	7.16	476.6	8.86	8.1	21.7	120	
1200	83.01	11.9	7.13	475.7	8.81	7.1	20.8	120	
1203	83.01	11.8	7.17	474.3	8.77	8.2	17.4	120	
1207	83.01	12.0	7.17	476.1	8.72	8.5	14.0	120	
1211	83.01	11.7	7.17	474.2	8.78	10.0	12.4	120	
1217	83.01	11.5	7.17	471.0	8.82	11.5	10.0	120	
1220	83.01	11.5	7.24	470.3	8.82	12.6	10.3	100	
1223	83.01	11.7	7.16	473.6	8.78	13.5	8.4	100	
1226	83.01	11.8	7.13	473.9	8.78	15.4	7.64	100	
1229	83.01	11.9	7.17	475.0	8.76	16.4	8.52	100	TOTAL PURGED: 2.5GAL.

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: **Recharge:** 20 **Discharge:** 10
Pressure: 70 **Cycles Per Minute:** 2 **Flow Rate:** 100 mL/min

Screened Interval: 119-129 ft bgs **Minimum purge volume:** 1.0 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12-14-20 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** 0.0

Well ID: MW-20S **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** 88

Initial Static Water Level (feet btoc): 83.19 **Analytical Parameters:** VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 83.19 **QC Samples Collected:** MS/MSD

Purge Start Time: 1535 **Ferrous Iron (mg/L):** 0.22 **Allowable Drawdown (ft):** 0.3

Sample Time: 1610 **Controller Settings: Recharge:** 9 secs **Discharge:** 11 secs **Pressure:** 45 psi

Samplers' Signatures: [signature] **Cycles Per Minute:** 3

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1542	83.21	11.7	7.12	880	1641	54.8	5.24	180	
1548	83.21	11.5	7.05	879	561	60.3	8.28	180	
1552	83.21	11.4	7.02	880	4.79	63.2	6.26	180	
1557	83.21	11.2	7.00	877	4.49	65.9	4.47	180	MIN. PURGE
1601	83.21	11.4	7.00	882	4.33	66.9	2.63	180	
1604	83.21	11.3	6.99	881	4.35	67.9	3.01	180	
									PURGED w/ 1.5 GAL.

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 11 secs **Discharge:** 9 secs

Pressure: 40 psi **Cycles Per Minute:** 3 **Flow Rate:** 250 mL/min

Screened Interval: 79.5-89.5 ft bgs **Minimum purge volume:** 0.7 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12/14/20 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0 **(Vented to)** 0

Well ID: MW-21 **Purging/Sampling Device:** ~~MP-50~~ ZIST + N_2 **Pump depth (ft bgs):** 70

Initial Static Water Level (feet btoc): 64.94 **Analytical Parameters:** VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 64.95 **QC Samples Collected:** None

Purge Start Time: 0940 **Ferrous Iron (mg/L):** 0.16 **Allowable Drawdown (ft):** 0.3

Sample Time: 1020 **Controller Settings: Recharge:** 15 secs **Discharge:** 15 secs **Pressure:** 35 psi

Samplers' Signatures: [signature] **Cycles Per Minute:** 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
0945	64.94	12.8	6.93	1799	7.44	-67.2	58.5	125	
0950	64.95	12.6	6.97	1770	7.65	4.3	48.0	125	
0955	64.96	12.7	6.97	1787	7.85	20.7	19.4	125	minimum purge met
1000	64.96	12.7	6.97	1801	7.65	32.1	9.73	125	
1005	64.96	12.6	6.97	1805	7.58	41.6	9.59	125	
1010	64.95	12.6	6.97	1806	7.56	47.9	7.13	125	
1015	64.95	12.5	6.97	1804	7.69	50.8	8.51	125	~1.5 gal purged
1020	SAMPLE								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: **Recharge:** 13 secs **Discharge:** 7 secs
Pressure: 25 psi **Cycles Per Minute:** 3 **Flow Rate:** 100 mL/min

Screened Interval: 62-72 ft bgs **Minimum purge volume:** 0.6 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12/14/20 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** Ø **(Vented to)** Ø

Well ID: MW-22 **Purging/Sampling Device:** ~~MP-50~~ 2ST + N2 **Pump depth (ft bgs):** 72

Initial Static Water Level (feet btoc): ~~63.50~~ 63.20 **Analytical Parameters:** VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): _____ **QC Samples Collected:** MS/MSD

Purge Start Time: 1055 **Ferrous Iron (mg/L):** 0.24 **Allowable Drawdown (ft):** 0.3

Sample Time: 1200 **Controller Settings: Recharge:** 13 secs **Discharge:** 17 secs **Pressure:** 35 psi

Samplers' Signatures: Jonn Campbell **Cycles Per Minute:** 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1102	~~63.51~~	12.1	7.21	1712	6.75	69.8	186	300	WL = 63.21
1107	63.22	12.4	7.07	1728	6.74	73.2	69.8	300	
1112	63.25	12.2	7.01	1722	6.77	78.3	42.9	300	minimum purge met
1117	63.24	12.4	6.99	1721	6.83	81.7	32.5	300	
1122	63.24	12.3	6.96	1722	6.78	83.5	22.7	300	
1127	63.23	12.5	6.95	1721	6.68	85.3	18.1	300	
1132	63.23	12.4	6.94	1723	6.69	86.1	13.9	300	
1137	63.23	12.1	6.94	1720	6.70	86.8	11.7	300	
1142	63.23	12.3	6.93	1719	6.78	86.5	10.9	300	
1147	63.23	12.4	6.93	1721	6.72	86.5	8.19	300	
1150	63.23	12.4	6.93	179	6.72	86.5	7.99	300	
1153	63.23	12.2	6.92	1718	6.78	86.0	7.75	300	purged approx 3.5 gal
1200	SAMPLE								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 13 secs **Discharge:** 17 secs
Pressure: 35 psi **Cycles Per Minute:** 2 **Flow Rate:** 300 mL/min

Screened Interval: 64-74 ft bgs **Minimum purge volume:** 0.6 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12/9/20 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** Ø **(Vented to)** Ø

Well ID: MW-23A **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 210

Initial Static Water Level (feet btoc): NA **Analytical Parameters:** VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): NA **QC Samples Collected:** None

Purge Start Time: 1410 **Ferrous Iron (mg/L):** 1.32 **Allowable Drawdown (ft):** NA

Sample Time: 1620 **Controller Settings: Recharge:** 120 secs **Discharge:** 20 secs **Pressure:** 120 psi

Samplers' Signatures: EmmaRA **Cycles Per Minute:** 0.4

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
1430	—	9.7	7.42	1691	9.55	125.2	—	50	
1437	—	9.6	7.32	1735	7.22	123.1	37.5	50	minimum purge met
1442	—	9.4	7.23	1734	6.89	121.9	27.6	50	
1448	—	9.9	7.29	1725	6.92	118.4	21.9	50	
1455	—	10.5	7.26	1713	6.01	20.5	82.8	50	
1508	—	11.1	7.20	1707	4.59	-69.7	331	50	
1513	—	11.3	7.15	1720	4.16	-71.9	455	50	
1518	—	11.5	7.11	1717	4.07	-70.3	418	50	
1523	—	11.7	7.07	1737	3.87	-68.7	384	50	
1540	—	12.0	7.01	1756	8.99	-66.4	120	50	
1605	—	11.6	6.98	1748	3.82	-66.0	32.7	50	
1610	—	11.8	6.97	1758	3.82	-65.7	33.5	50	
1615	—	11.5	6.98	1758	3.82	-65.3	33.6	50	~1 gal purged
1620	SAMPLE	—	—	—	—	—	—	—	

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 120 secs **Discharge:** 20 secs
Pressure: 110 psi **Cycles Per Minute:** _____ **Flow Rate:** 50 mL/cycle

Screened Interval: 210-220 ft bgs **Minimum purge volume:** 0.1 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12/10/20 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0 **(Vented to)** 0

Well ID: MW-23B **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 250

Initial Static Water Level (feet btoc): NA **Analytical Parameters:** VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): NA **QC Samples Collected:** None

Purge Start Time: 0850 **Ferrous Iron (mg/L):** 0.11 **Allowable Drawdown (ft):** NA

Sample Time: 1105 **Controller Settings: Recharge:** 120 secs **Discharge:** 35 secs **Pressure:** 130 psi

Samplers' Signatures: [signature] **Cycles Per Minute:** ~0.4

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
917	NA	7.2	7.29	953	5.29	114.1	4.02	50	Flow started at ~75ml/cycle, decreasing
925	NA	8.9	7.23	966	3.95	115	3.45	50	
933	NA	10.0	7.26	1000	3.22	108.7	8.50	50	
944	NA	11.4	7.33	1048	2.50	57.2	76.4	50	minimum purge met
954	NA	12.9	7.25	1083	2.20	32.8	328	50	
1008	NA	12.8	7.10	1095	2.66	47.4	366	50	
1014	NA	12.3	7.07	1088	3.02	52.7	219	50	
1022	NA	13.1	7.05	1089	3.01	59.3	110	50	
1030	NA	12.9	7.05	1095	3.37	64.3	63.7	75	saw increase in flow
1038	NA	12.7	7.04	1101	3.54	68.0	55.2	75	
1048	NA	12.8	7.05	1105	3.57	71.2	46.3	75	
1053	NA	13.7	7.04	1120	3.57	72.7	36.0	75	
1058	NA	13.8	7.04	1125	3.60	74.0	38.9	75	
1104	NA	14.0	7.07	1130	3.63	74.8	36.2	75	~1 gal pumped

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 120 secs **Discharge:** 35 secs
Pressure: 130 psi **Cycles Per Minute:** _____ **Flow Rate:** 150 mL/cycle

Screened Interval: 250-260 ft bgs **Minimum purge volume:** 0.2 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ■

 IC 12/9/20

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12/9/20 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** 0.0

Well ID: MW-23C **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 348

Initial Static Water Level (feet btoc): NA **Analytical Parameters:** VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): NA **QC Samples Collected:** None

Purge Start Time: 1313 **Ferrous Iron (mg/L):** 0.0 **Allowable Drawdown (ft):** NA

Sample Time: 1625 **Controller Settings: Recharge:** 120 secs **Discharge:** 23 secs **Pressure:** 130 psi

Samplers' Signatures: Jamie Campbell **Cycles Per Minute:** ~0.4

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
1351	NA	10.2	7.17	649	3.59	47.8	7.06	130 mL/min	← 2 mL/min
1401	NA	10.0	7.23	647	2.79	49.0	12.5	21 mL/min	
1413	NA	9.5	7.34	644	2.33	41.3	13.0	21 mL/min	
1422	NA	9.8	7.31	649	2.28	24.0	11.7	21	
1430	NA	10.5	7.32	658	2.03	-16.7	*	21	* out of range
1449	NA	10.0°C	7.28	650	2.57	-24.8	987	21	
1451	NA	10.0	7.28	650	2.42	-23.4	800	21	min purge vol met
1501	NA	9.8	7.27	651	2.80	-16.1	385	21	
1514	NA	9.8	7.26	654	2.95	-6.9	154	21	
1526	NA	10.2	7.26	660	3.23	-.9	87.1	21	
1539	NA	9.8	7.26	653	3.3	5.3	61.7	21	
1601	NA	9.4	7.25	649	3.64	12.8	19.2	21	
1606	NA	9.1	7.25	645	3.86	14.2	20.0	21	
1612	NA	9.4	7.25	646	3.76	15.1	19.7	21	~1 gal purged

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 120 secs **Discharge:** 23 secs
Pressure: 130 psi **Cycles Per Minute:** _____ **Flow Rate:** 50 mL/cycle

Screened Interval: 348-358 ft bgs **Minimum purge volume:** 0.5 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 2/08/20 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** ——

Well ID: MW-24 **Purging/Sampling Device:** Solinst 407 BP/Gas **Pump depth (ft bgs):** 211

Initial Static Water Level (feet btoc): 186.04 **Analytical Parameters:** VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 186.03 **QC Samples Collected:** None

Purge Start Time: 1145 **Ferrous Iron (mg/L):** 0.04 **Allowable Drawdown (ft):** 0.3

Sample Time: 1225 **Controller Settings: Recharge:** 20 secs **Discharge:** 20 secs **Pressure:** 145 psi

Samplers' Signatures: [signature] **Cycles Per Minute:** 1.5

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1145	186.04	15.5	8.00	1.46	7.41	-6.8	0.33	260	
1150	186.04	14.5	7.16	1.43	5.32	~~1.85~~ -8.20	1.85 ~~82~~	260	
1155	186.04	14.3	7.03	1.46	5.48	-8.70	2.63	260	
1200	186.03	14.2	7.03	1.46	5.30	-6.7	1.77	260	
1205	186.03	14.2	7.02	1.46	5.26	-4.3	1.78	260	
1210	186.03	14.2	7.02	1.46	5.31	-3.6	1.54	260	
1215	186.03	14.2	7.05	1.46	5.34	-3.5	1.02	260	min purge met
1220	186.03	14.1	7.04	1.46	5.30	-2.8	1.16	260	
1225	Sample								Total purged 2.5gal

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 20 secs **Discharge:** 20 secs
Pressure: 145 psi **Cycles Per Minute:** ——— **Flow Rate:** 200 mL/min

Screened Interval: 209.5-239.5 ft bgs **Minimum purge volume:** 1.8 gal

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Not Exceeded: ☑
Total Purge Volume Recorded: ☑

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12/9/20

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 N.M (12/9 BC) **(Vented to)** 0.0 N.M (12/9 BC)

Well ID: MW-25A

Purging/Sampling Device: ZIST/Compressed gas **Pump depth (ft bgs):** 201

Initial Static Water Level (feet btoc): NA

Analytical Parameters: VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA (BC 12/9)

Final Water Level (feet btoc): NA

QC Samples Collected: None

Purge Start Time: 1505

Ferrous Iron (mg/L): 0.08 **Allowable Drawdown (ft):** NA

Sample Time: 1705

Controller Settings: Recharge: 120 secs **Discharge:** 13 secs **Pressure:** 100 psi

Samplers' Signatures: B Curran ZH

Cycles Per Minute: 0.45

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
1520	NA	12.8	7.42	1885	1.60	-112.7	49.2	75	
1530	NA	12.6	7.15	2001	1.60	-129.9	27.5	75	~33 gal/min, ~82 min purge
1554	NA	12.3	7.04	2027	1.93	-124.7	21.1	75	
1604	NA	12.2	7.02	2021	1.95	-120.6	12.7	75	
1609	NA	12.0	7.02	2025	1.98	-118.2	10.3	75	
1614	NA	11.7	7.01	2029	2.02	-115.7	8.7.1	75	
1619	NA	11.5	7.03	2015	2.01	-110.4	7.6.8	75	
1624	NA	11.3	7.00	2019	2.04	-102.3	67.7	75	
1629	NA	11.0	6.99	2028	2.07	-94.6	70.6	75	
1639	NA	10.9	6.99	2020	2.10	-84.2	56.1	75	
1649	NA	10.7	7.00	2018	2.06	-77.2	61.4	75	
1652	NA	10.7	7.01	2010	2.08	-74.0	~~73.6~~ 52.2	75	
1655	NA	10.9	7.02	2011	2.02	-72.8	52.0	75	
1658	NA	10.9	7.01	2016	2.01	-71.1	52.4	75	~1 gal purged

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 120 secs **Discharge:** 25 secs
Pressure: 115 psi **Cycles Per Minute:** ~0.4 **Flow Rate:** 75 mL/cycle

Screened Interval: 201-211 ft bgs **Minimum purge volume:** 0.7 gallons ~ 2.7 L

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume Date: ~~12/9/20~~ 12/10/20

OVM: FID ☐ PID ■ In Casing (ppm): (Initial) 0.0 12/9 DC NM (Vented to) 0.0 12/9 DC NM

Well ID: MW-25B Purging/Sampling Device: ZIST/Compressed gas Pump depth (ft bgs): 231

Initial Static Water Level (feet btoc): NA Analytical Parameters: VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA DC 12/9

Final Water Level (feet btoc): NA QC Samples Collected: None

Purge Start Time: ~~12/9 1505~~ 1505 1415 (12-10-20) Ferrous Iron (mg/L): 0.00 Allowable Drawdown (ft): NA

Sample Time: 1555 Controller Settings: Recharge: 120 secs Discharge: ~~27~~ 24 12/10 secs Pressure: ~~130~~ 120 12/10 psi

Samplers' Signatures: B Carreon C Kelley Cycles Per Minute: 0.4

	Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
12/9	1520	NA	13.0	7.59	1193	2.32	56.3	12.7	150	
	1530	NA	13.4	7.25	1254	3.14	50.3	63.1	200	
	1540	Breakthrough, began	rebuilding	wc.	Encountered	breakthrough	when	rebuilding		
	12/10/20	(change)	Filter, began	rebuild #2	for	wc. (0945)	1420	finished	building	wc.
12/10	1425	NA	10.2	7.11	1038	2.26	~102.3 ORP	~~11.1~~	100	42 mL/min ~72 min purge
	1440	NA	7.5°	7.03	1061	2.39	-93.1	10.4	25	Flow dropped, will wait a few cycles before pumping
12/10										
	1506	NA	8.4	7.12	1033	2.12	-85.7	0.4	100	
	1515	NA	9.2	7.15	1041	2.10	-89.8	53.2	100	
	1525	NA	9.6	7.14	1044	2.13	-87.8	31.9	85	Min purge ~~time~~ 2 cycles volume met.
	1540	NA	9.7	7.11	1051	2.16	-84.9	18.7	85	
	1544	NA	9.8	7.11	1041	2.18	84.1	18.8	85	
	1547	NA	9.6	7.11	1045	2.20	-83.5	18.2	85	~1 gal purged

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 120 secs Discharge: 34 secs
Pressure: 120 psi Cycles Per Minute: ~0.4 Flow Rate: 150 mL/cycle

Screened Interval: 231-241 ft bgs Minimum purge volume: 0.8 gallons ~3 L

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12-10-20 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** 0.0

Well ID: MW-25C **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 308

Initial Static Water Level (feet btoc): NA **Analytical Parameters:** VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA (BC 12/9)

Final Water Level (feet btoc): NA **QC Samples Collected:** None

Purge Start Time: 0900 **Ferrous Iron (mg/L):** 0.04 **Allowable Drawdown (ft):** NA

Sample Time: 1035 **Controller Settings: Recharge:** 120 secs **Discharge:** 40 secs **Pressure:** 135 psi

Samplers' Signatures: B Carreon BC C Kelley **Cycles Per Minute:** ~0.4

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
~~0905~~	NA	10.6	7.83	597.2	5.71	-80.0	26.0	125	
0930	NA	11.6	8.69	603.9	3.36	-124.6	31.5	155	~58 mL/min ~22 min purge
0945	NA	11.4	7.26	753	3.85	-82.3	32.4	150	~~Min purge met.~~ (BC 12/10)
1000	NA	11.5	7.23	759	4.10	-79.9	38.2	150	
1010	NA	11.7	7.27	760	4.26	-77.9	31.8	150	
1015	NA	10.9	7.25	761	4.27	-77.2	30.3	150	Min Purge met.
1020	NA	10.8	7.25	753	4.18	-75.7	27.0	150	
1023	NA	10.8	7.25	748	4.26	-77.1	26.3	150	
1026	NA	11.9	7.21	748	4.20	-75.6	24.3	150	
1029	NA	10.8	7.25	753	4.23	-78.2	22.2	150	
1032	NA	11.2	7.24	752	4.24	-77.8	23.1	150	~1.5 gal purged

77.8 per BC

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 120 secs **Discharge:** 40 secs
Pressure: 140 psi **Cycles Per Minute:** _____ **Flow Rate:** 150 mL/cycle

Screened Interval: 307.5-317.5 ft bgs **Minimum purge volume:** 1.1 gallons ~4.2 L

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12/16/20 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.1 **(Vented to)** —

Well ID: MW-26A **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 205

Initial Static Water Level (feet btoc): NA **Analytical Parameters:** VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): NA **QC Samples Collected:** None

Purge Start Time: 1000 **Ferrous Iron (mg/L):** 0.0 **Allowable Drawdown (ft):** NA

Sample Time: 1325 **Controller Settings: Recharge:** 180 secs **Discharge:** 25 secs **Pressure:** 120 psi

Samplers' Signatures: [signature] **Cycles Per Minute:** ~0.3

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
1045	—	12.2	7.12	1.87	5.23	36.6	208	75	
1100	—	11.8	7.01	1.94	4.68	23.3	160	75	
1115	—	11.8	6.98	1.99	4.46	19.5	78.9	75	
1130	—	12.0	6.95	2.00	4.40	17.1	45.7	75	
1145	—	12.5	6.92	1.98	4.56	16.3	23.8	75	
1200	—	12.3	6.92	2.00	4.32	15.2	17.6	75	
1215	—	12.1	6.92	2.00	4.22	14.2	13.0	75	
1230	—	12.4	6.90	1.98	4.50	15.2	10.6	75	
1245	—	12.2	6.90	1.98	4.37	15.8	8.43	75	
1300	—	11.9	6.91	2.00	4.17	15.5	7.91	75	
1315	—	12.1	6.91	1.99	4.22	14.9	7.55	75	min purge met
1318	—	12.7	6.92	1.97	4.46	14.2	7.70		
1325	Sample								Total purged : ~ 1.2 gal

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 180 secs **Discharge:** 20 secs
Pressure: 120 psi **Cycles Per Minute:** _____ **Flow Rate:** 75 mL/cycle

Screened Interval: 205-215 ft bgs **Minimum purge volume:** 1.1 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume Date: ~~12/15/20~~ 12/16/20 BC

OVM: FID ☐ PID ■ In Casing (ppm): (Initial) 0.0 (Vented to) 0.0

Well ID: MW-26B Purging/Sampling Device: ZIST/Compressed gas Pump depth (ft bgs): 235

Initial Static Water Level (feet btoc): NA Analytical Parameters: VOCs, 1,4-Dioxane, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA BC 12/16

Final Water Level (feet btoc): NA QC Samples Collected: None

Purge Start Time: 1030 Ferrous Iron (mg/L): 0.28 Allowable Drawdown (ft): NA

Sample Time: 1130 Controller Settings: Recharge: 120 secs Discharge: 25 secs Pressure: 148 psi

Samplers' Signatures: B Curran BSC Cycles Per Minute: 0.4

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
1057									
~~1255~~ BC 12/16/20	NA	14.4	7.23	623	3.61	194.3	6.37	150	Start at 90psi Disch 15 & 120
1110	NA	14.9	7.02	622	3.70	193.7	10.7	150	~62 mL/min, 48 min in purge
1120	NA	14.7	7.02	621	3.45	188.9	6.83	150	Min purge met
1123	NA	14.7	7.00	621	3.32	186.5	9.77	150	
1126	NA	14.9	7.01	622	3.47	185.1	4.69	150	~1 gal purged
1130	Sample								
									Grab collected at 1030, will discard
									if purge is successful.

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: _____ secs Discharge: _____ secs
Pressure: _____ psi Cycles Per Minute: _____ Flow Rate: _____ mL/cycle

Screened Interval: 235-245 ft bgs Minimum purge volume: 0.8 gallons Max 247 mL/cycle

~3 L

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12/17/20 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** 0.0

Well ID: MW-26C **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 315

Initial Static Water Level (feet btoc): NA **Analytical Parameters:** VOCs, ~~1,4-Dioxane, Metals, Mercury, Anions, TDS/Alkalinity, Nitrate/Nitrite, TOC, MEEA~~

Final Water Level (feet btoc): NA **QC Samples Collected:** None

Purge Start Time: NA **Ferrous Iron (mg/L):** NM **Allowable Drawdown (ft):** NA

Sample Time: 1140 **Controller Settings: Recharge:** NA secs **Discharge:** NA secs **Pressure:** NA psi

Samplers' Signatures: BLC Blarcon **Cycles Per Minute:** NA

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
12/17	Collected	grab	sample.	See	field	notes.			Start at 150 psi

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 120 secs **Discharge:** _____ secs
Pressure: _____ psi **Cycles Per Minute:** _____ **Flow Rate:** _____ mL/cycle

Screened Interval: 315-325 ft bgs **Minimum purge volume:** 1.1 gallons

Max 640 mL/cycle

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume Date: ~~12/15/20~~ 12/17/20 (3x 12/17) OVM: FID ☐ PID ■ In Casing (ppm): (Initial) 0.0 (Vented to) 0.0

Well ID: MW-26D Purging/Sampling Device: ZIST/Compressed gas Pump depth (ft bgs): 348

Initial Static Water Level (feet btoc): NA Analytical Parameters: ~~VOCs, 1,4-Dioxane, Metals, Mercury, Anions, TDS/Alkalinity, Nitrate/Nitrite, TOC, MEEA~~

Final Water Level (feet btoc): NA QC Samples Collected: None

Purge Start Time: ~~330~~ 1530 Ferrous Iron (mg/L): N/A Allowable Drawdown (ft): NA

Sample Time: NS Controller Settings: Recharge: 120 secs Discharge: 25 secs Pressure: 160 psi

Samplers' Signatures: BZ, BC Cycles Per Minute: _____

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
							low	100	Start at 170 psi
							low	125	discharge = 30s, P = ~~150~~ 170 psi
							high	60	discharge = 15s, P = 180 psi * ↑ inP = high turbidity
1556	~~350~~ 3x						very high	125	discharge @ 25s P = 180 psi
	1600						high	175	disch = 30", P = 180
	1608						medium	~500	breakthrough occured, disch = 2.5s P = 180 psi
									large cnts of grey sediment
12/17	Collected ~~grab sample~~ (3x 12/17). See field notes. Not sampled. Frozen regulator.								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 120 secs Discharge: 20 secs
Pressure: 170 psi Cycles Per Minute: _____ Flow Rate: _____ mL/cycle
Max 582 mL/cycle
Screened Interval: 348-358 ft bgs Minimum purge volume: 1.1 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12/8/20

Well ID: MW-27

Initial Static Water Level (feet btoc): 188.68

Final Water Level (feet btoc): 188.65

Purge Start Time: 0955

Sample Time: 1050

Samplers' Signatures: [signature]

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** ____

Purging/Sampling Device: Compressed gas **Pump depth (ft bgs):** 210

Analytical Parameters: VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

QC Samples Collected: None

Ferrous Iron (mg/L): 0.12 **Allowable Drawdown (ft):** NA

Controller Settings: Recharge: 20 secs **Discharge:** 40 secs **Pressure:** 140 psi

Cycles Per Minute: 1

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
0955	188.65	17.3	8.22	1.49	6.61	132.1	1.10	160	
1000	188.65	16.8	7.10	1.67	4.73	35.4	13.6	160	
1005	188.65	16.2	7.04	1.79	5.19	48.3	~~8.6~~ 9.14	160	
1010	188.65	15.8	7.05	1.83	5.50	29.7	3.24	160	
1015	188.65	15.7	7.05	1.83	5.96	21.2	1.54	160	
1020	188.65	15.8	7.06	1.83	5.60	13.2	2.26	160	
1025	188.65	15.6	7.06	1.83	5.50	8.60	0.84	160	
1030	188.65	15.7	7.06	1.83	5.20	5.90	1.44	160	
1035	188.65	15.8	7.06	1.83	5.39	2.60	0.71	160	
1040	188.65	15.7	7.07	1.83	~~5.44~~ 5.39	0.90	0.55	160	min purge met
1045	188.65	15.4	7.07	1.83	5.32	-0.1	0.30	160	
1050	Sample								Total gal purged = 2.5

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 20 secs **Discharge:** 40 secs
Pressure: 140 psi **Cycles Per Minute:** 1 **Flow Rate:** 175 mL/min

Screened Interval: 200-220 ft bgs **Minimum purge volume:** 1.8 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Not Exceeded: ☑
Total Purge Volume Recorded: ☑

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume Date: 12-8-20

OVM: FID ☐ PID ■ In Casing (ppm): (Initial) 0.0 (Vented to) ←

Well ID: MW-28 Purging/Sampling Device: mp10 / Grab Pump depth (ft bgs): 204

Initial Static Water Level (feet btoc): 187.55 Analytical Parameters: VOCs, metal, geochem

Final Water Level (feet btoc): 187.55 QC Samples Collected:

Purge Start Time: 1342 Ferrous Iron (mg/L): 0.05 Allowable Drawdown (ft): 6.3

Sample Time: 1445 Controller Settings: Recharge: 20 secs Discharge: 40 secs Pressure: 145 psi

Samplers' Signatures: Cycles Per Minute: 1

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1342	187.55	14.1	7.99	1.65	7.23	-14.0	0.46	150	
1345	187.55	14.1	7.69	1.80	6.50	-19.2	0.95	150	
1350	187.55	14.0	7.17	1.90	6.10	~~-33.6~~	7.25	150	
1355	187.55	13.9	7.15	1.92	5.72	-34.1	3.78	150	
1400	187.55	13.8	7.13	1.90	5.60	-32.8	2.10	150	
1405	187.55	13.8	7.12	1.90	5.56	-29.7	1.63	150	
1410	187.55	13.8	7.12	1.90	5.62	-26.5	1.45	150	
1415	187.55	13.8	7.12	1.90	5.63	-22.9	0.58	150	
1420	187.55	13.6	7.13	1.91	5.61	-21.0	0.78	150	
1425	187.55	13.7	7.12	1.91	5.62	-19.4	0.88	150	
1430	187.55	13.9	7.12	1.90	5.64	-18.4	0.78	150	
1433	187.54	13.9	7.12	1.90	5.60	-17.2	0.47	150	
1437	187.54	13.8	7.12	1.91	5.60	-16.4	0.52	150	
1445	Sample								Total purged 2.4 gal

MIN PURGE

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 20 secs Discharge: 40 secs

Pressure: 145 psi Cycles Per Minute: _____ Flow Rate: _____ mL/min

Screened Interval: 190-210 ft bgs Minimum purge volume: _____ gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume Date: 12-13-20

OVM: FID ☐ PID ■ In Casing (ppm): (Initial) ~~0.5~~ 0.1 BT 12/13 (Vented to) ~~0.5~~ 0.1 BT 12/13

Well ID: MW-29A Purging/Sampling Device: ZIST/Compressed gas Pump depth (ft bgs): 128

Initial Static Water Level (feet btoc): ~~44.26~~ 12/13 NM Analytical Parameters: VOCs, Metals, Mercury, Anions, ~~TDS~~ 12/13/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): NM QC Samples Collected: None

Purge Start Time: ~~1050~~ 0930 Ferrous Iron (mg/L): 0.02 Allowable Drawdown (ft): 0.3

Sample Time: 1120 Controller Settings: Recharge 110 secs Discharge: 15 secs Pressure: 60 psi

Samplers' Signatures: C Kelley B Curran Cycles Per Minute: ~0.5

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
1004	—	2.5	7.01	984	6.63	141.8	1.81	40	Instrument water column to
1015	—	2.9	~~6.95~~	972	8.19	146.0	2.94	40	gauge with pump in well
1030	—	3.1	6.95	967	7.95	146.4	1.80	40	
1040	—	3.1	~~6.95~~ 7.95	966	7.88	145.9	1.28	40	
1045	—	3.2	6.95	965	7.82	145.8	1.14	40	
1055	—	4.1	6.96	958	7.70	144.8	1.22	40	
1100	—	4.4	6.96	960	7.69	144.2	1.17	40	
1105	—	4.5	6.96	961	7.63	143.8	1.09	40	
MIN. PURGE 1110	—	4.7	6.96	960	7.61	143.3	0.82	40	Min purge ~100 mL
1115	—	5.1	6.96	958	7.60	142.9	0.84	40	~3 Min
1120	Sample								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 120 secs **Discharge:** 20 secs
Pressure: 80 psi **Cycles Per Minute:** _____ **Flow Rate:** 40 mL/cycle

Screened Interval: 120-130 ft bgs **Minimum purge volume:** 0.5 gallons

100 mL

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑ Simultaneous Purge Allowed: ■

0.48

page 1 of 2

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume Date: 12/11/20

Well ID: MW-29B

Initial Static Water Level (feet btoc): NA

Final Water Level (feet btoc): NA

Purge Start Time: 1515

Sample Time: 1730

Samplers' Signatures: B Carron BSK

OVM: FID ☐ PID ■ In Casing (ppm): (Initial) 0.0 (Vented to) 0.0

Purging/Sampling Device: ZIST/Compressed gas Pump depth (ft bgs): 190

Analytical Parameters: VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA (Bc incl.)

QC Samples Collected: None

Ferrous Iron (mg/L): 0.20 Allowable Drawdown (ft): NA

Controller Settings: Recharge: 100 secs Discharge: 25-30 secs Pressure: 85 psi

Cycles Per Minute: 0.48

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
1544	NA	7.6	7.42	1009	1.53	-105.4	83.2	75	
1605	NA	9.2	7.20	1037	1.32	-89.7	80.0	75	~36 mL/min ~72 min purge
1610	NA	9.0	7.17	1056	1.35	-85.9	98.1	75	
1615	NA	9.2	7.15	1062	1.30	-79.7	96.4	75	
1620	NA	9.1	7.16	1071	1.36	-78.2	79.0	75	
1625	NA	8.5 (BC 1614) 7.2	7.13	1074	1.33	-78.2	119	75	
1630	NA	8.5	7.11	1059	1.18	-75.4	121	75	Min purge met.
1635	NA	9.4	7.13	1069	1.04	-73.7	123	110	
1640	NA	9.2	7.13	1073	1.05	-73.5	124	110	
1650	NA	9.0	7.10	1069	1.05	-71.9	65.8	110	
1655	NA	9.0	7.10	1074	1.02	-69.2	56.1	110	
1700	NA	9.1	7.12	1079	1.06	-67.7	50.1	110	
1705	NA	8.7	7.10	1073	1.07	-66.3	50.0	110	
1710	NA	9.1	7.09	1063	1.01	-63.9	42.7	110	~1.5 gal pumped

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 100 secs Discharge: 35 secs
Pressure: 95 psi Cycles Per Minute: ____ Flow Rate: 100 mL/cycle

Screened Interval: 190-200 ft bgs Minimum purge volume: 0.7 gallons 2.6L

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume Date: 12/11/20

OVM: FID ☐ PID ■ In Casing (ppm): (Initial) 0.0 (Vented to) 0.0

Well ID: MW 29B

Purging/Sampling Device: See Pg 1 Pump depth (ft bgs): See Pg 1

Initial Static Water Level (feet btoc): See Pg 1

Analytical Parameters:

Final Water Level (feet btoc):

QC Samples Collected:

Purge Start Time:

Ferrous Iron (mg/L): Allowable Drawdown (ft): NA

Sample Time:

Controller Settings: Recharge: 60 secs Discharge: 25 secs Pressure: 85 psi

Samplers' Signatures:

Cycles Per Minute: ~0.5

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1715	NA	8.3	7.13	1075	1.06	-64.3	46.6	110	
1720	NA	9.0	7.10	1069	1.07	-62.3	41.4	110	
1723	NA	8.9	7.10	1070	1.02	-62.0	37.5	110	
1726	NA	8.5	7.10	1059	1.00	-61.4	>5.2	110	Purged ~3 gal
1730	Sample								turbidity stabilization not met. Getting too dark.

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: _____ secs Discharge: _____ secs

Pressure: _____ psi Cycles Per Minute: _____ Flow Rate: _____ mL/min

Screened Interval: _____ ft bgs Minimum purge volume: _____ gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12-11-20

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** 0.0

Well ID: MW-29C **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 230

Initial Static Water Level (feet btoc): NA **Analytical Parameters:** VOCs, Metals, Mercury, Anions ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): NA **QC Samples Collected:** None

Purge Start Time: 1451 **Ferrous Iron (mg/L):** 0.22 **Allowable Drawdown (ft):** NA

Sample Time: 1555 **Controller Settings: Recharge:** 120 secs **Discharge:** 30 secs **Pressure:** 110 psi

Samplers' Signatures: [signature] **Cycles Per Minute:** 0.4

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
1455	—	10.7	9.5	966	2.28	79.6	31.6	220	
1505	—	10.2	6.95	983	3.97	66.2	27.5	235	
1520	—	9.5	6.90	971	4.68	75.6	19.1	220	
1530	—	9.5	6.90	976	4.88	81.4	10.2	220	
1540	—	10.1	6.90	976	5.08	84.5	6.8	220	
1544	—	10.2	6.89	978	5.13	85.2	6.58	220	
1547		10.0	6.89	978	5.15	85.9	6.64	220	~1.5 gal purged

MIN. DRAWDOWN

Casing Volume Calculations: 14

Water Col. X Casing Factor = Gallons per Casing Volume

Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Max discharge 4.46 mL/ft of WC (w/o VB)

Previous controller settings: Recharge: 120 secs **Discharge:** 40 secs

Pressure: 110 psi **Cycles Per Minute:** _____ **Flow Rate:** 225 mL/cycle

Screened Interval: 230-240 ft bgs **Minimum purge volume:** 0.8 gallons

0.4

85%

35%

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐

Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume Date: 12/3/20

OVM: FID ☐ PID ■ In Casing (ppm): (Initial) 0 (Vented to) 0

Well ID: MW-30RA

Purging/Sampling Device: Solinst pump, ZDT controller Pump depth (ft bgs): 240

Initial Static Water Level (feet btoc): 227.50

Analytical Parameters: anions, alkalinity, metals; MEE, 1,4-D, VOCs, Sulfate, Chloride, NH4N

Final Water Level (feet btoc): 227.50

QC Samples Collected:

Purge Start Time: 0950 / 1115

Ferrous Iron (mg/L): 0.0 Allowable Drawdown (ft): 0.3

Sample Time: 1200

Controller Settings: Recharge: 20 secs Discharge: 20 secs Pressure: 180 psi

Samplers' Signatures: EmmaRat

Cycles Per Minute: 1.5

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1126	227.48	13.8°C	7.03	1565	9.22 mg/L	96.0	26.2	225	
1132	227.49	13.6°C	7.05	1566	6.38	83.1	18.5	225	
1137	227.5	13.9°C	7.04	1558	6.10	77.5	11.1	225	
1142	227.5	13.7°C	7.02	1566	6.17	73.7	9.40	225	
1147	227.49	13.6°C	7.00	1560	6.29	72.2	7.50	225	min purge volume met
1152	227.5	13.6°C	7.01	1568	6.43	70.5	7.15	225	~2 gal Purged
1200	SAMPLE								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: _____ secs Discharge: _____ secs

Pressure: _____ psi Cycles Per Minute: _____ Flow Rate: 225 mL/min

Screened Interval: _____ ft bgs Minimum purge volume: 1.9 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12/8/20

Well ID: MW-30RB

Initial Static Water Level (feet btoc): 229.61'

Final Water Level (feet btoc): _____

Purge Start Time: 1230 / 150 IC 1445

Sample Time: 1540

Samplers' Signatures: E Rost

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 0 **(Vented to)** 0

Purging/Sampling Device: Solinst pump, Zest controller **Pump depth (ft bgs):** 280

Analytical Parameters: Metals, more Anions, Alkalinity, 1,4-D, VOCs, MEE, Chloride, Sulfate, N+N

QC Samples Collected: _____

Ferrous Iron (mg/L): 0.06 **Allowable Drawdown (ft):** 0.3

Controller Settings: Recharge: 20 secs **Discharge:** 20 secs **Pressure:** 200 psi

Cycles Per Minute: 1.5

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1501	229.60	14.3°C	7.21	1516	7.70	72.9	75.3	225	
1507	229.60	14.2°C	7.09	1498	6.54	35.3	8.49	225	
1512	229.58	13.9°C	7.06	1514	6.68	30.1	6.61	225	
1518	229.59	13.8°C	7.04	1508	6.25	32.5	9.10	225	
1523	229.60	13.7°C	7.02	1508	6.23	31.5	5.37	225	
1528	229.60	13.7°C	7.01	1509	6.23	34.7	4.19	225	
1532	229.69	13.6°C	7.00	1508	6.22	35.7	4.47	225	min. purge volume ~2.2 gal purged
1540	SAMPLE								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: _____ secs **Discharge:** _____ secs

Pressure: _____ psi **Cycles Per Minute:** _____ **Flow Rate:** 225 mL/min

Screened Interval: _____ ft bgs **Minimum purge volume:** 2.2 gallons

8.4 L

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12/9/20

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 0 **(Vented to)** 0

Well ID: MW-30C

Purging/Sampling Device: ZIST/Compressed gas **Pump depth (ft bgs):** 317

Initial Static Water Level (feet btoc): NA

Analytical Parameters: VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): NA

QC Samples Collected: None

Purge Start Time: 0915

Ferrous Iron (mg/L): 0.64 **Allowable Drawdown (ft):** NA

Sample Time: 1210

Controller Settings: Recharge: 240 secs **Discharge:** 70 secs **Pressure:** 150 psi

Samplers' Signatures: Emma Pitt

Cycles Per Minute: ~0.2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
0953	NA	6.8°C	7.57	1394	3.29	184	5.44	150	
1003	NA	12.2°C	7.53	1353	2.20	168.8	5.32	150	
1014	NA	9°C	7.48	1472	15.3	74.6	14.3	150	
1030	~~NA~~	~~10.4~~			~~2.74~~	~~71.0~~	~~71.0~~	88	malfunctioning YSI
1120	NA	13.0	7.25	1032	8.40	45.5	-10.2	150	
1125	NA	12.9°C	7.01	1017	4.03	-45.4	36.3	150	
1130	NA	13.5°C	7.04	1021	3.42	-47.7	29.0	150	
1136	NA	13.6°C	7.02	1033	3.10	-49.6	34.0	150	
1141	NA	13.8°C	7.05	1029	2.86	-49.7	17.9	150	min. purge volume met
1146	NA	13.8°C	7.07	1035	2.77	-50.4	14.1	150	
1151	NA	13.7°C	7.08	1029	2.93	-50.4	10.6	150	
1156	NA	13.9°C	7.06	1037	2.94	-49.9	8.63	150	
1201	NA	13.8°C	7.07	1037	2.94	-50.4	7.91	150	
1206	NA	13.6°C	7.08	1028	2.92	-50.0	7.27	150	~1.5 gal purged

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 240 sec **Discharge:** 70 secs
Pressure: 150 psi **Cycles Per Minute:** _____ **Flow Rate:** 150 mL/cycle

Screened Interval: 317-327 ft bgs **Minimum purge volume:** 1.1 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume Date: 12/11/20

OVM: FID ☐ PID ■ In Casing (ppm): (Initial) 0.1 (Vented to) 0.1

Well ID: MW-31A Purging/Sampling Device: ZIST/Compressed gas Pump depth (ft bgs): 138

Initial Static Water Level (feet btoc): NA → Volume booster, can not read WL Analytical Parameters: VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): QC Samples Collected: None

Purge Start Time: 0850 / 1045 * Ferrous Iron (mg/L): 0.07 Allowable Drawdown (ft): 0.3

Sample Time: 1420 Controller Settings: Recharge: 120 secs Discharge: 20 secs Pressure: 85 psi

Samplers' Signatures: EmmaRat Cycles Per Minute: ~0.4

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
1047	—	8.9	7.62	861	6.41	-72.8	5.14	50	
1100	—	7.2	7.31	878	6.85	92.5	24.8	50	
1103	Breakthrough.	Rebuilt	WC, see	logbook	for notes.				
	Purged approx.	1/4 gal.	through	initial	purge	and	breakthrough	water.	
1315	Water, dial in	settings	to	get	50	ml/discharge		~~50~~ 20	
1342	—	6.6	7.14	900	5.93	110.8	4.82	50	
1347	—	6.7	7.13	904	5.77	113.9	3.37	50	
1354	—	7.0	7.10	907	5.99	116.8	4.15	50	
1404	—	6.8	7.09	907	6.18	119.3	4.59	50	
1409	—	6.9	7.08	908	5.99	120.0	3.72	50	minimum purge met
1414	—	6.8	7.07	904	6.13	120.7	3.40	50	~0.6gal purged
1420	SAMPLE								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 120 secs Discharge: 20 secs
Pressure: 85 psi Cycles Per Minute: _____ Flow Rate: 50 mL/cycle
Screened Interval: 138-148 ft bgs Minimum purge volume: 0.5 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ■

Determined issue with fittings at surface

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume Date: 12/11/20

OVM: FID ☐ PID ■ In Casing (ppm): (Initial) 0.1 (Vented to) 0.1

Well ID: MW-31B Purging/Sampling Device: ZIST/Compressed gas Pump depth (ft bgs): 190

Initial Static Water Level (feet btoc): NA Analytical Parameters: VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): NA QC Samples Collected: None

Purge Start Time: 1125 Ferrous Iron (mg/L): 0.03 Allowable Drawdown (ft): NA

Sample Time: 1250 Controller Settings: Recharge: 120 secs Discharge: 40 secs Pressure: 105 psi

Samplers' Signatures: [signature] Cycles Per Minute: ~0.4

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
1137	—	10.4	7.16	1229	5.32	22.7	7.72	175	
1142	—	10.7	7.03	1238	4.04	5.2	168	175	
1150	—	10.7	6.97	1231	5.74	23.1	405	175	
~~1152~~ 1202	—	10.6	6.95	1240	5.96	39.3	178	175	minimum purge met
1209	—	10.7	6.95	1232	9.17	45.7	86.2	175	
1217	—	10.4	6.95	1230	6.60	51.2	50.4	175	
1223	—	10.5	6.94	1232	6.60	54.4	37.1	175	
1231	—	10.6	6.94	1233	6.57	58.6	29.2	175	
1236	—	10.7	6.94	1239	6.46	60.9	23.8	175	
~~1242~~	—	10.7	6.95	1241	6.69	63.5	22.1	175	
1246	—	10.7	6.94	1237	6.69	65.0	22.1	175	~1.5 gal purged
	SAMPLE								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 120 secs Discharge: 40 secs
Pressure: 100 psi Cycles Per Minute: ____ Flow Rate: 180 mL/cycle
Screened Interval: 190-200 ft bgs Minimum purge volume: 0.7 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12/11/20

Well ID: MW-31C

Initial Static Water Level (feet btoc): NA

Final Water Level (feet btoc): NA

Purge Start Time: 0850

Sample Time: 1045

Samplers' Signatures: EmmaRatt

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.1 **(Vented to)** 0.1

Purging/Sampling Device: ZIST/Compressed gas **Pump depth (ft bgs):** 228

Analytical Parameters: VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

QC Samples Collected: None

Ferrous Iron (mg/L): 1.14 **Allowable Drawdown (ft):** NA

Controller Settings: Recharge: 120 secs **Discharge:** 48 secs **Pressure:** 110 psi

Cycles Per Minute: ~0.35

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
907	NA	10.7	7.34	1077	2.25	-82.0	34.4	180	
912	NA	10.0	7.30	1126	1.14	-147.9	126	180	
918	NA	10.5	7.23	1126	8.7	-148.3	233	170	
930	NA	10.4	7.16	1117	9.0	-135.1	355	160	increase by 5 psi
944	NA	10.6	7.15	1111	2.95	-130.2	134	180	minimum purge met
955	NA	10.8	7.14	1117	9.0	-127.6	41.1	180	
1004	NA	10.6	7.13	1114	9.0	-125.9	26.3	180	
1010	NA	10.6	7.10	1112	~~1.05~~ 1.4	-124.9	20.5	180	
1015	NA	10.6	7.11	1111	1.86	-123.9	13.4	180	
1026	NA	9.8	7.13	1105	1.16	-121.5	10.7	180	
1032	NA	10.5	7.16	1110	1.09	-121.0	7.70	180	
1037	NA	10.2	7.13	1110	1.07	-120.9	5.47	180	
1043	NA	10.5	7.12	1109	1.05	-121.1	4.49	180	~2 gal purged
1045	SAMPLE								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 120 secs **Discharge:** 48 secs
Pressure: 105 psi **Cycles Per Minute:** _____ **Flow Rate:** 170 mL/cycle
Screened Interval: 228-238 ft bgs **Minimum purge volume:** 0.8 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12/10/20 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0 **(Vented to)** 0

Well ID: MW-32A **Purging/Sampling Device:** Solinist/Compressed gas **Pump depth (ft bgs):** _____

Initial Static Water Level (feet btoc): 82.86 **Analytical Parameters:** VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 82.90 **QC Samples Collected:** None

Purge Start Time: 1435 **Ferrous Iron (mg/L):** 0.27 **Allowable Drawdown (ft):** 0.3

Sample Time: 1600 **Controller Settings: Recharge:** 20 secs **Discharge:** 10 secs **Pressure:** 90 psi

Samplers' Signatures: EmmaRH **Cycles Per Minute:** 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1440	82.90	12.3	7.07	1648	8.51	25.1	402	200	water has slight orange tint
1447	82.90	12.2	6.97	1735	5.80	-4.1	365	200	water flow back during recharge
1457	82.90	12.1	7.17	1611	6.86	-0.8	145	200	minimum purge met
1506	82.90	12.1	6.96	1569	6.39	8.1	54.0	200	
1515	82.90	12.4	6.94	1531	8.41	17.6	29.8	200	
1523	82.90	12.3	6.96	1532	6.32	20.6	24.3	200	
1528	82.90	12.3	6.93	1525	6.49	21.9	18.4	200	
1533	82.90	12.1	7.01	1519	6.95	21.0	17.3	200	
1540	82.90	12.4	6.94	1506	6.61	23.7	13.8	200	
1545	82.90	12.2	6.96	1509	6.96	23.9	11.8	200	
1550	82.90	11.9	7.01	1500	6.90	22.2	11.3	200	
1555	82.90	12.2	7.01	1495	7.00	26.2	11.2	200	
1600	SAMPLE								purged approx 3 gal

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 20 secs **Discharge:** 10 secs
Pressure: 92 psi **Cycles Per Minute:** 2 **Flow Rate:** 200 mL/min

Screened Interval: 114-124 ft bgs **Minimum purge volume:** 1.0 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12/10/20 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** Ø **(Vented to)** Ø

Well ID: MW-32B **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 170

Initial Static Water Level (feet btoc): 82.37 **Analytical Parameters:** VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 82.40 **QC Samples Collected:** None

Purge Start Time: 1300 **Ferrous Iron (mg/L):** 0.0 **Allowable Drawdown (ft):** 0.3

Sample Time: 1410 **Controller Settings: Recharge:** 120 secs **Discharge:** ~~120~~ 25 or secs **Pressure:** 85 psi

Samplers' Signatures: [signature] **Cycles Per Minute:** ~0.4

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
1311	82.40	12.3	7.10	1032	4.90	-95.7	10.9	150	
1324	82.40	12.2	7.17	1044	1.64	-118.0	15.9	140	
1333	82.40	12.6	7.02	1075	4.15	-97.3	4.97	150	
1341	82.40	12.5	7.04	1076	6.03	-79.0	2.97	150	
1348	82.40	12.5	7.04	1081	5.46	-67.7	1.32	150	minimum purge met
1353	82.40	12.5	7.04	1081	5.50	-59.7	1.84	150	
1358	82.40	12.4	7.02	1086	5.83	-53.5	1.27	150	
~~1403~~ DR	82.40	12.4	7.02	1083	5.60	-49.5	1.52	150	purged approx 1 gal
1410	SAMPLE								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 180 secs **Discharge:** 25 secs
Pressure: 85 psi **Cycles Per Minute:** _____ **Flow Rate:** 160 mL/cycle

Screened Interval: 170-180 ft bgs **Minimum purge volume:** 0.6 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume Date: 12/10/20 OVM: FID ☐ PID ■ In Casing (ppm): (Initial) 0 (Vented to) 0

Well ID: MW-32C Purging/Sampling Device: ZIST/Compressed gas Pump depth (ft bgs): 260

Initial Static Water Level (feet btoc): 81.79* Analytical Parameters: VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 81.79 QC Samples Collected: None

Purge Start Time: 1230 Ferrous Iron (mg/L): 0.06 Allowable Drawdown (ft): 0.3

Sample Time: 1500 Controller Settings: Recharge: 180 secs Discharge: 30 secs Pressure: 110 psi

Samplers' Signatures: EmmaDH Cycles Per Minute: ~0.3

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
1246	~~81.77~~	11.1	7.55	750	3.2	-128.2	11.0	160 ~~100~~	
1257	81.76	9.9	7.50	736	2.41	-154.8	6.11	75	
1310	81.75	8.1	7.41	721	2.43	-145.7	19.5	45	
1320	81.74	9.5	7.37	727	2.32	-127.5	33.1	50	
1330	81.75	9.5	7.36	737	2.46	-109.0	37.6	50	increased discharge by 5s, 10s ea
1339	81.77	10.9	7.34	754	2.41	-92.5	27.9	100	
1354	81.77	11.0	7.26	759	3.40	-71.5	17.3	100	
1407	81.77	11.2	7.21	759	4.27	-50.3	10.5	100	
1418	81.75	11.1	7.20	765	4.59	-42.1	8.48	100	
1428	81.75	11.4	7.19	768	4.80	-33.2	7.99	100	
1435	81.75	11.2	7.19	764	4.92	-27.2	6.58	100	
1442	81.80	9.1	7.20	737	5.54	-21.4	6.18	100	
1448	81.77	8.0	7.18	717	5.57	-15.9	6.47	100	~Min purge met
1452	81.78	7.7	7.17	709	5.59	-13.2	5.30	100	~~1.3 gal purged~~

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 180 secs Discharge: 20 secs
Pressure: 110 psi Cycles Per Minute: _____ Flow Rate: 180 mL/cycle

Screened Interval: 260-270 ft bgs Minimum purge volume: 0.9 gallons

* had to surge pump to get WLM down.

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume Date: 12/10/20

OVM: FID ☐ PID ■ In Casing (ppm): (Initial) 0 (Vented to) 0

Well ID: MW-32C

Purging/Sampling Device: See Pg 1 Pump depth (ft bgs): 260

Initial Static Water Level (feet btoc): See Pg 1

Analytical Parameters: ↓

Final Water Level (feet btoc): ↓ QC Samples Collected:

Purge Start Time: 1230 Ferrous Iron (mg/L): 0.06 Allowable Drawdown (ft): 0.3

Sample Time: 1500 Controller Settings: Recharge: 180 secs Discharge: 30 secs Pressure: 110 psi

Samplers' Signatures: E Fots Cycles Per Minute: ~0.3

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1455	81.77	8.0	7.14	706	5.64	-10.5	3.51	100	start purge
1500	SAMPLE								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: _____ secs Discharge: _____ secs

Pressure: _____ psi Cycles Per Minute: _____ Flow Rate: _____ mL/min

Screened Interval: _____ ft bgs Minimum purge volume: _____ gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12/15/20

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 0 **(Vented to)** 0

Well ID: MW-34A **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 140

Initial Static Water Level (feet btoc): NA* **Analytical Parameters:** VOCs, 1,4-Dioxane, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): **QC Samples Collected:** None

Purge Start Time: 1040 **Ferrous Iron (mg/L):** 0.17 **Allowable Drawdown (ft):** 0.3

Sample Time: 1235 **Controller Settings: Recharge:** 120 secs **Discharge:** NM secs **Pressure:** NM psi

Samplers' Signatures: **Cycles Per Minute:** NM

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
1055	—	9.8	7.25	1.31	6.99	66.5	4.25	50	
1102	—	10.2	7.18	1.31	6.89	52.0	6.42	50	
1115	—	10.6	7.15	1.31	6.55	34.3	5.27	50	
1130	—	10.2	7.15	1.32	6.47	24.6	3.06	50	
1145	—	10.2	7.13	1.32	6.15	22.4	1.27	50	
1200	—	10.3	7.15	1.32	6.32	16.8	1.31	50	min purge met min purge met
1213	—	11.0	7.16	1.31	5.99	7.9	1.42	50	
1220	—	11.6	7.18	1.32	5.86	0.7	1.28	50	
1225	—	11.2	7.17	1.32	5.95	-3.9	1.15	50	
1230	—	10.6	7.16	1.33	6.17	-4.9	1.03	50	Total purged ~ 0.7 gal

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 120 secs **Discharge:** ____ secs
Pressure: 95 psi **Cycles Per Minute:** ____ **Flow Rate:** ____ mL/cycle

Screened Interval: 140-150 ft bgs **Minimum purge volume:** 0.5 gallons

* unable to get WLM downhole

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume Date: 12/13/20 OVM: FID ☐ PID ■ In Casing (ppm): (Initial) 0 (Vented to) 0

Well ID: MW-34B Purging/Sampling Device: ZIST/Compressed gas Pump depth (ft bgs): 175

Initial Static Water Level (feet btoc): 130.56 Analytical Parameters: ~~VOCs, Metals, Mercury, Anions, TDS/Alkalinity, Nitrate/Nitrite, TOC~~, MEEA

Final Water Level (feet btoc): _____ QC Samples Collected: None

Purge Start Time: 1100 Ferrous Iron (mg/L): _____ Allowable Drawdown (ft): 0.3

Sample Time: 1205 Controller Settings: Recharge: _____ secs Discharge: _____ secs Pressure: _____ psi

Samplers' Signatures: E Ross Cycles Per Minute: _____

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
1119	130.56	9.5	7.14	916	12.52	93.5	37.6	120	
1124	130.56	11.0	7.18	932	5.56	84.3	77.9	120	
1129	130.56	11.3	7.14	942	4.8	76.3	151.0	120	
1138	130.56	11.7	7.14	946	5.22	75.7	363.0	120	
1143	130.56	11.6	7.15	950	5.48	75.6	643.0	120	
1153	130.56	11.6	7.13	956	5.43	80.0	>1000 NTU	120	minimum purge met
1201	130.56	9.8	7.13	923	6.11	79.9	630.0	~~120~~ OR 75	
1209	130.56	8.5	7.15	897	6.34	86.2	400	60	
1215	130.56	9.0	7.13	893	6.34	86.1	411	60	
1228	130.56	10.9	7.17	918	555	89.7	232	100	
1235	130.56	11.2	7.14	951	5.89	87.3	292	100	
1246	130.56	10.9	7.12	940	5.82	89.8	41.6	100	
1255	130.56	10.7	7.13	943	5.90	91.6	14.7	125	
1315	130.56	11.7	7.13	959	5.76	92.2	8.70	125	

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 120 secs **Discharge:** 35 secs
Pressure: 95 psi **Cycles Per Minute:** _____ **Flow Rate:** 120 mL/cycle

Screened Interval: 175-185 ft bgs **Minimum purge volume:** 0.6 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ■

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GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume Date: 12/13/20

Well ID: ~~MW-31A~~ MW-34B

Initial Static Water Level (feet btoc): 130.56

Final Water Level (feet btoc): _____

Purge Start Time: 1100

Sample Time: ~~1330~~ 1330

Samplers' Signatures: [signature]

OVM: FID ☐ PID ■ In Casing (ppm): (Initial) 0 (Vented to) 0

Purging/Sampling Device: ZIST/Compressed gas Pump depth (ft bgs): ~~138~~ 175

Analytical Parameters: ~~VOCs, Metals, Mercury, Anions, TDS/Alkalinity, Nitrate/Nitrite, TOC, MEEA~~

QC Samples Collected: None

Ferrous Iron (mg/L): _____ Allowable Drawdown (ft): 0.3

Controller Settings: Recharge: _____ secs Discharge: _____ secs Pressure: _____ psi

Cycles Per Minute: _____

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
1320	130.56	10.0	7.16	945	5.67	92.5	6.30	125	
1325	130.56	11.6	7.13	960	5.61	92.0	6.36	125	
1330	SAMPLE								
	Breakthrough occured while sampling								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 120 secs Discharge: 20 secs
Pressure: 85 psi Cycles Per Minute: _____ Flow Rate: 50 mL/cycle

Screened Interval: 138-148 ft bgs Minimum purge volume: 0.5 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Recorded: ☐
Total Purge Volume Recorded: ☐ Simultaneous Purge Achieved: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume Date: 12/15/20 OVM: FID ☐ PID ■ In Casing (ppm): (Initial) 0 (Vented to) 0

Well ID: MW-34B Purging/Sampling Device: Comp Gas/Inst Cont Pump depth (ft bgs): 175

Initial Static Water Level (feet btoc): NM Analytical Parameters: _____

Final Water Level (feet btoc): ↓ QC Samples Collected: _____

Purge Start Time: 1220 Ferrous Iron (mg/L): _____ Allowable Drawdown (ft): _____

Sample Time: 1300 Controller Settings: Recharge: _____ secs Discharge: _____ secs Pressure: _____ psi

Samplers' Signatures: E Rotz Cycles Per Minute: _____

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1234	130.35	9.2	7.35	1309	3.68	125.3	40.5	225	
Return on		12/17/20.	Purge	start at 1300.					Started around 100ml/discharge.
									Began flowing back during
									recharge
1300	Pre-purge grab sample collected.								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: _____ secs Discharge: _____ secs

Pressure: _____ psi Cycles Per Minute: _____ Flow Rate: _____ mL/min

Screened Interval: _____ ft bgs Minimum purge volume: _____ gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

12/17/20 BK 12/17

Site Name: 700S 1600E PCE Plume Date: ~~12/13/20~~

Well ID: MW-34C

Initial Static Water Level (feet btoc): 129.80

Final Water Level (feet btoc): NM, did not measure due to frozen well

Purge Start Time: ~~BK 1430~~ 1255

Sample Time: 1255 (grab, pre-purge)

Samplers' Signatures: BCarreon BK

OVM: FID ☐ PID ■ In Casing (ppm): (Initial) 0.0 (Vented to) 0.0

Purging/Sampling Device: ZIST/Compressed gas Pump depth (ft bgs): 250

Analytical Parameters: VOCs, ~~Metals, Mercury, Anions, TDS/Alkalinity, Nitrate/Nitrite, TOC, MEEA~~ BK 12/17

QC Samples Collected: None

Ferrous Iron (mg/L): NM Allowable Drawdown (ft): 0.3

Controller Settings: Recharge: 120 secs Discharge: 30 secs Pressure: 160 psi

Cycles Per Minute: 0.4

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
1434	129.80	10.4	7.50	663	3.22	80.0	17.2	<50	started first w/ 120ml/cycle
12/13 1440	No Flow → Line is freezing. Team to attempt to defrost it.								
12/17 1318	NM	11.1	7.64	791	1.71	127.3	33.5	150	12/15/20 1030 Breakthrough occurred
1322	NM	12.1	7.53	790	1.45	103.1	42.3	150	~60 minutes ; ~57 min purge
1334	NM	12.2	7.47	755	1.49	72.2	~~72.3~~	150	
1348	NM	12.1	7.41	732	1.46	39.3	194	~~120~~ 150	
1358	NM	12.4	7.37	772	1.36	26.7	307	150	
1408	NM	12.1	7.37	775	1.34	23.2	NM	150	Min purge met, ~1gal purged
Stopped sampling due to increasing turb. d/t. Will submit grab VOCs.									
									Grab sample collected at 1255

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 120 secs **Discharge:** 30 secs
Pressure: 110 psi **Cycles Per Minute:** _____ **Flow Rate:** 160 mL/cycle

Screened Interval: 250-260 ft bgs **Minimum purge volume:** 0.9 gallons ~3.4 L

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume Date: 12/13/20 OVM: FID ☐ PID ■ In Casing (ppm): (Initial) 0 (Vented to) 0

Well ID: MW-34D Purging/Sampling Device: ZIST/Compressed gas Pump depth (ft bgs): 315

Initial Static Water Level (feet btoc): NA* Analytical Parameters: VOCs, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 129.90 QC Samples Collected: None

Purge Start Time: 1015 Ferrous Iron (mg/L): 0.0 Allowable Drawdown (ft): 0.3

Sample Time: 1230 Controller Settings: Recharge: 120 secs Discharge: 35 secs Pressure: 125 psi

Samplers' Signatures: [signature] Cycles Per Minute: ~0.4

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
1037	X	13.3	6.87	878	7.49	56.0	52.4	235	
1043		13.2	7.27	887	5.92	59.3	25.2	240	
1048		13.3	7.13	889	5.53	70.3	7.11	240	
1053		13.3	7.05	903	5.20	76.1	6.09	230	didnt have water level meter yet
1058	130.02	13.2	7.18	897	5.90	80.2	5.60	240	put water level meter in, surged pump
1108	130.0	11.8	7.39	875	5.28	84.1	3.67	240	min purge vol met
1114	130.0	11.4	6.93	904	4.99	85.7	6.32	240	
1119	130.0	12.2	7.11	881	4.94	84.9	6.49	240	
1125	129.95	12.9	7.31	904	4.77	82.5	11.0	200	
1130	129.95	12.9	7.25	896	5.51	56.2	43.1	200	
1138	129.95	12.6	7.80	894	4.58	35.1	38.30	175	
1143	129.90	12.2	7.40	892	4.64	37.8	20.4	150	
1154	129.90	12.6	7.44	898	4.75	50.8	13.2	175	
1159	129.90	12.9	7.29	901	4.72	57.9	11.9	175	

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 120 secs Discharge: 35 secs
Pressure: 125 psi Cycles Per Minute: _____ Flow Rate: 240 mL/cycle

Screened Interval: 315-325 ft bgs Minimum purge volume: 1.1 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ☒

* Drowned WLM after WC building and purge start.

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume Date: 12/13/20

OVM: FID ☐ PID ■ In Casing (ppm): (Initial) 0 (Vented to) 0

Well ID: ~~MW-30RA~~ IC MW-34D

Purging/Sampling Device: Compressed gas Pump depth (ft bgs): 315

Initial Static Water Level (feet btoc): NA

Analytical Parameters: VOCs, 1,4-Dioxane, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 129.90

QC Samples Collected: None

Purge Start Time: 1015

Ferrous Iron (mg/L): 0.0 Allowable Drawdown (ft): 0.3

Sample Time: 1230

Controller Settings: Recharge: 120 secs Discharge: 35 secs Pressure: 125 psi

Samplers' Signatures: Jana Campbell

Cycles Per Minute: 6.4

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1206	129.90	12.9	7.22	899	4.88	64.2	17.9	175	
1212	129.90	12.7	7.18	905	4.70	68.5	6.98	200	
1218	129.90	12.9	7.04	907	5.08	71.3	6.93	200	
1223	129.90	12.9	7.13	906	5.05	74.0	7.34	200	
1228	129.90	12.8	7.08	909	5.05	76.6	6.04	200	purged approx. 3 gallons
	SAMPLE								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 120 min Discharge: 35 secs

Pressure: 125 psi Cycles Per Minute: _____ Flow Rate: 240 mL/min

Screened Interval: 315-325 ft bgs Minimum purge volume: 1.1 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12/14/20

Well ID: MW-36

Initial Static Water Level (feet btoc): 44.68

Final Water Level (feet btoc):

Purge Start Time: 0936

Sample Time: 1115

Samplers' Signatures: B Cox D Carreon JSx M Day

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.1 **(Vented to)**

Purging/Sampling Device: ~~MP-50~~ ~~Bladder~~ Peristaltic/Grab **Pump depth (ft bgs):** 50

Analytical Parameters: VOCs,1,4-Dioxane, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

QC Samples Collected: MS/MSD, Field Duplicate FD07-GW (0800)

Ferrous Iron (mg/L): 0.12 **Allowable Drawdown (ft):** 0.3

Controller Settings: Recharge: 16 secs **Discharge:** 14 secs **Pressure:** ~50 psi

Cycles Per Minute: 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
0934	44.68	11.0	7.21	912	5.61	-6.4	1000 <	75	Start ~75 psi 25 sec/14 oz R 55 D
0943	44.68	12.6	7.23	906	3.57	-37.4	1000 <	100	Up discharge to 10s
0949	44.68	12.5	7.24	907	2.21	-47.3	541	140	Up discharge to 15s
0954	44.68	12.6	7.21	907	0.84	-56.3	595	140	
0959	44.68	12.5	7.25	909	0.79	-66.9	260	140	Up to 25 sec/14 oz D 35s R
1005	44.68	12.5	7.27	904	0.61	-75.9	178	140	Change 20s D, 10s R
1010	44.68	12.2	7.27	906	0.67	-82.1	198	150	14s D, 16s R PP 20s D, 10s R
1015	44.68	12.8	7.23	907	0.58	-88.5	119	190	14s D 16s R
1020	44.68	12.6	7.24	909	0.55	-98.3	58.9	190	min purge met after 0943
1025	44.68	12.8	7.24	908	0.53	-103.5	44.6	190	
1030	44.68	12.7	7.23	908	0.51	-107.0	27.3	190	
1038	44.68	12.7	7.22	909	0.51	-106.4	19.9	190	
1040	44.68	12.8	7.24	910	0.53	-105.0	22.2	190	
1045	44.68	12.8	7.23	911	0.54	-102.1	19.8	190	

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: _____ secs **Discharge:** _____ secs

Pressure: _____ psi **Cycles Per Minute:** _____ **Flow Rate:** _____ mL/min

Screened Interval: 47-52 ft bgs **Minimum purge volume:** 2.2 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume Date: 12/14/10

Well ID: MW-30 continued

Initial Static Water Level (feet btoc): See Pg 1

Final Water Level (feet btoc): _____

Purge Start Time: _____

Sample Time: _____

Samplers' Signatures: _____

OVM: FID ☐ PID ■ In Casing (ppm): (Initial) 0.1 (Vented to) 0.0

Purging/Sampling Device: 2" SST CONT PUMP Pump depth (ft bgs): 50'

Analytical Parameters: See Pg 1

QC Samples Collected: See Pg 1

Ferrous Iron (mg/L): See Pg 1 Allowable Drawdown (ft): 0.3

Controller Settings: Recharge: 16 secs Discharge: 14 secs Pressure: 50 psi

Cycles Per Minute: 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1050	44.68	12.7	7.23	910	0.59	-97.5	20.5	190	
1055	44.68	12.7	7.22	911	0.606	-92.5	16.4	190	
1100	44.68	12.5	7.22	912	0.71	-88.1	11.0	150	
1105	44.68	12.2	7.22	914	0.91	-83.6	8.21	150	
1109	44.68	12.2	7.20	912	0.85	-80.3	6.39	150	
1111	44.68	12.3	7.23	913	0.87	-80.5	6.57	150	~5 gal purged
1115	Sample								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: _____ secs Discharge: _____ secs

Pressure: _____ psi Cycles Per Minute: _____ Flow Rate: _____ mL/min

Screened Interval: _____ ft bgs Minimum purge volume: _____ gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume Date: 12/14/20

OVM: FID ☐ PID ■ In Casing (ppm): (Initial) 0.1 (Vented to) 0.0

Well ID: MW-37S

Purging/Sampling Device: MP-50 Pump depth (ft bgs): 65

Initial Static Water Level (feet btoc): 18.48

Analytical Parameters: VOCs,1,4-Dioxane, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 18.55

QC Samples Collected: ~~None~~ MD FD#1 0900

Purge Start Time: 1457

Ferrous Iron (mg/L): 0.0 Allowable Drawdown (ft): 0.3

Sample Time: 1605

Controller Settings: Recharge: 25 secs Discharge: 5 secs Pressure: ~20 psi

Samplers' Signatures: B Carmen RSC

Cycles Per Minute: 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1510	18.70	12.1	6.58	1458	6.61	101.4	117	100	25s R, 5s D
1520	18.68	12.2	6.52	1470	5.91	69.5	44.8	100	min purge
1530	18.68	12.2	6.52	1478	5.72	60.8	15.4	100	
1540	18.68	12.5	6.52	1477	5.62	54.7	13.2	100	
1550	18.68	12.5	6.52	1473	5.57	52.8	5.86	100	
1559	18.62	12.6	6.52	1477	5.55	53.0	3.90	100	
1600	18.67	12.4	6.52	1477	5.53	52.8	2.90	100	~2gal purged
1605	Sample								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: _____ secs Discharge: _____ secs

Pressure: _____ psi Cycles Per Minute: _____ Flow Rate: _____ mL/min

Screened Interval: 25-35 ft bgs Minimum purge volume: _____ gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ■

Pg 1 of 2

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume Date: 12/14/20

OVM: FID ☐ PID ■ In Casing (ppm): (Initial) 0 (Vented to) 0

Well ID: MW-37D Purging/Sampling Device: MP-50 Pump depth (ft bgs): _____

Initial Static Water Level (feet btoc): 42.20 Analytical Parameters: VOCs,1,4-Dioxane, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 42.21 QC Samples Collected: None

Purge Start Time: 1453 Ferrous Iron (mg/L): 8.00 Allowable Drawdown (ft): 0.3

Sample Time: 1700 Controller Settings: Recharge: 15 secs Discharge: 15 secs Pressure: ~~30~~ psi

Samplers' Signatures: [signature] Cycles Per Minute: 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1455	42.20	13.1	7.90	1112	0.22	-56.0	1000 +	150	DISS & FS
1505	42.20	13.10	7.11	1128	0.27	-57.2	929	150	
1515	42.20	12.9	7.06	1131	0.27	-52.6	204	120	Min purge met
1525	42.21	13.1	7.04	1128	1.42	-50.3	91.3	125	
1535	42.20	13.6	7.05	1129	2.03	-52.5	77.5	150	
1545	42.21	13.7	7.05	1126	2.06	-54.3	67.3	150	
1555	42.22	13.7	7.04	1127	2.04	-55.8	55.6	150	
1605	42.22	13.5	7.05	1131	4.09	-54.1	51.4	150	
1615	42.22	13.4	7.05	1135	4.25	-46.0	32.4	150	
1625	42.21	13.6	7.05	1140	4.09	-43.0	~~43~~ 170 NO	150	
1635	42.22	13.9	7.03	1138	4.10	-39.4	15.8	150	
1638	42.21	13.7	7.04	1141	4.07	-38.8	12.7	150	
1641	42.21	13.9	7.03	1142	4.19	-37.7	13.1	150	
1644	42.22	13.7	7.03	1141	4.18	-35.5	10.1	150	

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: _____ secs Discharge: _____ secs

Pressure: _____ psi Cycles Per Minute: _____ Flow Rate: _____ mL/min

Screened Interval: 60 – 70 ft bgs Minimum purge volume: _____ gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ■

Pg 2 of 2

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: _____ Date: 12/4/20 OVM: FID ☐ PID ■ In Casing (ppm): (Initial) 0 (Vented to) 0

Well ID: MW-37D continued Purging/Sampling Device: See Pg 1

Initial Static Water Level (feet btoc): _____ (after pump install) Analytical Parameters: _____

Final Water Level (feet btoc): _____ QC Samples Collected: _____

Purge Start Time: _____ Sample Number: _____

Sample Time: _____ Controller Settings: Recharge: 15 secs Discharge: 15 secs Pressure: ~36 psi

Samplers' Signatures: SLL first page Cycles Per Minute: 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1648	42.20	13.9	7.02	1137	4.25	-36.5	10.4	150	
1651	42.21	13.6	7.03	1141	4.27	-36.9	8.24	150	
1654	42.21	13.8	7.02	1137	4.19	-36.1	7.28	150	
1657	42.21	13.8	7.02	1140	4.28	-36.7	6.94	150	Total purged ~ 5 gals
1700	-								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	± 1° C	DO	± 10 %
pH	± 0.1 pH unit	ORP	± 10mV
Conductivity	± 10 %	Water Level	± 0.1 foot
		Turbidity	< 50 NTU

Ferrous Iron (mg/L): _____

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume Date: 12/16/20 OVM: FID ☐ PID ■ In Casing (ppm): (Initial) 0 (Vented to) 0

Well ID: MW-38S Purging/Sampling Device: MP-50 Pump depth (ft bgs): 32

Initial Static Water Level (feet btoc): 19.61 Analytical Parameters: VOCs,1,4-Dioxane, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 19.61 QC Samples Collected: None

Purge Start Time: 957 Ferrous Iron (mg/L): 0.12 Allowable Drawdown (ft): 0.3

Sample Time: 1200 Controller Settings: Recharge: 15 secs Discharge: 15 secs Pressure: 25 psi

Samplers' Signatures: Cycles Per Minute: 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
959	19.61	13.4°C	6.81	1648	8.01	88.7	28.4	240mL/min	
1003	19.61	13.4°C	6.87	1648	6.45	60.6	34.8	240	min purge met
1008	19.61	13.5°C	6.89	1648	6.42	55.4	39.7	240	
1012	19.61	13.5°C	6.89	1649	6.32	54.6	36.8	240	
1017	19.65	13.5°C	6.89	1649	6.41	54.5	30.4	240	
1022	19.63	13.4°C	6.89	1649	6.32	54.5	30.2	240	
1027	19.67	13.5	6.89	1650	6.35	55.5	40.4	240	
1032	19.67	13.5	6.89	1648	6.36	58.1	56.8	240	
1037	19.65	13.4	6.90	1649	6.35	58.6	66.6	240	
1042	19.63	13.5	6.90	1647	6.30	59.8	63.1	240	
1047	19.65	13.5	6.90	1646	6.33	60.0	53.8	240	
1052	19.65	13.4	6.90	1643	6.29	59.8	58.7	240	
1057	19.65	13.4	6.91	1642	6.32	58.8	49.7	240	
1102	19.63	13.5	6.91	1642	6.30	59.6	47.4	240	

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: _____ secs Discharge: _____ secs

Pressure: _____ psi Cycles Per Minute: _____ Flow Rate: _____ mL/min

Screened Interval: _____ ft bgs Minimum purge volume: ~~0.4~~ 1c gallons

Pump depth = 32ft 0.1

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12/16/20 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0 **(Vented to)** 0

Well ID: MW-38S **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** _____

Initial Static Water Level (feet btoc): 19.61 **Analytical Parameters:** VOCs,1,4-Dioxane, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 19.61 **QC Samples Collected:** None

Purge Start Time: 957 **Ferrous Iron (mg/L):** 0.12 **Allowable Drawdown (ft):** 0.3

Sample Time: 1200 **Controller Settings: Recharge:** 15 secs **Discharge:** 15 secs **Pressure:** 25 psi

Samplers' Signatures: _____ **Cycles Per Minute:** 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1110	19.65	13.4	6.91	1640	6.33	58.9	37.9	240	Mp pump
1115	19.63	13.5	6.91	1641	6.23	59.2	35.2	240	
1119	19.62	13.5	6.91	1635	6.19	59.0	32.6	240	
1123	19.67	13.3	6.92	1637	6.13	58.4	31.2	240	
1127	19.63	13.5	6.92	1635	6.19	57.3	25.7	240	
1138	19.62	13.4	6.93	1633	5.96	57.4	24.8	240	
1143	19.61	13.4	6.92	1631	6.10	57.2	23.0	240	
1148	19.61	13.4	6.93	1634	6.10	56.6	21.6	240	
1151	19.65	13.5	6.92	1636	6.08	56.6	15.4	240	
1154	19.61	13.4	6.93	1633	6.18	56.6	16.1	240	
1157	19.61	13.4	6.93	1630	5.98	56.2	15.9	240	~8 gal purged
1200	SAMPLE								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: _____ secs **Discharge:** _____ secs
Pressure: _____ psi **Cycles Per Minute:** _____ **Flow Rate:** _____ mL/min

Screened Interval: _____ ft bgs **Minimum purge volume:** 0.1 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Not Exceeded: ☐
Total Purge Volume Recorded: ☐ Simultaneous Purge Achieved: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 12/16/20 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** Ø **(Vented to)** Ø

Well ID: MW-38D **Purging/Sampling Device:** ~~MP-50~~ ZIST single channel **Pump depth (ft bgs):**

Initial Static Water Level (feet btoc): 18.55 **Analytical Parameters:** VOCs,1,4-Dioxane, Metals, Mercury, Anions, ~~TDS~~/Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 18.55 **QC Samples Collected:** None

Purge Start Time: 1010 **Ferrous Iron (mg/L):** 0.14 **Allowable Drawdown (ft):** 0.3

Sample Time: 1140 **Controller Settings: Recharge:** 15 secs **Discharge:** 2 secs **Pressure:** 40 psi → controller malfunctioning and won't discharge for longer times 2S.

Samplers' Signatures: [signature] **Cycles Per Minute:** 3.5

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1015	18.55	11.9	7.03	1281	8.11	163.8	>1000	NA	ZIST controller malfunctioning, keep
1025	18.55	11.9	6.96	1289	8.02	160.7	870	100	purging to lower TURB, will dial in settings
1035	18.55	12.1	6.96	1286	7.82	156.2	169	100	↑ once new controller ready
1045	18.56	12.2	6.96	1279	7.69	153.7	41.9	100	minimum purge met
1055	18.55	12.1	6.96	1276	7.60	152.2	23.0	100	
1105	18.55	12.4	6.96	1274	7.62	150.9	28.1	100	
1110	18.55	12.3	6.96	1274	7.66	150.3	17.8	100	
1115	18.55	12.3	6.96	1282	7.66	149.8	14.9	100	
1120	18.55	12.3	6.96	1278	7.68	149.8	12.9	100	
1125	18.55	12.4	6.96	1283	7.78	148.7	14.4	100	
1130	18.55	12.4	6.96	1282	7.76	148.2	13.5	100	
1135	18.55	12.5	6.96	1281	7.69	147.8	13.6	100	purged approx. 3.5 gal
1140	SAMPLE								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 15 secs **Discharge:** 2 secs
Pressure: 40 psi **Cycles Per Minute:** 3.5 **Flow Rate:** 100 mL/min

Screened Interval: 60 ft bgs **Minimum purge volume:** 0.2 gallons
0.9 Liters

pump depth = 65 bgs

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ■

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WATER LEVEL MEASUREMENTS

Project: VA Plume Project No: _____

Weather Conditions: Clear, Sunny Date: 12/7/20

Measurement Device: Solinst / Heron WL Meters Measured By: BC, CK, MD, IC,

Well	Date	Time	Depth to Water (feet)	Reference TOC = top of casing, TOH = top of housing	Comments
MW-01S	12/07/20	1626	~~157.00~~ MD 157.00	TOH	1847/24000 98%
MW-01D	12/07/20	1615	171.21	TOH	1847/24000 76% SWS_53032Barometric01
MW-02	12/07/20	1605	170.46	TOH	Large silt and sand pile by the well
MW-03RA	↓	1315	188.18	TOC	
MW-03RB	↓	1320	204.27	↓	
MW-03RC	↓	1325	204.40	↓	
MW-03RD	↓	1330	205.03	↓	
MW-04	↓	1700	136.19	↓	
MW-05R	12/7/20	0947	214.79	TOH	1846/24000 76%
MW-06	12/7/20	1445	123.79	TOC	1773/24000 92%
MW-08A	12/8/20	1135	60.14	TOH	
MW-08B	12/8/20	1138	58.49	TOH	
MW-08C	12/8/20	1140	56.82	TOH	
~~MW-12D~~ 13D MD	~~12/6/20 12/7/20~~ 12/7	1055	13.56	TOC	
MW-12S	12/7/20	12:29	~~57.43~~ IC 12/7/20	TOH	Dry - hit top of pump
~~MW-13D~~ 12D	12/7/20	1251	56.42	TOH	

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WATER LEVEL MEASUREMENTS

Well	Date	Time	Depth to Water (feet)	Reference TOC = top of casing, TOH = top of housing	Comments
MW-13S	12/6/20	1050	14.16	TOC	
MW-13L	↓	1100	~~32.04~~	↓	22.09 feet
MW-14D	12/8/20	1103	See Gauge P	Gauge	Pressure: ~~2.75~~ PSI, 0.2 bar No bit, return 12/8
MW-14S	12/7/20	1625	5.36	TOH	1850/48000 95%
MW-15D	12/7/20	11:40	50.7	TOH	casing was frozen 1879/48000, 94%
MW-15S	12/7/20	12:07	49.41	TOH	
MW-16D	12/7/20	1316	9.89	TOH	1848/48000 94%
MW-16S	12/7/20	1318	10.19	TOH	
MW-17D	12/7/20	1614	0.45	TOC (exist.)	Pressure: NA PSI, NA bar. If no pressure, add stickup. If water is below existing TOC, remove stickup and gauge. If water is above existing TOC, gauge with stickup. Record stickup height.
MW-17S	12/8/20	1114	6.69	TOH	Lock stuck. Come back w/ cutters.
MW-18	12/7/20	1353	81.69	TOH	
MW-19	12/7/20	1404	80.76	TOH	
MW-20D	12/7/20	1433	82.98	TOH	1846/48000 93%
MW-20S	12/7/20	1419	83.26	TOH	1846/48000 94%
MW-21	12/7/20	1510	64.70	TOH	1846/48000 96%
MW-22	12/7/20	1526	63.25	TOH	1848/48000 95%
MW-23A	12/7/20	1055	188.45	TOC	
MW-23B	↓	1107	195.40	↓	
MW-23C	↓	1115	217.12	↓	

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WATER LEVEL MEASUREMENTS

Well	Date	Time	Depth to Water (feet)	Reference TOC = top of casing, TOH = top of housing	Comments
MW-24	12/7/20	1210	185.91	TOH	
MW-25A	↓	1220	179.72	TOC	
MW-25B	↓	1226	184.71	↓	
MW-25C	↓	1240	207.73	↓	
MW-26A	↓	1250	190.90	TOC	
MW-26B	↓	1255	195.31	↓	
MW-26C	↓	1300	217.96	↓	
MW-26D	↓	1305	218.08	↓	
MW-27	↓	1125	188.46	TOH	
MW-28	12/8/20	1015	187.42	TOH	No b.t, return 12/8
MW-29A	↓	1557	116.55	TOC	Dry at 113.55. Pulled pump for WL.
MW-29B	↓	1530	155.50	TOC	
MW-29C	↓	1553	158.92	TOC	
MW-30RA	12/7/20	1428	227.47	TOC	
MW-30RB	↓	1420	229.25	TOC	
MW-30C	↓	1408	229.41	TOC	
MW-31A	12/7/20	1440	DRY	TOC	Below top of volume booster.
MW-31B	↓	1645	135.98	TOC	
MW-31C	↓	1455	148.53	TOC	
MW-32A	12/8/20	0952	83.03	TOH	

CDM Smith

WATER LEVEL MEASUREMENTS

Well	Date	Time	Depth to Water (feet)	Reference TOC = top of casing, TOH = top of housing	Comments
MW-32B	12/8/20	0955	82.50	TOC	
MW-32C	↓	1000	81.84	TOC	
MW-34A	12/7/20	1420	130.95	TOC	
MW-34B	↓	1505	130.60	↓	623/48000 98%
MW-34C	↓	1515	129.87	↓	623/48000 96%
MW-34D	↓	1520	130.0	↓	
MW-36	12/7/20	1718	44.72	TOH	
MW-37S	12/7/20	1702	~~42.28~~	TOC	North hole 18.45 feet
MW-37D	12/7/20	1705	~~18.45~~	TOC	South hole 42.28 feet
MW-38S	↓		19.59	TOC	
MW-38D	↓		18.53	TOC	

Additional Comments:

Measuring GWT locations occasionally requires re-raising and lowering the pump and tubing ac 12/8 which may cause turbidity issues ac 12/8 or other issues. This is due to the limited space within the casing among the tubing and water level meter.

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CONTENTS

PAGE	REFERENCE	DATE

9/21/20 Salt Lake City VA/700 South 1600 East PCE Plume

Weather: Sunny

PPE: Modified level D

Personel: Maria Day, Tea Vrtlar

0750 CDM Smith onsite

0800 Safety meeting / unpacking boxes

0830 PID calibration, using field forms

0841 Start packing bottle kits, ysi calibration

1100 Packing equipment into vehicles

1150 Located MW-5R

1200 Lifted cap to assit pulling out transducer and realized tubing was lost, called FTL Ben and pulled the transducer.

1212 Started MW-05R transducer download

1236 Finish MW-05R transducer download

Set it up to start @ ~~0300~~ 1300 MDT 9/21/20

Pump tubing disconnected Emma is taking over. Emma will be taking WL measurements from ZIST wells

1300 Arrived at MW15S and MW15D. There is a white truck parked over them. FTL agrees to come back later

1315 Arrived at MW12S & MW2D

1324 WL at MW12S taken

1330 WL at MW-12D taken

1341 Arrived at MW11S & MW11D

1346 WL at MW11D taken

Rite in the Rain

9/21/20 Salt Lake City VA PCE Plume 700 South 1600 East

1350 MW16D transducer download started

1354 MW16S water level collected
MW16D transducer set to start at 1400

1410 Arrived at MW14S and MW14D

1415 MW14S water level taken

1416 Transducer data for MW-14S downloaded

1425 WL of 14D. Could not confirm units, so a picture was taken of the gauge

1440 Arrived at MW-17S and MW-17D
MW-17S lock not attached

1442 Took water level at MW-17S

1446 Took water level at MW-17D
Checked with Emma, measurements needs to be redone w/ standing pipe, result crossed out.

1500 Arrived at MW-13S & MW-13D

1508 MW13D WL taken. Transducer pulled

1510 Transducer download complete, set to start at 1600

1511 MW-13S WL was taken
Went back to conex to get + equipment

1554 MW-21 WL was collected

1557 MW-21 Transducer download started

1610 Arrived at MW-22

1615 MW-22 WL collected

1617 MW-22 Transducer data download

9/21/20 Salt Lak City VA 700 South 1600 East PCE Plume
Started. Set to start at 1700

1630 Arrived back at 17D w/ attachment

1637 Measured WL at MW-17D

1650 Arrived at MW-18

1653 Collected WL at MW-18

1659 Arrived at MW-19

1702 Collected WL at MW-19

1708 Arrived at MW-20S & MW-20D

1711 Collected WL at MW-20S, started transducer download MD 9/21/20 Set to start 1800

1720 Collected WL @ MW-20D, started transducer download. Set to start 1800

1730 Arrived @ MW-8. White Subaru rear tire is on the well cover.

1745 Arrived @ MW-01S & MW-01D

1747 Collected WL @ MW-01S, pulled transducer

1755 Collected WL @ MW01D, pulled transducer, Started MW-01S download, set to start at

1805 Started MW-01D transducer download set to start at

1820 Arrived at MW-02

1825 Collected MW-02 water levels

1850 Offsite.

Rite in the Rain

9/22/20 Salt Lake City VA, 700 South 1600 East PCE Plume

Weather: Overcast

PPE: Modified level D

Personnel: Tea Vitlow, Maria Day

0700 Arrived onsite

0710 Health and Safety meeting

0715 Calibrating YSI's, PID, and load equipment into the vehicles.

0815 Arrived at MW-15S & MW-15D, truck still parked on wells, left a note, and a cone.

0825 Arrived at MW-13S & MW-13D, set up equipment, and found we were missing airline fittings, Tea left to go get the airline fittings.

Tea returned with the fittings.

Called Emma, we were unable to pull the fittings apart to connect.

Emma arrived w/ extra fittings

1023 Started purge at MW-13S

1020 Turbitity meter was calibrated.

1045 We been experiencing draw down.

1053 The water level meter not the top of the pump. Called FTL

1100 Stopped purging, purged approximately 1 gal. 1.42 gal based on calculations.

9/22/20 Salt Lake City VA, 700 S. 1600 E PCE Plume

1115 Started purging MW-13D

1155 ORP not stabilizing, called FTL, and he requested to purge for 15 more minutes before sampling

1220 Collected ~~MW-13D-092220~~ MD Sample

1320 Arrived at MW-12S and MW-12D.

1330 Set up traffic control measures.

1345 Started setting up equipment on site.

1455 FTL approved collecting the sample for MW-12D, with ORP range of 20 mV. Collected sample for ~~MW-12D-092220~~ MD

1530 Opened MW-12S, went to take a WL and it was hitting the top of the pump. Tried a second water level meter w/ same result. Called Emma, we should wait about 24 hrs to see if there is recharge. Checked and made sure the water level meters ~~were~~ MD were working

1600 Returned to ~~MW-~~ MD 15S & 15D, there is a truck still parked ontop of wells.

1630 Started packing an cooler for shipment.

1900 Offsite.

MW12D-GW092220 MW13D-GW092220

Rite in the Rain

9/23/20 Salt Lake City VA, 700S 1000E PCE Plume

0700 Arrived onsite.

0710 Calibrated YSI, PID, turbidity meter, and Had a health and safety meeting.

0715 Finished calibrating equipment and loaded Vehicle for sampling.
Weather: Sunny
PPE: Modified level D
Personnel Tea Vrtlar & Maria Day.

0800 Left Site to check if vehicle is still over MW-15S & MW-15D.

0810 Vehicle still parked over MW-15D & MW-15S, left an information fact sheet.

0815 Arrived at MW-12S to check water level. WL meter went down to 57.65 and it hit the pump, but no water.

0820 Went to Smiths to pick up supplies

0835 Dropped off supplies w/ Emma & Ben.

0850 Returned to MW-13S, set up equipment

0930 Got water from MW13S.

0935 Sample ~~MW-13S-GW-092320~~ MP

0950 Return to conex for bucket

1000 Stopped at Smith's for tape

1050 Arrived at MW-22

1105 Started Purge

1140 Sampled ~~MW-22-GW-092320~~ MP

MW22-GW092320

MW13S-GW092320

9/23/20 Salt Lake City VA, 700S. 1000E. PCE Plume.

1220 Arrived at MW-21

1230 Set up traffic control for MW-21

1245 Started Purging @ MW-21

1320 Sampled ~~MW-21-GW-092320~~ MP

1350 Cleaned up and packed equipment

1420 Arrived at Conex to get bottle kit for MW-18 and dedicated tubing.

1430 Arrived at MW-18, and started to set up equipment

1530 Sampled ~~MW18-GW-092320~~ MP

1630 Arrived at MW-19.

1640 Started purge @ MW19

1720 Sample MW19-GW092320

1725 Field Duplicate Sampled FD02-GW092320

1845 Offsite.

MW21-GW092320

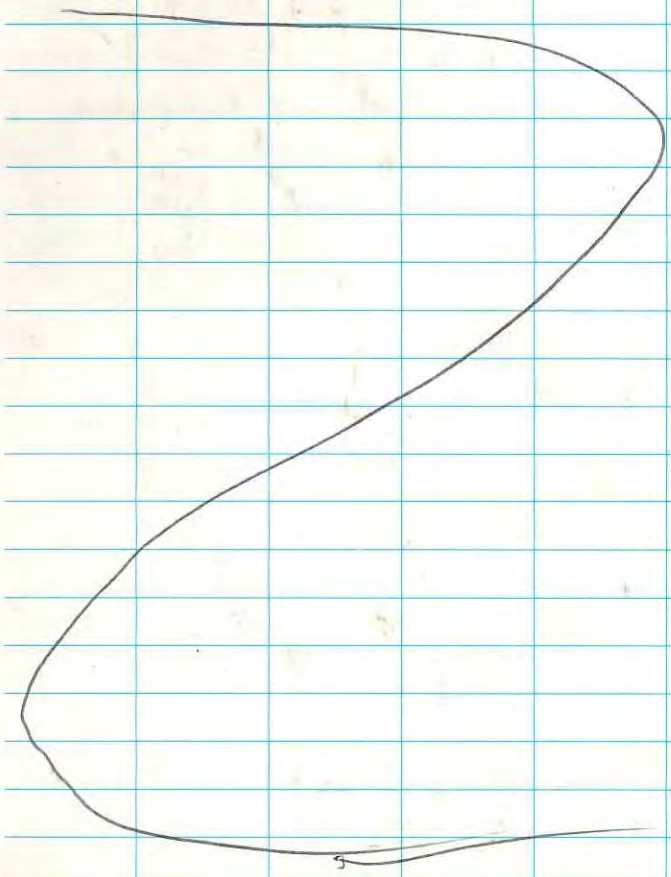
MW18-GW092320

Rite in the Rain

9/24/20 Salt Lake City VA, 700S 1600E PCE Plume
Weather: Sunny.
PPE: Modified level D
Personel: Tea Ulbar & Maria Day

0700 Arrived onsite.
0705 Started calibrating Ysis, PIDs, turbidity meters. Loaded equipment into vehicle.
0800 Had the Health and safety meeting.
0830 Contacted the engineering building about getting access to MW27.
0900 Arrived at MW-20D & MW 20S.
0905 Started setting up equipment.
1010 Collected MW20S-GW092420
1030 Collected MW20D-GW092420
1035 Collected FD03-GW092420
1105 Cleaned up and packed equipment
1145 Grabbed extra ice, and supplies
1210 Arrived at MW-27
1300 Purge started at MW-27
1350 Sample collected MW27-GW092420
1420 Arrived at MW-28
1445 Purge started at MW-28.
1535 Sample Collected MW28-GW092420
1545 Packed 15 coolers for shipment
1700 Arrived at MW-10
1817 Collected MW010-GW092420
1830 Collected transducer downloads.

9/29/20 Salt lake City VA, 700E, 1600E PCE Plume
1850 Back to the conex to dropp of equipment.
1900 Offsite.



Rite in the Rain

9/25/20 Salt Lake City VA, 7005, 1600E PCE Plume
Weather: Sunny
PPE: Modified Level D.
Personel: Tea Vrtlar, Maria Day

~~Arrived~~

0700 Arrived onsite
0705 Started loading vehicles & Calibrating YSIs, PIDs, turbidity meters.
0800 Health and Safety meeting was conducted.
0840 Checked MW-15S & MW-15D, truck is still parked over it.
0850 Arrived at MW-16S & MW-16D. and set up traffic control and equipment.
0930 Sampled MW16S-GW092520
0935 Sampled MW16D-GW092520
1015 Picked up supplies from Smiths
1100 Arrived at MW-14S & MW-14D
1105 Set up traffic control
1145 Sampled MW14D-GW092520
1315 Sampled MW14S-GW092520
1515 Started packing coolers for shipment.
1730 Shipped Coolers.
1745 Offsite

9/27/20 Salt Lake City VA, 7005. 1600E PCE Plume
Weather
PPE: Modified level D
Personnel: Tea Vrtlar, Maria Day
0700 Arrived onsite.
0705 Started calibrating PIDs, YSIs, turbidity meters. And Started loading equipment into vehicles.
0800 Health & Safety meeting held.
0820 Checked MW-15S & MW-15D, white truck is still parked over the wells.
0850 Arrived at MW-8 and started setting up equipment.
0911 Purge Started at MW-8a
0945 Sample MW08A-GW092720 collected
1020 Purge Started at MW08b
1050 Sample MW08B-GW092720 collected.
1115 Tea left to get extra quick connect for MW-08c, the top quick connect is missing.
1205 Got the lines reconnected.
1215 Tea left for ACE to get a 6.5 allan wrench, the regulator is stuck and the disc is stripping the regulator.
1230 Emma and Anna showed up w/ a new regulator, and helped us vent the pressure

Rite in the Rain

9/27/20 Salt Lake City VA. 700s no 00 & PCE Pumps from the old regulator.

1255 Hooked up the gas line to MW-08C and started increasing the pressure.

1257 Got water from MW-08C, Purge started

1410 Collected MW08C-GW092720

1500 Picked up Emma from MW-34

1520 Arrived at MW-25

Time	Pressure	Discharge	Recharge	Notes
1535	20	10s	120s	No movement
1542	20	20s	120s	No movement
1545	20	30s	120s	No movement
1547	30	10s	120s	No movement
1549	30	20s	120s	No movement
1552	30	30s	120s	No movement
1554	40	10s	120s	No movement
1557	40	20s	120s	No movement
1559	40	30s	120s	No movement
1601	50	10s	120s	No movement
1604	50	20s	120s	No movement
1606	50	30s	120s	No movement
1608	60	10s	120s	No movement
1610	60	20s	120s	No movement
1612	60	30s	120s	No movement
1615	70	10s	120s	No movement
1617	70	20s	120s	No movement

Time	Pressure (psi)	Discharge(s)	Recharge(s)	Notes
1619	70	30	120	bubbles
1622	70	30	120	bubbles
1625	70	30	120	bubbles
1650	80	10	120	no movement
1652	80	20	120	bubbles
1715	80	30	120	bubbles
1728	90	10	120	"
1732	90	20	120	"
1800	90	30	120	bubbles
1812	100	10	120	bubbles
1819	100	20	120	/

1900 Off site.

Rite in the Rain

9/28/2020 Salt Lake VA, 700s/1600E PCE Plume

0700 Arrived onsite.
Weather: Sunny / Breezy
PPE: Modified level D
Personel: Tea Vrtkar, Maria Pang

0705 Calibrated YSIs, PIDs, and turbidity meters. And loaded equipment

0745 Health & Safety meeting

0820 Arrived at MW-02

0844 Purge started at MW02

0930 Sample MW02-GW092820 collected, along w/ the coresponding MS/MSD.

1050 Returned to MW-15S & MW-15D, the truck moved. Left one of our vehicles as a placeholder for a core.

1110 Arrived back at the conex to collect supplies for MW-15S & MW-15D.

1145 Set up traffic control for MW-15S & MW-15D, and set up equipment.

1245 Sample MW15D-GW092820 collected.

1310 Sample MW15S-GW092820 collected

1400 Returned to conex to drop off the traffic control and extra equipment

1420 Met with the other team to pack and ship coolers.

1445 Collected TB01B-GW092820

9/28/20 Salt Lake City VA, 700s 1600E PCE Plume

1500 Collected TB02B-GW092820

1420 Dropped off coolers at FedEx.

1730 Unloaded Equipment from vehicles

1830 Offsite

Maria Pang

Rite in the Rain

9/29/20 Salt Lake VA, 700S 1600E PCE Plume

Weather: Sunny

PPE: Modified Level D

Personnel: Tea Vitten, Maria Day

0700 Arrived onsite

0705 Started Calibrating YSI, PIDs, & turbidity meters. Also started loading equipment into the vehicle

0750 Health and Safety meeting.

0805 Arrived at Smiths to grab DI and Ice.

0815 Dropped off Ice and DI with other team.

0820 Arrived at MW01S & MW01D, and started setting up equipment.

1005 Collected MW01S-GW092920 MD0920

1010 Collected FD01-GW092920

1100 Set up equipment on MW01D.

1109 Got water at MW01D

1230 Sample MW01D-GW092920

1305 Finished and packed up at MW-01.

1310 Arrived back at the connex to get a new gas cylinder.

1340 Arrived at MW-04 and set up equipment.

1355 Got water from MW-04

1450 Sample MW04-GW092920 collected

1700 Collected TB01B-GW092920 & TB02B-GW092920

9/29/20 Salt Lake VA, 700S 1600E PCE Plume

1705 Packed coolers for shipment

1830 Shipped Samples

1900 Offsite.

MaryDay

Rite in the Rain

9/30/20 Salt Lake VA, 7005 Koole PCE Plume

Weather:

PPE: Modified level D

Personnel: Tec- Urtiaga, Mario. Day

0700 Arrived onsite

0705 Started Calibrating YSIs, PIDs, & turbidity meters.

0735 Health and Safety meting

0740 Started loading equipment into the vehicles

0815 Arrived at MW-17S & MW-17D

0847 ~~Water~~ MW Purge started at MW-17S.

1005 Sample MW17S-GW093020 collected

1100 EB01-GW093020 collected

1135 FB01-GW093020 collected

1213 Purge at MW17D started.

1315 Sample MW17D-GW093020 Collected

1340 Arrived at the connex to drop of traffic control and grab equipment for MW-24.

1420 Arrived at MW-24

1437 Part of the building wall fell down by MW-24, talked to FTL, moved to MW-34 to build a intensity water column.

1505 Arrived at MW-32

9/30/20 Salt Lake VA, 7005, Koole PCE Plume.

Time	Pressure	Discharge	Recharge	Notes
1542	10 psi	10 s	120 s	None
1545	10 psi	20 s	120 s	No movement
1546	10 psi	30 s	120 s	No movement
1548	20 psi	10 s	120 s	No movement
1550	20 psi	20 s	120 s	No movement
1552	20 psi	30 s	120 s	Bubbles present
1628	30 psi	10 s	120 s	Bubbles present
1707	30 psi	20 s	120 s	Bubbles present
1714	30 psi	30 s	120 s	bubbles
1726	40 psi	10 s	120 s	"
1746	40 psi	20 s	120 s	"

1805 Returned to connex to drop off equipment.

1930 Offsite.

Mario Day

Rite in the Rain

10/1/20 Salt Lake VA, 700s NEOSE PCE Plume
Weather: Sunny
PPE: Modified level D
Personnel: Tea Vrtlar, Maria Day

0700 Arrived at site.
0705 Started calibrating YSIs, turbidity meter, and PIPs. Also loading equipment into vehicles
0815 Health and safety meeting
0820 Deployed the pump at MW-05R.
0940 Returned to connex to pick up extra gas cylinder.
0950 Arrived at MW-05R and setup equipment.
1000 Quick connect holding airline popped off at 120 psi. Contacted FTL.
1005 Replaced air line quick connect. ~~Contact~~ MP
1030 Water and airline tubing disconnected, need to pull the pump and redeploy.
1205 Arrived at connex to reorganize.
1330 Arrived at MW-05R and setup equipment.
1400 Bubbles were in the water line.
1600 Returned to connex to pack sleep and clean.
1930 Offsite.

12/7/20 700s 1600 F PCE plume
Weather: Sunny 30-40°F
PPE: Modified level D
Personnel: Tea. Vrtlar, ~~Maria~~ Cam Smith
Maria Day
Joe Miller
Emma Rott
Ben Carreon (AUTHOR)
Connor Kelley
Fiona Campbell
Kevin Murphy Wesated

Scope: Water level measurements, development
0800 Arrived on site, held HTS tailgate, see form.
~~0530~~ BC 12/7 ~~0700~~ ~~Started~~ BC 12/7 Calibrated equipment. See cal forms.
0900 Started water level measurements, see field forms.
Some lids were frozen. Bit for largest tamper proof bolt could not be located.
Transducer data downloaded for all locations.
1730 Back at IDW yard. Helped sample IDW for waste profiling.
1830 Cam offsite.

TSC 12/7/20

Rite in the Rain

12/8/20 — 700 S 1600 E PCE Plume

Weather: Sunny 30-40°F

PPE: Modified Level D

Personnel: Tea Urdial

Manica Day CDM Smith

Joe Miller

Emma Rott

Ben Carcon Author

Iong Campbell

Connor Kelley

Kevin Murphy Wasatch

Scope: Water level measurements, GW sampling, development

0800 Arrived on site.

0830 H+S meeting

0900 Calibrated equipment: See cal forms

0930 Assisted GW sampling team w/ access to MW-27.

Started water levels.

Assisted GW sampling crew at MW-30 with solenoid valve sticking issues.

Well lids for MW-32 and MW-29 frozen.

Attempted to open w/ salt solution, heat gun, hammer, praying, ~~and others~~ Bc 12/8

MW-32 opened with those approaches.

MW-29 required use of propane torch after filling out an JHA.

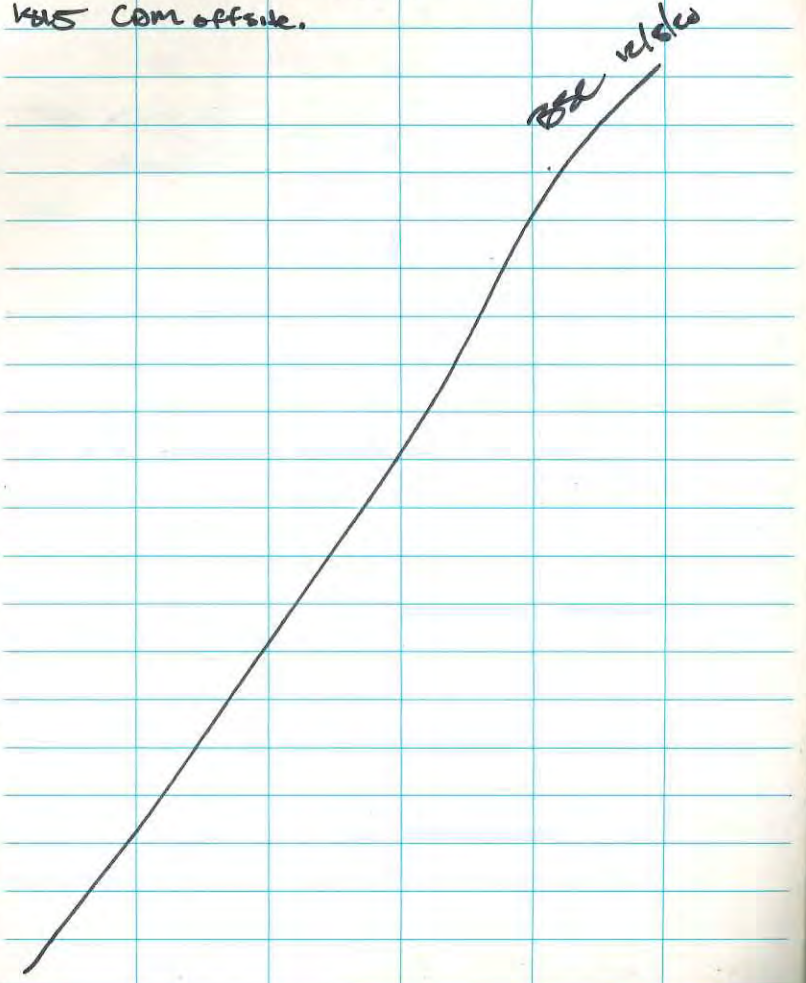
1600 Finished water levels

12/8/20 700 S 1600 E PCE Plume

1630 Brought cores to MW-26 for geo. team.

1700 Unloaded equipment, updated notes, communicated ~~team~~ Bc 12/8 w/ team.

1715 CDM offsite.



Rite in the Rain

12/9/20 700 S 1600 E ACE Plume

Weather sunny 30-40°F

PPE: Modified Level D

Personnel: Ben Carreon, Cam Smith, Author
Maria Day
Emma Reed
Fiona Campbell
Connor Kelley
Kevin Murphy — ec 12/9 Wasatch

Scope: Development, GW Sampling

0430 Arrived on site

0830 H2S meeting

0900 Calibrated equipment. See cal sheets.

0930 Debriefed Kevin w/ setting up at 26E for development.

1000 Teams began sampling. See field forms

1540 Breakthrough at MW-25 B. Began rebuilding WC.

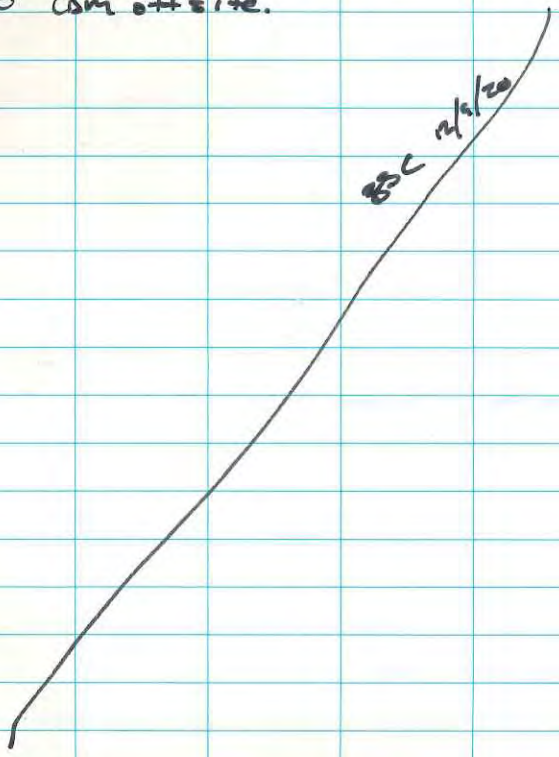
	psi	dsch	rech	Notes
1540	30	10	120	No Movement
	↓	20	120	
		30	120	
1600	40	10	120	
	↓	20	120	
		30	120	
1615	50	10	120	

12/9/20 700 S 1600 E ACE Plume

TIME	psi	DISCH	RECH	Notes
1620	50	20	120	No Movement
	50	30		↓
1635	60	10		
	60	20		
	60	30		Movement

1730 Breakthrough again. Will check filter. 12/10/20.

1900 Cam offsite.



Rite in the Rain

12/10/20 700 & 1600 E PCE Plume

Weather: sunny 30-40°F

PPE: modified level D

Personnel: Ben Cerreon — Cam Smith, Author
Maria Bury
Emma Rost
Tiona Campbell
Connor Kelley
Kevin Murphy — Wasatch

Scope: low sampling

0730 Arrived on site.

0830 H+S Briefing. Calibrated equipment (see forms)

0900 Began purging/sampling MW-25 (see forms)

0945 Started building WC at MW-28b while sampling 25C.

	PSI	Disch	Rech	Notes
0945	20	10	120	No Movement
		20		
		30		
0959	30	10		
		20		
		30		
1020	40	10		
		20		
		30		
1050	50	10		

12/10/20 700 & 1600 E PCE Plume

~~12/10~~ 20

	PSI	Disch	Rech	Notes
1033	50	20	120	No movement
1036	↓	30	↓	Bubbles
1045	60	10		Vigorous Movement

Bubbles continuing after discharge cycle.

1100	60	20	120	Bubbles
1110	↓	30	↓	↓
1120	70	10		
1128	↓	20		

Still. some movement after discharge cycle.

1142	70	30	120	Bubbles
1149	80	10	120	↓
1203	↓	20	↓	↓
1308	↓	30	↓	↓
1320	90	10	↓	↓
1347	↓	20	↓	↓
1400	↓	30	↓	↓
1404	60	10	WATER.	

DESIRED RATES: 120PSI, 120 SEC. RECHARGE, 34 SEC. DISCHARGE,

Actual settings: 120 psi, 120s recharge, 24 sec discharge.

1730 CAM off site.

Rite in the Rain

12/11/20 700 S 1600 E PCE Plume

Weather: Sunny 30-40°F

PPE: modified level D

Personnel: Ben Carman COM Smith Author
Maria Day
Emma Rott
Iona Campbell
Connor Kelley
Kevin Murphy Wasatch

Scope: GW Sampling

0730 Arrived on site

0800 Hrs briefing. Cal. baled equipment, see forms.

0845 Began Sampling. Discharge line frozen at MW03RB. Sampled MW03RA after thawing line.

Sampled MW-29 B+C. MW 29 B slow to stabilize. with turbidity.

See field forms

1900 COM off site

12/9/20 700 S 1600 E PCE Plume

Weather: Sunny 30-40°F

PPE: modified level D

Personnel: Ben Carman COM Smith Author
Maria Day
Emma Rott
Iona Campbell
Connor Kelley
Kevin Murphy Wasatch

Scope: GW Sampling

0730 Arrived on site.

0800 Hrs briefing. Calibrated equipment, see forms.

0900 Arrived at MW-29A. Frozen line took some time to thaw. Have to put pump discharge bucket in back of vehicle to keep from freezing, See field forms

Relinquish log book to C Kelley BSE 12/9/20

	PSI	DISCHARGE RATE	NOTES
1355	BUILDING WATER COLUMN @ 26 C. PUMP IS ~30' ABOVE DESIRED DEPTH, UNABLE TO LOWER FURTHER.		
	20	30	120
1356	30	10	120
1357	30	20	120
1400	30	30	120
1409	40	10	120

Rite in the Rain

12-13-20 7005 HOOF PCS PLUMS C. KELLEY

26C

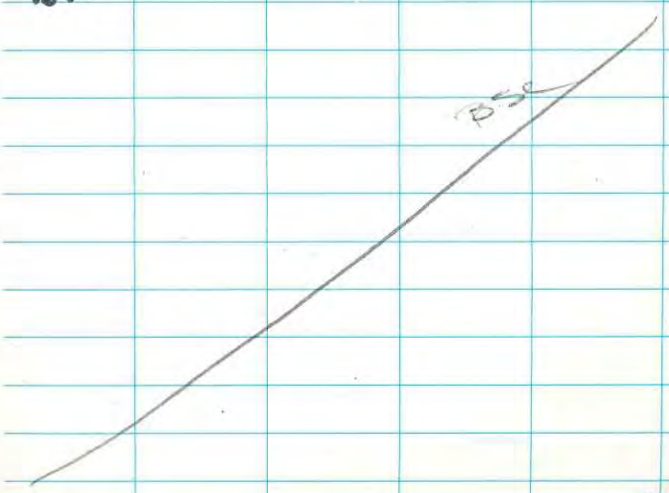
PSI	DISCH.	REC'H.	NOTES
1411 40	20	120	TUBING DROPPING
1413 40	30	120	SIGHTLY
1416 50	10	120	REPLACED
1418 50	20	120	FILTER
1421 50	30	120	
1422 60	10	120	
1425 60	20	120	
1427 60	30	120	
1430 70	10	120	
1431 70	20	120	
1434 70	30	120	
1436 80	10	120	
1439 80	20	120	
1443 100	30	120	
1446 110	10	120	
1450 110	20	120	
1452 110	30	120	
1454 120	10	120	
1457 120	20	120	
1459 120	30	120	
1502 130	10	120	
1504 130	20	120	
1507 130	30	120	
1510 140	10	120	
1512 140	20	120	

12-13-20 7005 HOOF PCS PLUMS C. KELLEY

26C

BUBBLES

PSI	DISCH.	REC'H.	NOTES
1513 140	30	120	
1516 140	30	120	
1519 150	10	120	
1520 150	20	120	
1527 150	30	120	
1528 12-13-20			
1536 160	10	120	
1615 160	20	120	BUBBLES
1618 160	30	120	
1625 170	10	120	Bubbles
1630 170	20	120	Bubbles
1635 170	30	120	Bubbles
1638 180	10	120	No movement
1641			



Rite in the Rain

12-13-20 700S 1600E PCE PLUME C.KELLEY

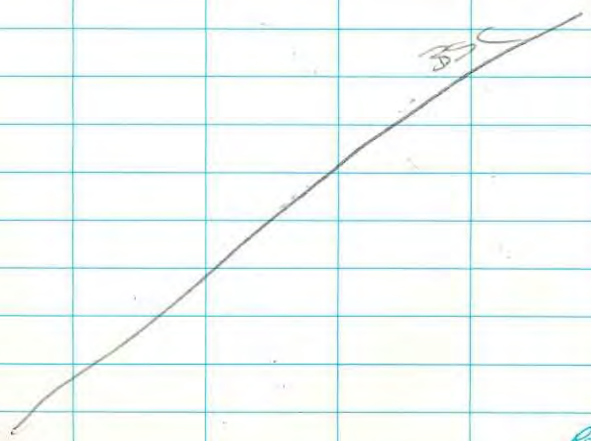
MW-26D.

	PSI	DISCH.	RECH.	NOTES
1410	20	20	120	TUBING DROPPING
	20	30	120	SLIGHTLY.
1412	30	10	120	REPLACED
1414	30	20	120	FILTER!
1416	30	30	120	
	40	10	120	
1421	40	20	120	
1422	40	30	120	
1426	50	10	120	
1428	50	20	120	
1430	50	30	120	
1433	60	10	120	
1435	60	20	120	
1437	60	30	120	
1440	70	10	120	
1442	70	20	120	
1444	70	30	120	
1447	80	10	120	
1449	80	20	120	
1451	80	30	120	
1454	90	10	120	
1456	90	20	120	
1458	90	30	120	
1500	BUBBLES			

12-23-20 700S 1600E PCE PLUME C.KELLEY

MW-26D

	PSI	DISCH.	RECH	NOTES
1508	100	10	120	Bubbles
1517	100	20	120	↓
1528	100	30	120	↓
1536	WATER @ SURFACE, FREEZING.			
1615	110	10	120	Water
1625	120	10	120	
1630	130	10	120	
1635	140	10	120	
1638	150	10	120	Frozen Water
1641	170	20	120	Frozen Water
1643	180	20	120	Water
1645	180	30	120	



Rite in the Rain

12/14/20 : 700 S 1600 E PCE Plume

Weather 30°F, snowing

PPE: Modified level D

Personnel: Ben Cannon COM Smith Author

Maria Day

Emma Rott

Iona Campbell

Connor Kelley

Kevin Murphy Wasatch

Scope: GW Sampling

0800 Arrived on site

0830 H+S Briefing. Calibrated equipment, see forms.

0930 Began sampling MW-36. See field forms.

1830 COM offsite.

12/15/20 700 S 1600 E PCE Plume

Weather 30°F, snowing, pt cloudy

PPE: Modified level D

Personnel: Ben Cannon COM Smith Author

Maria Day

Emma Rott

Iona Campbell

Connor Kelley

Kevin Murphy Wasatch

Scope: GW Sampling

0730 Arrived on site

0800 H+S briefing. Calibrated equipment, see forms.

0845 Setup at MW34. Sampled A. Breakthrough at B and C.

1330 Setup at MW26. Began started purging 26C. Big initial shot of turbidity once on flow through then breakthrough was encountered.

1900 Could not get measure at high pressure on 26C. Spilled pump lots of sediment in discharge line, air lined pump. Purged lines and rinsed.

1730 COM offsite.

12/15

Rite in the Rain

Date: 12/15/20

MW-34C

Time	Discharge	Recharge	P (psi)	Notes
1040	10	120	20	
1048	20	120	20	
1050	30	120	20	
1053	10	120	30	
1055	20	120	30	
1109	30	120	30	
1117	10	120	40	
1130	20	120	40	
1132	30	120	40	
1137	10	120	50	WATER
~~1140~~	20			

Breakthrough encountered.

SE 12/16/20

Date: 12/15/20

MW-26B

Time	Discharge	Recharge	P (psi)	Notes
~~1535~~	20	120	80	
1545	30	120	80	
1557	10	120	90	
1621	20	120	90	
1636	30	120	90	
1642	10	120	100	
1647	20	120	100	
12/16/20				
0915	20	120	100	Movement
0925	30	120	100	↓
0935	10	120	110	
1003	20	120	110	Water

Rite in the Rain

Date 12/15/20

MW-26A

Time	Discharge	Recharge	P (PSI)	Notes
1540	10	120	35	
1542	20	120	35	
1545	30	120	35	
1550	10	120	45	
1559	20	120	45	
1603	30	120	45	
1605	10	120	55	
1615	20	120	55	
1617	30	120	55	
1619	10	120	65	
1623	30	120	65	
1625	10	120	~~75~~	
1628	20	120	75	No bubbles through entire build.
1632	30	120	75	
1635	10	120	85	
1639	20	120	85	
1641	30	120	85	
1643	10	120	95	
1645	20	120	95	
1647	30	120	95	
12/16/20				
0915	10	120	105	Movement
0920	20	120	105	Movement

12/16/20

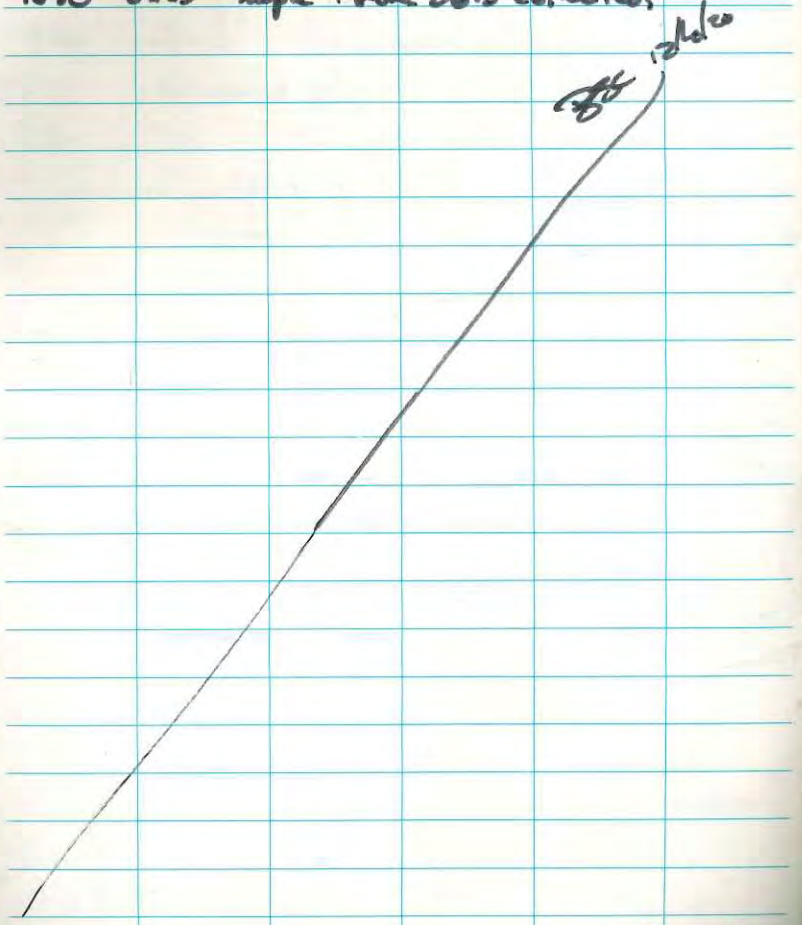
MW-26A

Time	Disch	Rech	P (psi)	Notes
0935	24	120	105	Water

Swapped sampling tubing for grab VOCs.

1000 Grab sample from 26A collected

1030 Grab sample from 26B collected



Rite in the Rain

12/16/20 700 S 1600 E PCE Plume.

Weather: 30°F Partly cloudy

PPE: modified level D

Personnel: Ben Carreon COM Smith (Anchor)
Maria Day
Emma Koti
Iona Campbell
Connor Kelley
Kevin Murphy Wasatch

Scope: GW Sampling

0800 Arrived on site. Held onsite safety form.

0815 Calibrated equipment. See forms.

0830 Loaded equipment.

0900 Setup at MW26A/B to build water columns.

1000 Grab sample from 26A collected

1030 Grab sample from 26B collected.

1400 Installed MW26D pump. MW26C difficult to install. Installed new filters on both. 26A and B sampled.

1730 COM off site

BJK

12/16/20

MW26D WC Building

Time	P(psi)	Quad(s)	Rech(s)	Notes
1400	25	10	120	No Movement
1403		20		Had to reset check valve
~~1406~~		~~30~~		and restart
1426	20	30	120	No movement
1428	30	10	120	No movement
1430	30	20	120	No movement
1435	30	30	120	
1445	Water flowed back down, pump was pulled and spring was replaced.			
1528	10	10	120	No movement
1532	10	20	120	No movement
1534	10	30	120	1 bubble
1536	20	10	120	No movement
1538	20	20	120	No movement
1540	20	30	100	1 bubble
1543	30	10	120	No movement
1545	30	20	120	Bubbles
1552	30	30	120	No Movement
1557	40	10	120	No movement
1601	40	20	120	No movement
1604	40	30	120	No movement

Rite in the Rain

12/16/20 MW 2 & D WC Building

Time	P(Psi)	D(s)	R(s)	Notes
1608	50	10	120	Babbles
1610	50	20	120	No movement
1615	50	30	120	No movement
1618	60	10	120	No movement
1622	60	20	120	No movement
1625	60	30	120	

Rite in the Rain

12/17/20 700 S 1600 E PCE Plume

Weather: 25-35°F Rain/snow

PPE: Modified Level D

Personnel Ben Carmon CDM Smith Author

Marcia Day

Emma Rott

Iona Campbell

Connor Campbell

Connor Kelley

Kevin Murphy Wasatch

Scope: Grab Sampling

0815 Arrived on site. H2S briefing, see forms.

0830 Calibrated equipment. See forms. Loaded equipment. Vehicle asked to minimize vehicle parking at corners due to snow

0900 Setup at MW34C and B to build water columns.

1700 CDM Smith off site.

12/17/20

MW34C 12/17/20

MW34C ~110 psi water

Time	Depth (ft)	Rock (ft)	Pres (psi)	Notes
0910	10	120	20	Bubbles
0919	20		↓	↓
0930	30			
0940	10		30	
0950	20		↓	
1000	30			
1006	~~40~~ 10		40	
1014	20		↓	
1030	30			
1036	10		50	
1045	20		↓	
1100	30			
1110	10		Depth 60	
1120	20		↓	
1140	30			
1150	10		70	
1209	20		↓	
1219	30			
1225	10		80	
1230	20		↓	
1240	30			
1246	10		90	Water
1255	Collected grab sample			

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— SINCE 1916 —

Rite in the Rain®

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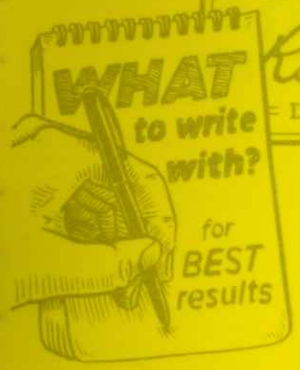

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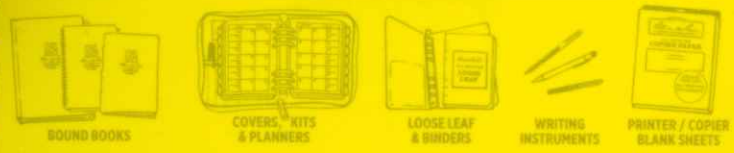

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CONTENTS

PAGE	REFERENCE	DATE

9/29/20

Water column building at MW-23

MW-23B

Time	Press	Disch	Rech	Notes
~~17~~ 10	20	10	120	No movement
1712	20	20	120	"
OR ~~15~~ 1715	20	30	120	"
1717	30	10	120	"
1719	30	20	120	"
1721	30	30	120	"
1723	40	10	120	"
1725	40	20	120	"
1728	40	30	120	"
1733	50	20	120	"
1735	50	30	120	"
1738	60	10	120	"
1740	60	20	120	"
1742	60	30	120	"
1745	70	10	120	"
1747	70	20	120	"
1749	70	30	120	"
1752	80	10	120	

Rite in the Rain

9/29/20

Dial in settings at MW-23C.

End with ~~150~~ 180 psi 45s d / 120s R

expect ~ 175 ml / discharge

9/30/2020

WC building at MW-25C.

Time	Pres	Recn	Dis	Notes
825	20	120	10	No movement
827	20	120	20	"
830	20	120	30	"
833	30	120	10	"
836	30	120	20	"
838	30	120	30	"
840	40	120	10	"
842	40	120	20	"
844	40	120	30	"
846	50	120	10	"
847	50	120	20	"
849	50	120	30	"
852	60	120	10	1 bubble
855	60	120	20	No movement
858	60	120	30	"
900	70	120	10	"
903	70	120	20	"
909	70	120	30	"
918	80	120	10	"
920	80	120	20	"
922	80	120	30	"
924	90	120	10	"

Rite in the Rain

MW-25C continued.

Time	Pres	Rech	DIS	NOTES
926	90	120	20	NO movement
928	90	120	30	"
930	100	120	10	"
932	100	120	20	"
937	100	120	30	"
940	110	120	10	"
943	110	120	20	bubbles
955	110	120	30	"
1002	120	120	10	"
1007	120	120	20	"
1014	120	120	30	"
1017	130	120	10	"
1024	130	120	20	NO movement
1026	130	120	30	water
1034	140	120	10	"
1036	140	120	20	"
1039	140	120	30	115mL flow
1041	140	120	35	130 mL flow
1054	140	120	40	150 mL flow

12/7/20 Salt Lake City VA, 7005 1600E PCE Plume
Weather: Cold, Clear
PPE: Modified level D
Personal: Iona Campbell & Maria Day (author)
0800 Arrived onsite
~~0820~~ 0815 Health & Safety meeting
0825 Calibrated PID & sorted equipment.
Scope: WL event.
0940 Arrived at MW-05R
0947 WL collected at MW-05R
1000 Transducer pulled.
1049 Left MW-05R
1100 Arrived at MW-15 S&D Well vaults are frozen shut.
1115 Called Emma for advice on opening well
1132 Called Ben for help. Ben and Connor are heading over.
1142 Got MW-15S&D Open
1200 Transducer data for MW-15D downloaded
1223 Arrived at MW-12 S&D.
1237 Called Ben for approval to call MW-12S dry.
1301 Arrived at MW-16 S&D
1327 Downloaded transducer data at MW-16D
1342 Arrived at MW-18
1400 Arrived at MW-F1
1412 Arrived at MW-20 S&D

Rite in the Rain

12/7/20 Salt Lake City VA, 7005 1400E PCE Plume

1502 Arrived at MW-24

1522 Arrived at MW-22

1540 Arrived at MW-23 to discuss rest of wells w/ Ben

~~1600~~ MD

1600 Arrived at MW-02, called FTL to inform him of a massive salt pile by the well

1611 Arrived at MW-01 S&D.

1615 Took WL from MW-01D and pulled transducer.

1626 Took WL from MW-05 and pulled transducer.

~~1700~~ MD 12/7/20 1700 Arrived at MW-37 S&D.

1702 Took WL from North well casing

1705 Took WL from South casing.

1710 Arrived at MW-36

1715 Took WL measurement from MW-36.

1725 Drove to MW-29 and dropped off magnet w/ Ben.

1737 Arrived back at Connex

1820 Offsite.

Mary Day 12/7/20

12/8/20 Salt Lake City VA, 7005 1400E PCE Plume

Weather: Clear, ~40°F

PPE: Modified level D

Personel: Maria Day (auth'yr)

Scope: MW-27, MW-24, MW-28, MW-05R

0705 Started Calibrations

0730 Called Ben to inform him ysi pH probe won't read correctly

0805 Arrived onsite

0820 Calibrated PIDs and sorted and loaded equipment.

0940 Arrived at MW-27

1050 Sample MW27-GW120820 collected

1130 Arrived at MW-24

1145 Purge started at MW-24

1225 Sample MW24-GW120820 collected

1315 Arrived at MW-28

1342 Purge Started at MW-28

1445 ~~MW28-GW-120820~~ MD 12/8/20 MW28-GW120820 Collected

1510 Arrived at MW-05R

1526 Purge started at MW-05R

1605 Stopped purge to install new gas cylinder

1618 Restarted purge @ MW-05R

1635 MW05R-GW120820 collected

1640 FD05-GW120820 collected

1820 Offsite.

Rite in the Rain

12/9/20 Salt Lake City VA 700S 1600E PCE Plume
Weather: Cold, Clear
PPE: Modified level D
Personel: Maria Day (self) Conner Kelly
Scope: MW-12D, MW-15S&D
0650 Calibrated turbidity meters.
0805 Onsite
0809 Started loading equipment into vehicles
0830 Health & safety tailgate
0935 Arrived at MW-15S&D.
There was ice found inside of the well vaults.
1050 Purge started at MW-15S
1117 Purge started at MW-15D
1200 Sample ~~MW15S~~ MW15S-GW120920 collected
1223 Sample MW15D-GW120920 collected
1320 Arrived at MW-12D
1330 Purge started at MW-12D
1400 Sample MW12D-GW120920 collected
1440 Started packing coolers
1642 Shipped coolers
1727 Shipped defective ysi back
1805 Offsite

MD 12/9/20

12/10/20 Salt Lake City VA 700S 1600E PCE Plume
Weather: Cold, clear
PPE: Modified level D
Personel: Maria Day (self)
Scope: MW-16S&D, MW-04, MW-06
0615 Calibrated turbidity meters & ysis.
0800 Arrived onsite
0830 Health & Safety tailgate
0845 Arrived at MW-16S&D
0900 Water at MW-16S. Purge started
0930 Sample MW16S-GW121020 collected
1008 Purge started at MW-16D
1045 MW16D-GW121020 collected
~~Arrived~~ MP MD 12/10
1130 Arrived at MW-04.
~~1250~~ 1250 MD MW04-GW121020 collected
1255 FD02-GW121020 collected
1415 MW06-GW121020 collected
~~1550~~ 1330 Arrived at MW-13
~~1518~~ 1328 Started purge at MW-13S
1400 Talked to FTL about drawdown issue, was told to purge until can't gauge.
1545 Returned to conner to drop of equipment.
1605 Offsite.

Rite in the Rain

12/11/20 Salt Lake City VA Plume 700 S/600 E PCE Plume
Weather: Cold ~ 30°F
PPE: Modified Level D
Personel: M. Day (Self) K. Murray
Scope: MW-13 S&D MW 17S&D
0655 Calibrated YSI & turbidity meters
0800 Arrived onsite
0805 Loaded equipment and calibrated PIDs
0815 Health and safety meeting
0830 Arrived at MW-13S
0925 MW13S-GW121120 collected
0957 Set up on MW-13D.
1210 MW13D-GW121120 collected
1300 Arrived at MW-17 S&D
1405 Called Ben about drawdown at MW17S was told to keep purging it should level out
1445 Called Ben about continuing drawdown, tried to reach Kolby.
1502 Heard back from Ben w/ the okay to sample.
1510 MW17S-GW121120 collected
1800 Offsite

12/11/20
Maxwell Day

12/13/20 Salt Lake City VA Plume 700S, 600E PCE Plume
Weather: Cold ~ 20°F
PPE: Modified level D
Personel: M. Day
Scope: MW17D.
0655 Calibrated YSI & turbidity meter.
0800 Arrived onsite, calibrated PIDs & loaded equipment into cars
0830 Health & Safety meeting
0835 Arrived at MW-17D
0900 Tried deploying pump at MW-17D, realized that the water line and airline had been switched
0915 Returned to conner for tubing
0925 Deployed the pump and found MP50s frozen. Let FTL know and stayed in cars trying to defrost them.
1035 Got a call from Ben MP50s were still frozen to deploy pumps at MW-37S, MW-37D, & MW-13L
1320 Finished deploying pumps at MW-37, called FTL and was told to get MW-13L ready but to wait to deploy for swagelok fittings.
1330 Arrived at MW-17D
1335 Experiencing water line freezing.
1620 Collected MW17D-GW121320
1725 Offsite

Rite in the Rain

12/14/20 Salt Lake City UT, 700s 1600s PCE Pump
Weather Snowy.
PPE Modified Level D
Personel M. Day (Self)
Stops
0705 Calibrated Hach turbidity meter
0800 Arrived onsite.
0815 Relinquish Logbook to Connor Kelley
12/14/20.
0910 @ MW-14S&D.
1009 BEGIN PURGING MW-14D
1035 SAMPLE MW-14D
1050 SAMPLE MW-14S
1130 FINISH SAMPLING MW-14S&D. LEAVE.
1150 ARRIVE @ MW18
1215 NO WATER @ SURFACE. PULL PUMP.
1300 TIGHTEN @ AMP.
GET WATER TO SURFACE.
1340 SAMPLE MW-FT
1415 @ MW-18
1500 SAMPLE MW-18
1505 SAMPLE FD06 @ MW-18
1530 @ MW20S
1610 SAMPLE MW-20S
1700 OFFSITE.
12-14-20

C. KELLEY 700S 1600E PCE PUMP 12-15-20
WEATHER: CLEAR
PPE: MOD. LEVEL D
PERSONNEL: KEVIN MURPHY (WASATCH)
CONNOR KELLEY (CDM SMITH)
0700 CALIBRATE YSI'S & TURBIDITY METER
0800 ONSITE. CONDUCT H&S TAILGATE.
0845 @ MW-20D UNABLE TO
GET CONSISTANT WATER.
PULL PUMP & TIGHTEN CONNECTIONS
PULL OUT TRANSDUCER.
1120 USE NITROGEN & MP-10.
SEEMS TO BE WORKING.
1235 SAMPLE MW-20D
1320 @ MW-1S&D.
1415 MP-50 INCONSISTANT PURGING.
SWAP W/ ZEST CONTROLLER
1437 RESUME PURGING MW-1D
1455 SWITCH NITROGEN TANKS.
1510 SAMPLE MW-1D
1525 NO WATER TO SURFACE
@ MW-1S. PULL XD & PUMP.
CABLE CONNECTOR DISSINTEGRATED.
AD SWAGELOK COMPONENTS.
WILL REPLACE PUMP & XD 12-16.
12-15-20
Rite in the Rain

12-16-20 700s/1600E ICE PLUME C. KELLEY

WEATHER 32°F CLEAR

PPE MOD. LEVEL D

PERSONNEL: C. KELLEY (COM SMITH) KEVIN MURPHY (WASATCH)

0700 CALIBRATE PID, YSI's, & TURBIDITY METER.

0900 H&S MEETING

0915 @ MW-1S. K. MURPHY PUTS NEW SWAGELOK FITTINGS ON PUMP. RE-DEPLOY PUMP.

1100 SAMPLE MW-1S

1135 @ MW-2

1230 SAMPLE MW-2

1235 SAMPLE FD01 @ MW-2

1400 @ MW-13L. SET ~~WATER~~ CA 121620 TO PUMP TO ~~147.8~~ CA 121620 ~147.8' (TOP OF PUMP)

RUN ~100 mL/MIN, 20 RE., 10 DIS NO PSI

1450 ~200 mL/MIN, 20 RE., 10 DIS. 120 PSI

VERY TURBID.

1510 INCONSISTANT DISCHARGING FROM MP-10.

1605 PURGE 5 GAL. STOP PURGE. TURBIDITY O.O.R. ENTIRE TIME. FINAL DTW: 16.96'

BEGINNING DTW: 16.94'

1645 TAKE VOC GRAB SAMPLE @ MW-13L

1650 TAKE FIELD BLANK @ MW-13L 0.17

700s/1600E ICE PLUME 12-17-20

WEATHER: 30's °F RAIN,

PPE: D (MOD.)

PERSONNEL: KEVIN MURPHY (WASATCH) CONNOR KELLEY (COM SMITH)

0700 CALIBRATE PID, TURBIDITY METER, YSI.

0800 CONDUCT H&S MEETING.

~~12/17/20~~

0910 DTW MW-2C: 2/17.94 NTO: 326.58'

0920 WATER @ SURFACE

1010 ~~12/17/20~~ RE-CHARGE REGULATOR & ADD TEFLON TAPE TO STOP LEAKING @ REG CONNECTION. RESUME PURGING. WATER BECOMES TURBID.

1035 2ND WELL VOLUME PURGED. WELL RECHARGED & BEGIN 3RD WELL VOLUME: ~3 GAL. PER WELL VOLUME. WATER STILL TURBID.

1055 3RD WELL VOLUME (~3 GAL.) PURGED.

1130 FINISH 4TH WELL VOLUME ~12.75 gal. PURGED

1140 TAKE VOC GRAB SAMPLE @ MW-26C AFTER ~1 GAL PURGED FROM 5TH CYCLE.

1156 PURGE 5TH CYCLE.

1230 PULLED MW-26D PUMP & Rite in the Rain

12-17-20 700 & 1600 E PCE PUMP C. KELLEY

BEGAN PURGING

1254 FINISH 1ST PURGE.

1212 BEGIN 2ND PURGE. EXTREMELY TURBID

1335 STOP TO CHANGE NITROGEN TANK. K. MURPHY BEGINS TO PULL PUMP, HAD BEGUN TO GET STUCK FROM THE SETTLING SEDIMENT. PULL PUMP OUT OF WELL, HAS MUD ON LOWER HALF

1415 TD: 356.4

1440 ATTEMPT TO PURGE FROM 350FT ABOVE BOTTOM. MAKE 3 ATTEMPTS BUT UNIT AIR THROUGH LINE NEARLY AS SOON AS WATER REACHES SURFACE. PULL PUMP.

DTW: ~222.45

1522 CHANGE REGULATOR (OTHER ONE FROZEN) BLOW OUT LINE & RE-DEPLOY PUMP IN MW-26D. IMMEDIATE AIR THROUGH LINE ONCE WATER HIT SURFACE. STILL POSSIBLE REGULATOR ISSUE. ATTEMPT AGAIN W/ MINIMALLY OPENING REGULATOR.

1540 LINE BLOW OUT AGAIN W/ REGULATOR READING 40 PSI.

C. KELLEY 700 S 1600E PCE PLUME 12-17-20

THE MINIMAL WATER THAT COMES OUT IS STILL EXTREMELY TURBID, EVEN ON 12-17-20 THOUGH PUMP IS ~30' OFF BOTTOM. SHEEN OBSERVED ON STINGER. ODOR OBSERVED

REPLICATED SETUP ON MW-26C, SAME ISSUE, LIKELY REGULATOR FREEZING. SAMPLE FOR MW-26D NOT TAKEN.

12-17-20

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Rite in the Rain®
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CONTENTS

PAGE	REFERENCE	DATE

Date 12/3/20
Weather 40°F, Sunny
Task. GW Sampling
Team. E. Rott (author), I. Campbell, B Carreon, M. Day, K. Murphy (Weston), T. Vrtlar, J. Miller

0800 Team onsite.
0815 H+S meeting at tailgate. Pack equipment
0900 E. Rott., I. Campbell to MW-30R.
0920 Begin setup at MW-30RA.
0950 Begin purge. Notice issues with MP-10H not discharging during cycle.
1000 I. Campbell to connex to get spare MP-10H.
1015 J. Miller to help E. Rott troubleshoot. Does not work on either MP-10H.
1030 Team to use ZIST controller from Field. E. Rott discovers that Field did not send the right connection for ZIST controller. Cannot use b/c don't have right electrical connection
1040 E. Rott to connex to get double channel ZIST controller. Then to T. VRTLAR for inverter

Rott in the Rain

Date 12/8/20

1100 E. Rott back to MW-30RA.

1115 Begin purge at MW-30RA.

1200 Collect MW-30RA.

MW30RA-GW120820

1230 Begin purge at MW30RB

1300 No water at surface after attempting multiple settings. Team to pull pump and inspect for issues.

1340 Pulled pump. No ~~stdi~~ GR water in water line. Appeared to have sediment in the bottom filter/ ball valve.

1350 Deconned pump and place back in well.

1445 Begin purge again. Water at surface.

1540 Collect MW30RB-GW120820

1600 Pack up at MW30R. Team to connex.

1700 I. Campbell offsite.

1800 Team offsite.

GR 12/8/20

Date 12/9/20

Weather: 40°F, Sunny

Task: GW Sampling

PPE: Modified Level D

Team: E. Rott (author), I. Campbell, M. Day, B. Carreon, K. Murphy (Wasatch), C. Kelley

0800 Team onsite. H+S meeting at tailgate.

0815 Pack vehicles.

0900 E. Rott & I. Campbell to MW-30RC

0915 Begin purge at MW-30RC.

1030 I. Campbell to connex for supplies Brought to B. Carreon at MW-08

1040 YSI reading very high pH and jumping around. Likely not functioning. E. Rott to try and clean it off.

1100 E. Rott to B. Carreon for another YSI.

1115 Return to ~~MW-30R~~ GR MW-30C.

1210 Collect MW30C-GW120920

1240 Pack up at MW30C, team to MW-23.

1250 Begin setup at ~~MW-30D~~ GR MW-23C.

1313 Start Purge at MW-23C.

Rott in the Rain

Date. 12/9/20

1320 E. Rott to connex. Getting swage lock fitting for splicing the water line at MW-23A. The line was too short to come out of the cap.

1350 E. Rott adds approx 6" 1/4" tubing to top of water line on MW-23A.

1410 Begin purge at MW-23A.

1430 Saw dramatic increase in turbidity while purging MW-23C.

1508 Saw jump in turbidity at MW-23A. MW-23C beginning to decrease in turbidity.

1540 MW-23A turbidity beginning to decrease.

1620 Collect MW-23A sample.
MW23A-GW120920

1625 Collect ~~MW-23B~~ DUP MW-23C.
MW23C-GW120920

1720 Team to connex to unpack.

1800 Team offsite.

Emma Rott
12/9/20

Date: 12/10/20

Weather 40°F, overcast

Task GW Sampling

PPE Level D, modified

Personnel E Rott (author), I. Campbell, B. Carreon, M. Day, C. Kelley, K. Murphy (Wasatch)

0800 Field team onsite H+S meeting at tailgate.

0810 Pack vehicles.

0830 E. Rott, I. Campbell to MW-23B

0850 Purge start at MW-23B.

1105 Collect MW23B-GW121020

1200 Team to connex to get traffic control and more nitrogen.

1215 Team to MW-32.

1230 Begin purge at MW-32C.

1245 Saw decrease in flow at MW32C

1250 B. Carreon at MW32. ZIST controller knob for adjusting intervals is stripped. Cannot fix today.

1255 B. Carreon leaves.

1300 Begin purge at MW-32B

1410 Collect MW32B-GW121020

1435 Begin purge at MW-32A.

1440 Notice that water flows back on recharge cycle

Date: 12/10/20

1440 The YSI fills then drains. Still able to purge. Team will continue, but notes that this issue should be addressed. Spoke with B Carreon about this issue.

1500 Collect MW32C-GW121020

1600 Collect MW32A-GW121020

1640 Team back to connex to unload vehicle.

1700 E Rott to Fedex to ship equipment used during development

1715 Team offsite.

Emma Rott 12/10/20

Date: 12/11/20

Weather: 30°F, Snow

Task: GW Sampling

PPE: Level D modified

Personnel: E. Rott (author), I. Campbell, M. Day, B. Carrion, K. Kelley, K. Murphy (Wasatch)

0800 Field team onsite. H+S meeting at tailgate.

0830 E. Rott, I. Campbell to MW-31.

0850 Start purge at MW-31A and MW-31C.

0900 No water from MW31A. Team notes that the pressure release on the controller sounds strange.

0905 Switch channels for MW31A and MW31C to see is controller is malfunctioning. Not the issue.

0910 Team pulls pump. Notes frozen water in top 2' of tubing. Places inside vehicle with heat on.

0945 Place pump back in well. Still seeing same issue.

1020 Change fittings on air line and ~~to~~ air hose. Water present.

1045 Collect ~~MW30~~ MW31C-GW121120

Rott on the Run

Date: 12/11/20

1103 Breakthrough at MW31A

1105 Begin building WC

Time	Disch	Rech	Pressure	Notes
1106	10	120	10	No movement
1108	20	120	10	"
1110	30	120	10	"
1112	10	120	30	Bubbles, switched when decreased
1120	20	120	30	"
1148	30	120	30	"
1155	10	120	40	"
1200	20	120	40	"
1211	30	120	40	"
1214	10	120	50	"
1218	20	120	60	"
1228	30	120	60	"
1234	10	120	70	"
1245	20	120	70	"
1250	30	120	70	"
1300	10	120	80	"
1315	20	120	80	water

Date: 12/11/20

1125 Begin purge at MW31B

1250 Collect MW31B-GW121120

1320 Restart purge at MW31A. Purged approx. 1/4 prior to breakthrough

1420 Collect MW31A-GW121120

1530 Team to MW34 to begin building water columns. See notes on next page for WC at MW34B and MW34C.

Arrival at 12/11/20

Date: 12/11/20

MW-34B

Time	Disc	Rech	Press	Notes
1556	10	120	20	
1558	20	120	20	
1600	30	120	20	
1603	10	120	30	
1605	20	120	30	
1608	30	120	30	
1610	10	120	40	
1612	20	120	40	
1615	30	120	40	
1617	10	120	50	
1619	20	120	50	
1622	30	120	50	
1624	10	120	60	
1627	20	120	60	
1629	30	120	60	
1632	10	120	70	
1634	20	120	70	
1636	30	120	70	
1639	10	120	80	saw tiny worms
1641	20	120	80	
1646	20	120	80	water coming out *put handwarmer on well

Date: 12/11/20

MW-34C

Time	Disch	Rech	Pres	Notes
1556	10	120	20	
1558	20	120	20	
1600	30	120	20	
1603	10	120	30	
1605	20	120	30	
1608	30	120	30	
1610	10	120	40	
1612	20	120	40	
1615	30	120	40	
1617	10	120	50	
1619	20	120	50	
1622	30	120	50	
1624	10	120	60	
1627	20	120	60	
1629	30	120	60	
1632	10	120	70	
1634	20	120	70	
1636	30	120	70	
1639	10	120	80	saw tiny bugs
1641	20	120	80	
1646	30	120	80	
1648	10	120	90	

MW-34C

Time	Disch	Rech	Press	Notes
1650	20	120	80	
1653	30	120	90	water!
Continue with purge on 12/13				

Continue PM 12/11/20

Date: 12/13/20

Weather 30°F, Sunny
Task: GW Sampling
PPE: Modified level D
Personnel: E. Rott (author), I. Campbell, M. Day, C. Kelley, B. Carreon, K. Murphy (Wasatch)

0800 Team onsite. Has meeting at tailgate.
0830 E. Rott, I. Campbell to MW34.
0900 Begin building WC at MW34D.
0910 E. Rott installs transducer on MW34A. Cleans/decons pump. Reinstall, leaving approx 5' above TOC. Will work on cutting tubing for permanent install.
0930 Begin building WC at MW34A.
0945 Notice water line is frozen on both A & D intervals. Team places hand warmers on lines and seems to be working.
1015 Begin purge at MW34D.
1020 Abandon WC building at MW34A. Wait until it begins to warm up.
1100 Begin purge at MW34B.

Date: 12/13/20

MW-34D

Time	Disch	Rech	Press	Notes
902	10	120	30	
904	20	120	30	
907	30	120	30	
909	10	120	40	
911	20	120	40	
914	30	120	40	
916	10	120	50	
921	20	120	50	
923	30	120	50	
930	10	120	60	
932	20	120	60	
935	30	120	60	
937	10	120	70	
940	20	120	70	
942	30	120	70	Freezing issues, water present
10:11	20	120	80	

Date: 12/13/20

MW-34A

Time	Disch	Rech	Press	Notes
0930	10	120	20	No movement
0934	20	120	20	"
0936	30	120	20	"
0939	10	120	30	"
0941	20	120	30	"
0943	30	120	30	Freezing water line.
1339	10	120	40	
1342	20	120	40	
1345	30	120	40	
1348	10	120	50	
1350	20	120	50	
1352	30	120	50	
1354	10	120	60	
1356	20	120	60	
1359	30	120	60	saw bubbles
1404	10	120	70	
1407	20	120	70	
1413	30	120	70	
1416	10	120	80	
1419	20	120	80	
1428	20	120	70	bubbling aggressive
1507	30	120	70	

Date: 12/13/20

MW-34A

Time	Disch	Rech	Press	Notes
1518	20	120	80	We think tubes keep freezing
1533	20	120	90	Water!
1537	10	120	90	
1538	15	120	90	

Date: 12/13/20

1230 Collect MW34D-GW121320

1330 Begin collection of MW34B. Breakthrough occurs after only collection of TOC. Will need to rebuild WC.

1340 Begin rebuilding WC at MW34A. Team noticing minimal movement, likely to freezing

1430 Begin purge at MW34C. Flow initially at 120 ml/discharge.

1440 Flow came to a stop at MW34C. Most likely due to freezing of line.

1500 E. Rott stops purge on MW34C.

1545 E. Rott speaks with B. Carreon and K. Leslie about freezing issues.

1600 E. Rott trims MW34A by 3 Ft to pull up pump after installation of transducer attachment.

1710 E. Rott, I. Campbell to MW26 to help with pump re-install. Issues with getting them fully installed.

1815 Team offsite.

Emma Rott
12/13/20

Date: 12/14/20

Weather: Snow, 30°F
TASK: GW Sampling
PPE: Modified Level D
Personel. E. Rott (author), I. Campbell, M. Day, B. Carreon, C. Kelley, K. Murphy (Wasatch)

0800 Team onsite. H+S meeting at tailgate.
0845 E. Rott, I. Campbell to MW20s/D.
0915 School grounds keeper stated he didn't want us to park on the grass. Team to move to different well.
0930 Team gets traffic control and sets up at MW-21.
0940 Begin purge at MW21.
0950 I. Campbell to bring heat gun to team at MW14S/D.
1010 I. Campbell back at MW21.
1020 Collect Sample at 1
MW21-GW121420
Using gas and 21ST controller b/c MP50s are being used elsewhere.

Date: 12/14/20

1040 Team to MW22.
1055 Begin purge at MW22. Using gas + 21ST controller b/c MP50s being used elsewhere.
1200 Collect MW22-GW121420
Collect MS/MSD.
1300 Team to connex to begin packing coolers.
1430 Collect TB01-GW121420
1435 Collect TB02-GW121420
1440 Collect TB03-GW121420
1445 Collect TB04-GW121420
1450 Collect TB05-GW121420
1455 Collect TB06-GW121420
~~1457~~ ER 1500 Collect TB07-GW121420
1505 Collect TB08-GW121420
1630 E. Rott, I. Campbell to Fedex to ship 9 coolers.
1700 Team offsite.

Emma Rott
12/13/14/20

Date: 12/15/20

Weather: Snow, cloudy, 30°F
Task: GW Sampling
PPE: Modified Level D
Team: E. Rott (author), I. Campbell, M. Day, B. Carreon, C. Kelley, K. Murphy (Nasatka)

0800 Team onsite. H+S meeting at tailgate.
0830 E. Rott, I. Campbell, M. Day, B. Carreon to MW34.
0900 Setup on MW34A, B, C.
*0930 Begin building WC at MW34B.
1040 Begin purge at MW34A.
1235 Collect MW34A-GW121520
→*915 Team pulled MW34B. Filter appeared clogged. Replaced filter and re-deployed.
1400 Breakthrough occurred at both MW34B and MW34C.
1430 Team to MW26.
1500 E. Rott calls Noah ~~Ke~~ re from BESST to order more filters and discuss options. Noah communicated that they have 60 micron filters available, but those won't

Date: 12/15/20
MW-34B

Time	Disch	Rech	Press	Notes
932	20	120	20	lots of bubs
935	30	120	20	
941	10	120	30	
955	20	120	30	
958	30	120	30	
1009	10	120	40	
1021	20	120	40	
1036	30	120	40	
1042	10	120	50	
1049	20	120	50	
1105	30	120	50	
1113	10	120	60	
1123	20	120	60	
1137	30	120	60	
1142	10	120	70	
1150	20	120	70	water!

Date: 12/15/20

1500 Fit in receivers. Could work at MW34.
Discussed that field team can attempt using backflow w/ N_2 through filter in water to clear out instead of replacing everytime.
Discussed idea of a stainless tube with holes drilled in it and mesh covering those holes as an attachment filter alternative for MW26 (with receivers).
Noah to ship team 4 new filters overnight.

1500 Team to MW26. Setup on MW26D, C, B.

1600 Breakthrough occurred at MW26C and D. Team pulled pumps.

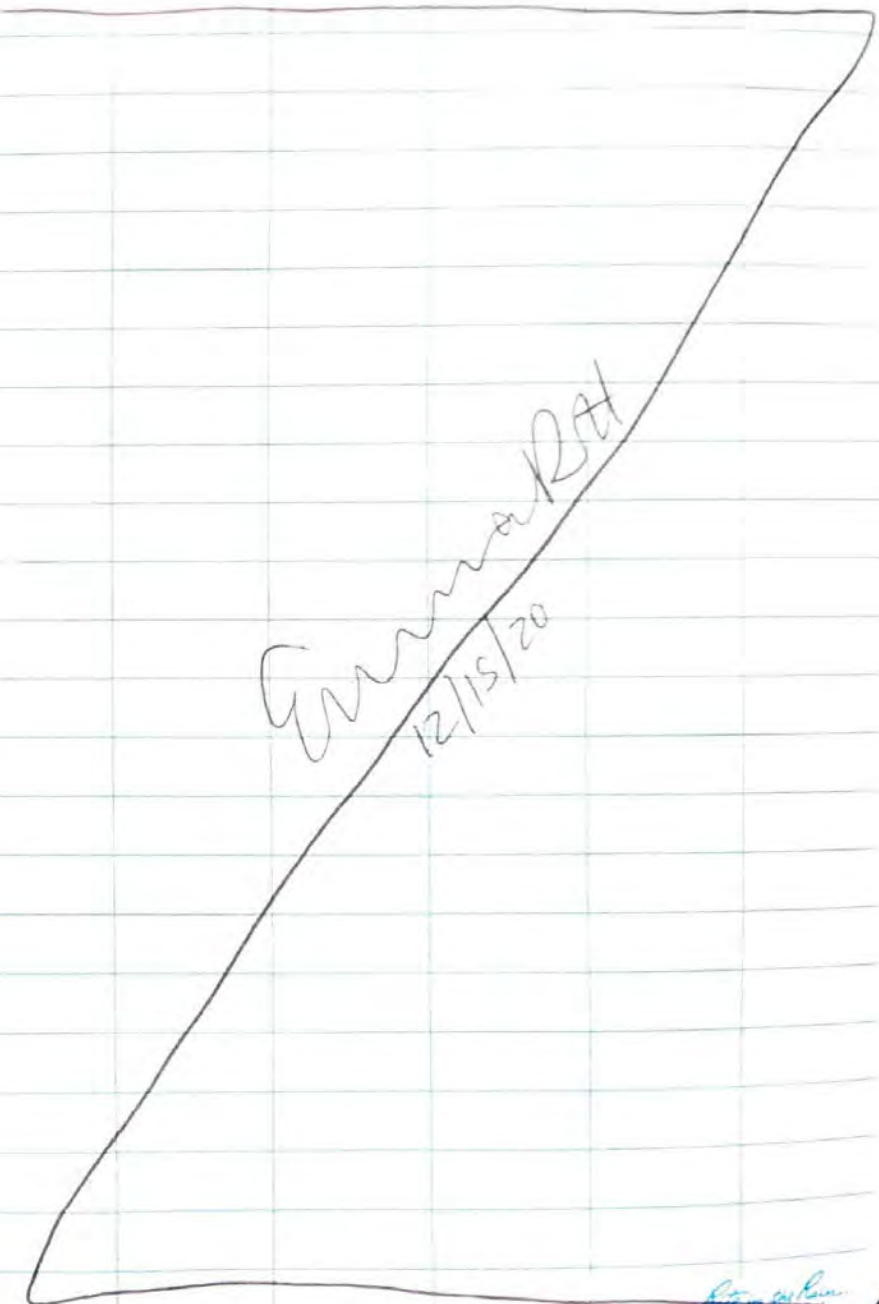
1610 MW26C pump and tubing clearly clogged with red-ish sediment. Team flushed both air and water line with DI water.

1620 Team pulled MW26D. Filter appeared to be a darker grey, similar to the water discharged prior to breakthrough.

Date: 12/15/20

1630 Team to connex to unpack.

1700 Field team offsite.



Date: 12/16/20

Weather: Cloudy, 30°F
Task: GW Sampling
PPE: Modified Level D
Personel: E. Rott (author), I. Campbell, M. Day, B. Carreon, C. Kelley, K. Murphy

0800 Team onsite. H+S meeting at tailgate.
0845 E. Rott, I. Campbell to MW38S/D.
0900 E. Rott back to connex to get traffic control.
0957 Begin purge at MW38S.
1000 Attempt purge start at MW38D. Issues with ZIST controller.
1010 Begin purge at MW38D. Setting can be adjusted in future with functioning controller.
1140 Collect MW38D-GW121620.
1200 Collect MW38S-GW121620
1300 Team to MW26 to help reinstall pumps.
1400 E. Rott, I. Campbell to MW34. Changed filter on MW34B. Re-deployed. Pulled MW34C. Replaced filter and redeployed.
1430 Both single channel ZIST controllers are not working.

Date: ~~12/16/20~~ 12/17/20

MW-34B
Replaced filter, redeployed pump

Time	Disch	Rech	Press	Notes
0910	10	120	20	No movement
0912	20	120	20	"
0916	30	120	20	Short bubbles at end
0919	10	120	30	" lots of bubbles after cycle
0932	20	120	30	
0946	30	120	30	
0945	10	120	40	
1000	20	120	40	
1020	30	120	40	
1027	10	120	50	
1035	20	120	50	
1100	30	120	50	
1116	10	120	60	
1140	20	120	60	
1152	30	120	60	
1202	10	120	70	
1213	20	120	70	
1226	30	120	70	water

Date: 12/16/20

1445 Controllers are releasing as soon as gas turned on. Likely stuck solenoid. Attempted changing battery connection, gas fittings, gas regulator.

1500 E. Rott calls Noah Heller (BESST) for troubleshooting assistance. He believes that it's likely the solenoids reached their lifetime.

1545 E. Rott, I. Campbell to MW26. Continue help installing MW26C. Unable to.

1700 Team offsite.

Emma Rott 12/16/20

Date: 12/17/20

Weather: Rain, snow 30°F
Task: GW Sampling
PPE: Modified Level D
Personel: E. Rott (author), I. Campbell, M. Day, B. Carreon, C. Kelley, K. Murphy (Wasatch)

0800 Team onsite. H&S meeting at tailgate.
0900 E. Rott, B. Carreon to MW34.
0910 Begin building WC at MW34B and C.
1300 Water at MW34B. Collect grab VOC sample.
MW34B-GW121720
1300 Begin purge at MW34B. Initial cycles at 100 ml/discharge.
1315 Began drawing back during recharge at MW34B. Pulling water up into airline, evident by relief valve on 213T controller bubbling, with moisture.
1405 End purge at MW34B. No positive water coming out during discharge.
1500 Team back to the connex. Finish packing equipment and coolers.
1700 Team offsite.

Rott in the Rain

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 12/7/2020	**Prepared by:** Ben Carreon

Personnel on site, including Contractors:	CDM Smith – Ben Carreon, Maria Day, Tea Vrtlar, Emma Rott, Joe Miller, Iona Campbell, Connor Kelley Wasatch – Kevin Murphy
Visitors/Others:	None

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	**0 To 32 º F**
Wind	**Still**	Moderate	High		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Development equipment • Water level and low-flow groundwater sampling equipment

Description of Field Activities – including samples/data collected, etc:

- A H&S tailgate was conducted at the IDW yard area.
- Equipment was calibrated.
- Synoptic Water Level Event
    - All water levels were completed except at monitoring wells: MW-08A/B/C, MW-14D, MW-17S, MW-28, MW-29 A/B/C, and MW-32A/B/C. These locations will be completed 12/8/20.
- Groundwater Sampling
    - No groundwater samples were collected.
- Development
    - MW-13L
        - Prior to development, the total depth at MW-13L was 151.06' below top of casing; anticipated depth should be 160' below top of casing. Eight gallons bailed and 17 gallons were pumped on 12/6/20. Depth to bottom was measured at 152.1' below top of casing. Today (12/7/20), surging and pumping with the Geotech reclaimer pump removed approximately 100 gallons and depth to water at the end of the day was 154.15' below top of casing. Depth to bottom will be measured tomorrow (12/8/20), at that time we will assess how to move forward with further development and sampling during this event.
    - MW-34A
        - Development was initiated at MW-34A using the Waterra pump, and 15 gallons were removed. At the end of the day turbidity was still high; development will continue tomorrow.
    - MW-38S/D
        - Dedicated pumps were deployed.
- Samples collected:
    - IDW15-GW120720 – Poly water tank
    - IDW16-GW120720 – Drum with sediment water and hydraulic fluid from phase I of investigation
- Samples to be collected tomorrow:
    - 2x IDW soil samples from remaining roll off bins.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

- MP10H controller solenoid was sticking until the temperature was above 35F. All controllers will be kept in the hotel rooms to prevent any moisture build up and reduce sticking at low temperatures.
- Development at MW-13L (see above).
- The teams were short one water level meter due to a shipping issue with Field Environmental. Everything else shipped for the groundwater sampling event was accounted for except 50' of silicone and a regulator. The missing equipment and supplies are expected to arrive 12/7/20.

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Salt Lake City, Utah

- Salt Lake County has a mandatory mask mandate in effect since Saturday, June 27. Masks are required in public.

Projected Work – Near Term:

- One team will continue development of MW-34A and will begin development of MW-26B. Following development, pumps will be deployed at MW-37S/D (time permitting).
- One team will complete the synoptic water level event and then begin sampling.
- Two teams will begin groundwater sampling.

Other Activities/Remarks:

Photos:

	Date: 12/7/2020 **Location:** MW-06 **Description:** Measuring water level
	Date: 12/7/2020 **Location:** MW-02 **Description:** Stockpile of salt/gravel near well

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700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 12/8/2020	**Prepared by:** Ben Carreon

Personnel on site, including Contractors:	CDM Smith – Ben Carreon, Maria Day, Tea Vrtlar, Emma Rott, Joe Miller, Iona Campbell, Connor Kelley Wasatch – Kevin Murphy
Visitors/Others:	None

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	**0 To 32 º F**
Wind	**Still**	Moderate	High		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Development equipment • Water level and low-flow groundwater sampling equipment

Description of Field Activities – including samples/data collected, etc:

- A H&S tailgate was conducted at the IDW yard area.
- Equipment was calibrated.
- Synoptic Water Level Event
    - The remaining water levels were measured.
- Groundwater Sampling
    - Groundwater samples collected:
        - MW-05R (MW05R-GW120820 and FD05-GW120820)
            - For the following parameters:
                - VOCs
                - Geochemistry
                    - Metals
                    - Dissolved gases
                    - Sulfate, chloride
                    - Nitrate + nitrite (total N)
                    - TOC
                    - Alkalinity
        - MW-24 (MW24-GW120820)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-27 (MW27-GW120820)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-28 (MW28-GW120820)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-30RA (MW30RA-GW120820)
            - For the following parameters:
                - VOCs
                - 1,4-Dioxane

        - Geochemistry
    - MW-30RB (MW30RB-GW120820)
        - For the following parameters:
            - VOCs
            - 1,4-Dioxane
            - Geochemistry
  - No samples were shipped to EMAX Labs.
- Development
  - MW-13L
    - DTB was measured at 153.91' BTOC.
  - MW-34A
    - Development was completed. A total of 88.5 gallons were purged with the Waterra pump.
  - MW-26B
    - Began development however not much progress was made with the limited daylight available.
- Drilling IDW
  - Samples collected:
    - Roll off bin #5843
    - Roll off bin #6030
  - IDW samples collected 12/7 and 12/8 were shipped to the lab.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

- At the beginning of purging MW-30RB, water did not surface at expected pressures. The pump was pulled and rinsed to remove sediment which corrected the issue and the well was sampled.
- MW-12S was dry. Water level was not measured, and samples will not be collected.
- The water level at MW-31A was below the top of the volume booster. As the installation of the volume booster was difficult at this location, the pump was not pulled, and a water level was not measured.
- The water level at MW-29A was below the top of the volume booster. After pulling the pump, the airline was noted to be twisted. Spare swagelok fittings will be purchased should any issues be encountered while sampling. The tubing was straightened however the tubing should be trimmed as preventative maintenance in the near future.
- MP10H controller solenoids were again sticking despite keeping the controllers in hotel rooms overnight.
- One YSI had a pH sensor in need of replacement. A replacement YSI was requested and will arrive 12/9/20.
- Salt Lake County has a mandatory mask mandate in effect since Saturday, June 27. Masks are required in public.

Projected Work – Near Term:

- Continue development of MW-26B. Following development, pumps will be deployed at MW-37S/D.
- Continue groundwater sampling.

Other Activities/Remarks:

- United services picked up the fencing and jobsite toilet.
- Drilling PIDs and Mag Sep meters were packed for shipment.

Photos:

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	Date: 12/8/2020 **Location:** MW-29A **Description:** Twisted tubing
	Date: 12/8/2020 **Location:** MW-26B **Description:** Waterra foot valve

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Date: 12/8/2020

Location: MW-26B

Description: Development setup

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700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 12/9/2020	**Prepared by:** Ben Carreon

Personnel on site, including Contractors:	CDM Smith – Ben Carreon, Maria Day, Emma Rott, Iona Campbell, Connor Kelley Wasatch – Kevin Murphy
Visitors/Others:	None

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	**0 To 32 º F**
Wind	**Still**	Moderate	High		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Development equipment • Water level and low-flow groundwater sampling equipment

Description of Field Activities – including samples/data collected, etc:

- A H&S tailgate was conducted at the IDW yard area.
- Equipment was calibrated.
- Groundwater Sampling
    - Groundwater samples collected:
        - MW-08A (MW08A-GW120920 and FD03-GW120920)
            - For the following parameters:
                - VOCs
                - Geochemistry
                    - Metals
                    - Dissolved gases
                    - Sulfate, chloride
                    - Nitrate + nitrite (total N)
                    - TOC
                    - Alkalinity
        - MW-08B (MW08B-GW120920)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-08C (MW08C-GW120920)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-12D (MW12D-GW120920)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-15S (MW15S-GW120920)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-15D (MW15D-GW120920)
            - For the following parameters:
                - VOCs

        - Geochemistry
    - MW-23A (MW23A-GW120920)
        - For the following parameters:
            - VOCs
            - Geochemistry
    - MW-23C (MW23C-GW120920)
        - For the following parameters:
            - VOCs
            - Geochemistry
    - MW-25A (MW25A-GW120920)
        - For the following parameters:
            - VOCs
            - Geochemistry
    - MW-30C (MW30C-GW120920)
        - For the following parameters:
            - VOCs
            - Geochemistry
- Difficulties were encountered while purging MW-25B. Breakthrough was experienced despite staying under the maximum allowable volume per discharge cycle. When rebuilding the water column, breakthrough was again experienced. The pump filter will be replaced 12/10/20 in an effort to resolve breakthrough issues.
- The following samples were shipped to EMAX Labs:
    - MW05R-GW120820
    - FD05-GW120820
    - MW08A-GW120920
    - FD03-GW120920
    - MW08B-GW120920
    - MW08C-GW120920
    - MW12D-GW120920
    - MW15S-GW120920
    - MW15D-GW120920
    - MW24-GW120820
    - MW27-GW120820
    - MW28-GW120820
    - MW30RA-GW120820
    - MW30RB-GW120820
    - MW30C-GW120920

- Development
    - MW-26B
        - Development with the Waterra pump was not successful. Instead, development was completed using the air lifting apparatus, but by slightly pressurizing the well casing during air lift. A total of 27 gallons were purged using this method for development, until the water had significantly cleared.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

- Breakthrough during purging and during water column building at MW-25B.
- One additional YSI was also displaying erroneous pH measurements. The readings had later normalized however a second replacement YSI was still requested.
- Salt Lake County has a mandatory mask mandate in effect since Saturday, June 27. Masks are required in public.

Projected Work – Near Term:

- Continue groundwater sampling.

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Other Activities/Remarks:

- None.

Photos:

	Date: 12/9/2020 **Location:** MW-23 **Description:** Equipment setup
	Date: 12/9/2020 **Location:** MW-26B **Description:** Development setup

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Salt Lake City, Utah

DATE: 12/10/2020	**Prepared by:** Ben Carreon

Personnel on site, including Contractors:	CDM Smith – Ben Carreon, Maria Day, Emma Rott, Iona Campbell, Connor Kelley Wasatch – Kevin Murphy
Visitors/Others:	None

Weather	Sunny	**Partly Cloudy**	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	**0 To 32 º F**
Wind	**Still**	Moderate	High		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Water level and low-flow groundwater sampling equipment

Description of Field Activities – including samples/data collected, etc:

- A H&S tailgate was conducted at the IDW yard area.
- Equipment was calibrated.
- Groundwater Sampling
    - Groundwater samples collected:
        - MW-04 (MW04-GW121020 and FD02-GW121020)
            - For the following parameters:
                - VOCs
                - Geochemistry
                    - Metals
                    - Dissolved gases
                    - Sulfate, chloride
                    - Nitrate + nitrite (total N)
                    - TOC
                    - Alkalinity
        - MW-06 (MW06-GW121020)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-16D (MW16D-GW121020)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-16S (MW16S-GW121020)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-23B (MW23B-GW121020)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-25B (MW25B-GW121020)
            - For the following parameters:
                - VOCs

        - Geochemistry
    - MW-25C (MW25C-GW121020)
        - For the following parameters:
            - VOCs
            - Geochemistry
    - MW-32A (MW32A-GW121020)
        - For the following parameters:
            - VOCs
            - Geochemistry
    - MW-32B (MW32B-GW121020)
        - For the following parameters:
            - VOCs
            - Geochemistry
    - MW-32C (MW32C-GW121020)
        - For the following parameters:
            - VOCs
            - Geochemistry
- MW-25B panacea pump porous media filter was replaced prior to secondary water column building efforts. The water column was successfully built, and the well was purged and sampled.
- No samples were shipped to EMAX labs.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

- Salt Lake County has a mandatory mask mandate in effect since Saturday, June 27. Masks are required in public.

Projected Work – Near Term:

- Continue groundwater sampling.

Other Activities/Remarks:

- None.

Photos:

Date: 12/10/2020

Location: MW-25B

Description: Used filter

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Date: 12/10/2020

Location: MW-25B

Description: Water column building

Date: 12/10/2020

Location: N/A

Description: Setting screw for recharge timer units stripped. Needs to be replaced.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 12/11/2020	**Prepared by:** Ben Carreon

Personnel on site, including Contractors:	CDM Smith – Ben Carreon, Maria Day, Emma Rott, Iona Campbell, Connor Kelley Wasatch – Kevin Murphy
Visitors/Others:	None

Weather	Sunny	**Partly Cloudy**	Overcast	Rain	**Snow**
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	**0 To 32 º F**
Wind	**Still**	Moderate	High		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Water level and low-flow groundwater sampling equipment

Description of Field Activities – including samples/data collected, etc:

- A H&S tailgate was conducted at the IDW yard area.
- Equipment was calibrated.
- Groundwater Sampling
    - Groundwater samples collected:
        - MW-03RA (MW03RA-GW121120)
            - For the following parameters:
                - VOCs
                - Geochemistry
                    - Metals
                    - Dissolved gases
                    - Sulfate, chloride
                    - Nitrate + nitrite (total N)
                    - TOC
                    - Alkalinity
        - MW-03RB (MW03RB-GW121120)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-03RC (MW03RC-GW121120)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-03RD (MW03RD-GW121120)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-13S (MW13D-GW121120)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-13D (MW13D-GW121120)
            - For the following parameters:
                - VOCs

        - Geochemistry
    - MW-17S (MW17S-GW121120)
        - For the following parameters:
            - VOCs
            - Geochemistry
    - MW-29B (MW29B-GW121120)
        - For the following parameters:
            - VOCs
            - Geochemistry
    - MW-29C (MW29C-GW121120)
        - For the following parameters:
            - VOCs
            - Geochemistry
    - MW-31A (MW31A-GW121120)
        - For the following parameters:
            - VOCs
            - Geochemistry
    - MW-31B (MW31B-GW121120)
        - For the following parameters:
            - VOCs
            - Geochemistry
    - MW-31C (MW31C-GW121120)
        - For the following parameters:
            - VOCs
            - Geochemistry
- No samples were shipped to EMAX labs. All samples currently being held will be sent out Monday.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

- Various discharge lines (MW-03R, MW-29, and MW-31) were found to be frozen near the surface. Pumps either had to be pulled and warmed in a vehicle or a portable electric device had to be attached to the outside of the tubing to thaw the water in the tubing and allow for successful purging.
- MW-03RA experienced breakthrough while purging. The water column was rebuilt, and the well was successfully sampled.
- MW-03RD had an apparent check valve issue causing purge water to drain back down the discharge tubing. The pump was pulled, and the spring and filter were replaced. The pump was then re-deployed and the draw back issue was resolved.
- While purging MW-13S on 12/10/20, a sample could not be collected before the well went dry. A sample was collected on 12/11/20 after recharge had occurred.
- Salt Lake County has a mandatory mask mandate in effect since Saturday, June 27. Masks are required in public.

Projected Work – Near Term:

- Sampling teams will have a rest day on 12/12/20.
- Continue groundwater sampling on 12/13/20.

Other Activities/Remarks:

- None.

Photos:

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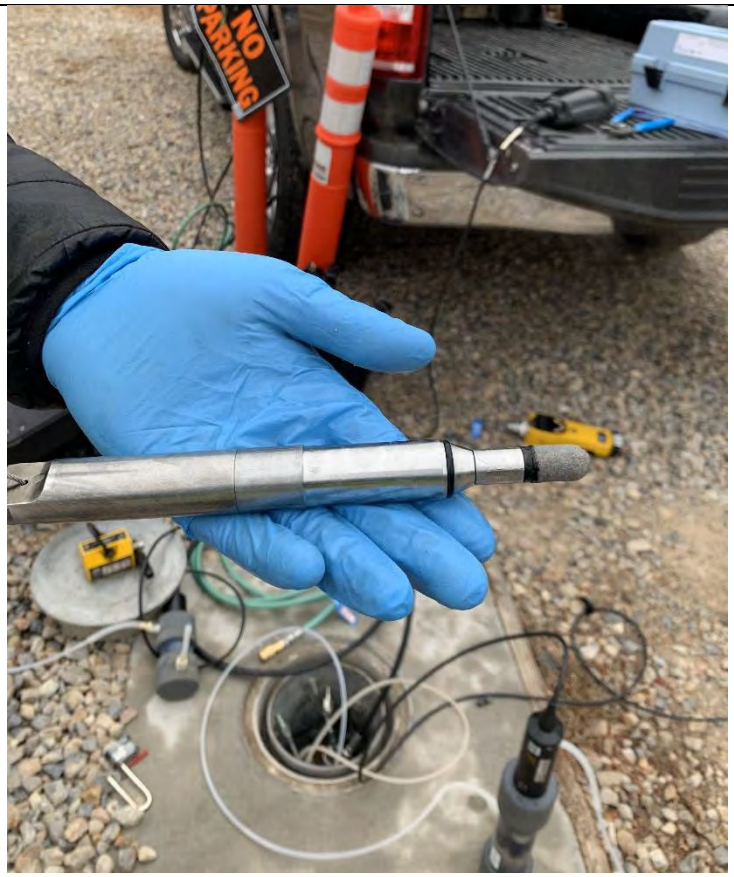
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 12/11/2020 **Location:** MW-32 **Description:** MW-32A (left) and MW-32B/C (right) purge water
	**Date:** 12/11/2020 **Location:** MW-03RB **Description:** Pump prior to filter and spring replacement

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 12/13/2020	**Prepared by:** Ben Carreon

Personnel on site, including Contractors:	CDM Smith – Ben Carreon, Maria Day, Emma Rott, Iona Campbell, Connor Kelley Wasatch – Kevin Murphy
Visitors/Others:	None

Weather	Sunny	**Partly Cloudy**	Overcast	Rain	**Snow**
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	**0 To 32 º F**
Wind	**Still**	Moderate	High		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Water level and low-flow groundwater sampling equipment

Description of Field Activities – including samples/data collected, etc:

- A H&S tailgate was conducted at the IDW yard area.
- Equipment was calibrated.
- Groundwater Sampling
    - Groundwater samples collected:
        - MW-17D (MW17D-GW121320)
            - For the following parameters:
                - VOCs
                - Geochemistry
                    - Metals
                    - Dissolved gases
                    - Sulfate, chloride
                    - Nitrate + nitrite (total N)
                    - TOC
                    - Alkalinity
        - MW-29A (MW29A-GW121320)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-34D (MW34C-GW121320)
            - For the following parameters:
                - VOCs
                - Geochemistry
    - No samples were shipped to EMAX labs. All samples currently being held will be sent out Monday.
    - A transducer was installed at MW-34A.
    - Water columns were built at MW-26C and D while working pumps down to the receivers.
    - Pumps were deployed at MW-37S/D.
    - MW-13L dedicated pump was assembled for mid-screen deployment, however, will be temporarily placed at a shallower depth during sampling due to the current presence of sediment in the well.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

- Various discharge lines (MW-26, MW-29, and MW-34) were found to be frozen and continued to freeze during purging. Before sampling, pumps were pulled and warmed in a vehicle. During sampling, a portable electric device

was attached to the outside of the tubing to thaw the water in the tubing and allow for successful purging. As this offered limited success, the sampling team will make the next attempt to sample the remaining ZIST wells (MW-26 and MW-34) during warmer/sunnier days (Tuesday and Wednesday). These wells are prone to freezing at the surface, due to the small diameter of tubing and the low flow rate during purging.

- Pump reinstallations were difficult at MW-26A, C, and D as the cold tubing is less flexible.
- Breakthrough was encountered at MW-34B.
- Salt Lake County has a mandatory mask mandate in effect since Saturday, June 27. Masks are required in public.

Projected Work – Near Term:

- Continue groundwater sampling.

Other Activities/Remarks:

- None.

Photos:

Date: 12/12/2020

Location: MW-37

Description: Typical shallow well pump deployment

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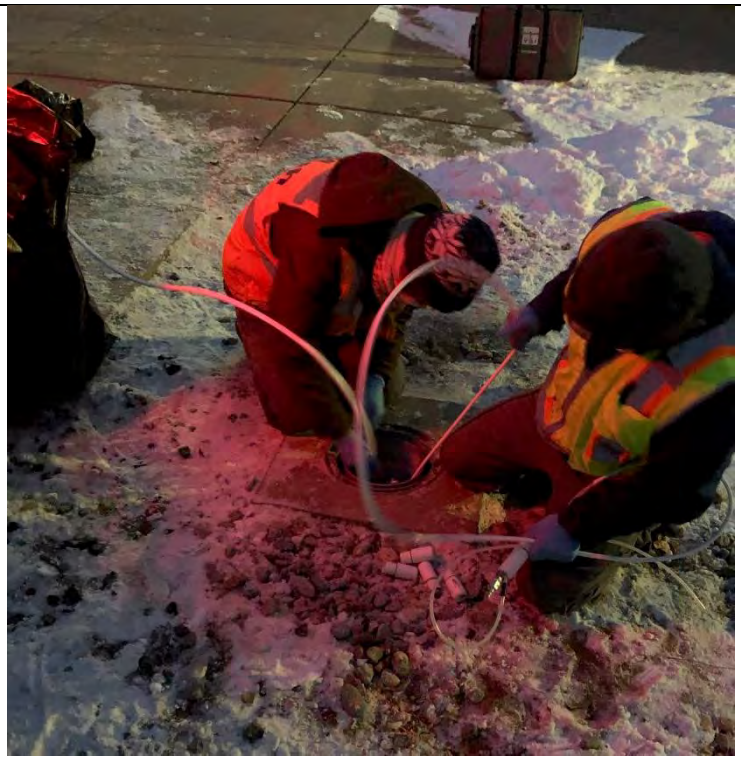
Salt Lake City, Utah

	Date: 12/12/2020 **Location:** MW-37S/D **Description:** Pump deployment
	**Date:** 12/12/2020 **Location:** MW-26A/D **Description:** Pump deployment

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 12/14/2020	**Prepared by:** Ben Carreon

Personnel on site, including Contractors:	CDM Smith – Ben Carreon, Maria Day, Emma Rott, Iona Campbell, Connor Kelley Wasatch – Kevin Murphy
Visitors/Others:	None

Weather	Sunny	**Partly Cloudy**	Overcast	Rain	**Snow**
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	0 To 32 º F
Wind	**Still**	Moderate	High		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Water level and low-flow groundwater sampling equipment

Description of Field Activities – including samples/data collected, etc:

- A H&S tailgate was conducted at the IDW yard area.
- Equipment was calibrated.
- Groundwater Sampling
    - Groundwater samples collected:
        - MW-14S (MW14S-GW121420)
            - For the following parameters:
                - VOCs
                - Geochemistry
                    - Metals
                    - Dissolved gases
                    - Sulfate, chloride
                    - Nitrate + nitrite (total N)
                    - TOC
                    - Alkalinity
        - MW-14D (MW14D-GW121420)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-18 (MW18-GW121420, FD06-GW121420)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-19 (MW19-GW121420)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - W-20S (MW20S-GW121420)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-21 (MW21-GW121420)
            - For the following parameters:
                - VOCs

        - Geochemistry
    - MW-22 (MW22-GW121420)
        - For the following parameters:
            - VOCs
            - Geochemistry
    - MW-36 (MW36-GW121420, FD07-GW121420)
        - For the following parameters:
            - VOCs
            - Geochemistry
            - 1,4-Dioxane
    - MW-37S (MW37S-GW121420 and FD04-GW121420)
        - For the following parameters:
            - VOCs
            - Geochemistry
            - 1,4-Dioxane
    - MW-37D (MW37D-GW121420)
        - For the following parameters:
            - VOCs
            - Geochemistry
            - 1,4-Dioxane
- The following samples were shipped to EMAX labs:
    - MW03RA-GW121120
    - MW03RB-GW121120
    - MW03RC-GW121120
    - MW03RD-GW121120
    - MW04-GW121020
    - FD02-GW121020
    - MW06-GW121020
    - MW13S-GW121120
    - MW13D-GW121120
    - MW14S-GW121420
    - MW14D-GW121420
    - MW16S-GW121020
    - MW16D-GW121020
    - MW17S-GW121120
    - MW17D-GW121320
    - MW19-GW121420
    - MW21-GW121420
    - MW22-GW121420
    - MW23A-GW120920
    - MW23B-GW121020
    - MW23C-GW120920
    - MW25A-GW120920
    - MW25B-GW121020
    - MW25C-GW121020
    - MW29A-GW121320
    - MW29B-GW121120
    - MW29C-GW121120
    - MW31A-GW121120
    - MW31B-GW121120
    - MW31C-GW121120
    - MW32A-GW121020
    - MW32B-GW121020

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- MW32C-GW121020
- MW34D-GW121320
- MW36-GW121420
- FD07-GW121420

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

- Salt Lake County has a mandatory mask mandate in effect since Saturday, June 27. Masks are required in public.

Projected Work – Near Term:

- Continue groundwater sampling.

Other Activities/Remarks:

- None.

Photos:

	Date: 12/14/2020 **Location:** MW-36 **Description:** Initial purge water

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Salt Lake City, Utah

Date: 12/14/2020

Location: MW-36

Description: Equipment setup

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 12/15/2020	**Prepared by:** Ben Carreon

Personnel on site, including Contractors:	CDM Smith – Ben Carreon, Maria Day, Emma Rott, Iona Campbell, Connor Kelley Wasatch – Kevin Murphy
Visitors/Others:	None

Weather	Sunny	**Partly Cloudy**	Overcast	Rain	**Snow**
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	**0 To 32 º F**
Wind	**Still**	Moderate	High		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Water level and low-flow groundwater sampling equipment

Description of Field Activities – including samples/data collected, etc:

- A H&S tailgate was conducted at the IDW yard area.
- Equipment was calibrated.
- Groundwater Sampling
    - Groundwater samples collected:
        - MW-01D (MW01D-GW121520)
            - For the following parameters:
                - VOCs
                - Geochemistry
                    - Metals
                    - Dissolved gases
                    - Sulfate, chloride
                    - Nitrate + nitrite (total N)
                    - TOC
                    - Alkalinity
        - MW-20D (MW20D-GW121520)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-34A (MW34A-GW121520)
            - For the following parameters:
                - VOCs
                - Geochemistry
                - 1,4-Dioxane
    - Water columns at MW-26A/B began to be built.
    - No samples were shipped to EMAX labs.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

- When purging MW-01S, air entrainment was present in the groundwater discharge line. The field team pulled the pump and noticed new and alternative compression fittings may resolve the issue. When pulling the pump, the field team also noticed that the ferrule cables at the pump were deteriorating and in need of replacement. Supplies will be purchased, and repairs will be made prior to sampling.
- When purging MW-20D, the QED MP50 and MP10H controllers were having issues cycling properly. Ultimately, a BESST ZIST controller was used to successfully purge the well.

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700 South 1600 East PCE Plume
Salt Lake City, Utah

- Attempts were made to continue building MW-26C, however, when no air movement was evident at pressures exceeding the anticipated purging pressure, the pump and tubing were pulled. Excessive sediment was noted in the pump and tubing. Groundwater and sediment were purged from the lines and DI water was flushed through the tubing.
- When purging MW-26D, a large grayish turbid slug of groundwater was noted to pass through the flow-through cell. Shortly after, breakthrough was encountered. The pump and tubing were pulled to examine the pump. Some sediment was noted.
- A new filter was installed at MW-34B. Attempts were made to build water columns at MW-34B/C, however, breakthrough was encountered at both locations.
- Salt Lake County has a mandatory mask mandate in effect since Saturday, June 27. Masks are required in public.

Projected Work – Near Term:

- Continue groundwater sampling.

Other Activities/Remarks:

- None.

Photos:

Date: 12/15/2020

Location: MW-01S

Description: Pump

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 12/15/2020 **Location:** MW-26C **Description:** Sediment in pump
	Date: 12/15/2020 **Location:** MW-34B **Description:** New and replacement filter

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 12/16/2020	**Prepared by:** Ben Carreon

Personnel on site, including Contractors:	CDM Smith – Ben Carreon, Maria Day, Emma Rott, Iona Campbell, Connor Kelley Wasatch – Kevin Murphy
Visitors/Others:	None

Weather	**Sunny**	**Partly Cloudy**	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	**0 To 32 º F**
Wind	**Still**	Moderate	High		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Water level and low-flow groundwater sampling equipment

Description of Field Activities – including samples/data collected, etc:

- A H&S tailgate was conducted at the IDW yard area.
- Equipment was calibrated.
- Groundwater Sampling
    - Groundwater samples collected:
        - MW-01S (MW01S-GW121620)
            - For the following parameters:
                - VOCs
                - Geochemistry
                    - Metals
                    - Dissolved gases
                    - Sulfate, chloride
                    - Nitrate + nitrite (total N)
                    - TOC
                    - Alkalinity
        - MW-02 (MW02-GW121620, FD01-GW121620)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-13L (MW13L-GW121620)
            - For the following parameters:
                - Grab VOCs only
        - MW-26A (MW26A-GW121620)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-26B (MW26B-GW121620)
            - For the following parameters:
                - VOCs
                - Geochemistry
                - 1,4-Dioxane
        - MW-38S (MW38S-GW121620)
            - For the following parameters:
                - VOCs

        - Geochemistry
        - 1,4-Dioxane
    - MW-38D (MW38D-GW121620)
        - For the following parameters:
            - VOCs
            - Geochemistry
            - 1,4-Dioxane
    - Field Blank (FB01-GW121620)
        - For the following parameters:
            - VOCs
            - 1,4-Dioxane
- Replaced the leaking Hy-Lok fittings with new Swagelok fittings on the MW-01S pump. Replaced the corroded aluminum cable crimps with new stainless steel cable clamps.
- Finished building water columns at MW-26A/B prior to purging and sampling.
- Started building MW-26D water column.
- Filters were replaced at MW-26C/D.
- A spring was replaced at MW-26D after it was noted that the discharge line was attempting to draw water back down the line.
- No samples were shipped to EMAX labs.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

- After purging MW-13L for over an hour at 200 mL/min, amounting to approximately 5 gallons, turbidity was still out of range (>1000 NTU). No parameters were collected due to how turbid the solution was, but a grab VOC sample was collected.
- The QED MP50, MP10H, and the rental ZIST controller units are all now experiencing solenoid valve issues. The only well operating controller is the VA dual-channel ZIST controller.
- Difficulties were encountered re-deploying MW-26C pump. This issue was experienced 12/13/20 as well, and it was observed that the tubing was clogged with sediment, likely causing buoyancy issues during pump deployment. Attempts were made to aid in lowering of the pump by purposely cycling air through the air line and out the discharge line however this didn't help. As the well is too turbid to deploy the pump, tomorrow an alternate sampling method without the pump will be attempted. This method will slightly pressurize the well, forcing water up the tubing to surface. After three casing volumes have been purged, a grab VOC sample will be collected.
- Salt Lake County has a mandatory mask mandate in effect since Saturday, June 27. Masks are required in public.

Projected Work – Near Term:

- Complete groundwater sampling.
- Send samples to the lab.
- Return rental equipment.
- IDW yard housekeeping.

Other Activities/Remarks:

- None.

Photos:

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 12/16/2020 **Location:** MW-01S **Description:** MW-01S pump with replacement fittings
	Date: 12/16/2020 **Location:** MW-26C **Description:** Attempting to deploy MW-26C

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 12/17/2020	**Prepared by:** Ben Carreon

Personnel on site, including Contractors:	CDM Smith – Ben Carreon, Maria Day, Emma Rott, Iona Campbell, Connor Kelley Wasatch – Kevin Murphy
Visitors/Others:	None

Weather	Sunny	**Partly Cloudy**	Overcast	**Rain**	**Snow**
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	**0 To 32 º F**
Wind	**Still**	**Moderate**	High		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Water level and low-flow groundwater sampling equipment

Description of Field Activities – including samples/data collected, etc:

- A H&S tailgate was conducted at the IDW yard area.
- Equipment was calibrated.
- Groundwater Sampling
    - Groundwater samples collected:
        - MW-26C (MW26C-GW121720)
            - For the following parameters:
                - Grab VOCs only
        - MW-34B (MW34B-GW121720)
            - For the following parameters:
                - Grab VOCs only
        - MW-34C (MW34C-GW121620)
            - For the following parameters:
                - Grab VOCs only
    - All rental equipment was returned.
    - The remaining samples were shipped to EMAX labs:
        - MW01S-GW121520
        - MW01D-GW121620
        - MW02-GW121620
        - MW13L-GW121620
        - MW26A- GW121620
        - MW26B-GW121620
        - MW26C-GW121720
        - MW34A-GW121520
        - MW34B-GW121720
        - MW34C-GW121720
        - MW37S-GW121420
        - MW37D- GW121420
        - MW38S-GW121620
        - MW38D-GW121620
        - FD01-GW121620
        - FD04-GW121420
        - FD06-GW121420

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

- Due to excessive sediment in the well, the team was unable to deploy a pump in MW-26C. A pressurized air lifting method was used to purge the well. Purge water was very turbid (>1000 NTU) throughout purging. After four casing volumes had been purged, a grab sample for VOCs was collected.
- Due to excessive sediment in the well, the team experienced difficulties deploying the pump in MW-26D. A pressurized air lifting method was used to purge the well, and two casing volumes were purged. Purge water was very turbid (>1000 NTU). A grab VOC sample was unable to be collected as the regulator froze when purging the third casing volume.
- When purging MW-34B, water began to drain back down the groundwater purge line. Attempts were made to overcome the drawback, however after approximately one hour of purging, water was noted to have entered the controller. It is presumed that there are likely check valve and/or solenoid valve issues. A grab sample for VOCs was collected.
- When purging MW-34C, turbidity began to steadily increase throughout the purge until the minimum purge volume had been met. Due to the excessive turbidity and the possibility of filter clogging, only a grab sample for VOCs was collected.
- Salt Lake County has a mandatory mask mandate in effect since Saturday, June 27. Masks are required in public.

Projected Work – Near Term:

- None.

Other Activities/Remarks:

- None.

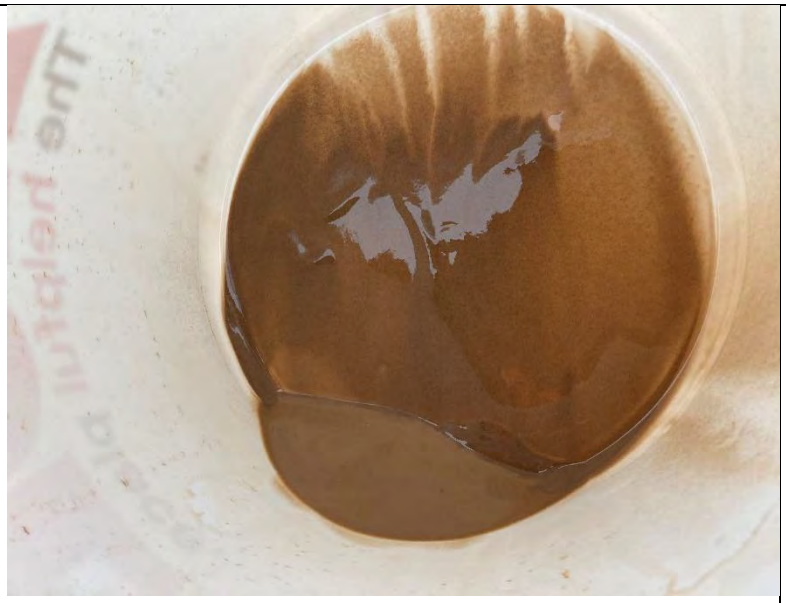
Photos:

Date: 12/17/2020

Location: MW-34B

Description: Water coming out the air discharge hose

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	**Date:** 12/16/2020 **Location:** MW-26C **Description:** Purge water
	Date: 12/16/2020 **Location:** MW-26D **Description:** Purge water

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): YSI Pro DSS 484177X

Manufacturer: YSI Professional Series

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12/15/20	7.08	pH 7.0	7003167 3/1/22	No	7.00	Pass	MZD
12/15/20	3.72	pH 4.0	7007137 1/22/22	No	4.00	Pass	MZD
12/15/20	10.29	pH 10.0	7005144 5/1/22	No	10.00	Pass	MZD
12/15/20	857	1409 $\frac{\mu mho}{cm}$	7406262 6/1/21	No	1409	Pass	MZD
12/15/20	97.6%	DO 650.24	———	No	95.7	Pass	MZD
12/15/20	212.2	ORP 220 mV	80 loass 5/1/2021	No	220.0	Pass	MZD

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): YSI U95071X

Manufacturer: YSI Professional Series

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12/13/20	6.92	pH 7.0	7064192 4/22/22	NO	7.00	P	
12/13/20	3.95	pH 4.0	7910457 11/1/21	NO	4.00	P	
12/13/20	9.95	pH 10.0	7911113 11/1/21	NO	10.00	P	
12/13/20	1367	1409 µmho/cm	7912350 01/01/22	NO	1409	P	
12/13/20	83.6%	DO 650.24	—	NO	83.6%	P	
12/13/20	222.5	220.0 mV	8010435 3/1/21	NO	220.0	P	

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): YSI 22516

Manufacturer: YSI Professional Series

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12/10/20	~~7.00~~ 6.99	7.0 pH	7004192 4/22/22	NO	7.00	P	
12/10/20	4.06	4.0 pH	7910457 11/1/21	NO	4.00	P	
12/10/20	9.99	10.0 pH	7911113 11/1/21	NO	10.00	P	
12/10/20	1339	1409 µmho/cm	7912380 01/01/22	NO	1409	P	
12/10/20	85.2%	DO 642.62 mmHg	—	NO	85.2%	P	
12/10/20	218.0	220 mV	8010435 5/1/21	NO	220.0	P	

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): HACH Turbidity 2100Q u938721X

Manufacturer: HACH

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12/8/20	20.0	20 NTU	~~A9199~~ A9275 Jan-21	NO	20.4	~~Standard NO expired~~ Pass	
12/8/20	100.0	100 NTU	A9281 Jan-21	NO	105	Pass	
12/8/20	800.0	800 NTU	A9277 Jan-21	NO	793	Pass	
12/9/20.	20.0	20 NTU	A0022 Apr-21	No	~~20.2~~ 21.7 MD	Pass	
12/9/20	100.0	100 NTU	A0041 May-21	No	~~100.2~~ 97.1 MD	Pass	
12/9/20	800.0	800 NTU	A0042 May-21	No	809	Pass	
12/10/20	20.0	20 NTU	A9275 JAN-21	No	~~18.1~~ MD 20.0	Pass	
12/10/20	100.10	100 NTU	A9281 JAN-21	No	101	Pass	
12/10/20	800.0	800 NTU	A9277 JAN-21	No	809	Pass	
12/11/20	20.00	20 NTU	A9275 Jan-21	NO	21.2	P	
12/11/20	100.00	100 NTU	A9281 Jan-21	NO	106	P	
12/11/20	800.00	800 NTU	A9277 Jan-21	NO	838	P	
12/13/20	20.0	20 NTU	A9275 JAN-21	No	19.1	Pass	
12/13/20	100.0	100 NTU	A9281 JAN-21	No	95.2	Pass	
12/13/20	800.0	800 NTU	A9277 JAN-21	No	777	Pass	

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): YSI 2251G

Manufacturer: YSI Professional Series

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12/8/20	7.15	pH 7.0	7004192 4/22/22	NO	7.00	Pass	
12/8/20	3.93	pH 4.0	7910457 11/1/21	No	4.00	Pass	
12/8/20	10.37	pH 10.0	7911113 11/1/21	NO	10.00	Pass	
12/8/20	1374	1409 µmho cm	7912380 01/01/22	NO	1409	Pass	
12/8/20	99.9%	~~1413~~ ~~775~~ 1 mm Hg ~~693.30~~ 0	—	NO	99.9%	Pass	
12/8/20	235.9	ORP 220 mV	8010435 8/1/21	NO	220	Pass	
12/9/20	7.12	pH 7.00	7004192 4/22/22	No	7.02	Pass	
12/9/20	4.05	pH 4.00	7910457 11/1/21	No	4.00	Pass	
12/9/20	10.11	pH 10.00	7911113 11/1/21	No	10.04	Pass	
12/9/20	88.2%	DO 452.8 mmHg	—	No	100%	Pass	
12/9/20	~~1385~~ 217.3	ORP 220 mV	8010435 8/1/21	No	220.2 ~~1409~~	Pass	
12/9/20	1383	1409 µmho Con	7912380 01/01/22	No	1409	Pass	

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): HACH Turbidity 2100Q 1195067 X

Manufacturer: HACH

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12/8/20	20.0	20 NTU	A9275 JAN-21	No	~~18.4~~ 19.9 MD	Pass	
12/8/20	100.0	100 NTU	A9281 JAN-21	No	~~99.4~~ 99.7	Pass	
12/8/20	800.0	800 NTU	A9277 JAN-21	No	~~787~~ 799	Pass	
12/9/20	20.0	20 NTU	A9275 JAN-21	No	19.8	Pass	
12/9/20	100.0	100 NTU	A9281 JAN-21	No	98.8	Pass	
12/9/20	800.0	800 NTU	A9277 JAN-21	No	799	Pass	
12/10/20	20.0	20 NTU	A9275 JAN-21	No	20.2	Pass	
12/10/20	100.0	100 NTU	A9281 JAN-21	No	100	Pass	
12/10/20	800.0	800 NTU	A9277 JAN-21	No	799	Pass	
12/11/20	20.0	20 NTU	A9275 JAN-21	No	19.4	Pass	
12/11/20	100.0	100 NTU	A9281 JAN-21	No	102	Pass	
12/11/20	800.0	800 NTU	A9277 JAN-21	No	770	Pass	
12/13/20	20.0	20 NTU	A9275 JAN-21	No	19.7	Pass	
12/13/20	100.0	100 NTU	A9281 JAN-21	No	101	Pass	
12/13/20	800.0	800 NTU	A9277 JAN-21	No	840	Pass	

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): YSI Proffesional Plus ~~22514~~ NO RFW22515

Manufacturer: YSI Proffesional Series

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12/~~9~~8/20	6.95	pH 7.0	7004192 4/22/22	NO	7.0	P	
12/~~9~~8/20	4.06	pH 4.0	7910457 11/1/21	NO	4.0	P	
12/~~9~~8/20	9.97	pH 10.0	7911113 11/1/21	NO	10.0	P	
12/~~9~~8/20	1335	1409 µmho/cm	7912350 01/01/22	NO	1409	P	
12/~~9~~8/20	102.9%	DO 652.78 mmHg	—	NO	100%	P	
12/~~9~~8/20	216.6	ORP 220 mV	8010435 8/1/2021	NO	220	P	
12/10/20	6.97	pH 7.0	7004192 4/22/22	No	7.02	Pass	
12/10/20	3.96	pH 4.0	7910257 11/1/21	No	4.00	Pass	
12/10/20	9.94	pH 10.0	7911113 11/1/21	No	10.00	Pass	
12/10/20	1335	1409 mmho/cm	7912350 01/01/22	No	1409	Pass	
12/10/20	100.0%	DO 642.62 mmHg	—	No	~~99.8~~ 99.7%	Pass	
12/10/20	221.1	ORP 220.0 mV	8010435 8/1/21	No	220.0	Pass	

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): YSI U95071X

Manufacturer: YSI Professional Series

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12/10/20	7.09	7.0 pH	7044192 4/22/22	NO	7.00	P	
12/10/20	4.05	4.0 pH	7910457 11/1/21	NO	4.00	P	
12/10/20	10.13	10.0 pH	711113 11/1/21 ~~01/01/22~~	NO	10.00	P	
12/10/20	1143	1409 µmho/cm	7912380 01/01/22	NO	1409	P	
12/10/20	98.6%	DO 6.42-6.42 mg/L	-	NO	98.6%	P	
12/10/20	216.1	220 mV	8010435 8/1/21	NO	220	P	
12/11/20	7.03	pH 7.0	7044192 4/22/22	NO	7.00	P	
12/11/20	4.19	pH 4.0	7910457 11/1/21	NO	4.00	P	
12/11/20	9.99	pH 10.0	711113 11/1/21	NO	10.00	P	
12/11/20	1390	1409 µmho/cm	7912380 01/01/22	NO	1409	P	
12/11/20	97.3%	DO 6.40-6.08	~~8010435~~ MP ~~8/1/21~~	NO	97.3%	P	
12/11/20	218.5	220.0 mV	8010435 8/1/21	NO	220	P	
~~12/13/20~~	6.92	pH 7.0	7044192 4/22/22	NO	7.00	P	IC
~~12/13/20~~	3.95	pH 4.0	7910457 11/1/21	NO	4.00	P	

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): YSI 22516

Manufacturer: YSI Professional Series

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12/11/20	6.98	pH 7.0	7004192 4/22/22	No	7.00	Pass	
	4.02	pH 4.0	7910457 11/1/21	No	4.01	Pass	
	10.08	pH 10.0	7911113 11/1/21	No	10.01	Pass	
	1484	1409 µmho/cm	7912380 01/01/22	No	1409	Pass	
	90.7%	DO 640.08	—	No	100%	Pass	
↓	~~94.6~~ 219.3 MD	ORP 220.0 mV	8010435 5/1/2021	No	~~100%~~ 220.4 MD	Pass	
12/13/20	6.95	7.0 pH	7004192 4/22/22	NO	7.00	Pass	
12/13/20	4.17	pH 4.0	7910457 4/1/21	No	4.00	P	
12/13/20	9.93	pH 10.0	~~7912380 MD~~ 11/1/21 MD 7911113 01/01/22	No	10.00	P	
12/13/20	1320	1409 µmho/cm	7912380 01/01/22	No	1409	P	
12/13/20	85.4%	DO 650.24	—	No	85.4%	P	
12/13/20	221.8	ORP 220.0 mV	8010435 5/1/2021	No	220.0	P	

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): YSI Professional Plus RFW 22515

Manufacturer: YSI Professional Series

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12/11/20	6.99	pH 7.0	7004192 4/22/22	No	7.00	Pass	
	4.09	pH 4.0	7910457 11/1/21	No	4.00	Pass	
	9.95	pH 10.0	7911113 11/1/21	No	10.03	Pass	
	1467	1409 mmho/cm	7912380 01/01/22	No	1409	Pass	
	94.6%	DO 640.08	—	No	100%	Pass	
↓	218.6	ORP 220.0 mV	8010435 5/1/2021	No	220.0	Pass	
12/13/20	7.03	pH 7.0	7004192 4/22/22	No	7.00	Pass	
	4.04	pH 4.0	7910457 11/1/21	No	4.00	Pass	
	9.97	pH 10.0	7911113 11/1/21	No	10.00	Pass	
	1317	1409 mmho/cm	7912380 01/01/22	No	1409	Pass	
	84.6%	DO 650.24	—	No	100%	Pass	
↓	225.6	ORP 220.0 mV	8010435 5/1/2021	No	219.2	Pass	

EQUIPMENT CALIBRATION LOG

SITE NAME: V/A Plume

Instrument (Name/Model No./Serial No.): Mini Rae 3000 U695245X 592-908331

Manufacturer: Mini Rae

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12/7/20	0.0	Fresh air	—	No	0.0	Pass	
12/7/20	100.0	100.0 ppm	BB1-248-10-7 1/22/2022	No	100.1	Pass	
12/9/20	0.0	Fresh air	—	No	0.0	Pass	
12/8/20	100.0	100.0 ppm	BB1-248-10-7 1/22/2022	No	96.3	Pass	
12-9-20	0.0	FRESHAIR	—	NO	0.0	PASS	
~~12-9-20~~	~~NO REGULATOR~~		NO 100 ICB CAL.				12-9-20
12-9-20	100.0	100 ppm ICB	304-401836354-1 8-20-24	NO	102.5	PASS	
12-10-20	0.0	FRESH AIR	—	NO	0.0	PASS	
12-10-20	100.0	100 ppm ICB	304-401836354-1 8-20-24	NO	100.1	PASS	
12/11/20	0.0	fresh air	—	NO	0.0	Pass	
12/11/20	100.0	100ppm ICB	304-401836354-1 8/20/24	NO	100.1	Pass	
12/13/20	0.0	fresh air	—	NO	0.0	Pass	
12/13/20	100.0	100ppm ICB	304-401836354-1 8/20/24	NO	100.0	Pass	
12-14-20	0.0	FRESHAIR	—	NO	0.0	PASS	
12-14-20	100.0	100ppm ICB	304-401836354-1 8-20-24	NO	99.9	PASS	

MD 12/9/20

EQUIPMENT CALIBRATION LOG

SITE NAME: ~~DTF~~ VA Plume

Instrument (Name/Model No./Serial No.): Mini Rae 4 76083X SN: 592-912114

Manufacturer: Mini Rae 3000

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12/7/20	0.0	Fresh air	—	No	0.0	Pass	
12/7/20	100.0	100.0 ppm	881-248-100-7 01/22/2022	No	99.5	Pass	
12/8/20	0	FRESH AIR	—	NO	0.0	PASS	
12-8-20	100	100 ppm	881-248-100-7 1-22-22	NO	99.3	PASS	
12-9-20	0.0	FRESHAIR	—	NO	100.0	PASS	
~~12-9-20~~	~~NO REGULATOR NO~~		~~100 LOS CAL~~				12-9-20
12-9-20	100.0	100 ICB	304-401836354-1 8-20-24	NO	100.0	PASS	
12-10-20	0.0	FRESHAIR	—	—	0.0	PASS	
12-10-20	100.0	100 ICB	304-401836354-1 8-20-24	—	100.1	PASS	
12/11/20	0.00	fresh air	—	—	0.0	Pass	
12/11/20	100.0	100ppm ICB	304-401836354-1 8/20/24	—	100.1	Pass	
12/13/20	0.00	fresh air	—	—	0.0	Pass	
12/13/20	100.0	100ppm ICB	304-401836354-1 8/20/24	—	99.9	Pass	
12-14-20	0.0	FRESHAIR	—	—	0.0	PASS	
12-14-20	0.0	100 ICB	304.401836354 8-20-24	—	100.1	PASS	

EQUIPMENT CALIBRATION LOG

SITE NAME: VA PLUME

Instrument (Name/Model No./Serial No.): MINI RAE 3000 592-901662

Manufacturer: RAE SYSTEMS

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12-7-20	0.0	~~100~~ FRESH AIR	~~BBI-245-100PPM~~ 12-7-20 1-	—	0.0	PASS	
12-7-20	0.0	100 PPM ICB	BBI-245-100PPM 1-22-2022	—	99.8	PASS	
12-8-20	0.0	FRESHAIR	—	—	0.0	PASS	
12-8-20	100.0	100 PPM ICB	BBI-245-100PPM 1-22-2022	—	95.4PPM	PASS	
12-9-20	0.0	FRESH AIR	—	—	0.0	PASS	
~~12-9-20 NO CALIBRATION~~		~~NO 100 ICB CAL~~					12-9-20
12-9-20	-	100PPM ICB	304-4015363541 8-20-24		100.1	PASS	
12-10-20	0.0	FRESHAIR	—	—	0.0	PASS	
12-10-20	100.0	100 PPM ICB	304-4018363554-1 8-20-24	—	100.1	PASS	
12/11/20	0.0	fresh air	—	—	0.0	Pass	
12/11/20	100.0	100 ppm ICB	304-4018363554-1 8/20/24	—	100.1 ppm	Pass	
12/13/20	0.0	fresh air	—	—	0.0	Pass	
12/13/20	100.0	100 ppm ICB	304-4018363554-1 8/20/24	—	100.0	Pass	
12-14-20	0.0	FRESHAIR	—	—	0.0	PASS	
12-14-20	100.0	100PPM ICB	304-4015363541 8-20-24	—	100.2	PASS	

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): Mini Rae 592-912114

Manufacturer: Mini Rae 3000

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12/15/20	0.0	fresh air	—	—	0.0	Pass	
12/15/20	100.0	100 ppm ICB	304-401536354-1 8/20/24	—	100.4 ppm	Pass	
12/16/20	0.0	fresh air	—	—	0.0	Pass	
12/16/20	0.0	100 ppm ICB	304-401536354-1 8/20/24	no adj. made —	100.1	Pass	

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): Mini Rae # 592-901662

Manufacturer: Mini Rae 3000

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12/15/20	0.0	fresh air	—	—	0.0	P	
12/15/20	100 ppm	~~304-40~~ 100ppm ICB	304-40183 G354-1 5/20/24	—	100.2	P	
12/16/20	0.0	fresh air	—	—	0.0	P	
12/16/20	100 ppm	100 ppm ICB	304-401536354-1 5/20/24	—	100.1	P	
12/17/20	0.0	fresh air	—	—	0.0	P	
12/17/20	100 ppm	100 ppm ICB	304-401536354-1 5/20/24	—	100.0	P	

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): Mini Rae 592 - 908331

Manufacturer: Mini Rae 3000

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12/15/20	0.0	fresh air	—	—	0.0	Pass	
12/15/20	100.0	100ppm IB	304-401836354-1 8/20/24	—	99.9	Pass	
12/16/20	0.0	fresh air	—	—	0.0	Pass	
12/16/20	100.0	100 ppm IB	304-401536354-1 8/20/24	—	100.3	Pass	
12/17/20	0.0	fresh air	—	—	0.0	Pass	
12/17/20	100.0	100ppm IB	304-401536354-1 8/20/24	—	100.4	Pass	

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): YSI Proffesional U95072X (on 12/14/20) RFW22515 (on 12/15/20)

Manufacturer: YSI Proffesional series

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12/14/20	7.01	pH 7.0	7004192 4/22/22	—	7.00	P	
12/14/20	4.05	pH 4.0	7910457 NOV-21	—	4.00	P	
12/14/20	10.09	pH 10.0	791113 NOV-21	—	10.00	P	
12/14/20	1468	1409 µmho/cm	J155-01 6/5/21	—	1409	P	
12/14/20	84.5%	DO 642.12 mm Hg	—	—	84.5%	P	
12/14/20	216.3	ORP 220mV	7008126 5/17/21	—	220.0	P	
12/15/20	7.10	pH 7.0	7004192 4/22/22	—	7.00	P	
12/15/20	4.16	pH 4.0	7910457 NOV-21	—	4.00	P	
12/15/20	9.89	pH 10.0	~~J155-01 6/5/21~~ 791113 NOV-21	—	10.00	P	
12/15/20	1274	1409 µmho/cm	J155-01 6/5/21	—	1409	P	
12/15/20	98.9%	DO 646.18 mm Hg	—		98.9%	P	
12/15/20	214.1	ORP 220mV	7008126 5/17/21	—	220.0	P	

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): YSI Pro Quatro 19C101106

Manufacturer: YSI Inc

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12/8/20	3.89	pH 4.0	7007157 7/22/22	No	4.02	pass	ER
↓	6.89	pH 7.0	7003167 7/3/22	No	7.00	pass	ER
↓	10.02	pH 10.0	7005144 5/1/22	No	10.00	pass	ER
↓	1441	1409 uS/cm	7906263 6/1/21	No	1410	pass	ER
↓	219.7	220 mV	7008126 5/17/21	No	220	pass	ER
↓	83.0%	100% DO	774 mm Hg	No	100%	pass	ER
12/9/20	3.81	↓	↓	No	3.95	pass	ER
↓	7.04	↓	↓	No	7.02	pass	ER
↓	10.08	↓	↓	No	10.00	pass	ER
↓	1379	↓	↓	No	1409	pass	ER
↓	210.0	↓	↓	No	220	pass	ER
↓	94.6%	↓	772 mm Hg	No	99.8%	pass	ER

EQUIPMENT CALIBRATION LOG

SITE NAME: SLC VA PCE PLUME

Instrument (Name/Model No./Serial No.): YSI PRO PLUS 19J100137

Manufacturer: YSI

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12-15-20	6.89	pH 7.0	7003167 3-1-22	—	7.0	PASS	CH
12-15-20	4.31	pH 4.0	7409703 9-1-21	—	4.0	PASS	CH
12-15-20	9.72	pH 10.0	7907178 7-1-21	—	10.0	PASS	CH
12-15-20	225.7	ORP 220mV	8010435 8-1-21	—	220.0	PASS	CH
12-15-20	2630	Conductivity 1409uM	7906263 6-1-21	—	1405	PASS	CH
12-15-20	—	DO	—	—	60.4	PASS	CH
12-16-20	6.96	pH 7.0	8003168 3-1-22	—	7.0	PASS	CH
12-16-20	4.01	pH 4.0	7409703 9-1-21	—	4.01	PASS	CH
12-16-20	9.96	pH 10.0	7907178 7-1-21	—	10.01	PASS	CH
12-16-20	219.2	ORP 220mV	8010435 8-1-21	✓	220.0	PASS	CH
12-16-20	1829	Conductivity 1409 uS	7906263 6-1-21	—	1404	PASS	CH
12-16-20	—	DO	—	—	88.7	PASS	CH

EQUIPMENT CALIBRATION LOG

SITE NAME: SLC VA PLUME

Instrument (Name/Model No./Serial No.): HACH 2100 Q 19040C075124

Manufacturer: HACH

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12-8-20	—	800 NTU	A0042 5-2021	—	802	✓	
12-8-20	—	20 NTU	A0022 4-2021	—	17.2	✓	
12-8-20	—	100 NTU	A0041 5-2021	—	100	✓	
12-10-20	—	20 NTU	A0022 4-2021	—	~~20.3~~ 27.3	✓	
12-10-20	—	100 NTU	A0041 5-2021	—	107	✓	
12-10-20	—	800 NTU	A0042 5-2021	—	809	✓	
12-11-20	—	20 NTU	A0022 4-2021	—	19.9	✓	
12-11-20	—	100 NTU	A0041 5-2-21	—	94.2	✓	
12-11-20	—	800 NTU	A0042 5-2021	—	801	✓	
12-13-20	—	20 NTU	A0022 4-2021	—	21.1	✓	
12-13-20	—	100 NTU	A0041 5-2-21	—	102	✓	
12-13-20	—	800 NTU	A0042 5-2021	—	823	✓	
12-14-20	—	20 NTU	A0022 4-2021	—	20.3	✓	
12-14-20	—	100 NTU	A0041 5-2021	—	100	✓	
12-14-20	—	800 NTU	A0042 5-2021	—	785	✓	

EQUIPMENT CALIBRATION LOG

SITE NAME: SLC VA PLUME

Instrument (Name/Model No./Serial No.): YSI PRO PLUS RFW 22513

Manufacturer: YSI

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12-14-20	6.76	pH 7.0	7003167 3-1-22	—	7.00	PASS	CH
12-14-20	3.76	pH 4.0	7409705 7-1-21	—	4.05	PASS	CH
12-14-20	9.89	pH 10.0	7907178 7-1-21	—	10.0	PASS	CH
12-14-20	220.5	ORP 220mV	8010435 8-1-21	—	220.0	PASS	CH
12-14-20	1574	CONDUCTIVITY 1409	8~~05~~263 7-1-21	—	1409	PASS	CH
12-14-20	—	DO	—	—	71.8%	PASS	CH

EQUIPMENT CALIBRATION LOG

SITE NAME: SLC VA PCE PLUME

Instrument (Name/Model No./Serial No.): YSI PRO DSS 16G104828

Manufacturer: YSI

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12-14-20	9.80	pH 10.0	7907178 9-1-21	—	10.0	PASS	CM
12-14-20	219.6	ORP 220mV	8010435 8-1-21	—	220.0	PASS	CM
12-14-20	1614	CONDUCTIVITY	7906265 7-1-21		1409	PASS	CM
12-14-20	—	DO	—	—	88.2%	PASS	CM

EQUIPMENT CALIBRATION LOG

SITE NAME: SLC VA PLUME

Instrument (Name/Model No./Serial No.): YSI PROFESSIONAL PLUS RFW 22513

Manufacturer: YSI

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12-10-20	10.04	7907178 7-1-21 ⟷ pH 10.0		—	10.04	PASS	
12-10-20	1732	CONDUCTIVITY 1409	7906265 6-1-21	✓	1409	PASS	
12-10-20	~~240~~ ~~220.7~~	ORP 220 mV	8010435 8-1-21	—	~~220~~ 219.7	PASS	
12-10-20		DO	—	—	8.60	PASS	
12-11-20	7.06	7.0 pH	9003167 3-1-22	—	7.05	PASS	
12-11-20	4.07	4.0 pH	7409705 9-1-21	—	4.06	PASS	
12-11-20	9.93	10.0 pH	7907178 7-1-21	—	9.94	PASS	
12-11-20	1452	CONDUCTIVITY 1409	7906263 6-1-21	—	1410	PASS	
12-11-20	221	ORP 220 mV	8010435 8-1-21	—	220.4	PASS	
12-11-20	—	DO	—	—	73.8%	PASS	
12-13-20	7.02	pH 7.0	9003167 3-1-22	—	7.01	PASS	
12-13-20	4.24	pH 4.0	7409703 9-1-21	—	3.97	PASS	
12-13-20	10.34	pH 10.0	7907178 7-1-21	—	10.02	PASS	
~~DO~~ 12-13-20	217.6	ORP 220 mV	8010435 8-1-21	—	219.9	PASS	
12-13-20	1720	CONDUCTIVITY 6-1-21	7906263 6-1-21	—	1409	PASS	
12-13-20	—	DO	—	—	86.1%	PASS	

EQUIPMENT CALIBRATION LOG

SITE NAME: SLC VA PLUME

Instrument (Name/Model No./Serial No.): YSI PROFESSIONAL PLUS RFW 22513

Manufacturer: YSI

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature	
12-8-20	7.03	pH 7.0	7003167 3-1-22	—	7.00	PASS		
12-8-20	4.00	pH 4.0	7909703 9-1-21	—	4.05	PASS		
12-8-20		pH 10.0	7907178 7-1-21	—	9.92	PASS		
12-8-20		CONDUCTIVITY 1409	7906263 6-1-21	✓ 1181→1409	1410	PASS		
12-8-20		ORP 220mV	8010435 8-1-21	✓	221.7	PASS		
12-8-20		DO	—	—	87.0%	PASS		
12-9-20		pH 7.0	7003167 3-1-22	—	7.06	PASS		7.05
12-9-20		pH 4.0	7709703 9-1-21	—	3.99	PASS		4.03
12-9-20		pH 10.0	7907178 7-1-21	—	10.01	PASS		9.95
12-9-20		CONDUCTIVITY 1409	7906263 6-1-21	—	1408	PASS		1409
12-9-20		ORP 220mV	8010435 8-1-21	—	223.4	PASS		221.3
12-9-20		DO	—	—	70.0%	PASS		
12-10-20	7.08	pH 7.0	7003167 3-1-22	—	7.07	PASS		
12-10-20	4.10	pH 4.0	7409703 9-1-21	—	4.03	PASS		

EQUIPMENT CALIBRATION LOG

SITE NAME: SLC VA PLUME

Instrument (Name/Model No./Serial No.): YSI PRO PLUS 19J100137

Manufacturer: YSI

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12-9-20		pH 7.0	7003167 3-1-22	—	7.05	PASS	
12-9-20		pH 4.0	7709703 9-1-21	—	4.03	PASS	
12-9-20		pH 10.0	7907178 7-1-21	—	9.95	PASS	
12-9-20		CONDUCTIVITY 1409	7906263 6-1-21	—	1409	PASS	
12-9-20		ORP 220	8010735 8-1-21	—	221.3	PASS	

EQUIPMENT CALIBRATION LOG

SITE NAME: SLC VA Rec Plume

Instrument (Name/Model No./Serial No.): YSI Pro Plus DSS 16810482 8

Manufacturer: YSI

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12-11-20	7.14	pH 7.0	7003168 3-1-22	—	7.03	PASS	CH
12-11-20	4.44	pH 4.0	74097707 9-1-21	—	4.00	PASS	CH
12-11-20	9.97	pH 10.0	7907178 9-1-21	—	10.0	PASS	CH
12-11-20	1690	CONDUCTIVITY 1409	7906263 6-1-21	—	1409	PASS	CH
12-11-20	232.8	ORP 220mV	8010435 8-1-21	—	220.1	PASS	CH
12-11-20		DO	—	—	88.1	PASS	CH
12-13-20	6.91	pH 7.0	3003168 3-1-22	—	7.00	PASS	CH
12-13-20	3.91	pH 4.0	74097707 9-1-21	—	4.00	PASS	CH
12-13-20	9.85	pH 10.0	7907178 9-1-21	—	10.0	PASS	CH
12-13-20	222.4	ORP 220mV	8010435 8-1-21	—	220	PASS	CH
12-13-20	1600	CONDUCTIVITY	7906263 6-1-21	—	1401	PASS	CH
12-13-20	—	DO	—	—	89.2	PASS	CH
12-14-20	6.97	pH 7.0	7003168 3-1-22	—	7.03	PASS	CH
12-14-20	4.29	pH 4.0	74097707	—	4.0	PASS	CH

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): YSI Professional Series 22516

Manufacturer: YSI Professional series

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12/16/20	7.04	pH 7.0	7004192 4/22/22	—	7.00	P	
12/16/20	4.16	pH 4.0	7910457 NOV 21	—	4.00	P	
↓	10.19	pH 10.0	791113 NOV 21	—	10.00	P	
	1457	1409 µmho/cm	J155-01 6/5/21	—	1409	P	
	88.3%	DO 647.1 mm Hg	—	—	88.3%	P	
	210.4	ORP 220 mV	7008126 5/17/21	—	220	P	
12/17/20	6.91	pH 7.0	7004192 4/22/22	—	7.00	P	
↓	3.96	pH 4.0	7910457 NOV 21	—	4.00	P	
	10.00	pH 10.0	791113 NOV 21	—	10.00	P	
	1396	1409 µmho/cm	J155-01 6/5/21	—	1409	P	
	86.3%	DO 644.4 mm Hg	—	—	86.3%	P	
↓	220.0	ORP 220 mV	7008126 5/17/21	—	220.0	P	

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): YSI Proffesional Series 22512 (on 12/14) RFW 22548 (12/16/20)

Manufacturer: YSI Proffesional series

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12/14/20	7.12	pH 7.0	7004192 4/22/22	—	7.00	P	
12/14/20	4.09	pH 4.0	7910457 NOV 21	—	4.00	P	
12/14/20	10.08	pH 10.0	791113 NOV 21	—	10.00	P	
12/14/20	1365	1409 µmho/cm	J155-01 6/5/21	—	1409	P	
12/14/20	~~274~~ IC .0	DO 642.2 mm Hg	—	—	96.9%	P	
12/14/20	213.4	ORP 220 mV	7008126 5/17/21	—	220.0	P	
12/16/20	6.89	pH 7	7004192 4/22/22	—	7.00	~~P~~ Fail	
	4.12	pH 4	7910457 NOV 21	—	4.00	~~P~~ Fail	
	9.76	pH 10	791113 NOV 21	—	10.00	~~P~~ Fail*	
		1409 µmho/cm					
		DO					
		ORP 220 mV					

*pH calibration out of range, redid twice and still out of range

EQUIPMENT CALIBRATION LOG

SITE NAME: SLC VA PCE PLUME

Instrument (Name/Model No./Serial No.): HACH 2100 Q 19090C079242

Manufacturer: HACH

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12-15-20	~	20 NTU	A9275 1-2021	~	20.5	PASS	CA
12-15-20	~	100 NTU	A9281 1-2021	~	106	PASS	CA
12-15-20	~	800 NTU	A9277 1-2021	~	782	PASS	CA
12-16-20	~	20 NTU	A9275 1-2021	~	~~210~~ 18.0	PASS	CA
12-16-20	~	100 NTU	A9281 1-2021	~	102	PASS	CA
12-16-20	~	800 NTU	A9277 1-2021	~	825	PASS	CA

EQUIPMENT CALIBRATION LOG

SITE NAME: SLC VA PCE PLUMS

Instrument (Name/Model No./Serial No.): YSI PRO PLUS 22512

Manufacturer: YSI

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12-15-20	6.95	pH 7.0	7003167 3-1-22	—	7.0	PASS	CH
12-15-20	4.25	pH 4.0	74099703 9-1-21	—	4.0	PASS	CH
12-15-20	9.66	pH 10.0	7907178 7-1-21	—	10.0	PASS	CH
12-15-20	226.6	ORP 220mV	8010435 8-1-21	—	220.0	PASS	CH
12-15-20	3037	CONDUCTIVITY 220mV	7906263 6-1-21	—	1400	PASS	CH
12-15-20	—	DO	—	—	115.7%	PASS	CH
12-16-20	7.10	pH 7.0	703167 3-1-22	—	~~7.08~~ 6.99	PASS	CH
12-16-20	4.13	pH 4.0	74099703 9-1-21	—	3.93	PASS	CH
12-16-20	10.05	pH 10.0	7907178 7-1-21	—	10.0	PASS	CH
12-16-20	219.0	ORP 220mV	8010435 8-1-21	—	220.0	PASS	CH
12-16-20	1644	CONDUCTIVITY 1409 mV	7906263 6-1-21	—	1404	PASS	CH
12-16-20	—	DO	—	—	99.8	PASS	CH

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): Hach Turbidity 2100Q 4950650 (4950677)

Manufacturer: HACH

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12/14/20	20	20 NTU	A9275 JAN-21	No	21.4	Pass	
12/14/20	100	100 NTU	A9281 JAN-21	No	99.5	Pass	
12/14/20	800	800 NTU	A9277 JAN-21	No	796	Pass	

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): HACH Turbidity 2100 Q # 93873x

Manufacturer: HACH

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12/9/20	20.0	20 NTU	A0022 Apr-21	No	19.2	Pass	MYD
12/9/20	100.0	100 NTU	A0041 May-21	No	99.5	Pass	MYD
12/9/20	800.0	800 NTU	A0042 May-21	No	796	Pass	MYD
12/15/20	20.0	20.0 NTU	A0022 Apr-21	No	22.4	Pass	MYD
12/15/20	100.0	100 NTU	A0041 May-21	No	98.9	Pass	MYD
12/15/20	800.0	800 NTU	A0042 May-21	No	786	Pass	MYD
12/16/20	20.0	20 NTU	A0022 Apr-21	No	19.1	Pass	MYD
12/16/20	100.0	100 NTU	A0041 May-21	No	97.1	Pass	MYD
12/16/20	800.0	800 NTU	A0042 May-21	No	762	Pass	MYD
12/17/20	20.0	20 NTU	A0022 Apr-21	No	18.5	Pass	MYD
12/17/20	100.0	100 NTU	A0041 May-21	No	97.7	Pass	MYD
12/17/20	800.0	800 NTU	A0042 May-21	No	808	Pass	MYD

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): Hach Turbidity 2100 Q 1193871X

Manufacturer: HACH

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12/14/20	20	20 NTU	A9275 JAN-21	No	20.3	Pass	
12/14/20	100	100 NTU	A9281 JAN-21	No	99.5	Pass	
12/14/20	800	800 NTU	A9277 JAN-21	No	802	Pass	
12/15/20	20	20.0 NTU	A0022 Apr-21	No	20.0	Pass	
12/15/20	100	100 NTU	A0041 May-21	No	103	Pass	
12/15/20	800	800 NTU	A0042 May-21	No	809	Pass	
12/16/20	20	20 NTU	A0022 Apr-21	No	18.2	Pass	
12/16/20	100	100 NTU	A0041 May-21	No	105	Pass	
12/16/20	800	800 NTU	A0042 May-21	No	800	Pass	
12/17/20	20	20 NTU	A0022 Apr-21	No	20.5	Pass	
12/17/20	100	100 NTU	A0041 May-21	No	96.8	Pass	
12/17/20	800	800 NTU	A0042 May-21	No	816	Pass	

EQUIPMENT CALIBRATION LOG

SITE NAME: VA plume

Instrument (Name/Model No./Serial No.): YSI Proffesional Plus 22512

Manufacturer: YSI Proffesional Series

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12/17/20	7.06	pH 7.0	7905316 5/1/21	No	7.03	Pass	
	3.86	pH 4.0	7605365 9/2/22	No	4.00	Pass	
	10.24	pH 10.0	7907178 7/1/21	No	10.00	Pass	
	1427	Mod plume Cal	7906253 6/1/21	No	1411	Pass Had to force cal	
	103.1%	DO: 0640.05 mm/Hg	—	No	101.1%	Pass	
	219.4	ORP 220.0mV	10104135 5/1/2021	No	220.1	Pass	

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): YSI Pro Quatro 18D100532

Manufacturer: YSI Inc

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12/16/20	3.96	pH 4.0	7910457 11/1/21	No	4.00	Pass	ER
↓	7.09	pH 7.0	7004192 4/22/22	6.99 ⇆ No	pass	pass	ER
	10.07	pH 10.0	7911113 11/1/21	No	10.00	pass	ER
	1502	1409 µs/cm	7912386 1/1/22	No	1410	pass	ER
	227.3	220mV	8010435 8/1/21	No	220.0	pass	ER
↓	92.4%	100% DO	~~752.6 mmHg~~	No	100%	pass	ER
12/17/20	4.02	↓	↓	No	4.00	pass	ER
↓	6.91			No	7.01	pass	ER
	10.21			No	10.00	pass	ER
	1515			No	1409	pass	ER
	215.9			No	220.0	pass	ER
↓	84.5%	↓	752.6 mmHg	No	99.8%	pass	ER

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): YSI Pro Quatro 18A 100281

Manufacturer: YSI Inc

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12/14/20	3.98	pH 4.0	7910457 11/1/21	No	4.00	pass	ER
↓	7.03	pH 7.0	7004192 4/22/22	No	7.01	pass	ER
	10.11	pH 10.0	7911113 11/1/21	No	10.04	pass	ER
	1.444 ms/cm	1409 µS/cm	7912386 1/1/22	No	1409	pass	ER
	221.5	220 mV	8010435 8/1/21	No	220.0	pass	ER
↓	70.04%	100% DO	765 mmHg	No	100%	pass	ER
12/15/20	3.90	↓	↓	No	4.00	pass	ER
↓	7.03			No	7.01	pass	ER
	9.97			No	10.00	pass	ER
	1362			1410 ⇄ No	pass		ER
	222			220 ⇄ No	pass		ER
↓	107%	↓	↓ 766 mmHg	No	100.4%	pass	ER

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): YSI Pro Quatro 19C101106

Manufacturer: YSI Inc

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12/10/20	3.93	pH 4.0	7007157 7/22/22	No	4.01	pass	ER
↓	7.05	pH 7.0	7003167 7/3/22	No	7.02	pass	ER
	10.21	pH 10.0	7005144 5/1/22	No	10.00	pass	ER
	1394	1409 uS/cm	7906263 6/1/21	No	1409	pass	ER
	219.6	220 mV	7008226 5/17/21	No	220.0	pass	ER
↓	108.6%	100% DO	763 mmHg	No	99.9%	pass	ER
12/11/20	4.09	↓	↓	No	4.00	pass	ER
↓	6.95			No	7.00	pass	ER
	10.08			No	10.00	pass	ER
	1362			No	1409	pass	ER
	224.1			No	220.0	pass	ER
↓	99.3%	↓	760.1 mmHg	No	100%	pass	ER

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): YSI Professional Series RFW22548

Manufacturer: YSI Professional series

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12/15/20	7.31	pH 7.0	7003167 3/1/22	—	7.00	Pass	
12/15/20	4.31	pH 4.0	7007157 7/22/22	—	4.00	Pass	
12/15/20	9.77	pH 10.0	7005144 5/1/22	—	10.00	Pass	
12/15/20	1346	1409 mMho/cm	7906268 6/1/21	—	1409	Pass	
12/15/20	87.7%	DO 646 18 mm Hg	87.7%	—	87.7%	Pass	
12/15/20		220.0 ORP					

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): YSI Pro Quatro 18D100532

Manufacturer: YSI Inc

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12/8/20	3.86	pH 4.0	7007157 7/22/22	No	3.98	pass	ER
↓	7.31	pH 7.0	7003167 3/1/22	No	7.00	pass	ER
	10.19	pH 10.0	7005144 5/1/22	No	10.00	pass	ER
	1350	1409 µS/cm	7906263 6/1/21	No	1409	pass	ER
	234.2	220 mV	7008126 5/17/21	No	220	pass	ER
↓	88.8%	100% DO	774 mm Hg	No	100%	pass	ER
12/14/20	4.07	↓	↓	No	4.03	pass	ER
↓	6.89			No	7.01	pass	ER
	10.12			No	10.00	pass	ER
	1384			No	1409	pass	ER
	219.4			No	220.1	pass	ER
↓	83.6%	↓	765 mmHg	No	100%	pass	ER

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): YSI Pro Quatro 19C101106

Manufacturer: YSI Inc

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12/13/20	3.97	pH 4.0	7007157 7/22/22	No	4.00	pass	ER
↓	6.94	pH 7.0	7003167 3/1/22	No	7.02	pass	ER
↓	9.97	pH 10.0	7005144 5/1/22	No	10.00	pass	ER
↓	1466	1409 us/cm	7906263 6/1/21	No	1415	pass	ER
↓	216.9	220 mV	8D10435 8/7/21	No	220.0	pass	ER
↓	97%	100% DO	—	No	100%	pass	ER

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): YSI Pro DSS 16H100049

Manufacturer: YSI Inc.

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12/16/20	4.01	pH 4.0	7910457 11/1/21	No	4.00	pass	ER
↓	7.07	pH 7.0	7004192 4/22/22	No	7.00	pass	ER
↓	10.05	pH 10.0	7911113 11/1/21	No	10.00	pass	ER
↓	1383	1409 µS/cm	7912380 1/1/22	No	1409	pass	ER
↓	230.4	220 mV	8010435 8/1/21	No	220	pass	ER
↓	87%	100% DO	752.6 mmHg	No	99.9%	pass	ER

EQUIPMENT CALIBRATION LOG

SITE NAME: SLC VA ACE ALUME

Instrument (Name/Model No./Serial No.): YSI PRO FLOS DSS 16610482 8

Manufacturer: YSI

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
12-11-20	7.14	pH 7.0	7003168 3-1-22	—	7.03	PASS	CH
12-11-20	4.44	pH 4.0	7409707 9-1-21	—	4.00	PASS	CH
12-11-20	9.97	pH 10.0	7907178 9-1-21	—	10.0	PASS	CH
12-11-20	1690	CONDUCTIVITY 1409	7906263 6-1-21	—	1409	PASS	CH
12-11-20	232.8	ORP 220mV	8010435 8-1-21	—	220.1	PASS	CH
12-11-20		DO	—	—	88.1	PASS	CH
12-13-20	6.91	pH 7.0	3003168 3-1-22	—	7.00	PASS	CH
12-13-20	3.91	pH 4.0	7409707 9-1-21	—	4.00	PASS	CH
12-13-20	9.85	pH 10.0	7907178 9-1-21	—	10.0	PASS	CH
12-13-20	222.4	ORP 220mV	8010435 8-1-21	—	220	PASS	CH
12-13-20	1600	CONDUCTIVITY	7906263 6-1-21	—	1401	PASS	CH
12-13-20	—	DO	—	—	89.2	PASS	CH
12-14-20	6.97	pH 7.0	7003168 3-1-22	—	7.03	PASS	CH
12-14-20	4.29	pH 4.0	7409707	—	4.0	PASS	CH

DECONTAMINATION CHECKLIST

Activity: Groundwater Sampling **Date:** 3/15/2021

Answer each question by checking the appropriote column (yes, no, not observed [N/O] or not applicable [N/A]). If "no" is checked, provide an explanation on the form.

Equipment	Yes	No	N/O	N/A
1. Was the decontamination pad constructed onsite per the UFP-QAPP?				X
2. Was all sampling equipment decontaminated properly prior to use and between sample intervals?	X			
3. Was each decontamination event recorded in the log book?	X			
4. Was clean equipment stored separately from non-decontaminated equipment?	X			
5. Was phosphate-free detergent and/or steam cleaning used?				X
6. Was IDW handled in accordance with the approved work plan?	X			

Comments and Corrective Actions

Initial and date when corrective actions have been implemented.

The Field Team Leader and Project Manager shall sign this checklist upon completion of all items on the checklist.

Field Team Leader: Emma Pratt Date 3/15/21

Project Manager: _____ Date _____

FIELD DOCUMENTATION CHECKLIST

Activity: Groundwater Sampling / Water Levels Date: 3/15/21

Answer each question by checking the appropriate column (yes, no, or not applicable [N/A]). If "no" or "N/A" are checked, provide an explanation in the comments section.

Field Documentation	Yes	No	N/A
1. Was all original field data recorded in indelible ink?	X		
2. Were log books and field forms (including DQCRs) filled out properly, accurately recounting the day's events? This includes documenting activities performed, weather conditions, personal protective equipment used, problems encountered, details of samples collected, site visitors, descriptions of photos taken, notes of conversations with Project Manager/Field Team Leader/Project Geologist, decontamination procedures used, etc.	X		
3. Were deficiencies reported to the Project Manager?	X		X
4. Were the equipment arrival date, equipment type, onsite storage location, and serial number recorded on the log for each field instrument?	X		
5. Were factory calibration certificates received with the field instruments and recorded on the log?	X		
6. Are instruments being calibrated before and after use when necessary, and against know standards and/or per manufacturer specifications? (Passing calibration is within 10% of the standard.)	X		
7. Are all instrument calibrations being accurately documented on the appropriate logs, including frequency of calibration checks, calibration acceptance criteria, and corrective actions for calibration failures?	X		
8. Was the date that the field instrument left the site recorded in the logbook or on the instrument's log?	X		
9. Was all IDW segregated by matrix/type to facilitate analysis and disposal? Were all IDW containers properly labeled as required in the QAPP?	X		

Comments and Corrective Actions

List all corrective actions. Initial and date when corrective actions have been implemented.

The Field Team Leader and Project Manager shall sign this checklist upon completion of all items on the checklist.

Field Team Leader: Emma Pratt Date 3/15/21

Project Manager: _____ Date _____

PREPARATORY INSPECTION/MOBILIZATION CHECKLIST

Activity: Groundwater Sampling/Water Levels Date: 3/15/2021

Answer each question by checking the appropriate column (yes, no, not observed [N/O] or not applicable [N/A]). If "no" is checked, provide an explanation on the form.

Activity	Yes	No	N/O	N/A	Remarks
1. Have copies of all work plans, including the health and safety plan, been printed for availability onsite? Have appropriate copies of all forms in the plans been prepared for site use?	X				
2. Have pertinent work plans and requirements been explained to project personnel, including project documentation and recordkeeping requirements?	X				
3. Have all personnel working onsite read over the health and safety plan provided by CDM Smith (acknowledgement is by signing the health and safety plan signature form from the SSHP)?	X				
4. Are the required materials, supplies, and equipment available, on-hand, in working order, and in accordance with plans and technical specifications?	X				
5. Have all applicable Safety Data Sheets been made available at the site?	X				
6. Has all equipment been properly calibrated per manufacturer's requirements?	X				
7. Have sample locations been marked out using a GPS unit or by a surveyor, as appropriate?				X	
8. Have all applicable permits, licenses, and certificates been identified and/or obtained?	X				
9. Have all utilities been marked out prior to the start of activities?				X	
10. Does the subcontractor need to clear heavy underbrush or any overhead obstructions to access any locations?				X	
11. Was all subcontractor equipment thoroughly checked, including inspection and testing of the emergency shutdown button on the drilling rig, generators, etc.?				X	
12. Have the necessary laboratories been contracted to perform the requested analyses?	X				
13. Has a designated staging area been established to store IDW and hold the decontamination pad?	X				
14. For sample locations not in public right-of-way, have all appropriate access agreements ben obtained?	X				
15. For existing wells, have keys been obtained?	X				

WATER LEVEL AND MONITORING WELL SAMPLING CHECKLIST

Activity: Groundwater Sampling / Water Levels Date: 3/15/21

Answer each question by checking the appropriate column (yes, no, or not applicable [N/A]). If "na" or "N/A" are checked, provide an explanation in the comments section.

Synoptic Water Level Measurements	Yes	No	N/A
1. Were synoptic water level measurements collected prior to each groundwater sampling event, with all measurements for the event collected within the required 24-hour period?	X		
Monitoring Well Sampling Procedures			
2. Was sampling equipment appropriate for the purpose and site conditions?	X		
3. Were new protective gloves worn between sampling locations and/or intervals?	X		
4. Was sampling equipment decontaminated between each location and/or sampling intervals, or dedicated/disposable equipment used?	X		
5. Was the correct technique/method used to purge each well prior to sample collection?	X		
6. If using a submersible pump, was the depth to which the pump was lowered recorded in the logbook or field form?			X
7. Was low-flow sampling conducted in accordance with the approved UFP-QAPP and SOP?	X		
8. Were field water quality monitoring instruments (e.g., YSI) calibrated per the UFP-QAPP?	X		
9. Was a steady pumping rate reached and maintained so that total drawdown in the well was < 0.3 feet; or was the pump kept at a flow rate between 200 to 500 mL per minute?	X		
10. Were wells purged until parameters stabilized before collecting samples?	X		
11. Were purge parameters recorded in the logbook or on the well sampling form?	X		
12. Was the purge line disconnected from the flow-through cell prior to sample collection and the flow rate < 250 mL per minute?	X		
13. Were the bottles pre-preserved as required in the UFP-QAPP?	X		
14. Were bottles adequately protected prior to sample collection to prevent cross-contamination?	X		
15. Was headspace in sample containers for volatiles eliminated?	X		
16. Were the appropriate QA/QC samples collected (duplicates, rinsate blanks, MS/MSD)?	X		
17. Were sample containers filled in the correct order – VOCs, hydrocarbons, metals, geochemical parameters?	X		
18. Was purge water properly containerized as IDW?	X		
Sample Shipment			
19. Was the following information recorded on each sample label and in the logbook and/or field form – sample ID (including sample depth interval), location, analysis, date, time, preservative, sampler initials, and any other relevant information?	X		
20. Were adhesive labels placed on each sample using indelible ink, or covered with clear tape?	X		
21. Were duplicate samples labeled such that they would be "blind" to the laboratory?	X		

Sample Shipment (continued)	Yes	No	N/A
22. Were MS/MSD samples noted in the logbook/field form and on the COC?	X		
23. Were the COCs properly filled out, readable, and signed?	X		
24. Were the sample coolers properly packed, including ice, trip blank (if appropriate), temperature blank, and a COC unique to the cooler?	X		
25. Were copies of the COCs retained by field personnel?	X		
26. Were custody seals signed, dated, and placed on each cooler prior to shipment?	X		
27. Were the coolers shipped priority overnight for next day delivery to the laboratory?	X		

Comments and Corrective Actions

List all corrective actions. Initial and date when corrective actions have been implemented.

The Field Team Leader and Project Manager shall sign this checklist upon completion of all items on the checklist.

Field Team Leader: Gina Pitt Date 3/15/21

Project Manager: _____ Date _____

DECONTAMINATION CHECKLIST

Activity: Groundwater Sampling **Date:** Rev 12/8 TO 12/8/20

Answer each question by checking the appropriate column (yes, no, not observed [N/O] or not applicable [N/A]). If "no" is checked, provide an explanation on the form.

Equipment	Yes	No	N/O	N/A
1. Was the decontamination pad constructed onsite per the UFP-QAPP?				X
2. Was all sampling equipment decontaminated properly prior to use and between sample intervals?	X			
3. Was each decontamination event recorded in the log book?	X			
4. Was clean equipment stored separately from non-decontaminated equipment?	X			
5. Was phosphate-free detergent and/or steam cleaning used?				X
6. Was IDW handled in accordance with the approved work plan?	X			

Comments and Corrective Actions

Initial and date when corrective actions have been implemented.

The Field Team Leader and Project Manager shall sign this checklist upon completion of all items on the checklist.

Field Team Leader: _____ Date Rev 12/8 TO 12/8/20

Project Manager: _____ Date _____

PREPARATORY INSPECTION/MOBILIZATION CHECKLIST

Activity: Groundwork Sampling / Water Levels Date: 12/8/20

Answer eoch question by checking the oppropriate column (yes, no, not observed [N/O] or not applicable [N/A]). If "no" is checked, provide an explonotion on the form.

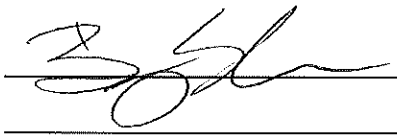
Activity	Yes	No	N/O	N/A	Remarks
1. Have copies of all work plans, including the health and safety plan, been printed for availability onsite? Have appropriate copies of all forms in the plans been prepared for site use?	X				
2. Have pertinent work plans and requirements been explained to project personnel, including project documentation and recordkeeping requirements?	X				
3. Have all personnel working onsite read over the health and safety plan provided by CDM Smith (acknowledgement is by signing the health and safety plan signature form from the SSHP)?	X				
4. Are the required materials, supplies, and equipment available, on-hand, in working order, and in accordance with plans and technical specifications?	X				
5. Have all applicable Safety Data Sheets been made available at the site?	X				
6. Has all equipment been properly calibrated per manufacturer's requirements?	X				
7. Have sample locations been marked out using a GPS unit or by a surveyor, as appropriate?				X	
8. Have all applicable permits, licenses, and certificates been identified and/or obtained?	X				
9. Have all utilities been marked out prior to the start of activities?				X	
10. Does the subcontractor need to clear heavy underbrush or any overhead obstructions to access any locations?				X	
11. Was all subcontractor equipment thoroughly checked, including inspection and testing of the emergency shutdown button on the drilling rig, generators, etc.?				X	
12. Have the necessary laboratories been contracted to perform the requested analyses?	X				
13. Has a designated staging area been established to store IDW and hold the decontamination pad?	X				
14. For sample locations not in public right-of-way, have all appropriate access agreements ben obtained?	X				
15. For existing wells, have keys been obtained?	X				

Sample Shipment (continued)	Yes	No	N/A
22. Were MS/MSD samples noted in the logbook/field form and on the COC?	X		
23. Were the COCs properly filled out, readable, and signed?	X		
24. Were the sample coolers properly packed, including ice, trip blank (if appropriate), temperature blank, and a COC unique to the cooler?	X		
25. Were copies of the COCs retained by field personnel?	X		
26. Were custody seals signed, dated, and placed on each cooler prior to shipment?	X		
27. Were the coolers shipped priority overnight for next day delivery to the laboratory?	X		

Comments and Corrective Actions

List all corrective actions. Initial and date when corrective actions have been implemented.

The Field Team Leader and Project Manager shall sign this checklist upon completion of all items on the checklist.

Field Team Leader:  Date 12/8/20

Project Manager: _____ Date _____

Field Health and Safety Meeting Record

CDM Smith Trainer: Joe Miller / Ben Carreon Date: 12/7/20 Time: 0815

Site: SLC VA

Review:

- Health & Safety Plan
- Buddy Teams
- Hospital Route/Nearest Phone Location
- Weather Concerns
- Potential Problems
- Problems Previously Occurred

Action Levels: 10ppm *Other:*

Protective Clothing/Equipment: Level D PPE: High Vis, Boots, Glasses, Glove

Special Equipment: Meshing

Chemical Hazards: PCE, TCE, VC

Physical Hazards: Lifting, Slips trips Falls, Fatigue, Crush points, traffic Focus, Hydrating, cold stress

Emergency Actions: Call 911 Call VA Emergency 801.582-1565 x55555

Other Issues: Covid

Check:

- H&S Monitoring Equipment/Calibration
- First Aid Kit/Eye Wash Station
- Fire Extinguisher Communications/Radio Check
- H&S Plan (each item) Respiratory Protection/Cartridges

Name/Firm/Office (Please Print)	*Signature*
Joe Miller CDM Smith Denver	
Ben Carreon CDM Smith Utah	
T. Mahoney CDM Smith DEN	
Connor Keller CDM Smith FH	
Mario Dini CDM Smith	
Tena Campbell CDM Smith	
Ted Kraus CDM Smith	
Kevin Murphy Wasatch Environmental	

Field Health and Safety Meeting Record

CDM Smith Trainer: _____ Date: 12-8-20 Time: _____

Site: VA PLUME

Review:

- Health & Safety Plan
- Buddy Teams
- Hospital Route/Nearest Phone Location
- Weather Concerns
- Potential Problems
- Problems Previously Occurred

Action Levels: _____ *Other:* _____

Protective Clothing/Equipment: LEVEL D

Special Equipment: MASKS

Chemical Hazards: PCE, TCE, VC

Physical Hazards: LIFTING, S/T/F, FATIGUE, TRAFFIC, PINCH POINTS, HYDRATION, COLD STRESS

Emergency Actions: 911, VA EMERGENCY 801-582-1565 x 5555

Other Issues: COVID

Check:

- H&S Monitoring Equipment/Calibration
- First Aid Kit/Eye Wash Station
- Fire Extinguisher Communications/Radio Check
- H&S Plan (each item) Respiratory Protection/Cartridges

Name/Firm/Office (Please Print)	***Signature***
Ben Carreon CDM Smith HLN	
Kevin Murphy Wasatch Environmental	
Connor Kelley CDM Smith HLN	
Iona Campbell CDM SMITH DEN	
Emma Rat CDM Smith DEN	
Maria Day CDM Smith Den	
Tea Villa CDM Smith Den	
Joe Miller CDM Smith Den	

Field Health and Safety Meeting Record

CDM Smith Trainer: _____ Date: 12-9-20 Time: 0830

Site: SLC VA PLUME

Review:

- Health & Safety Plan
- Buddy Teams
- Hospital Route/Nearest Phone Location
- Weather Concerns
- Potential Problems
- Problems Previously Occurred

Action Levels: 10 ppm *Other:* _____

Protective Clothing/Equipment: LEVEL D

Special Equipment: FACEMASKS (COVID-19)

Chemical Hazards: PCE

Physical Hazards: S/T/F, TRAFFIC CONTROL, TRAFFIC, COLD STRESS, PINCH POINTS, GAS.

Emergency Actions: 911 VA EMERGENCY

Other Issues: COVID-19

Check:

- H&S Monitoring Equipment/Calibration
- First Aid Kit/Eye Wash Station
- Fire Extinguisher Communications/Radio Check
- H&S Plan (each item) Respiratory Protection/Cartridges

Name/Firm/Office (Please Print)	***Signature***
Bre Correa CDM Smith HLN	
Kevin Murphy Wasatch Environmental	
Iona Campbell CDM Smith DEN	
Mario Day CDM Smith Denver	
Connor Keller CDM Smith HLN	
EMMA RATT CDM Smith DEN	EmmaRatt

Field Health and Safety Meeting Record

CDM Smith Trainer: _____ Date: 12-10-20 Time: 0830

Site: SLC VA

Review:

- Health & Safety Plan
- Buddy Teams
- Hospital Route/Nearest Phone Location
- Weather Concerns
- Potential Problems
- Problems Previously Occurred

Action Levels: 10 ppm *Other:* _____

Protective Clothing/Equipment: LEVEL D

Special Equipment: FACEMASK (COVID-19)

Chemical Hazards: PCE

Physical Hazards: S/T/F, TRAFFIC, TRAFFIC CONTROL, COLD STRESS, PINCH POINTS

Emergency Actions: 911, VA EMERGENCY LINE

Other Issues: _____

Check:

- H&S Monitoring Equipment/Calibration
- First Aid Kit/Eye Wash Station
- Fire Extinguisher Communications/Radio Check
- H&S Plan (each item) Respiratory Protection/Cartridges

Name/Firm/Office (Please Print)	***Signature***
CONNOR KELLEY / CDM SMITH / HLN	
Ben Carreon / CDM Smith HLN	
Maria Day CDM Smith Den	
Kevin Murphy Wasatch Environmental	
Emma Rott CDM Smith DEN	
Iona Campbell CDM Smith DEN	

Field Health and Safety Meeting Record

CDM Smith Trainer: _____ Date: 12-11-20 Time: 0815

Site: SLC VA PCE PLUMB

Review:

- Health & Safety Plan
- Buddy Teams
- Hospital Route/Nearest Phone Location
- Weather Concerns
- Potential Problems
- Problems Previously Occurred

Action Levels: >5PPM *Other:* _____

Protective Clothing/Equipment: LEVEL D, FACEMASK

Special Equipment: —

Chemical Hazards: DCE,

Physical Hazards: S/T/F, COLD STRESS, SNOW, ICE, TRAFFIC, TRAFFIC CONTROL, NITROGEN TANKS, LIFTING

Emergency Actions: 911, VA EMERGENCY LINE

Other Issues: _____

Check:

- H&S Monitoring Equipment/Calibration
- First Aid Kit/Eye Wash Station
- Fire Extinguisher Communications/Radio Check
- H&S Plan (each item) Respiratory Protection/Cartridges

Name/Firm/Office (Please Print)	***Signature***
Connor KELLER / CDM SMITH / HLN	
Ben Cannon / CDM Smith / HLN	
Kevin Murphy Wastech Environmental	
EMMA RATT CDM Smith ENV	Emma Ratt
Iona Campbell CDM Smith DEN	
Maria Day CDM Smith Ben	

Field Health and Safety Meeting Record

CDM Smith Trainer: _____ Date: 12-13-20 Time: 0830

Site: SLC VA PCE PLUME

Review:

- Health & Safety Plan
- Buddy Teams
- Hospital Route/Nearest Phone Location
- Weather Concerns
- Potential Problems
- Problems Previously Occurred

Action Levels: 10, 5PM *Other:* _____

Protective Clothing/Equipment: LEVEL D, FACEMASK

Special Equipment: –

Chemical Hazards: PCE ~~PLUME~~, ~~—~~

Physical Hazards: S/T/F, ICE (SLIPS), COLD STRESS, MINIMAL TRAFFIC, NITROGEN GAS

Emergency Actions: 911, VA EMERGENCY LINE

Other Issues: _____

Check:

- H&S Monitoring Equipment/Calibration
- First Aid Kit/Eye Wash Station
- Fire Extinguisher Communications/Radio Check
- H&S Plan (each item) Respiratory Protection/Cartridges

Name/Firm/Office (Please Print)	***Signature***
Connor KELLER / CDM SMITH / HLN	
Ben Curran / CDM Smith / HLN	
Iona Campbell CDM Smith DEN	
Marie Day / CDM Smith Den	
Kevin Murphy Wasatch Environmental SLC	
Emma Rott CDM Smith DEN	

Field Health and Safety Meeting Record

CDM Smith Trainer: _____ Date: 8/12-14-20 Time: 0830

Site: SLC VA PCE PLUME

Review:

- Health & Safety Plan
- Buddy Teams
- Hospital Route/Nearest Phone Location
- Weather Concerns
- Potential Problems
- Problems Previously Occurred

Action Levels: 10 ppm *Other:* _____

Protective Clothing/Equipment: LEVEL D, FACEMASK

Special Equipment: —

Chemical Hazards: PCE

Physical Hazards: S/T/E, FRESH SNOW, COLD STRESS, TRAFFIC, TRAFFIC CONTROL, SNOW REMOVAL EQUIPMENT, NITROGEN GAS

Emergency Actions: 911, VA EMERGENCY LINE

Other Issues: _____

Check:

- H&S Monitoring Equipment/Calibration
- First Aid Kit/Eye Wash Station
- Fire Extinguisher Communications/Radio Check
- H&S Plan (each item) Respiratory Protection/Cartridges

Name/Firm/Office (Please Print)	***Signature***
Connor Kelley /CDM Smith/ HLN	
Ben Corcoran /CDM Smith/ HLN	
Kevin Murphy Wasatch Environmental/ SLC	
EMMA Rist CDM Smith DEN	
Maria Day CDM Smith Den	
Iona Campbell CDM Smith DEN	

Field Health and Safety Meeting Record

CDM Smith Trainer: _____ Date: 12-15-20 Time: 0830

Site: SLC VA PCE PLUME

Review:

- Health & Safety Plan
- Buddy Teams
- Hospital Route/Nearest Phone Location
- Weather Concerns
- Potential Problems
- Problems Previously Occurred

Action Levels: 10 ppm *Other:* _____

Protective Clothing/Equipment: LEVEL D, FACEMASK

Special Equipment: —

Chemical Hazards: PCE

Physical Hazards: S/T/E, TRAFFIC, TRAFFIC CONTROL, COLD STRESS, NITROGEN, LIFTING

Emergency Actions: 911, VA EMERGENCY LINE

Other Issues: _____

Check:

- H&S Monitoring Equipment/Calibration
- First Aid Kit/Eye Wash Station
- Fire Extinguisher Communications/Radio Check
- H&S Plan (each item) Respiratory Protection/Cartridges

Name/Firm/Office (Please Print)	***Signature***
Connor Keller/CDM Smith/HLN	
Iona Campbell CDM Smith DEN	
Ben Carreon CDM Smith HLN	
Maria Day CDM Smith Den	
EMMARAH CDM Smith DEN	
Kevin Murphy Wasatch Environmental SLC	

Field Health and Safety Meeting Record

CDM Smith Trainer: _____ Date: 12/16/20 Time: 0830

Site: SLC VA PCE PLUME

Review:

- Health & Safety Plan
- Buddy Teams
- Hospital Route/Nearest Phone Location
- Weather Concerns
- Potential Problems
- Problems Previously Occurred

Action Levels: 10ppm *Other:* _____

Protective Clothing/Equipment: Level D, facemask

Special Equipment: —

Chemical Hazards: PCE

Physical Hazards: Traffic, Traffic control, cold stress, nitrogen, lifting, S/T/F

Emergency Actions: 911, VA emergency line

Other Issues: —

Check:

- H&S Monitoring Equipment/Calibration
- First Aid Kit/Eye Wash Station
- Fire Extinguisher Communications/Radio Check
- H&S Plan (each item) Respiratory Protection/Cartridges

Name/Firm/Office (Please Print)	***Signature***
Iona Campbell CDM Smith DEN	
Connor Kelley /CDM Smith/ HLN	
Maria Day /CDM Smith / Den	
Kevin Murphy Wasatch Environmental SLC	
Ben Carreon CDM Smith HLN	
Emma Rott CDM Smith DEN	

Field Health and Safety Meeting Record

CDM Smith Trainer: Ben Corcoran Date: 12/17/20 Time: 0830

Site: SLC UA

Review:

- Health & Safety Plan
- Buddy Teams
- Hospital Route/Nearest Phone Location
- Weather Concerns
- Potential Problems
- Problems Previously Occurred

Action Levels: 10 ppm *Other:*

Protective Clothing/Equipment: Mod Level D

Special Equipment:

Chemical Hazards: PCE

Physical Hazards: Snow, Ice, temperature, rain, slips/trips/falls, cold stress, nitrogen tank lifting

Emergency Actions: 911

Other Issues: ~

Check:

- H&S Monitoring Equipment/Calibration
- First Aid Kit/Eye Wash Station
- Fire Extinguisher Communications/Radio Check
- H&S Plan (each item) Respiratory Protection/Cartridges

Name/Firm/Office (Please Print)	***Signature***
Ben Corcoran / CDM Smith HLN	
Jenna Campbell CDM Smith DEN	Jenna Campbell
Maria Day / CDM Smith / Den	
Kevin Murphy Woratch Environmental SLC	
Emma Rat CDM Smith DEN	Emma Rat
Connor Keller / CDM SMITH / HLN	

Appendix C

Quality Control Summary Report

Quality Control Summary Report

Q4 2020 Groundwater Sampling Event

Operable Unit 1 Remedial Investigation
700 South 1600 East PCE Plume,
Salt Lake City, Utah

March 2021

CDM Smith

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Attachment 1 Data Validation Reports
Attachment 2 Data Package Completeness Review Checklists
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Acronyms

%	percent
%D	percent difference
%R	percent recovery
CDM Smith	CDM Federal Programs Corporation
COC	chain-of-custody
DQI	data quality indicator
DQO	data quality objective
EPA	U.S. Environmental Protection Agency
ICP	inductively coupled plasma
ICP-MS	inductively coupled plasma mass spectrometry
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
EMAX	EMAX Laboratories, Inc.
MDL	method detection limit
MRL	method reporting limit
MS/MSD	matrix spike/matrix spike duplicate
NTU	nephelometric turbidity unit
PARCCS	precision, accuracy, representativeness, comparability, completeness, and sensitivity
PCE	tetrachloroethene
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
QCSR	quality control summary report
RPD	relative percent difference
RSD	relative standard deviation
SDG	sample delivery group
SIM	selective ion monitoring
Site	700 South 1600 East Tetrachloroethene Plume Superfund Site
SM	standard method
SVOC	semivolatile organic compound
TOC	total organic carbon
USACE	U.S. Army Corps of Engineers
VOC	volatile organic compound
ZIST	Zone Isolation Sampling Technology

Section 1

Data Usability and Assessment Review

Under the U.S. Army Corps of Engineers, Kansas City District, Contract No. W912DQ-18-D-3008, Task Order No. W912DQ19F3048, CDM Federal Programs Corporation (CDM Smith) was directed to perform a remedial investigation for Operable Unit 1 of the 700 South 1600 East Tetrachloroethene (PCE) Plume Superfund Site (Site) in Salt Lake City, Utah. To assist in the ongoing remedial investigation at the Site, groundwater samples were collected from December 8 through 17, 2020 and shipped to EMAX Laboratories, Inc. (EMAX) in Torrance, California for analysis.

The purpose of this quality control summary report (QCSR) is to summarize the data validation and determine whether the sample results meet the data quality objective (DQO) of the data usability outlined in the *Phase 2 Quality Assurance Project Plan, Operable Unit 1, 700 South 1600 East PCE Plume, Salt Lake City, Utah,* Prepared for the U.S. Army Corps of Engineers, Kansas City District *(QAPP)* (CDM Smith 2020).

1.1 Usability Summary

Data collected and validated during this field investigation are usable as reported. Applicable data validation qualifiers were added if required. No sample results were rejected. Specific details are provided in the data validation reports summarized in Section 5 and presented in **Attachment 1** of this report.

Section 2
Quality Assurance Objectives

Quality assurance (QA) objectives for measurement data are expressed in terms of precision, accuracy, representativeness, comparability, completeness, and sensitivity (PARCCS). The PARCCS parameters characterize the quality of the data and as such are called data quality indicators (DQIs). The DQIs provide a mechanism for ongoing quality control (QC) and evaluating and measuring data quality throughout the project.

A review of the collected data is necessary to determine if data measurement objectives established in the QAPP (CDM Smith 2020) were met. In general, the following data measurement objectives were considered:

- Achievement of analytical method and reporting limit requirements
- Adherence to and achievement of appropriate laboratory analytical and field QC requirements
- Achievement of required measurement performance criteria for DQIs (the PARCCS parameters)
- Adherence to sampling and sample handling procedures
- Adherence to the sampling design and deviations documented on field change notifications, if required

The data validation review of the DQIs and other QA objectives determines if the data are of sufficient quality to support their intended use.

Section 3

Field and Laboratory Quality Assurance Activities

CDM Smith completed field sampling activities between December 8 and 17, 2020. The following table provides a summary of the number of samples collected and the date on which the sampling event occurred:

EMAX SDG* 20L102 – Groundwater – December 8 and 9, 2020
13 samples
2 field duplicate samples
4 trip blank samples
EMAX SDG 20L175 – Groundwater – December 14 through 17, 2020
17 samples
3 field duplicate samples
1 field blank sample
6 trip blank samples
EMAX SDG 20L132– Groundwater – December 10 and 14, 2020
6 samples
2 field duplicate samples
2 trip blank samples
EMAX SDG 20L141 – Groundwater – December 11, 13 and 14, 2020
12 samples
3 trip blank samples
EMAX SDG 20L133 – Groundwater – December 9 through 11, 13 and 14, 2020
16 samples
3 trip blank samples

*SDG – sample delivery group

All samples were received intact with proper chain-of-custody (COC) documentation at EMAX. Sample identification was accurately documented.

Table 3-1 presents a list of the samples collected and the analyses performed. **Attachment 2** presents the completeness review checklists of the data packages. **Attachment 3** includes the analytical data packages.

Sample preparation and analyses were conducted within the method-specified holding times.

The QAPP (CDM Smith 2020) defined the procedures to be followed and the data quality requirements for the field sampling events and associated analytical work.

3.1 Deviations from Field Procedures

As discussed in Section 2.4 of the Data Summary Report, the following deviations were encountered during the sampling events:

- Purge parameter stabilization criteria for turbidity (either less than 10 nephelometric turbidity unit [NTU] or less than 50 NTU and within 10 percent) were not met at MW-03RB/D, MW-25A, and MW-29B prior to the collection of groundwater samples. Turbidity at these locations was less than 50 NTU, but not within 10 percent. As all other purge parameter stabilization criteria was met and turbidity was below 50 NTU, there is no expected impact upon data quality at these locations.
- As MW-13S was purged dry, a sample was collected the next day once sufficient recharge was observed without meeting purge parameter stabilization. This is an accepted deviation in the low-flow groundwater sampling standard operating procedure, and there is no impact upon data quality at this location.
- There was insufficient water to collect a groundwater sample from MW-12S. As this location has been successfully in the past, there is no significant impact to the groundwater plume delineation data quality objective.
- Due to a high amount of sediment, groundwater samples for VOCs were collected from MW-13L without collecting purge and geochemical parameters. This location will be further developed prior to Q1-2021 groundwater sampling. As a VOC sample was collected, there is no significant impact to the groundwater plume delineation data quality objective. As groundwater samples for geochemical analyses will be collected during the Q1-2021 event, there is no significant impact to the natural attenuation data quality objective.
- Due to difficulties with the Zone Isolation Sampling Technology (ZIST) sampling systems, a consistent flow of water to the surface could not be sustained during purging at several locations. At these locations, visible sediment was observed on the ZIST Panacea pump porous media filters. These locations will be developed prior to Q1-2021 groundwater sampling.
    - At MW-26C and MW-34B/C groundwater samples for VOCs were collected without collecting purge and geochemical parameters. As VOC samples were collected, there is no significant impact to the groundwater plume delineation data quality objective. As groundwater samples for geochemical analyses will be collected during the Q1-2021 event, there is no significant impact to the natural attenuation data quality objective.
    - At MW-26D no groundwater samples were collected. As a VOC sample was collected during the Q3-2020 event, there is no significant impact to the groundwater plume delineation data quality objective. As groundwater samples for geochemical analyses will be collected during the Q1-2021 event, there is no significant impact to the natural attenuation data quality objective.

These deviations do not impact the DQOs and these well locations and analyses will be sampled during upcoming sampling events.

3.2 Field Quality Assurance/Quality Control

Seven field duplicate pairs, and 8 matrix spike/matrix spike duplicate (MS/MSD) samples were analyzed for the 64 groundwater samples. The QC sample collection frequency requirements in the QAPP (CDM Smith 2020) of 10 percent for field duplicates and 5 percent for MS/MSD samples were met.

One field blank sample was collected. Trip blanks were submitted with each cooler sent to the laboratory, for a total of 18 trip blank samples. **Table 3-2** presents the results for the field and trip blank sample results. No equipment blank samples were required as disposable sampling equipment was used.

Field QA/QC objectives were accomplished through the use of appropriate sampling techniques and collection of the required QC samples at the required frequencies.

3.3 Laboratory Quality Assurance/Quality Control

Analytical QA/QC was assessed by laboratory QC checks, method blanks, sample custody tracking, sample preservation, adherence to holding times, laboratory control samples (LCSs), MS samples, calibration verifications, surrogates, inductively coupled plasma (ICP) interference checks, and other applicable QC parameters. As presented in the data validation reports in **Attachment 1** of this report, the laboratory QC samples met project criteria requirements with the appropriate qualifiers applied. All data are considered usable.

3.3.1 Laboratory Methods

Samples were analyzed using the following U.S. Environmental Protection Agency (EPA) or Standard Methods (SM):

Groundwater

- EPA Method SW8260C – VOCs
- EPA Method SW8270D selective ion monitoring (SIM) – Semivolatile Organic Compounds – (1,4-Dioxane)
- EPA Method SW6020A – Metals
- EPA Method SW7470A – Mercury
- Method RSK-175 – Dissolved Gases (Ethane, Ethene, Methane)
- EPA Method E300.0 – Chloride, Sulfate
- Method SM2320B – Total Alkalinity
- Method SM4500-NO3E – Nitrogen, Nitrate-Nitrite
- EPA Method SW9060 – Total Organic Carbon (TOC)

The methods used met project objectives.

Table 3-1
Sample List and Analyses

Field Sample ID	Matrix	Date Sampled	Laboratory SDG	Method
FB01-GW121620	WQ	12/16/2020	20L175	8270DSIM SW8260C
FD01-GW121620	WG	12/16/2020	20L175	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
FD02-GW121020	WG	12/10/2020	20L132	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
FD03-GW120920	WG	12/9/2020	20L102	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
FD04-GW121420	WG	12/14/2020	20L175	8270DSIM A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
FD05-GW120820	WG	12/8/2020	20L102	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
FD06-GW121420	WG	12/14/2020	20L175	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060

Table 3-1
Sample List and Analyses

Field Sample ID	Matrix	Date Sampled	Laboratory SDG	Method
FD07-GW121420	WG	12/14/2020	20L132	8270DSIM A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW01D-GW121520	WG	12/15/2020	20L175	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW01S-GW121620	WG	12/16/2020	20L175	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW02-GW121620	WG	12/16/2020	20L175	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW03RA-GW121120	WG	12/11/2020	20L141	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW03RB-GW121120	WG	12/11/2020	20L141	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060

Table 3-1
Sample List and Analyses

Field Sample ID	Matrix	Date Sampled	Laboratory SDG	Method
MW03RC-GW121120	WG	12/11/2020	20L141	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW03RD-GW121120	WG	12/11/2020	20L141	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW04-GW121020	WG	12/10/2020	20L132	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW05R-GW120820	WG	12/8/2020	20L102	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW06-GW121020	WG	12/10/2020	20L132	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW08A-GW120920	WG	12/9/2020	20L102	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060

Table 3-1
Sample List and Analyses

Field Sample ID	Matrix	Date Sampled	Laboratory SDG	Method
MW08B-GW120920	WG	12/9/2020	20L102	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW08C-GW120920	WG	12/9/2020	20L102	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW12D-GW120920	WG	12/9/2020	20L102	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW13D-GW121120	WG	12/11/2020	20L141	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW13L-GW121620	WG	12/16/2020	20L175	SW8260C
MW13S-GW121120	WG	12/11/2020	20L141	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW14D-GW121420	WG	12/14/2020	20L141	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060

Table 3-1
Sample List and Analyses

Field Sample ID	Matrix	Date Sampled	Laboratory SDG	Method
MW14S-GW121420	WG	12/14/2020	20L141	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW15D-GW120920	WG	12/9/2020	20L102	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW15S-GW120920	WG	12/9/2020	20L102	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW16D-GW121020	WG	12/10/2020	20L132	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW16S-GW121020	WG	12/10/2020	20L132	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW17D-GW121320	WG	12/13/2020	20L141	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060

Table 3-1
Sample List and Analyses

Field Sample ID	Matrix	Date Sampled	Laboratory SDG	Method
MW17S-GW121120	WG	12/11/2020	20L141	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW18-GW121420	WG	12/14/2020	20L175	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW19-GW121420	WG	12/14/2020	20L132	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW20D-GW121520	WG	12/15/2020	20L175	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW20S-GW121420	WG	12/14/2020	20L175	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW21-GW121420	WG	12/14/2020	20L133	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060

Table 3-1
Sample List and Analyses

Field Sample ID	Matrix	Date Sampled	Laboratory SDG	Method
MW22-GW121420	WG	12/14/2020	20L141	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW23A-GW120920	WG	12/9/2020	20L133	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW23B-GW121020	WG	12/10/2020	20L133	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW23C-GW120920	WG	12/9/2020	20L133	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW24-GW120820	WG	12/8/2020	20L102	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW25A-GW120920	WG	12/9/2020	20L133	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060

Table 3-1
Sample List and Analyses

Field Sample ID	Matrix	Date Sampled	Laboratory SDG	Method
MW25B-GW121020	WG	12/10/2020	20L133	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW25C-GW121020	WG	12/10/2020	20L133	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW26A-GW121620	WG	12/16/2020	20L175	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW26B-GW121620	WG	12/16/2020	20L175	8270DSIM A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW26C-GW121720	WG	12/17/2020	20L175	SW8260C
MW27-GW120820	WG	12/8/2020	20L102	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW28-GW120820	WG	12/8/2020	20L102	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060

Table 3-1
Sample List and Analyses

Field Sample ID	Matrix	Date Sampled	Laboratory SDG	Method
MW29A-GW121320	WG	12/13/2020	20L133	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW29B-GW121120	WG	12/11/2020	20L133	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW29C-GW121120	WG	12/11/2020	20L133	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW30C-GW120920	WG	12/9/2020	20L102	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW30RA-GW120820	WG	12/8/2020	20L102	8270DSIM A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW30RB-GW120820	WG	12/8/2020	20L102	8270DSIM A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060

Table 3-1
Sample List and Analyses

Field Sample ID	Matrix	Date Sampled	Laboratory SDG	Method
MW31A-GW121120	WG	12/11/2020	20L133	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW31B-GW121120	WG	12/11/2020	20L133	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW31C-GW121120	WG	12/11/2020	20L141	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW32A-GW121020	WG	12/10/2020	20L133	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW32B-GW121020	WG	12/10/2020	20L133	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW32C-GW121020	WG	12/10/2020	20L133	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060

Table 3-1
Sample List and Analyses

Field Sample ID	Matrix	Date Sampled	Laboratory SDG	Method
MW34A-GW121520	WG	12/15/2020	20L175	8270DSIM A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW34B-GW121720	WG	12/17/2020	20L175	SW8260C
MW34C-GW121720	WG	12/17/2020	20L175	SW8260C
MW34D-GW121320	WG	12/13/2020	20L133	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW36-GW121420	WG	12/14/2020	20L132	8270DSIM A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW37D-GW121420	WG	12/14/2020	20L175	8270DSIM A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW37S-GW121420	WG	12/14/2020	20L175	8270DSIM A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW38D-GW121620	WG	12/16/2020	20L175	8270DSIM A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060

Table 3-1
Sample List and Analyses

Field Sample ID	Matrix	Date Sampled	Laboratory SDG	Method
MW38S-GW121620	WG	12/16/2020	20L175	8270DSIM A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
TB01A-GW120920	WQ	12/9/2020	20L102	SW8260C
TB01-GW121420	WQ	12/14/2020	20L133	SW8260C
TB01-GW121720	WQ	12/17/2020	20L175	SW8260C
TB02A-GW120920	WQ	12/9/2020	20L102	SW8260C
TB02-GW121420	WQ	12/14/2020	20L133	SW8260C
TB02-GW121720	WQ	12/17/2020	20L175	SW8260C
TB03A-GW120920	WQ	12/9/2020	20L102	SW8260C
TB03-GW121420	WQ	12/14/2020	20L133	SW8260C
TB03-GW121720	WQ	12/17/2020	20L175	SW8260C
TB04A-GW120920	WQ	12/9/2020	20L102	SW8260C
TB04-GW121420	WQ	12/14/2020	20L141	SW8260C
TB04-GW121720	WQ	12/17/2020	20L175	SW8260C
TB05-GW121420	WQ	12/14/2020	20L141	SW8260C
TB05-GW121720	WQ	12/17/2020	20L175	SW8260C
TB06-GW121420	WQ	12/14/2020	20L141	SW8260C
TB06-GW121720	WQ	12/17/2020	20L175	SW8260C
TB07-GW121420	WQ	12/14/2020	20L132	SW8260C
TB08-GW121420	WQ	12/14/2020	20L132	SW8260C

Acronyms:
ID - identificaton
SDG - sample delivery group
WG - groundwater
WQ - water quality
SW8260C - volatile organic compounds
8270D SIM - semivolatile organic compounds - selective ion monitoring
SW6020A - metals
SW7470A - mercury
RSK-175 - dissolved gases
E300.0 - chloride, sulfate
SM2320B - total alkalinity
A4500NE - nitrogen, nitrate-nitrite
SW9060 - total organic carbon

Table 3-2
Blank Sample Results

		Sample Name	FB01-GW121620		TB01A-GW120920		TB01-GW121420		TB01-GW121720		TB02A-GW120920	
		Sample Date	12/16/2020		12/9/2020		12/14/2020		12/17/2020		12/9/2020	
		Sample Type	FB		TB		TB		TB		TB	
Method	Chemical Name	Unit	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
SW8260C	1,1,1-Trichloroethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,1,2,2-Tetrachloroethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,1,2-Trichloroethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,1,2-Trichlorotrifluoroethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,1-Dichloroethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,1-Dichloroethene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2,3-Trichlorobenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2,4-Trichlorobenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2,4-Trimethylbenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2-Dibromo-3-Chloropropane	µg/L	2	U	2	U	2	U	2	U	2	U
SW8260C	1,2-Dibromoethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2-Dichlorobenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2-Dichloroethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2-Dichloropropane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,3,5-Trimethylbenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,3-Dichlorobenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,4-Dichlorobenzene	µg/L	1	U	1	U	1	U	1	U	1	U
8270DSIM	1,4-Dioxane	µg/L	0.44	U	--	--	--	--	--	--	--	--
SW8260C	2-Butanone (MEK)	µg/L	20	U	20	U	20	U	20	U	20	U
SW8260C	2-Hexanone	µg/L	20	U	20	U	20	U	20	U	20	U
SW8260C	4-Methyl-2-Pentanone (MIBK)	µg/L	20	U	20	U	20	U	20	U	20	U
SW8260C	Acetone	µg/L	**3**	**J**	**2.8**	**J**	**2.9**	**J**	20	U	20	U
SW8260C	Benzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Bromochloromethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Bromodichloromethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Bromoform	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Bromomethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Carbon Disulfide	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Carbon Tetrachloride	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Chlorobenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Chloroethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Chloroform	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Chloromethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Cis-1,2-Dichloroethene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Cis-1,3-Dichloropropene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Dibromochloromethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Dichlorodifluoromethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Ethylbenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Isopropylbenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	M+P-xylenes	µg/L	2	U	2	U	2	U	2	U	2	U
SW8260C	Methyl Acetate	µg/L	2	U	2	U	2	U	2	U	2	U
SW8260C	Methyl Tert-Butyl Ether	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Methylene Chloride	µg/L	2	U	2	U	2	U	2	U	**0.6**	**J**
SW8260C	O-xylene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Styrene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Tetrachloroethene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Toluene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Trans-1,2-Dichloroethene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Trans-1,3-Dichloropropene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Trichloroethene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Trichlorofluoromethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Vinyl Acetate	µg/L	2	U	2	U	2	U	2	U	2	U
SW8260C	Vinyl Chloride	µg/L	1	U	1	U	1	U	1	U	1	U

Acronyms:

SW8260C - volatile organic compounds

8270DSIM - semivolatile organic compounds selective ion monitoring

µg/L - micrograms per liter

U - nondetect

J - estimated

Q - qualifier

TB - trip blank

FB - field blank

Highlighted and bolded results are detect.

-- - not analyzed

Table 3-2
Blank Sample Results

		Sample Name	TB02-GW121420		TB02-GW121720		TB03A-GW120920		TB03-GW121420		TB03-GW121720	
		Sample Date	12/14/2020		12/17/2020		12/9/2020		12/14/2020		12/17/2020	
		Sample Type	TB		TB		TB		TB		TB	
Method	Chemical Name	Unit	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
SW8260C	1,1,1-Trichloroethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,1,2,2-Tetrachloroethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,1,2-Trichloroethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,1,2-Trichlorotrifluoroethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,1-Dichloroethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,1-Dichloroethene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2,3-Trichlorobenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2,4-Trichlorobenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2,4-Trimethylbenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2-Dibromo-3-Chloropropane	µg/L	2	U	2	U	2	U	2	U	2	U
SW8260C	1,2-Dibromoethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2-Dichlorobenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2-Dichloroethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2-Dichloropropane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,3,5-Trimethylbenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,3-Dichlorobenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,4-Dichlorobenzene	µg/L	1	U	1	U	1	U	1	U	1	U
8270DSIM	1,4-Dioxane	µg/L	--	--	--	--	--	--	--	--	--	--
SW8260C	2-Butanone (MEK)	µg/L	20	U	20	U	20	U	20	U	20	U
SW8260C	2-Hexanone	µg/L	20	U	20	U	20	U	20	U	20	U
SW8260C	4-Methyl-2-Pentanone (MIBK)	µg/L	20	U	20	U	20	U	20	U	20	U
SW8260C	Acetone	µg/L	20	U	**2.6**	**J**	20	U	**2.8**	**J**	**3.1**	**J**
SW8260C	Benzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Bromochloromethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Bromodichloromethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Bromoform	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Bromomethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Carbon Disulfide	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Carbon Tetrachloride	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Chlorobenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Chloroethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Chloroform	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Chloromethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Cis-1,2-Dichloroethene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Cis-1,3-Dichloropropene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Dibromochloromethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Dichlorodifluoromethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Ethylbenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Isopropylbenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	M+P-xylenes	µg/L	2	U	2	U	2	U	2	U	2	U
SW8260C	Methyl Acetate	µg/L	2	U	2	U	2	U	2	U	2	U
SW8260C	Methyl Tert-Butyl Ether	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Methylene Chloride	µg/L	2	U	2	U	**0.6**	**J**	2	U	2	U
SW8260C	O-xylene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Styrene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Tetrachloroethene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Toluene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Trans-1,2-Dichloroethene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Trans-1,3-Dichloropropene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Trichloroethene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Trichlorofluoromethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Vinyl Acetate	µg/L	2	U	2	U	2	U	2	U	2	U
SW8260C	Vinyl Chloride	µg/L	1	U	1	U	1	U	1	U	1	U

Acronyms:
SW8260C - volatile organic compounds
8270DSIM - semivolatile organic compounds selective ion monitoring
µg/L - micrograms per liter
U - nondetect
J - estimated
Q - qualifier
TB - trip blank
FB - field blank
Highlighted and bolded results are detect.
-- - not analyzed

Table 3-2
Blank Sample Results

		Sample Name	TB04A-GW120920		TB04-GW121420		TB04-GW121720		TB05-GW121420		TB05-GW121720	
		Sample Date	12/9/2020		12/14/2020		12/17/2020		12/14/2020		12/17/2020	
		Sample Type	TB		TB		TB		TB		TB	
Method	Chemical Name	Unit	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
SW8260C	1,1,1-Trichloroethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,1,2,2-Tetrachloroethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,1,2-Trichloroethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,1,2-Trichlorotrifluoroethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,1-Dichloroethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,1-Dichloroethene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2,3-Trichlorobenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2,4-Trichlorobenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2,4-Trimethylbenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2-Dibromo-3-Chloropropane	µg/L	2	U	2	U	2	U	2	U	2	U
SW8260C	1,2-Dibromoethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2-Dichlorobenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2-Dichloroethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2-Dichloropropane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,3,5-Trimethylbenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,3-Dichlorobenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,4-Dichlorobenzene	µg/L	1	U	1	U	1	U	1	U	1	U
8270DSIM	1,4-Dioxane	µg/L	--	--	--	--	--	--	--	--	--	--
SW8260C	2-Butanone (MEK)	µg/L	20	U	20	U	20	U	20	U	20	U
SW8260C	2-Hexanone	µg/L	20	U	20	U	20	U	20	U	20	U
SW8260C	4-Methyl-2-Pentanone (MIBK)	µg/L	20	U	20	U	20	U	20	U	20	U
SW8260C	Acetone	µg/L	20	U	**4.2**	**J**	20	U	20	U	**2.7**	**J**
SW8260C	Benzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Bromochloromethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Bromodichloromethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Bromoform	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Bromomethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Carbon Disulfide	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Carbon Tetrachloride	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Chlorobenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Chloroethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Chloroform	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Chloromethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Cis-1,2-Dichloroethene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Cis-1,3-Dichloropropene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Dibromochloromethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Dichlorodifluoromethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Ethylbenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Isopropylbenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	M+P-xylenes	µg/L	2	U	2	U	2	U	2	U	2	U
SW8260C	Methyl Acetate	µg/L	2	U	2	U	2	U	2	U	2	U
SW8260C	Methyl Tert-Butyl Ether	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Methylene Chloride	µg/L	2	U	2	U	2	U	2	U	2	U
SW8260C	O-xylene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Styrene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Tetrachloroethene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Toluene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Trans-1,2-Dichloroethene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Trans-1,3-Dichloropropene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Trichloroethene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Trichlorofluoromethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Vinyl Acetate	µg/L	2	U	2	U	2	U	2	U	2	U
SW8260C	Vinyl Chloride	µg/L	1	U	1	U	1	U	1	U	1	U

Acronyms:
SW8260C - volatile organic compounds
8270DSIM - semivolatile organic compounds selective ion monitoring
µg/L - micrograms per liter
U - nondetect
J - estimated
Q - qualifier
TB - trip blank
FB - field blank
Highlighted and bolded results are detect.
-- - not analyzed

Table 3-2
Blank Sample Results

		Sample Name	TB06-GW121420		TB06-GW121720		TB07-GW121420		TB08-GW121420	
		Sample Date	12/14/2020		12/17/2020		12/14/2020		12/14/2020	
		Sample Type	TB		TB		TB		TB	
Method	Chemical Name	Unit	Result	Q	Result	Q	Result	Q	Result	Q
SW8260C	1,1,1-Trichloroethane	µg/L	1	U	1	U	1	U	1	U
SW8260C	1,1,2,2-Tetrachloroethane	µg/L	1	U	1	U	1	U	1	U
SW8260C	1,1,2-Trichloroethane	µg/L	1	U	1	U	1	U	1	U
SW8260C	1,1,2-Trichlorotrifluoroethane	µg/L	1	U	1	U	1	U	1	U
SW8260C	1,1-Dichloroethane	µg/L	1	U	1	U	1	U	1	U
SW8260C	1,1-Dichloroethene	µg/L	1	U	1	U	1	U	1	U
SW8260C	1,2,3-Trichlorobenzene	µg/L	1	U	1	U	1	U	1	U
SW8260C	1,2,4-Trichlorobenzene	µg/L	1	U	1	U	1	U	1	U
SW8260C	1,2,4-Trimethylbenzene	µg/L	1	U	1	U	1	U	1	U
SW8260C	1,2-Dibromo-3-Chloropropane	µg/L	2	U	2	U	2	U	2	U
SW8260C	1,2-Dibromoethane	µg/L	1	U	1	U	1	U	1	U
SW8260C	1,2-Dichlorobenzene	µg/L	1	U	1	U	1	U	1	U
SW8260C	1,2-Dichloroethane	µg/L	1	U	1	U	1	U	1	U
SW8260C	1,2-Dichloropropane	µg/L	1	U	1	U	1	U	1	U
SW8260C	1,3,5-Trimethylbenzene	µg/L	1	U	1	U	1	U	1	U
SW8260C	1,3-Dichlorobenzene	µg/L	1	U	1	U	1	U	1	U
SW8260C	1,4-Dichlorobenzene	µg/L	1	U	1	U	1	U	1	U
8270DSIM	1,4-Dioxane	µg/L	--	--	--	--	--	--	--	--
SW8260C	2-Butanone (MEK)	µg/L	20	U	20	U	20	U	20	U
SW8260C	2-Hexanone	µg/L	20	U	20	U	20	U	20	U
SW8260C	4-Methyl-2-Pentanone (MIBK)	µg/L	20	U	20	U	20	U	20	U
SW8260C	Acetone	µg/L	20	U	**2.6**	**J**	20	U	20	U
SW8260C	Benzene	µg/L	1	U	1	U	1	U	1	U
SW8260C	Bromochloromethane	µg/L	1	U	1	U	1	U	1	U
SW8260C	Bromodichloromethane	µg/L	1	U	1	U	1	U	1	U
SW8260C	Bromoform	µg/L	1	U	1	U	1	U	1	U
SW8260C	Bromomethane	µg/L	1	U	1	U	1	U	1	U
SW8260C	Carbon Disulfide	µg/L	1	U	1	U	1	U	1	U
SW8260C	Carbon Tetrachloride	µg/L	1	U	1	U	1	U	1	U
SW8260C	Chlorobenzene	µg/L	1	U	1	U	1	U	1	U
SW8260C	Chloroethane	µg/L	1	U	1	U	1	U	1	U
SW8260C	Chloroform	µg/L	1	U	1	U	1	U	1	U
SW8260C	Chloromethane	µg/L	1	U	1	U	1	U	1	U
SW8260C	Cis-1,2-Dichloroethene	µg/L	1	U	1	U	1	U	1	U
SW8260C	Cis-1,3-Dichloropropene	µg/L	1	U	1	U	1	U	1	U
SW8260C	Dibromochloromethane	µg/L	1	U	1	U	1	U	1	U
SW8260C	Dichlorodifluoromethane	µg/L	1	U	1	U	1	U	1	U
SW8260C	Ethylbenzene	µg/L	1	U	1	U	1	U	1	U
SW8260C	Isopropylbenzene	µg/L	1	U	1	U	1	U	1	U
SW8260C	M+P-xylenes	µg/L	2	U	2	U	2	U	2	U
SW8260C	Methyl Acetate	µg/L	2	U	2	U	2	U	2	U
SW8260C	Methyl Tert-Butyl Ether	µg/L	1	U	1	U	1	U	1	U
SW8260C	Methylene Chloride	µg/L	2	U	2	U	2	U	2	U
SW8260C	O-xylene	µg/L	1	U	1	U	1	U	1	U
SW8260C	Styrene	µg/L	1	U	1	U	1	U	1	U
SW8260C	Tetrachloroethene	µg/L	1	U	1	U	1	U	1	U
SW8260C	Toluene	µg/L	1	U	1	U	1	U	1	U
SW8260C	Trans-1,2-Dichloroethene	µg/L	1	U	1	U	1	U	1	U
SW8260C	Trans-1,3-Dichloropropene	µg/L	1	U	1	U	1	U	1	U
SW8260C	Trichloroethene	µg/L	1	U	1	U	1	U	1	U
SW8260C	Trichlorofluoromethane	µg/L	1	U	1	U	1	U	1	U
SW8260C	Vinyl Acetate	µg/L	2	U	2	U	2	U	2	U
SW8260C	Vinyl Chloride	µg/L	1	U	1	U	1	U	1	U

Acronyms:
SW8260C - volatile organic compounds
8270DSIM - semivolatile organic compounds selective ion monitoring
µg/L - micrograms per liter
U - nondetect
J - estimated
Q - qualifier
TB - trip blank
FB - field blank
Highlighted and bolded results are detect.
-- - not analyzed

Section 4
Data Validation Procedures

For this QCSR, there were five laboratory SDGs. Qualified CDM Smith data validators not associated with project sampling activities validated the data reported in the five SDGs. Data validation was performed in accordance with specified analytical methods and performance criteria outlined in the QAPP (CDM Smith 2020) and in the EPA *National Functional Guidelines for Inorganic Superfund Methods Data Review* (EPA 2017) and EPA *National Functional Guidelines for Organic Superfund Methods Data Review* (EPA 2017). Validation reports were prepared and are presented in **Attachment 1**. The following SDG data packages were validated:

- EMAX – SDG 20L102
- EMAX – SDG 20L175
- EMAX – SDG 20L132
- EMAX – SDG 20L141
- EMAX – SDG 20L133

Table 4-1 presents the results that were qualified and the reasons for the qualifications. Qualifiers applied are defined as follows:

- J → Result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- U → Analyte was analyzed for, but was not detected above the level of the sample method reporting limit (MRL).
- UJ → Analyte was analyzed for, but was not detected above the level of the sample MRL. The MRL is approximate.

Table 4-1
Qualification Summary

Field Sample ID	Lab SDG	Method	Analyte	CAS #	Final Result	Unit	Validation Qualifier	Interpreted Qualfier	Qualifier Reason
FD01-GW121620	20L175	SW6020A	Manganese	7439-96-5	1	µg/L	U-RL	U	CCB
FD01-GW121620	20L175	SW6020A	Selenium	7782-49-2	1	µg/L	U-RL	U	ICB, CCB
FD02-GW121020	20L132	SW6020A	Manganese	7439-96-5	3.23	µg/L	J	J	FD
FD02-GW121020	20L132	SW7470A	Mercury	7439-97-6	0.5	µg/L	U-RL	U	ICB
FD02-GW121020	20L132	SW9060	Total Organic Carbon	TOC	1	mg/L	U-RL	U	MB
FD03-GW120920	20L102	SW6020A	Arsenic	7440-38-2	1	µg/L	U-RL	U	ICB
FD03-GW120920	20L102	SW6020A	Iron	7439-89-6	100	µg/L	U-RL	U	ICB
FD03-GW120920	20L102	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	MB, ICB
FD04-GW121420	20L175	SW6020A	Arsenic	7440-38-2	1	µg/L	U-RL	U	ICB
FD04-GW121420	20L175	SW6020A	Chromium	7440-47-3	1	µg/L	U-RL	U	ICB
FD04-GW121420	20L175	SW6020A	Nickel	7440-02-0	1	µg/L	U-RL	U	ICB
FD05-GW120820	20L102	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	MB,ICB
FD05-GW120820	20L102	SW6020A	Manganese	7439-96-5	1	µg/L	U-RL	U	MB, ICB
FD05-GW120820	20L102	SW6020A	Selenium	7782-49-2	1	µg/L	U-RL	U	ICB, CCB
FD06-GW121420	20L175	SW6020A	Nickel	7440-02-0	1	µg/L	U-RL	U	ICB
FD07-GW121420	20L132	8270DSIM	1,4-Dioxane	123-91-1	3.1	µg/L	J	J	FD
MW01D-GW121520	20L175	SW6020A	Arsenic	7440-38-2	1	µg/L	U-RL	U	ICB
MW01D-GW121520	20L175	SW6020A	Manganese	7439-96-5	1	µg/L	U-RL	U	CCB
MW01D-GW121520	20L175	SW6020A	Nickel	7440-02-0	1	µg/L	U-RL	U	ICB
MW01S-GW121620	20L175	SW6020A	Arsenic	7440-38-2	1	µg/L	U-RL	U	ICB
MW01S-GW121620	20L175	SW6020A	Chromium	7440-47-3	1	µg/L	U-RL	U	ICB
MW01S-GW121620	20L175	SW6020A	Nickel	7440-02-0	1	µg/L	U-RL	U	ICB
MW01S-GW121620	20L175	SW6020A	Selenium	7782-49-2	1	µg/L	U-RL	U	ICB, CCB
MW02-GW121620	20L175	SW6020A	Manganese	7439-96-5	1	µg/L	U-RL	U	CCB
MW02-GW121620	20L175	SW6020A	Selenium	7782-49-2	1	µg/L	U-RL	U	ICB, CCB
MW03RA-GW121120	20L141	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	ICB, CCB
MW03RB-GW121120	20L141	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	ICB, CCB
MW03RC-GW121120	20L141	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	ICB, CCB
MW03RD-GW121120	20L141	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	ICB, CCB
MW04-GW121020	20L132	SW6020A	Manganese	7439-96-5	1	µg/L	UJ-RL	UJ	CCB,FD
MW04-GW121020	20L132	SW9060	Total Organic Carbon	TOC	1	mg/L	U-RL	U	MB
MW05R-GW120820	20L102	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	MB, ICB
MW05R-GW120820	20L102	SW6020A	Selenium	7782-49-2	1	µg/L	U-RL	U	ICB, CCB
MW05R-GW120820	20L102	SW6020A	Thallium	7440-28-0	1	µg/L	U-RL	U	ICB
MW06-GW121020	20L132	SW9060	Total Organic Carbon	TOC	1	mg/L	U-RL	U	MB
MW08A-GW120920	20L102	SW6020A	Arsenic	7440-38-2	1	µg/L	U-RL	U	ICB
MW08A-GW120920	20L102	SW6020A	Iron	7439-89-6	100	µg/L	U-RL	U	ICB
MW08A-GW120920	20L102	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	MB, ICB
MW08A-GW120920	20L102	SW6020A	Selenium	7782-49-2	1	µg/L	U-RL	U	ICB, CCB
MW08B-GW120920	20L102	SW6020A	Arsenic	7440-38-2	1	µg/L	U-RL	U	ICB
MW08B-GW120920	20L102	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	MB, ICB
MW08C-GW120920	20L102	SW6020A	Arsenic	7440-38-2	1	µg/L	U-RL	U	ICB
MW08C-GW120920	20L102	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	MB, ICB
MW08C-GW120920	20L102	SW6020A	Thallium	7440-28-0	1	µg/L	U-RL	U	ICB
MW08C-GW120920	20L102	SW8260C	Acetone	67-64-1	20	µg/L	U-RL	U	TB
MW12D-GW120920	20L102	SW6020A	Arsenic	7440-38-2	1	µg/L	U-RL	U	ICB
MW12D-GW120920	20L102	SW6020A	Iron	7439-89-6	100	µg/L	U-RL	U	ICB
MW12D-GW120920	20L102	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	MB, ICB

Table 4-1
Qualification Summary

Field Sample ID	Lab SDG	Method	Analyte	CAS #	Final Result	Unit	Validation Qualifier	Interpreted Qualfier	Qualifier Reason
MW13L-GW121620	20L175	SW8260C	Acetone	67-64-1	20	µg/L	U-RL	U	TB,FB
MW14D-GW121420	20L141	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	ICB, CCB
MW14S-GW121420	20L141	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	ICB, CCB
MW15D-GW120920	20L102	SW6020A	Arsenic	7440-38-2	1	µg/L	U-RL	U	ICB
MW15D-GW120920	20L102	SW6020A	Iron	7439-89-6	100	µg/L	U-RL	U	ICB
MW15D-GW120920	20L102	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	MB, ICB
MW15D-GW120920	20L102	SW6020A	Thallium	7440-28-0	1	µg/L	U-RL	U	ICB
MW15S-GW120920	20L102	SW6020A	Arsenic	7440-38-2	1	µg/L	U-RL	U	ICB
MW15S-GW120920	20L102	SW6020A	Iron	7439-89-6	100	µg/L	U-RL	U	ICB
MW15S-GW120920	20L102	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	MB, ICB
MW16S-GW121020	20L132	SW9060	Total Organic Carbon	TOC	1	mg/L	U-RL	U	MB
MW17D-GW121320	20L141	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	ICB, CCB
MW17S-GW121120	20L141	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	ICB, CCB
MW18-GW121420	20L175	SW6020A	Nickel	7440-02-0	1	µg/L	U-RL	U	ICB
MW18-GW121420	20L175	SW6020A	Selenium	7782-49-2	1	µg/L	U-RL	U	ICB, CCB
MW19-GW121420	20L132	SW9060	Total Organic Carbon	TOC	1	mg/L	U-RL	U	MB
MW20D-GW121520	20L175	SW6020A	Selenium	7782-49-2	1	µg/L	U-RL	U	ICB, CCB
MW20S-GW121420	20L175	SW6020A	Selenium	7782-49-2	1	µg/L	U-RL	U	ICB, CCB
MW21-GW121420	20L133	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	ICB, CCB
MW22-GW121420	20L141	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	ICB, CCB
MW22-GW121420	20L141	SW8260C	Styrene	100-42-5	1	µg/L	UJ	UJ	MS
MW23A-GW120920	20L133	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	ICB, CCB
MW23A-GW120920	20L133	SW9060	Total Organic Carbon	TOC	1	mg/L	U-RL	U	MB
MW23B-GW121020	20L133	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	ICB, CCB
MW23C-GW120920	20L133	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	ICB, CCB
MW23C-GW120920	20L133	SW9060	Total Organic Carbon	TOC	1	mg/L	U-RL	U	MB
MW24-GW120820	20L102	SW6020A	Iron	7439-89-6	100	µg/L	U-RL	U	ICB
MW24-GW120820	20L102	SW6020A	Selenium	7782-49-2	1	µg/L	U-RL	U	ICB, CCB
MW25A-GW120920	20L133	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	ICB, CCB
MW25A-GW120920	20L133	SW9060	Total Organic Carbon	TOC	1	mg/L	U-RL	U	MB
MW25B-GW121020	20L133	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	ICB, CCB
MW25C-GW121020	20L133	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	ICB, CCB
MW26A-GW121620	20L175	SW6020A	Arsenic	7440-38-2	1	µg/L	U-RL	U	ICB
MW26A-GW121620	20L175	SW6020A	Chromium	7440-47-3	1	µg/L	U-RL	U	ICB
MW26A-GW121620	20L175	SW6020A	Selenium	7782-49-2	1	µg/L	U-RL	U	ICB, CCB
MW26A-GW121620	20L175	SW6020A	Vanadium	7440-62-2	1	µg/L	U-RL	U	ICB
MW26B-GW121620	20L175	SW6020A	Arsenic	7440-38-2	1	µg/L	U-RL	U	ICB
MW26B-GW121620	20L175	SW6020A	Chromium	7440-47-3	1	µg/L	U-RL	U	ICB
MW26B-GW121620	20L175	SW6020A	Selenium	7782-49-2	1	µg/L	U-RL	U	ICB, CCB
MW26B-GW121620	20L175	SW8260C	Acetone	67-64-1	20	µg/L	U-RL	U	TB,FB
MW26C-GW121720	20L175	SW8260C	Acetone	67-64-1	20	µg/L	U-RL	U	TB,FB
MW27-GW120820	20L102	SW6020A	Iron	7439-89-6	100	µg/L	U-RL	U	ICB
MW27-GW120820	20L102	SW6020A	Selenium	7782-49-2	1	µg/L	U-RL	U	ICB, CCB
MW28-GW120820	20L102	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	MB, ICB
MW28-GW120820	20L102	SW6020A	Selenium	7782-49-2	1	µg/L	U-RL	U	ICB, CCB
MW29A-GW121320	20L133	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	ICB, CCB
MW29B-GW121120	20L133	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	ICB, CCB
MW29C-GW121120	20L133	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	ICB, CCB

Table 4-1
Qualification Summary

Field Sample ID	Lab SDG	Method	Analyte	CAS #	Final Result	Unit	Validation Qualifier	Interpreted Qualfier	Qualifier Reason
MW30C-GW120920	20L102	SW6020A	Arsenic	7440-38-2	1	µg/L	U-RL	U	ICB
MW30C-GW120920	20L102	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	MB, ICB
MW30C-GW120920	20L102	SW6020A	Selenium	7782-49-2	1	µg/L	U-RL	U	ICB, CCB
MW30RA-GW120820	20L102	SW6020A	Arsenic	7440-38-2	1	µg/L	U-RL	U	ICB
MW30RA-GW120820	20L102	SW6020A	Iron	7439-89-6	100	µg/L	U-RL	U	ICB
MW30RA-GW120820	20L102	SW6020A	Selenium	7782-49-2	1	µg/L	U-RL	U	ICB, CCB
MW30RB-GW120820	20L102	SW6020A	Arsenic	7440-38-2	1	µg/L	U-RL	U	ICB
MW30RB-GW120820	20L102	SW6020A	Iron	7439-89-6	100	µg/L	U-RL	U	ICB
MW30RB-GW120820	20L102	SW6020A	Selenium	7782-49-2	1	µg/L	U-RL	U	ICB, CCB
MW31A-GW121120	20L133	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	ICB, CCB
MW31B-GW121120	20L133	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	ICB, CCB
MW32B-GW121020	20L133	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	ICB, CCB
MW32C-GW121020	20L133	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	ICB, CCB
MW34A-GW121520	20L175	SW6020A	Arsenic	7440-38-2	1	µg/L	U-RL	U	ICB
MW34A-GW121520	20L175	SW6020A	Selenium	7782-49-2	1	µg/L	U-RL	U	ICB, CCB
MW34B-GW121720	20L175	SW8260C	Acetone	67-64-1	20	µg/L	U-RL	U	TB,FB
MW34C-GW121720	20L175	SW8260C	Acetone	67-64-1	20	µg/L	U-RL	U	TB,FB
MW34D-GW121320	20L133	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	ICB, CCB
MW36-GW121420	20L132	8270DSIM	1,4-Dioxane	123-91-1	0.42	µg/L	UJ	UJ	FD
MW36-GW121420	20L132	SW9060	Total Organic Carbon	TOC	1	mg/L	U-RL	U	MB
MW37D-GW121420	20L175	SW6020A	Arsenic	7440-38-2	1	µg/L	U-RL	U	ICB
MW37D-GW121420	20L175	SW6020A	Chromium	7440-47-3	1	µg/L	U-RL	U	ICB
MW37S-GW121420	20L175	SW6020A	Arsenic	7440-38-2	1	µg/L	U-RL	U	ICB
MW37S-GW121420	20L175	SW6020A	Chromium	7440-47-3	1	µg/L	U-RL	U	ICB
MW37S-GW121420	20L175	SW6020A	Nickel	7440-02-0	1	µg/L	U-RL	U	ICB
MW38D-GW121620	20L175	SW6020A	Arsenic	7440-38-2	1	µg/L	U-RL	U	ICB
MW38D-GW121620	20L175	SW6020A	Nickel	7440-02-0	1	µg/L	U-RL	U	ICB
MW38D-GW121620	20L175	SW6020A	Selenium	7782-49-2	1	µg/L	U-RL	U	ICB, CCB
MW38S-GW121620	20L175	SW6020A	Arsenic	7440-38-2	1	µg/L	U-RL	U	ICB
MW38S-GW121620	20L175	SW6020A	Selenium	7782-49-2	1	µg/L	U-RL	U	ICB, CCB

Acronyms:

ID - identification
SDG - sample delivery group
SW8260C - volatile organic compounds
SW6020A - metals
SW9060 - total organic carbon
8270DSIM - 1,4-dioxane
SW-7470A - mercury
µg/L - microgram per liter
mg/L - milligram per liter
CAS - Chemical Abstract Service
U - nondetect
UJ - estimated nondetect
J - estimated

U-RL - result is qualified as nondetect at the method reporting limit value
UJ-RL - result is qualified as estimated nondetect at the method reporting limit value
RL - reporting limit
MS - matrix spike criteria
FD - field duplicate criteria
FB - field blank criteria
ICB - initial calibration blank criteria
CCB - continuing calibration blank criteria
MB - method blank criteria
TB - trip blank criteria
SIM - selective ion monitoring

Section 5
Data Quality Indicators

This section summarizes the validation performed and the overall quality of the data. The validation reports are provided in **Attachment 1**.

Achievement of the DQO regarding data usability was determined by the use of DQIs. These DQIs for are expressed in terms of PARCCS. The DQIs provide a mechanism to evaluate and measure data quality throughout the project. These criteria are defined in **Table 5-1** and in the following subsections.

5.1 Precision

Precision is a quantitative term that estimates the reproducibility of a set of replicate measurements under a given set of conditions. It is defined as a measurement of mutual agreement between measurements of the same property and is expressed in terms of relative percent difference (RPD) between duplicate determinations.

RPD is calculated as follows:

$$\mathbf{RPD = absolute\ value\ [(C1 - C2)/\{(C1 + C2)/2)\}] \times 100\%}$$

Where:

C1 = concentration of primary sample
C2 = concentration of duplicate sample

Field and analytical precision were determined from review of the field duplicate results, MS/MSDs, LCS/laboratory control sample duplicate (LCSDs), laboratory duplicates and ICP serial dilution tests. The duplicate sample results were compared after calculating their RPDs. Field duplicate samples were collected in the same manner as the original samples but collected in separate individual containers, given separate sample identifiers, and treated as unique samples by the laboratory.

Table 5-2 presents the field duplicate sample results. A control limit of 30 percent (%) RPD was used for the groundwater field duplicate samples when both sample concentrations were greater than five times the MRL. If the sample concentrations were below five times the MRL, the absolute difference between the samples is calculated; if that value is below the MRL, no qualification is required. Laboratory RPDs are specific to the QC parameter. RPD results are summarized below:

- Field duplicate RPDs or the absolute criteria results were within control limits except for 1,4-dioxane in field duplicate pair MW36-GW121420/FD07-GW121420 and manganese in field duplicate pair MW04-GW121020/FD02-GW121020 (absolute criteria not met for either analyte) in SDG 20L132. The 1,4-dioxane and manganese results for these samples

were qualified as estimated "J/UJ." The difference between the sample results was greater than the MRL.

- Laboratory duplicate sample RPDs were within the control limits.
- LCS/LCSD RPDs were within control limits.
- MS/MSD RPD results were within control limits except for trichlorotrifluoroethane in SDG 20L132, which had an RPD of 22% and styrene in SDG 20L141, which had an RPD of 22%. Qualification for MS/MSD RPDs outside of criteria is only required for detected results. The trichlorotrifluoroethane and styrene results were nondetect in the MS parent samples MW32-GW121420 and MW22-GW121420 respectively. No qualification was required.
- ICP serial dilution results were within criteria.

No field or laboratory issues were identified from the RPD results outside criteria; the exceedances are reasonable for this type of sampling activity.

5.2 Accuracy

Accuracy is the degree of agreement of a measurement with an accepted reference or true value and is a measure of the bias in a system. Two different metrics are evaluated to assess result accuracy—calculation of percent recovery (%R) for spiked analytes with known concentrations, and review of blank results for cross-contamination.

5.2.1 Percent Recovery

Accuracy of the data was assessed by comparing recoveries of LCSs, MSs, calibration standards, surrogates, internal standards, and from ICP interference checks during metals analyses. Accuracy is expressed as %R, which is calculated as:

$$\textbf{Percent Recovery} = \frac{\textbf{(Total Analyte Found – Analyte Originally Present)} \times \textbf{100}}{\textbf{Analyte Added}}$$

Analytical accuracy for the entire data collection activity is difficult to measure because several sources of error exist. Errors can be introduced by any of the following:

- Sampling procedure and duration of sampling
- Field contamination
- Sample preservation and handling
- Sample matrix
- Sample preparation
- Analytical techniques

Accuracy is maintained by adhering to the laboratory method and approved field and analytical standard operating procedures.

The following is a summary of the accuracy parameters reviewed and the resulting qualifications for the data collected:

SDG 20L102

- LCS/LCSD %Rs were within criteria.
- MS/MSD %Rs were within criteria except for sodium (73/83%) and calcium (0/-67%). Initial sample concentrations were greater than four times the spike level; therefore, no qualifications were required.
- Initial and continuing calibration verifications were within criteria.
- Surrogate results were within criteria.
- ICP interference checks were within criteria.
- Inorganic and organic tune results were within criteria.
- Internal standard results were within criteria.

SDG 20L175

- LCS/LCSD %Rs were within criteria.
- MS/MSD %Rs were within criteria except for magnesium (87/73%), calcium (100/-33%) and sodium (87/10%). Initial sample concentrations were greater than four times the spike level; therefore, no qualifications were required.
- Initial and continuing calibration verifications were within criteria.
- Surrogate results were within criteria.
- ICP interference checks were within criteria.
- Inorganic and organic tune results were within criteria.
- Internal standard results were within criteria.

SDG 20L132

- LCS/LCSD %Rs were within criteria.
- MS/MSD %Rs were within criteria except for calcium (33/167%) and sodium (67/133%). Initial sample concentrations were greater than four times the spike level; therefore, no qualifications were required.
- Initial and continuing calibration verifications were within criteria.
- Surrogate results were within criteria.

- ICP interference checks were within criteria.
- Inorganic and organic tune results were within criteria.
- Internal standard results were within criteria.

SDG 20L141

- LCS/LCSD %Rs were within criteria.
- MS/MSD %Rs were within criteria except for styrene (83/66%), magnesium (147/97%) and sodium (0/100%). The styrene result in sample MW22-GW121420 was qualified as estimated nondetect "UJ." The magnesium and sodium initial sample concentrations were greater than four times the spike level; therefore, no qualifications were required.
- Initial and continuing calibration verifications were within criteria.
- Surrogate results were within criteria.
- ICP interference checks were within criteria.
- Inorganic and organic tune results were within criteria.
- Internal standard results were within criteria.

SDG 20L133

- LCS/LCSD %Rs were within criteria.
- MS/MSD %Rs were within criteria except for calcium (233/233%), magnesium (167/170%) and sodium (207/243%). Initial sample concentrations were greater than four times the spike level therefore no qualifications were required.
- Initial and continuing calibration verifications were within criteria.
- Surrogate results were within criteria.
- ICP interference checks were within criteria.
- Inorganic and organic tune results were within criteria.
- Internal standard results were within criteria.

Sample preservation, handling, and holding times are additional measures of accuracy of the data. All cooler temperatures, sample handling information and holding times were acceptable.

5.2.2 Blank Contamination

Blanks are used to determine the level of laboratory and field contamination introduced into the samples, independent of the level of target analytes found in the sample source. Sources of sample contamination can include the containers and equipment used to collect the sample, preservatives added to the sample, other samples in transport coolers, laboratory sample storage

refrigerators, standards and solutions used to calibrate instruments, glassware and reagents used to process samples, airborne contamination in the laboratory preparation area, and the analytical instrument sample introduction equipment. Each analyte group has its own particular suite of common laboratory contaminants. Active measures must be performed to continually measure the ambient contamination level, and steps taken to discover the source of the contamination to eliminate or minimize the levels. Random spot contamination can also occur from analytes that are not common laboratory problems but can arise as a problem for a specific project or over a short period. Field blanks, equipment blanks, trip blanks, and laboratory method blanks are analyzed to identify possible sources of contamination.

For this project, one field blank sample was collected to assess potential ambient background cross-contamination of sampled media. Eighteen trip blank samples were sent with the coolers to assess potential cooler transportation cross contamination. VOC results for the field and trip blank samples are presented in **Table 3-2**. The following text discusses validation actions required as a result of laboratory, field and/or trip blank contamination.

SDG 20L102

- Acetone and methylene chloride were detected in the trip blank samples. One acetone sample result was qualified as nondetect "U" at the MRL. The remaining sample results were nondetect and did not require qualification.
- Lead, manganese, sodium, calcium, iron, arsenic, selenium, thallium and mercury were detected in some of the laboratory blanks. Applicable sample results for arsenic, iron, lead, manganese, selenium, and thallium were qualified as nondetect "U" at the MRL. The remaining associated sample results were either nondetect, greater than the MRL, or the negative blank result was greater than the negative MRL value and did not require qualification.

SDG 20L175

- Acetone was detected in multiple trip blank samples and the field blank sample. Applicable acetone results were qualified as nondetect "U" at the MRL. The remaining sample results were nondetect and did not require qualification.
- Vanadium, chromium, nickel, arsenic, selenium, mercury and manganese were detected in some of the laboratory blanks. Applicable sample results for vanadium, chromium, nickel, arsenic, selenium, and manganese were qualified as nondetect "U" at the MRL. The remaining associated sample results were either nondetect, greater than the MRL, or the negative blank result was greater than the negative MRL value and did not require qualification.

SDG 20L132

- Mercury, sodium, manganese, cadmium, thallium, lead, barium, copper and sulfate were detected in some of the laboratory blank samples. Applicable sample results for mercury and manganese were qualified as nondetect "U" at the MRL. The remaining associated sample results were either nondetect, greater than the MRL, or the negative blank result was greater than the negative MRL value and did not require qualification. Some of the detected analytes in the laboratory blanks were associated with dilution analyses. Associated sample results for these analytes were reported from the initial analysis. This

analysis was identified as the most defensible set of results and therefore these results did not require qualification.

- Total organic carbon was detected in the method blank. Associated sample results were qualified as nondetect "U" at the MRL.

SDG 20L141

- Acetone was detected in some of the trip blank samples. Associated sample results were nondetect and did not require qualification.
- Manganese, lead, mercury, cadmium, copper and sodium were detected in some of the laboratory blank samples. Applicable sample results for lead were qualified as nondetect "U" at the MRL. The remaining associated sample results were either nondetect, greater than the MRL, or the negative blank result was greater than the negative MRL value and did not require qualification. Some of the detected analytes in the laboratory blanks were associated with dilution analyses. Associated sample results for these analytes were reported from the initial analysis. This analysis was identified as the most defensible set of results and therefore these results did not require qualification.

SDG 20L133

- Acetone was detected in some of the trip blank samples. Associated sample results were nondetect and did not require qualification.
- Manganese, lead, mercury, and thallium were detected in some of the laboratory blank samples. Applicable sample results for lead were qualified as nondetect "U" at the MRL. The remaining associated sample results were either nondetect, greater than the MRL, or the negative blank result was greater than the negative MRL value and did not require qualification. Some of the detected analytes in the laboratory blanks were associated with dilution analyses. Associated sample results for these analytes were reported from the initial analysis. This analysis was identified as the most defensible set of results and therefore these results did not require qualification.
- Total organic carbon was detected in the method blank. Associated sample results were qualified as nondetect "U" at the MRL.

Ideally, no contaminants should be found in the blank samples. Blank samples are used to determine the validity of the analytical results by determining the existence and magnitude of contamination resulting from laboratory (or field) activities or baseline drift during analysis. As discussed above, analytes were detected in some of the laboratory blank samples and/or field and trip blank samples. Concentrations were below the MRLs for all detected blank results. Analytes detected in laboratory blanks are common with laboratory analyses and almost unavoidable.

Associated sample results for the laboratory blanks and/or field and trip blank samples were qualified following the appropriate guidelines. Detected blank concentrations were below the MRLs and the resulting sample qualifications as nondetect or "U" does not falsely diminish identification of site-related contaminants.

5.3 Representativeness

Representativeness is a qualitative term that expresses the degree to which the sample data accurately and precisely represent the environmental conditions corresponding to the location and/or depth interval of sample collection. Requirements and procedures for sample collection were designed to maximize sample representativeness.

Representativeness can be monitored by reviewing field documentation and/or performing field audits. For this report, a detailed review was performed on the COC and field data collection forms. Appropriate laboratory QA/QC requirements were described in the QAPP (CDM Smith 2020) and laboratory statement of work to confirm that the laboratory analytical results were representative of true field conditions.

Field sampling representativeness was attained through strict adherence to the sampling design and the approved QAPP (CDM Smith 2020) procedures and by using EPA-approved analytical methods for sample analyses. As a result, the data represent as near as possible the actual field conditions at the time of sampling.

Representativeness, as defined above, was met for the fieldwork and laboratory analyses. The data collected are suitable for project use.

5.4 Comparability

Comparability is a qualitative term that expresses the confidence with which a data set can be compared with another. Strict adherence to standard sample collection procedures, analytical detection limits, and analytical methods is necessary so data from similar samples and sample conditions are comparable. This comparability is independent of laboratory personnel, data reviewers, or sampling personnel. Comparability criteria are met for the project if, based on data review, the sample collection and analytical procedures used are similar and are determined to have been followed.

To achieve comparability of data generated for the Site, CDM Smith followed standard sample collection procedures and EPA-approved analytical methods during sampling activities. The sample analyses were performed by EMAX using approved standard operating procedures and reporting units. Utilizing such procedures and methods enables the current data to be comparable to future data sets generated with similar methods and units.

5.5 Completeness

Completeness of the field program is defined as the percentage of samples planned for collection, as listed in the QAPP (CDM Smith 2020), versus the actual number of samples collected during the field program (see equation A).

Completeness for acceptable data is defined as the percentage of acceptable data obtained judged to be valid versus the total quantity of data generated (see equation B). Acceptable data include both data that pass all the QC criteria (unqualified data) and data that may not pass all the QC criteria but had appropriate corrective actions taken (qualified but usable data).

A. $$\%Completeness = Cx\frac{100}{n}$$

Where:

C = actual number of samples collected
n = total number of samples planned

B. $$\%Completeness = Vx\frac{100}{n'}$$

Where:

V = number of measurements judged valid
n' = total number of measurements made

The overall completeness goal for this sampling event was 90% for all project data.

Not all samples outlined in the QAPP (CDM Smith, 2020) were able to be collected as planned; this is discussed in Section 3.1. Sixty-six samples were planned to be collected not including field duplicates. Sixty-four samples were collected. The completeness for the number of samples planned to be collected versus the number of samples collected was 97%, thus exceeding the 90% goal. Samples that were not able to be collected will be sampled in future sampling events if possible.

Analyses for the sampling event exceeded the 90% completeness goal of acceptable data for the number of measurements judged to be valid versus the total number of measurements made.

One hundred percent of the data validated and reported are suitable for their intended use for site characterization. No results were rejected, and all data collected met the overall project objective for data usability. The completeness goals were met for both the number of samples collected for all sampling events and the number of measurements judged to be valid.

The data usability DQO was achieved; the data reported are suitable for their intended use as stated in the QAPP (CDM Smith 2020). The achievement of the completeness goals for the data provides sufficient data for project decisions.

5.6 Sensitivity

Sensitivity is related to the ability to compare analytical results with project-specific levels of interest such as delineation levels or action levels. Analytical quantitation limits for the various sample analytes should be below the level of interest to allow an effective comparison.

The method detection limit (MDL) study attempts to answer the question, “What is the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero?” The study is based upon repetitive analysis of an interference-free sample spiked with a known amount of the target analyte. The MDL is a measure of the ability of the test procedure to generate a positive response for the target analyte in the absence of any other interferences from the sample.

The MRL is generally defined as the lowest concentration at which an analyte can be confidently reported in a sample and its concentration reported with a reasonable degree of accuracy and

precision. For samples that do not pose a particular matrix problem, the MRL is typically about three to five times higher than the MDL.

Laboratory results are reported according to rules that provide established certainty of detection. The result for an analyte is flagged with a "U" if that analyte was not detected and reported at the MRL value or qualified with a "J" flag if associated QC results fall outside the appropriate QC criteria. Additionally, if an analyte is present at a concentration between the MDL and the MRL, the analytical result is flagged with a "J," indicating an estimated quantity. Qualifying the result as an estimated concentration reflects uncertainty in the reported value.

When required, dilutions were performed and accounted for in the reported MRLs. For each analyte, laboratory MRLs were low enough to compare to the project criteria stated in the laboratory statement of work and the QAPP (CDM Smith 2020).

Table 5-1 DQIs and Corresponding QC Parameters

Data Quality Indicators	QC Parameters Evaluation in Data Review/Validation
Precision	RPD values of: 1) Laboratory duplicates 2) Field duplicates 3) MS/MSD 4) LCS/LCSD 5) Serial dilution (ICP metals) Relative standard deviation (RSD) values of: 1) Initial calibration verifications
Accuracy/Bias	%R or percent difference (%D) values of: 1) LCS/LCSD %R 2) MS/MSD %R 3) Initial calibration verification/continuing calibration verification %R 4) ICP interference check standards 5) ICP-mass spectrometry (MS) tune percent RSD 6) ICP-MS internal standard %R intensity 7) Surrogates 8) Internal standards Results of: 1) Instrument and calibration blanks 2) Method (preparation) blanks 3) Field blanks 4) Trip blanks
Representativeness	Results of all blanks Adherence to field standard operating procedures Sample integrity (COC and sample receipt forms) Holding times
Comparability	Similar reporting limits and units Similar sample collection methods Similar laboratory analytical methods
Completeness	Data qualifiers Laboratory deliverables Requested/Reported valid results Field sample collection (primary and QC samples) Contract compliance (i.e., method and instrument QC within limits)
Sensitivity	Sample method reporting limits meet QAPP criteria Adequacy of sample dilution

Table 5-2
Summary of Field Duplicate Sampling Results

		Well	MW-02		MW-02		RPD (%)	MW-04		MW-04		RPD (%)	MW-05R		MW-05R		RPD (%)	MW-08A		MW-08A		RPD (%)	MW-18		MW-18		RPD (%)
		Sample Name	MW02-GW121620		FD01-GW121620			MW04-GW121020		FD02-GW121020			MW05R-GW120820		FD05-GW120820			MW08A-GW120920		FD03-GW120920			MW18-GW121420		FD06-GW121420		
		Sample Date	12/16/2020		12/16/2020			12/10/2020		12/10/2020			12/8/2020		12/8/2020			12/9/2020		12/9/2020			12/14/2020		12/14/2020		
		Sample Type	N		FD			N		FD			N		FD			N		FD			N		FD		
Method	Analyte	Unit	Result	Q	Result	Q		Result	Q	Result	Q		Result	Q	Result	Q		Result	Q	Result	Q		Result	Q	Result	Q	
Volatile Organic Compounds																											
SW8260C	1,1,1-Trichloroethane	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	0.64	J	0.65	J	ABS Criteria	0.61	J	0.6	J	ABS Criteria
SW8260C	1,1,2,2-Tetrachloroethane	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,1,2-Trichloroethane	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,1,2-Trichlorotrifluoroethane	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,1-Dichloroethane	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,1-Dichloroethene	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	0.19	J	0.18	J	ABS Criteria	0.12	J	0.14	J	ABS Criteria
SW8260C	1,2,3-Trichlorobenzene	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,2,4-Trichlorobenzene	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,2,4-Trimethylbenzene	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,2-Dibromo-3-Chloropropane	µg/L	2	U	2	U	NC	2	U	2	U	NC	2	U	2	U	NC	2	U	2	U	NC	2	U	2	U	NC
SW8260C	1,2-Dibromoethane	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,2-Dichlorobenzene	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,2-Dichloroethane	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,2-Dichloropropane	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,3,5-Trimethylbenzene	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,3-Dichlorobenzene	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,4-Dichlorobenzene	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	2-Butanone (MEK)	µg/L	20	U	20	U	NC	20	U	20	U	NC	20	U	20	U	NC	20	U	20	U	NC	20	U	20	U	NC
SW8260C	2-Hexanone	µg/L	20	U	20	U	NC	20	U	20	U	NC	20	U	20	U	NC	20	U	20	U	NC	20	U	20	U	NC
SW8260C	4-Methyl-2-Pentanone (MIBK)	µg/L	20	U	20	U	NC	20	U	20	U	NC	20	U	20	U	NC	20	U	20	U	NC	20	U	20	U	NC
SW8260C	Acetone	µg/L	20	U	20	U	NC	20	U	20	U	NC	20	U	2.6	J	ABS Criteria	20	U	3.6	J	ABS Criteria	20	U	20	U	NC
SW8260C	Benzene	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Bromochloromethane	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Bromodichloromethane	µg/L	0.36	J	0.38	J	ABS Criteria	0.36	J	0.38	J	ABS Criteria	0.35	J	0.37	J	ABS Criteria	0.57	J	0.6	J	ABS Criteria	0.24	J	0.24	J	ABS Criteria
SW8260C	Bromoform	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Bromomethane	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Carbon Disulfide	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Carbon Tetrachloride	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Chlorobenzene	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Chloroethane	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Chloroform	µg/L	3.9		4		ABS Criteria	4.2		4.1		ABS Criteria	6.4		6.3		1.57	4.3		4.8		ABS Criteria	2.4		2.4		ABS Criteria
SW8260C	Chloromethane	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	cis-1,2-Dichloroethene	µg/L	0.43	J	0.44	J	ABS Criteria	0.15	J	0.15	J	ABS Criteria	1	U	1	U	NC	0.23	J	0.26	J	ABS Criteria	0.23	J	0.21	J	ABS Criteria
SW8260C	cis-1,3-Dichloropropene	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Dibromochloromethane	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Dichlorodifluoromethane	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Ethylbenzene	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Isopropylbenzene	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	M+P-Xylenes	µg/L	2	U	2	U	NC	2	U	2	U	NC	2	U	2	U	NC	2	U	2	U	NC	2	U	2	U	NC
SW8260C	Methyl Acetate	µg/L	2	U	2	U	NC	2	U	2	U	NC	2	U	2	U	NC	2	U	2	U	NC	2	U	2	U	NC
SW8260C	Methyl Tert-Butyl Ether	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Methylene Chloride	µg/L	2	U	2	U	NC	2	U	2	U	NC	2	U	2	U	NC	2	U	2	U	NC	2	U	2	U	NC
SW8260C	O-Xylene	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Styrene	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Tetrachloroethene	µg/L	220		210		4.65	40		38		5.13	1	U	1	U	NC	52		53		1.90	53		56		5.50
SW8260C	Toluene	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Trans-1,2-Dichloroethene	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Trans-1,3-Dichloropropene	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Trichloroethene	µg/L	0.55	J	0.6	J	ABS Criteria	0.24	J	0.22	J	ABS Criteria	1	U	1	U	NC	0.42	J	0.42	J	ABS Criteria	0.44	J	0.43	J	ABS Criteria
SW8260C	Trichlorofluoromethane	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Vinyl Acetate	µg/L	2	U	2	U	NC	2	U	2	U	NC	2	U	2	U	NC	2	U	2	U	NC	2	U	2	U	NC
SW8260C	Vinyl Chloride	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
Semivolatile Organic Compounds SIM (1,4-Dioxane)																											
8270DSIM	1,4-Dioxane	µg/L	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

Table 5-2
Summary of Field Duplicate Sampling Results

		Well	MW-02		MW-02		RPD (%)	MW-04		MW-04		RPD (%)	MW-05R		MW-05R		RPD (%)	MW-08A		MW-08A		RPD (%)	MW-18		MW-18		RPD (%)
		Sample Name	MW02-GW121620		FD01-GW121620			MW04-GW121020		FD02-GW121020			MW05R-GW120820		FD05-GW120820			MW08A-GW120920		FD03-GW120920			MW18-GW121420		FD06-GW121420		
		Sample Date	12/16/2020		12/16/2020			12/10/2020		12/10/2020			12/8/2020		12/8/2020			12/9/2020		12/9/2020			12/14/2020		12/14/2020		
		Sample Type	N		FD			N		FD			N		FD			N		FD			N		FD		
Method	Analyte	Unit	Result	Q	Result	Q		Result	Q	Result	Q		Result	Q	Result	Q		Result	Q	Result	Q		Result	Q	Result	Q	
Total Metals																											
SW6020A	Aluminum	µg/L	100	U	100	U	NC	100	U	100	U	NC	59.7	J	100	U	ABS Criteria	58.2	J	55.3	J	ABS Criteria	100	U	100	U	NC
SW6020A	Antimony	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW6020A	Arsenic	µg/L	1.44		1.43		ABS Criteria	1.3		1.39		ABS Criteria	1.05		1.04		ABS Criteria	1	U	1	U	NC	1.16		1.22		ABS Criteria
SW6020A	Barium	µg/L	86.4		85.6		0.93	50		51.5		2.96	73		74.2		1.63	86.1		86.1		0.00	96.3		100		3.77
SW6020A	Beryllium	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW6020A	Cadmium	µg/L	1	U	1	U	NC	1	U	1	U	NC	0.171	J	1	U	ABS Criteria	1	U	1	U	NC	1	U	1	U	NC
SW6020A	Calcium	µg/L	172000		173000		0.58	142000		141000		0.71	165000		167000		1.20	188000		189000		0.53	165000		166000		0.60
SW6020A	Chromium	µg/L	3.08		2.84		ABS Criteria	2		2.11		ABS Criteria	0.646	J	0.681	J	ABS Criteria	0.948	J	0.99	J	ABS Criteria	1.41		1.46		ABS Criteria
SW6020A	Cobalt	µg/L	0.414	J	0.406	J	ABS Criteria	0.496	J	0.512	J	ABS Criteria	0.635	J	0.437	J	ABS Criteria	0.599	J	0.537	J	ABS Criteria	0.383	J	0.409	J	ABS Criteria
SW6020A	Copper	µg/L	0.749	J	0.671	J	ABS Criteria	2.97		2.85		ABS Criteria	2.16		2	U	ABS Criteria	2	U	2	U	NC	2	U	2	U	NC
SW6020A	Iron	µg/L	100	U	100	U	NC	100	U	100	U	NC	100	U	100	U	NC	100	U	100	U	NC	207		221		ABS Criteria
SW6020A	Lead	µg/L	1	U	1	U	NC	0.254	J	0.279	J	ABS Criteria	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW6020A	Magnesium	µg/L	60100		59300		1.34	47200		48200		2.10	63800		63100		1.10	72500		72800		0.41	64000		66800		4.28
SW6020A	Manganese	µg/L	1	U	1	U	NC	1	UJ	3.23	J	ABS Criteria	1.56		1	U	ABS Criteria	9.14		7.98		13.55	5.89		4.89		ABS Criteria
SW6020A	Nickel	µg/L	1.5		1.45		ABS Criteria	2.15		2.17		ABS Criteria	0.438	J	0.529	J	ABS Criteria	0.599	J	0.703	J	ABS Criteria	1	U	1	U	NC
SW6020A	Potassium	µg/L	2740		2780		1.45	2320		2390		2.97	2710		2750		1.47	2830		2850		0.70	3220		3350		3.96
SW6020A	Selenium	µg/L	1	U	1	U	NC	0.655	J	0.752	J	ABS Criteria	1	U	1	U	NC	1	U	1		ABS Criteria	1	U	1.03		ABS Criteria
SW6020A	Silver	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW6020A	Sodium	µg/L	147000		148000		0.68	112000		112000		0.00	60900		61900		1.63	93500		93900		0.43	98600		99500		0.91
SW6020A	Thallium	µg/L	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC	1	U	1	U	NC
SW6020A	Vanadium	µg/L	2.36		2.39		ABS Criteria	2.66		2.76		ABS Criteria	2.04		2.09		ABS Criteria	1.79		1.81		ABS Criteria	1.97		2.08		ABS Criteria
SW6020A	Zinc	µg/L	20	U	20	U	NC	11	J	11.6	J	ABS Criteria	20	U	20	U	NC	20	U	20	U	NC	20	U	6.72	J	ABS Criteria
SW7470A	Mercury	µg/L	0.5	U	0.5	U	NC	0.5	U	0.5	U	NC	0.5	U	0.5	U	NC	0.5	U	0.5	U	NC	0.5	U	0.5	U	NC
Dissolved Gases																											
RSK-175	Ethane	µg/L	2	U	2	U	NC	2	U	2	U	NC	2	U	2	U	NC	2	U	2	U	NC	2	U	2	U	NC
RSK-175	Ethene	µg/L	2	U	2	U	NC	2	U	2	U	NC	2	U	2	U	NC	2	U	2	U	NC	2	U	2	U	NC
RSK-175	Methane	µg/L	2	U	2	U	NC	2	U	2	U	NC	0.46	J	0.56	J	ABS Criteria	0.34	J	0.36	J	ABS Criteria	2	U	2	U	NC
General Chemistry Parameters																											
A4500NE	Nitrate/Nitrite	mg/L	3.38		3.42		1.18	2.4		2.22		7.79	3.71		3.78		1.87	4.58		4.27		7.01	5.04		4.76		5.71
E300.0	Chloride	mg/L	437		439		0.46	241		241		0.00	307		278		9.91	462		450		2.63	370		353		4.70
E300.0	Sulfate	mg/L	88.8		90.9		2.34	96.2		102		5.85	121		117		3.36	102		109		6.64	104		98.9		5.03
SM2320B	Alkalinity	mg/L	294		295		0.34	298		293		1.69	293		293		0.00	219		220		0.46	281		288		2.46
SW9060	Total Organic Carbon	mg/L	0.855	J	0.842	J	ABS Criteria	1	U	1	U	NC	1.06		1.11		ABS Criteria	0.588	J	0.665	J	ABS Criteria	0.577	J	0.68	J	ABS Criteria

Notes:
N - Normal sample
FD- Field Duplicate
µg/L - microgram per liter
mg/L - milligram per liter
Q - qualifier
ABS - absolute difference
RPD - Relative Percent Difference
SIM - selective ion monitoring
U - nondetect
UJ - estimated nondetect
J - estimated value
NC - not calculated
ABS Criteria - One or both of the sample results are less than 5 times the reporting limit. The absolute value between the two results is within acceptable criteria.
Yellow highlighting - RPD value is outside of 30% criteria and/or the ABS Criteria is outside of control limits

Table 5-2
Summary of Field Duplicate Sampling Results

		Well	MW-36		MW-36		RPD (%)	MW-37S		MW-37S		RPD (%)
		Sample Name	MW36-GW121420		FD07-GW121420			MW37S-GW121420		FD04-GW121420		
		Sample Date	12/14/2020		12/14/2020			12/14/2020		12/14/2020		
		Sample Type	N		FD			N		FD		
Method	Analyte	Unit	Result	Q	Result	Q		Result	Q	Result	Q	
Volatile Organic Compounds												
SW8260C	1,1,1-Trichloroethane	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,1,2,2-Tetrachloroethane	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,1,2-Trichloroethane	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,1,2-Trichlorotrifluoroethane	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,1-Dichloroethane	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,1-Dichloroethene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,2,3-Trichlorobenzene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,2,4-Trichlorobenzene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,2,4-Trimethylbenzene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,2-Dibromo-3-Chloropropane	µg/L	2	U	2	U	NC	2	U	2	U	NC
SW8260C	1,2-Dibromoethane	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,2-Dichlorobenzene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,2-Dichloroethane	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,2-Dichloropropane	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,3,5-Trimethylbenzene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,3-Dichlorobenzene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,4-Dichlorobenzene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	2-Butanone (MEK)	µg/L	20	U	20	U	NC	20	U	20	U	NC
SW8260C	2-Hexanone	µg/L	20	U	20	U	NC	20	U	20	U	NC
SW8260C	4-Methyl-2-Pentanone (MIBK)	µg/L	20	U	20	U	NC	20	U	20	U	NC
SW8260C	Acetone	µg/L	20	U	20	U	NC	20	U	20	U	NC
SW8260C	Benzene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Bromochloromethane	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Bromodichloromethane	µg/L	1	U	1	U	NC	0.11	J	0.11	J	ABS Criteria
SW8260C	Bromoform	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Bromomethane	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Carbon Disulfide	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Carbon Tetrachloride	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Chlorobenzene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Chloroethane	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Chloroform	µg/L	0.79	J	0.77	J	ABS Criteria	2.2		2.1		ABS Criteria
SW8260C	Chloromethane	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	cis-1,2-Dichloroethene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	cis-1,3-Dichloropropene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Dibromochloromethane	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Dichlorodifluoromethane	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Ethylbenzene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Isopropylbenzene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	M+P-Xylenes	µg/L	2	U	2	U	NC	2	U	2	U	NC
SW8260C	Methyl Acetate	µg/L	2	U	2	U	NC	2	U	2	U	NC
SW8260C	Methyl Tert-Butyl Ether	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Methylene Chloride	µg/L	2	U	2	U	NC	2	U	2	U	NC
SW8260C	O-Xylene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Styrene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Tetrachloroethene	µg/L	0.28	J	0.28	J	ABS Criteria	1	U	1	U	NC
SW8260C	Toluene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Trans-1,2-Dichloroethene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Trans-1,3-Dichloropropene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Trichloroethene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Trichlorofluoromethane	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Vinyl Acetate	µg/L	2	U	2	U	NC	2	U	2	U	NC
SW8260C	Vinyl Chloride	µg/L	1	U	1	U	NC	1	U	1	U	NC
Semivolatile Organic Compounds SIM (1,4-Dioxane)												
8270DSIM	1,4-Dioxane	µg/L	0.42	UJ	3.1	J	ABS Criteria	0.45	U	0.44	U	NC

Table 5-2
Summary of Field Duplicate Sampling Results

		Well	MW-36		MW-36		RPD (%)	MW-37S		MW-37S		RPD (%)
		Sample Name	MW36-GW121420		FD07-GW121420			MW37S-GW121420		FD04-GW121420		
		Sample Date	12/14/2020		12/14/2020			12/14/2020		12/14/2020		
		Sample Type	N		FD			N		FD		
Method	Analyte	Unit	Result	Q	Result	Q		Result	Q	Result	Q	
Total Metals												
SW6020A	Aluminum	µg/L	100	U	27.3	J	ABS Criteria	100	U	100	U	NC
SW6020A	Antimony	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW6020A	Arsenic	µg/L	0.71	J	0.697	J	ABS Criteria	1	U	1	U	NC
SW6020A	Barium	µg/L	135		136		0.74	48.4		48.5		0.21
SW6020A	Beryllium	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW6020A	Cadmium	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW6020A	Calcium	µg/L	150000		151000		0.66	176000		181000		2.80
SW6020A	Chromium	µg/L	0.26	J	0.275	J	ABS Criteria	1	U	1	U	NC
SW6020A	Cobalt	µg/L	2.46		2.49		ABS Criteria	0.463	J	0.454	J	ABS Criteria
SW6020A	Copper	µg/L	2	U	2	U	NC	2	U	1.4	J	ABS Criteria
SW6020A	Iron	µg/L	105		109		ABS Criteria	67.7	J	73.5	J	ABS Criteria
SW6020A	Lead	µg/L	0.104	J	0.109	J	ABS Criteria	1	U	1	U	NC
SW6020A	Magnesium	µg/L	45900		46700		1.73	82700		86100		4.03
SW6020A	Manganese	µg/L	778		790		1.53	17		17.1		0.59
SW6020A	Nickel	µg/L	8.74		9.01		3.04	1	U	1	U	NC
SW6020A	Potassium	µg/L	3480		3540		1.71	4250		4270		0.47
SW6020A	Selenium	µg/L	0.798	J	0.823	J	ABS Criteria	2.43		2.45		ABS Criteria
SW6020A	Silver	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW6020A	Sodium	µg/L	118000		118000		0.00	205000		212000		3.36
SW6020A	Thallium	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW6020A	Vanadium	µg/L	0.963	J	1.01		ABS Criteria	1.44		1.44		ABS Criteria
SW6020A	Zinc	µg/L	225		224		0.45	5.05	J	11.2	J	ABS Criteria
SW7470A	Mercury	µg/L	0.5	U	0.5	U	NC	0.5	U	0.5	U	NC
Dissolved Gases												
RSK-175	Ethane	µg/L	2	U	2	U	NC	2	U	2	U	NC
RSK-175	Ethene	µg/L	2	U	2	U	NC	2	U	2	U	NC
RSK-175	Methane	µg/L	0.47	J	0.45	J	ABS Criteria	2	U	2	U	NC
General Chemistry Parameters												
A4500NE	Nitrate/Nitrite	mg/L	1.58		1.51		4.53	6.42		6.29		2.05
E300.0	Chloride	mg/L	225		215		4.55	451		439		2.70
E300.0	Sulfate	mg/L	132		131		0.76	199		198		0.50
SM2320B	Alkalinity	mg/L	339		349		2.91	405		403		0.50
SW9060	Total Organic Carbon	mg/L	1	U	1.24		ABS Criteria	1.74		0.908	J	ABS Criteria

Notes:
N - Normal sample
FD- Field Duplicate
µg/L - microgram per liter
mg/L - milligram per liter
Q - qualifier
ABS - absolute difference
RPD - Relative Percent Difference
SIM - selective ion monitoring
U - nondetect
UJ - estimated nondetect
J - estimated value
NC - not calculated
ABS Criteria - One or both of the sample results are less than 5 times the reporting limit. The absolute value between the two results is within acceptable criteria.
Yellow highlighting - RPD value is outside of 30% criteria and/or the ABS Criteria is outside of control limits

Section 6

Data Usability Assessment

One hundred percent of the data reported and validated in this QCSR are suitable for their intended use as stated in the QAPP (CDM Smith 2020). No sample results were rejected.

The achievement of the completeness goals for the number of samples collected and the number of sample results acceptable for use provides sufficient quality data to support project decisions. Sample results that were qualified as estimated are usable for project decisions.

Section 7
References

CDM Smith. 2020. *Phase 2 Quality Assurance Project Plan, Operable Unit 1, 700 South 1600 East PCE Plume, Salt Lake City, Utah.* Prepared for the U.S. Army Corps of Engineers, Kansas City District. December 2020.

EPA. 2017. *National Functional Guidelines for Inorganic Superfund Methods Data Review*, EPA-540-R-2017-001, January 2017.

EPA. 2017. *National Functional Guidelines for Organic Superfund Methods Data Review*, EPA-540-R-2017-002, January 2017.

EPA 2004. EPA's *Test Methods for Evaluating Solid Wastes: Physical/Chemical Methods* (SW-846 2nd edition 1982, revised 1984; 3rd edition 1986; and Updates I, II, IIA, III, IIIA, and IIIB, 1996, 1998, and 2004.

Attachment 1

Data Validation Reports

VA Salt Lake City
Salt Lake City, Utah
Groundwater Validation Report

Sample Delivery Group (SDG) Number: 20L102
Laboratory: EMAX Laboratories, Inc.

Matrix: Groundwater
Collection date: 12/08/2020, 12/09/2020
Analysis/Methods:

Volatile Organic Compounds SW 846 8260C
Semivolatile Organic Compounds SW 846 8270D (1,4-Dioxane)
Metals SW 846 6020A
Mercury SW 846 7470A
Dissolved Gases - RSK 175
Wet Chemistry Parameters:
Chloride EPA 300.0
Sulfate EPA 300.0
Total Alkalinity SM 2320B
Nitrate / Nitrite - N SM 4500 NO3E
Total Organic Carbon (TOC) SW 9060

Samples in SDG:

Lab ID	Sample Number	Lab ID	Sample Number
L102-01	MW27-GW120820	L102-11	TB01A-GW120920
L102-02	MW05R-GW120820	L102-12	MW30RA-GW120820
L102-03	FD05-GW120820	L102-13	MW30RB-GW120820
L102-04	MW15D-GW120920	L102-14	MW30C-GW120920
L102-05	MW15S-GW120920	L102-15	TB04A-GW120920
L102-06	TB03A-GW120920	L102-16	MW08A-GW120920
L102-07	MW24-GW120820	L102-17	MW08B-GW120920
L102-08	MW28-GW120820	L102-18	FD03-GW120920
L102-09	MW12D-GW120920	L102-19	TB02A-GW120920
L102-10	MW08C-GW120920		

Data validation was performed in accordance with the specific analytical methods, National Functional Guidelines for Organic Superfund Methods Data Review (EPA January 2017), and the National Functional Guidelines for Inorganic Superfund Methods Data Review (EPA January 2017).

Volatile Organic Compounds 8260C

Precision:

	Yes	No	N/A
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?	Yes		
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)	Yes		
Laboratory Control Spike Duplicates RPD within limits?	Yes		

Comments (note deviations):

Field Duplicates	8260C	Sample	Duplicate	%RPD	Qualifiers	Associated Samples
		MW05R-GW120820 (L102-02)	**FD05-GW120820 (L102-03)**			
	Acetone	20 U	2.6 J	NC	None	Sample results < 5xs RL;
	Bromodichloromethane	0.35 J	0.37 J	NC	None	ABS Diff. < RL
		MW08A-GW120920 (L102-16)	**FD03-GW120920 (L102-18)**			
	1,1,1-Trichloroethane	0.64 J	0.65 J	NC	None	Sample results < 5xs RL;
	1,1-Dichloroethene	0.19 J	0.18 J	NC	None	ABS Diff. < RL
	Acetone	20 U	3.6 J	NC	None	
	Bromodichloromethane	0.57 J	0.6 J	NC	None	
	Chloroform	4.3	4.8	NC	None	
	Cis-1,2-Dichloroethylene	0.23 J	0.26 J	NC	None	Sample results < 5xs RL;
	Trichlorothene	0.42 J	0.42 J	NC	None	ABS Diff. < RL

MS/MSD	8260C	%RPD	Limit	Qualifiers	Associated Samples
MW08B-GW120920 (L102-17)	MS/MSD	Acceptable			

LCS/LCSD	8260C	%RPD	Limits	Qualifiers	Associated Samples
LCS1W / LCSD1W		Acceptable			
LCS2W / LCSD2W		Acceptable			
LCS3W / LCSD3W		Acceptable			

Accuracy:	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)	Yes		
Laboratory Control Sample criteria met?	Yes		
Were the Laboratory Method Blank results all < RL?	Yes		
Were the Field Blanks results all < RL?		No	
Was the ICAL criteria met?	Yes		
Was the CCV criteria met?	Yes		
Was the Tuning criteria met?	Yes		
Were the Surrogate % recoveries within laboratory determined control limits?	Yes		
Were the Internal Standard areas within ± 50 - 150%?	Yes		

Comments (note deviations):

Blanks	8260C	Concentration	MDL /RL	Qualifiers	Associated Samples
MBLK1W		Nondetect			
MBLK2W		Nondetect			
MBLK3W		Nondetect			

Field Blank	8260C	Concentration	MDL /RL	Qualifiers	Associated Samples
Associated Samples: L102-07 through L102-10					
TB01A-GW120920	Acetone	2.8 J	2.5 / 20	U-RL	L102-10
Associated Samples: L102-16 through L102-18					
TB02A-GW120920	Methylene Chloride	0.60 J	0.5 / 2.0	None	Sample results nondetect
Associated Samples: L102-01 through L102-05					
TB03A-GW120920	Methylene Chloride	0.60 J	0.5 / 2.0	None	Sample results nondetect
TB04A-GW120920		Nondetect			

Surrogates	8260C	%R	Limit	Qualifiers	Associated Samples
		Acceptable			

MS/MSD	8260C	%R	Limit	Qualifiers	Associated Samples
MW08B-GW120920 MS/MSD (L102-17)		Acceptable			

LCS/LCSD	8260C	%R	Limits	Qualifiers	Associated Samples
LCS1W / LCSD1W		Acceptable			
LCS2W / LCSD2W		Acceptable			
LCS3W / LCSD3W		Acceptable			

ICAL	8260C	RRF	%RSD	Qualifiers	Associated Samples
12/03/2020 9:58		Acceptable	Acceptable		

CCV	8260C	RRF	%D	Limits	Qualifiers	Associated Samples
12/15/20 9:53		Acceptable	Acceptable			
12/16/20 10:26		Acceptable	Acceptable			
12/17/20 10:21		Acceptable	Acceptable			

Tune	8260C
	Acceptable

Internal Standards	8260C	Area	Area Lower / Upper Limit	Qualifiers	Associated Samples
		Acceptable			

Semivolatile Organic Compounds 8270D (1,4-Dioxane SIM)

Precision:

	Yes	No	N/A
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?			N/A
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			N/A
Laboratory Control Spike Duplicates RPD within limits?	Yes		

Comments (note deviations):

Field Duplicates	8270D	Sample	Duplicate	RPD	Qualifiers	Associated Samples
N/A						

MS/MSD	8270D	RPD	Limit	Qualifiers	Associated Samples
N/A					

LCS/LCSD	8270D	RPD	Limit	Qualifiers	Associated Samples
LCS1W / LCSD1W		Acceptable			

Accuracy:

	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			N/A
Laboratory Control Sample criteria met?	Yes		
Were the Laboratory Method Blank results all < RL?	Yes		
Were the Field Blanks results all < RL?			N/A
Was the ICAL criteria met?	Yes		
Was the CCV criteria met?	Yes		
Was the Tuning criteria met?	Yes		
Were the Surrogate % recoveries within laboratory determined control limits?	Yes		
Were the Internal Standard areas within ± 50 - 150%?	Yes		

Comments (note deviations):

Blanks	8270D	Concentration (ug/L)	MDL / RL	Qualifiers	Associated Samples
MBLK1W		Nondetect			

Field Blank	8270D	Concentration	MDL / RL	Qualifiers	Associated Samples
N/A					

Surrogates	8270D	%R	Limit	Qualifiers	Associated Samples
		Acceptable			

MS/MSD	8270D	%R	Limits (%)	Qualifiers	Associated Samples
N/A					

LCS/LCSD	8270D	%R	Limits	Qualifiers	Associated Samples
LCS1W / LCSD1W		Acceptable			

ICAL	8270D	RRF	%RSD	Qualifiers	Associated Samples
6/3/2020 14:04		Acceptable	Acceptable		

CCV	8270D	RRF	%D	Qualifiers	Associated Samples
12/15/2020 14:37		Acceptable	Acceptable		

Tune	8270D
	Acceptable

Internal Standards	8270D	Area	Area Lower / Upper Limit	Qualifiers	Associated Samples
		Acceptable			

Dissolved Gases RSK-175

Precision:

	Yes	No	N/A
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?	Yes		
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)	Yes		
Laboratory Control Spike Duplicates RPD within limits?	Yes		
Are the laboratory duplicate RPDs ≤ 20% for water ≤35% for soils or within CRQL criteria?			N/A

Comments (note deviations):

Field Duplicates	RSK-175	Sample	Duplicate	%RPD	Qualifiers	Associated Samples
		MW05R-GW120820	FD05-GW120820			
	Methane	0.46 J	0.56 J	NC	None	Sample results < 5xs RL; ABS Diff. < RL
		MW08A-GW120920	FD03-GW120920			
	Methane	0.34 J	0.36 J	NC	None	Sample results < 5xs RL; ABS Diff. < RL

MS/MSD	RSK-175	%RPD	Limit	Qualifiers	Associated Samples
MW08B-GW120920 MS/MSD (L102-17)		Acceptable			

LCS/LCSD	RSK-175	%RPD	Limits	Qualifiers	Associated Samples
LCS1W / LCD1W		Acceptable			

Laboratory Duplicates	RSK-175	Sample (ug/L)	Duplicate (ug/L)	RPD	Qualifiers	Associated Samples
N/A						

Accuracy:

	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)	Yes		
Laboratory Control Sample criteria met?	Yes		
Were the Laboratory Method Blank results all < RL?	Yes		
Were the Field Blanks results all < RL?			N/A
Was the ICAL criteria met?	Yes		
Was the CCV criteria met?	Yes		
Was the Tuning criteria met?			N/A
Were the Surrogate % recoveries within laboratory determined control limits?			N/A
Were the Internal Standard areas within ± 50 - 150%?			N/A

Comments (note deviations):

Blanks	RSK-175	Concentration (ug/L)	MDL / RL	Qualifiers	Associated Samples
MBLK1W		Nondetect			

Field Blank	RSK-175	Concentration	MDL / RL	Qualifiers	Associated Samples
N/A					

Surrogates	RSK-175	%R	Limit	Qualifiers	Associated Samples
N/A					

MS/MSD	RSK-175	%R	Limits (%)	Qualifiers	Associated Samples
MW08B-GW120920 MS/MSD (L102-17)		Acceptable			

LCS/LCSD	RSK-175	%R	Limits	Qualifiers	Associated Samples
LCS1W / LCD1W		Acceptable			

ICAL	RSK-175	RRF	%RSD	Qualifiers	Associated Samples
4/29/2020		Acceptable	Acceptable		

CCV 4/29/2020 '14:39	**RSK-175**	**RRF** Acceptable	**%D** Acceptable	**Limits**	**Qualifiers**	**Associated Samples**

Tune N/A	**RSK-175**

Internal Standards N/A	**RSK-175**	**Area**	**Area Lower / Upper Limit**	**Qualifiers**	**Associated Samples**

Metals SW 6020A / Mercury 7470A

Precision:

	Yes	No	N/A
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?		No	
Are the laboratory duplicate RPDs ≤ 20% for (water / soil) or within CRQL criteria?			N/A
Are the matrix spike duplicates RPD ≤ 20%?	Yes		
Are the laboratory control sample duplicates RPDs ≤ 20%?	Yes		

Comments (note deviations):

Field Duplicates	Sample (ug/L)	Duplicate (ug/L)	%RPD	Qualifier	Associated Samples
	MW05R-GW120820 (L102-02)	FD05-GW120820 (L102-03)			
Aluminum	59.7 J	100 U	NC	None	Sample results < 5xs RL;
Arsenic	1.05	1.04	NC	None	ABS Diff. < RL
Cadmium	0.171 J	1.0 U	NC	None	
Chromium	0.646 J	0.681 J	NC	None	
Cobalt	0.635 J	0.437 J	NC	None	
Copper	2.16	2.0 U	NC	None	
Manganese	1.56	1 U	NC	None	
Nickel	0.438 J	0.539 J	NC	None	Sample results < 5xs RL;
Vanadium	2.04	2.09	NC	None	ABS Diff. < RL
	MW08A-GW120920 (L102-16)	FD03-GW120920 (L102-18)			
Aluminum	58.2 J	55.3 J	NC	None	Sample results < 5xs RL;
Chromium	0.948 J	0.99 J	NC	None	ABS Diff. < RL
Cobalt	0.599 J	0.537 J	NC	None	
Iron	51.2 J	47.6 J	NC	None	
Nickel	0.599 J	0.703 J	NC	None	
Selenium	0.971 J	1	NC	None	Sample results < 5xs RL;
Vanadium	1.79	1.81	NC	None	ABS Diff. < RL

MS/MSD	RPD	Qualifiers	Associated Samples
MW08B-GW120920 MS/MSD (L102-17)	Acceptable		
MW08B-GW120920 MS/MSD (Hg)	Acceptable		

LCS / LCSD	RPD	Qualifiers	Associated Samples
LCS1W / LCD1W	Acceptable		
LCS1W / LCD1W (Hg)	Acceptable		

Laboratory Duplicate	Sample	Duplicate	RPD	Qualifier	Associated Samples
N/A					

Accuracy:

	Yes	No	N/A
Were serial dilutions analyzed and within control limits of ±10% for waters (± for 15% for soils) or initial sample result less than 50x MDL?	Yes		
Was matrix spike criteria met (frequency 20% and % recovery 75-125%)?		No	
Was post digestion spike criteria met (if applicable)?	Yes		
Was laboratory control sample criteria met?	Yes		
Was laboratory blank criteria met (within control limits)?	Yes		
Were ICV/CCV % recoveries within 90-110%?	Yes		
Were the Detection Limit PQL Standards within 70-130?			N/A
Was the %D on form 16-IN for the initial calibration instrument response and concentration data <30%?			N/A
Were ICSA/ICSAB % recoveries acceptable or within CRQL criteria?	Yes		
Was the tune %RPD <5% (Peak width < 0.75)?	Yes		
Was internal standard criteria met?	Yes		

Comments (note deviations):

Serial Dilution	Analyte	Initial Sample Result	%D	50 x MDL	Qualifier	Associated Samples
			Acceptable			

MS/MSD	Analyte	%R	Limits	Post Digestion	Qualifiers	Associated Samples
MW08B-GW120920 MS/MSD						
(L102-17)	Sodium	73 / 83	75-125	93	None	ISR > 4xs the spike added
	Calcium	0 / -67	75-125	110	None	ISR > 4xs the spike added
MW08B-GW120920 MS/MSD (Hg)		Acceptable				

LCS/LCSD	Analyte	%R	Limits	Qualifiers	Associated Samples
LCS1W / LCD1W		Acceptable			
LCS1W / LCD1W (Hg)		Acceptable			

ICV/CCV	Analyte	%R	Limits	Qualifier	Associated Samples
		Acceptable			

Blanks

Prep Blank		Result (ug/L)	MDL/RL (ug/L)	Qualifier	Associated Samples
MBLK1W	Lead	0.130	0.05 / 1	**U-RL**	**L102-02, L102-03, L102-04, L102-05, L102-08, L102-09, L102-10, L102-14, L102-16, L102-17, L102-18**
	Manganese	0.380	0.25 / 1	**U-RL**	**L102-03**

ICBs	Analyte	Result (ug/L)	MDL/RL (ug/L)	Qualifier	Associated Samples
	Sodium	30	25 / 100	None	Sample results > RL++
	Calcium	30	25 / 100	None	Sample results > RL**
	Manganese	0.7	0.25 / 1	**U-RL**	**L102-03**
	Iron	30	25 / 100	**U-RL**	**L102-01, L102-04, L102-05, L102-07, L102-09, L102-12, L102-13, L102-16, L102-18**
	Arsenic	0.2	0.125 / 1	**U-RL**	**L102-04, L102-05, L102-09, L102-10, L102-12, L102-13, L102-14, L102-16, L102-17, L102-18**
	Selenium	0.3	0.15 / 1	**U-RL**	**L102-01, L102-02, L102-03, L102-07, L102-08, L102-12, L102-13, L102-14, L102-16**
	Thallium	0.2	0.1 / 1	**U-RL**	**L102-02, L102-04, L102-10**
	Lead	0.10	0.05 / 1	**U-RL**	**L102-02, L102-03, L102-04, L102-05, L102-08, L102-09, L102-10, L102-14, L102-16, L102-17, L102-18**
	Mercury	-0.031	0.1/0.5	None	-Blank result > - RL

++ ICB associated with initial analysis - analyte was reanalyzed - a majority of the reported results were from dilution

** ICB associated with initial analysis - analyte was reanalyzed - reported results were from dilution

CCBs	Analyte	Result (ug/L)	MDL/RL (ug/L)	Qualifier	Associated Samples
CCB1**	Sodium	30	25 / 100	None	Sample results > RL
CCB2**		Nondetect			
CCB3**	Calcium	60	25 / 100	None	Sample results > RL
	Selenium	0.2	0.15 / 1	**U-RL**	**L102-01, L102-02, L102-03, L102-07, L102-08, L102-12, L102-13, L102-14, L102-16**
CCB1	Mercury	-0.003	0.1 / 0.5	None	-Blank results > - RL
CCB2	Mercury	0.009	0.1 / 0.5	None	Sample results nondetect
CCB3	Mercury	-0.016	0.1 / 0.5	None	-Blank results > - RL

** CCB associated with diluted analysis

Field Blank	6020A	Concentration (ug/L)	MDL/RL (ug/L)	Qualifiers	Associated Samples
N/A					

ICSA/AB	Analyte - Solution A	%R	Found Sol. A / True A	RL	Qualifier	Associated Samples
		Acceptable				

PQL Standard Check	%R	Qualifiers	Associated Samples
N/A			

Tune

Acceptable

Internal Standards	Qualifier	Associated Samples
Acceptable		

Wet Chemistry Parameters

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPD) ≤30% (soils / water) or within CRQL criteria?	**Yes**		
Are the laboratory duplicate RPDs ≤ 20% for water ≤35% for soils or within CRQL criteria?	**Yes**		
Are the matrix spike duplicates RPD ≤ 20%?	**Yes**		
Are the laboratory control spike duplicates RPD ≤ 20%?	**Yes**		

Comments (note deviations):

Field Duplicates	**Sample (mg/L)**	**Duplicate (mg/L)**	**RPD**	**Qualifier**	**Associated Samples**
	MW05R-GW120820 (L102-02)	**FD05-GW120820 (L102-03)**			
TOC	1.06 J	1.11 J	NC	None	Sample results < 5xs RL; ABS Diff. < RL
	MW08A-GW120920 (L102-16)	**FD03-GW120920 (L102-18)**			
	0.588 J	0.665 J	NC	None	Sample results < 5xs RL; ABS Diff. < RL

MS/MSD	**%R**	**Limits**	**RPD %**	**Qualifiers**	**Associated Samples**
MW08B-GW120920 MS/MSD** (L102-17)			Acceptable		

** Numerous MS/MSDs performed / evaluated all QC data within acceptable criteria

LCS/ LCSD	**Limits**	**RPD**	**Qualifiers**	**Associated Samples**
		Acceptable		

** Numerous LCS/LCSDs performed / evaluated all QC data within acceptable criteria

Laboratory Duplicate	**Sample**	**Duplicate**	**RPD**	**Qualifiers**	**Associated Samples**
			Acceptable		

Accuracy:	**Yes**	**No**	**N/A**
Was matrix spike criteria met (frequency 20% and % recovery 75-125%)?	**Yes**		
Was post digestion spike criteria met (if applicable)?	**N/A**		
Was laboratory control sample criteria met?	**Yes**		
Was laboratory blank criteria met (within control limits)?	**No**		
Were the Field Blanks results all < RL?	**N/A**		
Were ICV/CCV % recoveries within 90-110%?	**Yes**		
Was the tune %RSD <5% ?	**N/A**		
Was internal standard criteria met?	**N/A**		

Comments (note deviations):

MS /MSD	**Analyte**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
MW08B-GW120920 MS/MSD**		Acceptable			

** Numerous MS/MSD performed / evaluated all QC data within acceptable criteria

LCS / LCSD	**Analyte**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
		Acceptable			

** Numerous LCS/LCSD performed / evaluated all QC data within acceptable criteria

ICV/CCV	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
	Acceptable			

Blanks	**Analyte**	**Result**	**MDL/RL**	**Qualifiers**	**Associated Samples**
		Nondetect			

** Numerous prep. blanks performed / evaluated all QC blanks were nondetect

ICB / CCBs	Analyte	Result	MDL/RL	Qualifier	Associated Samples
CCB1	TOC	0.277	0.25 / 1	None	
CCB2	TOC	0.392	0.25 / 1	None	See Note
CCB3	TOC	0.371	0.25 / 1	None	

Note: The laboratory reported method blank criteria was met and the concentrations in the CCBs does not significantly affect the concentrations for TOC. Based on professional judgement, no qualifications were required.

** The remaining ICB/CCBs performed / evaluated were nondetect

Field Blank	Analyte	Result (mg/L)	MDL/RL	Qualifiers	Associated Samples
N/A					

Tune	Analyte	%RSD	Limits	Qualifiers	Associated Samples
N/A					

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	**Yes**		
Were holding times met?	**Yes**		
Was preservation criteria met? (0° C - 6° C)	**Yes**		
Were Chain-of-Custody records complete and provided in data package?	**Yes**		

Comments (note

The cooler temperatures were 1.4, 1.8, 1.9 & 2.2 °C

Preservation	Cooler Temperature (Degrees C)	Preservation Criteria	Qualifier	Associated Samples
	Acceptable			

Holding Times	Analyte	Days to Extraction	HT Criteria	Qualifier	Associated Samples
		Acceptable			

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	**Yes**		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	**Yes**		

Comments (note deviations):

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	**Yes**		
Do the reporting limits meet project requirements?	**Yes**		

Comments (note deviations):

Comment:

Data is usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 2/12/2021

Data Reviewer: Cherie Zakowski Date: 2/13/2021

VA Salt Lake City
Salt Lake City, Utah
Groundwater Validation Report

Sample Delivery Group (SDG) Number: 20L132
Laboratory: EMAX Laboratories, Inc.

Matrix: Groundwater
Collection date: 12/10/2020, 12/14/2020
Analysis/Methods:

Volatile Organic Compounds SW 846 8260C
Semivolatile Organic Compounds SW 846 8270D (1,4-Dioxane)
Metals SW 846 6020A
Mercury SW 846 7470A
Dissolved Gases - RSK 175
Wet Chemistry Parameters:
Chloride EPA 300.0
Sulfate EPA 300.0
Total Alkalinity SM 2320B
Nitrate / Nitrite - N SM 4500 NO3E
Total Organic Carbon (TOC) SW 9060

Samples in SDG:

Lab ID	Sample Number	Lab ID	Sample Number
L132-01	MW16S-GW121020	L132-06	TB07-GW121420
L132-02	MW16D-GW121020	L132-07	MW36-GW121420
L132-03	MW04-GW121020	L132-08	FD07-GW121420
L132-04	FD02-GW121020	L132-09	MW19-GW121420
L132-05	MW06-GW121020	L132-10	TB08-GW121420

Data validation was performed in accordance with the specific analytical methods, National Functional Guidelines for Organic Superfund Methods Data Review (EPA January 2017), and the National Functional Guidelines for Inorganic Superfund Methods Data Review (EPA January 2017).

Volatile Organic Compounds 8260C

Precision:

	Yes	No	N/A
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?	**Yes**		
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)		**No**	
Laboratory Control Spike Duplicates RPD within limits?	**Yes**		

Comments (note deviations):

Field Duplicates	8260C	Sample	Duplicate	%RPD	Qualifiers	Associated Samples
		MW04-GW121020 (L132-03)	**FD02-GW121020** (L132-04)			
	Bromodichloromethane	0.36 J	0.38 J	NC	None	
	Chloroform	4.2	4.1	NC	None	Sample results < 5xs RL;
	Cis-1,2-Dichloroethylene	0.15 J	0.15 J	NC	None	ABS Diff. < RL
	Trichlorothene (TCE)	0.24 J	0.22 J	NC	None	
		MW36-GW121420 (L132-07)	**FD07-GW121420** (L132-08)			
	Chloroform	0.79 J	0.77 J	NC	None	Sample results < 5xs RL;
	Tetrachlorothene	0.28 J	0.28 J	NC	None	ABS Diff. < RL

MS/MSD	8260C	%RPD	Limit	Qualifiers	Associated Samples
MW36-GW121420 MS/MSD (L132-07)	Trichlorotrifluoroethane	22%	20	**J****	**L132-07**

** Qualification required for detected results only - associated results nondetect - no qualification required

LCS/LCSD	8260C	%RPD	Limits	Qualifiers	Associated Samples
LCS1W / LCSD1W		Acceptable			
LCS2W / LCSD2W		Acceptable			

Accuracy:	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)	**Yes**		
Laboratory Control Sample criteria met?	**Yes**		
Were the Laboratory Method Blank results all < RL?	**Yes**		
Were the Field Blanks results all < RL?	**Yes**		
Was the ICAL criteria met?	**Yes**		
Was the CCV criteria met?	**Yes**		
Was the Tuning criteria met?	**Yes**		
Were the Surrogate % recoveries within laboratory determined control limits?	**Yes**		
Were the Internal Standard areas within ± 50 - 150%?	**Yes**		

Comments (note deviations):

Blanks	**8260C**	**Concentration**	**MDL /RL**	**Qualifiers**	**Associated Samples**
MBLK1W		Nondetect			
MBLK2W		Nondetect			

Field Blank	**8260C**	**Concentration**	**MDL /RL**	**Qualifiers**	**Associated Samples**
Associated Samples:L132-01 through L132-05					
TB07-GW121420		Nondetect			
Associated Samples:L132-07 through L132-09					
TB08-GW121420		Nondetect			

Surrogates	**8260C**	**%R**	**Limit**	**Qualifiers**	**Associated Samples**
		Acceptable			

MS/MSD	**8260C**	**%R**	**Limit**	**Qualifiers**	**Associated Samples**
MW36-GW121420 MS/MSD (L132-07)		Acceptable			

LCS/LCSD	**8260C**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
LCS1W / LCSD1W		Acceptable			
LCS2W / LCSD2W		Acceptable			

ICAL	**8260C**	**RRF**	**%RSD**	**Qualifiers**	**Associated Samples**
12/03/2020 9:58		Acceptable	Acceptable		

CCV	**8260C**	**RRF**	**%D**	**Limits**	**Qualifiers**	**Associated Samples**
12/16/20 10:26		Acceptable	Acceptable			
12/17/20 10:21		Acceptable	Acceptable			

Tune	**8260C**
	Acceptable

Internal Standards	**8260C**	**Area**	**Area Lower / Upper Limit**	**Qualifiers**	**Associated Samples**
		Acceptable			

Semivolatile Organic Compounds 8270D (1,4-Dioxane SIM)

Precision:	Yes	No	N/A
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?		**No**	
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)	**Yes**		
Laboratory Control Spike Duplicates RPD within limits?	**Yes**		

Comments (note deviations):

Field Duplicates	**8270D**	**Sample**	**Duplicate**	**RPD**	**Qualifiers**	**Associated Samples**
		MW36-GW121420	**FD07-GW121420**			
	1,4-Dioxane	0.42 U	3.1	NC	**J / UJ**	**MW36-GW121420 & FD07-GW121420**

MS/MSD	**8270D**	**RPD**	**Limit**	**Qualifiers**	**Associated Samples**
MW36-GW121420 MS/MSD (L132-07)		Acceptable			

LCS/LCSD	**8270D**	**RPD**	**Limit**	**Qualifiers**	**Associated Samples**
LCS1W / LCSD1W		Acceptable			

Accuracy:	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)	**Yes**		
Laboratory Control Sample criteria met?	**Yes**		
Were the Laboratory Method Blank results all < RL?	**Yes**		
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met?	**Yes**		
Was the CCV criteria met?	**Yes**		
Was the Tuning criteria met?	**Yes**		
Were the Surrogate % recoveries within laboratory determined control limits?	**Yes**		
Were the Internal Standard areas within ± 50 - 150%?	**Yes**		

Comments (note deviations):

Blanks	**8270D**	**Concentration (ug/L)**	**MDL / RL**	**Qualifiers**	**Associated Samples**
MBLK1W		Nondetect			

Field Blank	**8270D**	**Concentration**	**MDL / RL**	**Qualifiers**	**Associated Samples**
N/A					

Surrogates	**8270D**	**%R**	**Limit**	**Qualifiers**	**Associated Samples**
		Acceptable			

MS/MSD	**8270D**	**%R**	**Limits (%)**	**Qualifiers**	**Associated Samples**
MW36-GW121420 MS/MSD (L132-07)		Acceptable			

LCS/LCSD	**8270D**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
LCS1W / LCSD1W		Acceptable			

ICAL	**8270D**	**RRF**	**%RSD**	**Qualifiers**	**Associated Samples**
6/3/2020 14:04		Acceptable	Acceptable		

CCV	**8270D**	**RRF**	**%D**	**Qualifiers**	**Associated Samples**
12/18/2020 13:27		Acceptable	Acceptable		

Tune	**8270D** Acceptable				
Internal Standards	**8270D**	**Area** Acceptable	**Area Lower / Upper Limit**	**Qualifiers**	**Associated Samples**

Dissolved Gases RSK-175

Precision:

	Yes	No	N/A
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?	**Yes**		
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)	**Yes**		
Laboratory Control Spike Duplicates RPD within limits?	**Yes**		
Are the laboratory duplicate RPDs ≤ 20% for water ≤35% for soils or within CRQL criteria?			**N/A**

Comments (note deviations):

Field Duplicates	RSK-175	Sample	Duplicate	%RPD	Qualifiers	Associated Samples
		MW04-GW121020 (L132-03) ND	**FD02-GW121020** (L132-04) ND			
		MW36-GW121420 (L132-07)	**FD07-GW121420** (L132-08)			
	Methane	0.47 J	0.45 J	NC	None	Sample results < 5xs RL; ABS Diff. < RL

MS/MSD	RSK-175	%RPD	Limit	Qualifiers	Associated Samples
MW36-GW121420 MS/MSD (L132-07)		Acceptable			

LCS/LCSD	RSK-175	%RPD	Limits	Qualifiers	Associated Samples
LCS1W / LCD1W		Acceptable			

Laboratory Duplicates	RSK-175	Sample (ug/L)	Duplicate (ug/L)	RPD	Qualifiers	Associated Samples
N/A						

Accuracy:

	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)	**Yes**		
Laboratory Control Sample criteria met?	**Yes**		
Were the Laboratory Method Blank results all < RL?	**Yes**		
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met?	**Yes**		
Was the CCV criteria met?	**Yes**		
Was the Tuning criteria met?			**N/A**
Were the Surrogate % recoveries within laboratory determined control limits?			**N/A**
Were the Internal Standard areas within ± 50 - 150%?			**N/A**

Comments (note deviations):

Blanks	RSK-175	Concentration (ug/L)	MDL / RL	Qualifiers	Associated Samples
MBLK1W		Nondetect			

Field Blank	RSK-175	Concentration	MDL / RL	Qualifiers	Associated Samples
N/A					

Surrogates	RSK-175	%R	Limit	Qualifiers	Associated Samples
N/A					

MS/MSD	RSK-175	%R	Limits (%)	Qualifiers	Associated Samples
MW36-GW121420 MS/MSD (L132-07)		Acceptable			

LCS/LCSD	RSK-175	%R	Limits	Qualifiers	Associated Samples
LCS1W / LCD1W		Acceptable			

ICAL	RSK-175	RRF	%RSD	Qualifiers	Associated Samples
4/29/2020		Acceptable	Acceptable		

CCV 4/29/2020 14:39	**RSK-175**	**RRF** Acceptable	**%D** Acceptable	**Limits**	**Qualifiers**	**Associated Samples**

Tune N/A	**RSK-175**					

Internal Standards N/A	**RSK-175**	**Area**	**Area Lower / Upper Limit**		**Qualifiers**	**Associated Samples**

Metals SW 6020A / Mercury 7470A

Precision:

	Yes	No	N/A
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?		No	
Are the laboratory duplicate RPDs ≤ 20% for (water / soil) or within CRQL criteria?			N/A
Are the matrix spike duplicates RPD ≤ 20%?	Yes		
Are the laboratory control sample duplicates RPDs ≤ 20%?	Yes		

Comments (note deviations):

Field Duplicates		Sample (ug/L)	Duplicate (ug/L)	%RPD	Qualifier	Associated Samples
		MW04-GW121020 (L132-03)	FD02-GW121020 (L132-04)			
	Arsenic	1.3	1.39	NC	None	Sample results < 5xs RL;
	Cobalt	0.496 J	0.512 J	NC	None	ABS Diff. < RL
	Copper	2.97	2.85	NC	None	
	Chromium	2	2.11	NC	None	
	Lead	0.254 J	0.279 J	NC	None	
	Selenium	0.655 J	0.752 J	NC	None	
	Nickel	2.15	2.17	NC	None	
	Vanadium	2.66	2.76	NC	None	Sample results < 5xs RL;
	Zinc	11 J	11.6 J	NC	None	ABS Diff. < RL
	Manganese	1.0 U**	3.23	NC	J / UJ	MW04-GW121020 & FD02-GW121020
		MW36-GW121420 (L132-07)	FD07-GW121420 (L132-08)			
	Aluminum	100 U	27.3 J	NC	None	Sample results < 5xs RL;
	Arsenic	0.71 J	0.697 J	NC	None	ABS Diff. < RL
	Chromium	0.26 J	0.275 J	NC	None	
	Cobalt	2.46	2.49	NC	None	
	Iron	105	109	NC	None	
	Lead	0.104 J	0.109 J	NC	None	
	Selenium	0.798 J	0.823 J	NC	None	Sample results < 5xs RL;
	Vanadium	0.963 J	1.01	NC	None	ABS Diff. < RL

** Reported as ND at the RL based on CCB detection

MS/MSD	RPD	Qualifiers	Associated Samples
MW36-GW121420 MS/MSD (L132-07)	Acceptable		
MW36-GW121420 MS/MSD (Hg)	Acceptable		

LCS / LCSD	RPD	Qualifiers	Associated Samples
LCS1W / LCD1W	Acceptable		
LCS1W / LCD1W (Hg)	Acceptable		

Laboratory Duplicate	Sample	Duplicate	RPD	Qualifier	Associated Samples
N/A					

Accuracy:

	Yes	No	N/A
Were serial dilutions analyzed and within control limits of ±10% for waters (± for 15% for soils) or initial sample result less than 50x MDL?	Yes		
Was matrix spike criteria met (frequency 20% and % recovery 75-125%)?		No	
Was post digestion spike criteria met (if applicable)?	Yes		
Was laboratory control sample criteria met?	Yes		
Was laboratory blank criteria met (within control limits)?	Yes		
Were ICV/CCV % recoveries within 90-110%?	Yes		
Were the Detection Limit PQL Standards within 70-130?			N/A
Was the %D on form 16-IN for the initial calibration instrument response and concentration data <30%?			N/A
Were ICSA/ICSAB % recoveries acceptable or within CRQL criteria?	Yes		
Was the tune %RPD <5% (Peak width < 0.75)?	Yes		
Was internal standard criteria met?	Yes		

Comments (note deviations):

Serial Dilution	Analyte	Initial Sample Result	%D	50 x MDL	Qualifier	Associated Samples
			Acceptable			

MS/MSD	Analyte	%R	Limits	Post Digestion	Qualifiers	Associated Samples
MW36-GW121420 MS/MSD (L132-07)						
	Calcium	33 / 167	75-125	107	None	ISR > 4xs the spike added
	Sodium	67 / 133	75-125	100	None	ISR > 4xs the spike added
MW32A-GW092220 MS/MSD (Hg)		Acceptable				

LCS/LCSD	Analyte	%R	Limits	Qualifiers	Associated Samples
LCS1W / LCD1W		Acceptable			
LCS1W / LCD1W (Hg)		Acceptable			

ICV/CCV	Analyte	%R	Limits	Qualifier	Associated Samples
		Acceptable			

Blanks

Prep Blank		Result (ug/L)	MDL/RL (ug/L)	Qualifier	Associated Samples
MBLK1W		Nondetect			
MBLK1W (Hg)		Nondetect			

ICBs	Analyte	Result (ug/L)	MDL/RL (ug/L)	Qualifier	Associated Samples
ICB		Nondetect			
ICB (Hg)	Mercury	0.023	0.1 / 0.5	**U-RL**	**L132-04**

CCBs	Analyte	Result (ug/L)	MDL/RL (ug/L)	Qualifier	Associated Samples
CCB3**	Sodium	30	25 / 100	None	Sample results > RL
CCB5**	Manganese	0.3	0.25 / 1	**U-RL**	**L132-03**
CCB6++	Manganese	0.7	0.25 / 1	None	No associated samples - sample results reported from initial analysis
	Cadmium	0.2	0.1 / 1	None	
	Barium	0.3	0.25 / 1	None	
	Thallium	0.2	0.1 / 1	None	
	Lead	0.1	0.05 / 1	None	
CCB7++	Manganese	0.7	0.25/1	None	No associated samples - sample results reported from initial analysis
	Thallium	0.2	0.1 / 1	None	
	Lead	0.1	0.05 / 1	None	
CCB8++	Manganese	0.6	0.25 / 1	None	No associated samples - sample results reported from initial analysis
	Copper	0.6	2 / 0.5	None	
	Thalium	0.2	0.1 / 1	None	
	Lead	0.1	0.05 / 1	None	
CCB2 through CCB4	Mercury	-0.055 to -0.136	0.1 / 0.5	None	-Blank results > - RL

**Applies to initial analysis
++Applies to reanalyzed samples

Field Blank	6020A	Concentration (ug/L)	MDL/RL (ug/L)	Qualifiers	Associated Samples
N/A					

ICSA/AB	Analyte - Solution A	%R	Found Sol. A / True A	RL	Qualifier	Associated Samples
		Acceptable				

PQL Standard Check	%R	Qualifiers	Associated Samples
N/A			

Tune

Acceptable

Internal Standards	**Qualifier**	**Associated Samples**
Acceptable		

Wet Chemistry Parameters

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPD) ≤30% (soils / water) or within CRQL criteria?	**Yes**		
Are the laboratory duplicate RPDs ≤ 20% for water ≤35% for soils or within CRQL criteria?	**Yes**		
Are the matrix spike duplicates RPD ≤ 20%?	**Yes**		
Are the laboratory control spike duplicates RPD ≤ 20%?	**Yes**		

Comments (note deviations):

Field Duplicates		**Sample (mg/L)**	**Duplicate (mg/L)**	**RPD**	**Qualifier**	**Associated Samples**
		MW04-GW121020 (L132-03)	**FD02-GW121020** (L132-04)	Acceptable		
		MW36-GW121420 (L132-07)	**FD07-GW121420** (L132-08)			
	TOC	1.0 U	1.24	NC	None	Sample results < 5xs RL; ABS Diff. < RL

MS/MSD	**%R**	**Limits**	**RPD %**	**Qualifiers**	**Associated Samples**
MW36-GW121420 MS/MSD (L132-07)		Acceptable			

** Numerous MS/MSDs performed / evaluated all QC data within acceptable criteria

LCS/ LCSD	**Limits**	**RPD**	**Qualifiers**	**Associated Samples**
		Acceptable		

** Numerous LCS/LCSDs performed / evaluated all QC data within acceptable criteria

Laboratory Duplicate	**Sample**	**Duplicate**	**RPD**	**Qualifiers**	**Associated Samples**
			Acceptable		

Accuracy:	**Yes**	**No**	**N/A**
Was matrix spike criteria met (frequency 20% and % recovery 75-125%)?	**Yes**		
Was post digestion spike criteria met (if applicable)?	**N/A**		
Was laboratory control sample criteria met?	**Yes**		
Was laboratory blank criteria met (within control limits)?	**Yes**		
Were the Field Blanks results all < RL?	**N/A**		
Were ICV/CCV % recoveries within 90-110%?	**Yes**		
Was the tune %RSD <5% ?	**N/A**		
Was internal standard criteria met?	**N/A**		

Comments (note deviations):

MS /MSD	**Analyte**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
MW36-GW121420 MS/MSD (L132-07)		Acceptable			

** Numerous MS/MSD performed / evaluated all QC data within acceptable criteria

LCS / LCSD	**Analyte**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
		Acceptable			

** Numerous LCS/LCSD performed / evaluated all QC data within acceptable criteria

ICV/CCV	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
	Acceptable			

Blanks	**Analyte**	**Result**	**MDL/RL**	**Qualifiers**	**Associated Samples**
MBLK1	TOC	0.370 J	0.250 / 1	**U - RL**	**L132-01, L132-03, L132-04, L132-05, L132-07, L132-09**

** Numerous prep. blanks performed / evaluated all QC blanks were nondetect

ICB / CCBs	Analyte	Result	MDL/RL	Qualifier	Associated Samples
ICB		Nondetect			
CCB3	TOC	0.371	0.25 / 1	See MBLK1 Qualification	
CCB4	TOC	0.385	0.25 / 1	See MBLK1 Qualification	
CCB5	TOC	0.411	0.25 / 1	See MBLK1 Qualification	
CCB76	Sulfate	0.25	0.13 / 0.5	None	Sample results > RL

Field Blank	Analyte	Result (mg/L)	MDL/RL	Qualifiers	Associated Samples
N/A					

Tune	Analyte	%RSD	Limits	Qualifiers	Associated Samples
N/A					

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	Yes		
Were holding times met?	Yes		
Was preservation criteria met? (0° C - 6° C)	Yes		
Were Chain-of-Custody records complete and provided in data package?	Yes		

Comments (note

The cooler temperatures were 1.2, 1.3 & 3.2 °C

Preservation	Cooler Temperature (Degrees C)	Preservation Criteria	Qualifier	Associated Samples
	Acceptable			

Holding Times	Analyte	Days to Extraction	HT Criteria	Qualifier	Associated Samples
		Acceptable			

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	Yes		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	Yes		

Comments (note deviations):

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	Yes		
Do the reporting limits meet project requirements?	Yes		

Comments (note deviations):

Comment:

Data is usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 2/12/2021

Data Reviewer: Cherie Zakowski Date: 2/13/2021

VA Salt Lake City
Salt Lake City, Utah
Groundwater Validation Report

Sample Delivery Group (SDG) Number: 20L133
Laboratory: EMAX Laboratories, Inc.

Matrix: Groundwater
Collection date: 12/09/2020 through 12/11/2020 & 12/13/2020, 12/14/2020
Analysis/Methods:

Volatile Organic Compounds SW 846 8260C
Semivolatile Organic Compounds SW 846 8270D (1,4-Dioxane)
Metals SW 846 6020A
Mercury SW 846 7470A
Dissolved Gases - RSK 175
Wet Chemistry Parameters:
Chloride EPA 300.0
Sulfate EPA 300.0
Total Alkalinity SM 2320B
Nitrate / Nitrite - N SM 4500 NO3E
Total Organic Carbon (TOC) SW 9060

Samples in SDG:

Lab ID	Sample Number	Lab ID	Sample Number
L133-01	MW32A-GW121020	L133-11	MW23C-GW120920
L133-02	MW25A-GW120920	L133-12	TB02-GW121420
L133-03	MW25B-GW121020	L133-13	MW34D-GW121320
L133-04	MW25C-GW121020	L133-14	MW29A-GW121320
L133-05	MW21-GW121420	L133-15	MW29B-GW121120
L133-06	TB01-GW121420	L133-16	MW29C-GW121120
L133-07	MW32C-GW121020	L133-17	MW31A-GW121120
L133-08	MW32B-GW121020	L133-18	MW31B-GW121120
L133-09	MW23A-GW120920	L133-19	TB03-GW121420
L133-10	MW23B-GW121020		

Data validation was performed in accordance with the specific analytical methods, National Functional Guidelines for Organic Superfund Methods Data Review (EPA January 2017), and the National Functional Guidelines for Inorganic Superfund Methods Data Review (EPA January 2017).

Volatile Organic Compounds 8260C

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?			**N/A**
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Laboratory Control Spike Duplicates RPD within limits?	**Yes**		

Comments (note deviations):

Field Duplicates	**8260C**	**Sample**	**Duplicate**	**%RPD**	**Qualifiers**	**Associated Samples**
N/A						

MS/MSD	**8260C**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
N/A					

LCS/LCSD	**8260C**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
LCS1W / LCSD1W		Acceptable			
LCS2W / LCSD2W		Acceptable			

Accuracy:	**Yes**	**No**	**N/A**
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?	**Yes**		
Were the Laboratory Method Blank results all < RL?	**Yes**		
Were the Field Blanks results all < RL?		**No**	
Was the ICAL criteria met?	**Yes**		
Was the CCV criteria met?	**Yes**		
Was the Tuning criteria met?	**Yes**		
Were the Surrogate % recoveries within laboratory determined control limits?	**Yes**		
Were the Internal Standard areas within ± 50 - 150%?	**Yes**		

Comments (note deviations):

Blanks	8260C	Concentration	MDL /RL		Qualifiers	Associated Samples
MBLK1W		Nondetect				
MBLK2W		Nondetect				

Field Blank	8260C	Concentration	MDL /RL	Qualifiers	Associated Samples
Associated Samples:L133-01 through L133-05					
TB01-GW121420	Acetone	2.9 J	2.5 / 20	None	Sample results nondetect
Associated Samples:L133-07 through L133-11					
TB02-GW121420		Nondetect			
Associated Samples:L133-13through L133-18					
TB03-GW121420	Acetone	2.8 J	2.5 / 20	None	Sample results nondetect

Surrogates	8260C	%R	Limit	Qualifiers	Associated Samples
		Acceptable			

MS/MSD	8260C	%R	Limit	Qualifiers	Associated Samples
N/A					

LCS/LCSD	8260C	%R	Limits	Qualifiers	Associated Samples
LCS1W / LCSD1W		Acceptable			
LCS2W / LCSD2W		Acceptable			

ICAL	8260C	RRF	%RSD	Qualifiers	Associated Samples
12/03/2020 9:58		Acceptable	Acceptable		

CCV	8260C	RRF	%D	Limits	Qualifiers	Associated Samples
12/17/20 10:21		Acceptable	Acceptable			
12/18/20 10:55		Acceptable	Acceptable			

Tune	8260C
	Acceptable

Internal Standards	8260C	Area	Area Lower / Upper Limit	Qualifiers	Associated Samples
		Acceptable			

Dissolved Gases RSK-175

Precision:

	Yes	No	N/A
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?			N/A
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			N/A
Laboratory Control Spike Duplicates RPD within limits?	Yes		
Are the laboratory duplicate RPDs ≤ 20% for water ≤35% for soils or within CRQL criteria?			N/A

Comments (note deviations):

Field Duplicates	RSK-175	Sample	Duplicate	%RPD	Qualifiers	Associated Samples
N/A						

MS/MSD	RSK-175	%RPD	Limit	Qualifiers	Associated Samples
N/A		Acceptable			

LCS/LCSD	RSK-175	%RPD	Limits	Qualifiers	Associated Samples
LCS1W / LCD1W		Acceptable			

Laboratory Duplicates	RSK-175	Sample (ug/L)	Duplicate (ug/L)	RPD	Qualifiers	Associated Samples
N/A						

Accuracy:

	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			N/A
Laboratory Control Sample criteria met?	Yes		
Were the Laboratory Method Blank results all < RL?	Yes		
Were the Field Blanks results all < RL?			N/A
Was the ICAL criteria met?	Yes		
Was the CCV criteria met?	Yes		
Was the Tuning criteria met?			N/A
Were the Surrogate % recoveries within laboratory determined control limits?			N/A
Were the Internal Standard areas within ± 50 - 150%?			N/A

Comments (note deviations):

Blanks	RSK-175	Concentration (ug/L)	MDL / RL	Qualifiers	Associated Samples
MBLK1W		Nondetect			

Field Blank	RSK-175	Concentration	MDL / RL	Qualifiers	Associated Samples
N/A					

Surrogates	RSK-175	%R	Limit	Qualifiers	Associated Samples
N/A					

MS/MSD	RSK-175	%R	Limits (%)	Qualifiers	Associated Samples
N/A					

LCS/LCSD	RSK-175	%R	Limits	Qualifiers	Associated Samples
LCS1W / LCD1W		Acceptable			

ICAL	RSK-175	RRF	%RSD	Qualifiers	Associated Samples
4/29/2020		Acceptable	Acceptable		

CCV	RSK-175	RRF	%D	Limits	Qualifiers	Associated Samples
4/29/2020 '14:39		Acceptable	Acceptable			

Tune	**RSK-175**				
N/A					

Internal Standards	**RSK-175**	**Area**	**Area Lower / Upper Limit**	**Qualifiers**	**Associated Samples**
N/A					

Metals SW 6020A / Mercury 7470A

Precision:

	Yes	No	N/A
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?			N/A
Are the laboratory duplicate RPDs ≤ 20% for (water / soil) or within CRQL criteria?			N/A
Are the matrix spike duplicates RPD ≤ 20%?			Yes
Are the laboratory control sample duplicates RPDs ≤ 20%?			Yes

Comments (note deviations):

Field Duplicates	Sample (ug/L)	Duplicate (ug/L)	%RPD	Qualifier	Associated Samples
N/A					

MS/MSD	RPD	Qualifiers	Associated Samples
MW32A-GW121020 MS/MSD (L133-01)	Acceptable		

LCS / LCSD	RPD	Qualifiers	Associated Samples
LCS1W / LCD1W	Acceptable		
LCS1W / LCD1W (Hg)	Acceptable		

Laboratory Duplicate	Sample	Duplicate	RPD	Qualifier	Associated Samples
N/A					

Accuracy:

	Yes	No	N/A
Were serial dilutions analyzed and within control limits of ±10% for waters (± for 15% for soils) or initial sample result less than 50x MDL?			Yes
Was matrix spike criteria met (frequency 20% and % recovery 75-125%)?			No
Was post digestion spike criteria met (if applicable)?			Yes
Was laboratory control sample criteria met?			Yes
Was laboratory blank criteria met (within control limits)?			No
Were ICV/CCV % recoveries within 90-110%?			Yes
Were the Detection Limit PQL Standards within 70-130?			N/A
Was the %D on form 16-IN for the initial calibration instrument response and concentration data <30%?			N/A
Were ICSA/ICSAB % recoveries acceptable or within CRQL criteria?			Yes
Was the tune %RPD <5% (Peak width < 0.75)?			Yes
Was internal standard criteria met?			Yes

Comments (note deviations):

Serial Dilution	Analyte	Initial Sample Result	%D	50 x MDL	Qualifier	Associated Samples
			Acceptable			

MS/MSD	Analyte	%R	Limits	Post Digestion	Qualifiers	Associated Samples
MW32A-GW121020 MS/MSD (L133-01)	Calcium	233 / 233	75-125	97	None	ISR > 4xs the spike added
	Magnesium	167 / 170	75-125	97	None	ISR > 4xs the spike added
	Sodium	207 / 243	75-125	96	None	ISR > 4xs the spike added

LCS/LCSD	Analyte	%R	Limits	Qualifiers	Associated Samples
LCS1W / LCD1W		Acceptable			
LCS1W / LCD1W (Hg)		Acceptable			

ICV/CCV	Analyte	%R	Limits	Qualifier	Associated Samples
		Acceptable			

Blanks Prep Blank	Result (ug/L)	MDL/RL (ug/L)	Qualifier	Associated Samples
MBLK1W	Nondetect			

ICBs	Analyte	Result (ug/L)	MDL/RL (ug/L)	Qualifier	Associated Samples
ICB++		Nondetect			
ICB**	Manganese	0.4	0.25 / 1	None	Sample result > RL
	Lead	0.10	0.05 / 1	**U-RL**	**L133-02 through L133-05, L133-07, L133-08 through L133-11, L133-13 through L133-18**
	Mercury	-0.025	0.1/0.5	None	-Blank result > - RL

++ ICB associated with initial analysis
** ICB associated with diluted and re-analyzed results

CCBs	Analyte	Result (ug/L)	MDL/RL (ug/L)	Qualifier	Associated Samples
CCB4++		Nondetect			
CCB5++	Manganese	0.3	0.25 / 1	None	Sample result > RL
CCB6**	Manganese	0.3	0.25 / 1	None	Sample result > RL
	Lead	0.07	0.05 / 1	**U-RL**	**L133-02 through L133-05, L133-07, L133-08 through L133-11**
CCB7**	Manganese	0.3	0.25 / 1	None	Sample result > RL
CCB8**	Manganese	0.4	0.25 / 1	None	Sample result > RL
	Lead	0.07	0.05 / 1	**U-RL**	**L133-13 through L133-18**
	Thallium	0.2	0.1 /1	None	Sample results nondetect
CCB8		Nondetect**			
CCB9		Nondetect**			
CCB9		Nondetect**			
CCB4	Mercury	-0.062	0.1 / 0.5	None	-Blank results > - RL
CCB5	Mercury	0.026	0.1 / 0.5	None	Sample results nondetect or > RL
CCB6	Mercury	0.02	0.1 / 0.5	None	Sample results nondetect

++ CCB associated with initial analysis
** CCB associated with re-analyzed results
**Applicable only to Ca, Mg, and Na results

Field Blank	6020A	Concentration (ug/L)	MDL/RL (ug/L)	Qualifiers	Associated Samples
N/A					

ICSA/AB	Analyte - Solution A	%R	Found Sol. A / True A	RL	Qualifier	Associated Samples
		Acceptable				

PQL Standard Check		%R	Qualifiers	Associated Samples
N/A				

Tune
Acceptable

Internal Standards	Qualifier	Associated Samples
Acceptable		

Wet Chemistry Parameters

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPD) ≤30% (soils / water) or within CRQL criteria?			**N/A**
Are the laboratory duplicate RPDs ≤ 20% for water ≤35% for soils or within CRQL criteria?			**Yes**
Are the matrix spike duplicates RPD ≤ 20%?			**Yes**
Are the laboratory control spike duplicates RPD ≤ 20%?			**Yes**

Comments (note deviations):

Field Duplicates	**Sample (mg/L)**	**Duplicate (mg/L)**	**RPD**	**Qualifier**	**Associated Samples**
N/A					

MS/MSD	**%R**	**Limits**	**RPD %**	**Qualifiers**	**Associated Samples**
MW32A-GW121020 MS/MSD (L133-01)			Acceptable		

** Numerous MS/MSDs performed / evaluated all QC data within acceptable criteria

LCS/ LCSD	**Limits**	**RPD**	**Qualifiers**	**Associated Samples**
		Acceptable		

** Numerous LCS/LCSDs performed / evaluated all QC data within acceptable criteria

Laboratory Duplicate	**Sample**	**Duplicate**	**RPD**	**Qualifiers**	**Associated Samples**
			Acceptable		

Accuracy:	**Yes**	**No**	**N/A**
Was matrix spike criteria met (frequency 20% and % recovery 75-125%)?			**Yes**
Was post digestion spike criteria met (if applicable)?			**N/A**
Was laboratory control sample criteria met?			**Yes**
Was laboratory blank criteria met (within control limits)?			**No**
Were the Field Blanks results all < RL?			**N/A**
Were ICV/CCV % recoveries within 90-110%?			**Yes**
Was the tune %RSD <5% ?			**N/A**
Was internal standard criteria met?			**N/A**

Comments (note deviations):

MS /MSD	**Analyte**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
MW32A-GW121020 MS/MSD (L133-01)		Acceptable			
MW31A-GW121120 MS/MSD (L133-17)		Acceptable			

** Numerous MS/MSD performed / evaluated all QC data within acceptable criteria

LCS / LCSD	**Analyte**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
		Acceptable			

** Numerous LCS/LCSD performed / evaluated all QC data within acceptable criteria

ICV/CCV	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
	Acceptable			

Blanks	**Analyte**	**Result**	**MDL/RL**	**Qualifiers**	**Associated Samples**
MBLK1	TOC	0.370 J	0.25 / 1	**U - RL**	**L133-02, L133-09, L133-11**

** Numerous prep. blanks performed / evaluated all QC blanks were nondetect

ICB / CCBs	Analyte	Result	MDL/RL	Qualifier	Associated Samples
CCB5	TOC	0.411	0.25 / 1	None	See MBLK1 Qualification
CCB6	TOC	0.251	0.25 / 1	None	See MBLK1 Qualification
CCB2	TOC	0.223	0.25 / 1	None	See MBLK1 Qualification
CCB3	TOC	0.302	0.25 / 1	None	See MBLK1 Qualification
CCB3	TOC	0.446	0.25 / 1	None	See MBLK1 Qualification

** The remaining ICB/CCBs performed / evaluated were nondetect

Field Blank	Analyte	Result (mg/L)	MDL/RL	Qualifiers	Associated Samples
N/A					

Tune	Analyte	%RSD	Limits	Qualifiers	Associated Samples
N/A					

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	**Yes**		
Were holding times met?	**Yes**		
Was preservation criteria met? (0° C - 6° C)	**Yes**		
Were Chain-of-Custody records complete and provided in data package?	**Yes**		

Comments (note

The cooler temperatures were 1.0, 1.7 & 1.8 °C

Preservation	Cooler Temperature (Degrees C)	Preservation Criteria	Qualifier	Associated Samples
	Acceptable			

Holding Times	Analyte	Days to Extraction	HT Criteria	Qualifier	Associated Samples
		Acceptable			

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	**Yes**		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	**Yes**		

Comments (note deviations):

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	**Yes**		
Do the reporting limits meet project requirements?	**Yes**		

Comments (note deviations):

Comment:

Data is usable with appropriate qualifiers applied.

Data Validator: *Kristine Molloy* Date: *2/13/2021*

Data Reviewer: Cherie Zakowski Date: 2/14/2021

VA Salt Lake City
Salt Lake City, Utah
Groundwater Validation Report

Sample Delivery Group (SDG) Number: 20L141
Laboratory: EMAX Laboratories, Inc.

Matrix: Groundwater
Collection date: 12/11/2020, 12/13/2020 & 12/14/2020
Analysis/Methods:

Volatile Organic Compounds SW 846 8260C
Semivolatile Organic Compounds SW 846 8270D (1,4-Dioxane)
Metals SW 846 6020A
Mercury SW 846 7470A
Dissolved Gases - RSK 175
Wet Chemistry Parameters:
Chloride EPA 300.0
Sulfate EPA 300.0
Total Alkalinity SM 2320B
Nitrate / Nitrite - N SM 4500 NO3E
Total Organic Carbon (TOC) SW 9060

Samples in SDG:

Lab ID	Sample Number	Lab ID	Sample Number
L141-01	MW17S-GW121120	L141-09	MW03RD-GW121120
L141-02	MW17D-GW121320	L141-10	TB05-GW121420
L141-03	MW22-GW121420	L141-11	MW13S-GW121120
L141-04	TB04-GW121420	L141-12	MW13D-GW121120
L141-05	MW31C-GW121120	L141-13	MW14S-GW121420
L141-06	MW03RA-GW121120	L141-14	MW14D-GW121420
L141-07	MW03RB-GW121120	L141-15	TB06-GW121420
L141-08	MW03RC-GW121120		

Data validation was performed in accordance with the specific analytical methods, National Functional Guidelines for Organic Superfund Methods Data Review (EPA January 2017), and the National Functional Guidelines for Inorganic Superfund Methods Data Review (EPA January 2017).

Volatile Organic Compounds 8260C

Precision:

	Yes	No	N/A
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?			**N/A**
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)		**No**	
Laboratory Control Spike Duplicates RPD within limits?	**Yes**		

Comments (note deviations):

Field Duplicates	8260C	Sample	Duplicate	%RPD	Qualifiers	Associated Samples
N/A						

MS/MSD	8260C	%RPD	Limit	Qualifiers	Associated Samples
MW22-GW121420 (L141-03)	Styrene	22%	20	**J****	**L141-03**

** Qualification required for detected results only - assocaited results nondetect - no qualification required

LCS/LCSD	8260C	%RPD	Limits	Qualifiers	Associated Samples
LCS1W / LCSD1W		Acceptable			
LCS2W / LCSD2W		Acceptable			

Accuracy:

	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)		**No**	
Laboratory Control Sample criteria met?	**Yes**		
Were the Laboratory Method Blank results all < RL?	**Yes**		
Were the Field Blanks results all < RL?		**No**	
Was the ICAL criteria met?	**Yes**		
Was the CCV criteria met?	**Yes**		
Was the Tuning criteria met?	**Yes**		
Were the Surrogate % recoveries within laboratory determined control limits?	**Yes**		
Were the Internal Standard areas within ± 50 - 150%?	**Yes**		

Comments (note deviations):

Blanks	8260C	Concentration	MDL /RL		Qualifiers	Associated Samples
MBLK1W		Nondetect				
MBLK2W		Nondetect				

Field Blank	8260C	Concentration	MDL /RL	Qualifiers	Associated Samples
Associated Samples:L133-01 through L133-05					
TB04-GW121420	Acetone	4.2 J	2.5 / 20	None	Sample results nondetect
Associated Samples:L133-07 through L133-11					
TB05-GW121420		Nondetect			
Associated Samples:L133-13through L133-18					
TB06-GW121420		Nondetect			

Surrogates	8260C	%R	Limit	Qualifiers	Associated Samples
		Acceptable			

MS/MSD	8260C	%R	Limit	Qualifiers	Associated Samples
MW22-GW121420					
(L141-03)	Styrene	83 / 66	78-123	**J / UJ**	**L141-03**

LCS/LCSD	8260C	%R	Limits	Qualifiers	Associated Samples
LCS1W / LCSD1W		Acceptable			
LCS2W / LCSD2W		Acceptable			

ICAL	8260C	RRF	%RSD	Qualifiers	Associated Samples
10/30/2020 11:33		Acceptable	Acceptable		

CCV	8260C	RRF	%D	Limits	Qualifiers	Associated Samples
12/16/20 15:31		Acceptable	Acceptable			
12/17/20 11:15		Acceptable	Acceptable			

Tune	8260C
	Acceptable

Internal Standards	8260C	Area	Area Lower / Upper Limit	Qualifiers	Associated Samples
		Acceptable			

Dissolved Gases RSK-175

Precision:	Yes	No	N/A
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?			**N/A**
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)	**Yes**		
Laboratory Control Spike Duplicates RPD within limits?	**Yes**		
Are the laboratory duplicate RPDs ≤ 20% for water ≤35% for soils or within CRQL criteria?			**N/A**

Comments (note deviations):

Field Duplicates	**RSK-175**	**Sample**	**Duplicate**	**%RPD**	**Qualifiers**	**Associated Samples**
N/A						

MS/MSD	**RSK-175**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
MW22-GW121420 (L141-03)		Acceptable			

LCS/LCSD	**RSK-175**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
LCS1W / LCD1W		Acceptable			

Laboratory Duplicates	**RSK-175**	**Sample (ug/L)**	**Duplicate (ug/L)**	**RPD**	**Qualifiers**	**Associated Samples**
N/A						

Accuracy:	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)	**Yes**		
Laboratory Control Sample criteria met?	**Yes**		
Were the Laboratory Method Blank results all < RL?	**Yes**		
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met?	**Yes**		
Was the CCV criteria met?	**Yes**		
Was the Tuning criteria met?			**N/A**
Were the Surrogate % recoveries within laboratory determined control limits?			**N/A**
Were the Internal Standard areas within ± 50 - 150%?			**N/A**

Comments (note deviations):

Blanks	**RSK-175**	**Concentration (ug/L)**	**MDL / RL**	**Qualifiers**	**Associated Samples**
MBLK1W		Nondetect			

Field Blank	**RSK-175**	**Concentration**	**MDL / RL**	**Qualifiers**	**Associated Samples**
N/A					

Surrogates	**RSK-175**	**%R**	**Limit**	**Qualifiers**	**Associated Samples**
N/A					

MS/MSD	**RSK-175**	**%R**	**Limits (%)**	**Qualifiers**	**Associated Samples**
MW22-GW121420 (L141-03)		Acceptable			

LCS/LCSD	**RSK-175**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
LCS1W / LCD1W		Acceptable			

ICAL	**RSK-175**	**RRF**	**%RSD**	**Qualifiers**	**Associated Samples**
4/29/2020		Acceptable	Acceptable		

CCV	**RSK-175**	**RRF**	**%D**	**Limits**	**Qualifiers**	**Associated Samples**
4/29/2020 '14:39		Acceptable	Acceptable			

Tune	**RSK-175**				
N/A					

Internal Standards	**RSK-175**	**Area**	**Area Lower / Upper Limit**	**Qualifiers**	**Associated Samples**
N/A					

Metals SW 6020A / Mercury 7470A

Precision:

	Yes	No	N/A
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?			N/A
Are the laboratory duplicate RPDs ≤ 20% for (water / soil) or within CRQL criteria?			N/A
Are the matrix spike duplicates RPD ≤ 20%?	Yes		
Are the laboratory control sample duplicates RPDs ≤ 20%?	Yes		

Comments (note deviations):

Field Duplicates	Sample (ug/L)	Duplicate (ug/L)	%RPD	Qualifier	Associated Samples
N/A					

MS/MSD	RPD	Qualifiers	Associated Samples
MW22-GW121420 (L141-03)	Acceptable		

LCS / LCSD	RPD	Qualifiers	Associated Samples
LCS1W / LCD1W	Acceptable		
LCS1W / LCD1W (Hg)	Acceptable		

Laboratory Duplicate	Sample	Duplicate	RPD	Qualifier	Associated Samples
N/A					

Accuracy:

	Yes	No	N/A
Were serial dilutions analyzed and within control limits of ±10% for waters (± for 15% for soils) or initial sample result less than 50x MDL?	Yes		
Was matrix spike criteria met (frequency 20% and % recovery 75-125%)?		No	
Was post digestion spike criteria met (if applicable)?	Yes		
Was laboratory control sample criteria met?	Yes		
Was laboratory blank criteria met (within control limits)?	Yes		
Were ICV/CCV % recoveries within 90-110%?	Yes		
Were the Detection Limit PQL Standards within 70-130?			N/A
Was the %D on form 16-IN for the initial calibration instrument response and concentration data <30%?			N/A
Were ICSA/ICSAB % recoveries acceptable or within CRQL criteria?	Yes		
Was the tune %RPD <5% (Peak width < 0.75)?	Yes		
Was internal standard criteria met?	Yes		

Comments (note deviations):

Serial Dilution	Analyte	Initial Sample Result	%D	50 x MDL	Qualifier	Associated Samples
			Acceptable			

MS/MSD	Analyte	%R	Limits	Post Digestion	Qualifiers	Associated Samples
MW22-GW121420 (L141-03)	Magnesium	147 / 97	75-125	101	None	ISR > 4xs the spike added
	Sodium	0 / 100	75-125	100	None	ISR > 4xs the spike added

LCS/LCSD	Analyte	%R	Limits	Qualifiers	Associated Samples
LCS1W / LCD1W		Acceptable			
LCS1W / LCD1W (Hg)		Acceptable			

ICV/CCV	Analyte	%R	Limits	Qualifier	Associated Samples
		Acceptable			

Blanks Prep Blank	Result (ug/L)	MDL/RL (ug/L)	Qualifier	Associated Samples
MBLK1W	Nondetect			

ICBs	Analyte	Result (ug/L)	MDL/RL (ug/L)	Qualifier	Associated Samples
ICB	Manganese	0.4	0.25 / 1	None	Sample results > RL
	Lead	0.09	0.05 / 1	**U-RL**	**L141-01 through L141-03, L141-06 through L141-09, L141-13, L141-14**
	Cadmium	0.2	0.1 / 1	None	Samples results nondetect
	Mercury	-0.011	0.1/0.5	None	-Blank result > - RL

CCBs	Analyte	Result (ug/L)	MDL/RL (ug/L)	Qualifier	Associated Samples
CCB1**	Lead	0.07	0.05 / 1	**U-RL**	**L141-01 through L141-03**
CCB2**	Manganese	0.3	0.25 / 1	None	Sample results > RL
	Lead	0.06	0.05 / 1	**U-RL**	**L141-01 through L141-03, L141-06 through L141-09, L141-13, L141-14**
CCB3**	Copper	0.6	0.5 / 2	None	Sample results nondetect or > RL
CCB4++	Sodium	30	25 / 100	None	Sample results > RL
	Copper	0.6	0.5 / 2		Sample results nondetect or > RL
CCB5++	Sodium	30	25 / 100	None	Sample results > RL
	Copper	0.7	0.5 / 2		Sample results nondetect or > RL
CCB1	Mercury	-0.013	0.1 / 0.5	None	-Blank results > - RL
CCB2	Mercury	0.009	0.1 / 0.5	None	Sample results nondetect
CCB3	Mercury	0.00	0.1 / 0.5	None	Sample results nondetect

** CCB associated with intial analysis
++ CCB associated with dilution results

Field Blank	6020A	Concentration (ug/L)	MDL/RL (ug/L)	Qualifiers	Associated Samples
N/A					

ICSA/AB	Analyte - Solution A	%R	Found Sol. A / True A	RL	Qualifier	Associated Samples
		Acceptable				

PQL Standard Check	%R	Qualifiers	Associated Samples
N/A			

Tune
Acceptable

Internal Standards	Qualifier	Associated Samples
Acceptable		

Wet Chemistry Parameters

Precision:	Yes	No	N/A
Are the field duplicate relative percent differences (RPD) ≤30% (soils / water) or within CRQL criteria?			**N/A**
Are the laboratory duplicate RPDs ≤ 20% for water ≤35% for soils or within CRQL criteria?	**Yes**		
Are the matrix spike duplicates RPD ≤ 20%?	**Yes**		
Are the laboratory control spike duplicates RPD ≤ 20%?	**Yes**		

Comments (note deviations):

Field Duplicates	**Sample (mg/L)**	**Duplicate (mg/L)**	**RPD**	**Qualifier**	**Associated Samples**
N/A					

MS/MSD	**%R**	**Limits**	**RPD %**	**Qualifiers**	**Associated Samples**
MW22-GW121420 (L141-03)			Acceptable		

** Numerous MS/MSDs performed / evaluated all QC data within acceptable criteria

LCS/ LCSD	**Limits**	**RPD**	**Qualifiers**	**Associated Samples**
		Acceptable		

** Numerous LCS/LCSDs performed / evaluated all QC data within acceptable criteria

Laboratory Duplicate	**Sample**	**Duplicate**	**RPD**	**Qualifiers**	**Associated Samples**
			Acceptable		

Accuracy:	Yes	No	N/A
Was matrix spike criteria met (frequency 20% and % recovery 75-125%)?	**Yes**		
Was post digestion spike criteria met (if applicable)?			**N/A**
Was laboratory control sample criteria met?	**Yes**		
Was laboratory blank criteria met (within control limits)?		**No**	
Were the Field Blanks results all < RL?			**N/A**
Were ICV/CCV % recoveries within 90-110%?	**Yes**		
Was the tune %RSD <5% ?			**N/A**
Was internal standard criteria met?			**N/A**

Comments (note deviations):

MS /MSD	**Analyte**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
MW22-GW121420 (L141-03)		Acceptable			

** Numerous MS/MSD performed / evaluated all QC data within acceptable criteria

LCS / LCSD	**Analyte**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
		Acceptable			

** Numerous LCS/LCSD performed / evaluated all QC data within acceptable criteria

ICV/CCV	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
	Acceptable			

Blanks	**Analyte**	**Result**	**MDL/RL**	**Qualifiers**	**Associated Samples**
		Nondetect			

** Numerous prep. blanks performed / evaluated all QC blanks were nondetect

ICB / CCBs	**Analyte**	**Result**	**MDL/RL**	**Qualifier**	**Associated Samples**
CCB3	TOC	0.302	0.25 / 1	None	Sample results > RL
CCB4	TOC	0.446	0.25 / 1	None	Sample results > RL
CCB5	TOC	0.382	0.25 / 1	None	See Note
CCB6	TOC	0.438	0.25 / 1	None	

Note: The laboratory reported method blank criteria was met and the concentrations in the CCBs does not significantly affect the concentrations for TOC. Based on professional judgement, no qualifications were required.

** The remaining ICB/CCBs performed / evaluated were nondetect

Field Blank	Analyte	Result (mg/L)	MDL/RL	Qualifiers	Associated Samples
N/A					

Tune	Analyte	%RSD	Limits	Qualifiers	Associated Samples
N/A					

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	Yes		
Were holding times met?	Yes		
Was preservation criteria met? (0° C - 6° C)	Yes		
Were Chain-of-Custody records complete and provided in data package?	Yes		

Comments (note

The cooler temperatures were 1.0, 1.6 and 2.1 °C

Preservation	Cooler Temperature (Degrees C)	Preservation Criteria	Qualifier	Associated Samples
	Acceptable			

Holding Times	Analyte	Days to Extraction	HT Criteria	Qualifier	Associated Samples
		Acceptable			

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	Yes		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	Yes		

Comments (note deviations):

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	Yes		
Do the reporting limits meet project requirements?	Yes		

Comments (note deviations):

Comment:

Data is usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 2/15/2021

Data Reviewer: Cherie Zakowski Date: 2/14/2021

VA Salt Lake City
Salt Lake City, Utah
Groundwater Validation Report

Sample Delivery Group (SDG) Number: 20L175
Laboratory: EMAX Laboratories, Inc.

Matrix: Groundwater
Collection date: 12/14/2020 through 12/17/2020
Analysis/Methods:

Volatile Organic Compounds SW 846 8260C
Semivolatile Organic Compounds SW 846 8270D (1,4-Dioxane)
Metals SW 846 6020A
Mercury SW 846 7470A
Dissolved Gases - RSK 175
Wet Chemistry Parameters:
Chloride EPA 300.0
Sulfate EPA 300.0
Total Alkalinity SM 2320B
Nitrate / Nitrite - N SM 4500 NO3E
Total Organic Carbon (TOC) SW 9060

Samples in SDG:

Lab ID	Sample Number	Lab ID	Sample Number
L175-01	MW01D-GW121520	L175-15	FB01-GW121620
L175-02	MW01S-GW121620	L175-16	TB06-GW121720
L175-03	MW02-GW121620	L175-17	MW34B-GW121720
L175-04	FD01-GW121620	L175-18	MW34C-GW121720
L175-05	FD06-GW121420	L175-19	MW26C-GW121720
L175-06	TB04-GW121720	L175-20	MW37S-GW121420
L175-07	MW20D-GW121520	L175-21	MW37D-GW121420
L175-08	MW18-GW121420	L175-22	MW26A-GW121620
L175-09	MW20S-GW121420	L175-23	TB01-GW121720
L175-10	TB03-GW121720	L175-24	MW38S-GW121620
L175-11	MW26B-GW121620	L175-25	MW38D-GW121620
L175-12	MW34A-GW121520	L175-26	MW13L-GW121620
L175-13	FD04-GW121420	L175-27	TB05-GW121720
L175-14	TB02-GW121720		

Data validation was performed in accordance with the specific analytical methods, National Functional Guidelines for Organic Superfund Methods Data Review (EPA January 2017), and the National Functional Guidelines for Inorganic Superfund Methods Data Review (EPA January 2017).

Volatile Organic Compounds 8260C

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?	**Yes**		
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)	**Yes**		
Laboratory Control Spike Duplicates RPD within limits?	**Yes**		

Comments (note deviations):

Field Duplicates	8260C	Sample	Duplicate	%RPD	Qualifiers	Associated Samples
		MW02-GW121620	**FD01-GW121620**			
	Bromodichloromethane	0.36 J	0.38 J	NC	None	
	Chloroform	3.9 J	4	NC	None	Sample results < 5xs RL;
	Cis-1,2-Dichloroethylene	0.43 J	0.44 J	NC	None	ABS Diff. < RL
	Trichloroethene	0.55 J	0.6 J	NC	None	
		MW18-GW121420	**FD06-GW121420**			
	1,1,1-Trichloroethane	0.61 J	0.6 J	NC	None	
	1,1-Dichloroethene	0.12 J	0.14 J	NC	None	
	Bromodichloromethane	0.24 J	0.24 J	NC	None	Sample results < 5xs RL;
	Chloroform	2.4	2.4	NC	None	ABS Diff. < RL
	Cis-1,2-Dichloroethylene	0.23 J	0.21 J	NC	None	
	Trichloroethene	0.44 J	0.43 J	NC	None	
		MW37S-GW121420	**FD04-GW121420**			
	Bromodichloromethane	0.11 J	0.11 J	NC	None	Sample results < 5xs RL;
	Chloroform	2.2	2.1	NC	None	ABS Diff. < RL

MS/MSD	8260C	%RPD	Limit	Qualifiers
MW20S-GW121420 (L175-09)		Acceptable		

LCS/LCSD	8260C	%RPD	Limits	Qualifiers	Associated Samples
LCS1W / LCSD1W		Acceptable			
LCS2W / LCSD2W		Acceptable			
LCS3W / LCSD3W		Acceptable			

Accuracy:	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**Yes**
Laboratory Control Sample criteria met?			**Yes**
Were the Laboratory Method Blank results all < RL?			**Yes**
Were the Field Blanks results all < RL?			**No**
Was the ICAL criteria met?			**Yes**
Was the CCV criteria met?			**Yes**
Was the Tuning criteria met?			**Yes**
Were the Surrogate % recoveries within laboratory determined control limits?			**Yes**
Were the Internal Standard areas within ± 50 - 150%?			**Yes**

Comments (note deviations):

Blanks	8260C	Concentration	MDL /RL	Qualifiers	Associated Samples
MBLK1W		Nondetect			
MBLK2W		Nondetect			
MBLK3W		Nondetect			

Field Blank	8260C	Concentration	MDL /RL	Qualifiers	Associated Samples
Associated Samples: L175-01 through L175-05					
TB04-GW121720		Nondetect			
Associated Samples: L175-07 through L175-09					
TB03-GW121720	Acetone	3.1 J	2.5 / 20	None	Sample results nondetect
Associated Samples: L175-11 through L175-13					
TB02-GW121720	Acetone	2.6 J	2.5 / 20	**U-RL**	**L175-11**
Associated Samples: L175-17 through L175-19					
TB06-GW121720	Acetone	2.6 J	2.5 / 20	**U-RL**	**L175-17 through L175-19**
Associated Samples: L175-20 through L175-22					
TB01-GW121720		Nondetect			
Associated Samples: L175-24 through L175-26					
TB05-GW121720	Acetone	2.7 J	2.5 / 20	**U-RL**	**L175-26**
Associated Samples: All samples					
FB01-GW121620	Acetone	3.0 J	2.5 / 20	**U-RL**	**L175-11, L175-17 through L175-19, L175-26**

Surrogates	8260C	%R	Limit	Qualifiers	Associated Samples
		Acceptable			

MS/MSD	8260C	%R	Limit	Qualifiers	Associated Samples
MW20S-GW121420 (L175-09)		Acceptable			

LCS/LCSD	8260C	%R	Limits	Qualifiers	Associated Samples
LCS1W / LCSD1W		Acceptable			
LCS2W / LCSD2W		Acceptable			
LCS3W / LCSD3W		Acceptable			

ICAL	8260C	RRF	%RSD	Qualifiers	Associated Samples
12/03/2020 9:58		Acceptable	Acceptable		

CCV	8260C	RRF	%D	Limits	Qualifiers	Associated Samples
12/21/20 11:41		Acceptable	Acceptable			
12/22/20 12:21		Acceptable	Acceptable			
12/23/20 11:24		Acceptable	Acceptable			

Tune	8260C
	Acceptable

Internal Standards	8260C	Area	Area Lower / Upper Limit	Qualifiers	Associated Samples
		Acceptable			

Semivolatile Organic Compounds 8270D (1,4-Dioxane SIM)

Precision:

	Yes	No	N/A
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?	Yes		
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			N/A
Laboratory Control Spike Duplicates RPD within limits?	Yes		

Comments (note deviations):

Field Duplicates	8270D	Sample	Duplicate	RPD	Qualifiers	Associated Samples
		MW37S-GW121420	FD04-GW121420			
		ND	ND	Acceptable		

MS/MSD	8270D	RPD	Limit	Qualifiers	Associated Samples
N/A					

LCS/LCSD	8270D	RPD	Limit	Qualifiers	Associated Samples
LCS1W / LCSD1W		Acceptable			

Accuracy:

	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			N/A
Laboratory Control Sample criteria met?	Yes		
Were the Laboratory Method Blank results all < RL?	Yes		
Were the Field Blanks results all < RL?	Yes		
Was the ICAL criteria met?	Yes		
Was the CCV criteria met?	Yes		
Was the Tuning criteria met?	Yes		
Were the Surrogate % recoveries within laboratory determined control limits?	Yes		
Were the Internal Standard areas within ± 50 - 150%?	Yes		

Comments (note deviations):

Blanks	8270D	Concentration (ug/L)	MDL / RL	Qualifiers	Associated Samples
MBLK1W		Nondetect			

Field Blank	8270D	Concentration	MDL / RL	Qualifiers	Associated Samples
FB01-GW121620		Nondetect			

Surrogates	8270D	%R	Limit	Qualifiers	Associated Samples
		Acceptable			

MS/MSD	8270D	%R	Limits (%)	Qualifiers	Associated Samples
N/A					

LCS/LCSD	8270D	%R	Limits	Qualifiers	Associated Samples
LCS1W / LCSD1W		Acceptable			

ICAL	8270D	RRF	%RSD	Qualifiers	Associated Samples
6/3/2020 14:04		Acceptable	Acceptable		

CCV	8270D	RRF	%D	Qualifiers	Associated Samples
12/22/2020 12:52		Acceptable	Acceptable		

Tune	8270D
	Acceptable

Internal Standards	8270D	Area	Area Lower / Upper Limit	Qualifiers	Associated Samples
		Acceptable			

Dissolved Gases RSK-175

Precision:

	Yes	No	N/A
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?	Yes		
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)	Yes		
Laboratory Control Spike Duplicates RPD within limits?	Yes		
Are the laboratory duplicate RPDs ≤ 20% for water ≤35% for soils or within CRQL criteria?			N/A

Comments (note deviations):

Field Duplicates	RSK-175	Sample	Duplicate	%RPD	Qualifiers	Associated Samples
		MW02-GW121620	FD01-GW121620			
		ND	ND	Acceptable		
		MW18-GW121420	FD06-GW121420			
		ND	ND	Acceptable		
		MW37S-GW121420	FD04-GW121420			
		ND	ND	Acceptable		

MS/MSD	RSK-175	%RPD	Limit	Qualifiers	Associated Samples
MW20S-GW121420 (L175-09)		Acceptable			

LCS/LCSD	RSK-175	%RPD	Limits	Qualifiers	Associated Samples
LCS1W / LCD1W		Acceptable			

Laboratory Duplicates	RSK-175	Sample (ug/L)	Duplicate (ug/L)	RPD	Qualifiers	Associated Samples
N/A						

Accuracy:

	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)	Yes		
Laboratory Control Sample criteria met?	Yes		
Were the Laboratory Method Blank results all < RL?	Yes		
Were the Field Blanks results all < RL?			N/A
Was the ICAL criteria met?	Yes		
Was the CCV criteria met?	Yes		
Was the Tuning criteria met?			N/A
Were the Surrogate % recoveries within laboratory determined control limits?			N/A
Were the Internal Standard areas within ± 50 - 150%?			N/A

Comments (note deviations):

Blanks	RSK-175	Concentration (ug/L)	MDL / RL	Qualifiers	Associated Samples
MBLK1W		Nondetect			

Field Blank	RSK-175	Concentration	MDL / RL	Qualifiers	Associated Samples
N/A					

Surrogates	RSK-175	%R	Limit	Qualifiers	Associated Samples
N/A					

MS/MSD	RSK-175	%R	Limits (%)	Qualifiers	Associated Samples
MW20S-GW121420 (L175-09)		Acceptable			

LCS/LCSD	RSK-175	%R	Limits	Qualifiers	Associated Samples
LCS1W / LCD1W		Acceptable			

ICAL	RSK-175	RRF	%RSD	Qualifiers	Associated Samples
4/29/2020		Acceptable	Acceptable		

CCV 4/29/2020 '14:39	**RSK-175**	**RRF** Acceptable	**%D** Acceptable	**Limits**	**Qualifiers**	**Associated Samples**

Tune N/A	**RSK-175**

Internal Standards N/A	**RSK-175**	**Area**	**Area Lower / Upper Limit**	**Qualifiers**	**Associated Samples**

Metals SW 6020A / Mercury 7470A

Precision:	Yes	No	N/A
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?	**Yes**		
Are the laboratory duplicate RPDs ≤ 20% for (water / soil) or within CRQL criteria?			**N/A**
Are the matrix spike duplicates RPD ≤ 20%?	**Yes**		
Are the laboratory control sample duplicates RPDs ≤ 20%?	**Yes**		

Comments (note deviations):

Field Duplicates		**Sample (ug/L)**	**Duplicate (ug/L)**	**%RPD**	**Qualifier**	**Associated Samples**
		MW02-GW121620	**FD01-GW121620**			
	Arsenic	1.44	1.43	NC	None	
	Chromium	3.08	2.84	NC	None	
	Cobalt	0.414 J	0.406 J	NC	None	Sample results < 5xs RL;
	Copper	0.749 J	0.671 J	NC	None	ABS Diff. < RL
	Nickel	1.5	1.45	NC	None	
	Vanadium	2.36	2.39	NC	None	
		MW18-GW121420	**FD06-GW121420**			
	Arsenic	1.16	1.22	NC	None	
	Chromium	1.41	1.46	NC	None	
	Cobalt	0.383 J	0.409 J	NC	None	
	Iron	207	221	NC	None	Sample results < 5xs RL;
	Manganese	5.89	4.89	NC	None	ABS Diff. < RL
	Selenium	1 U	1.03	NC	None	
	Vanadium	1.97	2.08	NC	None	
	Zinc	20 U	6.72 J	NC	None	
		MW37S-GW121420	**FD04-GW121420**			
	Cobalt	0.463 J	0.454 J	NC	None	
	Copper	2 U	1.4	NC	None	
	Iron	67.7 J	73.5 J	NC	None	Sample results < 5xs RL;
	Selenium	2.43	2.45	NC	None	ABS Diff. < RL
	Vanadium	1.44	1.44	NC	None	
	Zinc	5.05 J	11.2 J	NC	None	

MS/MSD		**RPD**	**Qualifiers**	**Associated Samples**
MW20S-GW121420 (L175-09)		Acceptable		
MW20S-GW121420 (L175-09)	Mercury	Acceptable		

LCS / LCSD	**RPD**	**Qualifiers**	**Associated Samples**
LCS1W / LCD1W	Acceptable		
LCS1W / LCD1W (Hg)	Acceptable		

Laboratory Duplicate	**Sample**	**Duplicate**	**RPD**	**Qualifier**	**Associated Samples**
N/A					

Accuracy:	Yes	No	N/A
Were serial dilutions analyzed and within control limits of ±10% for waters (± for 15% for soils) or initial sample result less than 50x MDL?	**Yes**		
Was matrix spike criteria met (frequency 20% and % recovery 75-125%)?		**No**	
Was post digestion spike criteria met (if applicable)?	**Yes**		
Was laboratory control sample criteria met?	**Yes**		
Was laboratory blank criteria met (within control limits)?		**No**	
Were ICV/CCV % recoveries within 90-110%?	**Yes**		
Were the Detection Limit PQL Standards within 70-130?			**N/A**
Was the %D on form 16-IN for the initial calibration instrument response and concentration data <30%?			**N/A**
Were ICSA/ICSAB % recoveries acceptable or within CRQL criteria?	**Yes**		
Was the tune %RPD <5% (Peak width < 0.75)?	**Yes**		
Was internal standard criteria met?	**Yes**		

Comments (note deviations):

Serial Dilution	Analyte	Initial Sample Result	%D	50 x MDL	Qualifier	Associated Samples
			Acceptable			

MS/MSD	Analyte	%R	Limits	Post Digestion	Qualifiers	Associated Samples
MW20S-GW121420 MS/MSD						
(L175-09)	Magnesium	87 / 73	75-125	83	None	ISR > 4xs the spike added
	Calcium	100 / -33	75-125	103	None	ISR > 4xs the spike added
	Sodium	87 / 10	75-125	105	None	ISR > 4xs the spike added
MW20S-GW121420 MS/MSD						
(L175-09)	Mercury	Acceptable				

LCS/LCSD	Analyte	%R	Limits	Qualifiers	Associated Samples
LCS1W / LCD1W		Acceptable			
LCS1W / LCD1W (Hg)		Acceptable			

ICV/CCV	Analyte	%R	Limits	Qualifier	Associated Samples
		Acceptable			

Blanks

Prep Blank	Result (ug/L)	MDL/RL (ug/L)	Qualifier	Associated Samples
MBLK1W	Nondetect			

ICBs	Analyte	Result (ug/L)	MDL/RL (ug/L)	Qualifier	Associated Samples
ICB++	Vanadium	0.4	0.25 / 1	**U-RL**	**L175-22**
	Chromium	0.4	0.1 / 1	**U-RL**	**L175-02, L175-11, L175-13, L175-20, L175-21, L175-22**
	Nickel	0.4	0.25 / 1	**U-RL**	**L175-01, L175-02, L175-05, L175-08, L175-13, L175-20, L175-25**
	Arsenic	0.4	0.125 / 1	**U-RL**	**L175-01, L175-02, L175-11, L175-12, L175-13, L175-20, L175-21, L175-22, L175-24, L175-25**
	Selenium	0.2	0.15 / 1	**U-RL**	**L175-02, L175-03, L175-04, L175-07, L175-08, L175-09, L175-11, L175-12, L175-22, L175-24, L175-25**
ICB**		Nondetect			
ICB	Mercury	-0.011	0.1 / 0.5	None	-Blank result > - RL

++ ICB associated with initial analysis
** ICB associated with re-analyzed results

CCBs	Analyte	Result (ug/L)	MDL/RL (ug/L)	Qualifier	Associated Samples
CCB4++		Nondetect			
CCB5++	Manganese	0.4	0.25 / 1	**U-RL**	**L175-01, L175-03, L175-04**
	Selenium	0.2	0.15 / 1	**U-RL**	**L175-02, L175-03, L175-04, L175-07, L175-08, L175-09, L175-11, L175-12, L175-22, L175-24, L175-25**
CCB6++		Nondetect			
CCB5**		Nondetect**			
CCB6**		Nondetect**			
CCB7**		Nondetect**			
CCB4	Mercury	0.002	0.1 / 0.5	None	Sample results nondetect
CCB5	Mercury	-0.012	0.1 / 0.5	None	-Blank results > - RL
CCB6	Mercury	-0.002	0.1 / 0.5	None	-Blank results > - RL
CCB7	Mercury	-0.004	0.1 / 0.5	None	-Blank results > - RL

++ CCB associated with initial analysis
** CCB associated with re-analyzed results
**Applicable only to Ca, Mg, and Na results

Field Blank	6020A	Concentration (ug/L)	MDL/RL (ug/L)		Qualifiers	Associated Samples
N/A						

ICSA/AB	Analyte - Solution A	%R	Found Sol. A / True A	RL	Qualifier	Associated Samples
		Acceptable				

PQL Standard Check			%R		Qualifiers	Associated Samples
N/A						

Tune

Acceptable

Internal Standards					Qualifier	Associated Samples
Acceptable						

Wet Chemistry Parameters

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPD) ≤30% (soils / water) or within CRQL criteria?	**Yes**		
Are the laboratory duplicate RPDs ≤ 20% for water ≤35% for soils or within CRQL criteria?	**Yes**		
Are the matrix spike duplicates RPD ≤ 20%?	**Yes**		
Are the laboratory control spike duplicates RPD ≤ 20%?	**Yes**		

Comments (note deviations):

Field Duplicates		**Sample (mg/L)**	**Duplicate (mg/L)**	**RPD**	**Qualifier**	**Associated Samples**
		MW02-GW121620	**FD01-GW121620**			
	TOC	0.855 J	0.842 J	NC	None	Sample results < 5xs RL; ABS Diff. < RL
		MW18-GW121420	**FD06-GW121420**			
	TOC	0.577 J	0.68 J	NC	None	Sample results < 5xs RL; ABS Diff. < RL
		MW37S-GW121420	**FD04-GW121420**			
	TOC	1.74	0.908 J	NC	None	Sample results < 5xs RL; ABS Diff. < RL

MS/MSD	**%R**	**Limits**	**RPD %**	**Qualifiers**
MW20S-GW121420 MS/MSD (L175-09)			Acceptable	

** Numerous MS/MSDs performed / evaluated all QC data within acceptable criteria

LCS/ LCSD	**Limits**	**RPD**	**Qualifiers**	**Associated Samples**
		Acceptable		

** Numerous LCS/LCSDs performed / evaluated all QC data within acceptable criteria

Laboratory Duplicate	**Sample**	**Duplicate**	**RPD**	**Qualifiers**	**Associated Samples**
			Acceptable		

Accuracy:	**Yes**	**No**	**N/A**
Was matrix spike criteria met (frequency 20% and % recovery 75-125%)?	**Yes**		
Was post digestion spike criteria met (if applicable)?			**N/A**
Was laboratory control sample criteria met?	**Yes**		
Was laboratory blank criteria met (within control limits)?		**No**	
Were the Field Blanks results all < RL?			**N/A**
Were ICV/CCV % recoveries within 90-110%?	**Yes**		
Was the tune %RSD <5% ?			**N/A**
Was internal standard criteria met?			**N/A**

Comments (note deviations):

MS /MSD	**Analyte**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
MW20S-GW121420 MS/MSD (L175-09)		Acceptable			

** Numerous MS/MSD performed / evaluated all QC data within acceptable criteria

LCS / LCSD	**Analyte**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
		Acceptable			

** Numerous LCS/LCSD performed / evaluated all QC data within acceptable criteria

ICV/CCV	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
	Acceptable			

Blanks	**Analyte**	**Result**	**MDL/RL**	**Qualifiers**	**Associated Samples**
		Nondetect			

** Numerous prep. blanks performed / evaluated all QC blanks were nondetect

ICB / CCBs	Analyte	Result	MDL/RL	Qualifier	Associated Samples
CCB5	TOC	0.292	0.25 / 1	None	See Note
CCB6	TOC	0.329	0.25 / 1	None	

Note: The laboratory reported method blank criteria was met and the concentrations in the CCBs does not significantly affect the concentrations for TOC. Based on professional judgement, no qualifications were required.

** The remaining ICB/CCBs performed / evaluated were nondetect

Field Blank	Analyte	Result (mg/L)	MDL/RL	Qualifiers	Associated Samples
N/A					

Tune	Analyte	%RSD	Limits	Qualifiers	Associated Samples
N/A					

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	Yes		
Were holding times met?	Yes		
Was preservation criteria met? (0° C - 6° C)	Yes		
Were Chain-of-Custody records complete and provided in data package?	Yes		

Comments (note

The cooler temperatures were 3.3, 2.2, 3.8, 2.5 & 3.1 °C

Preservation	Cooler Temperature (Degrees C)	Preservation Criteria	Qualifier	Associated Samples
	Acceptable			

Holding Times	Analyte	Days to Extraction	HT Criteria	Qualifier	Associated Samples
		Acceptable			

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	Yes		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	Yes		

Comments (note deviations):

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	Yes		
Do the reporting limits meet project requirements?	Yes		

Comments (note deviations):

Comment:

Data is usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 2/17/2021

Data Reviewer: Cherie Zakowski Date: 2/18/2021

Attachment 2

Data Package Completeness Review Checklists

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 20L102

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt	X		1.8 °C, 2.2 °C, 1.4 °C
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)			Not Applicable
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)	X		
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)	X		
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)	X		
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)	X		
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks	X		

Data package complete and ready for Validation Cherie Zakowski Date: 1/15/2021

Signature

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 20L132

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt	X		1.2 °C, 1.3 °C, 3.2 °C
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)			Not Applicable
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)	X		
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)	X		
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)	X		
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)	X		
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks	X		

Data package complete and ready for Validation Cherie Zakowski Date: 1/15/2021

Signature

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 20L133

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt	X		1.0 °C, 1.7 °C, 1.8 °C
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)			Not Applicable
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)	X		
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)	X		
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)	X		
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)	X		
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks	X		

Data package complete and ready for Validation Cherie Zakowski Date: 1/20/2021

Signature

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 20L141

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt	X		1.0 °C, 1.6 °C, 2.1 °C
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)			Not Applicable
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)	X		
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)	X		
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)	X		
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)	X		
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks	X		

Data package complete and ready for Validation Cherie Zakowski Date: 1/16/2021

Signature

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 20L175

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt	X		3.3 °C, 3.3 °C, 2.2 °C, 3.8 °C, 2.5 °C, 3.1 °C
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)			Not Applicable
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)	X		
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)	X		
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)	X		
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)	X		
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks	X		

Data package complete and ready for Validation Cherie Zakowski Date: 1/28/2021

Signature

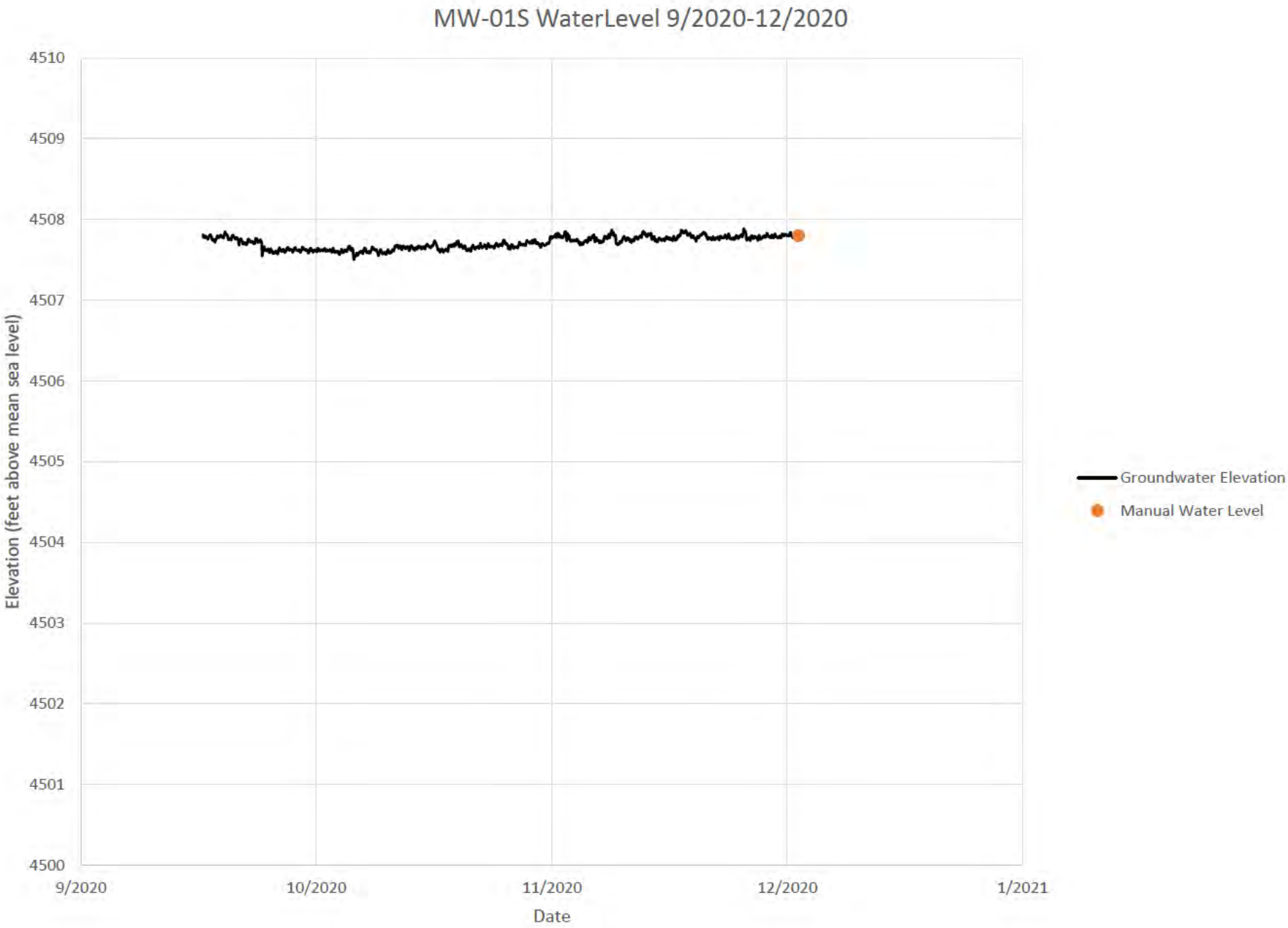
Attachment 3

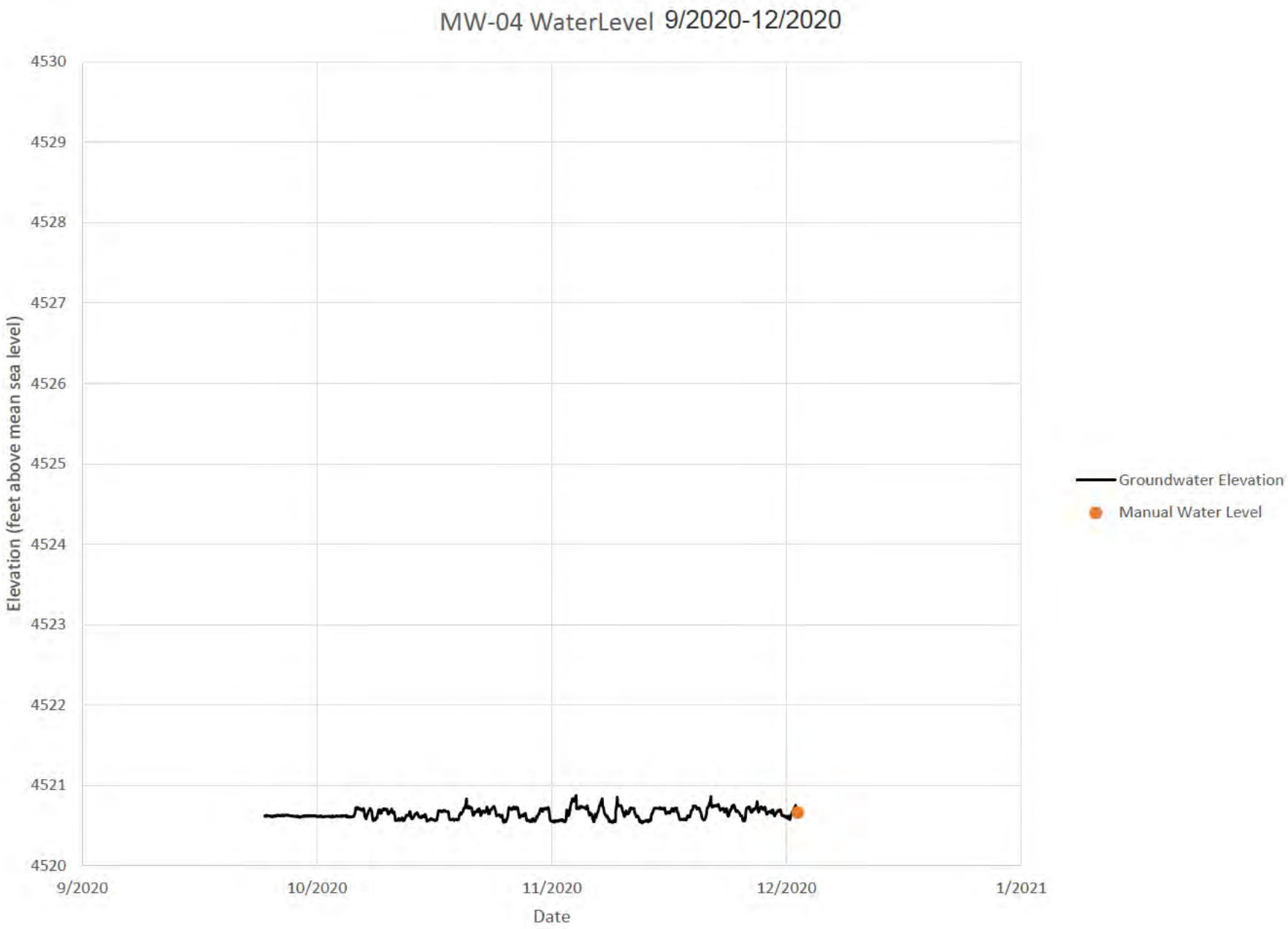
Analytical Data Packages

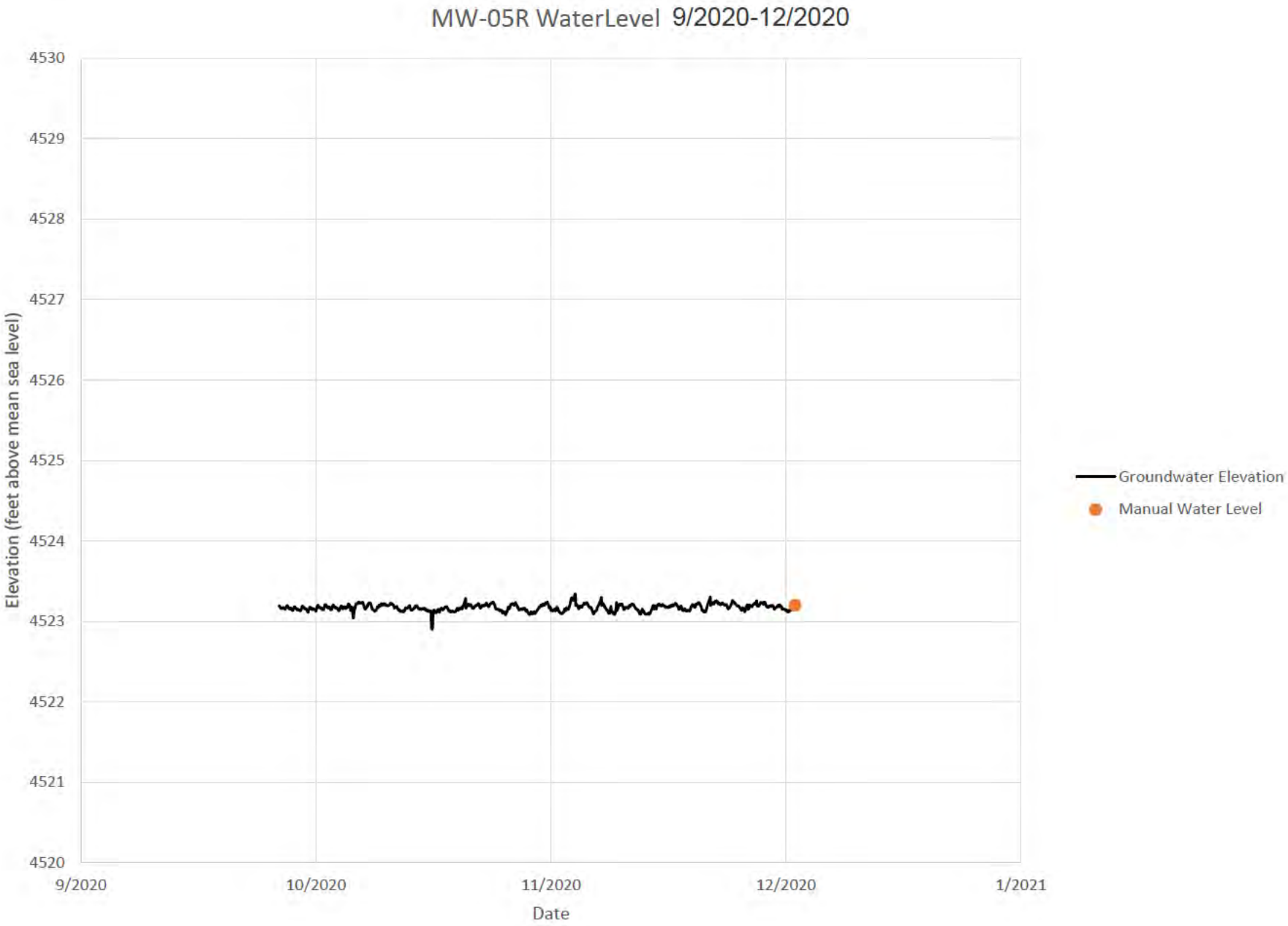
Note: Laboratory Data Reports removed from report and provided separately.

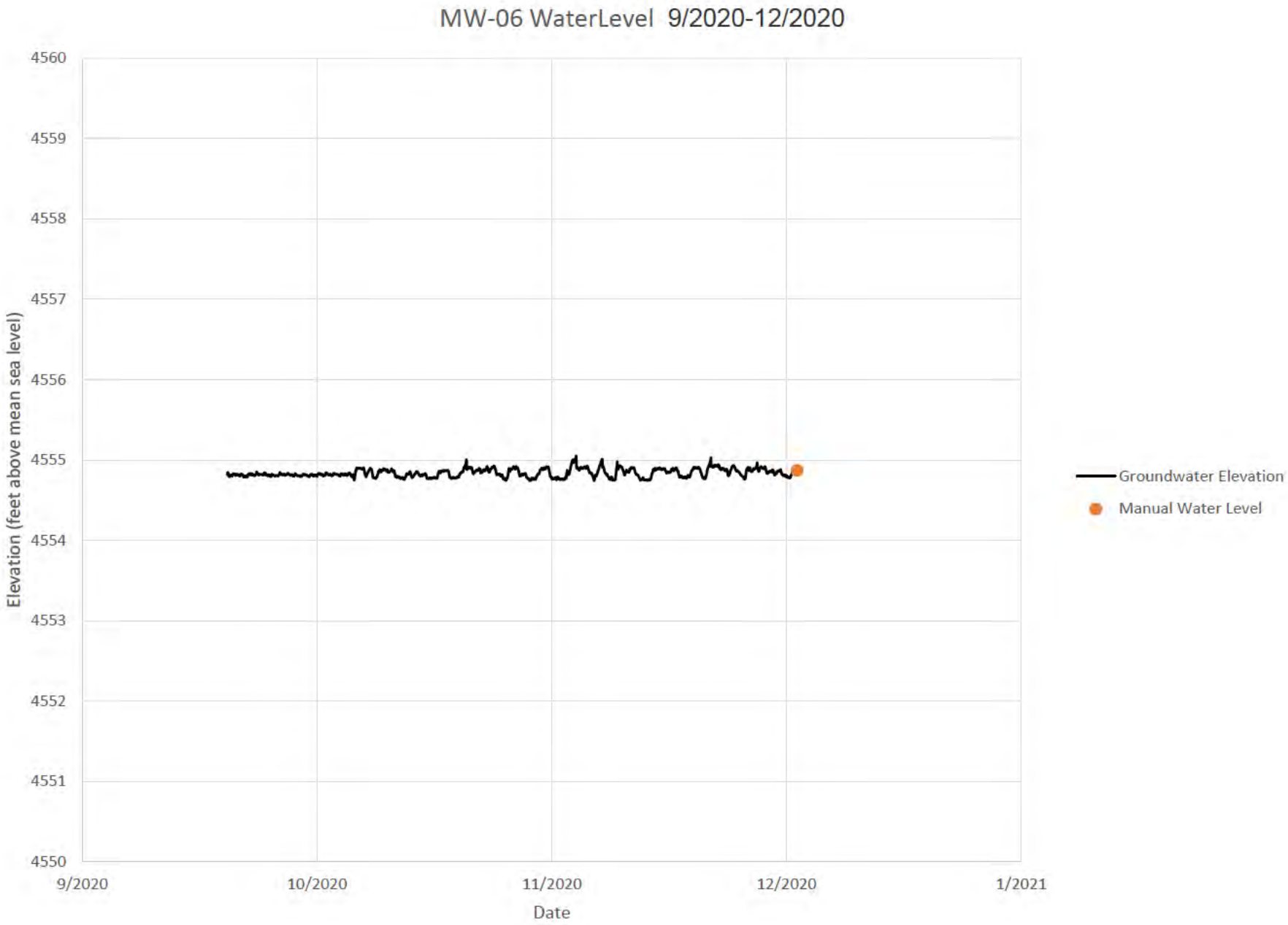
Appendix D

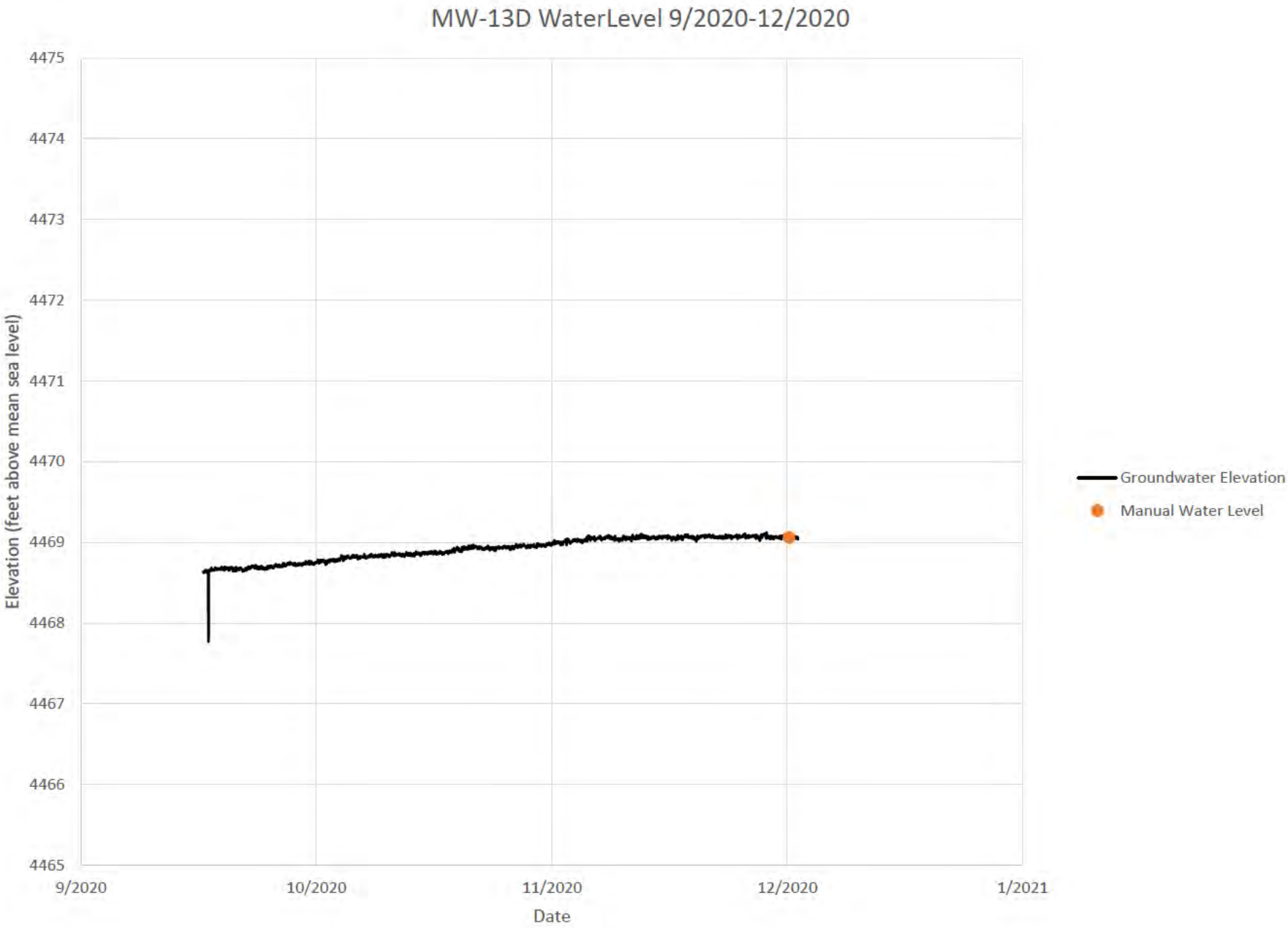
Transducer Hydrographs

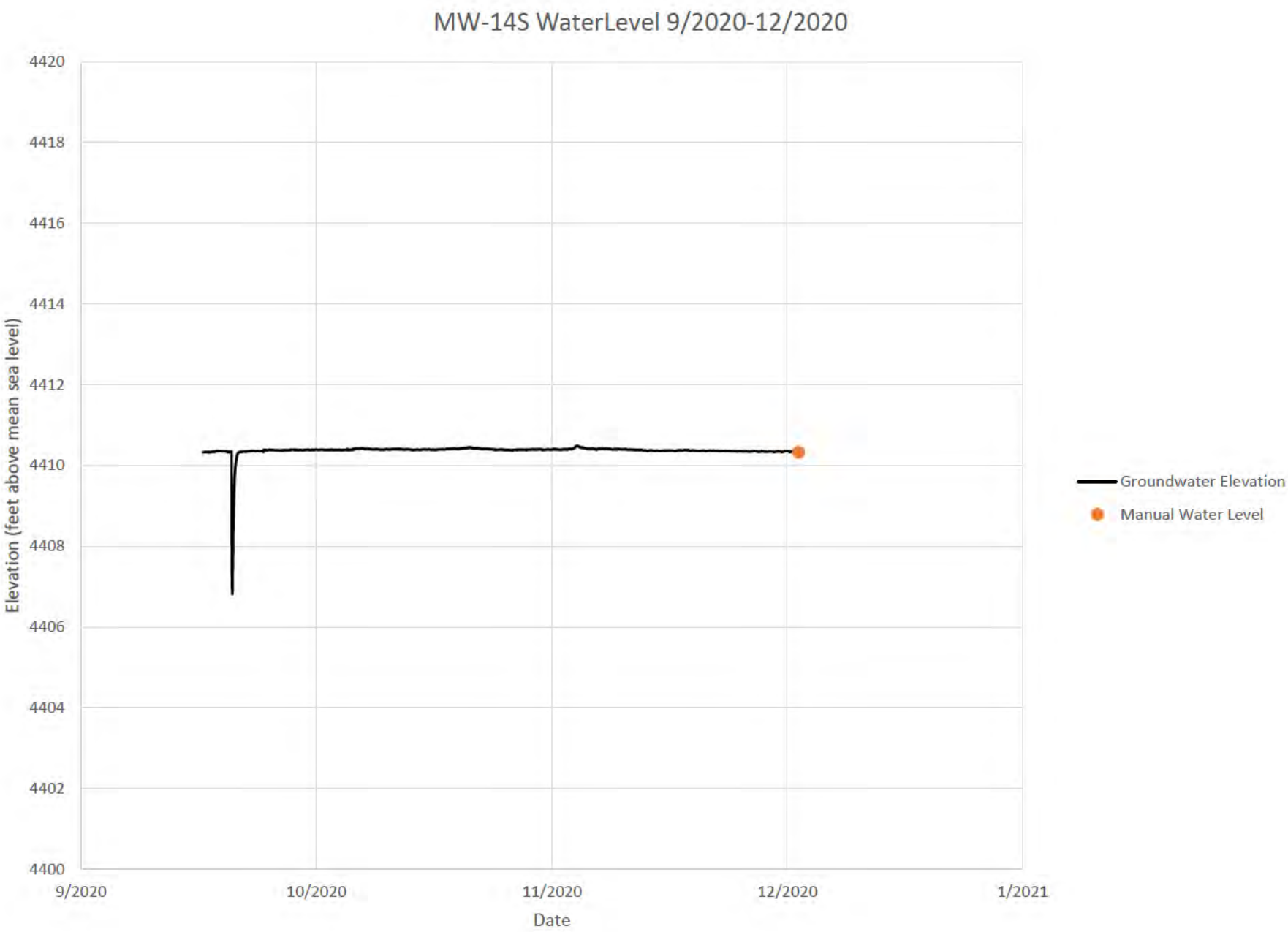

MW-01S WaterLevel 9/2020-12/2020
4510
4509
4508
4507
4506
4505
4504
4503
4502
4501
4500
Elevation (feet above mean sea level)
9/2020
10/2020
11/2020
12/2020
1/2021
Date
Groundwater Elevation
Manual Water Level

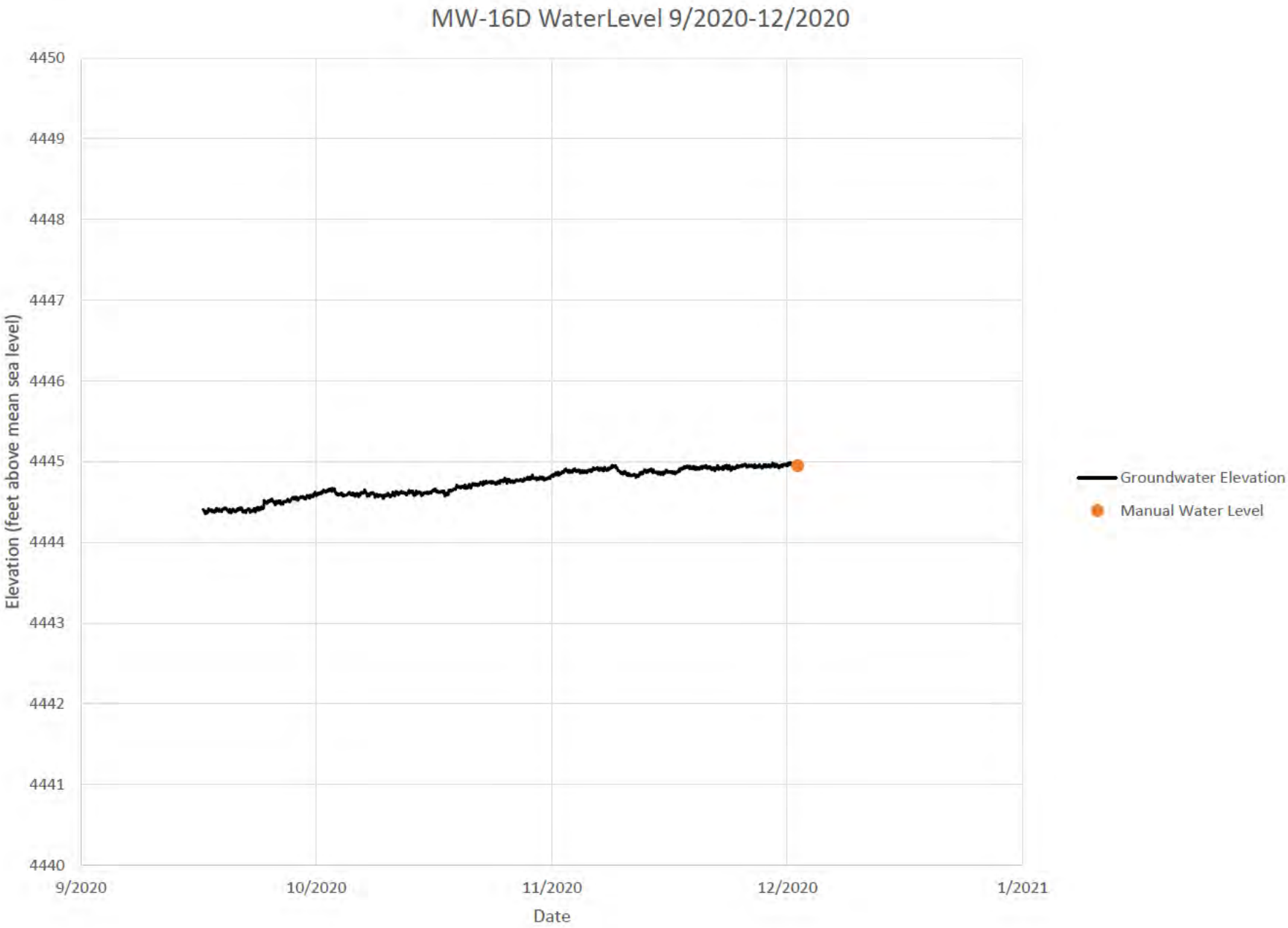

MW-04 WaterLevel 9/2020-12/2020
4530
4529
4528
4527
4526
4525
4524
4523
4522
4521
4520
Elevation (feet above mean sea level)
9/2020
10/2020
11/2020
12/2020
1/2021
Date
Groundwater Elevation
Manual Water Level

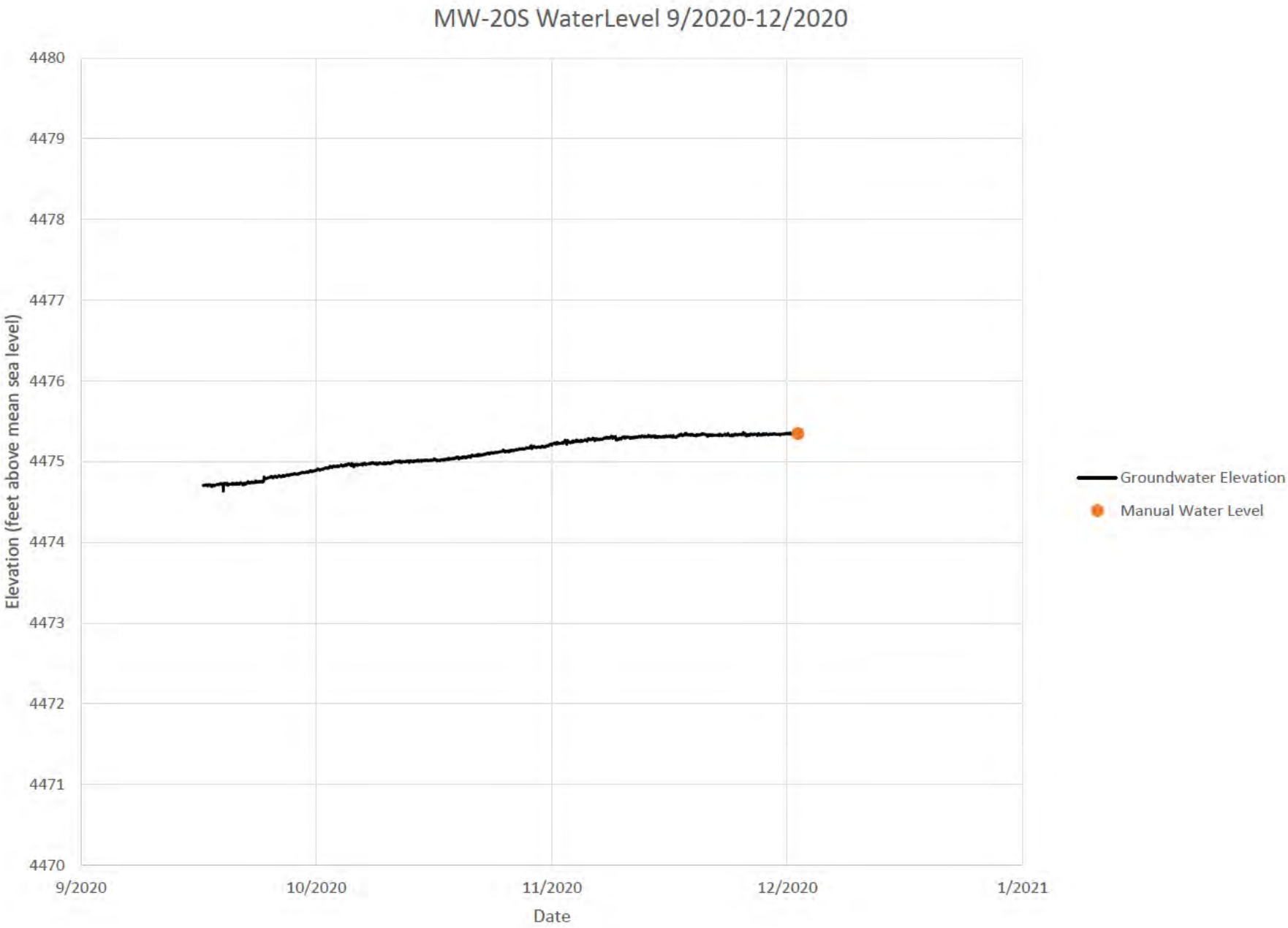

MW-05R WaterLevel 9/2020-12/2020
4530
4529
4528
4527
4526
4525
4524
4523
4522
4521
4520
Elevation (feet above mean sea level)
9/2020
10/2020
11/2020
12/2020
1/2021
Date
Groundwater Elevation
Manual Water Level

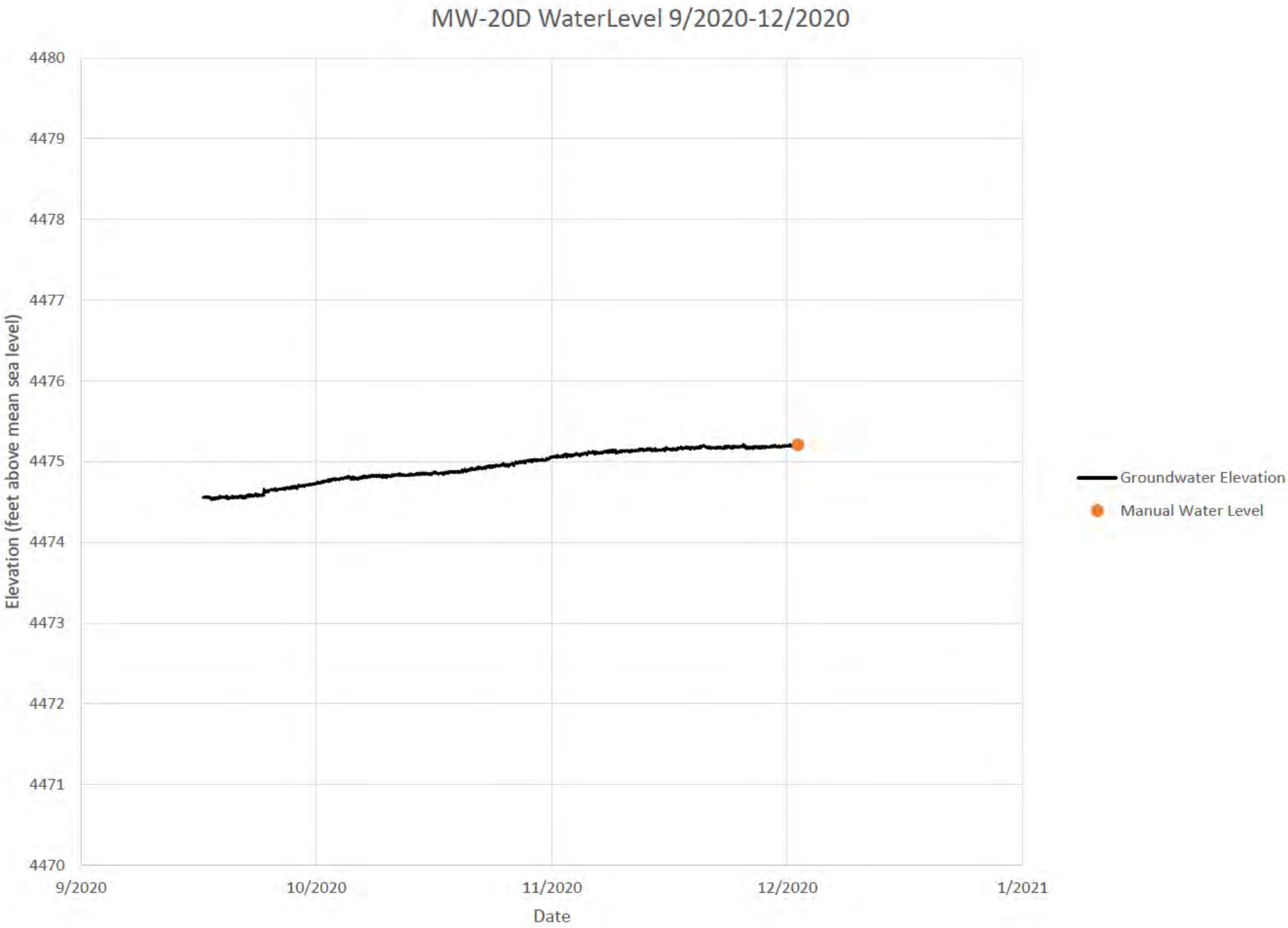

MW-06 WaterLevel 9/2020-12/2020
4560
4559
4558
4557
4556
4555
4554
4553
4552
4551
4550
Elevation (feet above mean sea level)
9/2020
10/2020
11/2020
12/2020
1/2021
Date
Groundwater Elevation
Manual Water Level

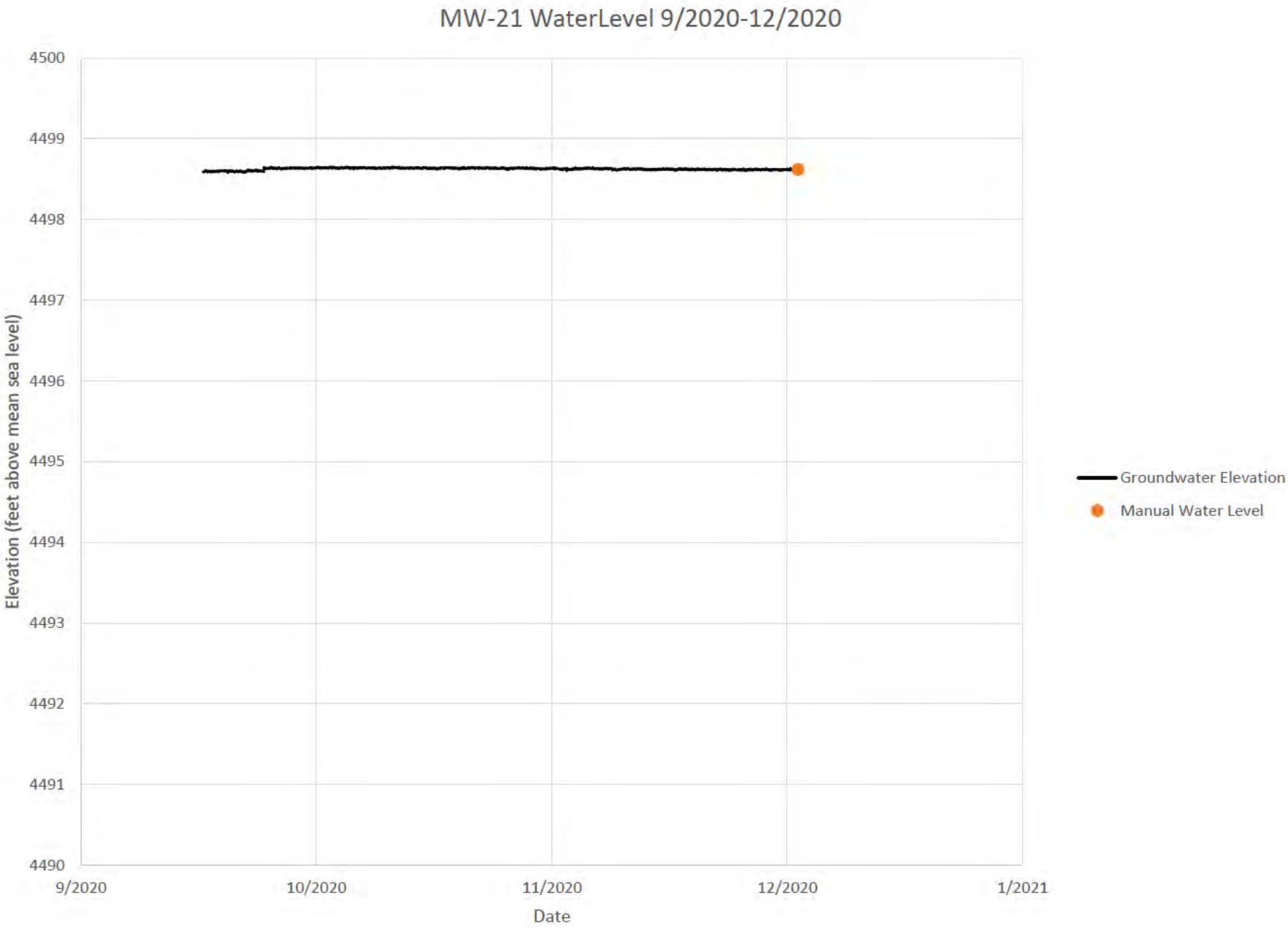

MW-13D WaterLevel 9/2020-12/2020
4475
4474
4473
4472
4471
4470
4469
4468
4467
4466
4465
Elevation (feet above mean sea level)
9/2020
10/2020
11/2020
12/2020
1/2021
Date
Groundwater Elevation
Manual Water Level

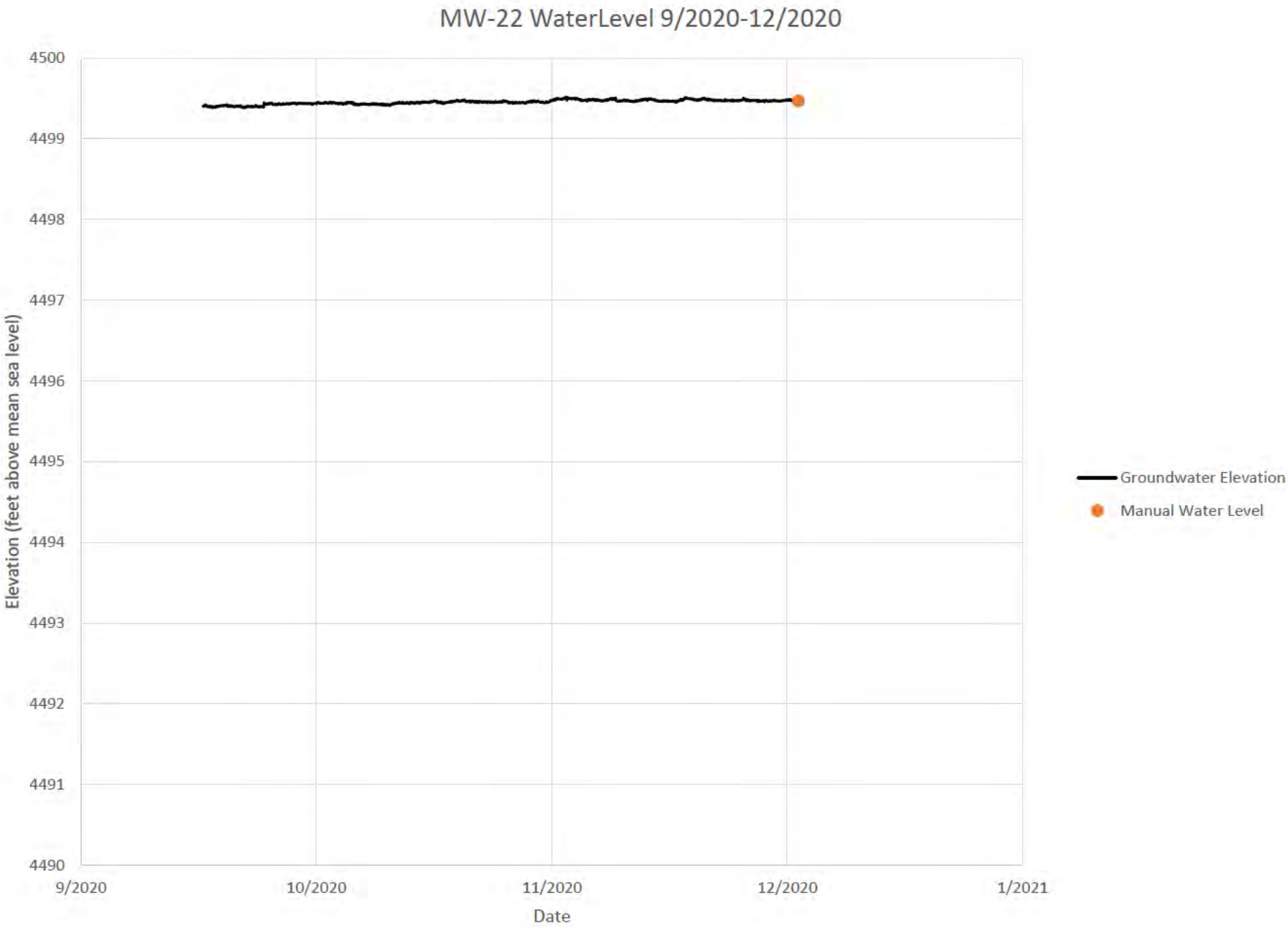

MW-14S WaterLevel 9/2020-12/2020
4420
4418
4416
4414
4412
4410
4408
4406
4404
4402
4400
Elevation (feet above mean sea level)
9/2020
10/2020
11/2020
12/2020
1/2021
Date
Groundwater Elevation
Manual Water Level

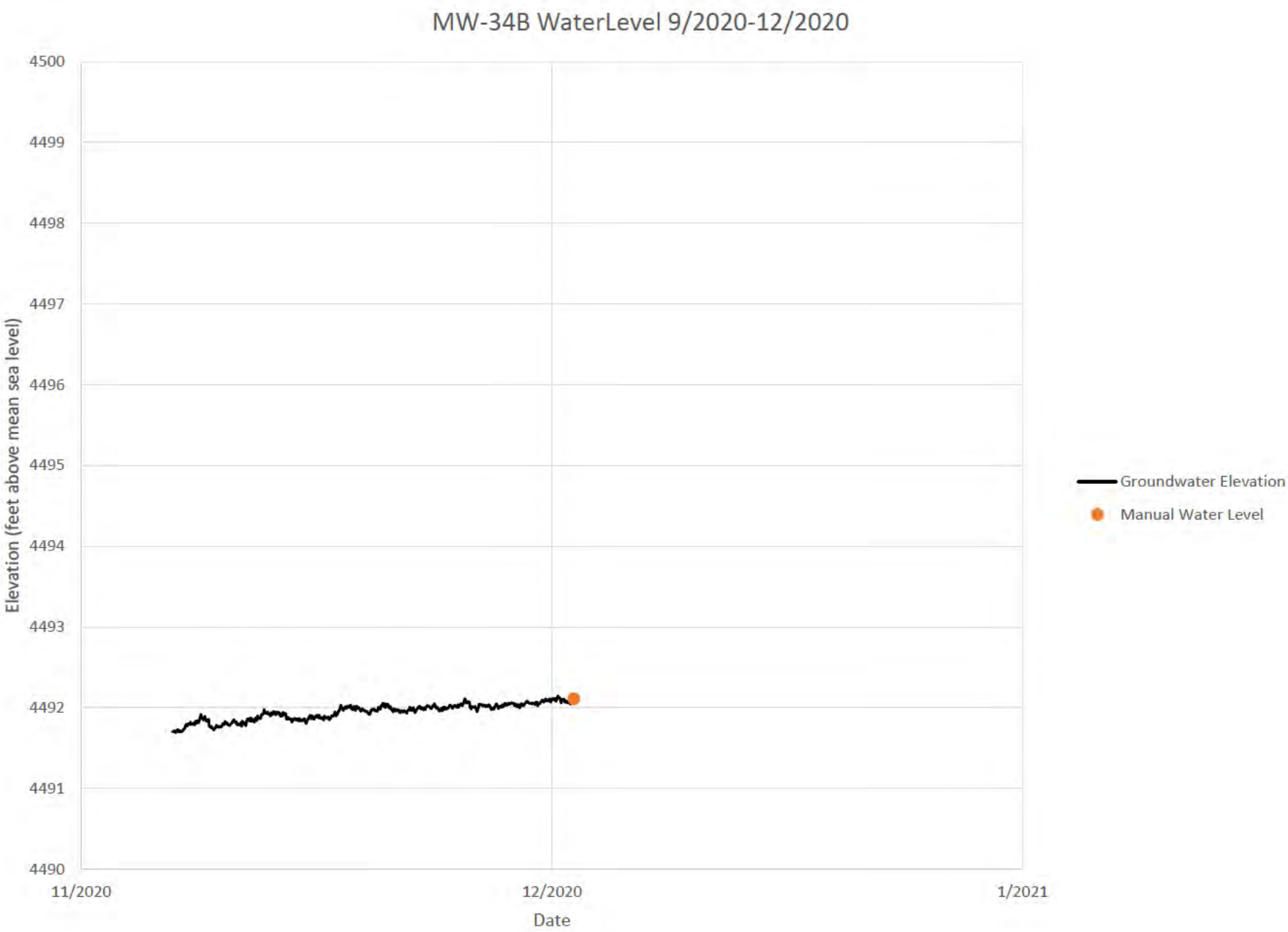

MW-16D WaterLevel 9/2020-12/2020
4450
4449
4448
4447
4446
4445
4444
4443
4442
4441
4440
Elevation (feet above mean sea level)
9/2020
10/2020
11/2020
12/2020
1/2021
Date
Groundwater Elevation
Manual Water Level

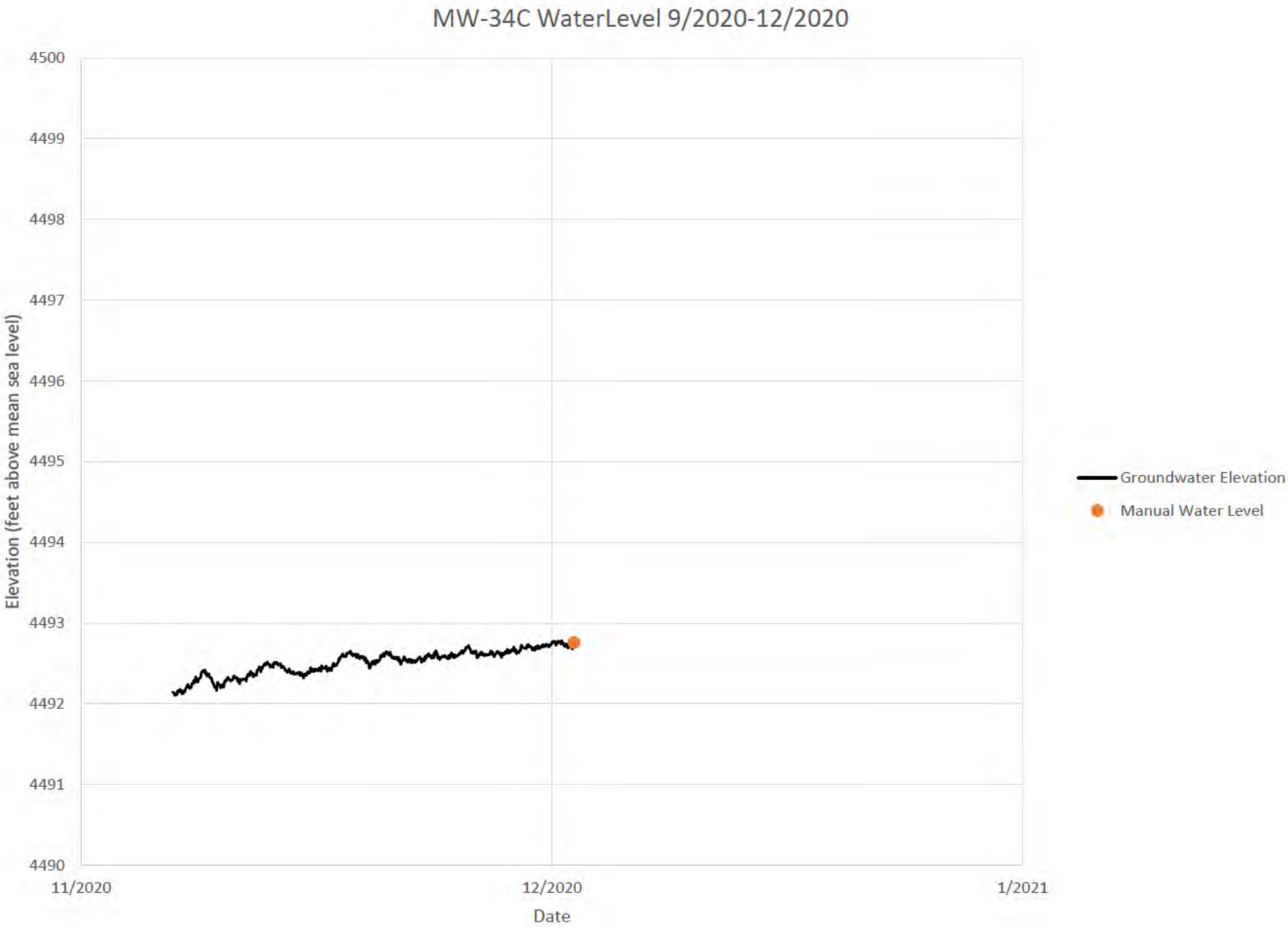

MW-20S WaterLevel 9/2020-12/2020
4480
4479
4478
4477
4476
4475
4474
4473
4472
4471
4470
Elevation (feet above mean sea level)
9/2020
10/2020
11/2020
12/2020
1/2021
Date
Groundwater Elevation
Manual Water Level

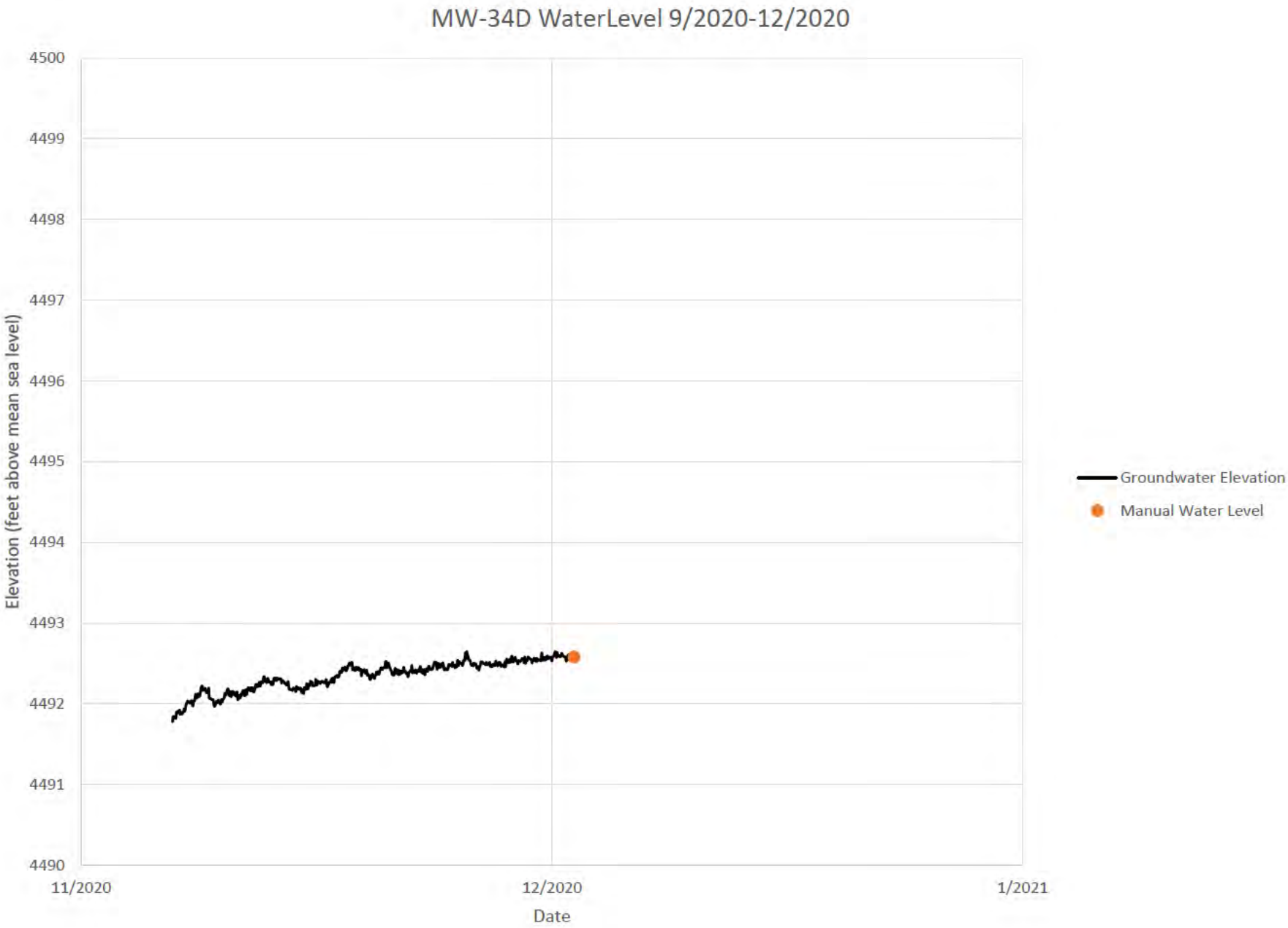

MW-20D WaterLevel 9/2020-12/2020
4480
4479
4478
4477
4476
4475
4474
4473
4472
4471
4470
Elevation (feet above mean sea level)
9/2020
10/2020
11/2020
12/2020
1/2021
Date
Groundwater Elevation
Manual Water Level


MW-21 WaterLevel 9/2020-12/2020
4500
4499
4498
4497
4496
4495
4494
4493
4492
4491
4490
Elevation (feet above mean sea level)
9/2020
10/2020
11/2020
12/2020
1/2021
Date
Groundwater Elevation
Manual Water Level


MW-22 WaterLevel 9/2020-12/2020
4500
4499
4498
4497
4496
4495
4494
4493
4492
4491
4490
Elevation (feet above mean sea level)
9/2020
10/2020
11/2020
12/2020
1/2021
Date
Groundwater Elevation
Manual Water Level


MW-34B WaterLevel 9/2020-12/2020
4500
4499
4498
4497
4496
4495
4494
4493
4492
4491
4490
Elevation (feet above mean sea level)
11/2020
12/2020
1/2021
Date
Groundwater Elevation
Manual Water Level


MW-34C WaterLevel 9/2020-12/2020
4500
4499
4498
4497
4496
4495
4494
4493
4492
4491
4490
Elevation (feet above mean sea level)
11/2020
12/2020
1/2021
Date
Groundwater Elevation
Manual Water Level


MW-34D WaterLevel 9/2020-12/2020
4500
4499
4498
4497
4496
4495
4494
4493
4492
4491
4490
Elevation (feet above mean sea level)
11/2020
12/2020
1/2021
Date
Groundwater Elevation
Manual Water Level

Final Data Summary Report
Q1 2021 Groundwater Sampling Event

CONTRACT NO.: W912DQ-18-D-3008
DELIVERY ORDER NO.: W912DQ19F3048

700 South 1600 East PCE Plume Site
Salt Lake City, Utah

U.S. Army Corps of Engineers
Kansas City District

Department of Veterans Affairs
Veterans Health Administration Salt Lake City
Health Care System

June 30, 2021

CDM Smith

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Acronyms and Abbreviations

bgs	below ground surface
CDM Smith	CDM Federal Programs Corporation
DO	dissolved oxygen
DSR	data summary report
EPA	U.S. Environmental Protection Agency
feet/foot	feet per foot
IDW	investigation-derived waste
MCL	maximum contaminant level
mg/L	milligrams per liter
mL/min	milliliters per minute
NTU	nephelometric turbidity unit
ORP	oxidation-reduction potential
OU	operable unit
PCE	tetrachloroethene
Q1-2021	first quarter 2021
QAPP	quality assurance project plan
RI	remedial investigation
RSL	regional screening level
SOP	standard operating procedure
TCE	trichloroethene
TOC	total organic carbon
VAMC	Veterans Affairs Medical Center
VOC	volatile organic compound
ZIST	zone isolation sampling technology
µg/L	micrograms per liter

Section 1
Introduction

Under the U.S. Army Corps of Engineers, Kansas City District Contract No. W912DQ-18-D-3008, Task Order No. W912DQ19F3048, CDM Federal Programs Corporation (CDM Smith) was directed to perform a remedial investigation (RI) for Operable Unit (OU) 1 of the 700 South 1600 East Tetrachloroethene (PCE) Plume Superfund Site (Site) in Salt Lake City, Utah. CDM Smith prepared this data summary report (DSR) to present the results of the first quarter of 2021 (Q1-2021) groundwater monitoring event as part of the RI field characterization activities.

1.1 Background

The Salt Lake City Healthcare System George E. Wahlen Veterans Affairs Medical Center (VAMC) is located in Salt Lake City, Utah (**Figure 1**). PCE contamination was first identified in groundwater in 1990 at the nearby Mt. Olivet Cemetery irrigation well during Salt Lake City Department of Public Utilities routine monitoring. This led to U.S. Environmental Protection Agency (EPA) and Utah Department of Environmental Quality involvement at the Site and the preliminary determination that the source of PCE in groundwater was the historical dry-cleaning facility located at the VAMC. The Veterans Health Administration operated a part-time dry-cleaning operation that used PCE over a 6-year period in the late 1970s and early 1980s. During this period, dry-cleaning residuals were disposed of in the sanitary sewer. A PCE groundwater plume is present beneath the VAMC property in areas hydraulically downgradient, extending to the East Side Springs neighborhood. In addition, elevated concentrations of PCE in soil gas and subslab vapor (up to 20,000 micrograms per cubic meter) have been observed adjacent to VAMC Buildings 6 and 7 (location of the VAMC dry-cleaning facility) (Jacobs 2019).

1.2 Purpose and Scope

The purpose and scope of this DSR is to describe the work conducted and present the analytical and field data collected during the Q1-2021 groundwater monitoring event.

Section 2
Field Sampling Activities

The following sections outline the field sampling activities that were completed during the Q1-2021 sampling event, which occurred from March 15 to 23, 2021.

2.1 Groundwater Sampling

The Q1-2021 groundwater monitoring event included the planned collection of 66 groundwater samples. All monitoring wells (including previously abandoned wells) are shown in **Figure 1,** and location data and well construction details are presented in **Table 1**. The sampling activities were conducted in accordance with the Phase 2 OU1 Quality Assurance Project Plan (QAPP) (CDM Smith 2020a) and the Phase 2 OU1 RI Work Plan (CDM Smith 2020b).

Several groundwater wells are in the public right-of-way and require traffic control and special work requirements to be implemented when accessing the wells. The associated traffic control permit and location-specific plans from the Salt Lake City Division of Transportation are attached (**Appendix A**). Field forms associated with this event, including the field logbook pages, water level measurement recordings, and sample purge forms, are included in **Appendix B**.

2.1.1 Synoptic Water Level Measurement

Prior to sampling activities, synoptic water levels were collected from 66 wells on March 15, 2021, following procedures outlined in Standard Operating Procedure (SOP) 1-6, *Groundwater Level Measurement* (CDM Smith 2020a). Manual water-level measurements were recorded from the northern edge of the casing using electronic water level meters. At artesian well MW-14D, the pressure reading on the gauge was recorded and converted to feet above the top of the casing. Water levels are presented in **Table 2**.

The collection of water level measurements in monitoring wells with dedicated Zone Isolation Sampling Technology (ZIST) pumps requires pulling the pump and allowing the water to equilibrate in the well casing. ZIST pumps provide isolation of the screen by creating a seal in the well casing when the pump is properly seated in the well screen dock. To collect water level measurements, the pumps were pulled approximately 1 foot out of the receiver in the well casing for approximately 3 hours to allow the water level to equilibrate following pump removal. After verifying that water levels had stabilized, the water level measurements were recorded manually, and the pump was properly reseated.

The following wells have dedicated ZIST pumps:

- MW-03RA/B/C/D
- MW-08C
- MW-23A/B/C
- MW-25A/B/C

- MW-26A/B/C/D
- MW-29A[1]/B/C
- MW-30C
- MW-31A[1]/B/C
- MW-32B[1]/C[1]
- MW-34A[1]/B[1]/C[1]/D[1]

2.1.2 Groundwater Sampling Procedures

All wells were sampled following project-specific SOP 6-2, *Low-Stress (Low-Flow) Groundwater Sampling* (CDM Smith 2020a) procedures. All wells were sampled using dedicated pumps, except for MW-14D.

Prior to collecting groundwater samples with low-flow sampling techniques, each well was purged to remove a minimum volume, which was calculated before the event. The minimum purge volume is three times the total amount of stagnant water in the pump and tubing. Low-flow groundwater sampling includes purging the well at a rate typically less than 500 milliliters per minute (mL/min) and with minimal drawdown (less than 0.3 feet) to ensure that the water sampled is representative of the formation surrounding the screened interval and not of the stagnant water column. If the drawdown exceeds 0.3 feet, the stagnant water column is contributing to the purge water and the minimum purge volume must be recalculated. Once the minimum purge volume was removed and water quality parameters stabilized as described in SOP 6-2, samples were collected.

At MW-14D, a permanent valve and gauge were previously installed to assist in controlling the artesian flow at the well. During sampling, the team opened the valve to maximum capacity, noted the flow rate, and collected grab samples for field parameter analysis. The flow rate decreased considerably over the purging period, from an initial flow of approximately 1,000 mL/min to 500 mL/min.

MW-17D has been observed to be seasonally artesian; therefore, a permanent threaded connection was previously attached to the wellhead to plug the well. As a result, the dedicated bladder pump is not permanently deployed in the well and is only used to sample the well when conditions are not artesian. During the sampling event, water was not free flowing from MW-17D; therefore, the dedicated bladder pump was used to sample the well.

All groundwater sampling was completed according to the project-specific SOP 6-2, *Low-Stress (Low-Flow) Groundwater Sampling* (CDM Smith 2020a), except for deviations outlined in Section 2.4. Field documentation of sampling procedures is provided in **Appendix B**.

2.1.3 Sample Analysis

The water quality parameters were analyzed continuously while purging with the use of a flow-through cell. The following parameters were recorded for each well:

[1] ZIST wells constructed without a pump receiver

- Dissolved oxygen (DO)
- Oxidation-reduction potential (ORP)
- pH
- Temperature
- Conductivity
- Turbidity

In addition to the water quality parameters, samples collected from all wells were analyzed for:

- Ferrous iron (measured in the field using HACH Method 8146)
- Volatile organic compounds (VOCs) by EPA Method SW8260C (**Table 3**)

Three samples (MW-13L and MW-26C/D) were analyzed for 1,4-dioxane by EPA Method 8270D (**Table 3**).

Thirty-five samples (MW-13L and MW-23 through MW-38) were analyzed for the following additional analyses (**Table 3**):

- Total metals (unfiltered) by EPA Method SW6020A/SW7470A
- Alkalinity by EPA Method SM2320B
- Anions (sulfate, chloride) by EPA Method E300.0
- Dissolved gases (methane, ethane, ethene) by RSK-175
- Total organic carbon (TOC) by EPA Method SW9060A
- Nitrate and nitrite by EPA Method SM4500-NO3E

All samples were submitted to EMAX Laboratories Inc. in Torrance, California. The analytical results are discussed in Section 3. Laboratory data are included in **Appendix C**. Field quality control samples were collected, including field duplicates, matrix /matrix spike duplicates, trip blanks, and field blanks, and are discussed in the Quality Control Summary Report in **Appendix C**.

Not all samples were able to be collected as planned as further discussed in Section 2.4. The completeness for the number of samples planned versus the number of samples collected was 97 percent, thus exceeding the 90 percent project data goal. The achievement of the completeness goals provides sufficient data for project decisions. Sample results meet the data quality objectives presented in the RI Work Plan (CDM Smith 2020b).

2.2 Transducer Data Collection

Transducer data was downloaded from December 2020 through March 2021. Data were collected from 15 groundwater wells during the Q1-2021 groundwater monitoring event. **Table 2** presents

the date, time, and location of transducer data downloads. Hydrographs were prepared from the transducer downloads and are presented in **Appendix D**. A drop in water levels due to groundwater sampling activities in December can be seen in the hydrograph for MW-13D and MW-14S. The hydrograph for MW-34B is only showing data from December 2020 to January 2021 because of the transducer being pulled from the well for well development purposes. A sudden rise in water level occurred at MW-05R; however, as no maintenance or investigation activities were completed at that time, it is possible the transducer cable was caught in the well and the transducer suddenly dropped. No other inconsistencies are observable in the hydrographs, and the data are useable for monitoring groundwater elevations. The transducer data will be (1) evaluated for seasonal and annual trends as well as potential variations due to anthropogenic usage (i.e., irrigation well pumping) and (2) presented in the RI report.

2.3 Decontamination and Investigation-Derived Waste

All nondedicated equipment used during the groundwater sampling event was decontaminated following the procedures outlined in SOP 4-5, *Field Equipment Decontamination at Nonradioactive Sites* (CDM Smith 2020a). Nondedicated equipment used during this event were electronic water level meters. Investigation-derived waste (IDW) was handled per SOP 2-2, *Guide to Handling Investigation-Derived Waste* (CDM Smith 2020a). All decontamination water and purge water were containerized at their source and transferred to the holding tanks at the VAMC. These tanks will be emptied by a certified IDW disposal company.

2.4 Deviations from the Quality Assurance Project Plan

The following QAPP deviations occurred during the Q1-2021 sampling event:

- Purge parameter stabilization criteria for turbidity (either less than 10 nephelometric turbidity unit [NTU] or less than 50 NTU and within 10 percent) were not met at MW-14S and MW-23B. Turbidity at these locations was less than 50 NTU, but not within 10 percent. No analytical result bias for dissolved VOCs, including chlorinated compounds (EPA 2005), is anticipated to result from turbid water samples. This deviation does not affect DQOs or data usability. As all other purge parameter stabilization criteria for these two wells were met, there is no expected impact upon data quality at these locations.
- Purge parameter stabilization criteria for turbidity and conductivity (within 10 percent) was not met for MW-08C. As three times the minimum purge volume had been removed and all other purge parameter stabilization criteria were met, there is no expected impact upon data quality at this location.
- As MW-13S was purged dry, a sample was collected the next day once sufficient recharge was observed, without meeting purge parameter stabilization. This is an acceptable procedure in the low-flow groundwater sampling SOP, and there is no impact upon data quality at this location.
- Because of a malfunctioning pump at MW-05R, groundwater samples could not be obtained. At MW-12S, there was insufficient water to collect a groundwater sample. As both locations have been successfully sampled in the past, there is no significant impact on the groundwater plume delineation data quality objective.

- Water level elevations could not be measured at MW-29A, MW-31A, and MW-34A, as the water levels were above the pump intakes but below the volume booster. As the water level of the shallow aquifer could be measured at other, deeper screened intervals at each of these locations, there is no impact upon data quality.

Section 3
Groundwater Monitoring Results

Groundwater monitoring results from the Q1-2021 event, specifically groundwater elevations and analytical results, are presented below.

3.1 Groundwater Elevations

Measured groundwater elevations are presented in **Table 2** and on the potentiometric groundwater surface maps (**Figures 2** and **3**). Vertical gradients were calculated using the approach described by EPA (EPA 2016). The potentiometric groundwater contours were developed from manual groundwater elevation measurements collected during the synoptic event on March 15, 2021. The following discusses the groundwater elevation evaluations.

Based on the observed piezometric heads, the subsurface was divided into the following hydraulic zones:

- Perched Zone: This zone is situated above the water table; it exhibits significantly higher piezometric heads than what is observed at other wells. The only well that exhibits this feature is MW-06 (screened 100 to 130 feet below the ground surface [bgs]). Perched head data has not been contoured.
- Shallow Aquifer Zone: This zone extends to approximately 220 feet bgs at VAMC Building 7 and gets shallower to the west as the ground surface dips. The shallow aquifer zone is contoured (using a 10-foot contour interval) in **Figure 2**.
    - Flow directions are generally east to west, with horizontal gradients approximately 0.014 feet per foot (feet/foot) over a distance of 2,500 feet between MW-24 and MW-34. Over the next 1,000 feet between MW-34 and MW-18, the horizontal gradients are approximately 0.012 feet/foot. Between MW-13S and MW-14S (approximately 500 feet), horizontal gradients are an order of magnitude higher, at approximately 0.12 feet/foot.
- Deep Aquifer Zone: This zone sits below approximately 260 feet bgs at VAMC Building 7 and gets shallower to the west as the ground surface dips. The deep aquifer zone heads are contoured in **Figure 3**.
    - Flow directions are generally east to west. Horizontal gradients are approximately 0.002 feet/foot between MW-23C and MW-34C (approximately 2,500 feet), and 0.013 feet/foot between MW-34C and MW-13L (approximately 2,350 feet).
    - Piezometric heads at MW-03RB/C/D show that heads are approximately 10 feet lower than in the shallow aquifer zone situated approximately 40 feet above. These steep vertical gradients are indicative of hydraulic separation between the shallow and deep aquifer zones, likely because of the presence of a semiconfining unit between 220 and 260 feet bgs.

- Heads at MW-03RC/D are nearly identical despite spanning nearly 35 vertical feet of the aquifer. This likely indicates the lack of significant aquitard units within the deep aquifer zone.

- Intermediate Zone: This zone sits between the shallow and deep aquifer zones (approximately 220 to 260 feet bgs) at wells near VAMC Building 7 including MW-23B, MW-25B, MW-26B, MW-29C, and MW-30A. The zone is characterized by heads that are slightly lower than those in the shallow aquifer zone. It is unclear how laterally extensive this zone is and whether it is bounded by lower permeability units. Head data from this unit have not been contoured.

Vertical gradients, which are typically strongly downward on-site, dissipate along the east to the west groundwater flow path. MW-34C/D and MW-32C are estimated to be screened in the deep aquifer zone; however, there is little distinction in heads between these wells and the shallow aquifer zone at MW-34B and MW-32A/B. West of MW-34, vertical head gradients shift upwards, with artesian conditions present in the deeper portions of the shallow aquifer zone at well MW-14D, just east of the fault. West of the fault, the vertical head differences, and therefore, the hydraulic distinction between the shallow and deep aquifer zones was not observed.

3.2 Groundwater Analytical Results

Analytical results from the Q1-2021 groundwater monitoring event are presented below.

3.2.1 Volatile Organic Compounds

Groundwater samples were collected and analyzed for VOCs. **Table 4** presents the concentrations of detected VOCs compared to the EPA maximum contaminant levels (MCLs) or regional screening levels (RSLs) for tap water (for compounds without an established MCL). Detections are presented as bolded values and exceedances of the MCL or RSL are presented as highlighted values. Additionally, the approximate extent of PCE in groundwater and results for PCE and trichloroethene (TCE) are shown in **Figure 4**. This figure also presents the projected fault traces (Davis 1983, Personius 2009) and the monitoring well transect lines.

A total of 64 samples were collected for VOC analysis. Of those, PCE exceeded the MCL (5 micrograms per liter [µg/L)] in 20 samples, with concentrations ranging from 5.4 to 230 µg/L. The highest concentrations of PCE were detected in MW-02 (230 µg/L), MW-03RB (220 µg/L), and MW-01S (170 µg/L). PCE was detected at concentrations less than 5 µg/L in 17 samples and was not detected in 27 samples. PCE was non-detect or below the MCL in MW-01D, MW-03RD, MW-08B/C, MW-16D, MW-29B/C, and MW-34C/D, indicating a possible vertical boundary for the PCE plume in these locations. PCE was non-detect or below the MCL in MW-06, MW-23A/B/C, MW-24, MW-25A/B/C, MW-26A/B/C/D, MW-27, and MW-28, bounding the plume to the east. PCE was non-detect or below the MCL in MW-17S/D, MW-21, MW-22, MW-31A/B/C, and MW-36, providing a southern plume boundary. PCE was non-detect or below the MCL in MW-12D, MW-15S/D, and MW-37S/D, bounding the plume to the west. PCE was non-detect at MW-30RA/RB/C, MW-32A/B/C, and MW-38S/D, bounding the plume to the north (**Figure 4**).

TCE was detected at concentrations below the MCL (5 µg/L) in 26 of the 64 samples collected, with the highest detection at MW-14S (4.8 µg/L). Low-level (less than 1.2 µg/L) detections of cis-

1,2-dichloroethene were observed in 14 samples, with the highest detection at MW-03RB and MW-14S (both 1.2 µg/L). There were no detections of vinyl chloride.

3.2.2 1,4-Dioxane

Analytical results for 1,4-dioxane are presented in **Table 4**. Because no MCL is established for 1,4-dioxane, results are screened against the RSL of 0.46 µg/L (EPA 2020). There were no detections of 1,4-dioxane.

3.2.3 General Chemistry

Total (unfiltered) metal concentrations provide information on the general chemistry of groundwater (i.e., salinity), and redox conditions (i.e., redox sensitive metals such as arsenic). Analytical results for total (unfiltered) metals are presented in **Table 5**. The highest observed concentrations of redox sensitive metals were as follows:

- Concentrations of arsenic greater than 1 µg/L were observed at MW-25A, MW-27, MW-28, MW-29A/C, MW-31A, and MW-38S.
- Concentrations of iron greater than 500 µg/L were observed at MW-23A and MW-31C.
- Concentrations of manganese greater than 500 µg/L were observed at MW-23A and MW-31C.

DO, ORP, sulfate, nitrate, ferrous iron, and methane are geochemical parameters that can be used to evaluate redox conditions. Reductive dechlorination of PCE to TCE and cis-1,2-dichloroethene generally occurs under iron-reducing to sulfate-reducing conditions, while complete dechlorination to ethene and ethane generally occurs under sulfate-reducing to methanogenic conditions (EPA 2006). Conditions are considered aerobic when DO is greater than 0.5 milligrams per liter (mg/L), iron-reducing when ferrous iron is greater than 0.5 mg/L, and methanogenic when methane is greater than 1 mg/L (EPA 2006). As presented in **Table 6**, high DO (greater than 0.5 mg/L) at all locations (except for MW-37S) suggests that groundwater conditions at the site are generally aerobic. Low ferrous iron (less than 1.36 mg/L), low methane (less than 3.8 µg/L), and high sulfate (72.8 to 206 mg/L) in most wells further support the observation that conditions are generally aerobic (**Table 6**). Conditions are locally less aerobic at MW-23A (higher ferrous iron, negative ORP, and detectable methane), MW-31C (higher ferrous iron, low DO, negative ORP, and detectable methane), and MW-37S (low DO, negative ORP, and detectable methane).

Chloride, alkalinity and TOC provide information on general water quality (i.e., salinity). Chloride concentrations ranged from 30.7 J mg/L (MW-34C) to 385 J- mg/L (MW-28). Alkalinity ranged from 212 mg/L (MW-31C) to 380 mg/L (MW-37S). TOC was less than 2 mg/L for all the samples, with the highest detection of 1.57mg/L at MW-27.

Section 4
Summary

This report presents the results from the Q1-2021 groundwater monitoring event. Further analysis and evaluation of these results will be presented in the RI report.

Groundwater flow directions are generally east to west. There are four distinct hydraulic zones in the subsurface: perched, shallow aquifer zone, deep aquifer zone, and intermediate zone. There is a hydraulic separation between the shallow and deep aquifer zones, likely because of the presence of a semiconfining silt/clay unit. The lateral extent of the perched and intermediate zones is unclear. Vertical gradients, which are typically strongly downward on campus, dissipate along the east to west groundwater flow path towards MW-34. West of MW-34, vertical head gradients generally shift upwards in the deeper portions of the shallow zone aquifer, with artesian conditions present in well MW-14D, just east of the fault. West of the fault, vertical head differences and the distinction between the shallow and deep aquifer zones are not observed.

The piezometric head data collected allows for a more refined understanding of groundwater flow directions, gradients, and vertical head differences described above, as compared to manual water level measurements. This hydraulic framework, notably the separation of the aquifer into two distinct hydraulic zones, has been incorporated into the conceptual site model. The framework has also been compared with the other datasets collected from the wells, including lithologic and water quality data. Further refinements to the zonation of the system may be necessary upon review of the conceptual site model and will be incorporated into future reports.

Non-detect wells define the vertical and horizontal extent of the PCE plume (**Figure 4**). The highest concentrations of PCE were detected in MW-02 (230 µg/L), MW-03RB (220 µg/L), and MW-01S (170 µg/L) (**Figure 4**). Along with VOCs, samples were collected for the determination of general chemistry, including ORP, DO, metals, sulfate, nitrate/nitrite, chloride, alkalinity, TOC, ferrous iron, and dissolved gases. These data were used to determine that the redox conditions at the site are generally aerobic. The observation of aerobic conditions and low concentrations of biodegradation daughter products suggest that biodegradation of PCE at the Site is limited. Further evaluation of plume delineation, concentration trends, and attenuation will be presented in the RI report.

Section 5
References

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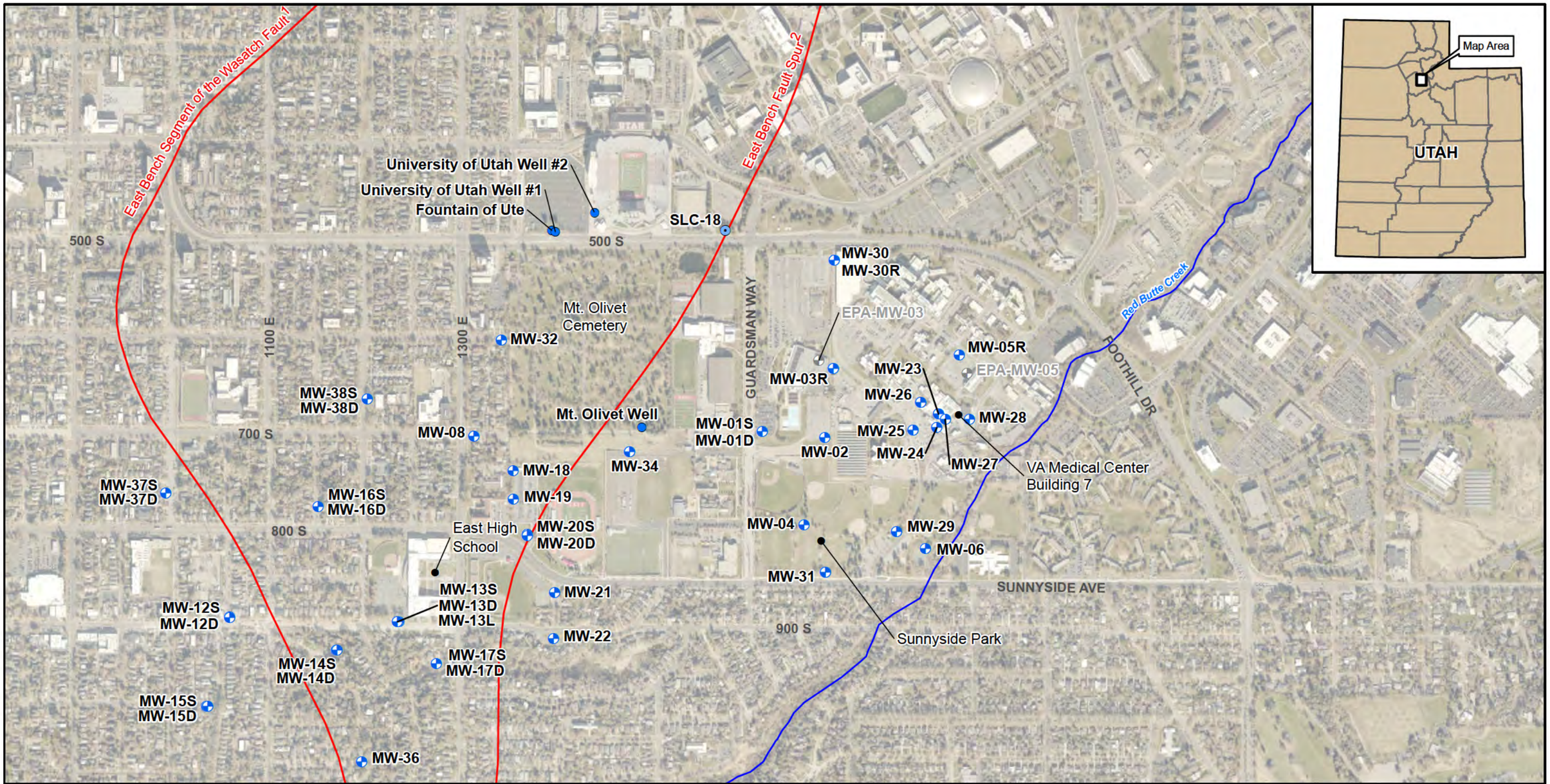
Figures



Legend

- Monitoring Well
- Abandoned Monitoring Well
- Drinking Water Supply Well
- Irrigation Well
- Landmark
- Red Butte Creek
- Fault Line

Notes:
1. Location of University of Utah Well #1 is approximate; well is located less than 100 feet east of Fountain of Ute.
2. Proposed monitoring wells MW-07, MW-09, MW-10, MW-11, MW-33, and MW-35 were not installed.

OU = operable unit
PCE = tetrachloroethene
VHA = Veterans Health Administration

[1] Davis, F.D. 1983. Geologic Map of the Central Wasatch Front, Utah. Utah Geological and Mineral Survey. Map 54-A – Wasatch Front Series. May.
[2] Personius, S.F. and Scott, W.E. 2009. Surficial Geologic Map of the Salt Lake City Segment and Parts of Adjacent Segments of the Wasatch Fault Zone, Davis, Salt Lake, and Utah Counties, Utah

N W E S

0 500 1,000 Feet

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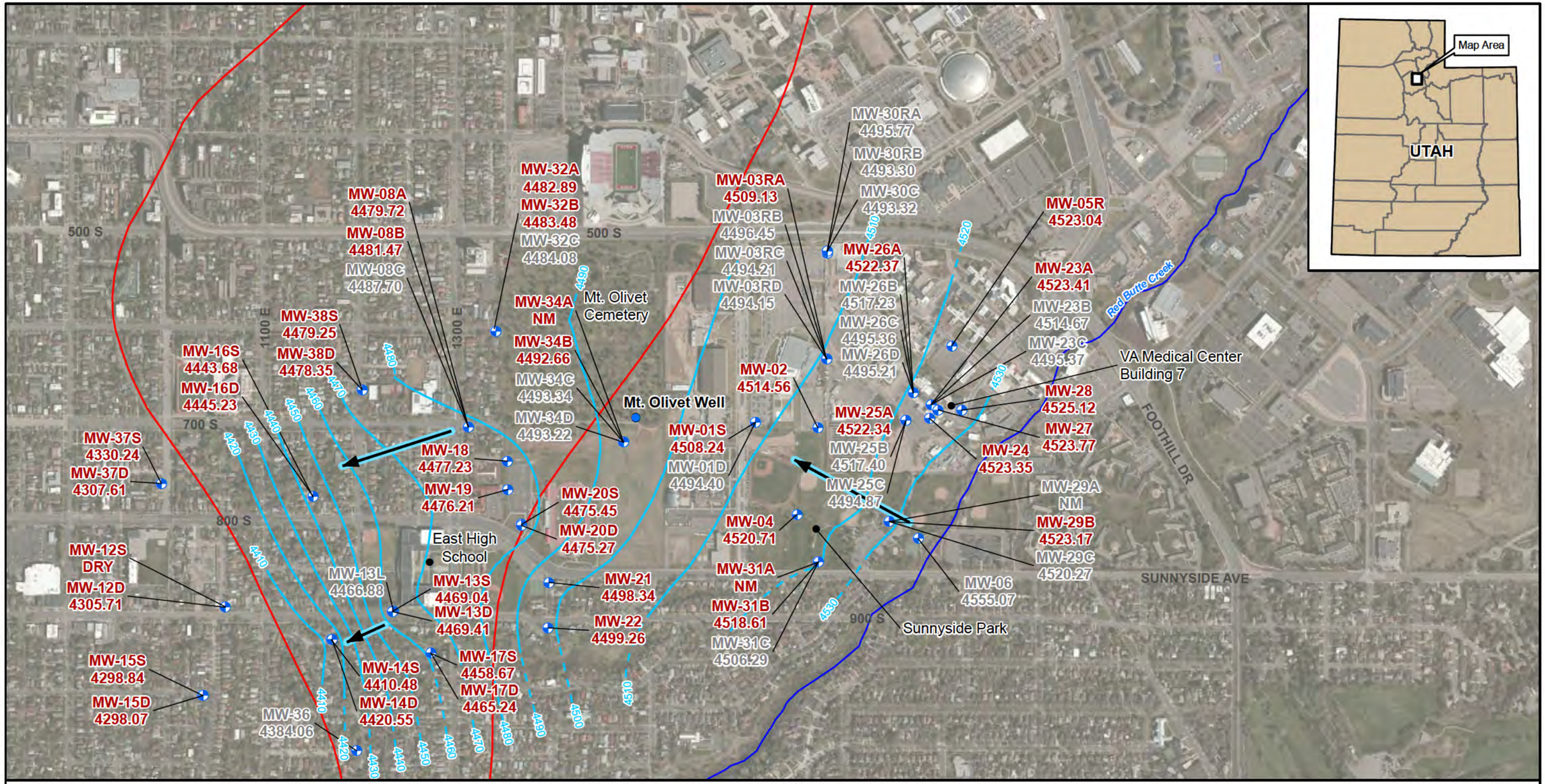
Figure 1
Site Location Map

Q1 2021 Data Summary Report
OU1 700 South 1600 East PCE Plume
Salt Lake City, Utah

File Path: J:\238824_VA_Medical_Salt_Lake\MXD\Sampling_2021\DSR_2021Q1\Fig1_DSR_SiteMap.mxd WAGNERA 6/14/2021



Legend

- Monitoring Well
- Irrigation Well
- Landmark
- Red Butte Creek
- Fault Line
- Groundwater Contour
- Dashed Line - Inferred Extent
- Groundwater Flow Direction

Notes:

1. All ground surface elevations in feet amsl.
2. Measurements taken March 15th 2021.
3. Water levels shown in grey were not used for the generation of the potentiometric contours and are shown for information only.
4. Water level values for MW-14S/D and MW-17S/D were averaged during contouring.
5. Water level measurements for MW-29A, MW-31A, and MW-34A could not be obtained as the water level was above the pump intake, but below the volume boosters.

amsl = above mean sea level
OU = operable unit
VHA = Veterans Health Administration

N W E S

0 500 1,000 Feet

CDM Smith

Figure 2
Potentiometric Groundwater Surface Map - Shallow Aquifer

Q1 2021 Data Summary Report
OU1 700 South 1600 East PCE Plume
Salt Lake City, Utah

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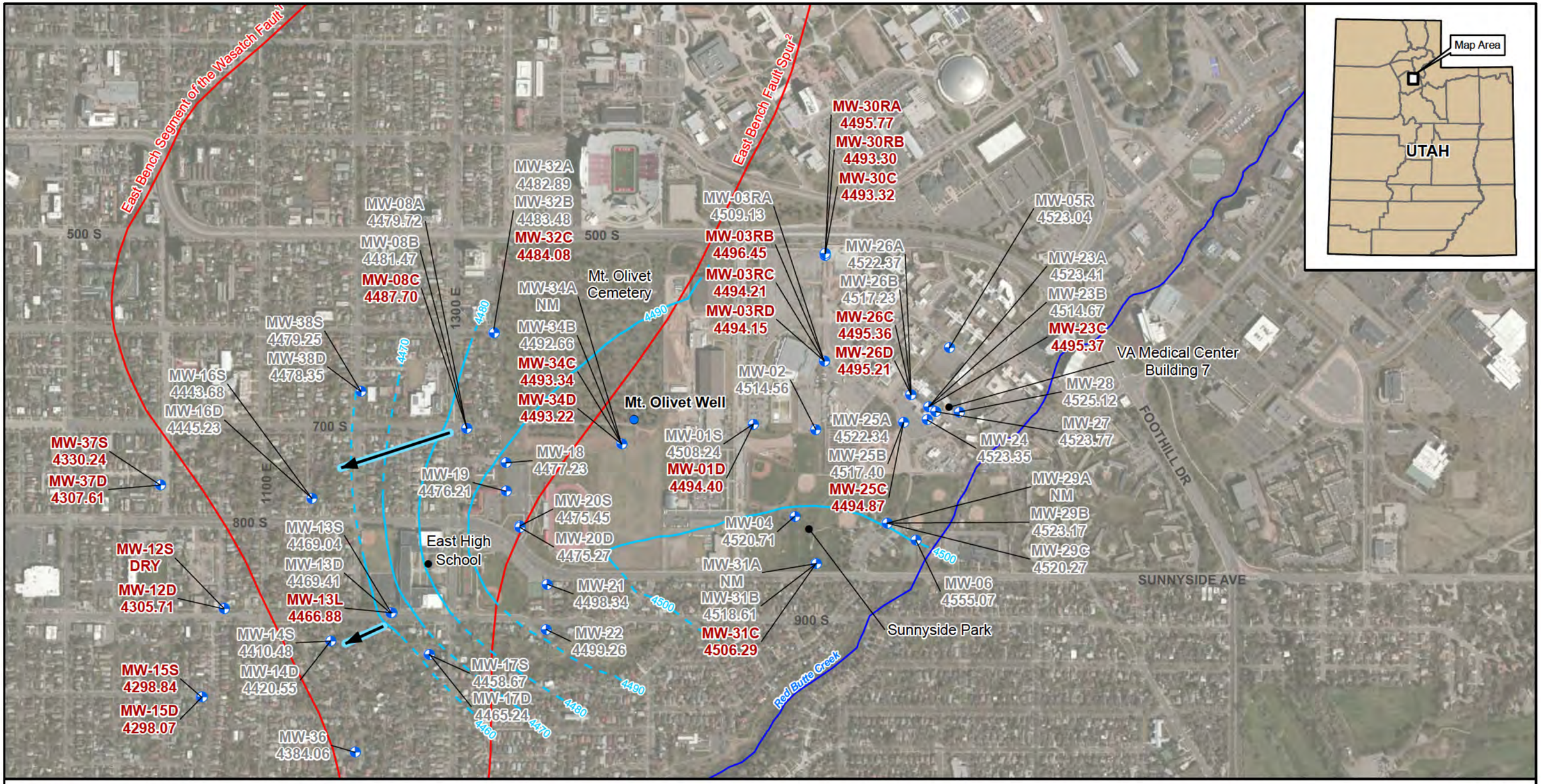

Legend

- Monitoring Well
- Irrigation Well
- Landmark
- Red Butte Creek
- Fault Line
- Groundwater Contour
- Dashed Line - Inferred Extent
- Groundwater Flow Direction

Notes:
1. All ground surface elevations in feet amsl
2. Measurements taken March 15th 2021.
3. Water levels shown in grey were not used for the generation of the potentiometric contours and are shown for information only.
4. Water level measurements for MW-29A, MW-31A, and MW-34A could not be obtained as the water level was above the pump intake, but below the volume boosters.

amsl = above mean sea level
OU = operable unit
VHA = Veterans Health Administration

N W E S

0 500 1,000 Feet

CDM Smith

Figure 3
Potentiometric Groundwater Surface Map - Deep Aquifer

Q1 2021 Data Summary Report
OU1 700 South 1600 East PCE Plume
Salt Lake City, Utah

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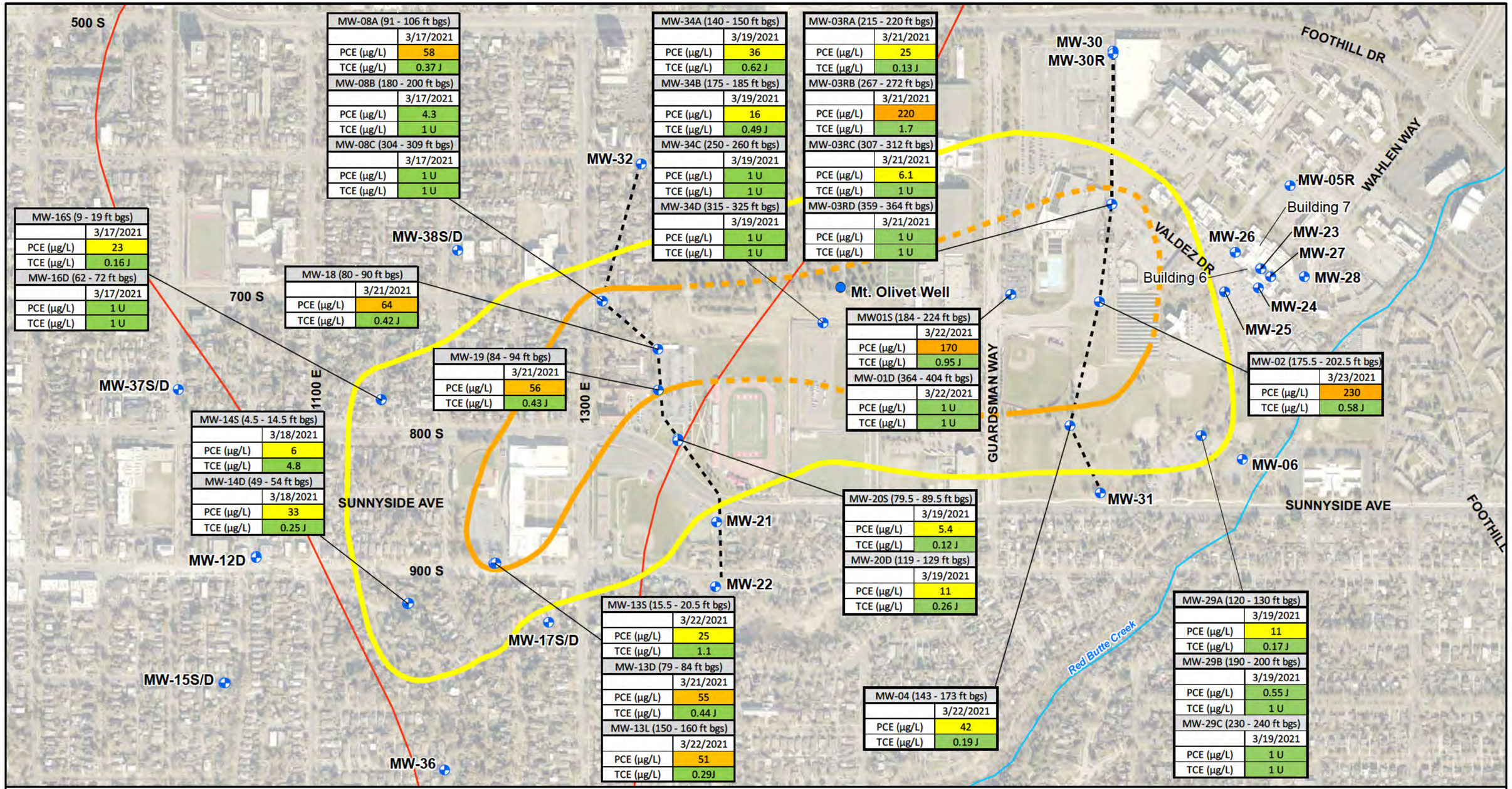

Legend

- Monitoring Well
- Irrigation Well
- Monitoring Well Transect Line
- Red Butte Creek
- Fault Line

PCE and TCE Concentrations (µg/L)

- = < 5 µg/L
- = 5 - 50 µg/L
- = > 50 µg/L

PCE Contours

- 5 µg/L
- 50 µg/L

Dashed Line - Inferred Extent

Notes

1. Proposed monitoring wells MW-07, MW-09, MW-10, MW-11, MW-33, and MW-35 were not installed.
2. Plume contours were developed using Leapfrog 3-dimensional visualization software to interpolate data from the Q1 2021 groundwater sampling event. The contours represent a top-down view of the 3-dimensional extent of the plume as interpreted in the Leapfrog software.
3. Monitoring wells without a result table did not have results above 5 µg/L for both PCE and TCE during the Q1 2021 groundwater sampling event.

OU = operable unit
PCE = tetrachloroethene
TCE = trichloroethene
µg/L = micrograms per liter
ft bgs = feet below ground surface
J = Result is estimated
U = Analyte was not detected at the associated value

N W E S

0 250 500 Feet

Figure 4
Q1 2021 Groundwater PCE and TCE Results and Approximate Extent of PCE in Groundwater

CDM Smith

Q1 2021 Data Summary Report
OU1 700 South 1600 East PCE Plume
Salt Lake City, Utah

File Path: J:\238824_VA_Medical_Salt_Lake\MXD\Sampling_2021\DSR_2021Q1\Fig4_DSR_PCE_and_TCE_in_GW_All.mxd WAGNERA 8/23/2021

Tables

Table 1
Monitoring Well Survey Data and Construction Details

Location	Sample Interval	Y Coordinate (Utah State Plane, ft)[1]	X Coordinate (Utah State Plane, ft)[1]	Surface Elevation (ft amsl)[2]	Top of casing elevation (ft amsl)[2]	Total Well Depth (ft bgs)	Screen Start (ft bgs)	Screen End (ft bgs)	Pump Depth (ft bgs)	Pump Type
MW-01S	-	7443663.78	1544832.82	4665.50	4664.80	224	184	224	204	Solinist bladder pump
MW-01D	-				4664.80	404	364	404	384	Solinist bladder pump
MW-02	-	7443618.23	1545346.65	4685.76	4685.24	205.5	175.5	202.5	195	Solinist bladder pump
MW-03R	A	7444184.94	1545418.19	4698.74	4698.12	223	215	220	215	ZIST/Gas - with reciever
	B				4697.90	275	267	272	267	ZIST/Gas - with reciever
	C				4697.92	315	307	312	307	ZIST/Gas - with reciever
	D				4697.93	367	359	364	359	ZIST/Gas - with reciever
MW-04	-	7442902.88	1545176.20	4657.20	4656.85	173	143	173	160	Solinist bladder pump
MW-05R	-	7444293.27	1546450.38	4738.25	4737.99	230	198	228	222	Solinist bladder pump
MW-06	-	7442705.05	1546174.37	4679.13	4678.66	134	100	130	128	Solinist bladder pump
MW-08	A	7443625.54	1542467.21	4540.36	4539.81	106	91	106	99	Solinist bladder pump
	B				4539.77	200	180	200	190	Solinist bladder pump
	C				4539.68	312	304	309	304	ZIST/Gas - with reciever
MW-12S	-	7442144.27	1540464.18	4360.35	4360.03	65	50	60	60	Solinist bladder pump
MW-12D	-	7442139.2	1540464.27	4360.40	4360.07	95	88.5	93.5	90	Solinist bladder pump
MW-13S	-	7442104.9	1541844.99	4483.26	4482.93	22	15.5	20.5	19	Solinist bladder pump
MW-13D	-	7442104.65	1541840.18	4482.93	4482.62	90	79	84	82	Solinist bladder pump
MW-13L	-	7442106.298	1541851.01	4483.67	4483.23	160	150	160	155	Solinist bladder pump
MW-14S	-	7441871.55	1541340.04	4415.96	4415.69	15	4.5	14.5	12	Solinist bladder pump
MW-14D	-	7441874.22	1541345.22	4416.45	4415.93	65	49	54	NA	Artesian
MW-15S	-	7441412.92	1540276.55	4347.65	4347.35	65	52.5	55	54	Solinist bladder pump
MW-15D	-	7441412.63	1540283.39	4347.99	4347.72	95	69	74	72	Solinist bladder pump
MW-16S	-	7443049.27	1541188.74	4455.19	4454.83	20	9	19	16.0	Solinist bladder pump
MW-16D	-	7443052.83	1541188.80	4455.32	4454.84	73	62	72	67	Solinist bladder pump
MW-17S	-	7441761.45	1542156.28	4465.51	4465.18	22	6	21	20	Solinist bladder pump
MW-17D	-	7441762.17	1542159.83	4465.86	4465.69	70	44	54	NA	Artesian/Solinst bladder pump
MW-18	-	7443344.52	1542789.74	4559.06	4558.76	110	80	90	88	Solinist bladder pump
MW-19	-	7443109.99	1542791.56	4557.51	4557.16	110	84	94	89	Solinist bladder pump
MW-20S	-	7442822.74	1542905.98	4558.92	4558.61	90.8	79.5	89.5	88	Solinist bladder pump
MW-20D	-	7442813.21	1542905.39	4558.46	4558.19	150	119	129	124	Solinist bladder pump
MW-21	-	7442343.24	1543130.25	4563.57	4563.32	80	62	72	70	Solinist bladder pump
MW-22	-	7441969.31	1543122.59	4563.06	4562.72	120	64	74	72	Solinist bladder pump
MW-23	A	7443809.38	1546280.59	4712.47	4711.80	222	210	220	210	ZIST/Gas - with reciever
	B				4711.77	262	250	260	250	ZIST/Gas - with reciever
	C				4711.69	360	348	358	348	ZIST/Gas - with reciever
MW-24	-	7443698.74	1546266.48	4709.77	4709.19	250	209.5	239.5	211	Solinist bladder pump
MW-25	A	7443676.94	1546071.97	4703.04	4702.02	213	201	211	201	ZIST/Gas - with reciever
	B				4702.09	243	231	241	231	ZIST/Gas - with reciever
	C				4702.07	320	307.5	317.5	308	ZIST/Gas - with reciever
MW-26	A	7443907.17	1546132.96	4713.25	4712.29	217	205	215	205	ZIST/Gas - with reciever
	B				4712.55	247	235	245	235	ZIST/Gas - with reciever
	C				4712.51	327	315	325	315	ZIST/Gas - with reciever
	D				4712.50	360	347.75	357.75	348	ZIST/Gas - with reciever
MW-27	-	7443766.76	1546337.14	4712.61	4712.34	220	200	220	210	Solinist bladder pump
MW-28	-	7443764.76	1546532.92	4712.80	4712.54	210	190	210	204	Solinist bladder pump
MW-29	A	7442845.95	1545935.59	4679.35	4678.46	132	120	130	128	ZIST/Gas - w/o reciever
	B				4678.45	202	190	200	190	ZIST/Gas - with reciever
	C				4678.68	242	230	240	230	ZIST/Gas - with reciever
MW-30	RA	7445055.62	1545425.12	4722.89	4722.60	252	240	250	245	Solinist bladder pump
	RB	7445055.62	1545425.12	4722.89	4722.36	294	282	292	285	Solinist bladder pump
	C	7445073.45	1545424.98	4723.07	4721.92	329	317	327	317	ZIST/Gas - with reciever
MW-31	A	7442512.47	1545351.52	4655.22	4654.27	150	138	148	138	ZIST/Gas - w/o reciever
	B				4654.39	202	190	200	190	ZIST/Gas - with reciever
	C				4654.35	230	228	238	228	ZIST/Gas - with reciever
MW-32	A	7444416.40	1542692.62	4566.22	4565.67	126	114	124	119	Solinist bladder pump
	B				4565.63	182	170	180	170	ZIST/Gas - w/o reciever
	C				4565.59	272	260	270	260	ZIST/Gas - w/o reciever
MW-34	A	7443498.84	1543745.66	4623.61	4623.09	152	140	150	148	ZIST/Gas - w/o reciever
	B				4622.71	187	175	185	175	ZIST/Gas - w/o reciever
	C				4622.63	262	250	260	250	ZIST/Gas - w/o reciever
	D				4622.58	327	315	325	315	ZIST/Gas - w/o reciever
MW-36	-	7440955.06	1541547.17	4429.01	4428.49	52	47	52	50	Solinist bladder pump
MW-37S	-	7443160.46	1539938.63	4348.36	4348.00	35	25	35	30	Solinist bladder pump
MW-37D	-	7443160.46	1539938.63	4348.36	4347.97	70	60	70	65	Solinist bladder pump
MW-38S	-	7443931.79	1541593.58	4498.56	4497.64	37	27	37	32	Solinist bladder pump
MW-38D	-	7443931.79	1541593.58	4498.56	4497.80	70	60	70	65	Solinist bladder pump

Notes:
[1] X/Y Coordinates measured using NAD 83 State Plane Coordinate System
[2] Elevations measured using NAVD 88 vertical datum

Acronyms:
amsl = above mean sea level
bgs = below ground surface
ft = feet
w/o = without
ZIST = Zone Isolation Sampling Technology

Table 2
Groundwater Elevations and Transducer Locations and Download Dates

Location	Sample Interval	Screen Start (ft bgs)	Screen End (ft bgs)	Top of Casing Elevation (ft amsl)[1]	Aquifer Zone	Water Level Measurement Date and Time	Water Level Depth (ft btoc)	Water Level Elevation (ft amsl)[1]	Direction of Gradient[2]	Vertical Gradient[2]	Transducer Download Date and Time
MW-01S	-	184	224	4664.80	Shallow	3/15/21 13:40	156.56	4508.24	down	0.07	3/15/21 12:00
MW-01D	-	364	404	4664.80	Deep	3/15/21 13:50	170.40	4494.40			3/15/21 12:00
MW-02	-	175.5	202.5	4685.24	Shallow	3/15/21 14:02	170.68	4514.56	-	-	-
MW-03R	A	215	220	4698.12	Shallow	3/15/21 10:00	188.99	4509.13	down	0.22	-
	B	267	272	4697.90	Deep	3/15/21 201.45	201.45	4496.45			-
	C	307	312	4697.92	Deep	3/15/21 10:10	203.71	4494.21			-
	D	359	364	4697.93	Deep	3/15/21 10:15	203.78	4494.15			-
MW-04	-	143	173	4656.85	Shallow	3/15/21 16:12	136.14	4520.71	-	-	3/15/21 15:00
MW-05R	-	198	228	4737.99	Shallow	3/15/21 14:40	214.95	4523.04	-	-	3/15/21 13:00
MW-06	-	100	130	4678.66	Perched	3/15/21 15:18	123.59	4555.07	-	-	-
MW-08	A	91	106	4539.81	Shallow	3/15/21 15:40	60.09	4479.72	up	0.04	-
	B	180	200	4539.77	Shallow	3/15/21 15:45	58.30	4481.47			-
	C	304	309	4539.68	Deep	3/15/21 15:47	51.98	4487.70			-
MW-12S	-	50	60	4360.03	-	3/15/21 10:40	DRY	DRY	--	--	-
MW-12D	-	88.5	93.5	4360.07	-	3/15/21 13:10	54.36	4305.71			-
MW-13S	-	15.5	20.5	4482.93	Shallow	3/15/21 10:09	13.89	4469.04	down	0.02	-
MW-13D	-	79	84	4482.62	Shallow	3/15/21 10:12	13.21	4469.41			3/15/21 11:00
MW-13L		150	160	4483.23	Deep	3/15/21 10:14	16.35	4466.88			
MW-14S	-	4.5	14.5	4415.69	Shallow	3/15/21 9:41	5.21	4410.48	up	0.22	3/15/21 11:00
MW-14D*	-	49	54	4415.93	Shallow	3/15/21 9:40	-4.62	4420.55			-
MW-15S	-	52.5	55	4347.35	-	3/15/21 10:26	48.51	4298.84	down	0.04	-
MW-15D	-	69	74	4347.72	-	3/15/21 10:25	49.65	4298.07			3/15/21 12:00
MW-16S	-	9	19	4454.83	Shallow	3/15/21 11:04	11.15	4443.68	up	0.03	-
MW-16D	-	62	72	4454.84	Shallow	3/15/21 11:03	9.61	4445.23			3/15/21 12:00
MW-17S	-	6	21	4465.18	Shallow	3/15/21 9:51	6.51	4458.67	up	0.17	-
MW-17D	-	44	54	4465.69	Shallow	3/15/21 9:55	0.45	4465.24			-
MW-18	-	80	90	4558.76	Shallow	3/15/21 12:12	81.53	4477.23	-	-	-
MW-19	-	84	94	4557.16	Shallow	3/15/21 12:10	80.95	4476.21	-	-	-
MW-20S	-	79.5	89.5	4558.61	Shallow	3/15/21 11:45	83.16	4475.45	down	0.00	3/15/21 10:00
MW-20D	-	119	129	4558.19	Shallow	3/15/21 11:47	82.92	4475.27			3/15/21 10:00
MW-21	-	62	72	4563.32	Shallow	3/15/21 12:27	64.98	4498.34	-	-	3/15/21 11:00
MW-22	-	64	74	4562.72	Shallow	3/15/21 12:35	63.46	4499.26	-	-	3/15/21 11:00
MW-23	A	210	220	4711.80	Shallow	3/15/21 12;17	188.39	4523.41	down	0.21	-
	B	250	260	4711.77	Intermediate	3/15/21 12:21	197.10	4514.67			-
	C	348	358	4711.69	Deep	3/15/21 12:27	216.32	4495.37			-
MW-24	-	209.5	239.5	4709.19	Shallow	3/15/21 11:!9	185.84	4523.35	-	-	-
MW-25	A	201	211	4702.02	Shallow	3/15/21 10:43	179.68	4522.34	down	0.27	-
	B	231	241	4702.09	Intermediate	3/15/21 10:48	184.69	4517.40			-
	C	307.5	317.5	4702.07	Deep	3/15/21 10:53	207.20	4494.87			-
MW-26	A	205	215	4712.29	Shallow	3/15/21 11:28	189.92	4522.37	down	0.26	-
	B	235	245	4712.55	Intermediate	3/15/21 11:30	195.32	4517.23			-
	C	315	325	4712.51	Deep	3/15/21 11:35	217.15	4495.36			-
	D	347.75	357.75	4712.50	Deep	3/15/21 11:50	217.29	4495.21			-
MW-27	-	200	220	4712.34	Shallow	3/15/21 12:07	188.57	4523.77	-	-	-
MW-28	-	190	210	4712.54	Shallow	3/15/21 16:02	187.42	4525.12	-	-	-
MW-29	A	120	130	4678.46	Perched	3/15/21 12:40	NM[3]	NM[3]	down	0.05	-
	B	190	200	4678.45	Shallow	3/15/21 12:40	155.28	4523.17			-
	C	230	240	4678.68	Intermediate	3/15/21 13:00	158.41	4520.27			-
MW-30R	A	240	250	4722.60	Deep	3/15/21 9:15	226.83	4495.77	up	0.00	-
	B	282	292	4722.36	Deep	3/15/21 9:20	229.06	4493.30			-
MW-30	C	317	327	4721.92	Deep	3/15/21 9:25	228.60	4493.32			-
MW-31	A	138	148	4654.27	Shallow	3/15/21 13:10	NM[3]	NM[3]	--	--	-
	B	190	200	4654.39	Shallow	3/15/21 13:19	135.78	4518.61			-
	C	228	238	4654.35	Deep	3/15/21 13:25	148.06	4506.29			-
MW-32	A	114	124	4565.67	Shallow	3/15/21 15:24	82.78	4482.89	NA	0.00	-
	B	170	180	4565.63	Shallow	3/15/21 15:20	82.15	4483.48			-
	C	260	270	4565.59	Deep	3/15/21 15:36	81.51	4484.08			-
MW-34	A	140	150	4623.09	Shallow	3/15/21 14:10	NM[3]	NM[3]	NA	0.01	--
	B	175	185	4622.71	Shallow	3/15/21 14:40	130.05	4492.66			3/15/21 15:00
	C	250	260	4622.63	Deep	3/15/21 14:43	129.29	4493.34			3/15/21 14:00
	D	315	325	4622.58	Deep	3/15/21 14:46	129.36	4493.22			3/15/21 14:00
MW-36	-	47	52	4428.49	-	3/15/21 9:30	44.43	4384.06	-	-	-
MW-37S	-	25	35	4348.00	-	3/15/21 10:50	17.76	4330.24	down	0.83	-
MW-37D	-	60	70	4347.97	-	3/15/21 10:51	40.36	4307.61			-
MW-38S	-	27	37	4497.64	Shallow	3/15/21 13:27	18.39	4479.25	down	0.02	-
MW-38D	-	60	70	4497.80	Shallow	3/15/21 13:26	19.45	4478.35			-

Notes:
[1] Elevations measured using NAVD 88 vertical datum
[2] Direction and magnitude of vertical gradient is calculated between shallow and deep aquifers in paired/nested wells
[3] Water level measurements could not be obtained as the water level was above the pump intake, but below the volume boosters
*Water level measured using pressure gauge, converted to height above top of casing (head [ft] = pressure [psi] x 2.31)

Acronyms:
amsl = above mean sea level
bgs = below ground surface
btoc = below top of casing
ft = feet
NA = not applicable
NM = not measured
psi = pounds per square inch

Table 3
Groundwater Sampling Analytes

Analysis	Method	Sample Container	Number of Containers	Preservative
VOCs	EPA Method SW8260C	40 mL VOA	3	HCl to pH < 2, 4°C (±2°C)
1,4-Dioxane	EPA Method SW8270D	1 L amber glass	2	4°C (±2°C)
Dissolved Gases	EPA Method RSK-175	40 mL VOA	3	HCl to pH < 2, 4°C (±2°C)
Total Metals (unfiltered)	EPA Method SW6020A/SW7470A	250 mL HDPE	1	HNO_3 to pH < 2, 4°C (±2°C)
Alkalinity[1]	EPA Method SM2320B	250 mL HDPE	1	4°C (±2°C)
Anions (sulfate, chloride)	EPA Method E300.0	250 mL HDPE	1	4°C (±2°C)
TOC	EPA Method SW9060A	250 mL amber glass	1	H_2SO_4 to pH < 2, 4°C (±2°C)
Nitrate and Nitrite as Total Nitrogen	EPA Method SM4500-NO3E	125 mL HDPE	1	H_2SO_4 to pH < 2, 4°C (±2°C)

Notes:
[1] Anions and Alkalinity are collected in the same container

Acronyms:
°C = degrees Celcius
EPA = U.S. Environmental Protection Agency
HCl = hydrochloric acid
HDPE = high density polyethylene
HNO_3 = nitric acid
H_2SO_4 = sulfuric acid
L = liter
mL = milliliter
TOC = total organic carbon
VOA = volatile organic analysis vial
VOCs = volatile organic compounds

Table 4
1,4-Dioxane and Detected VOC Analytical Results

			Location	MW-01D		MW-01S		MW-02		MW-03RA		MW-03RB		MW-03RC		MW-03RD		MW-04		MW-04	
			Sample Name	MW01D-GW032221		MW01S-GW032221		MW02-GW032321		MW03RA-GW032121		MW03RB-GW032121		MW03RC-GW032121		MW03RD-GW032121		FD01-GW032221		MW04-GW032221	
			Sample Date	3/22/2021		3/22/2021		3/23/2021		3/21/2021		3/21/2021		3/21/2021		3/21/2021		3/22/2021		3/22/2021	
Analyte	Screening Level	Unit		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,4-Dioxane	0.46[b]	µg/L		NS		NS		NS		NS		NS		NS		NS		NS		NS	
1,1,1-Trichloroethane	200[a]	µg/L		*1*	*U*	**0.1**	**J**	*1*	*U*	*1*	*U*	**0.13**	**J**	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
1,1-Dichloroethane	2.8[b]	µg/L		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
1,1-Dichloroethene	7[a]	µg/L		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	**0.12**	**J**	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Acetone	1400	µg/L		*20*	*U*	**4.3**	**J**	*20*	*U*	**3.5**	**J**	**3.5**	**J**	**5**	**J**	**4.2**	**J**	**4.1**	**J**	**4**	**J**
Benzene	5[a]	µg/L		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Bromodichloromethane	80[a]	µg/L		*1*	*U*	**0.33**	**J**	**0.34**	**J**	**0.42**	**J**	**0.44**	**J**	**0.16**	**J**	*1*	*U*	**0.29**	**J**	**0.3**	**J**
Carbon Tetrachloride	5[a]	µg/L		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Chloroform	80[a]	µg/L		**0.17**	**J**	**4.2**		**4.2**		**5.2**		**3.6**		**1.5**		*1*	*U*	**4**		**4**	
Chloromethane	190[b]	µg/L		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
cis-1,2-Dichloroethene	70[a]	µg/L		*1*	*U*	**0.44**	**J**	**0.36**	**J**	*1*	*U*	**1.2**		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Dichlorodifluoromethane	20	µg/L		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Tetrachloroethene	5[a]	µg/L		*1*	*U*	**170**		**230**		**25**		**220**		**6.1**		*1*	*U*	**42**		**42**	
Trichloroethene	5[a]	µg/L		*1*	*U*	**0.95**	**J**	**0.58**	**J**	**0.13**	**J**	**1.7**		*1*	*U*	*1*	*U*	**0.2**	**J**	**0.19**	**J**
Trichlorofluoromethane	5200[b]	µg/L		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Vinyl Chloride	2	µg/L		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*

Notes:

[a] Screening level is EPA MCL

[b] Screening level is EPA Tap Water RSL (target cancer risk 1 x 10-6, hazard quotient = 1)

Highlight indicates values greater than screening level

Bold indicates detected values

Italics indicates nondetected values

Acronyms:

VOC = volatile organic compound

µg/L = microgram per liter

EPA = U.S. Environmental Protection Agency

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NS = not sampled

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Q = qualifier

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U = Analyte was not detected at the associated value, which is the reporting limit

Table 4
1,4-Dioxane and Detected VOC Analytical Results

			Location	MW-06		MW-08A		MW-08B	MW-08C	MW-12D	MW-13D		MW-13S
			Sample Name	MW06-GW032221		FD02-GW031721	MW08A-GW031721	MW08B-GW031721	MW08C-GW031721	MW12D-GW031721	FD03-GW032121	MW13D-GW032121	MW13S-GW032221
			Sample Date	3/22/2021		3/17/2021	3/17/2021	3/17/2021	3/17/2021	3/17/2021	3/21/2021	3/21/2021	3/22/2021
Analyte	Screening Level	Unit		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,4-Dioxane	0.46[b]	µg/L		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
1,1,1-Trichloroethane	200[a]	µg/L		*1*	*U*	**0.49**	**J**	**0.49**	**J**	*1*	*U*	*1*	*U*	*1*	*U*	**0.44**	**J**	**0.43**	**J**	**0.15**	**J**
1,1-Dichloroethane	2.8[b]	µg/L		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	**0.11**	**J**
1,1-Dichloroethene	7[a]	µg/L		*1*	*U*	**0.14**	**J**	**0.18**	**J**	*1*	*U*	*1*	*U*	*1*	*U*	**0.21**	**J**	**0.21**	**J**	*1*	*U*
Acetone	1400	µg/L		**4.9**	**J**	**2.5**	**J**	*20*	*U*	**3.7**	**J**	**5.4**	**J**	**3.1**	**J**	**5.6**	**J**	*20*	*U*	*20*	*U*
Benzene	5[a]	µg/L		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	**0.12**	**J**	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Bromodichloromethane	80[a]	µg/L		**0.27**	**J**	**0.47**	**J**	**0.46**	**J**	**0.16**	**J**	*1*	*U*	**0.42**	**J**	**0.21**	**J**	**0.2**	**J**	*1*	*U*
Carbon Tetrachloride	5[a]	µg/L		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Chloroform	80[a]	µg/L		**2.3**		**4.1**		**4.3**		**1.7**		**0.14**	**J**	**5.7**		**2**		**1.9**		**1**	
Chloromethane	190[b]	µg/L		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
cis-1,2-Dichloroethene	70[a]	µg/L		*1*	*U*	**0.18**	**J**	**0.19**	**J**	*1*	*U*	*1*	*U*	*1*	*U*	**0.28**	**J**	**0.26**	**J**	**0.19**	**J**
Dichlorodifluoromethane	20	µg/L		*1*	*U*	*1*	*U*	**0.17**	**J**	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Tetrachloroethene	5[a]	µg/L		**0.18**	**J**	**56**		**58**		**4.3**		*1*	*U*	*1*	*U*	**56**		**55**		**25**	
Trichloroethene	5[a]	µg/L		*1*	*U*	**0.38**	**J**	**0.37**	**J**	*1*	*U*	*1*	*U*	*1*	*U*	**0.43**	**J**	**0.44**	**J**	**1.1**	
Trichlorofluoromethane	5200[b]	µg/L		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Vinyl Chloride	2	µg/L		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*

Notes:

[a] Screening level is EPA MCL

[b] Screening level is EPA Tap Water RSL (target cancer risk 1 x 10-6, hazard quotient = 1)

Highlight indicates values greater than screening level

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µg/L = microgram per liter

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Table 4
1,4-Dioxane and Detected VOC Analytical Results

Location			MW-13L		MW-14D	MW-14S	MW-15D	MW-15S	MW-16D	MW-16S	MW-17D
Sample Name			FD04-GW032221	MW13L-GW032221	MW14D-GW031821	MW14S-GW031821	MW15D-GW031621	MW15S-GW031621	MW16D-GW031721	MW16S-GW031721	MW17D-GW031921
Sample Date			3/22/2021	3/22/2021	3/18/2021	3/18/2021	3/16/2021	3/16/2021	3/17/2021	3/17/2021	3/19/2021
Analyte	Screening Level	Unit	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
1,4-Dioxane	0.46[b]	µg/L	*0.44 U*	*0.42 U*	NS	NS	NS	NS	NS	NS	NS
1,1,1-Trichloroethane	200[a]	µg/L	**0.59 J**	**0.58 J**	**0.42 J**	*1 U*	*1 U*	*1 U*	*1 U*	**0.27 J**	*1 U*
1,1-Dichloroethane	2.8[b]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
1,1-Dichloroethene	7[a]	µg/L	**0.23 J**	**0.17 J**	**0.2 J**	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Acetone	1400	µg/L	*20 U*	**3 J**	**4.1 J**	**3.4 J**	*20 U*	**3.1 J**	*20 U*	*20 U*	*20 U*
Benzene	5[a]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Bromodichloromethane	80[a]	µg/L	**0.23 J**	**0.22 J**	**0.24 J**	*1 U*	*1 U*	*1 U*	*1 U*	**0.16 J**	**0.19 J**
Carbon Tetrachloride	5[a]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Chloroform	80[a]	µg/L	**2.2**	**2.2**	**1.9**	**0.2 J**	**3.5**	**3**	**1.7**	**5**	**2.3**
Chloromethane	190[b]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
cis-1,2-Dichloroethene	70[a]	µg/L	**0.51 J**	**0.5 J**	**0.29 J**	**1.2**	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Dichlorodifluoromethane	20	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Tetrachloroethene	5[a]	µg/L	**51**	**51**	**33**	**6**	**0.16 J**	**0.34 J**	*1 U*	**23**	**2.8**
Trichloroethene	5[a]	µg/L	**0.29 J**	**0.29 J**	**0.25 J**	**4.8**	*1 U*	*1 U*	*1 U*	**0.16 J**	**0.1 J**
Trichlorofluoromethane	5200[b]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Vinyl Chloride	2	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*

Notes:

[a] Screening level is EPA MCL

[b] Screening level is EPA Tap Water RSL (target cancer risk 1 x 10-6, hazard quotient = 1)

Highlight indicates values greater than screening level

Bold indicates detected values

Italics indicates nondetected values

Acronyms:

VOC = volatile organic compound

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Table 4
1,4-Dioxane and Detected VOC Analytical Results

		Location	MW-17S	MW-18	MW-19	MW-20D	MW-20S	MW-21	MW-22	MW-23A	MW-23B
		Sample Name	MW17S-GW031921	MW18-GW032121	MW19-GW032121	MW20D-GW031921	MW20S-GW031921	MW21-GW031621	MW22-GW032121	MW23A-GW031621	MW23B-GW031621
		Sample Date	3/19/2021	3/21/2021	3/21/2021	3/19/2021	3/19/2021	3/16/2021	3/21/2021	3/16/2021	3/16/2021
Analyte	Screening Level	Unit	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
1,4-Dioxane	0.46[b]	µg/L	NS	NS	NS	NS	NS	NS	NS	NS	NS
1,1,1-Trichloroethane	200[a]	µg/L	*1 U*	**0.57 J**	**0.47 J**	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
1,1-Dichloroethane	2.8[b]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
1,1-Dichloroethene	7[a]	µg/L	*1 U*	**0.15 J**	**0.19 J**	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Acetone	1400	µg/L	*20 U*	*20 U*	*20 U*	*20 U*	*20 U*	*20 U*	*20 U*	*20 U*	*20 U*
Benzene	5[a]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Bromodichloromethane	80[a]	µg/L	*1 U*	**0.19 J**	**0.19 J**	**0.22 J**	**0.15 J**	*1 U*	**0.33 J**	**0.2 J**	**0.48 J**
Carbon Tetrachloride	5[a]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Chloroform	80[a]	µg/L	**1.7**	**2.5**	**2.2**	**1.8**	**1.7**	**2.6**	**2.7**	**5.4**	**7.5**
Chloromethane	190[b]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
cis-1,2-Dichloroethene	70[a]	µg/L	*1 U*	**0.17 J**	**0.19 J**	**0.12 J**	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Dichlorodifluoromethane	20	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Tetrachloroethene	5[a]	µg/L	**0.88 J**	**64**	**56**	**11**	**5.4**	**1.3**	**3**	*1 U*	*1 U*
Trichloroethene	5[a]	µg/L	*1 U*	**0.42 J**	**0.43 J**	**0.26 J**	**0.12 J**	*1 U*	**0.11 J**	*1 U*	*1 U*
Trichlorofluoromethane	5200[b]	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Vinyl Chloride	2	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*

Notes:

[a] Screening level is EPA MCL

[b] Screening level is EPA Tap Water RSL (target cancer risk 1 x 10-6, hazard quotient = 1)

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Table 4
1,4-Dioxane and Detected VOC Analytical Results

			Location	MW-23C		MW-24		MW-25A		MW-25B		MW-25C		MW-26A		MW-26B		MW-26C		MW-26D	
			Sample Name	MW23C-GW031621		MW24-GW032121		MW25A-GW032121		MW25B-GW032121		MW25C-GW032121		MW26A-GW031721		MW26B-GW031721		MW26C-GW031821		MW26D-GW031821	
			Sample Date	3/16/2021		3/21/2021		3/21/2021		3/21/2021		3/21/2021		3/17/2021		3/17/2021		3/18/2021		3/18/2021	
Analyte	Screening Level	Unit		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,4-Dioxane	0.46[b]	µg/L		NS		NS		NS		NS		NS		NS		NS		*0.44*	*U*	*0.4*	*U*
1,1,1-Trichloroethane	200[a]	µg/L		*1*	*U*	*1*	*U*	**0.11**	**J**	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
1,1-Dichloroethane	2.8[b]	µg/L		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
1,1-Dichloroethene	7[a]	µg/L		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Acetone	1400	µg/L		*20*	*U*	*20*	*U*	*20*	*U*	*20*	*U*	*20*	*U*	*20*	*U*	*20*	*U*	*20*	*U*	*20*	*U*
Benzene	5[a]	µg/L		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Bromodichloromethane	80[a]	µg/L		*1*	*U*	**0.4**	**J**	**0.43**	**J**	**0.58**	**J**	**0.38**	**J**	**0.34**	**J**	**0.5**	**J**	**0.4**	**J**	*1*	*U*
Carbon Tetrachloride	5[a]	µg/L		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	**0.12**	**J**	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Chloroform	80[a]	µg/L		*1*	*U*	**7.1**		**7**		**8.4**		**3.1**		**5.2**		**7.4**		**3.3**		*1*	*U*
Chloromethane	190[b]	µg/L		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	**0.16**	**J**	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
cis-1,2-Dichloroethene	70[a]	µg/L		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Dichlorodifluoromethane	20	µg/L		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Tetrachloroethene	5[a]	µg/L		*1*	*U*	*1*	*U*	**1.6**		*1*	*U*	**1.1**		*1*	*U*	*1*	*U*	**0.79**	**J**	*1*	*U*
Trichloroethene	5[a]	µg/L		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	**0.14**	**J**	*1*	*U*	*1*	*U*	*1*	*U*
Trichlorofluoromethane	5200[b]	µg/L		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Vinyl Chloride	2	µg/L		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*

Notes:

[a] Screening level is EPA MCL

[b] Screening level is EPA Tap Water RSL (target cancer risk 1 x 10-6, hazard quotient = 1)

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Table 4
1,4-Dioxane and Detected VOC Analytical Results

			Location	MW-27		MW-28		MW-29A		MW-29B		MW-29C		MW-30C		MW-30RA		MW-30RA		MW-30RB	
			Sample Name	MW27-GW031621		MW28-GW032121		MW29A-GW031921		MW29B-GW031921		MW29C-GW031921		MW30C-GW031621		FD05-GW031621		MW30RA-GW031621		MW30RB-GW031621	
			Sample Date	3/16/2021		3/21/2021		3/19/2021		3/19/2021		3/19/2021		3/16/2021		3/16/2021		3/16/2021		3/16/2021	
Analyte	**Screening Level**	**Unit**		**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**
1,4-Dioxane	0.46[b]	µg/L		NS		NS		NS		NS		NS		NS		NS		NS		NS	
1,1,1-Trichloroethane	200[a]	µg/L		*1*	*U*	*1*	*U*	*1*	*U*	**0.14**	**J**	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
1,1-Dichloroethane	2.8[b]	µg/L		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
1,1-Dichloroethene	7[a]	µg/L		*1*	*U*	*1*	*U*	*1*	*U*	**0.13**	**J**	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Acetone	1400	µg/L		*20*	*U*	**5.3**	**J**	**5**	**J**	*20*	*U*	*20*	*U*	**5.8**	**J**	*20*	*U*	**3.8**	**J**	*20*	*U*
Benzene	5[a]	µg/L		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Bromodichloromethane	80[a]	µg/L		**0.36**	**J**	**0.4**	**J**	**0.48**	**J**	**0.46**	**J**	**0.43**	**J**	**0.36**	**J**	**0.54**	**J**	**0.54**	**J**	**0.63**	**J**
Carbon Tetrachloride	5[a]	µg/L		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Chloroform	80[a]	µg/L		**5.4**		**5.3**		**6.8**		**5.4**		**4.5**		**5.1**		**6.5**		**6.4**		**6**	
Chloromethane	190[b]	µg/L		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
cis-1,2-Dichloroethene	70[a]	µg/L		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Dichlorodifluoromethane	20	µg/L		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Tetrachloroethene	5[a]	µg/L		*1*	*U*	*1*	*U*	**11**		**0.55**	**J**	*1*	*U*	**0.35**	**J**	**0.18**	**J**	**0.18**	**J**	*1*	*U*
Trichloroethene	5[a]	µg/L		**0.11**	**J**	**0.18**	**J**	**0.17**	**J**	*1*	*U*	*1*	*U*	*1*	*U*	**0.29**	**J**	**0.29**	**J**	**0.18**	**J**
Trichlorofluoromethane	5200[b]	µg/L		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	**0.19**	**J**	*1*	*U*	*1*	*U*	**0.24**	**J**
Vinyl Chloride	2	µg/L		*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*

Notes:

[a] Screening level is EPA MCL

[b] Screening level is EPA Tap Water RSL (target cancer risk 1 x 10-6, hazard quotient = 1)

Highlight indicates values greater than screening level

Bold indicates detected values

Italics indicates nondetected values

Acronyms:

VOC = volatile organic compound

µg/L = microgram per liter

EPA = U.S. Environmental Protection Agency

MCL = maximum contaminant level

NS = not sampled

RSL = regional screening level

Q = qualifier

J = Result is estimated

U = Analyte was not detected at the associated value, which is the reporting limit

Table 4
1,4-Dioxane and Detected VOC Analytical Results

		Location	MW-31A		MW-31B		MW-31C		MW-32A		MW-32A		MW-32B		MW-32C		MW-34A		MW-34B	
		Sample Name	MW31A-GW031821		MW31B-GW031821		MW31C-GW031821		FD06-GW031721		MW32A-GW031721		MW32B-GW031721		MW32C-GW031721		MW34A-GW031921		MW34B-GW031921	
		Sample Date	3/18/2021		3/18/2021		3/18/2021		3/17/2021		3/17/2021		3/17/2021		3/17/2021		3/19/2021		3/19/2021	
Analyte	Screening Level	Unit	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,4-Dioxane	0.46[b]	µg/L	NS		NS		NS		NS		NS		NS		NS		NS		NS	
1,1,1-Trichloroethane	200[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	**0.14**	**J**
1,1-Dichloroethane	2.8[b]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
1,1-Dichloroethene	7[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Acetone	1400	µg/L	**5.8**	**J**	*20*	*U*	**3.2**	**J**	**4.6**	**J**	*20*	*U*	**3.9**	**J**	**3.5**	**J**	**7.8**	**J**	*20*	*U*
Benzene	5[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Bromodichloromethane	80[a]	µg/L	**0.33**	**J**	**0.43**	**J**	*1*	*U*	**0.35**	**J**	**0.34**	**J**	**0.1**	**J**	*1*	*U*	**0.33**	**J**	**0.29**	**J**
Carbon Tetrachloride	5[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Chloroform	80[a]	µg/L	**3**		**3.7**		**0.86**	**J**	**5.6**		**5.4**		**1.8**		**0.9**	**J**	**2.9**		**2.1**	
Chloromethane	190[b]	µg/L	*1*	*U*	*1*	*U*	**0.2**	**J**	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
cis-1,2-Dichloroethene	70[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	**0.25**	**J**	**0.49**	**J**
Dichlorodifluoromethane	20	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Tetrachloroethene	5[a]	µg/L	**0.55**	**J**	*1*	*U*	*1*	*U*	**0.39**	**J**	**0.44**	**J**	**0.32**	**J**	*1*	*U*	**36**		**16**	
Trichloroethene	5[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	**0.62**	**J**	**0.49**	**J**
Trichlorofluoromethane	5200[b]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Vinyl Chloride	2	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*

Notes:

[a] Screening level is EPA MCL

[b] Screening level is EPA Tap Water RSL (target cancer risk 1 x 10-6, hazard quotient = 1)

Highlight indicates values greater than screening level

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Table 4
1,4-Dioxane and Detected VOC Analytical Results

		Location	MW-34C		MW-34D		MW-36		MW-36		MW-37D		MW-37S		MW-38D		MW-38S	
		Sample Name	MW34C-GW031921		MW34D-GW031921		FD07-GW031621		MW36-GW031621		MW37D-GW031721		MW37S-GW031721		MW38D-GW031821		MW38S-GW031721	
		Sample Date	3/19/2021		3/19/2021		3/16/2021		3/16/2021		3/17/2021		3/17/2021		3/18/2021		3/17/2021	
Analyte	Screening Level	Unit	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,4-Dioxane	0.46[b]	µg/L	NS		NS		NS		NS		NS		NS		NS		NS	
1,1,1-Trichloroethane	200[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
1,1-Dichloroethane	2.8[b]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
1,1-Dichloroethene	7[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Acetone	1400	µg/L	*20*	*U*	*20*	*U*	*20*	*U*	**5.5**	**J**	**4.9**	**J**	**5.8**	**J**	**3.5**	**J**	**4.3**	**J**
Benzene	5[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Bromodichloromethane	80[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Carbon Tetrachloride	5[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Chloroform	80[a]	µg/L	*1*	*U*	*1*	*U*	**0.43**	**J**	**0.38**	**J**	**0.62**	**J**	**1.8**		**2.3**		**3.3**	
Chloromethane	190[b]	µg/L	*1*	*U*	**0.16**	**J**	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
cis-1,2-Dichloroethene	70[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Dichlorodifluoromethane	20	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Tetrachloroethene	5[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Trichloroethene	5[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Trichlorofluoromethane	5200[b]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Vinyl Chloride	2	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*

Notes:

[a] Screening level is EPA MCL

[b] Screening level is EPA Tap Water RSL (target cancer risk 1 x 10-6, hazard quotient = 1)

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Table 5
Metals Analytical Results

Location		MW-13L		MW-23A	MW-23B	MW-23C	MW-24	MW-25A	MW-25B	MW-25C	MW-26A
Sample Name		FD04-GW032221	MW13L-GW032221	MW23A-GW031621	MW23B-GW031621	MW23C-GW031621	MW24-GW032121	MW25A-GW032121	MW25B-GW032121	MW25C-GW032121	MW26A-GW031721
Sample Date		3/22/2021	3/22/2021	3/16/2021	3/16/2021	3/16/2021	3/21/2021	3/21/2021	3/21/2021	3/21/2021	3/17/2021
Analyte	Unit	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Aluminum	µg/L	**151**	**143**	**56.9 J**	**80.9 J**	*100 U*	**64.1 J**	**90.9 J**	*100 U*	**93.6 J**	*100 U*
Antimony	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Arsenic	µg/L	**0.741 J**	**0.747 J**	**0.698 J**	**0.84 J**	**0.358 J**	**0.989 J**	**1.07**	**0.704 J**	**0.589 J**	**0.853 J**
Barium	µg/L	**47**	**48.2**	**82.3**	**49.4**	**22.7**	**64.9**	**65.2**	**48.9**	**27.8**	**73.6**
Beryllium	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Cadmium	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Calcium	µg/L	**137000**	**144000**	**171000**	**148000**	**138000**	**159000**	**171000**	**156000**	**120000**	**161000**
Chromium	µg/L	**1.19**	**1.24**	**0.255 J**	**0.689 J**	**0.452 J**	**15.3**	**0.983 J**	**0.488 J**	**0.808 J**	**0.646 J**
Cobalt	µg/L	**0.585 J**	**0.593 J**	**0.793 J**	**0.163 J**	**0.389 J**	**0.336 J**	**0.192 J**	**0.145 J**	**0.124 J**	**0.254 J**
Copper	µg/L	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	**1.47 J**	*2 U*	*2 U*	**2.27**
Iron	µg/L	**303**	**284**	**1490**	**176**	**41.1 J**	**96.8 J**	**122**	*100 U*	**127**	*100 U*
Lead	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	**0.236 J**
Magnesium	µg/L	**53000**	**52800**	**58700**	**53300**	**40300**	**56800**	**60600**	**54400**	**39100**	**56900**
Manganese	µg/L	**172**	**175**	**691**	**22.2**	**166**	**42.5**	**9.45**	**40.9**	**13**	**43.8**
Mercury	µg/L	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*
Nickel	µg/L	**1.55**	**1.54**	**9.23**	**1.91**	**4.34**	**3.87**	**13**	**1.08**	**1.84**	**9.6**
Potassium	µg/L	**2300**	**2310**	**3240**	**1990**	**2170**	**2420**	**2420**	**2010**	**1890**	**2640**
Selenium	µg/L	**0.901 J**	**0.884 J**	**0.436 J**	**0.77 J**	**1.09**	**0.714 J**	**0.791 J**	**0.889 J**	**1.23**	**0.74 J**
Silver	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	**0.509 J**	*1 U*	*1 U*	*1 U*	*1 U*
Sodium	µg/L	**37800**	**37700**	**125000**	**40600**	**28100**	**113000**	**110000**	**39400**	**25500**	**131000**
Thallium	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Vanadium	µg/L	**1.66**	**1.67**	**0.728 J**	**1.97**	**1.23**	**2.3**	**2.4**	**1.57**	**1.94**	**1.9**
Zinc	µg/L	**69.7**	**75.3**	*20 U*	**19.2 J**	**6.25 J**	**8.52 J**	**18.7 J**	*20 U*	*20 U*	**81.5**

Notes:

Bold indicates detected values

Italics indicates nondetected values

Acronyms:

µg/L = microgram per liter

Q = qualifier

J = Result is estimated

U = Analyte was not detected at the associated value, which is the reporting limit

Table 5
Metals Analytical Results

Location		MW-26B		MW-26C		MW-26D		MW-27		MW-28		MW-29A		MW-29B		MW-29C		MW-30RA		MW-30RA	
Sample Name		MW26B-GW031721		MW26C-GW031821		MW26D-GW031821		MW27-GW031621		MW28-GW032121		MW29A-GW031921		MW29B-GW031921		MW29C-GW031921		FD05-GW031621		MW30RA-GW031621	
Sample Date		3/17/2021		3/18/2021		3/18/2021		3/16/2021		3/21/2021		3/19/2021		3/19/2021		3/19/2021		3/16/2021		3/16/2021	
Analyte	Unit	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Aluminum	µg/L	*100*	*U*	*100*	*U*	*100*	*U*	*100*	*U*	*100*	*U*	*100*	*U*	**39**	**J**	**55.5**	**J**	*100*	*U*	*100*	*U*
Antimony	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Arsenic	µg/L	**0.759**	**J**	**0.48**	**J**	**0.302**	**J**	**1.22**		**1.29**		**1.49**		**0.477**	**J**	**1.02**		**0.482**	**J**	**0.522**	**J**
Barium	µg/L	**52.7**		**29.7**		**30.8**		**65.2**		**82.4**		**68**		**46.9**		**34.8**		**78.3**		**81.8**	
Beryllium	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Cadmium	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Calcium	µg/L	**154000**		**116000**		**133000**		**165000**		**167000**		**131000**		**157000**		**146000**		**176000**		**176000**	
Chromium	µg/L	**0.458**	**J**	**0.397**	**J**	**0.579**	**J**	**4.42**		**14.4**		*1*	*U*	*1*	*U*	*1*	*U*	**0.699**	**J**	**0.788**	**J**
Cobalt	µg/L	**0.184**	**J**	**0.37**	**J**	**0.432**	**J**	**0.164**	**J**	**0.254**	**J**	**0.114**	**J**	**0.831**	**J**	**0.12**	**J**	**0.162**	**J**	**0.177**	**J**
Copper	µg/L	*2*	*U*	*2*	*U*	*2*	*U*	**0.551**	**J**	*2*	*U*	**0.58**	**J**	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*
Iron	µg/L	*100*	*U*	*100*	*U*	**58.7**	**J**	*100*	*U*	**73.6**	**J**	*100*	*U*	**71.1**	**J**	**67.8**	**J**	*100*	*U*	*100*	*U*
Lead	µg/L	**0.0704**	**J**	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	**0.101**	**J**	**0.0707**	**J**	**0.0807**	**J**	*1*	*U*	*1*	*U*
Magnesium	µg/L	**52200**		**37700**		**39600**		**56900**		**58400**		**43900**		**52200**		**49400**		**71600**		**66900**	
Manganese	µg/L	**34.7**		**91.6**		**91**		**1.45**		**17.4**		**0.384**	**J**	**200**		**1.79**		**25.5**		**26.6**	
Mercury	µg/L	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*	*0.5*	*U*
Nickel	µg/L	**1.65**		**2.36**		**2.53**		**2.47**		**4.94**		**2.85**		**2.35**		**0.591**	**J**	**0.528**	**J**	**0.623**	**J**
Potassium	µg/L	**2080**		**1950**		**2160**		**2590**		**2680**		**2050**		**2140**		**1960**		**2820**		**2800**	
Selenium	µg/L	**0.794**	**J**	**0.958**	**J**	**0.78**	**J**	**0.742**	**J**	**0.751**	**J**	**0.664**	**J**	**0.885**	**J**	**1.07**		**0.607**	**J**	**0.643**	**J**
Silver	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Sodium	µg/L	**46700**		**27100**		**29100**		**139000**		**160000**		**95200**		**38900**		**33400**		**68000**		**66600**	
Thallium	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Vanadium	µg/L	**1.81**		**1.6**		**0.983**	**J**	**2.36**		**2.09**		**2.5**		**1.25**		**2.33**		**1.27**		**1.31**	
Zinc	µg/L	*20*	*U*	*20*	*U*	**6.41**	**J**	*20*	*U*	*20*	*U*	**6.67**	**J**	**9.46**	**J**	**27**		*20*	*U*	*20*	*U*

Notes:

Bold indicates detected values

Italics indicates nondetected values

Acronyms:

µg/L = microgram per liter

Q = qualifier

J = Result is estimated

U = Analyte was not detected at the associated value, which is the reporting limit

Table 5
Metals Analytical Results

Location		MW-30RB	MW-30C	MW-31A	MW-31B	MW-31C	MW-32A		MW-32B	MW-32C	MW-34A
Sample Name		MW30RB-GW031621	MW30C-GW031621	MW31A-GW031821	MW31B-GW031821	MW31C-GW031821	FD06-GW031721	MW32A-GW031721	MW32B-GW031721	MW32C-GW031721	MW34A-GW031921
Sample Date		3/16/2021	3/16/2021	3/18/2021	3/18/2021	3/18/2021	3/17/2021	3/17/2021	3/17/2021	3/17/2021	3/19/2021
Analyte	Unit	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Aluminum	µg/L	*100 U*	*100 U*	**35.3 J**	**27.4 J**	**28.5 J**	**33.1 J**	**41.4 J**	*100 U*	*100 U*	*100 U*
Antimony	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Arsenic	µg/L	**0.536 J**	**0.289 J**	**1.04**	**0.664 J**	**0.703 J**	**0.902 J**	**0.965 J**	**0.387 J**	**0.367 J**	**0.609 J**
Barium	µg/L	**60.5**	**75.4**	**50.5**	**28.3**	**33.8**	**60.1**	**59.4**	**27.1**	**20.6**	**46.1**
Beryllium	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Cadmium	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	**0.314 J**	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Calcium	µg/L	**164000**	**161000**	**133000**	**149000**	**133000**	**123000**	**124000**	**129000**	**115000**	**126000**
Chromium	µg/L	**0.766 J**	**0.305 J**	**0.592 J**	**0.435 J**	**0.13 J**	**1.56**	**1.44**	**0.904 J**	**1.17**	**1.76**
Cobalt	µg/L	**0.161 J**	**1.16**	**0.129 J**	**0.158 J**	**1.05**	**0.274 J**	**0.25 J**	**0.129 J**	**0.106 J**	**0.111 J**
Copper	µg/L	*2 U*	**0.508 J**	**4.05**	*2 U*	**0.624 J**	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*
Iron	µg/L	*100 U*	**205**	**42.8 J**	**32.1 J**	**853**	**119**	**148**	*100 U*	*100 U*	*100 U*
Lead	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	**0.151 J**	*1 U*	**0.108 J**
Magnesium	µg/L	**66100**	**58100**	**48400**	**52100**	**41900**	**47100**	**47600**	**44200**	**39600**	**43000**
Manganese	µg/L	**15.7**	**367**	**13.3**	**19.1**	**507**	**84.7**	**77.9**	**9.59**	**16.3**	**8.54**
Mercury	µg/L	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*
Nickel	µg/L	**0.627 J**	**3.26**	**1.43**	**0.93 J**	**1.51**	**0.614 J**	**0.529 J**	**3.92**	**1.76**	**4.01**
Potassium	µg/L	**2520**	**4120**	**2140**	**2000**	**2030**	**2680**	**2680**	**2050**	**1950**	**2020**
Selenium	µg/L	**0.669 J**	**0.537 J**	**0.633 J**	**1.01**	**0.598 J**	**0.636 J**	**0.61 J**	**0.937 J**	**1.02**	**0.842 J**
Silver	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	**0.123 J**	*1 U*
Sodium	µg/L	**53100**	**66600**	**79200**	**32200**	**36300**	**88700**	**85300**	**31300**	**27900**	**54300**
Thallium	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Vanadium	µg/L	**1.54**	**0.526 J**	**1.93**	**1.62**	**0.26 J**	**1.9**	**1.92**	**1.26**	**1.23**	**1.76**
Zinc	µg/L	*20 U*	**12.1 J**	**31.1**	*20 U*	*20 U*	*20 U*	*20 U*	**6.61 J**	*20 U*	**8.88 J**

Notes:

Bold indicates detected values

Italics indicates nondetected values

Acronyms:

µg/L = microgram per liter

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Table 5
Metals Analytical Results

Location		MW-34B	MW-34C	MW-34D	MW-36		MW-37D	MW-37S	MW-38D	MW-38S
Sample Name		MW34B-GW031921	MW34C-GW031921	MW34D-GW031921	FD07-GW031621	MW36-GW031621	MW37D-GW031721	MW37S-GW031721	MW38D-GW031821	MW38S-GW031721
Sample Date		3/19/2021	3/19/2021	3/19/2021	3/16/2021	3/16/2021	3/17/2021	3/17/2021	3/18/2021	3/17/2021
Analyte	Unit	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Aluminum	µg/L	*100 U*	*100 U*	*100 U*	*100 U*	*100 U*	*100 U*	*100 U*	**51.1 J**	**63.5 J**
Antimony	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Arsenic	µg/L	**0.473 J**	**0.26 J**	**0.26 J**	**0.531 J**	**0.541 J**	**0.59 J**	**0.537 J**	**0.578 J**	**1.27**
Barium	µg/L	**45.5**	**35**	**23.2**	**103**	**103**	**48**	**41.2**	**38.9**	**56.6**
Beryllium	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Cadmium	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Calcium	µg/L	**127000**	**86700**	**113000**	**161000**	**160000**	**190000**	**186000**	**131000**	**140000**
Chromium	µg/L	*1 U*	*1 U*	*1 U*	**0.415 J**	**0.533 J**	**1.28**	**0.732 J**	**1.68**	**4.04**
Cobalt	µg/L	**0.247 J**	**0.549 J**	**0.189 J**	**0.487 J**	**0.504 J**	**0.219 J**	**0.152 J**	**0.252 J**	**0.17 J**
Copper	µg/L	**0.591 J**	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*
Iron	µg/L	*100 U*	**47.8 J**	*100 U*	**150**	**172**	**37.4 J**	*100 U*	*100 U*	**304**
Lead	µg/L	**0.108 J**	**0.0631 J**	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	**0.177 J**
Magnesium	µg/L	**40800**	**36800**	**36200**	**50000**	**50400**	**76100**	**85700**	**50100**	**55800**
Manganese	µg/L	**92.6**	**303**	**79.3**	**189**	**178**	**28.1**	**4.1**	**33.8**	**10.3**
Mercury	µg/L	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*
Nickel	µg/L	**7.56**	**6.69**	**1.46**	**1.74**	**1.85**	**0.445 J**	**0.283 J**	*1 U*	*1 U*
Potassium	µg/L	**2000**	**1680**	**1640**	**2940**	**3010**	**3990**	**4100**	**2430**	**2810**
Selenium	µg/L	**0.801 J**	**0.703 J**	**0.964 J**	**0.605 J**	**0.745 J**	**2.04**	**2.47**	**0.96 J**	**0.872 J**
Silver	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Sodium	µg/L	**41200**	**23900**	**24900**	**96000**	**94700**	**112000**	**208000**	**48700**	**85200**
Thallium	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Vanadium	µg/L	**1.28**	**0.756 J**	**0.979 J**	**0.807 J**	**0.601 J**	**1.66**	**1.5**	**1.62**	**2.52**
Zinc	µg/L	**24.5**	**5.86 J**	*20 U*	**9.06 J**	**8.18 J**	*20 U*	*20 U*	*20 U*	*20 U*

Notes:

Bold indicates detected values

Italics indicates nondetected values

Acronyms:

µg/L = microgram per liter

Q = qualifier

J = Result is estimated

U = Analyte was not detected at the associated value, which is the reporting limit

Table 6
General Chemistry Analytical Results and Field Parameters

Location		MW-01D	MW-01S	MW-02	MW-03RA	MW-03RB	MW-03RC	MW-03RD	MW-04	MW-06	MW-08A	MW-08B	MW-08C
Sample Name		MW01D-GW032221	MW01S-GW032221	MW02-GW032321	MW03RA-GW032121	MW03RB-GW032121	MW03RC-GW032121	MW03RD-GW032121	MW04-GW032221	MW06-GW032221	MW08A-GW031721	MW08B-GW031721	MW08C-GW031721
Sample Date		3/22/2021	3/22/2021	3/23/2021	3/21/2021	3/21/2021	3/21/2021	3/21/2021	3/22/2021	3/22/2021	3/17/2021	3/17/2021	3/17/2021
Analyte	Unit	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Nitrate/Nitrite[1]	mg/L	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Chloride	mg/L	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Sulfate	mg/L	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Ethane	µg/L	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Ethene	µg/L	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Methane	µg/L	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Alkalinity[2]	mg/L	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Total Organic Carbon	mg/L	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Dissolved Oxygen	mg/L	**6.51**	**7.96**	**5.26**	**5.43**	**6.52**	**5.68**	**4.43**	**7.68**	**3.76**	**5.02**	**7.23**	**4.38**
Ferrous Iron	mg/L	**0**	**0**	**0**	**0.31**	**0.05**	**0.25**	**0.21**	**0**	**0**	**0**	**0**	**0.3**
ORP	mV	**85.3**	**157.9**	**185.8**	**59.1**	**71.7**	**93**	**16.7**	**148.8**	**144.9**	**75.7**	**108.4**	**-128.3**
pH	su	**7.12**	**6.93**	**6.84**	**6.98**	**7.06**	**7.18**	**7.11**	**7.16**	**7.28**	**7.03**	**7.23**	**7.47**
Specific Conductance	mS/cm	**1.107**	**1.575**	**2.105**	**1.389**	**1.055**	**0.766**	**0.941**	**1.502**	**0.772**	**1.576**	**0.938**	**0.906**
Temperature	deg C	**12.1**	**12.8**	**12.2**	**10.4**	**10.9**	**11.8**	**11.7**	**11.2**	**11**	**12.3**	**12.4**	**12.7**
Turbidity	NTU	**0.43**	**1.3**	**0.19**	**7.05**	**61.7**	**7.2**	**9.04**	**0.49**	**1.09**	**4.19**	**4.38**	**11.1**

Notes:
Bold indicates detected values
Italics indicates nondetected values
[1] Nitrate and Nitrite as total Nitrogen
[2] Total Alkalinity as calcium carbonate

Acronyms:
deg C = degrees Celsius
ORP = oxidation reduction potential
mg/L = milligram per liter
µg/L = microgram per liter
mS/cm = millisiemens per centimeter
mV = millivolts
NTU = nephelometric turbidity unit
NS = not sampled
su = standard units
Q = qualifier
J = Result is estimated
J+ = Result is estimated, biased high
J- = Result is estimated, biased low
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Table 6
General Chemistry Analytical Results and Field Parameters

Location		MW-12D	MW-13D	MW-13L		MW-13S	MW-14D	MW-14S	MW-15D	MW-15S	MW-16D	MW-16S	MW-17D
Sample Name		MW12D-GW031721	MW13D-GW032121	FD04-GW032221	MW13L-GW032221	MW13S-GW032221	MW14D-GW031821	MW14S-GW031821	MW15D-GW031621	MW15S-GW031621	MW16D-GW031721	MW16S-GW031721	MW17D-GW031921
Sample Date		3/17/2021	3/21/2021	3/22/2021	3/22/2021	3/22/2021	3/18/2021	3/18/2021	3/16/2021	3/16/2021	3/17/2021	3/17/2021	3/19/2021
Analyte	Unit	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Nitrate/Nitrite[1]	mg/L	NS	NS	**4.1 J**	**1.22 J**	NS	NS	NS	NS	NS	NS	NS	NS
Chloride	mg/L	NS	NS	**182 J-**	**182 J-**	NS	NS	NS	NS	NS	NS	NS	NS
Sulfate	mg/L	NS	NS	**90.3**	**90.9**	NS	NS	NS	NS	NS	NS	NS	NS
Ethane	µg/L	NS	NS	*2 U*	*2 U*	NS	NS	NS	NS	NS	NS	NS	NS
Ethene	µg/L	NS	NS	*2 U*	*2 U*	NS	NS	NS	NS	NS	NS	NS	NS
Methane	µg/L	NS	NS	**0.36 J**	**0.28 J**	NS	NS	NS	NS	NS	NS	NS	NS
Alkalinity[2]	mg/L	NS	NS	**217**	**216**	NS	NS	NS	NS	NS	NS	NS	NS
Total Organic Carbon	mg/L	NS	NS	**0.805 J**	**0.735 J**	NS	NS	NS	NS	NS	NS	NS	NS
Dissolved Oxygen	mg/L	**5.18**	**1.12**	NS	**7.3**	**3.41**	**3.23**	**0.97**	**3.45**	**5.49**	**2.74**	**4.01**	**1.78**
Ferrous Iron	mg/L	*0*	**0.12**	NS	**0.21**	**0.31**	**0.09**	*0*	*0*	*0*	**0.21**	**0.06**	*0*
ORP	mV	**-37.4**	**-55.2**	NS	**62.7**	**64.5**	**-36.9**	**-111**	**-97.5**	**-41.6**	**-37.4**	**-41.4**	**-66.3**
pH	su	**6.95**	**7.12**	NS	**6.94**	**6.92**	**7.17**	**7.21**	**6.96**	**6.94**	**7.2**	**7.08**	**7**
Specific Conductance	mS/cm	**1.396**	**1.405**	NS	**1.112**	**1.889**	**1.35**	**1.64**	**1.893**	**2.079**	**1.058**	**1.486**	**1.58**
Temperature	deg C	**14**	**12.8**	NS	**12.9**	**11.4**	**12.8**	**11.4**	**13.8**	**13.9**	**13**	**13**	**12.8**
Turbidity	NTU	**2.84**	**1.25**	NS	**40.1**	**20.03**	**0.16**	**32.2**	**8.17**	**3.67**	**1.85**	**8.8**	**30.7**

Notes:
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[1] Nitrate and Nitrite as total Nitrogen
[2] Total Alkalinity as calcium carbonate

Acronyms:
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ORP = oxidation reduction potential
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µg/L = microgram per liter
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mV = millivolts
NTU = nephelometric turbidity unit
NS = not sampled
su = standard units
Q = qualifier
J = Result is estimated
J+ = Result is estimated, biased high
J- = Result is estimated, biased low
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Table 6
General Chemistry Analytical Results and Field Parameters

Location		MW-17S		MW-18		MW-19		MW-20D		MW-20S		MW-21		MW-22		MW-23A		MW-23B		MW-23C		MW-24		MW-25A	
Sample Name		MW17S-GW031921		MW18-GW032121		MW19-GW032121		MW20D-GW031921		MW20S-GW031921		MW21-GW031621		MW22-GW032121		MW23A-GW031621		MW23B-GW031621		MW23C-GW031621		MW24-GW032121		MW25A-GW032121	
Sample Date		3/19/2021		3/21/2021		3/21/2021		3/19/2021		3/19/2021		3/16/2021		3/21/2021		3/16/2021		3/16/2021		3/16/2021		3/21/2021		3/21/2021	
Analyte	Unit	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Nitrate/Nitrite[1]	mg/L	NS		NS		NS		NS		NS		NS		NS		**1.02**		**2.58**		**1.6**		**1.85**		**2.02**	
Chloride	mg/L	NS		NS		NS		NS		NS		NS		NS		**329**	J	**184**	J	**62.9**	J	**311**	J-	**322**	J-
Sulfate	mg/L	NS		NS		NS		NS		NS		NS		NS		**90.9**		**81.9**		**206**		**87.1**		**87**	
Ethane	µg/L	NS		NS		NS		NS		NS		NS		NS		**0.37**	J	*2*	*U*	**0.6**	J	*2*	*U*	*2*	*U*
Ethene	µg/L	NS		NS		NS		NS		NS		NS		NS		**0.78**	J	**0.52**	J	**2**		*2*	*U*	*2*	*U*
Methane	µg/L	NS		NS		NS		NS		NS		NS		NS		**1.1**	J	**0.42**	J	**1.4**	J	*2*	*U*	*2*	*U*
Alkalinity[2]	mg/L	NS		NS		NS		NS		NS		NS		NS		**285**		**258**		**224**		**268**		**276**	
Total Organic Carbon	mg/L	NS		NS		NS		NS		NS		NS		NS		**1.13**		**0.82**	J	**0.772**	J	**0.385**	J	**0.84**	J
Dissolved Oxygen	mg/L	**2.53**		**5.26**		**1.91**		**3.01**		**4.13**		**3.16**		**2.67**		**2.87**		**4.01**		**2.37**		**6.07**		**5.87**	
Ferrous Iron	mg/L	**0.04**		**0.36**		**0.16**		**0.24**		**0.05**		*0*		**0.47**		**1.36**		**0.45**		**0.03**		*0*		**0.02**	
ORP	mV	**-82.7**		**-28.5**		**-32.7**		**-35.7**		**-16.1**		**-79.2**		**-28.3**		**-55.9**		**74**		**9.4**		**22.5**		**76.2**	
pH	su	**7.04**		**6.94**		**7.08**		**7.1**		**7.06**		**7.07**		**7.05**		**7.08**		**7.07**		**7.21**		**7.05**		**7.33**	
Specific Conductance	mS/cm	**1.804**		**1.896**		**1.764**		**0.996**		**1.071**		**1.807**		**1.084**		**1.738**		**1.306**		**1.017**		**1.498**		**1.728**	
Temperature	deg C	**12**		**12.1**		**12.6**		**13**		**12.9**		**13.5**		**12.5**		**12.9**		**14.6**		**13.5**		**13.2**		**9.1**	
Turbidity	NTU	**16.2**		**5.35**		**4.44**		**3.64**		**1.52**		**3.16**		**7.78**		**11.6**		**38.3**		**7.5**		**4.7**		**19.3**	

Notes:
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Acronyms:
deg C = degrees Celsius
ORP = oxidation reduction potential
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µg/L = microgram per liter
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Q = qualifier
J = Result is estimated
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J- = Result is estimated, biased low
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Table 6
General Chemistry Analytical Results and Field Parameters

Location		MW-25B	MW-25C	MW-26A	MW-26B	MW-26C	MW-26D	MW-27	MW-28	MW-29A	MW-29B	MW-29C	MW-30C
Sample Name		MW25B-GW032121	MW25C-GW032121	MW26A-GW031721	MW26B-GW031721	MW26C-GW031821	MW26D-GW031821	MW27-GW031621	MW28-GW032121	MW29A-GW031921	MW29B-GW031921	MW29C-GW031921	MW30C-GW031621
Sample Date		3/21/2021	3/21/2021	3/17/2021	3/17/2021	3/18/2021	3/18/2021	3/16/2021	3/21/2021	3/19/2021	3/19/2021	3/19/2021	3/16/2021
Analyte	Unit	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Nitrate/Nitrite[1]	mg/L	**2.76**	**3.08**	**2.18**	**2.48**	**2.94**	**1.68**	**2.19**	**2.32**	**2.03**	**2.08**	**2.99**	**2.55**
Chloride	mg/L	**187 J-**	**86.5 J-**	**352 J**	**189 J**	**81.2 J**	**59.3 J**	**309 J**	**385 J-**	**203 J**	**372 J**	**147 J**	**249 J**
Sulfate	mg/L	**84.3**	**108**	**92.7**	**83.1**	**110**	**191**	**91.8**	**86.8**	**91.3**	**106**	**100**	**73.4**
Ethane	µg/L	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*
Ethene	µg/L	**0.33 J**	**0.49 J**	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	**0.65 J**
Methane	µg/L	*2 U*	**0.4 J**	*2 U*	**0.2 J**	**0.23 J**	**0.34 J**	**0.22 J**	*2 U*	**0.18 J**	**0.3 J**	**0.26 J**	**0.77 J**
Alkalinity[2]	mg/L	**259**	**228**	**287**	**262**	**233**	**226**	**278**	**277**	**292**	**250**	**252**	**265**
Total Organic Carbon	mg/L	**0.722 J**	**0.711 J**	**1.03**	**0.754 J**	**0.948 J**	**0.774 J**	**1.57**	**0.512 J**	**0.846 J**	**0.638 J**	**0.733 J**	**1.36**
Dissolved Oxygen	mg/L	**5.53**	**6.84**	**4.25**	**2.81**	**2.61**	**3.12**	**4.76**	**7.16**	**5.42**	**4.75**	**4.18**	**1.67**
Ferrous Iron	mg/L	**0.06**	**0.62**	**0.02**	**0.02**	**0.8**	**0.2**	*0*	**0.12**	*0*	*0*	*0*	**0.09**
ORP	mV	**169.4**	**145.9**	**93.1**	**93.7**	**132.2**	**5.6**	**46.9**	**17.2**	**164.7**	**143.8**	**44.7**	**-16.5**
pH	su	**6.97**	**7.08**	**6.92**	**6.91**	**7.06**	**7.3**	**7.05**	**6.97**	**7.17**	**7.08**	**6.94**	**7.19**
Specific Conductance	mS/cm	**1.313**	**0.952**	**1.917**	**1.359**	**0.943**	**1.023**	**2.087**	**1.703**	**1.19**	**1.292**	**1.197**	**1.641**
Temperature	deg C	**10.8**	**12.1**	**15.5**	**16.4**	**15.9**	**15.8**	**15.1**	**12.9**	**10.1**	**10.9**	**12.3**	**12.8**
Turbidity	NTU	**5.9**	**11.4**	**3.44**	**1.16**	**3.51**	**1.79**	**0.71**	**4.11**	**0.35**	**9.53**	**7.34**	**8.78**

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Acronyms:
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Table 6
General Chemistry Analytical Results and Field Parameters

Location		MW-30RA		MW-30RB	MW-31A	MW-31B	MW-31C	MW-32A		MW-32B	MW-32C	MW-34A	MW-34B
Sample Name		FD05-GW031621	MW30RA-GW031621	MW30RB-GW031621	MW31A-GW031821	MW31B-GW031821	MW31C-GW031821	FD06-GW031721	MW32A-GW031721	MW32B-GW031721	MW32C-GW031721	MW34A-GW031921	MW34B-GW031921
Sample Date		3/16/2021	3/16/2021	3/16/2021	3/18/2021	3/18/2021	3/18/2021	3/17/2021	3/17/2021	3/17/2021	3/17/2021	3/19/2021	3/19/2021
Analyte	Unit	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Nitrate/Nitrite[1]	mg/L	**3.17**	**2.95**	**3.32**	**2.04**	**2.46**	**1.64**	**2.17**	**2.21**	**3.44**	**2.89**	**1.78**	**2**
Chloride	mg/L	**272 J**	**301 J**	**276 J**	**190 J-**	**129 J-**	**85.5 J-**	**175 J**	**198 J**	**106 J**	**61.3 J**	**157 J**	**132 J**
Sulfate	mg/L	**72.8**	**73.9**	**72.9**	**88.7**	**146**	**178**	**98.3**	**93.7**	**132**	**153**	**86.6**	**98.4**
Ethane	µg/L	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	**2.7**	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*
Ethene	µg/L	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	**1 J**	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*	*2 U*
Methane	µg/L	*2 U*	*2 U*	**0.19 J**	*2 U*	*2 U*	**3.8**	*2 U*	*2 U*	**0.22 J**	**0.24 J**	**0.18 J**	**0.39 J**
Alkalinity[2]	mg/L	**285**	**283**	**261**	**261**	**242**	**212**	**278**	**276**	**238**	**226**	**233**	**225**
Total Organic Carbon	mg/L	**0.926 J**	**1.02**	**0.818 J**	**0.855 J**	**0.71 J**	**1.29**	**0.898 J**	**0.918 J**	**0.777 J**	**0.371 J**	**0.766 J**	**0.79 J**
Dissolved Oxygen	mg/L	NS	**4.99**	**5.14**	**6.14**	**7.52**	**0.82**	NS	**7.06**	**6.67**	**6.08**	**6**	**3.5**
Ferrous Iron	mg/L	NS	*0*	*0*	**0.04**	*0*	**0.48**	NS	**0.03**	**0.02**	**0.19**	**0.01**	**0.04**
ORP	mV	NS	**89.3**	**115.3**	**75.2**	**103.9**	**-72.9**	NS	**110.9**	**34.8**	**-18.4**	**131.1**	**28.3**
pH	su	NS	**7.03**	**7.06**	**7.14**	**7.08**	**7.23**	NS	**7.27**	**7.26**	**7.31**	**7.19**	**7.14**
Specific Conductance	mS/cm	NS	**1.847**	**1.556**	**1.267**	**1.122**	**0.797**	NS	**1.128**	**0.93**	**1.068**	**1.131**	**1.083**
Temperature	deg C	NS	**13.5**	**13.1**	**12.7**	**10.7**	**11.1**	NS	**13.2**	**12.7**	**12.8**	**12.9**	**16.7**
Turbidity	NTU	NS	**1.14**	**1.68**	**8.18**	**3.98**	**7.81**	NS	**7.06**	**2.88**	**0.56**	**1.04**	**3.69**

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Acronyms:
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Table 6
General Chemistry Analytical Results and Field Parameters

Location		MW-34C		MW-34D		MW-36		MW-36		MW-37D		MW-37S		MW-38D		MW-38S	
Sample Name		MW34C-GW031921		MW34D-GW031921		FD07-GW031621		MW36-GW031621		MW37D-GW031721		MW37S-GW031721		MW38D-GW031821		MW38S-GW031721	
Sample Date		3/19/2021		3/19/2021		3/16/2021		3/16/2021		3/17/2021		3/17/2021		3/18/2021		3/17/2021	
Analyte	Unit	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Nitrate/Nitrite[1]	mg/L	**0.709**		**2.54**		**0.842**		**0.695**		**1.92**		**2.09**		**3.88**		**4.43**	
Chloride	mg/L	**30.7**	J	**44.6**	J	**188**	J	**186**	J	**272**	J	**360**	J	**156**	J	**235**	J
Sulfate	mg/L	**115**		**132**		**122**		**129**		**191**		**198**		**128**		**97.9**	
Ethane	µg/L	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*
Ethene	µg/L	*2*	*U*	**0.88**	J	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*
Methane	µg/L	**0.44**	J	**0.5**	J	**0.21**	J	*2*	*U*	**0.19**	J	*2*	*U*	*2*	*U*	*2*	*U*
Alkalinity[2]	mg/L	**228**		**235**		**331**		**330**		**318**		**380**		**236**		**262**	
Total Organic Carbon	mg/L	**0.753**	J	**0.558**	J	**1.09**		*1*	*U*	**1.06**		*1*	*U*	**0.726**	J	**0.888**	J
Dissolved Oxygen	mg/L	**2.99**		**4.41**		NS		**3.8**		**2.71**		**0.05**		**3.31**		**2.43**	
Ferrous Iron	mg/L	*0*		**0.46**		NS		**0.07**		*0*		*0*		*0*		**0.29**	
ORP	mV	**53**		**69.1**		NS		**-174.4**		**-56.5**		**-57.6**		**-30.1**		**-37.4**	
pH	su	**7.4**		**7.09**		NS		**6.94**		**6.97**		**6.95**		**7.11**		**7.08**	
Specific Conductance	mS/cm	**0.717**		**0.87**		NS		**1.535**		**1.948**		**2.358**		**1.27**		**1.536**	
Temperature	deg C	**14.2**		**12.9**		NS		**13.1**		**15.2**		**15.5**		**13.2**		**13.6**	
Turbidity	NTU	**7.29**		**2**		NS		**4.39**		**2.66**		**0.73**		**2.57**		**14.7**	

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Appendix A

Salt Lake City Division of Transportation Traffic Control Permit

Traffic Control Permit

Salt Lake City Community and Neighborhoods
Division of Transportation
349 South 200 East #150
Salt Lake City, Utah 84111
Telephone (801) 535-6630
E-Mail TechPermit@slcgov.com

Permit # TRN2020-02332

Organization Name: Wasatch Environmental
Address: 2410 W California Ave SALT LAKE CITY, UT 84104
Contact Person: EMMA ROTT Phone: 4062413259 Cell: 406-551-5169
Barricade Company: Barricade Phone:

WORK SHALL COMPLY WITH PART 6 OF THE 2009 MUTCD.
PERMITS MUST BE EXTENDED 24 HOURS IN ADVANCE OF EXPIRATION.
IF THE TRAFFIC CONTROL PERMIT IS ALLOWED TO EXPIRE, A NEW PERMIT, AND AN ADDITIONAL FEE WILL BE REQUIRED.
CLOSURES ON A DIFFERENT STREET THAN LISTED WILL REQUIRE AN ADDITIONAL TRAFFIC CONTROL, AND ENGINEERING PERMIT.
THE ORGANIZATION ISSUED THE TRAFFIC CONTROL PERMIT SHALL BE RESPONSIBLE FOR ALL BARRICADE PLACEMENT AND MAINTENENCE.
AN ADDITIONAL PERMIT FROM SLC ENGINEERING MAY ALSO BE REQUIRED.
SHALL MAINTAIN ACCESS TO ALL PROPERTIES.
SHALL INFORM BUSINESSES & RESIDENTS OF PROJECT & DURATION.
SHALL COORDINATE WITH BUSINESSES & RESIDENTS AFFECTED.
SHALL OBTAIN A PERMIT FOR ALL PARKING METERS OR OTHER RESTRICTED PARKING MADE UNAVAILBABLE TO THE PUBLIC.
TRAFFIC CONTROL PERMITS ARE NOT VALID UNTIL PAID IN FULL.
CHANGES TO PERMIT MAY BE REQUIRED AND MADE UPON REVIEW and/or COMPLAINT.

Project Name / Description: Sampling ground water wells for the VA at various locations.
General Work Type: Staging Specific Work Type: Barricade
City Project # Public Way Permit #
Special Event Permit # Block Party Permit #

Closure Type	*On Street Name*	*From Number*	*To Number*	*Side of Street*
Street	**Elizabeth St.**	**785 S**	**785 S**	**E**

Start Date	*End Date*	*Full Road Closure?*	*Barricade Manual Fig #*	*Description*	*Special Requirements*
03/12/2021	03/26/2021	No	TA-6	TESTING GROUND WATER NOT DRILLING OR TRENCHING	SHALL MAINTAIN ACCESS TO ALL PROPERTIES AND COORDINATE WITH RESIDENTS AND BUSINESSES AFFECTED. WORK HOURS SHALL BE BETWEEN 9AM & 4PM. MAY WORK FROM 6PM TO 6AM.

Closure Type	*On Street Name*	*From Number*	*To Number*	*Side of Street*
Street	**McClelland St.**	**900 S**	**900 S**	**E**

Start Date	*End Date*	*Full Road Closure?*	*Barricade Manual Fig #*	*Description*	*Special Requirements*
03/12/2021	03/26/2021	No	TA-6	TESTING GROUND WATER NOT DRILLING OR TRENCHING	SHALL MAINTAIN ACCESS TO ALL PROPERTIES AND COORDINATE WITH RESIDENTS AND BUSINESSES AFFECTED. WORK HOURS SHALL BE BETWEEN 9AM & 4PM. MAY WORK FROM 6PM TO 6AM.

Approved By: Jacob Fenton Issue Date: 9/14/2020

Closure Type	*On Street Name*	*From Number*	*To Number*	*Side of Street*	
Street	**Alpine Place**	**1150 E**	**1150 E**	**E**	
Start Date	*End Date*	*Full Road Closure?*	*Barricade Manual Fig #*	*Description*	*Special Requirements*
03/12/2021	03/26/2021	No	TA-6	TESTING GROUND WATER NOT DRILLING OR TRENCHING	SHALL MAINTAIN ACCESS TO ALL PROPERTIES AND COORDINATE WITH RESIDENTS AND BUSINESSES AFFECTED. WORK HOURS SHALL BE BETWEEN 9AM & 4PM. MAY WORK FROM 6PM TO 6AM.

Closure Type	*On Street Name*	*From Number*	*To Number*	*Side of Street*	
Street	**Gilmer Dr**	**1280 E**	**1280 E**	**S**	
Start Date	*End Date*	*Full Road Closure?*	*Barricade Manual Fig #*	*Description*	*Special Requirements*
03/12/2021	03/26/2021	No	TA-6	TESTING GROUND WATER NOT DRILLING OR TRENCHING	SHALL MAINTAIN ACCESS TO ALL PROPERTIES AND COORDINATE WITH RESIDENTS AND BUSINESSES AFFECTED. WORK HOURS SHALL BE BETWEEN 9AM & 4PM. MAY WORK FROM 6PM TO 6AM.

Closure Type	*On Street Name*	*From Number*	*To Number*	*Side of Street*	
Street	**14th E**	**Sunnyside Ave**	**Sunnyside Ave**	**W**	
Start Date	*End Date*	*Full Road Closure?*	*Barricade Manual Fig #*	*Description*	*Special Requirements*
03/12/2021	03/26/2021	No	TA-6	TESTING GROUND WATER NOT DRILLING OR TRENCHING	SHALL MAINTAIN ACCESS TO ALL PROPERTIES AND COORDINATE WITH RESIDENTS AND BUSINESSES AFFECTED. WORK HOURS SHALL BE BETWEEN 9AM & 4PM. MAY WORK FROM 6PM TO 6AM.

Closure Type	*On Street Name*	*From Number*	*To Number*	*Side of Street*	
Street	**Belmont Ave**	**McClelland St.**	**McClelland St.**	**S**	
Start Date	*End Date*	*Full Road Closure?*	*Barricade Manual Fig #*	*Description*	*Special Requirements*
03/12/2021	03/26/2021	No	TA-6	TESTING GROUND WATER NOT DRILLING OR TRENCHING	SHALL MAINTAIN ACCESS TO ALL PROPERTIES AND COORDINATE WITH RESIDENTS AND BUSINESSES AFFECTED. WORK HOURS SHALL BE BETWEEN 9AM & 4PM. MAY WORK FROM 6PM TO 6AM.

Closure Type	*On Street Name*	*From Number*	*To Number*	*Side of Street*	
Street	**University St.**	**700 S**	**700 S**	**S**	
Start Date	*End Date*	*Full Road Closure?*	*Barricade Manual Fig #*	*Description*	*Special Requirements*
03/12/2021	03/26/2021	No	TA-6	TESTING GROUND WATER NOT DRILLING OR TRENCHING	SHALL MAINTAIN ACCESS TO ALL PROPERTIES AND COORDINATE WITH RESIDENTS AND BUSINESSES AFFECTED. WORK HOURS SHALL BE BETWEEN 9AM & 4PM. MAY WORK FROM 6PM TO 6AM.

Approved By: Jacob Fenton

Issue Date: 9/14/2020

Closure Type	*On Street Name*	*From Number*	*To Number*	*Side of Street*
Street	**600 S**	**1300 E**	**1305 E**	**N**

Start Date	*End Date*	*Full Road Closure?*	*Barricade Manual Fig #*	*Description*	*Special Requirements*
03/12/2021	03/26/2021	No	TA-6	TESTING GROUND WATER NOT DRILLING OR TRENCHING	SHALL MAINTAIN ACCESS TO ALL PROPERTIES AND COORDINATE WITH RESIDENTS AND BUSINESSES AFFECTED. WORK HOURS SHALL BE BETWEEN 9AM & 4PM. MAY WORK FROM 6PM TO 6AM.

Closure Type	*On Street Name*	*From Number*	*To Number*	*Side of Street*
Street	**HERBERT AVE**	**1177 E**	**1183 E**	**N**

Start Date	*End Date*	*Full Road Closure?*	*Barricade Manual Fig #*	*Description*	*Special Requirements*
03/12/2021	03/26/2021	No	TA-6	TESTING GROUND WATER NOT DRILLING OR TRENCHING	SHALL MAINTAIN ACCESS TO ALL PROPERTIES AND COORDINATE WITH RESIDENTS AND BUSINESSES AFFECTED. WORK HOURS SHALL BE BETWEEN 9AM & 4PM. MAY WORK FROM 6PM TO 6AM.

Closure Type	*On Street Name*	*From Number*	*To Number*	*Side of Street*
Street	**1200 E**	**647 S**	**649 S**	**E**

Start Date	*End Date*	*Full Road Closure?*	*Barricade Manual Fig #*	*Description*	*Special Requirements*
03/12/2021	03/26/2021	No	TA-6	TESTING GROUND WATER NOT DRILLING OR TRENCHING	SHALL MAINTAIN ACCESS TO ALL PROPERTIES AND COORDINATE WITH RESIDENTS AND BUSINESSES AFFECTED. WORK HOURS SHALL BE BETWEEN 9AM & 4PM. MAY WORK FROM 6PM TO 6AM.

Approved By: Jacob Fenton

Issue Date: 9/14/2020

Appendix B
Field Forms

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/22/21

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** 0.0

Well ID: MW-01D **Purging/Sampling Device:** Compressed gas/MP-10H **Pump depth (ft bgs):** 384

Initial Static Water Level (feet btoc): 170.45 **Analytical Parameters:** VOCs

Final Water Level (feet btoc): 170.45 **QC Samples Collected:** MS/MSD

Purge Start Time: 1350 **Ferrous Iron (mg/L):** 0.00 **Allowable Drawdown (ft):** 0.3

Sample Time: 1450 **Controller Settings: Recharge:** 25 secs **Discharge:** ~~14~~ 20 bc 3/22 secs **Pressure:** 160 psi

Samplers' Signatures: **Cycles Per Minute:** ~0.8

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1401	170.45	12.5	7.21	1108	9.95	82.7	bc 3/22 8 1.72	~~150~~ bc 3/22 225	
1413	170.45	12.5	7.11	1112	6.79	84.7	3.98	225	
1418	170.45	12.4	7.12	1111	6.57	84.0	2.73	225	
1423	170.45	12.4	7.12	1109	6.48	84.1	1.30	225	
1428	170.45	12.4	7.12	1108	6.34	84.4	0.83	225	
~~1433~~	~~170.45~~							~~225~~	bc 3/22/21
1437	170.41	12.1	7.12	1107	6.33	85.1	1.87	225	min purge met
1440	170.45	12.3	7.11	1107	6.43	85.5	0.56	225	
1443	170.45	12.1	7.12	1107	6.51	85.3	0.43	225	~4.5 gal purged.

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 8 secs **Discharge:** 22 secs

Pressure: 180 psi **Cycles Per Minute:** 2 **Flow Rate:** 200 mL/min

Screened Interval: 364-404 ft bgs **Minimum purge volume:** 3.1 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/22/21 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** 0.0

Well ID: MW-01S **Purging/Sampling Device:** Compressed gas/MP-10H **Pump depth (ft bgs):** 204

Initial Static Water Level (feet btoc): 156.91 **Analytical Parameters:** VOCs

Final Water Level (feet btoc): 156.94 **QC Samples Collected:** None

Purge Start Time: 1359 **Ferrous Iron (mg/L):** 0.00 **Allowable Drawdown (ft):** 0.3

Sample Time: 1445 **Controller Settings: Recharge:** 15 secs **Discharge:** ~~15~~ 10 secs **Pressure:** 100 psi

Samplers' Signatures: Jonna Campbell **Cycles Per Minute:** 2.4

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1409	156.95	13.2	7.03	1619	8.62	133.6	4.19	100	
1421	156.91	13.0	6.99	1582	8.05	137.5	1.01	90	
1431	156.95	12.9	6.97	1578	8.02	149.9	0.47	90	
1436	156.95	12.9	6.98	1576	8.00	154.1	1.00	90	min purge met
1440	156.95	12.8	6.93	1575	7.96	157.9	1.30	100	~2 gal purged
1445	SAMPLE								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 10 secs **Discharge:** 20 secs

Pressure: 180 psi **Cycles Per Minute:** 2 **Flow Rate:** 150 mL/min

Screened Interval: 184-224 ft bgs **Minimum purge volume:** 1.6 gallons

68 cycled x 2.4

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ TV Simultaneous Purge Allowed: ■
05/26/21

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume

Date: ~~3/22/21~~ 3/23/21

Well ID: MW-02

Initial Static Water Level (feet btoc): 170.80

Final Water Level (feet btoc): 170.76

Purge Start Time: ~~0940~~ 0930 PC 3/23/21

Sample Time: 1040

Samplers' Signatures: B Carreon

OVM: FID ☐ PID ■ In Casing (ppm): (Initial) ~~3/22/21~~ 0.9 (Vented to) ~~3/22/21~~ 0.9

Purging/Sampling Device: Compressed gas/~~MP-10H~~ 3/21ST Pump depth (ft bgs): 195

Analytical Parameters: VOCs

QC Samples Collected: ~~None~~ EB01-GW 032321-0830

Ferrous Iron (mg/L): 0.00 Allowable Drawdown (ft): 0.3

Controller Settings: Recharge: 30 secs Discharge: 15 secs Pressure: 180 psi

Cycles Per Minute: ~~0.8~~ ~1.3

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
0950	170.56	11.4	6.87	2138	7.35	176.7	NM	~~45.1~~ 3/23/21 90	Some air entrainment and drawdown
1000	170.75	11.9	6.86	2142	4.81	179.6	0.88	90	in purge line. Very minor.
1015	170.74	12.4	6.86	2128	4.74	181.3	0.90	90	
1025	170.74	12.2	6.85	2119	5.06	183.5	0.75	90	
1030	170.74	12.3	6.84	2116	5.17	185.1	0.19	90	min purge volume met
1035	170.74	12.2	6.84	2105	5.26	185.8	0.19	90	~~PC~~ 3/23/21 ~1.7 gal purged.

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 8 secs Discharge: 22 secs

Pressure: 100 psi Cycles Per Minute: 2 Flow Rate: 200 mL/min

Screened Interval: 175.5-202.5 ft bgs Minimum purge volume: 1.5 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ TV
05/26/21

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/21/21 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** 0.0

Well ID: MW-03RA **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 215

Initial Static Water Level (feet btoc): NA **Analytical Parameters:** VOCs

Final Water Level (feet btoc): NA **QC Samples Collected:** None

Purge Start Time: 0900 **Ferrous Iron (mg/L):** 0.31 **Allowable Drawdown (ft):** NA

Sample Time: 1010 **Controller Settings: Recharge:** 80 secs **Discharge:** 15 secs **Pressure:** 100 psi

Samplers' Signatures: Jenna Campbell **Cycles Per Minute:** ~.6

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
907	NA	10.0	7.23	1350	6.41	152.6	4.01	90	
917	NA	10.0	7.23	1357	3.25	70.3	18.0	80	
928	NA	10.1	6.96	1362	4.14	23.1	16.0	90	
938	NA	10.3	6.96	1350	4.79	32.5	7.00	90	
948	NA	10.6	6.98	1394	5.07	45.3	6.03	80	
954	NA	10.6	6.98	1396	5.43	52.1	5.02	80	min purge met
959	NA	10.5	6.98	1389	5.49	56.5	4.81	80	
1004	NA	10.4	6.98	1389	5.43	59.1	7.05	80	~0.8 gal purged
1010	SAMPLE								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 80 secs **Discharge:** 20 secs
Pressure: 120 psi **Cycles Per Minute:** _____ **Flow Rate:** <120 mL/cycle
Screened Interval: 215-220 ft bgs **Minimum purge volume:** 0.8 gallons

53 min purge

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ TV Simultaneous Purge Allowed: ■
05/26/21

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/21/21

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** 0.0

Well ID: MW-03RB **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 267

Initial Static Water Level (feet btoc): NA **Analytical Parameters:** VOCs

Final Water Level (feet btoc): NA **QC Samples Collected:** None

Purge Start Time: 0900 **Ferrous Iron (mg/L):** 0.85 **Allowable Drawdown (ft):** NA

Sample Time: ~~1115~~ BC 3/21/21 1115 **Controller Settings: Recharge:** 80 secs **Discharge:** 25 secs **Pressure:** 120 psi

Samplers' Signatures: B Carreon TSC **Cycles Per Minute:** ~0.6

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
0913	NA	9.7	6.64	1081	1.04	110.8	26.6	150	
0925	NA	10.0	7.01	1056	5.17	95.9	18.2	150	
0935	NA	10.2	7.01	1050	5.97	93.5	14.6	150	
0945	NA	10.3	7.01	1050	6.14	90.6	40.9	150	
0955	NA	10.2	7.02	1053	7.09	88.6	57.6	150	Min purge met
1015	NA	10.0	7.04	1055	6.60	84.2	62.1	150	
1030	NA	NM				→	67.2	150	
1055	NA	10.6	7.06	1051	6.25	76.6	68.5	150	
1100	NA	10.8	7.05	1052	6.34	8:3121 675.3	67.4	150	
1105	NA	10.8	7.06	1057	6.58	74.1	58.5	150	~2.5 gal purged. Turbidity stabilized at >50 NTUs as it had in Dec-20
1110	NA	10.9	7.06	1053	6.58	73.2	57.3	150	
1114	NA	10.9	7.06	1055	6.52	71.7	61.7	150	
1115	Sample								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)

Previous controller settings: Recharge: 80 secs **Discharge:** 30 secs

Pressure: 130 psi **Cycles Per Minute:** _____ **Flow Rate:** 150 mL/cycle

Screened Interval: 267-272 ft bgs **Minimum purge volume:** 0.9 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/21/21 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** _____

Well ID: MW-03RC **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 307

Initial Static Water Level (feet btoc): NA **Analytical Parameters:** VOCs

Final Water Level (feet btoc): NA **QC Samples Collected:** None

Purge Start Time: 1030 **Ferrous Iron (mg/L):** 0.25 **Allowable Drawdown (ft):** NA

Sample Time: 1220 **Controller Settings: Recharge:** 80 secs **Discharge:** 30 secs **Pressure:** 120 psi

Samplers' Signatures: _____ **Cycles Per Minute:** ~0.55

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
1053	NA	11.5	7.20	762	1.21	59.3	28.1	150	
1103	NA	11.9	7.25	763	4.30	50.8	16.1	140	
1120	NA	11.1	7.20	761	5.25	69.1	37.3	140	
1137	NA	12.1	7.19	772	5.15	79.1	22.4	150	min purge met
1150	NA	12.2	7.19	775	5.64	84.2	11.2	155	
1156	NA	12.0	7.18	772	5.46	86.3	15.0	150	
1207	NA	11.6	7.18	769	5.57	89.7	9.55	150	
1212	NA	11.9	7.19	769	5.74	91.1	8.32	150	
1217	NA	11.8	7.18	766	5.68	93.0	7.20	150	
1220	SAMPLE								~2.5 gal purged

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 80 secs **Discharge:** 34 secs
Pressure: 130 psi **Cycles Per Minute:** _____ **Flow Rate:** 150 mL/cycle

Screened Interval: 307-312 ft bgs **Minimum purge volume:** 1.1 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/21/21

Well ID: MW-03RD

Initial Static Water Level (feet btoc): NA

Final Water Level (feet btoc): NA

Purge Start Time: 1125

Sample Time: 1320

Samplers' Signatures: Jonna Campbell

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** 0.0

Purging/Sampling Device: ZIST/Compressed gas **Pump depth (ft bgs):** 359

Analytical Parameters: VOCs

QC Samples Collected: None

Ferrous Iron (mg/L): 0.21 **Allowable Drawdown (ft):** NA

Controller Settings: Recharge: 80 secs **Discharge:** 40 secs **Pressure:** 146 psi

Cycles Per Minute: 0.5

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
1133	NA	11.7	7.12	975	4.27	47.5	8.05	250	
1145	NA	11.4	7.16	975	5.47	20.9	22.4	250	
1155	NA	11.7	7.13	967	3.71	21.5	57.2	250	
1220	NA	11.6	7.13	948	4.59	19.0	21.4	250	YSI unit is shutting off occassionally, DO takes time to stabilize. Min purge met.
1239	NA	11.7	7.13	946	3.98	18.0	16.4	225	
1250	NA	11.8	7.14	944	4.45	17.3	14.4	225	
1303	NA	11.7	7.14	942	4.36	16.7	10.4	225	
1308	NA	11.8	7.14	940	4.13	16.6	8.87	225	
1312	NA	11.7	7.17	943	4.13	16.6	9.27	225	
1315	NA	11.7	7.11	941	4.43	16.7	9.04	225	~1.3 gal purged
1320	SAMPLE								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)

Previous controller settings: Recharge: 80 secs **Discharge:** 40 secs

Pressure: 145 psi **Cycles Per Minute:** _____ **Flow Rate:** 225 mL/cycle

Screened Interval: 359-364 ft bgs **Minimum purge volume:** 1.3 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated; ☑
Total Purge Volume Recorded: ☒ TV Simultaneous Purge Allowed: ■

05/26/21

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/22/21

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.1 **(Vented to)** 0.0

Well ID: MW-04 **Purging/Sampling Device:** Compressed gas/MP-10 **Pump depth (ft bgs):** 160

Initial Static Water Level (feet btoc): 136.18 **Analytical Parameters:** VOCs

Final Water Level (feet btoc): 136.21 **QC Samples Collected:** Field Duplicate FD01-GW

Purge Start Time: ~1030 **Ferrous Iron (mg/L):** 0.0 **Allowable Drawdown (ft):** 0.3

Sample Time: 1145 **Controller Settings: Recharge:** 15 secs **Discharge:** 15 secs **Pressure:** ____ psi

Samplers' Signatures: Jona campbell **Cycles Per Minute:** 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1055	136.21	NM	NM	NM	NM	NM	0.78	100	YSI dead, getting replacment
1120									min purge met
1125	136.22	11.2	7.46	1500	8.45	87.2	4.76	120	replacment YSI arrived
1129	136.27	11.2	7.19	1503	7.65	127.6	2.71	120	
1135	136.25	11.2	7.16	1501	7.73	141.3	2.75	120	
1138	136.21	11.3	7.15	1499	7.72	145.9	0.79	120	
1141	136.29	11.2	7.16	1502	7.68	148.8	0.49	100	
1145	SAMPLE								~2.75 gal purged

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 16 secs **Discharge:** 14 secs

Pressure: 100 psi **Cycles Per Minute:** 2 **Flow Rate:** 250 mL/min

Screened Interval: 143-173 ft bgs **Minimum purge volume:** 1.4 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ TV 05/26/21

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 03/21/2021 & 03/22/2021 TV 05/26/2021 **OVM:** **FID** ☐ **PID** ■ **In Casing (ppm): (Initial)** TV 05/26/2021 0.0 **(Vented to)** TV 05/26/2021 0.0

Well ID: MW-05R **Purging/Sampling Device:** Compressed gas/MP-10 **Pump depth (ft bgs):** 222

Initial Static Water Level (feet btoc): 214.95 TV 05/26/2021 **Analytical Parameters:** VOCs

Final Water Level (feet btoc): N/A TV 05/26/2021 **QC Samples Collected:** None

Purge Start Time: 15:30 TV 05/26/2021 **Ferrous Iron (mg/L):** N/A TV 05/26/2021 **Allowable Drawdown (ft):** 0.3

Sample Time: N/A TV 05/26/2021 **Controller Settings: Recharge:** N/A secs **Discharge:** N/A TV 05/26/2021 secs **Pressure:** N/A TV 05/26/2021 psi

Samplers' Signatures: E. Rott/M. Day TV 05/26/2021 Emma Rott **Cycles Per Minute:** N/A TV 05/26/2021

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
									The sample was attempted to be obtained on 03/21/2021, however, no water appeared on the surface after 30 minutes of purging. The field team attempted to increase discharge time and pressure. The team also pulled the pump up, took it apart, and cleaned it. The team did observe water in the bottom five feet of tubing mixed with bubbles. The team attempted to redeploy the pump and purge. No water surfaced. On 03/22/2021, it was determined a pump replacement was needed so the malfunctioning pump was pulled and the well was not sampled. A j-plug was added to MW-05R since the protective housing was no longer in place. TV 05/26/2021

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 15 secs **Discharge:** 15 secs
Pressure: 145 psi **Cycles Per Minute:** 2 **Flow Rate:** 300 mL/min

Screened Interval: 198-228 ft bgs **Minimum purge volume:** 1.9 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/22/21

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** 0.0

Well ID: MW-06

Purging/Sampling Device: Compressed gas/MP-10 **Pump depth (ft bgs):** 128

Initial Static Water Level (feet btoc): 123.56

Analytical Parameters: VOCs

Final Water Level (feet btoc): 123.52

QC Samples Collected: None

Purge Start Time: 918

Ferrous Iron (mg/L): 0.00 **Allowable Drawdown (ft):** 0.3

Sample Time: 950

Controller Settings: Recharge: 20 secs **Discharge:** 15 secs **Pressure:** 85 psi

Samplers' Signatures: Jenna Campbell

Cycles Per Minute: ~1.7

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
928	123.48	11.0	7.09	782	4.68	170.9	2.33	150	
939	123.63	11.1	7.23	772	3.80	150.2	1.57	150	min purge met
942	123.68	11.1	7.26	772	3.80	147.3	1.05	150	
945	123.75	11.0	7.28	772	3.76	144.9	1.09	150	
950	SAMPLE								~2 gal purged

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 15 secs **Discharge:** 15 secs

Pressure: 105 psi **Cycles Per Minute:** 2 **Flow Rate:** 350 mL/min

Screened Interval: 100-130 ft bgs **Minimum purge volume:** 1.2 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume Date: 3/17/21

OVM: FID ☐ PID ■ In Casing (ppm): (Initial) 0.00 (Vented to) 0.00

Well ID: MW-08A Purging/Sampling Device: Compressed gas/Solinist Pump depth (ft bgs): 99

Initial Static Water Level (feet btoc): 60.10 Analytical Parameters: VOCs

Final Water Level (feet btoc): 59.97 QC Samples Collected: Field Duplicate FD02-GW 031721 0800

Purge Start Time: 915 Ferrous Iron (mg/L): 0.00 Allowable Drawdown (ft): 0.3

Sample Time: 940 Controller Settings: Recharge: 13 secs Discharge: 17 secs Pressure: 60 psi

Samplers' Signatures: Jonn Campbell Cycles Per Minute: 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
921	60.30	12.2	7.00	1580	4.86	90.3	11.9	400	
928	60.01	12.2	7.03	1577	4.87	78.6	8.28	400	
933	60.03	12.3	7.02	1575	4.92	77.2	5.97	400	min purge met
936	60.00	12.4	7.02	1575	5.05	76.2	5.07	400	
939	60.00	12.3	7.03	1576	5.02	75.7	4.19	400	
940	SAMPLE								~3 gal purged

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Vent: 13 secs Drive: 17 secs
Pressure: 60 psi Cycles Per Minute: 3 Flow Rate: 300 mL/min

Screened Interval: 91-106 ft bgs Minimum purge volume: 0.8 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/17/21 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** 0.0

Well ID: MW-08B **Purging/Sampling Device:** Compressed gas/Solinist **Pump depth (ft bgs):** 190

Initial Static Water Level (feet btoc): 58.24 **Analytical Parameters:** VOCs

Final Water Level (feet btoc): 58.24 **QC Samples Collected:** MS/MSD

Purge Start Time: 1000 **Ferrous Iron (mg/L):** 0.0 **Allowable Drawdown (ft):** 0.3

Sample Time: 1025 **Controller Settings: Recharge:** 10 secs **Discharge:** 16 secs **Pressure:** 55 psi

Samplers' Signatures: B Cannon **Cycles Per Minute:** 3

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1013	58.24	12.5	7.29	934	7.76	108.6	8.87	300	
1018	58.24	12.4	7.23	938	7.23	107.9	5.70	300	
1021	58.24	12.4	7.23	938	7.23	108.4	4.38	300	min purge met. ~1.5 gal purged
1025	Sample								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: **Vent:** 10 secs **Drive:** 10 secs
Pressure: 90 psi **Cycles Per Minute:** 3 **Flow Rate:** 400 mL/min

Screened Interval: 180-200 ft bgs **Minimum purge volume:** 1.5 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/17/21 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** 0.0

Well ID: MW-08C **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 304

Initial Static Water Level (feet btoc): NA **Analytical Parameters:** VOCs

Final Water Level (feet btoc): NA **QC Samples Collected:** None

Purge Start Time: 0915 **Ferrous Iron (mg/L):** 0.30 **Allowable Drawdown (ft):** NA

Sample Time: 1140 **Controller Settings: Recharge:** 22 secs **Discharge:** 15 secs **Pressure:** 85 psi

Samplers' Signatures: B Carreon SF **Cycles Per Minute:** 1.6

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
0926	NA	11.7	7.77	1620	0.29	-140.2	OOR	150	Sulfur-like odor Out of range=OOR
0949	↓	11.7	7.41	1135	4.21	-116.7	255	125	
1001		11.9	7.42	1124	2.67	-131.8	89.9	125	
1016		12.0	7.42	1104	3.23	-131.8	40.1	125	
1037		12.2	7.43	1089	3.82	-130.2	18.6	125	min purge met
1046		12.2	7.47	1086	3.99	-127.8	60.9	NM	
1104		12.1	7.44	1085	6.41	-132.4	27.0	125	dumped + refilled YSI
1118		12.1	7.43	1082	4.22	-129.8	13.2	100	
1129		12.5	7.48	1056	4.21	-127.4	12.6	75	
1132		12.7	7.47	1073	4.13	-127.8	10.9	75	~3 gal pumped.
1135	↓	12.7	7.47	906	4.38	-128.3	11.1	75	22 hours on 3/17 hrs. Flow dropping slowly and turbidity stabilizing ~11 NTUs
1140	Sample								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 22 secs **Discharge:** 15 secs
Pressure: 85 psi **Cycles Per Minute:** 1.6 **Flow Rate:** 160 mL/cycle

Screened Interval: 304-309 ft bgs **Minimum purge volume:** 1.1 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 03/17/21 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** —

Well ID: MW-12S **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** 60

Initial Static Water Level (feet btoc): DRY **Analytical Parameters:** VOCs, Metals, Mercury, Anions, Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): N/A **QC Samples Collected:** None

Purge Start Time: N/A **Ferrous Iron (mg/L):** N/A **Allowable Drawdown (ft):** 0.3

Sample Time: N/A **Controller Settings: Recharge:** N/A secs **Discharge:** N/A secs **Pressure:** N/A psi

Samplers' Signatures: [signature] / Anna Fiorini **Cycles Per Minute:** N/A

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 49 secs **Discharge:** 11 secs

Pressure: 45 psi **Cycles Per Minute:** 1 **Flow Rate:** 60 mL/min

Screened Interval: 50-60 ft bgs **Minimum purge volume:** 0.5 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 03/17/21

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** —

Well ID: MW-12D **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** 90

Initial Static Water Level (feet btoc): 54.55 **Analytical Parameters:** VOCs

Final Water Level (feet btoc): 54.55 **QC Samples Collected:** None

Purge Start Time: 0921 **Ferrous Iron (mg/L):** 0.00 **Allowable Drawdown (ft):** 0.3

Sample Time: 0945 **Controller Settings: Recharge:** 16 secs **Discharge:** 14 secs **Pressure:** 55 psi

Samplers' Signatures: TA/Hla / Anna Fiorito **Cycles Per Minute:** 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
0923	54.55	14.1	6.80	1397	4.81	-54.0	17.0	325	
0928	54.55	14.0	6.86	1398	4.90	-42.9	9.60	325	
0933	54.55	14.1	6.90	1398	5.08	-40.0	6.41	325	Minimum purge volume met
0938	54.55	14.0	6.95	1396	5.18	-37.4	2.89	325	purged ~ 2 gallons
0945	SAMPLE TIME								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 16 secs **Discharge:** 14 secs
Pressure: 55 psi **Cycles Per Minute:** 2 **Flow Rate:** 300 mL/min

Screened Interval: 88.5-93.5 ft bgs **Minimum purge volume:** 0.7 gallons ≈ 3 min

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ TV 05/26/21

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/21/21 / 03/22/21 * **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** —

Well ID: MW-13S **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** 19

Initial Static Water Level (feet btoc): (03/21/21) 13.42 / (03/22/21) 13.42 **Analytical Parameters:** VOCs

Final Water Level (feet btoc): 14.65 **QC Samples Collected:** None

Purge Start Time: 1407 / 0929 * **Ferrous Iron (mg/L):** 0.31 **Allowable Drawdown (ft):** 0.3

Sample Time: 0935 **Controller Settings: Recharge:** 54 secs **Discharge:** 6 secs **Pressure:** 18 psi

Samplers' Signatures: [signature] / [signature] **Cycles Per Minute:** 1

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1410	14.41	12.1	7.30	1984	0.31	-83.3	9.79	50	
1415	14.42	11.7	7.24	2052	0.24	-103.9	6.84	50	
1420	14.60	12.2	7.24	2077	0.24	-114.4	4.47	50	
1430	14.85	12.1	7.26	2098	0.27	-133.3	3.12	50	
1440	15.06	12.1	7.24	2101	0.14	-136.0	1.98	50	minimum purge volume met
1445	15.29	11.6	7.7	2107	0.32	-137.0	1.75	50	
1450	15.41	11.7	7.21	2110	0.34	-139.7	1.86	50	
1455	15.68	12.5	7.18	2089	0.72	-142.7	3.81	50	increased to 20/10 22 psi 2 cpm, purging to
1505	16.54	13.0	7.13	2091	0.61	-146.1	1.12	200	pumped dry, will continue tomorrow, purged ~1.5 gallons
* 0931	14.39	11.4	6.42	1889	3.41	64.5	20.03	50	next day @ 6614hrs, YSI
0935	SAMPLE	DONE							

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 54 secs **Discharge:** 6 secs
Pressure: 18 psi **Cycles Per Minute:** 1 **Flow Rate:** 50 mL/min

Screened Interval: 15.5-20.5 ft bgs **Minimum purge volume:** 0.4 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ TV 05/26/21

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 03/21/21

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** ____

Well ID: MW-13D **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** 82

Initial Static Water Level (feet btoc): 13.28 **Analytical Parameters:** VOCs

Final Water Level (feet btoc): 13.91 **QC Samples Collected:** Field Duplicate FD03-GW032121

Purge Start Time: 1625 ~~1625~~ ~~1630 (FD 03)~~ **Ferrous Iron (mg/L):** 0.12 **Allowable Drawdown (ft):** 0.3

Sample Time: 1625 / 1630 (FD 03) **Controller Settings: Recharge:** 20 secs **Discharge:** 10 secs **Pressure:** 40 psi

Samplers' Signatures: [signature] / Kevin Murphy **Cycles Per Minute:** 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1530	14.03	13.1	7.16	1397	~~3.21 36.0~~ 3.28	-67.0	36.3	200	
1535	13.91	12.9	7.16	1392	2.94	-62.5	16.4	200	
1540	13.94	13.1	7.17	1397	2.56	-61.3	9.39	200	minimum purge volume met
1545	13.96	13.2	7.17	1395	1.90	-60.8	5.09	200	minimum purge volume reached for extra drawdown sample
1550	13.93	13.4	7.17	1399	1.68	-61.4	3.81	200	
1555	13.95	13.2	7.15	1400	1.49	-62.8	2.63	200	
1600	13.91	13.0	7.14	1399	1.37	-63.0	2.57	200	
1605	13.91	13.0	7.12	1401	1.28	-61.9	4.64	200	
1610	13.91	13.0	7.13	1404	1.13	-60.4	4.30	200	
1615	13.91	13.0	7.13	1407	1.08	-57.3	1.48	200	
1620	13.91	12.8	7.12	1405	1.12	-55.2	1.25	200	purged ~ 3.5 gallons
1625	SAMPLE TAKEN								
1630	FIELD DUPLICATE SAMPLE TAKEN								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 20 secs **Discharge:** 10 secs
Pressure: 40 psi **Cycles Per Minute:** 2 **Flow Rate:** 250 mL/min

Screened Interval: 79-84 ft bgs **Minimum purge volume:** 0.7 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ TV 05/26/21

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 03/22/21 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** _____

Well ID: MW-13L **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** 153.1 TOP OF PUMP

Initial Static Water Level (feet btoc): 16.51 **Analytical Parameters:** VOCs, 1,4-Dioxane, Metals, Mercury, Anions, Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 16.53 **QC Samples Collected:** MS/MSD, Field Duplicate FD04-GW032221 FB01-GW032221

Purge Start Time: 0956 **Ferrous Iron (mg/L):** 2.21 **Allowable Drawdown (ft):** 0.3

Sample Time: 1315 / 1320 (FD) 1230 (FB) **Controller Settings: Recharge:** 20 secs **Discharge:** 10 secs **Pressure:** 120 psi

Samplers' Signatures: Tim Mc / Kevin Murphy **Cycles Per Minute:** 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1000	16.54	12.9	6.97	1138	8.62	87.7	~~TV 3.21.21 3.56~~ 38	200	
1005	16.54	12.9	6.93	1140	8.06	85.2	overrange	200	
1020	16.54	12.9	6.94	1139	8.04	84.8	921	225	minimum purge volume met
1030	16.54	13.0	6.93	1137	7.69	83.2	759	225	
1040	16.54	13.0	6.93	1133	8.40	82.1	544	225	
1050	16.54	12.9	6.93	1131	7.65	79.7	358	225	
1100	16.54	12.9	6.94	1129	7.48	78.1	388	225	
1110	16.54	13.0	6.93	1133	8.80	76.2	114	225	
1120	16.54	12.8	6.94	1122	7.76	74.0	385	225	
1130	16.54	12.8	6.94	1121	7.48	72.2	304	225	
1140	16.54	12.8	6.94	1119	7.59	70.9	218	225	
1150	16.54	12.9	6.94	1118	8.63	69.2	153	225	
1200	16.54	12.9	6.94	1116	7.74	68.0	94.9	225	
1210	16.54	13.0	6.94	1115	7.70	67.5	71.7	225	

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 20 secs **Discharge:** 10 secs
Pressure: 120 psi **Cycles Per Minute:** 2 **Flow Rate:** 200 mL/min

Screened Interval: 150-160 ft bgs **Minimum purge volume:** 0.6 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ TV 05/26/21

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume Date: 3/22/21 OVM: FID ☐ PID ■ In Casing (ppm): (Initial) 0.0 (Vented to) –

Well ID: MW-132 Purging/Sampling Device: MP-50 Pump depth (ft bgs): 157.1

Initial Static Water Level (feet btoc): 16.51 Analytical Parameters: See Pg 1

Final Water Level (feet btoc): 16.53 QC Samples Collected:

Purge Start Time: 0956 Ferrous Iron (mg/L): 0.21 Allowable Drawdown (ft): 0.3

Sample Time: 1315 (1320 FD) (1230 FB) Controller Settings: Recharge: 20 secs Discharge: 10 secs Pressure: 120 psi

Samplers' Signatures: TV | KM Cycles Per Minute: 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1220	16.54	12.9	6.94	1114	8.76	67.1	64.3	200	
1230	16.54	12.9	6.94	1112	7.63	66.1	52.3	225	
1240	16.54	12.9	6.94	1110	7.69	65.2	47.0	225	
1250	16.54	12.9	6.94	1109	7.42	64.6	44.0	225	
1255	16.59	12.9	6.94	1108	7.57	64.5	41.4	225	
1300	16.59	12.8	6.95	1110	7.23	64.1	43.8	225	Changed gas cylinder.
1305	16.59	12.4	6.94	1104	7.32	63.6	43.0	225	
1310	16.54	12.9	6.94	1112	7.30	62.7	40.1	225	Purged ~11 gallons.
1315	Sample								
1320	Duplicate								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: _____ secs Discharge: _____ secs

Pressure: _____ psi Cycles Per Minute: _____ Flow Rate: _____ mL/min

Screened Interval: _____ ft bgs Minimum purge volume: _____ gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

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Site Name: 700S 1600E PCE Plume Date: 05/18/21

OVM: FID ☐ PID ■ In Casing (ppm): (Initial) 0.0 (Vented to) —

Well ID: MW-14S Purging/Sampling Device: MP-50 Pump depth (ft bgs): 12

Initial Static Water Level (feet btoc): 5.12 Analytical Parameters: VOCs

Final Water Level (feet btoc): 8.25 QC Samples Collected: None

Purge Start Time: 1154 Ferrous Iron (mg/L): 0.00 Allowable Drawdown (ft): 0.3

Sample Time: 1335 Controller Settings: Recharge: 56 secs Discharge: 4 secs Pressure: 12 psi

Samplers' Signatures: [signature] / Adrian Flores Cycles Per Minute: 1

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1200	5.90	12.7	7.03	1555	1.45	-92.1	43.0	100	pump/tubing pressure 6 psi 50mL/min due to drawdown
1205	6.12	11.1	7.07	1555	1.13	-92.1	32.4	50	pressure at 12 psi
1210	6.32	10.9	7.14	1591	1.07	-106.4	19.9	50	
1220	6.45	11.1	7.15	1607	1.10	-107.1	17.3	50	
1230	~~6.59~~ 6.74	11.0	7.17	1631	1.14	-107.0	18.5	50	
1240	6.98	11.1	7.18	1648	1.14	-106.0	17.2	50	
1245	7.11	11.1	7.18	1651	1.13	-106.5	18.8	50	minimum purge of 0.7 gallons met + accounting for additional dwng. = 24.4 mins
1255	7.32	11.2	7.19	1656	1.11	-106.6	21.5	50	
1300	7.34	11.3	7.20	1660	1.12	-107.1	21.0	50	
1305	7.52	11.3	7.21	1660	1.08	-107.6	22.5	50	
1310	7.59	11.3	7.21	1656	1.06	-107.9	20.4	50	
1315	7.73	11.3	7.21	1647	1.04	-108.8	23.3	50	
1320	7.80	11.4	7.22	1648	1.02	-109.3	26.0	50	
1325	7.95	11.3	7.21	1640	0.98	-110.1	29.3	50	
1330	8.01	11.4	7.21	1640	0.97	-111.0	32.2	50	1335 - Sample Purged ~1.5 gallons.

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 56 secs (=0.6 L) Discharge: 4 secs

Pressure: 20 psi Cycles Per Minute: 1 Flow Rate: 50 mL/min

Screened Interval: 4.5-14.5 ft bgs Minimum purge volume: 0.7 gallons

≈ 55mins @ 50mL = 6,130 mL ≈ 4 gallons (1241) + 0.16 gal/ft (12 min @ 50mL/min) = 1 gallons

0.1-0.3

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: [X] Minimum Purge Met and Notated: [X]
Total Purge Volume Recorded: [X] TV Simultaneous Purge Allowed: [ ] 05/26/21

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 03/18/21 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** —

Well ID: MW-14D **Purging/Sampling Device:** Artesian/Open Valve **Pump depth (ft bgs):** NA

Initial Static Water Level (feet btoc): 3.25 ft (0.22 psi) **Analytical Parameters:** VOCs

Final Water Level (feet btoc): 0.1 psi **QC Samples Collected:** None

Purge Start Time: 1352 **Ferrous Iron (mg/L):** 0.09 **Allowable Drawdown (ft):** NA

Sample Time: 1419 **Controller Settings: Recharge:** — secs **Discharge:** — secs **Pressure:** — psi

Samplers' Signatures: Anna Fiorini, Tea Vrtar **Cycles Per Minute:** —

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1353	2.0	11.4	7.55	1377	4.80	-50.8	0.46	1000	
1358	1.5	11.3	7.57	1362	3.55	-55.8	0.17	1000	min. purge met
1403	~0.5	12.1	7.16	1355	2.96	-54.0	0.27	800	
1406	0.25	12.3	7.18	1352	3.65	-47.9	0.24	500	
1409	<0.25	12.4	7.20	1348	3.59	-43.3	0.17	800	
1412	<0.25	12.4	7.26	1347	3.21	-39.8	0.12	550	
1415	<0.25	12.7	7.18	1349	3.22	-37.0	0.16	500	
1418	<0.25	12.8	7.17	1350	3.23	-36.9	0.16	500	
1419	SAMPLE								~6 gal purged

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: NA **Discharge:** NA

Pressure: NA **Cycles Per Minute:** NA **Flow Rate:** 300-500 mL/min

Screened Interval: 49-54 ft bgs **Minimum purge volume:** 0.4 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ TV Simultaneous Purge Allowed: ■

05/26/21

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/16/21

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** —

Well ID: MW-15S **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** 54

Initial Static Water Level (feet btoc): 48.50 **Analytical Parameters:** VOCs

Final Water Level (feet btoc): 48.50 **QC Samples Collected:** None

Purge Start Time: 1055 **Ferrous Iron (mg/L):** 0.00 **Allowable Drawdown (ft):** 0.3

Sample Time: 1130 **Controller Settings: Recharge:** 8 secs **Discharge:** 12 secs **Pressure:** 30 psi

Samplers' Signatures: [signature]/Anna Fiorini **Cycles Per Minute:** 3

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1107	48.50	13.7	6.93	2054	6.08	-35.1	32	250	
1112	48.50	13.9	6.94	2075	5.93	-32.3	19.0	250	minimum purge volume met
1117	48.50	13.8	6.94	2077	5.78	-36.6	9.48	250	
1122	48.50	13.8	6.94	2079	5.63	-39.1	6.31	250	
1127	48.50	13.9	6.94	2079	5.49	-41.6	3.67	250	purged about 2 gallons
1130	SAMPLE PMG								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 8 secs **Discharge:** 12 secs
Pressure: 30 psi **Cycles Per Minute:** 3 **Flow Rate:** 275 mL/min

Screened Interval: 52.5-55 ft bgs **Minimum purge volume:** 0.5 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ TV Simultaneous Purge Allowed: ■

05/26/21

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/16/21 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** —

Well ID: MW-15D **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** 72

Initial Static Water Level (feet btoc): 49.60 **Analytical Parameters:** VOCs

Final Water Level (feet btoc): 49.70 **QC Samples Collected:** None

Purge Start Time: 1202 **Ferrous Iron (mg/L):** 0.00 **Allowable Drawdown (ft):** 0.3

Sample Time: 1250 **Controller Settings: Recharge:** 11 secs **Discharge:** 9 secs **Pressure:** 40 psi

Samplers' Signatures: Tom Nolan / Anna Fiorini **Cycles Per Minute:** 3

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1206	49.70	13.8	6.92	1876	5.05	-123.3	26.7	275	
1211	49.70	13.8	6.95	1878	4.91	-109.8	23.4	275	minimum purge volume met
1216	49.72	13.9	6.97	1882	4.39	-105.7	18.5	275	
1221	49.75	13.9	6.96	1884	3.88	-104.5	14.4	275	
1226	49.70	13.8	6.96	1885	3.72	-105.1	13.5	275	
1231	49.71	13.8	6.96	1887	3.59	-103.8	11.7	275	
1236	49.70	13.8	6.96	1891	3.53	-101.5	9.65	275	
1241	49.70	13.8	6.96	1892	3.51	-99.6	9.14	275	
1246	49.70	13.8	6.96	1893	3.45	-97.5	8.17	275	purged about 4 gallons TV 03/16
1250	SAMPLE TIME								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 11 **Discharge:** 9

Pressure: 35 **Cycles Per Minute:** 3 **Flow Rate:** 275 mL/min

Screened Interval: 69-74 ft bgs **Minimum purge volume:** 0.6 gallons ≈8 mins

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ TV Simultaneous Purge Allowed: ■
05/26/21

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 03/17/21 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** —

Well ID: MW-16S **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** 16

Initial Static Water Level (feet btoc): 11.15 **Analytical Parameters:** VOCs

Final Water Level (feet btoc): 11.43 **QC Samples Collected:** None

Purge Start Time: 1055 **Ferrous Iron (mg/L):** 0.06 **Allowable Drawdown (ft):** 0.3

Sample Time: 1110 **Controller Settings: Recharge:** 25 secs **Discharge:** 5 secs **Pressure:** 18 psi

Samplers' Signatures: [signature] / ANNA FIALKO **Cycles Per Minute:** 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1058	11.43	13.1	7.15	1486	4.07	-36.0	5.61	100	reduced pressure to 18 psi
1103	11.43	13.0	7.08	1487	4.03	-40.9	8.24	100	purged minimum volume
1108	11.43	13.0	7.08	1486	4.01	-41.4	8.80	100	purged ~0.5 gal
1110	SAMPLE TIME								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 25 secs **Discharge:** 5 secs

Pressure: 18 psi **Cycles Per Minute:** 2 **Flow Rate:** 300 mL/min

Screened Interval: 9-19 ft bgs **Minimum purge volume:** 0.2 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ TV 05/26/21

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 03/17/21 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** 0.0

Well ID: MW-16D **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** 67

Initial Static Water Level (feet btoc): 9.66 TV 03/17 **Analytical Parameters:** VOCs

Final Water Level (feet btoc): 9.73 **QC Samples Collected:** None

Purge Start Time: 1125 **Ferrous Iron (mg/L):** 0.21 **Allowable Drawdown (ft):** 0.3

Sample Time: 1155 **Controller Settings: Recharge:** 20 secs **Discharge:** 10 secs **Pressure:** 25 psi

Samplers' Signatures: Tim Miller M. Flores **Cycles Per Minute:** 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1130	9.66	13.0	7.41	1017	2.45	-78.0	2.23	100	increased pressure to 25
1135	9.70	12.9	7.22	1058	2.82	-43.5	3.63	200	
1140	9.70	13.0	7.21	1058	2.84	-40.6	5.52	200	
1145	9.71	13.0	7.21	1058	2.87	-39.2	3.18	200	minimum purge volume met
1150	9.71	13.0	7.20	1058	2.74	-37.4	1.85	200	purged ~1 gallon
1155	SAMPLE	TIME							

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 20 **Discharge:** 10

Pressure: 25 **Cycles Per Minute:** 2 **Flow Rate:** 200 mL/min

Screened Interval: 62-72 ft bgs **Minimum purge volume:** 0.6 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ TV 05/26/21

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 03/14/21 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** —

Well ID: MW-17S **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** 20

Initial Static Water Level (feet btoc): 6.56 **Analytical Parameters:** VOCs

Final Water Level (feet btoc): ~~6.29~~ TV 03/14 8.96 **QC Samples Collected:** None

Purge Start Time: 1130 **Ferrous Iron (mg/L):** 0.04 **Allowable Drawdown (ft):** 0.3

Sample Time: 1255 **Controller Settings: Recharge:** 55 secs **Discharge:** 5 secs **Pressure:** 19 psi

Samplers' Signatures: [signature] / KIEL KREUGER **Cycles Per Minute:** 1

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1135	6.89	11.9	7.09	1731	3.05	-75.3	57.3	50	
1140	7.01	12.2	6.99	1749	2.97	-74.4	~~54.5~~ TV 03/14 52.0	50	
1150	7.25	12.0	6.96	1779	2.80	-77.4	34.00	50	
1200	7.38	12.1	7.01	1785	2.62	-78.6	21.7	50	
1210	7.75	12.2	7.03	1787	2.64	-79.7	15.3	50	
1220	7.97	12.1	7.08	1797	2.58	-80.5	13.00	50	minimum purge volume met
1225	8.02	12.2	7.05	1800	2.60	-81.0	12.6	50	
1230	8.23	12.2	7.02	1803	2.62	-81.9	12.7	50	
1235	8.40	12.1	7.05	1801	2.56	-82.5	~~12.2~~ TV 03/14 13.5	50	
1240	8.49	12.1	7.04	1804	2.60	-82.5	13.3	50	
1245	8.69	12.3	7.04	1803	2.53	-82.6	14.8	50	minimum purge volume met for TV 03/14 1.95 extra drawdown ft
1248	8.69	12.1	7.05	1801	2.51	-82.7	15.4	50	
1251	8.81	12.0	7.04	1804	2.53	-82.7	16.2	50	purged ~ 2 gallons
1255	SAMPLE TIME								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
0.16 L → 12 min/ft

Previous controller settings: Recharge: 55 secs **Discharge:** 5 secs

Pressure: 18 psi **Cycles Per Minute:** 1 **Flow Rate:** 50 mL/min

Screened Interval: 6-21 ft bgs **Minimum purge volume:** 0.6 gallons ≈45.4 mL × 12 min/ft × ft

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ TV - Simultaneous Purge Allowed: ■

05/26/21

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

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Site Name: 700S 1600E PCE Plume Date: 3/14/21 OVM: FID ☐ PID ■ In Casing (ppm): (Initial) 0.0 (Vented to) ~

Well ID: MW-17D Purging/Sampling Device: Artesian/Open Valve Pump depth (ft bgs): NA 49

Initial Static Water Level (feet btoc): 0.4 (1.5 with attachment) Analytical Parameters: VOCs

Final Water Level (feet btoc): _____ QC Samples Collected: None

Purge Start Time: 1348 Ferrous Iron (mg/L): 0.00 Allowable Drawdown (ft): NA

Sample Time: 1600 Controller Settings: Recharge: 12 secs Discharge: 8 secs Pressure: 40 psi

Samplers' Signatures: Tim Killer / Ciel Keller Cycles Per Minute: 3

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1350	1.53	12.9	6.81	1567	0.80	-127.7	Over range	200	
1400	1.56	13.0	6.93	570	1.12	-102.4	over range	200	increased pressure to 40 psi
1410	1.60	12.9	6.96	1583	1.01	-94.3	over rage	250	minimum purge volume met
1420	1.62	12.9	6.97	1589	0.83	-86.6	928	250	
1430	1.62	12.9	6.98	1567	0.66	-80.4	535	250	
1450	1.63	12.8	7.02	1575	2.83	-76.1	223	300	
1510	1.62	12.8	6.99	1576	1.95	-70.2	80.5	300	
1515	1.63	12.8	6.99	1578	1.78	-69.2	65.9	300	
1525	1.62	12.8	7.00	1580	1.43	-68.2	47.1	300	
1530	1.65	12.8	7.00	1579	1.60	-67.8	43.9	300	
1535	1.64	12.8	7.00	1578	1.75	-67.8	41.5	300	
1540	1.66	12.8	7.00	1580	1.80	-67.6	36.3	300	
1545	1.66	12.9	7.00	1579	1.81	-67.0	32.8	300	
1550	1.66	12.8	7.00	1579	1.81	-66.6	33.6	300	
1555	1.66	12.8	7.00	1580	1.78	-66.3	30.7	300	~Purged 12 gallons. 1600-sample

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: NA/12 Discharge: NA/8

Pressure: NA/30 psi Cycles Per Minute: NA/3 Flow Rate: 300 mL/min

Screened Interval: 44-54 ft bgs Minimum purge volume: 0.4 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ TV Simultaneous Purge Allowed: ■ 05/26/21

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 03/21/21

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** —

Well ID: MW-18 **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** 88

Initial Static Water Level (feet btoc): 81.67 **Analytical Parameters:** VOCs

Final Water Level (feet btoc): 81.70 **QC Samples Collected:** None

Purge Start Time: 0908 **Ferrous Iron (mg/L):** 0.36 **Allowable Drawdown (ft):** 0.3

Sample Time: 0945 **Controller Settings: Recharge:** 18 secs **Discharge:** 12 secs **Pressure:** 50 psi

Samplers' Signatures: Tom M / Kevin Murphy **Cycles Per Minute:** 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
0910	81.67	11.8	7.00	1853	7.47	-57.5	227	250	
0915	81.74	11.8	6.62	1888	5.78	-43.1	68.1	250	
0920	81.67	11.4	6.86	1884	5.68	-37.3	26.2	250	minimum purge volume ex.
0925	81.68	12.0	6.89	1891	5.55	-32.7	15.0	250	
0930	81.67	12.0	6.91	1890	5.47	-30.7	9.87	250	
0935	81.70	12.0	6.92	1894	5.40	-29.5	7.72	250	
0940	81.70	12.1	6.94	1896	5.26	-28.5	5.35	250	purged ~ 2 gal/6x
0945	SAMPLE TIME								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 18 secs **Discharge:** 12 secs
Pressure: 50 psi **Cycles Per Minute:** 2 **Flow Rate:** 200 mL/min

Screened Interval: 80-90 ft bgs **Minimum purge volume:** 0.7 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒ TV 05/26/21
Total Purge Volume Recorded: ☒

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 03/21/24 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** _____

Well ID: MW-19 **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** 89

Initial Static Water Level (feet btoc): 81.00 **Analytical Parameters:** VOCs

Final Water Level (feet btoc): 81.00 **QC Samples Collected:** None

Purge Start Time: 1003 **Ferrous Iron (mg/L):** 0.16 **Allowable Drawdown (ft):** 0.3

Sample Time: 1040 **Controller Settings: Recharge:** 18 secs **Discharge:** 12 secs **Pressure:** 55 psi

Samplers' Signatures: Tayler / Kevin Murphy **Cycles Per Minute:** 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1005	81.01	12.4	7.10	1722	2.67	-25.5	103	300	
1010	81.00	12.5	7.09	1753	2.09	-33.2	32.0	300	
1015	81.00	12.6	7.09	1757	2.14	-33.2	15.3	300	minimum purge volume met
1020	81.01	12.6	7.08	1765	2.11	-32.0	8.24	300	
1025	81.01	12.7	7.08	1761	1.90	-30.3	6.01	300	
1030	81.03	12.7	7.08	1763	1.80	-31.5	4.99	300	
1035	81.00	12.6	7.08	1764	1.91	-32.7	4.44	300	purged ~ 3 gallons
1040	SAMPLE	DONE							

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 18 secs **Discharge:** 12 secs

Pressure: 55 psi **Cycles Per Minute:** 2 **Flow Rate:** 200 mL/min

Screened Interval: 84-94 ft bgs **Minimum purge volume:** 0.7 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ TV 05/26/21

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 03/19/21 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** —

Well ID: MW-20S **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** 88

Initial Static Water Level (feet btoc): 83.33 **Analytical Parameters:** VOCs

Final Water Level (feet btoc): ~~0855~~ TV 03/19 83.37 **QC Samples Collected:** None

Purge Start Time: 0855 **Ferrous Iron (mg/L):** 0.05 **Allowable Drawdown (ft):** 0.3

Sample Time: 0940 **Controller Settings: Recharge:** 11 secs **Discharge:** 9 secs **Pressure:** 50 psi

Samplers' Signatures: [signature] / Ciel Keller **Cycles Per Minute:** 3

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
0900	83.37	11.5	7.09	1056	6.55	114.1	2.34	200	
0905	83.35	12.7	7.08	1063	4.72	54.5	44.4	200	
0910	83.37	12.8	7.07	1061	4.35	24.6	33.7	200	
0915	83.36	12.5	7.06	1068	4.39	12.5	10.6	200	minimum TV 03/19 purge volume met
0920	83.35	12.8	7.06	1069	4.33	2.8	6.53	200	
0925	83.37	12.9	7.06	1071	4.23	-6.7	3.67	200	
0930	83.37	12.9	7.06	1070	4.17	-11.2	2.32	200	
0935	83.37	12.9	7.06	1071	4.13	-16.1	1.52	200	purged about 2 gallons
0940	SAMPLE	TIME							

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 11 secs **Discharge:** 9 secs
Pressure: 40 psi **Cycles Per Minute:** 3 **Flow Rate:** 250 mL/min

Screened Interval: 79.5-89.5 ft bgs **Minimum purge volume:** 0.7 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ TV Simultaneous Purge Allowed: ■

05/26/21

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 03/19/21

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** —

Well ID: MW-20D **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** 124

Initial Static Water Level (feet btoc): 83.00 **Analytical Parameters:** VOCs

Final Water Level (feet btoc): 83.02 **QC Samples Collected:** None

Purge Start Time: 0950 **Ferrous Iron (mg/L):** 0.24 **Allowable Drawdown (ft):** 0.3

Sample Time: 1035 **Controller Settings: Recharge:** 20 secs **Discharge:** 10 secs **Pressure:** 62.5 psi

Samplers' Signatures: T. Kirk / Rhel Keller **Cycles Per Minute:** 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
~~0945~~ 0955	83.02	13.0	6.95	1000	4.56	-32.8	4.15	200	
1000	83.01	13.0	7.10	995	4.50	-31.7	37.7	200	
1005	83.02	13.0	7.09	995	3.73	-35.2	33.2	200	
1010	83.02	13.0	7.09	995	3.47	-36.0	~~3~~ 18.9	200	minimum purge volume met
1015	83.02	13.0	7.09	994	3.26	-35.7	12.3	200	
1020	8302	13.0	7.10	996	3.10	-35.7	8.57	200	
1025	8302	13.0	7.10	996	3.04	-35.7	5.76	200	
1030	83.02	13.0	7.10	996	3.01	-35.7	3.64	200	purged ~ 2.5 gal.
1035	SAME TIME								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 20 **Discharge:** 10
Pressure: 70 **Cycles Per Minute:** 2 **Flow Rate:** 100 mL/min

Screened Interval: 119-129 ft bgs **Minimum purge volume:** 1.0 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ TV Simultaneous Purge Allowed: ■

05/26/21

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 05/16/21 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** —

Well ID: MW-21 **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** 70

Initial Static Water Level (feet btoc): 65.08 **Analytical Parameters:** VOCs

Final Water Level (feet btoc): 65.11 **QC Samples Collected:** None

Purge Start Time: 1605 **Ferrous Iron (mg/L):** 0.00 **Allowable Drawdown (ft):** 0.3

Sample Time: 1650 **Controller Settings: Recharge:** 13 secs **Discharge:** 7 secs **Pressure:** 40 psi (3)

Samplers' Signatures: [signature] **Cycles Per Minute:** _____

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1612	65.11	13.4	7.09	1752	3.60	-97.3	178	100	
1617	65.11	13.7	6.94	1767	3.62	-89.1	63.1	125	
1622	65.11	13.7	6.98	1788	3.53	-87.0	24.0	125	
1627	65.11	13.6	7.01	1796	3.51	-85.7	13.9	125	minimum purge volume met
1632	65.11	13.6	7.04	1804	3.43	-83.4	6.98	125	
1637	65.11	13.6	7.06	1807	3.26	-81.2	3.94	125	
1642	65.11	13.5	7.07	1807	3.16	-79.7	3.16	125	purged about 1 gallon total
1650	SAMPLE TIME								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 13 secs **Discharge:** 7 secs
Pressure: 25 psi **Cycles Per Minute:** 3 **Flow Rate:** 100 mL/min

Screened Interval: 62-72 ft bgs **Minimum purge volume:** 0.6 gallons @ 15min

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ TV
05/26/21

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 03/21/21 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** —

Well ID: MW-22 **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** 72

Initial Static Water Level (feet btoc): 63.61 **Analytical Parameters:** VOCs

Final Water Level (feet btoc): 63.61 **QC Samples Collected:** None

Purge Start Time: 1100 **Ferrous Iron (mg/L):** 0.47 **Allowable Drawdown (ft):** 0.3

Sample Time: 1220 **Controller Settings: Recharge:** 13 secs **Discharge:** 17 secs **Pressure:** 45 psi

Samplers' Signatures: Tom Wilke / Kevin Murphy **Cycles Per Minute:** 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1105	63.61	11.0	7.16	1667	1.57	-32.8	251	60	Increasing Pressure to 45 PSI
1110	63.61	12.2	7.04	1685	1.25	-25.2	309	300	
1115	63.61	12.5	7.05	1690	0.88	-29.3	63.4	300	
1120	63.61	12.4	7.06	1687	1.37	-30.4	48.5	300	Minimum purge volume met
1125	63.61	12.4	7.05	1686	2.13	-29.2	49.9	300	
1130	63.61	12.4	7.06	1688	2.91	-28.1	33.4	300	
1135	63.61	12.4	7.06	1687	3.15	-27.6	22.6	300	
1140	63.61	12.5	7.09	1680	2.80	-27.1	20.6	300	
1145	63.61	12.6	7.07	1686	2.83	-26.8	19.5	300	
1150	63.61	12.5	7.06	1686	2.69	-28.6	13.8	300	
1155	63.61	12.6	7.06	1686	2.69	-28.5	12.5	300	
1200	63.61	12.5	7.05	1686	2.71	-28.6	11.1	300	
1205	63.61	12.5	7.05	1684	2.66	-28.2	9.50	300	
1210	63.61	12.5	7.06	1684	2.65	-28.2	8.44	300	
1215	63.61	12.5	7.05	1684	2.67	-28.3	7.98	300	~ 6 gal purged.
1220	SAMPLE TIME								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 13 secs **Discharge:** 17 secs
Pressure: 35 psi **Cycles Per Minute:** 2 **Flow Rate:** 300 mL/min

Screened Interval: 64-74 ft bgs **Minimum purge volume:** 0.6 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ TV 05/26/21

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/16/2021

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** ____

Well ID: MW-23A **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 210

Initial Static Water Level (feet btoc): NA **Analytical Parameters:** VOCs, Metals, Mercury, Anions, Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): NA **QC Samples Collected:** None

Purge Start Time: 1137 **Ferrous Iron (mg/L):** 1.30 **Allowable Drawdown (ft):** NA

Sample Time: 1405 **Controller Settings: Recharge:** ____ secs **Discharge:** ____ secs **Pressure:** 115 psi

Samplers' Signatures: [signature] **Cycles Per Minute:** ____

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
1153	—	10.8	7.45	1662	6.67	196.8	1.77	30	Upped P to 115 PSI
1208	—	11.4	7.30	1695	4.19	192.7	1.16	50	
1218	—	12.0	7.26	1713	5.63	188.9	1.37	50	min purge met
1227	—	12.1	7.24	1715	5.24	78.8	3.11	50	
1239	—	12.1	7.22	1716	4.64	-17.5	15.7	50	
1255	—	12.1	7.13	1725	3.39	-49.9	40.2	50	
1306	—	12.2	7.11	1731	3.14	-50.9	44.1	50	
1310	—	12.4	7.10	1731	3.14	-49.9	35.6	50	
1316	—	12.6	7.10	1730	3.11	-49.4	30.5	50	
1326	—	12.7	7.09	1738	3.08	-50.4	19.1	50	
1336	—	12.4	7.08	1740	2.98	-51.2	16.4	50	
1354	—	12.9	7.08	1739	2.89	-55.1	11.8	50	
1356	—	12.9	7.08	1738	2.94	-55.3	11.7	50	
1359	—	12.9	7.08	1738	2.87	-55.9	11.6	50	Total purged 0.75 gal

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)

Previous controller settings: Recharge: 120 secs **Discharge:** 20 secs
Pressure: 110 psi **Cycles Per Minute:** 0.4 **Flow Rate:** 50 mL/cycle

Screened Interval: 210-220 ft bgs **Minimum purge volume:** 0.1 gallons
0.379 L

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/16/21

Well ID: MW-23B

Initial Static Water Level (feet btoc): NA

Final Water Level (feet btoc): NA

Purge Start Time: 1510

Sample Time: 1730

Samplers' Signatures:

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 0 **(Vented to)** 0

Purging/Sampling Device: ZIST/Compressed gas **Pump depth (ft bgs):** 250

Analytical Parameters: VOCs, Metals, Mercury, Anions, Alkalinity, Nitrate/Nitrite, TOC, MEEA

QC Samples Collected: None

Ferrous Iron (mg/L): 0.45 **Allowable Drawdown (ft):** NA

Controller Settings: Recharge: _____ secs **Discharge:** _____ secs **Pressure:** _____ psi

Cycles Per Minute: _____

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
1517	—	13.3	7.37	1158	6.77	64.2	4.79	50	flow dramatically decreasing.
1532	—	12.8	7.27	1281	3.18	65.6	7.58	50	flow increasing w/o adjusting settings
1547	—	13.9	7.27	1281	2.13	53.1	14.8	50	
1555	—	14.2	7.28	1282	1.92	23.0	73.2	60	minimum purge met
1603	~~1403~~ MD —	14.3	7.22	1292	1.97	17.9	262	~~50~~ 75	max turb reading @ 372 NTU
1622	—	13.9	7.08	1305	2.83	49.1	213	75	
1635	—	14.1	7.07	1303	3.24	58.7	119	75	
1648	—	14.1	7.07	1301	3.67	65.1	74.4	75	
1700	—	14.2	7.04	1301	4.15	71.1	58.5	75	
1715	—	14.3	7.07	1295	4.11	71.9	46.7	75	
1720	—	14.7	7.07	1312	MD 3.94	73.0	43.0	75	
1725	—	14.6	7.07	1304	4.01	74.0	38.3	75	Total purged 1.2 gal
1730	Sample								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 120 secs **Discharge:** 35 secs
Pressure: 130 psi **Cycles Per Minute:** 0.4 **Flow Rate:** 150 mL/cycle

Screened Interval: 250-260 ft bgs **Minimum purge volume:** 0.2 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/16/2021

Well ID: MW-23C

Initial Static Water Level (feet btoc): NA

Final Water Level (feet btoc): NA

Purge Start Time: 1115 / water @ 1134

Sample Time: 1400

Samplers' Signatures: Emma Pst

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** Ø **(Vented to)** Ø

Purging/Sampling Device: ZIST/Compressed gas **Pump depth (ft bgs):** 348

Analytical Parameters: VOCs, Metals, Mercury, Anions, Alkalinity, Nitrate/Nitrite, TOC, MEEA

QC Samples Collected: None

Ferrous Iron (mg/L): 0.03 **Allowable Drawdown (ft):** NA

Controller Settings: Recharge: 120 secs **Discharge:** 23 secs **Pressure:** 130 psi

Cycles Per Minute: n/a 20.4

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
1155		11.5	7.31	985	5.66	181.6	3.18	50	
1205		12.7	7.12	1010	3.41	159.9	14.6	50	
1217		13.0	7.03	1029	2.01	135.8	29.0	50	
1227		13.0	7.14	1028	1.64	99.1	30.8	50	
1237		12.9	7.23	1026	1.39	41.4	38.5	50	
1302		12.9	7.22	1013	1.44	-63.8	50.1	50	minimum purge met
1312		13.1	7.22	1013	1.72	-45.7	25.2	50	
1317		13.1	7.22	1014	1.99	-34.4	20.2	50	
1329		13.2	7.22	1020	2.18	-13.6	14.8	50	
1335		13.1	7.22	1020	1.98	-7.5	13.5	50	
1340		13.2	7.21	1018	2.30	-2.7	11.4	50	
1344		13.2	7.21	1019	2.37	1.0	11.1	50	
1350		13.4	7.18	1019	2.38	7.8	8.83	50	
1355		13.5	7.20	1017	~~2.7~~ 2.47	7.7	8.65	50	
1359	↓	13.5	7.21	1017	2.37	9.4	7.50	50	purged approx 1 gal

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)

Previous controller settings: Recharge: 120 secs **Discharge:** 23 secs

Pressure: 130 psi **Cycles Per Minute:** 0.4 **Flow Rate:** 50 mL/cycle

Screened Interval: 348-358 ft bgs **Minimum purge volume:** 0.5 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume Date: 3/21/21 OVM: FID ☐ PID ■ In Casing (ppm): (Initial) 0.1 (Vented to) 0.2

Well ID: MW-24 Purging/Sampling Device: Solinst 407 BP/Gas Pump depth (ft bgs): 211

Initial Static Water Level (feet btoc): 185.85 Analytical Parameters: VOCs, Metals, Mercury, Anions, Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 185.80 QC Samples Collected: None

Purge Start Time: 1630 Ferrous Iron (mg/L): 0.00 Allowable Drawdown (ft): 0.3

Sample Time: 1730 Controller Settings: Recharge: 30 secs Discharge: 20 secs Pressure: 145 psi

Samplers' Signatures: B Cameron T. Campbell Cycles Per Minute: ~1.2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1638	184.93	13.1	7.01	1488	7.24	17.0	26.3	180	
1643	184.40	13.2	7.02	1491	6.15	18.0	13.0	180 then 175	~38 min purge, lots of water fluctuation during purge. Min purge met
1700	184.42	13.1	7.05	1500	5.89	19.5	10.9	175	
~~1705~~ 1713	184.92	13.2	7.04	1493	6.04	21.1	6.50	175	
1716	183.81	13.2	7.05	1498	~~6.03~~ 6.44 SC 3/24	21.9	4.60	175	
1719	184.30	13.2	7.05	1498	6.07	22.5	4.70	175	~3 gal purged
1730	Sample								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 20 secs Discharge: 20 secs
Pressure: 145 psi Cycles Per Minute: 1.5 Flow Rate: 200 mL/min

Screened Interval: 209.5-239.5 ft bgs Minimum purge volume: 1.8 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/21/21

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 0 **(Vented to)** 0

Well ID: MW-25A **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 201

Initial Static Water Level (feet btoc): NA **Analytical Parameters:** VOCs, Metals, Mercury, Anions, Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): NA **QC Samples Collected:** None

Purge Start Time: 0915 **Ferrous Iron (mg/L):** 0.02 **Allowable Drawdown (ft):** NA

Sample Time: 1120 **Controller Settings: Recharge:** 120 secs **Discharge:** 24 secs **Pressure:** 110 psi

Samplers' Signatures: Emmarst **Cycles Per Minute:** NA ~0.4

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
0924	—	7.0	7.65	1558	8.22	125.7	18.5	75	
0942	—	8.7	7.51	1691	6.48	116.0	89.1	75	
0954	—	8.7	7.39	1718	5.71	72.5	129.0	75	
1014	—	8.7	7.32	1718	5.92	61.9	45.8	75	
1028	—	8.5	7.31	1720	5.95	66.3	28.5	75	
1040	—	8.8	7.33	1720	5.78	69.0	30.5	75	
1050	—	8.6	7.31	1726	5.68	71.5	23.6	75	
1059	—	9.3	7.32	1718	5.72	71.2	21.2	75	minimum purge met
1108	—	9.6	7.32	1721	5.60	73.9	19.3	75	
1114	—	9.6	7.33	1725	5.47	74.3	18.5	75	
1115	—	9.1	7.33	1728	5.87	76.2	19.3	75	
1120	SAMPLE	—						—	total purged 1 gallon

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 120 secs **Discharge:** 25 secs
Pressure: 115 psi **Cycles Per Minute:** 0.4 **Flow Rate:** 75 mL/cycle
Interval: 201-211 ft bgs **Minimum purge volume:** 0.7 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ TV Simultaneous Purge Allowed: ■

05/26/21

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 03/21/21

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 0 **(Vented to)** 0

Well ID: MW-25B **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 231

Initial Static Water Level (feet btoc): NA **Analytical Parameters:** VOCs, Metals, Mercury, Anions, Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): NA **QC Samples Collected:** None

Purge Start Time: 0912 **Ferrous Iron (mg/L):** 0.06 **Allowable Drawdown (ft):** NA

Sample Time: 1035 **Controller Settings: Recharge:** 120 secs **Discharge:** 30 secs **Pressure:** 120 psi

Samplers' Signatures: [signature] **Cycles Per Minute:** 0.4

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
0920	—	10.4	7.10	1250	3.15	181.9	5.17	160	
0930	—	10.7	7.06	1243	3.00	175.6	13.2	160	
0940	—	11.0	6.99	1270	4.25	175.8	29.7	160	
0950	—	10.9	6.97	1298	4.95	174.4	28.0	160	
1000	—	10.7	6.97	1308	5.23	173.1	22.4	160	
~~1010~~ MD	—	10.8	6.95	1314	5.30	171.4	12.3	160	min purge met @ 1015
1020	—	10.9	6.97	1312	5.38	170.3	8.22	160	
1025	—	10.6	6.97	1323	5.50	170.3	6.79	160	
1030	—	10.8	6.97	1313	5.53	169.4	5.90	160	
1035	Sample								Total purged 1.5 gal.

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 120 secs **Discharge:** 34 secs
Pressure: 120 psi **Cycles Per Minute:** 0.4 **Flow Rate:** 150 mL/cycle

Screened Interval: 231-241 ft bgs **Minimum purge volume:** 0.8 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒ TV 05/26/21
Total Purge Volume Recorded: ☒ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 03/21/21

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 0 **(Vented to)** 0

Well ID: MW-25C **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 308

Initial Static Water Level (feet btoc): NA **Analytical Parameters:** VOCs, Metals, Mercury, Anions, Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): NA **QC Samples Collected:** None

Purge Start Time: 1200 **Ferrous Iron (mg/L):** 0.02 **Allowable Drawdown (ft):** NA

Sample Time: 1400 **Controller Settings: Recharge:** 120 secs **Discharge:** 40 secs **Pressure:** 140 psi

Samplers' Signatures: [signature] **Cycles Per Minute:** ~0.4

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
1210	—	11.2	8.11	746	7.98	158.0	5.62	180	
1220	—	11.9	8.53	749	3.99	147.6	32.2	180	
1230	—	12.0	7.56	900	5.14	158.9	36.5	180	
1240	—	12.3	7.20	937	5.75	148.0	51.9	180	
1250	—	12.1	7.15	948	6.23	156.2	40.7	180	
1300	—	11.8	7.13	949	6.69	155.3	28.3	180	minimum purge met
1307	—	12.0	7.08	950	6.87	153.3	24.7	180	
1314	—	12.0	7.09	951	6.67	151.9	21.6	180	
1325	—	12.1	7.09	949	6.77	150.9	17.4	180	
1330	—	11.9	7.08	952	6.89	149.1	18.7	180	
1335	—	11.9	7.09	953	6.96	146.9	12.21	180	
1345	—	11.9	7.09	955	6.72	146.5	11.4	180	
1350	—	11.7	7.07	950	6.95	146.6	10.6	180	
1355	—	12.1	7.08	952	6.84	145.9	11.4	180	Total purged 2 gal

1400 sample

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)

Previous controller settings: Recharge: 120 secs **Discharge:** 40 secs

Pressure: 140 psi **Cycles Per Minute:** 0.4 **Flow Rate:** 150 mL/cycle

Screened Interval: 307.5-317.5 ft bgs **Minimum purge volume:** 1.1 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/17/21

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** 0.0

Well ID: MW-26A **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 205

Initial Static Water Level (feet btoc): NA **Analytical Parameters:** VOCs, Metals, Mercury, Anions, Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): NA **QC Samples Collected:** None

Purge Start Time: 0920 **Ferrous Iron (mg/L):** 0.02 **Allowable Drawdown (ft):** NA

Sample Time: 1230 **Controller Settings: Recharge:** 180 secs **Discharge:** 20 secs **Pressure:** 125 psi

Samplers' Signatures: [signature] **Cycles Per Minute:** 0.3

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
0922	—	12.9	6.97	1758	5.29	150.3	21.7	75	
0951	—	14.1	6.93	1917	4.40	84.2	94.0	75	
1018	—	14.6	6.93	1916	5.07	93.9	22.9	75	
1053	—	15.4	6.84	1918	5.51	97.0	10.5	75	
1125	—	14.4	6.89	1898	4.44	91.5	7.100	75	
1153	—	15.0	6.91	1907	4.41	92.3	6.71	75	
1215	—	15.5	6.91	1903	4.04	93.0	3.79	75	
1220	—	15.5	6.91	1908	4.38	93.0	3.61	75	Minimum purge met
1225	—	15.5	6.92	1917	4.25	93.1	3.44	75	
1230	Sample								
	Note: while sampling noticed fluctuation in flow, ranging from 35 ml/discharge to 75 ml/discharge								
									Purged total of 1.6 gallons

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 180 secs **Discharge:** 20 secs
Pressure: 120 psi **Cycles Per Minute:** 0.3 **Flow Rate:** 75 mL/cycle
Screened Interval: 205-215 ft bgs **Minimum purge volume:** 1.1 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☒ TV Simultaneous Purge Allowed: ■
05/26/21

WC building MW-20D

Time	Pressure (psi)	ON (s)	OFF (s)	Notes
1350	20	10	120	
1358	20	20	120	

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/17/21

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 0 **(Vented to)** 0

Well ID: MW-26B **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 235

Initial Static Water Level (feet btoc): NA **Analytical Parameters:** VOCs, Metals, Mercury, Anions, Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): NA **QC Samples Collected:** None

Purge Start Time: 0920 **Ferrous Iron (mg/L):** 0.02 **Allowable Drawdown (ft):** NA

Sample Time: 1455 **Controller Settings: Recharge:** 120 secs **Discharge:** 30 secs **Pressure:** 130 psi

Samplers' Signatures: [signature] **Cycles Per Minute:** 0.4

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
0924	—	13.3	7.12	1189	2.76	149.6	0.86	150	increase pressure to 140 psi
0936	—	14.2	7.06	1312	0.77	150.5	0.94	150	
0950	Breakthrough. Begin rebuilding column. Purged approx 0.75 gallons.								
1432	—	14.2	6.96	1877	1.54	91.6	3.70	125	reached minimum purge
1437	—	14.3	6.90	1863	1.73	91.4	2.48	125	
1443	—	14.3	6.91	1862	2.75	92.5	3.57	125	
1448	—	14.7	6.90	1356	2.90	93.8	3.42	125	
1452	—	14.4	6.91	1359	2.81	93.7	1.16	125	Total purged 1.2 gal
1455	Sample								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 120 secs **Discharge:** 25 secs
Pressure: 140 psi **Cycles Per Minute:** 0.4 **Flow Rate:** <240 mL/cycle

Screened Interval: 235-245 ft bgs **Minimum purge volume:** 0.8 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ TV Simultaneous Purge Allowed: ■
05/26/21

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/18/21 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** Ø **(Vented to)** Ø

Well ID: MW-26C **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 315

Initial Static Water Level (feet btoc): NA **Analytical Parameters:** VOCs, 1,4-Dioxane, Metals, Mercury, Anions, Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): NA **QC Samples Collected:** None

Purge Start Time: 1240 **Ferrous Iron (mg/L):** 0.80 **Allowable Drawdown (ft):** NA

Sample Time: 1400 **Controller Settings: Recharge:** ~~150~~ 120 SR secs **Discharge:** 45 secs **Pressure:** 150 psi

Samplers' Signatures: Emma Pfaff **Cycles Per Minute:** nA 0.4

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
1255	—	16.3	6.92	980	2.89	205.1	7.30	250	
1303	—	16.1	7.00	949	2.68	175.9	18.9	250	
1314	—	16.1	7.02	938	2.69	160.0	11.8	250	
1323	—	15.7	7.03	931	2.71	152.3	8.26	250	
1332	—	15.8	7.05	926	2.81	145.9	28.70	250	
1340	—	15.6	7.05	934	2.91	141.0	5.49	250	minimum purge met
1345	—	15.6	7.06	954	2.70	135.3	5.47	250	
1350	—	15.7	7.05	942	2.60	133.6	4.21	250	
1356	—	15.9	7.06	943	2.61	132.2	3.51	250	total purge 2.1 gallons
1400	SAMPLE	—							

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: _____ secs **Discharge:** _____ secs
Pressure: _____ psi **Cycles Per Minute:** _____ **Flow Rate:** <640 mL/cycle

Screened Interval: 315-325 ft bgs **Minimum purge volume:** 1.1 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ TV Simultaneous Purge Allowed: ■
05/26/21

WC Build on 3/17/20

Time	Pressure	On	OFF	Notes
~~1440~~	20	10	120	
1445	20	20	120	
1454	20	30	120	
1503	30	10	120	
1505	30	20	120	

Water drawing back during recharge
pull pump + fix check valve

Continuing on 3/18/20

0923	50 ~~40~~	10	120	
0926	50	20	120	
0945	50	30	120	
0948	60	10	120	
0952	60	20	120	
1004	60	30	120	
1014	70	10	120	
1022	70	20	120	
1029	70	30	120	
1035	80	10	120	
1048	80	20	120	
1057	80	30	120	
1102	90	10	120	
1109	90	20	120	
1126	90	30	120	
1132	100	10	120	
1136	100	20	120	
1143	100	30	120	
1149	110	10	120	
1151	110	20	120	
1209	110	30	120	
1214	120	10	120	
1219	120	20	120	
1226	120	30	120	

Water. Dial in settings for flow
150 psi, 120 off, 45s on = 250 ml discharge

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/18/21

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 0 **(Vented to)** 0

Well ID: MW-26D **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 348

Initial Static Water Level (feet btoc): NA **Analytical Parameters:** VOCs, 1,4-Dioxane, Metals, Mercury, Anions, Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): NA **QC Samples Collected:** None

Purge Start Time: 1300 **Ferrous Iron (mg/L):** 0.20 **Allowable Drawdown (ft):** NA

Sample Time: 1410 **Controller Settings: Recharge:** 120 secs **Discharge:** 40 secs **Pressure:** 150 psi

Samplers' Signatures: [signature] **Cycles Per Minute:** ~0.4

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
1310	—	16.4	7.21	1027	4.09	170.7	12.8	200	
~~1315~~ 1325	—	15.9	7.29	1015	9.37	97.3	4.95	200	flow fluctuating inbetween 200 & 225
1340	—	15.8	7.29	1016	3.19	32.0	3.42	225	
1350	—	15.0	7.30	1019	3.12	14.3	2.03	200	
1400	—	15.0	7.30	1023	3.32	6.2	1.46	200	minimum purge met
1405	—	15.8	7.30	1023	3.12	5.6	1.79	200	
1410	Sample								1.75 total purged

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 120 secs **Discharge:** 25 secs
Pressure: 180 psi **Cycles Per Minute:** 0.4 **Flow Rate:** <500 mL/cycle

Screened Interval: 348-358 ft bgs **Minimum purge volume:** 1.2 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑ Simultaneous Purge Allowed: ■

3/18/2021

MM-26D WC Build

Time	Pressure	ON	OFF	Notes
0929	50 (psi)	10(s)	120(s)	
0934	50 (psi)	20 (s)	120 (s)	
0935	50 (psi)	30 (s)	120 (s)	
0940	60 (psi)	10 (s)	120 (s)	No bubbles
0943	100 (psi)	20 (s)	120 (s)	
0948	60 (psi)	30 (s)	120 (s)	
0952	70 (psi)	10 (s)	120 (s)	
1001	70 (psi)	20 (s)	120 (s)	
1004	70 (psi)	30 (s)	120 (s)	
1007	80 (psi)	10 (s)	120 (s)	
1020	80 (psi)	20 (s)	120 (s)	
1030	80 (psi)	30 (s)	120(s)	
1047	90 (psi)	10 (s)	120(s)	
1107	90 (psi)	20 (s)	120 (s)	
1123	90 (psi)	30 (s)	120 (s)	
1131	100 (psi)	10 (s)	120 (s)	
1136	100 (psi)	20 (s)	120 (s)	
1145	100 (psi)	30 (s)	120 (s)	
1148	110 (psi)	10 (s)	120 (s)	
1201	110 (psi)	20 (s)	120 (s)	
1213	110 psi)	30 (s)	120(s)	
1216	120 (psi)	10 (s)	120(s)	
1218	120 (psi)	20 (s)	120 (s)	water is moving up and down the line.
1225	120 (psi)	30 (s)	120 (s)	couldn't move water bubble
1228	130 (psi)	10 (s)	120 (s)	
1234	130 (psi)	20 (s)	120 (s)	
1237	130 (psi)	30 (s)	120 (s)	
1239	140 (psi)	10 (s)	120 (s)	
1242	140 (psi)	20 (s)	120 (s)	got water

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume Date: 2/16/21

OVM: FID ☐ PID ■ In Casing (ppm): (Initial) 0.0 (Vented to) 0.0

Well ID: MW-27 Purging/Sampling Device: Compressed gas Pump depth (ft bgs): 210

Initial Static Water Level (feet btoc): 188.79 Analytical Parameters: VOCs, metals, anions, alkalinity, TN, TOC, MEA

Final Water Level (feet btoc): 188.8 QC Samples Collected: None

Purge Start Time: 1636 Ferrous Iron (mg/L): 0.00 Allowable Drawdown (ft): NA

Sample Time: 1720 Controller Settings: Recharge: 40 secs Discharge: 25 secs Pressure: 146 psi

Samplers' Signatures: Jenn Campbell Cycles Per Minute: ~0.9

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1643	188.81	16.1	6.99	2119	4.44	-27.3	8.78	175	
1649	188.79	15.3	7.05	2100	4.74	-9.7	10.3	175	
1656	188.8	15.5	7.06	2110	4.79	14.1	3.67	175	
1707	188.81	15.1	7.05	2091	4.62	34.6	0.66	175	
1712	188.8	15.1	7.06	2093	4.81	42.9	0.86	175	
1716	188.8	15.1	7.05	2087	4.76	46.9	0.71	175	min purge met ~2 gal purged
1720	SAMPLE								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 20 secs Discharge: 40 secs
Pressure: 140 psi Cycles Per Minute: 1 Flow Rate: 175 mL/min

Screened Interval: 200-220 ft bgs Minimum purge volume: 1.8 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☐

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/21/24

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** 0.0

Well ID: MW-28 **Purging/Sampling Device:** Compressed gas **Pump depth (ft bgs):** 200

Initial Static Water Level (feet btoc): 187.61 **Analytical Parameters:** VOCs, metals, mercury, anions, alkalinity, nitrate, TDS, methane

Final Water Level (feet btoc): 187.37 **QC Samples Collected:** None

Purge Start Time: 1415 **Ferrous Iron (mg/L):** 0.12 **Allowable Drawdown (ft):** NA

Sample Time: 1540 **Controller Settings: Recharge:** 45 secs **Discharge:** 15 secs **Pressure:** 140 psi

Samplers' Signatures: Conor Campbell **Cycles Per Minute:** 1

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1430	water is dark brown + extremely turbid. Some drawdown initially likley due to sediment								
	in check valve. Cable was loose, pulled cable, pump no longer attached. Will reinstall								
	cable after sample.								
1452	187.37	12.6	6.95	1718	7.26	1.5	47.2	150	water level reference point changed
1505	187.37	12.6	6.97	1716	6.98	9.1	12.7	150	
1510	187.38	13.2	6.97	1702	6.91	11.2	10.1	150	Min purge met
1515	187.39	13.1	6.97	1702	7.13	13.0	11.8	150	YSI turned off
1520	187.39	13.1	6.96	1702	7.16	14.3	10.6	150	
1525	187.37	13.2	6.96	1701	6.90	15.5	5.84	150	
1528	187.37	13.1	6.99	1705	6.84	16.3	6.71	150	
1531	187.37	12.9	6.97	1703	7.16	17.2	4.11	150	~3 gal purged
1540	SAMPLE								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 20 secs **Discharge:** 40 secs
Pressure: 145 psi **Cycles Per Minute:** 1 **Flow Rate:** 175 mL/min

Screened Interval: 190-210 ft bgs **Minimum purge volume:** 1.8 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☐

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/9/21

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 6.0 **(Vented to)** 0.0

Well ID: MW-29A **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 128

Initial Static Water Level (feet btoc): NA **Analytical Parameters:** VOCs, Metals, Mercury, Anions, Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): NA **QC Samples Collected:** None

Purge Start Time: 0900 **Ferrous Iron (mg/L):** 0.00 **Allowable Drawdown (ft):** 0.3

Sample Time: 1030 **Controller Settings: Recharge:** 120 secs **Discharge:** 8 secs **Pressure:** 80 psi

Samplers' Signatures: B Carreon **Cycles Per Minute:** ~0.5

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
0910	NA	8.8	7.07	1191	6.16	230.1	2.44	50	~1890 mL @ 24 mL/min ~80 min purge
0930	NA	9.5	7.17	1177	~~6~~ 5.83	199.0	0.96	50	
1000	NA	9.6	7.17	1175	5.93	175.6	0.48	50	
1010	NA	9.8	7.17	1183	5.64	166.9	1.07	50	
1015	NA	10.0	7.17	1186	5.54	167.1	0.35	50	
1020	NA	10.1	7.17	1190	5.42	164.7	0.35	50	Min purge met, ~0.6 gal purged.
1030	Sample								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)

Previous controller settings: Recharge: 120 secs **Discharge:** 20 secs

Pressure: 80 psi **Cycles Per Minute:** 0.5 **Flow Rate:** 40 mL/cycle

Screened Interval: 120-130 ft bgs **Minimum purge volume:** 0.5 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/19/21 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** 0.0

Well ID: MW-29B **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 190

Initial Static Water Level (feet btoc): NA **Analytical Parameters:** VOCs, Metals, Mercury, Anions, Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): NA **QC Samples Collected:** None

Purge Start Time: 0900 **Ferrous Iron (mg/L):** 0.00 **Allowable Drawdown (ft):** NA

Sample Time: 1115 **Controller Settings: Recharge:** 100 secs **Discharge:** 20 secs **Pressure:** 95 psi

Samplers' Signatures: Anna Campbell **Cycles Per Minute:** 0.5

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
0910	NA	9.0°C	7.28	1313	5.21	223.6	7.01	100	
0932	NA	10.0°C	7.14	1264	3.33	194.3	38.9	100	
0948	NA	10.1	7.09	1282	4.98	184.3	out of range	100	issues calibrating upper range of turbidity
0953	NA	10.0	7.09	1290	4.61	181.4	out of range	100	min purge vol met
1011	NA	10.1	7.07	1304	4.91	130.3	77.5	100	
1021	NA	10.2	7.08	1299	5.33	106.1	42.1	100	
1032	NA	10.3	7.08	1295	4.75	160.4	25.9	100	
1042	NA	10.5	7.08	1291	4.75	156.4	15.3	100	
1047	NA	10.5	7.08	1294	4.76	152.5	11.5	100	
1053	NA	10.6	7.08	1294	4.92	149.9	11.1	100	
1058	NA	10.6	7.08	1293	5.00	147.7	9.91	100	
1103	NA	10.7	7.07	1294	5.01	145.9	9.17	100	
1107	NA	10.9	7.08	1292	4.75	143.8	9.53	100	
1115	SAMPLE								~1.6 gal purged

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 100 secs **Discharge:** 35 secs
Pressure: 95 psi **Cycles Per Minute:** 0.5 **Flow Rate:** 100 mL/cycle
Interval: 190-200 ft bgs **Minimum purge volume:** 0.7 gallons

purge time = ~1hr

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/19/21

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** 0.0

Well ID: MW-29C **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 230

Initial Static Water Level (feet btoc): NA **Analytical Parameters:** VOCs, Metals, Mercury, Anions, Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): NA **QC Samples Collected:** None

Purge Start Time: ~~1125~~ IC 3/19 1500 **Ferrous Iron (mg/L):** 0.00 **Allowable Drawdown (ft):** NA

Sample Time: 1700 **Controller Settings: Recharge:** 120 secs **Discharge:** 40 secs **Pressure:** 105 psi

Samplers' Signatures: B Corcoran **Cycles Per Minute:** ~0.4

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
1150	Initial drawback attempt	continued loss of gw entrainment. Will pump				pull pump, clean, rebuild, and			~~Some drawback during initial purge.~~ IC 3/19/21
1221	Started	rebuilding.							
1450	Finished	building WC.							
1519	NA	13.3°C	7.27	7725	3.91	115.4	35.2	190	
1530	NA	12.3	7.11	3167	2.96	89.4	25.7	190	
1540	NA	12.1	7.09	2470	3.20	72.4	41.8	190	
1558	NA	12.5	7.15	1687	5.65	56.3	30.3	190	min purge met
1603	NA	12.6	7.13	1544	4.08	53.1	26.3	190	
1623	NA	12.2	7.09	1301	3.99	44.7	16.9	190	
1639	NA	12.5	7.11	1222	4.29	44.2	15.2	190	
1643	NA	12.3	6.93	1219	4.40	45.5	11.2	190	
1649	NA	12.3	6.90	1201	4.21	45.3	9.23	190	
1654	NA	12.3	6.98	1201	4.31	44.9	9.17	190	
1659	NA	12.3	~~7.14~~ IC 3/19 6.97	1197	4.18	44.7	7.34	190	~2.5 gal purged

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)

Previous controller settings: Recharge: 120 secs **Discharge:** 40 secs

Pressure: 110 psi **Cycles Per Minute:** 0.4 **Flow Rate:** 225 mL/cycle ~320 mL/cycle max

Screened Interval: 230-240 ft bgs **Minimum purge volume:** 0.8 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume Date: 3/16/21

OVM: FID ☐ PID ■ In Casing (ppm): (Initial) 0.0 (Vented to) 0.0

Well ID: MW-30RA Purging/Sampling Device: Compressed gas Pump depth (ft bgs): 240

Initial Static Water Level (feet btoc): 226.78 Analytical Parameters: VOCs, Metals, Mercury, Anions, Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 226.79 QC Samples Collected: Field Duplicate FD05-GW 031621 0800

Purge Start Time: 1115 Ferrous Iron (mg/L): 0.00 Allowable Drawdown (ft): 0.3

Sample Time: 1205 Controller Settings: Recharge: 25 secs Discharge: 20 secs Pressure: 145 psi

Samplers' Signatures: B Carreon Cycles Per Minute: 0.75

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1132	226.78	13.7	7.05	1853	4.91	112.3		250	
1139	226.8	13.5	7.04	1849	5.07	103.1	0.83	250	
1144	226.73	13.5	7.04	1848	4.90	98.3	0.62	250	
1150	226.85	13.5	7.03	1848	4.99	94.1	0.66	250	
1155	226.79	13.5	7.03	1847	4.93	91.2	3.09	250	
1200	226.79	13.5	7.03	1847	4.99	89.3	1.14	250	~2.2 gals purged. Min purge met.
1205	Sample								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: ~~20~~ secs Discharge: 20 secs

Pressure: 180 psi Cycles Per Minute: 1.5 Flow Rate: 225 mL/min

Screened Interval: 240-250 ft bgs Minimum purge volume: 1.9 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/16/21

Well ID: MW-30RB

Initial Static Water Level (feet btoc): 229.03

Final Water Level (feet btoc): 229.03

Purge Start Time: 1140

Sample Time: 1240

Samplers' Signatures: B Carreon BSC

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** 0.0

Purging/Sampling Device: Compressed gas **Pump depth (ft bgs):** 280

Analytical Parameters: VOCs, Metals, Mercury, Anions, Alkalinity, Nitrate/Nitrite, TOC, MEEA

QC Samples Collected: None

Ferrous Iron (mg/L): 0.00 **Allowable Drawdown (ft):** 0.3

Controller Settings: Recharge: 25 secs **Discharge:** 30 secs **Pressure:** 160 psi

Cycles Per Minute: 1.1

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1150	229.03	13.1	7.03	1557	5.10	156.4	42.8	225	
1205	229.03	13.2	7.06	1552	5.08	139.3	8.29	360 225	
1221	229.03	13.2	7.08	1556	5.14	122.5	3.12	225	
1227	229.04	13.2	7.05	1557	5.03	118.5	2.27	225	
1231	229.04	13.1	7.05	1557	5.29	116.6	1.96	225	
1235	229.03	13.1	7.06	1556	5.14	115.3	1.68	225	Min purge met. ~2.5 gal purged.
1240	Sample								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 20 ~~min~~ sec **Discharge:** 20 secs

Pressure: 200 psi **Cycles Per Minute:** 1.5 **Flow Rate:** 225 mL/min

Screened Interval: 280-290 ft bgs **Minimum purge volume:** 2.2 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/16/21 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** 0.0

Well ID: MW-30C **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 317

Initial Static Water Level (feet btoc): NA **Analytical Parameters:** VOCs, Metals, Mercury, Anions, Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): NA **QC Samples Collected:** None

Purge Start Time: 1305 **Ferrous Iron (mg/L):** 0.05 **Allowable Drawdown (ft):** NA

Sample Time: 1525 **Controller Settings: Recharge:** 240 secs **Discharge:** 60 secs **Pressure:** 145 psi

Samplers' Signatures: B Carreon BSC **Cycles Per Minute:** 0.2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
IC 3/16/21 1418 1318	NM	13.4	7.51	1561	1.08	98.6	26.3	350	
1334	NM	11.6	7.42	1552	0.88	19.3	14.8	175 125 SC	3/16/21
1346	NM	12.9	11.16	5972	0.70	19.4	67.2	200	
1357	NM	13.3	12.33	16033	0.60	-39.9	147	225	
1408	NM	13.2	11.75	5675	0.84	-78.4	262	225	purge water
1424	NM	13.0	7.81	1870	1.09	-47.2	73.5	225	started to draw back slightly
1439	NM	12.8	7.29	1677	1.22	-24.6	25.2	225	
1449	NM	12.2	7.26	1646	1.37	-20.8	13.8	225	
1501	NM	13.0	7.22	1654	1.64	-18.1	12.8	225	min purge met
1506	NM	12.6	7.21	1646	1.59	-17.3	10.2	225	
1512	NM	13.4	7.22	1675	1.52	-16.1	9.14	225	
1517	NM	13.3	7.20	1675	1.61	-16.5	9.91	225	
1522	NM	12.8	7.19	1641	1.67	-16.5	8.78	225	
1525	SAMPLE								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 240 sec **Discharge:** 70 secs
Pressure: 150 psi **Cycles Per Minute:** 0.2 **Flow Rate:** 150 mL/cycle

Screened Interval: 317-327 ft bgs **Minimum purge volume:** 1.1 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** ~~3/18/21~~ 3/19/21

OVM: FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** 0.0

Well ID: MW-31A

Purging/Sampling Device: ZIST/Compressed gas **Pump depth (ft bgs):** 138

Initial Static Water Level (feet btoc): NA TV 06/01

Analytical Parameters: VOCs, Metals, Mercury, Anions, Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): NA TV 06/01

QC Samples Collected: None

Purge Start Time: ~~IC 3/18 0820~~ 1610

Ferrous Iron (mg/L): 0.04 **Allowable Drawdown (ft):** 0.3

Sample Time: 1705

Controller Settings: Recharge: 120 secs **Discharge:** 15 secs **Pressure:** 80 psi

Samplers' Signatures: [signature]

Cycles Per Minute: ~0.4

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
0935	Breakthrough occurred. Pulled pump. Water level at 133.40 ft bgs, 152.40 ft below TOC.								
	adjusted pump depth to ~~IC 3/18~~ 143 ft bgs								
1342	started building water column								
1610	finished building water column					started	purge		
1622	NA	13.3	7.92	1329	3.79	83.4	17.3	50mL	
1635	NA	13.4	7.18	1279	4.75	76.1	45	50mL	
1647	NA	13.1	7.13	1270	5.61	76.1	14.6	50mL	
1657	NA	12.8	7.12	1270	5.78	75.5	8.68	50mL	
1658	NA	12.5	7.11	1272	6.09	75.2	5.40	50mL	min purge met
1701	NA	12.7	7.14	1267	6.14	75.2	8.18	50mL	~0.5 gal purged
1705	SAMPLE								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 120 secs **Discharge:** 20 secs
Pressure: 85 psi **Cycles Per Minute:** 0.4 **Flow Rate:** 50 mL/cycle

Screened Interval: 138-148 ft bgs **Minimum purge volume:** 0.5 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/18/21 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** 0.0

Well ID: MW-31B **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 190

Initial Static Water Level (feet btoc): NA **Analytical Parameters:** VOCs, Metals, Mercury, Anions, Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): NA **QC Samples Collected:** None

Purge Start Time: 0930 **Ferrous Iron (mg/L):** 0.00 **Allowable Drawdown (ft):** NA

Sample Time: 1100 **Controller Settings: Recharge:** 120 secs **Discharge:** 30 secs **Pressure:** 90 psi

Samplers' Signatures: Jonna Campbell **Cycles Per Minute:** ~0.4

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
0940	NA	~~10.4~~ DC 3/18 10.3	7.21	1110	8.63	138.4	13.0	175	
0950	NA	10.3	7.08	1121	6.77	114.5	125	180	
1002	NA	10.6	7.12	1120	7.52	114.4	40.6	180	min purge met
1011	NA	10.6	7.07	1121	8.38	112.3	20.4	200	↓ discharge time
1024	NA	10.5	7.07	1123	7.55	108.8	8.87	180	
1030	NA	10.6	7.08	1123	7.81	107.0	11.5	180	
1035	NA	10.6	7.08	1122	7.68	105.6	5.77	180	
1038	NA	10.6	7.07	1123	7.61	104.8	5.15	175	
1041	NA	10.7	7.08	1122	7.52	103.9	3.98	175	~1.5 gal purged
1100	SAMPLE								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 120 secs **Discharge:** 40 secs
Pressure: 100 psi **Cycles Per Minute:** 0.4 **Flow Rate:** 180 mL/cycle
Screened Interval: 190-200 ft bgs **Minimum purge volume:** 0.7 gallons max = 250 mL/cycle

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☐
Total Purge Volume Recorded: ☐ TV Simultaneous Purge Allowed: ■

05/26/21

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/18/21 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** 0.0

Well ID: MW-31C **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 228

Initial Static Water Level (feet btoc): NA **Analytical Parameters:** VOCs, Metals, Mercury, Anions, Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): NA **QC Samples Collected:** None

Purge Start Time: 0940 **Ferrous Iron (mg/L):** 0.48 **Allowable Drawdown (ft):** NA

Sample Time: 1200 **Controller Settings: Recharge:** 120 secs **Discharge:** 40 secs **Pressure:** 100 psi

Samplers' Signatures: Jenna Campbell **Cycles Per Minute:** ~0.4

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
0950	NA	10.0	7.26	791	3.59	143.6	4.21	170	
1026	NA	11.0	7.22	801	0.76	-73.6	166	150	
1043	NA	11.0	7.22	799	0.75	-73.8	92.4	150	
1058	NA	11.0	7.22	797	0.73	-73.9	53.6	150	~min purge vol met
1108	NA	11.0	7.21	798	0.78	-73.2	30.2	150	
1126	NA	11.0	7.21	796	0.72	-72.5	18.2	150	
1136	NA	11.1	7.22	796	0.77	-72.7	10.5	150	
~~1140~~ 1140	NA	11.1	7.22	796	0.77	-73.0	8.44	150	
1143	NA	11.2	7.23	796	0.85	-72.8	9.16	150	
1146	NA	11.1	7.23	797	0.82	-72.9	7.81	150	~2 gal purged
1200	SAMPLE								

IC 3/18

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 120 secs **Discharge:** 48 secs
Pressure: 105 psi **Cycles Per Minute:** 0.4 **Flow Rate:** 170 mL/cycle

Screened Interval: 228-238 ft bgs **Minimum purge volume:** 0.8 gallons ~350mL/vol x 3 = ~850 min purge

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/17/21 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 NM 3/17/21 **(Vented to)** 0.0 NM 3/17/21

Well ID: MW-32A **Purging/Sampling Device:** Solinist/Compressed gas **Pump depth (ft bgs):** 119

Initial Static Water Level (feet btoc): 82.65 **Analytical Parameters:** VOCs, Metals, Mercury, Anions, Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 82.65 **QC Samples Collected:** MS/MSD, Field Duplicate FD06-GW031721 0800

Purge Start Time: 1430 **Ferrous Iron (mg/L):** 0.03 **Allowable Drawdown (ft):** 0.3

Sample Time: 1600 **Controller Settings: Recharge:** 20 secs **Discharge:** 15 secs **Pressure:** 80 psi

Samplers' Signatures: [signature] **Cycles Per Minute:** ~1.7

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1434	82.65	13.0	7.29	1253	7.90	81.0	748	200	Some drawback occurs during recharge.
1454	82.65	13.1	7.27	550	7.95	91.7	90.3	200	
15 1308	82.62	13.1	7.22	1152	6.49	94.7	54.6	200	min purge met
IC 3/17/21 1518	82.67	13.5	7.37	640	7.49	99.8	29.1	200	
1525	82.62	13.2	7.22	1156	7.06	101.2	18.9	100	
1535	82.60	13.4	7.26	1167	7.03	105.5	9.16	100	
1545	82.64	13.4	7.29	1125	7.01	109.6	8.68	200	
1548	82.62	13.2	7.27	1128	7.06	110.9	7.06	75	~3.5 gal purged
1600	SAMPLE								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: **Recharge:** 20 secs **Discharge:** 10 secs
Pressure: 92 psi **Cycles Per Minute:** 2 **Flow Rate:** 200 mL/min

Screened Interval: 114-124 ft bgs **Minimum purge volume:** 1.0 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☐ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☐ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/17/21 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** NM & 3/17/21 0.0 **(Vented to)** NM 3/17/21 0.0

Well ID: MW-32B **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 170

Initial Static Water Level (feet btoc): NA **Analytical Parameters:** VOCs, Metals, Mercury, Anions, Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): NA **QC Samples Collected:** None

Purge Start Time: 1230 **Ferrous Iron (mg/L):** 0.02 **Allowable Drawdown (ft):** 0.3

Sample Time: 1335 **Controller Settings: Recharge:** 180 secs **Discharge:** 25 secs **Pressure:** 80 psi

Samplers' Signatures: B Carreon **Cycles Per Minute:** 0.3

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
1240	NA	13.2	7.42	899	4.10	-141.7	12.7	180	
1255	NA	13.2	7.27	926	5.45	-44.9	NM	180	
1305	NA	13.2	7.26	931	5.96	-20.9	3.75	180	min purge met
1310	NA	12.7	7.27	925	6.28	-6.4	3.40	180	
1315	NA	13.1	7.25	935	5.78	5.5	NM	180	
1325	NA	13.2	7.24	936	6.22	21.4	NM	180	
1328	NA	13.3	7.23	940	6.22	25.8	3.14	180	
1331	NA	13.0	7.26	939	6.50	29.7	2.74	180	
1334	NA	12.7	7.26	930	6.67	34.8	2.88	180	~1 gal purged

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 180 secs **Discharge:** 25 secs
Pressure: 85 psi **Cycles Per Minute:** 0.4 **Flow Rate:** 160 mL/cycle

Screened Interval: 170-180 ft bgs **Minimum purge volume:** 0.6 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/17/21 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** NM **(Vented to)** NM

Well ID: MW-32C **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 260

Initial Static Water Level (feet btoc): NA **Analytical Parameters:** VOCs, Metals, Mercury, Anions, Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): NA **QC Samples Collected:** None

Purge Start Time: 1230 **Ferrous Iron (mg/L):** 0.19 **Allowable Drawdown (ft):** 0.3

Sample Time: ~~1230~~ IC 3/17/21 1420 **Controller Settings: Recharge:** 180 secs **Discharge:** 20 secs **Pressure:** 110 psi

Samplers' Signatures: [signature] **Cycles Per Minute:**

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
1233	NA	12.6	7.72	1039	1.41	-154.9	1.01	175	
1254	NA	12.1	7.42	1069	5.41	-92.7	6.90	150	moisture in air line
1304	NA	12.3	7.39	1068	4.33	-80.7	2.75	150	
1315	NA	12.4	7.35	1064	4.46	-67.1	1.46	NM	
1325	NA	12.5	7.32	1066	5.30	-51.4	0.91	150	min purge vol met
1332	NA	12.4	7.35	1071	5.61	-46.1	1.03	150	
1357	NA	12.4	7.31	1067	7.35	-26.1	0.58	150	
1400	NA	12.2	7.30	1068	6.21	-24.5	0.54	150	
1405	NA	12.6	7.29	1073	6.06	-21.3	0.51	175	
1411	NA	12.8	7.31	1068	~~8.08~~ IC 6.08	-18.4	0.56	200	~1.6 gal purged
1415	SAMPLE								
20	IC 3/17/21								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)

Previous controller settings: Recharge: 180 secs **Discharge:** 20 secs
Pressure: 110 psi **Cycles Per Minute:** 0.3 **Flow Rate:** 180 mL/cycle

Screened Interval: 260-270 ft bgs **Minimum purge volume:** 0.9 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ TV Simultaneous Purge Allowed: ■
05/26/21

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/19/21 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0 **(Vented to)** 0

Well ID: MW-34A **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 140

Initial Static Water Level (feet btoc): N/A **Analytical Parameters:** VOCs, Metals, Mercury, Anions, Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): N/A **QC Samples Collected:** None

Purge Start Time: 0935 **Ferrous Iron (mg/L):** 0.01 **Allowable Drawdown (ft):** 0.3

Sample Time: 1110 **Controller Settings: Recharge:** 120 secs **Discharge:** ~~15~~ 20 secs **Pressure:** 90 psi

Samplers' Signatures: [signature] **Cycles Per Minute:** ~0.4

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
0943	—	10.6	6.27	1103	6.36	167.2	0.80	50	
1000	—	11.3	7.25	1122	5.65	158.8	9.08	50	
1015	—	11.5	7.21	1127	5.50	150.7	12.9	45	upped discharge time to 20s
1030	—	12.0	7.19	1128	6.01	142.8	4.17	50	
1045	—	12.3	7.19	1129	5.79	137.7	0.92	50	
1100	—	12.7	7.19	1128	6.08	133.0	2.37	50	minimum purge met
1105	—	12.9	7.19	1131	6.00	131.1	1.04	50	
1110	Sample								
									Total purged 0.75 gal

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 120 secs **Discharge:** 15 secs
Pressure: 95 psi **Cycles Per Minute:** _____ **Flow Rate:** _____ mL/cycle

Screened Interval: 140-150 ft bgs **Minimum purge volume:** 0.5 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ Simultaneous Purge Allowed: ■

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/19/21 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0 **(Vented to)** 0

Well ID: MW-34B **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 175

Initial Static Water Level (feet btoc): — **Analytical Parameters:** VOCs, Metals, Mercury, Anions, Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): — **QC Samples Collected:** None

Purge Start Time: 1340 **Ferrous Iron (mg/L):** 0.04 **Allowable Drawdown (ft):** 0.3

Sample Time: 1530 **Controller Settings: Recharge:** 120 secs **Discharge:** 20 secs **Pressure:** 90 psi

Samplers' Signatures: [signature] **Cycles Per Minute:** ~0.4

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
1348	—	15.6	7.23	1109	1.27	46.3	60.7	55	there is some fall back w/ water
1400	—	15.8	7.18	1087	1.75	16.8	31.0	55	
1415	—	15.4	7.10	1080	2.48	34.5	14.4	55	
1430	—	15.6	7.11	1081	2.92	53.0	7.59	55	
1445	—	16.0	7.15	1088	3.21	50.2	4.68	55	
1500	—	16.1	7.10	1084	3.38	54.9	5.40	55	
1515	—	16.3	7.12	1082	3.52	28.3	3.16	55	minimum purge met
1520	—	16.7	7.12	1084	3.68	27.9	2.93	55	
1525	—	16.7	7.14	1083	3.50	28.3	3.69	55	
1530	Sample								
									Total purged 0.75 gal

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 120 secs **Discharge:** 35 secs
Pressure: 95 psi **Cycles Per Minute:** 0.4 **Flow Rate:** 120 mL/cycle

Screened Interval: 175-185 ft bgs **Minimum purge volume:** 0.6 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☑ Minimum Purge Met and Notated: ☑
Total Purge Volume Recorded: ☑ Simultaneous Purge Allowed: ■

Water Column building for MW-34B

Time	Pressure (PSI)	ON (s)	OFF (s)	Notes
1217	30	10	120	
1226	30	20	120	
1235	30	30	120	
1244	40	10	120	
1254	40	20	120	
1304	40	30	120	water is coming up the line but shutting back
1310	50	10	120	

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/19/21 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** Ø **(Vented to)** Ø

Well ID: MW-34C **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 250

Initial Static Water Level (feet btoc): — **Analytical Parameters:** VOCs, Metals, Mercury, Anions, Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): — **QC Samples Collected:** None

Purge Start Time: 1210 **Ferrous Iron (mg/L):** 0.00 **Allowable Drawdown (ft):** 0.3

Sample Time: 1340 **Controller Settings: Recharge:** 120 secs **Discharge:** 30 secs **Pressure:** 110 psi

Samplers' Signatures: EmmaRH **Cycles Per Minute:** NA 0.4

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
1224	—	14.1	7.38	730	2.65	123.1	96.0	225	
1229	—	13.9	7.33	728	4.87	114.2	186	225	
1242	—	13.8	7.36	716	3.71	98.8	28.0	225	
1247	—	13.9	7.36	710	3.50	92.8	34.4	225	
1255	—	13.8	7.36	715	3.34	85.7	29.0	225	minimum purge met
1300	—	13.9	7.37	714	3.29	81.1	23.9	225	
1308	—	13.9	7.38	714	3.16	74.8	21.1	225	
1315	—	13.9	7.38	715	3.09	67.0	12.4	225	
1325	—	14.1	7.39	715	3.01	58.8	9.69	225	
1333	—	14.3	7.39	717	2.99	55.9	7.76	225	
1338	—	14.2	7.40	717	2.99	53.0	7.29	225	
1340	SAMPLE	—	—	—	—	—	—	—	total purge 2.25 gallons

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)
Previous controller settings: Recharge: 120 secs **Discharge:** 30 secs
Pressure: 110 psi **Cycles Per Minute:** 0.4 **Flow Rate:** 160 mL/cycle

Screened Interval: 250-260 ft bgs **Minimum purge volume:** 0.9 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ TV Simultaneous Purge Allowed: ■

05/26/21

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/19/21 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0 **(Vented to)** 0

Well ID: MW-34D **Purging/Sampling Device:** ZIST/Compressed gas **Pump depth (ft bgs):** 315

Initial Static Water Level (feet btoc): — **Analytical Parameters:** VOCs, Metals, Mercury, Anions, Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): — **QC Samples Collected:** None

Purge Start Time: 0915 **Ferrous Iron (mg/L):** 0.46 **Allowable Drawdown (ft):** 0.3

Sample Time: 1025 **Controller Settings: Recharge:** 120 secs **Discharge:** 35 secs **Pressure:** 110 psi

Samplers' Signatures: [signature] **Cycles Per Minute:**

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. ~~(µs/cm)~~ mS/cm	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/cycle)	Comments
0930	—	13.0	7.27	0.86	1.33	147.8	0.68	250	
0940	—	13.0	7.17	0.86	5.23	20.8	17.4	250	
0950	—	13.0	7.11	0.87	4.67	41.5	7.90	250	
1000	—	13.0	7.10	0.87	4.65	56.8	4.51	250	
1008	—	13.0	7.09	0.87	4.42	65.8	2.87	250	minimum purge met
1013	—	13.0	7.09	0.87	4.45	67.5	2.31	250	
1020	—	12.9	7.09	0.87	4.41	69.1	2.00	250	
1025	SAMPLE	—	—	—	—	—	—	—	total purge 1.5 gallons

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47
Max discharge 4.46 mL/ft of WC (w/o VB)

Previous controller settings: Recharge: 120 secs **Discharge:** 35 secs
Pressure: 125 psi **Cycles Per Minute:** 0.4 **Flow Rate:** 240 mL/cycle

Screened Interval: 315-325 ft bgs **Minimum purge volume:** 1.1 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ TV Simultaneous Purge Allowed: ■

05/26/21

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 03/16/21 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** —

Well ID: MW-36 **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** 50

Initial Static Water Level (feet btoc): 44.47 **Analytical Parameters:** VOCs, Metals, Mercury, Anions, Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 44.47 **QC Samples Collected:** Field Duplicate FD07-GW03/21

Purge Start Time: 1417 **Ferrous Iron (mg/L):** 0.07 **Allowable Drawdown (ft):** 0.3

Sample Time: 1450 / 1505 **Controller Settings: Recharge:** 16 secs **Discharge:** 14 secs **Pressure:** 35 psi

Samplers' Signatures: T. Vinton / A. Flores **Cycles Per Minute:** 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1422	44.47	13.1	6.87	1534	8.1	-147.7	29.5	300	Minimum purge volume met
1427	44.47	13.0	6.91	1535	5.6	-158.3	15.0	300	
1432	44.47	13.0	6.91	1534	4.3	-166.3	10.6	300	
1437	44.47	13.1	6.92	1535	3.8	-171.3	6.80	300	
1442	44.47	13.0	6.93	1535	3.6	-174.9	4.89	300	
1447	44.47	13.1	6.94	1535	3.8	-174.4	4.39	300	Total volume pumped ~3.5 gal
1450	SAMPLE	TIME							
1505	FIELD DUPLICATE	SAMPLE	TIME						

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 16 secs **Discharge:** 14 secs
Pressure: 50 psi **Cycles Per Minute:** 2 **Flow Rate:** 190 mL/min

Screened Interval: 47-52 ft bgs **Minimum purge volume:** 0.2 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ TV 05/26/21

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 03/17/21 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** —

Well ID: MW-37S **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** 27.71 (top of the pump)

Initial Static Water Level (feet btoc): 17.86 **Analytical Parameters:** VOCs, Metals, Mercury, Anions, Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 18.14 **QC Samples Collected:** None

Purge Start Time: 1258 **Ferrous Iron (mg/L):** 0.90 **Allowable Drawdown (ft):** 0.3

Sample Time: 1315 **Controller Settings: Recharge:** 25 secs **Discharge:** 5 secs **Pressure:** 25 psi

Samplers' Signatures: Tim Kelly / Anna Fiorini **Cycles Per Minute:** 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1300	18.11	15.3	6.92	2380	0.08	-62.6	0.61	150	
1305	18.13	15.5	6.93	2361	0.06	-59.3	0.75	150	Minimum purge volume not
1310	18.14	15.5	6.95	2358	0.05	-57.6	0.73	150	purged ~ 0.5 gal
1315	SAMPLE	TIME							

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 25 secs **Discharge:** 5 secs
Pressure: 20 psi **Cycles Per Minute:** 2 **Flow Rate:** 150 mL/min

Screened Interval: 25-35 ft bgs **Minimum purge volume:** 0.1 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ TV Simultaneous Purge Allowed: ■

05/26/21

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/17/21 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** 0.0

Well ID: MW-37D **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** 65

Initial Static Water Level (feet btoc): 40.52 **Analytical Parameters:** VOCs, Metals, Mercury, Anions, Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 40.55 **QC Samples Collected:** None

Purge Start Time: 1341 **Ferrous Iron (mg/L):** 0.00 **Allowable Drawdown (ft):** 0.3

Sample Time: 1410 **Controller Settings: Recharge:** 15 secs **Discharge:** 15 secs **Pressure:** 40 psi

Samplers' Signatures: Tom Viller / Anna Fiorini **Cycles Per Minute:** 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1345	40.55	15.1	6.96	1925	2.30	-73.5	19.3	200	
1350	40.54	15.0	6.90	1949	2.49	-61.5	10.4	200	minimum purge volume met
1355	40.54	15.1	6.93	1948	2.58	-58.5	6.38	200	
1400	40.54	15.1	6.95	1949	2.67	-57.5	4.38	200	
1405	40.54	15.2	6.97	1948	2.71	-56.5	2.66	200	purged ~2 gallons
1410	SAMPLE	TIME							

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 15 secs **Discharge:** 15 secs
Pressure: 30 psi **Cycles Per Minute:** 2 **Flow Rate:** 150 mL/min

Screened Interval: 60-70 ft bgs **Minimum purge volume:** 0.2 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ TV Simultaneous Purge Allowed: ■

05/26/21

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 3/17/21 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** —

Well ID: MW-38S **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** 32

Initial Static Water Level (feet btoc): 20.39 (=19.52 top of casing / top of outer casing) **Analytical Parameters:** VOCs, Metals, Mercury, Anions, Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 20.43 **QC Samples Collected:** None

Purge Start Time: 1514 **Ferrous Iron (mg/L):** 0.29 **Allowable Drawdown (ft):** 0.3

Sample Time: 1630 **Controller Settings: Recharge:** 15 secs **Discharge:** 15 secs **Pressure:** 25 psi

Samplers' Signatures: Tom Heffer / Anna Fontini **Cycles Per Minute:** 2

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
1520	20.43	13.7	6.90	1545	5.79	-53.1	20.0	150	minimum purge volume met
1525	20.43	13.7	6.98	1543	4.97	-48.0	9.44	150	
1530	20.43	13.7	6.99	1544	4.36	-46.1	12.9	150	
1535	20.43	13.7	7.02	1545	3.02	-44.5	47.5	150	decreased pressure to 22 psi. Flow rate ~ 75 mL/min
1540	20.43	13.6	7.04	1545	2.88	-43.4	36.4	75	increased pressure to 24 psi. Flow rate ~ 100 mL/min
1545	20.43	13.7	7.04	1545	2.79	-42.3	25.2	100	
1550	20.45	13.7	7.06	1544	2.63	-41.4	26.7	100	
1555	20.43	13.7	7.06	1542	2.55	-40.5	24.3	100	
1600	20.43	13.7	7.07	1541	2.52	-39.9	21.2	100	
1605	20.43	13.7	7.07	1540	2.53	-39.5	20.9	100	
1610	20.43	13.7	7.09	1539	2.47	-38.9	18.8	100	
1615	20.43	13.7	7.07	1537	2.48	-38.3	15.3	100	
1620	20.43	13.6	7.08	1537	2.46	-37.7	14.8	100	
1625	20.43	13.6	7.08	1536	2.43	-37.4	14.7	100	purged ~ 6 gallons

1630 SAMPLE TAKE

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 15 secs **Discharge:** 15 secs
Pressure: 25 psi **Cycles Per Minute:** 3 **Flow Rate:** 100 mL/min

Screened Interval: 27-37 ft bgs **Minimum purge volume:** 0.1 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ TV Simultaneous Purge Allowed: ■

05/26/21

GROUNDWATER MONITORING WELL
LOW-FLOW SAMPLING DATA SHEET

Site Name: 700S 1600E PCE Plume **Date:** 05/18/21 **OVM:** FID ☐ PID ■ **In Casing (ppm): (Initial)** 0.0 **(Vented to)** —

Well ID: MW-38D **Purging/Sampling Device:** MP-50 **Pump depth (ft bgs):** 65

Initial Static Water Level (feet btoc): 18.41 **Analytical Parameters:** VOCs, Metals, Mercury, Anions, Alkalinity, Nitrate/Nitrite, TOC, MEEA

Final Water Level (feet btoc): 18.42 **QC Samples Collected:** None

Purge Start Time: 0936 **Ferrous Iron (mg/L):** 0.00 **Allowable Drawdown (ft):** 0.3

Sample Time: 1025 **Controller Settings: Recharge:** 15 secs **Discharge:** 5 secs **Pressure:** 40 psi

Samplers' Signatures: Tia Ville / Anna Frosini **Cycles Per Minute:** 3

Time	Water Level (ft btoc)	Temperature (Degrees C)	pH	Specific Cond. (µs/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (mL/min)	Comments
0940	18.42	13.0	6.95	1264	5.43	-44.1	13.8	150	
0945	18.42	13.0	6.98	1273	6.15	-34.9	10.9	150	minimum purge volume met
0950	18.42	13.0	7.00	1269	6.09	-33.8	8.43	150	
0955	18.42	13.0	7.02	1274	5.60	-32.2	6.06	150	
1000	18.42	13.0	7.04	1273	4.68	-31.6	4.64	150	
1005	18.42	12.9	7.07	1274	3.77	-31.5	3.70	150	
1010	18.42	13.0	7.11	1272	3.59	-30.7	3.03	150	
1015	18.42	13.1	7.11	1271	3.50	-30.3	2.97	150	
1020	18.42	13.2	7.11	1270	3.31	-30.1	2.57	150	purged ~ 2 gallons
1025	SAMPLE DAY								

Casing Volume Calculations:
Water Col. X Casing Factor = Gallons per Casing Volume
Casing Factors: 2" diameter well: 0.16 / 4" diameter well: 0.65 / 6" diameter well: 1.47

Previous controller settings: Recharge: 15 secs **Discharge:** 5 secs
Pressure: 40 psi **Cycles Per Minute:** 3 **Flow Rate:** 240 mL/min

Screened Interval: 60-70 ft bgs **Minimum purge volume:** 0.2 gallons

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature	±1°C	DO	±10% OR ±0.2mg/L (whichever is greater)
pH	±0.1 pH unit		
Specific Cond	±3%		
ORP	±10mV	Turbidity	< 50 NTU and ±10% OR < 10 NTU
Water Level	± 0.3 foot		

Ferrous Fe Analyzed: ☒ Minimum Purge Met and Notated: ☒
Total Purge Volume Recorded: ☒ TV Simultaneous Purge Allowed: ■

05/26/21

CDM Smith

WATER LEVEL MEASUREMENTS

Project: VA Plume Project No: 238824

Weather Conditions: Sunny, 50°F Date: 3/15/20

Measurement Device: Heron/solinst water probe Measured By: ER/AF/ICK/BC

Well	Date	Time	Depth to Water (feet)	Reference TOC = top of casing, TOH = top of housing	Comments
MW-01D	3/15/21	1350	170.40	TOH	6479/~~74000~~ 24000 - Bat OK
MW-01S	↓ 3/16/21	1340	156.56	↓	2347/74000 Bat OK
MW-02	↓	1402	170.68	↓	well vault filled w/ water. Well covered w/ sand
MW-03RA	3/15/21	1000	~~123.99~~	TOC	188.99 (BSC - 4/19/21)
MW-03RB	↓	1005	201.45	TOC	
MW-03RC	↓	1010	203.71	TOC	
MW-03RD	3/15/21	1015	203.78	TOC	
MW-04	↓	1612	136.14	TOH	2350 Bat ok 6486 Bat OK
MW-05R	↓	1440	214.95	↓	2354/24000 Bat ok
MW-06	↓	1518	123.59	↓	
MW-08A	3/15/21	1540	60.09	TOC	
MW-08B	↓	1545	58.30	TOC	
MW-08C	↓	1547	51.98	TOC	
MW-12D	3/15/21	1310	54.36	TOH	
MW-12S	↓	1040	DRY	TOH	
MW-13D	↓	1012	13.21	TOH	2349 Bat ok

CDM Smith

WATER LEVEL MEASUREMENTS

Well	Date	Time	Depth to Water (feet)	Reference TOC = top of casing, TOH = top of housing	Comments
MW-13L	3/15/21	1014	16.35	TOC	TD: 159.75 (ft below TOC)
MW-13S	3/15/21	1009	13.89	TOH	
MW-14D		0940	NA	NA	Pressure: 2.0 PSI, 0.2 bar
MW-14S		0941	5.21	TOH	2346 | 48000 Bat OK
MW-15D		1025	49.65		2352 | 48000 Bat OK
MW-15S		1026	48.51		
MW-16D		1103	9.61		2350 | 48000 Bat OK
MW-16S		1104	11.15		
MW-17D		~~0955~~ 0955	0.37 → 0.45 →	TOC → TOC of stickup	Pressure: NA PSI, NA bar. If no pressure, add stickup. If water is below existing TOC, remove stickup and gauge. If water is above existing TOC, gauge with stickup. Record stickup height.
MW-17S		0951	6.51	TOH	
MW-18		1212	81.53		Vault filled w/ water
MW-19		1210	80.95		
MW-20D		1147	82.92		2336 | 48000 Bat OK
MW-20S		1145	83.16		2347 | 48000 Bat OK
MW-21		1227	64.98		2347 | 48000 Bat OK
MW-22		1235	63.46		2347 | 48000 Bat OK
MW-23A	3/15/21	1217	188.39	TOC	
MW-23B		1221	197.10	TOC	
MW-23C		1227	216.32	TOC	

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WATER LEVEL MEASUREMENTS

Well	Date	Time	Depth to Water (feet)	Reference TOC = top of casing, TOH = top of housing	Comments
MW-24	3/15/21	1119	185.84	TOC	
MW-25A	3/15/21	1043	179.68	TOC	
MW-25B	↓	1048	184.69	TOC	
MW-25C	↓	1053	207.20	TOC	
MW-26A	3/15/21	1128	189.92	TOC	
MW-26B	↓	1130	195.32	↓	
MW-26C	↓	1135	217.15	↓	
MW-26D	↓	1140	217.29	↓	
MW-27	3/15/21	1207	188.57	TOH	
MW-28	3/15/21	1602	187.42	TOH	
MW-29A	3/15/21	1240	DRY	TOC	Water below top of volume booster.
MW-29B	↓	1250	155.28	↓	
MW-29C	↓	1300	158.41	↓	
MW-30RA	3/15/21	0915	226.83	TOH	
MW-30RB	↓	0920	229.06	TOH	
MW-30C	↓	0925	228.60	TOC	
MW-31A	3/15/21	1310	DRY	TOC	Water below top of volume booster.
MW-31B	↓	1319	135.78	↓	
MW-31C	↓	1325	148.06	↓	
MW-32A	3/15/21	1524	3/15/21 82.78	TOH	

CDM Smith

WATER LEVEL MEASUREMENTS

Well	Date	Time	Depth to Water (feet)	Reference TOC = top of casing, TOH = top of housing	Comments
MW-32B	3/15/21	1520	82.15	TOC	
MW-32C	↓	1536	81.51	↓	
MW-34A	3/15/21	1410	DRY	TOC	Water below top of volume booster.
MW-34B		1440	130.05		97% bat 2495/48000 Bat OK
MW-34C		1443	129.29		2350/48000 Bat OK
MW-34D	↓	1446	129.36	↓	2350/48000 Bat OK
MW-36	3/15/21	0930	44.43	TOH	Well vault filled w/water
MW-37D		1051	40.36		
MW-37S		1050	17.76		
MW-38D		1327	18.39		
MW-38S	↓	1326	19.45	↓	

Additional Comments:
Locations with TP bolts: MW-4, MW-6, MW-14, MW-17, MW-28

700 S 1600 E

PCE BLUME

#1

Rite in the Rain

ALL-WEATHER

LEVEL

Nº 313

12/16/20 MW 26D WX Building

Time	P(psi)	D(s)	R(s)	Notes
1608	50	10	120	Bubbles
1610	50	20	120	No movement
1615	50	30	120	No movement
1618	60	10	120	No movement
1622	60	20	120	No movement
1625	60	30	120	

3/15/21 700 & 1600 E PCE Plume

Weather: 40°F Pt Cloudy

PPE: Modified level D

Personnel: Ben Carreon COM Smith (author)
Emerson Rott ↓
Kid Keller Wasatch
Dave Fouin. ↓

Scope: Gas Sampling

~~0800: Arrived on site.~~ Dc 3/15

0730: Arrived at Wasatch. loaded equipment/coolers.

0800: Arrived at WA. Unloaded equipment. H&S briefing. Calibrated Equipment. and argon. fed.

Rite in the Rain

12/17/20 700 S 1600 E PCE Plume

Weather: 25-35°F Rain/snow

PPE: Modified Level D

Personnel Ben Carreon CDM Smith Author

Marcia Day

Emma Rose

Iona Campbell

Connor Campbell

Connor Kelley

Kevin Murphy Wasatch

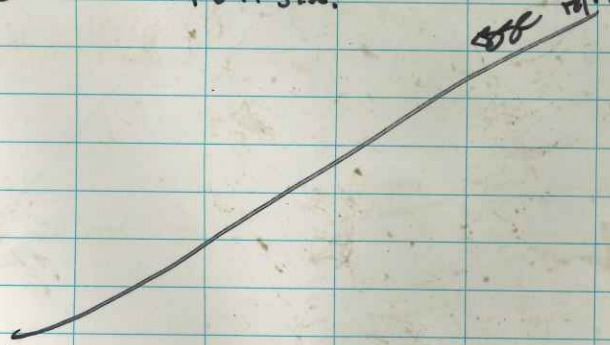
Scope: Grw Sampling

0815 Arrived on site. Hld safety briefing, see Form.

0830 Calibrated equipment. See forms. Loaded equipment. VR asked to maximize vehicle parking at corner due to snow

0900 Setup at MW34C and D to build water columns.

1700 CDM Smith offsite.



MW34C 12/17/20

MW34C ~110 psi water

Time	Depth (ft)	Rate (ft)	Pres (psi)	Notes
0910	10	120	20	Bubbles
0919	20		↓	
0930	30			
0940	10		30	
0950	20		↓	
1000	30			
1006	Begin 40-10		40	
1014	20		↓	
1030	30			
1036	10		50	
1045	20		↓	
1100	30			
1116	10		↓ Purge 60	
1126	20		↓	
1140	30			
1150	10		70	
1209	20		↓	
1219	30			
1225	10		80	
1236	20		↓	
1246	30			
1249	10		90	Water

1255 Collected grab sample

Rite in the Rain

3/15/21 700 S 1600 E PCE Plume

Weather: 40°F, lt wind, pt cloudy

PPE: modified level D

Personnel: Ben Carreon

Emma Rott

~~Tea Vetter~~ BC 3/15/21

~~Marsa Day~~ BC 3/16/21

Kiel Keller

Anna Fiorini

Scope: Water levels

0730: Arrived at Wasatch. Loaded equipment + coolers. Cleared drive through area.

0800: Arrived at UA. Unloaded equipment. H+S briefing. Calibrated and organized. Started collecting water levels. See field forms.

0830 Access partially blocked to MW-30 by vehicles.

1400 MW-31, no transducer at B. Will try and redeploy at later date

1630 Finished water levels

1730 CDM and Wasatch offsite.

BSL

3/16/21 700 S 1600 E PCE Plume

Weather: 40°F, lt wind, pt cloudy

PPE: modified level D

Personnel: Ben Carreon CDM Smith (Author)

Emma Rott

Marsa Day

Kiel Keller Wasatch

Anna Fiorini

Scope: GW sampling

0730: Arrived at site. H+S briefing. Calibrated equipment

0800: Tea Vetter (CDM onsite). Organized bottle kits and equipment.

1030 Gas received and teams started sampling. See field forms.

~~1630 Team~~ as 3/16 1300 Kiel Keller offsite.

1410 Field teams finished sampling. MW-23B did not stabilize prior to sampling. Purged > 2 hrs.

1440 CDM offsite

BSL

Rite in the Rain

3/17/21 700 S 1600 E PCE Plume
Weather: Sunny ~40°F
PPE: Modified level D
Personnel: Ben Carreon CDM Smith (Author)
Iona Campbell
Tea Vrtlar
Maria Day
Emma Rott
Anna Fiorini Wasatch
Scope: GW Sampling
0800: CDM Smith Arrived on site. H&S briefing - see field forms. Started GW sampling - see field forms.
0845 MW-09C was very turbid and out of range on the hach 2100Q. Cleared up to <20 after 90 minutes. Team at MW-26 reportedly had breakthrough at 26B.
1700 stopped sampling.
1745 CDM/Wasatch offsite.

3/18/21 700 S 1600 E PCE Plume
Weather: Sunny ~40°F
PPE: Modified Level D
Personnel: Ben Carreon CDM Smith (Author)
Iona Campbell
Tea Vrtlar
Maria Day
Emma Rott
Anna Fiorini Wasatch
Scope: GW Sampling
0800: CDM Smith arrived on site. H&S briefing see field forms. Started GW sampling - see field forms.
0935 Breakthrough at MW-31A. Pulled pump, gauged water level. WL 133.40 ft bgs. 132.40 ft btoc. Pump is 138 ft bgs. WC = 4.6'. 20mL/discharge. Even though well was eased into at 10 sec discharge, insufficient WC is the likely reason breakthrough occurred. Recommending lowering pump depth to 143 ft bgs. Dipped sounder to 145 ft bgs to check for sediment. No sediment noted, will lower pump. Rebuild & Sampled.
1400 Finished sampling.
1430 CDM/Wasatch offsite.

Rite in the Rain

3/18/24 700 S 1600 E PCE Plume MW-31A

TIME	PRES (PSI)	DISCH.	RECH.	NOTES
1342	20	10	120	no movement
1344	20	20	120	no movement
1345	20	30	120	no movement
1347	35	10	120	no movement
1349	35	20	120	no movement
1351	35	30	120	no mvmnt
1355	30	10	120	lots of bubs
1357	30	10	120	no mvmnt
1358	30	20	120	a few bubs
1402	30	20	120	a few bubs
1404	30	20	120	a few bubs
1406	30	30	~~130~~ 120 IC 3/18	a few bubs
1408	40	10	120	a few bubs
1411	40	10	120	some bubs
1429	40	20	120	some bubs
1435	40	20	120	tons of bubs
1440	40	30	120	some bubs
1451	50	10	120	lots of bubs
1500	50	20	120	lots of bubs
1515	50	30	120	some bubs
1527	60	10	120	IC 3/18 ~~AO bubs~~ bubs
1555	60	20	120	bubs
1603	60	20	120	water
1604	70	10	120	water
1604	80	10	120	water

TIME	PRES	DISCH	RECH	NOTES
1608	80	15	120	50mL/cycle
1610	starting purge			

Rite in the Rain

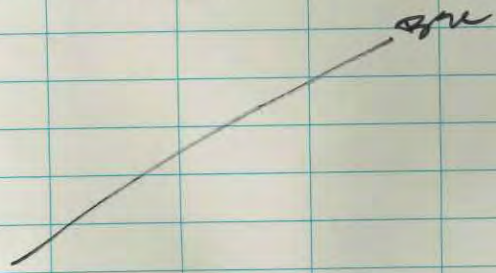
3/19/21 700 s 1600 E PCE Plume
Weather: 40°F, sunny
PPE: modified level D
Personnel: Ben Carreon — CDM Smith (Anchor)
Marin Day
Emma Rose
Iona Campbell
Tim Vinther
Kiel Keller — Wasatch

Scope: Low Sampling

0730: CDM Smith arrived on site. Conducted H+S briefing and calibrated - see field forms. Started low sampling. 400 NTU standard for the Ben + Iona turbidity unit was not calibrating within range, however, was reading 80's. All other standards were calibrating fine.

1130 Pump issues at 29C. Drawing back. Breakthrough. Pulled pump - cleaned. Redeployed, built, purged and sampled

1745 CDM off site.

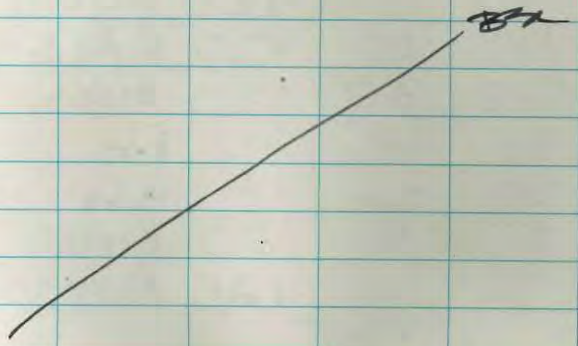


3/19/21 700S 1600E PCE PLUME
MW-29C

TIME	PRES	DISCH	RECH	NOTES
1221	20	10S	120S	no movement
1223	20	20	120	no movement
1225	20	30	120	No movement
1233	30	10	120	No movement
1237	↓	20	120	↓
1241	↓	30	120	
1245	40	10	120	
1247	↓	20 ~~30~~	120	
1249	↓	30	120	no mvmnt
1252	50	10	120	no mvmnt
1253	50	20	120	no mvmnt
1255	50	30	120	no mvmnt
1258	60	10	120	no mvmnt
1302	60	20	120	no mvmnt
1304	60	30	120	no mvmnt
1306	70	10	120	Bubs
1321	70	20	120	Bubs
1334	70	30	120	Bubs
1350	80	10	↓	Bubs
1410	80	20	↓	bubs
1428	80	30	120	Bubs
1445	90	10	120	Bubs
1450	water			

Rite in the Rain

3/21/21 700 S 1600 E PCE Plume
Weather: ~25°F, lt snow
PPE: modified level D
Personnel: Ben Carreon — COM Smith (Author)
Maria Day
Emma Roth
Iona Campbell
Tea Vrtar
Kevin Murphy — Wasatch
Scope: GW Sampling
0800: COM Smith on site. Equipment calibrated individually at hotels - see field forms. HASP briefing conducted - see field form. Started GW sampling - see field forms.
1050 Replaced pump hanging cables at MW-05R, MW-24, and MW-28. Used galvanized clamps and stainless cable. Should replace clamps w/ stainless
1800 COM offsite.



3/22/21 700 S 1600 E PCE Plume
Weather: 25°F, cloudy
PPE: modified level D
Personnel: Ben Carreon — COM Smith (Author)
Maria Day
Emma Roth
Iona Campbell
Tea Vrtar
Whitney Treadway
Kevin Murphy — Wasatch
Kiel Keller
Scope: GW Sampling, SG Sampling
0800: COM and Wasatch onsite. Equipment calibrated - see field forms. HASP briefing - see field forms. started GW sampling - see field forms. MW-05R and MW-02 troubleshooted for purging issues. Both cleaned, developed, inspected, and tested above and below ground surface.
1400 Packed and shipped samples
1630 Redeployed MW-24 pump w/ new cable. Performed smaller tasks at cores.
1730 Shipped back most rental equipment
1815 COM offsite.

Rite in the Rain

3/23/21 700 S 1600 E PCE Plume

Weather: 25°F, clear

PPE: Modified Level D

Personnel: Ben Carreon — CDM Smith (Author)
Tea Unter
Maria Day
Iona Campbell
Emma Rott
Whitney Treadway
Kiel Keller — Wasatch
Kevin Murphy

Scope: Grow Sampling, housekeeping, SVE sampling, utility 0730 CDM Smith and Wasatch on site. Equip. calibrated - see field forms. H&S briefing - see field form.

1100 Finished sampling. Took rinse at MW02 prior to sampling.

1130 Setup to troubleshoot MW-27 SVE ~48, 75, 155

1215 SVE-48, Applied 50 psi for one minute. Turned off tank. Drained ~10psi over ~30 seconds.

1220 SVE-48 applied 50 psi for 5 minutes. ~10 psi over 30 seconds drained. No drop in tank pressure

~~Up SVE-75~~

1230 SVE-75 ~75 psi, ~780 tank pres(psi),

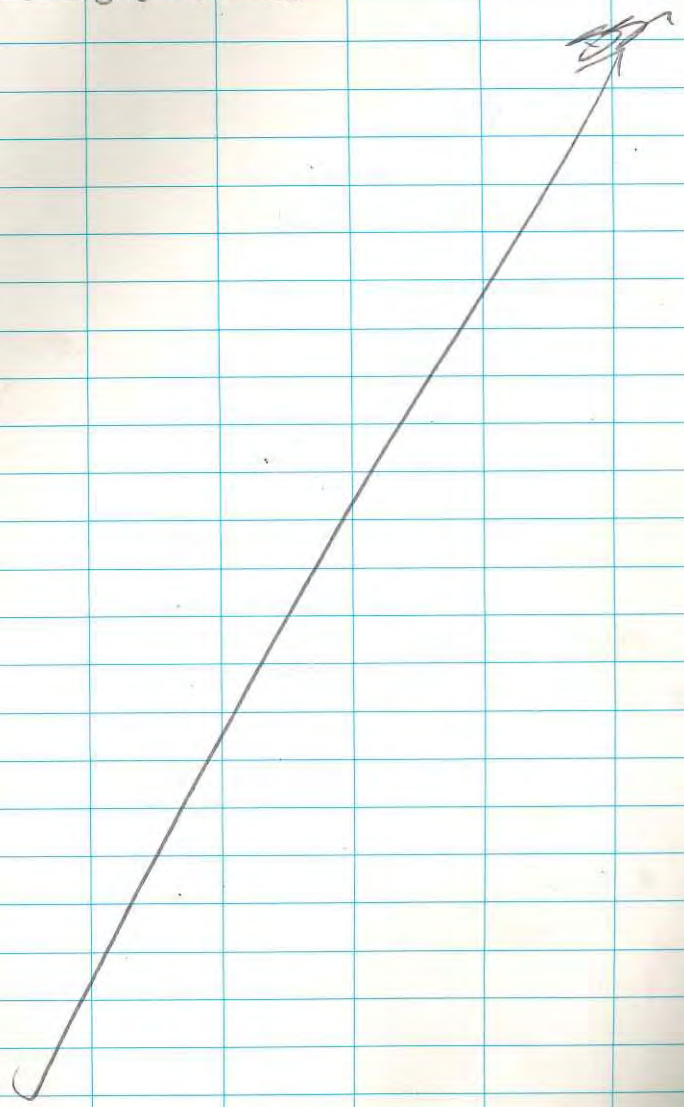
1235 SVE, around 5psi drop per minute. ~780 tank psi

1240 ~~1240~~ SVE-155 ~150 psi, ~780 tank pres(psi),

1245 SVE, 0 psi drop per minute. ~780 tank psi

3/23/21 700 S 1600E PCE Plume

1600 CDM offsite.



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PCE PLUME

#2

Rite in the Rain®
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LEVEL
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VA Plume SLC

Date: 3/15/20
Author: E. Rott
Activity: GW Sampling
Team: E. Rott, B. Cameron (consmuth), A. Fiorni (Wasatch), Kiel Keller (Wasatch)
PPE: Level D, masked

0730 Team to Wasatch to pick up equipt. + coolers.
0800 Field team onsite. Unpack vehicles. Calibrate PIDs, H+S meeting at tailgate.
0830 Organize equipment in connex and vehicles.
0920 E. Rott, A. Fiorni to take WLs at offsite wells, off-campus.
*0950 Team at MW-17S/D, note, WL below TOC at MW17D, no need to use stickup
↳ 0940 Team at MW14S/D Cable ferrules at dissimegrated from top of pump at MW14S. Team cut cable and will return to put back on.
1400 Team at MW02. Nearly covered by the salt/sand pile in parking lot.

3/15/21 700S 1600E PCE Plume

1410 Team to MW05R. Difficulty pulling up transducer. Ended up pulling pump to see the issue. Bottom of 20" cable attached to top of pump had fallen apart and tangled in well. Team to WC, pulled pump and transducer.
1500 Team to MW06. Transducer was not attached to cable. Ferrules had fallen apart.
1600 Team to MW04. Tamper proof bits were stripped. Able to remove using vise grips.
1700 Team to connex to unpack and export transducer data.
1730 Team offsite.

Emma Rott
3/16/20

3/16/2021 — 700S 1600E PCE Plume

Weather: Cloudy, 50°F
PPE: Modified Level D, masks
Personnel: E. Rott (author), M. Day, T. Vrtlar, B. Carreon, A. Fiorni (Wasatch, Kyle Keller (Wasatch)
Task: GW Sampling

0730	Team onsite.
0800	Begin calibrating equipment (YSIs, PIDs)
0900	Organize equipment + teams for sampling.
0950	H+S meeting at tailgate.
1050	Airgas dropped off cylinders for samp.
1100	E. Rott, M. Day to MW23.
1115	Turn on controller at MW23A and MW23C. Ease pressure/settings at first.
1134	Water at surface at MW23C.
1155	Water at surface at MW23A.
1300	Shannon Smith (VA) onsite.
1305	Shannon Smith (VA) offsite
1400	Collect MW23C-GW031621
1405	Collect MW23A-GW031621
1410	Wynn John (VA) onsite
1420	Wynn John (VA) offsite.

3/16/21 — 700S 1600E PCE Plume

1510	Purge start at MW23B
1730	Collect MW23B-GW031621
1800	Team to connex to unload.
1830	Field team offsite.

Summary
3/16/21

Rite in the Rain

3/17/21 700S 1600E PCE Plume

Weather: Sunny, 50°F

PPE: Modified Level D, masks

Personnel: E. Rott (author), M. Day, T. VrHar, B. Carreon, T. Campbell, A. Fiorni (Wasatch)

Task: GW Sampling at MW26

0800 Field team onsite. Calibrate PIDs

0830 H+S meeting at the tailgate.

0845 E. Rott, M. Day to MW26. Start on A/B intervals.

0920 Begin purge at MW26A and B

0950 Breakthrough at MW26B.

0952 Begin rebuilding WC at MW26B

1000 Clean and take apart pumps for MW26C and MW26D. Need to wait for new filters for deployment.

1215 Place new filters on MW26C/D

1220 Deploy MW26D, no issues.

1225 Begin deploy of MW26C. Stuck w/ approx 20 ft above TOC.

1230 Collect MW26A-GW031721

1300 Finish installing MW26C.

1315 Begin WC building at MW26D. Water line is drawing back during recharge, indicating check valve issue.

1400 Troubleshoot check valve at (con't)

Time	Pressure	on	off	Notes
MW26B Column build				
0952	20	10	120	
1007	20	20	120	
1017	20	30	120	
1019	30	10	120	
1032	30	20	120	
1037	30	30	120	
1040	50	10	120	
1049	50	20	120	
1100	50	30	120	
1115	60	10	120	
1130	60	20	120	
1135	60	30	120	
1149	70	10	120	
1203	70	20	120	
1220	70	30	120	
1230	80	10	120	
1235	80	20	120	
1245	80	30	120	
1258	90	10	120	
1305	90	20	120	
1320	90	30	120	
1335	100	10	120	
1340	100	20	120	
1345	100	30	120	

Rite in the Rain

3/17/21

MW26B Column Building

Time	Press	on	off	Notes
1350	110	10	120	
1355	110	20	120	
1400	110	~~20~~ 30	120	
1410	120	10	120	
1415	120	20	120	Water

1400 (cont) by pulling high pressure through air line, forcing breakthrough. Then high pressure through water line. Tried each twice, still seeing drawback.

1440 Disconnect from MW26D. Begin WC building at MW26C.

1455 Collect MW26B-GW031721

1515 See drawback at MW26C, same as MW26D. Attempt same trouble shooting as listed above.

1600 Pull up MW26D. Check valve installed backwards. Fix and redeploy.

1615 Pull up MW26C. Fix check valve and redploy pump.

1700 Verify both are working + begin building WCs.

~~3/18/21~~ 3/17/21 SR

1715 Team packs up and heads to connex.

1740 Field team offsite.

Cinnapoint

3/17/21

Rite in the Rain

3/18/21 700S 1600E PCE Plume

Weather: Sunny, 50°F

PPE: Modified Level D, masks

Personel: E. Rott (author), M. Day, I. Campbell, T. Vrtlar, B. Carreon, A. Fiorni (Wasatch)

Task: GW Sampling at MW26

0700 E. Rott onsite. Troubleshooting YSI calibration. Called Field Environmental. Factory reset 2 b/c pH and ORP not working.

0730 Field environmental suggested switching cables & handhelds. Worked.

0800 Remaining field team onsite. Calibrate YSIs, PIDs, turb.

0900 H&S meeting at tailgate.

0910 E. Rott, M. Day to MW26.

0920 Begin building WCs at MW26C & D.

1240 Purge start at MW26C, water present and dialed in settings to get flow rate of approx 250ml/disch

1300 Purge start at MW26D. Water present and dialed in settings to get flow rate of approx 200ml/disch

1400 Collect MW26C-GW031821

1410 Collect MW26D-GW031821

3/18/21

1500 Team to connex area to help pack/ship samples

1550 Collect TB01-GW031821

1555 Collect TB02-GW031821

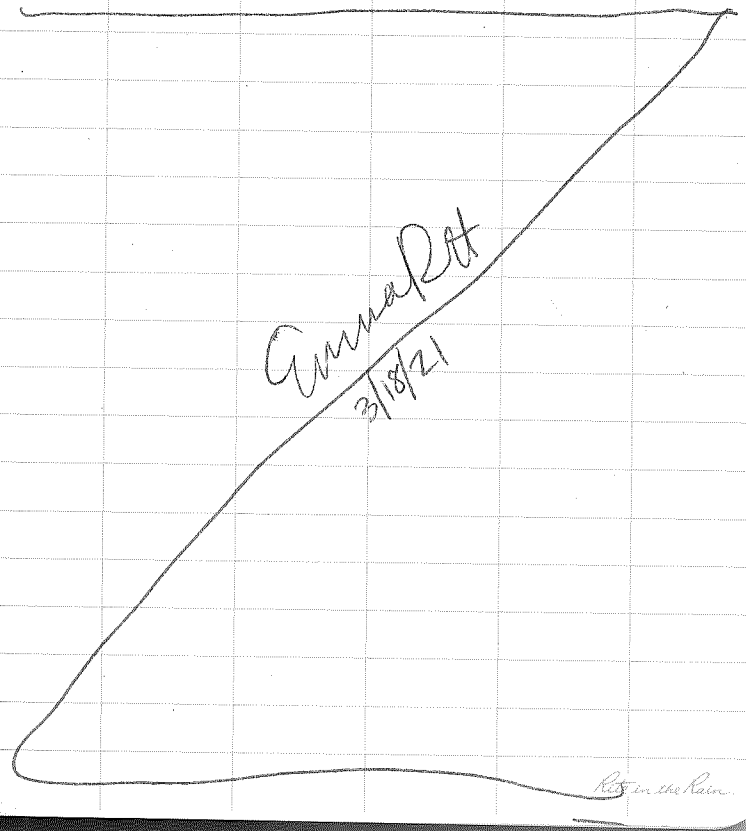
1600 Collect TB03-GW031821

1605 Collect TB04-GW031821

1610 Collect TB05-GW031821

1700 T. Vrtlar to ship at Fedex.

1730 Team offsite.



3/19/2021 700S 1600E PCE PLUME

Weather: Sunny, 60°F

PPE: Modified Level D, masks

Personnel: E. Rott (author), M. Day, B. Carreon, T. Vrtlar, I. Campbell, K. Keller (Wasatch)

0730 Field team onsite. Calibrate PIDs, YSIs, turbidimeters.

0800 H+S meeting at tailgate.

0845 E. Rott, M. Day to MW34.

0915 Begin purge at MW34D.

0935 Begin purge at MW34A.

1025 Collect MW34D-GW031921

1110 Collect MW34A-GW031921

1115 E. Rott to connex to get ice and transducer for MW34B.

1125 E. Rott returns to MW34. Begin WC building at MW34C.

1210 Begin purge at MW34C.

1215 Begin WC building at MW34B

1340 Collect MW34C-GW031921

1340 Start purge at MW34B

1530 Collect MW34B-GW031921

1615 Pack vehicle and head to connex.

1650 Field team offsite.

Emma Bell
3/19/21

3/19/21

Column building at MW34C

Time	Pressure (psi)	On (s)	Off (s)	Notes
1123	20	10	120	No movement
1125	20	20	120	"
1127	20	30	120	"
1129	30	10	120	"
1134	30	20	120	"
1136	30	30	120	"
1138	40	20	120	"
1141	40	30	120	"
1143	50	20	120	"
1146	50	30	120	"
1150	60	20	120	small bubbles
1152	60	30	120	with bubs
1154	70	20	120	Water present
1156	70 ~~80~~ 90	30	120	mostly water
1201	80	20	120	
	Begin purging.	to dial	in settings for	

Rain on the Rain

3/21/2021 TODS 16000E PCE Pump

Weather: Snow, cloudy, 35°F

PPE: Modified Level D, masks

Personnel: E. Rott (author), M. Day, B. Carr, I. Campbell, T. Vrhtar, K. Murphy (Wasatch)

Task: GW Sampling

0800 Field team onsite. Calibrate PIDs.

0830 H+S meeting at tailgate.

0845 E. Rott, M. Day to MW25.

0912 Purge start at MW25B

0915 Purge start at MW25A.

1036 Collect MW25B-GW032121

1120 Collect MW25A-GW032121

1200 Purge start at MW25C

1330 E. Rott to Home depot for supplies.

1400 Collect MW25C-GW032121

1410 E. Rott onsite.

1430 Team to connex. Get supplies for deploying pump at MW05R and sample.

1450 Team to MW05R. Team cleaned pump. Attached new 1/16" stainless wire cable with 2 clamps at bottom and 1 on top.

1530 Team begin purge.

1600 No water at surface. Attempted raising discharge time + pressure.

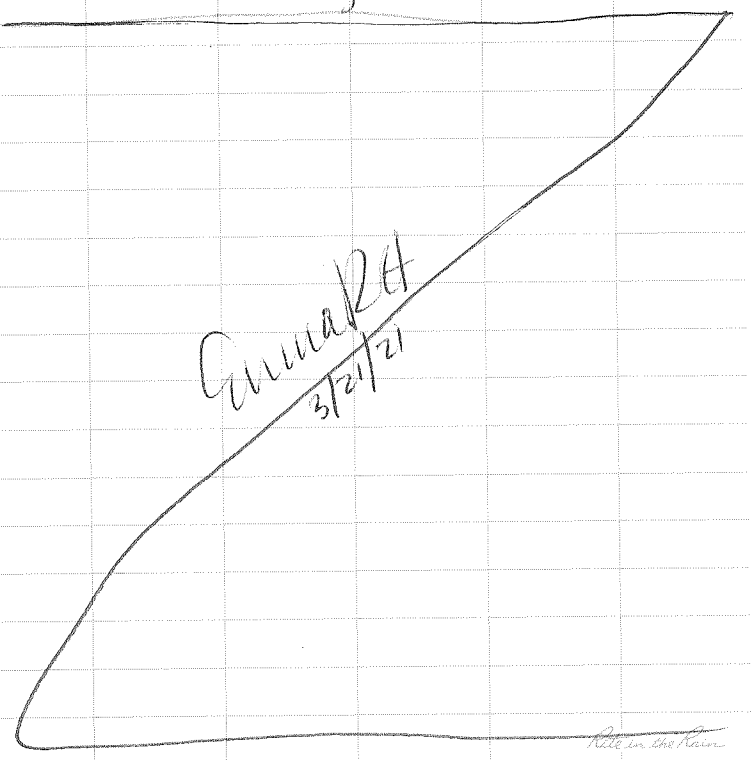
3/21/2021

1605 Team pulled pump. Took apart and cleaned again. No noticable issues, did see water in bottom 5 ft of tubing, water mixed w/ bubbles.

1610 Noted fittings loose on top of pump. Tightened.

1615 Redeployed pump and attempt purge.

1645 No water at surface. Team to return tomorrow for further troubleshooting.



3/22/2021 7005 1610E PCE Plume

Weather: Sunny, 40°F

PPE: Modified Level D, masks

Personnel: E. Rott (Author), M. Day, B. Carreon, I. Campbell, T. Virtue, K. Murphy (Wasatch)

Task: GW Sampling

0800 Field team onsite. Calibrate PIDs.

0830 H&S meeting at tailgate.

0845 E. Rott, M. Day to ~~MW25~~ MW05R. Team pulls pump. Decision to not attempt further troubleshooting. Had tried multiple efforts to clean pump on 3/21. Saw noticeable discoloring of pump from water.

0930 Team to MW02. Begin purge.

1000 No water at surface. Team pulls pump. Takes apart and cleans/inspects. Note some water in air line. Bladder looks OK, noticable discoloration. Clears water from air line.

1030 Redeploys. Second quick connect on airline at pump housing failing at >50psi. E. Rott to connex to find replacement.

1100 Replace top of pump housing with new ones. Attempt purge.

3/22/2021

1200 Only ~~water~~ air at surface. Team to pull pump.

1215 E. Rott to connex for solinst replacement parts.

1230 E. Rott returns to MW02. Replace all O-Rings and check balls on pump.

1330 Test at surface. Team seeing bubbles from bottom of pump. Attempts to fix. Still not functioning or pulling any water.

1500 E. Rott, M. Day to connex with MW02 pump. Look at MW17D dedicated pump to see if those could be switched with MW02 parts to function. Can't b/c old style pump doesn't match the new style (MW17D).

1530 Begin packing coolers.

1530 Collect TB01-GW032221

1535 Collect TB02-GW032221

1540 Collect TB03-GW032221

1545 Collect TB04-GW032221

1550 Collect TB05-GW032221

1700 I. Campbell to Fedex. Team packs equiptment.

1800 Field team offsite. ——— Rott on the Rein

3/23/2021 700S 1600E PCE Plume

Weather: Partly cloudy, 40°F
PPE: Modified Level D, masks
Personnel: E. Rott (author), M. Day, I. Campbell, T. Vrtlar, B. Carreon, T. Vrtlar
Task: Transducer re-deployment

0800 Field team onsite.
0845 H&S meeting at tailgate
0915 E. Rott to MW01S/D to replace wire rope for transducers. Stop & download data for transducer at MW01S & MW01D. Cut cable and replace with same length string.
1055 M. Day, E. Rott to MW20S. Pull transducer, download data, cut wire, replace with string, redeploy.
1110 Team to MW20D. Pull transducer, download data, cut wire, replace with string, redeploy.
1120 Team to MW21. Pull transducer, download data, cut wire, replace with string, redeploy.
1125 Team to MW22. Pull transducer, download data, cut wire, replace with string, redeploy.

3/23/2021

1130 Team to MW13D, Pull transducer, download data, cut wire, replace with string, redeploy.
1135 Team to MW14S, pull transducer, download data, cut wire, replace with string, redeploy.
1140 Team to MW15D, pull transducer, download data, cut wire, replace with string, redeploy. Missing 1 bolt on MW15D and MW15S.
1155 Team to MW16D, pull transducer, download, data, cut wire, replace with string, redeploy.
1200 E. Rott to connex for WLM.
1210 Team to MW04. Redeploy transducer with string. Replaced 1 bolt with non tamper proof bolt b/c bolts wouldn't screw all the way down.
1245 Team to MW34B to attempt to deploy transducer. Team pulled pump, attached transducer, redeployed. Noticeable resistance at approx. 20' above TOC, then again at approx 1' above TOC. Able to pull at an angle and get passed resistence.
1330 Team to connex and unpack. Note, at many transducer locations, aluminum ferrules had disenegrated.
1430 Field team to demobilize.

Rite in the Rain

INCH

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PCE PUMP

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ALL-WEATHER

LEVEL

№ 313

Location SLC VA Date 3/16/21

Project / Client 700 S 1600 E PCE PLUME

WEATHER: MOSTLY CLOUDY, HIGH 54°F, LOW 39°F

TASK: GW SAMPLING

PPE: LEVEL D

PERSONNEL: T. VRTAR (COM SMITH), ANNA FIORINI (WASATCH ENVIRONMENTAL)

0700 T. VRTAR TO AIRPORT TO PICK UP CAR RENTAL

0730 TRUCK RENTED OUT, T. VRTAR TO SITE. A FIORINI ONSITE

0810 T. VRTAR ONSITE. CALIBRATING YSI'S, PUMP/DI TUBING, FOR RINSING OTHER EQUIPMENT.

0930 HEALTH AND SAFETY MEETING WITH EMPLOYEES, BEN, MARIA, AND LEE

0940 LOADING EQUIPMENT FOR MW-155(D) AND MW-36

1010 TEAM AND ANNA TO PICK UP TRAFFIC CONTROL.

1030 TEAM AT MW-155 SET UP TRAFFIC CONTROL STARTED PURGING AT 1055 ISSUES WITH CONTROLLER (YELLOW) WITH PRESSURE HOSE WILL INVESTIGATE LATER, YSI ~~HOSE~~ TV 3/16 TUBING CONNECTION BROKE. ISSUES FIXED, USING OTHER COMPRESSOR/CONTROLLER (BLACK). RESUMED PURGING AT 1104, TAKEN FIRST MEASUREMENTS AT 1107

1127 PARAMETERS STABLE, READY TO SAMPLE MW-155

1130 MW155-GW031621 SAMPLES COLLECTED

1145 SETTING UP AT MW-150

1202 PURGE START TIME AT MW-150

1250 COLLECTED MW150-GW031621 SAMPLES

1300 DEMOBILIZING FROM MW-150 TO CONNEX TO DISPOSE PURGE WATER COLLECTED. STOPPED BY MW-36 TO ENSURE NO VEHICLES ARE PARKED ON TOP.

Location SLC VA Date 03/16/21

Project / Client 700 S 1600 E PCE PLUME

1330 STOPPED BY BEN AND ANNA TO GET THE NIGHT

1345 TEAM MOBILIZING TO MW-36, SETTING UP TRAFFIC CONTROL AND ATTEMPTING TO TROUBLESHOOT COMPRESSOR/CONTROLLER. CALLED BEN, CAN'T RESOLVE ISSUE, HE WILL TRY TO FIX IT LATER. ISSUE IS THAT THE PRESSURE KNOB ON CONTROLLER WON'T TURN PAST 20 PSI. TRIED RELEASING PRESSURE ON THE SIDE, NO LUCK. OTHER COMPRESSOR/CONTROLLER MP-50 WORKS FINE

1417 STARTED PURGING MW-36. TURBIDITY AND PUMP HIGH, REDUCED PRESSURE TO 35 PSI FLOWRATE IS 300 mL/min

1450 COLLECTED MW36-GW031621 SAMPLES

1505 COLLECTED FIELD DUPLICATE SAMPLES FD07-GW031621

1520 DEMOBILIZING FROM MW-36 TO CONNEX TO DISPOSE PURGE WATER. BEN REQUESTED MW-21 TO BE SAMPLED TODAY. SAMPLE BOTTLES AND TUBING COLLECTED FOR SAMPLING MW-21

1545 TEAM MOBILIZING TO MW-21

1605 PURGE START TIME ~~AT~~ TV 3/16 AT MW-21

1650 COLLECTED ~~MW-21~~ TV 3/16 MW21-GW031621

1700 FIELD TEAM DROPPING OFF TRAFFIC CONTROL AND GOING TO CONNEX TO DROP OFF THE REST OF THE EQUIPMENT

1745 FIELD TEAM OFFSITE.

TV 3/16/21

Location SLC VA Date 3/17/21

Project Client 700 S 1600 E PCE PLUME

WEATHER SUNNY, HIGH 53°F, LOW 42°F

TASK GW SAMPLING OF 12S, 12D, 16S AND 16D, MW-37S AND MW-37D

PPE LEVEL D

PERSONNEL TEA VETLAR (CON SHIFT), ANNA PIERINI (WASATCH ENVIRONMENTAL)

0645 EQUIPMENT CALIBRATION IN THE HWBZ ROOM. SOME ISSUES WITH CALIBRATING TURBIDITY METER (100 NTU) ISN'T HAVE BEEN RESOLVED AND BOTH YSI AND TURBIDITY METER WERE CALIBRATED

0700 TEAM ONSITE, CALIBRATING PID AND LOADING EQUIPMENT

0815 HEALTH AND SAFETY MEETING WITH ERIN BEN, JOHN AND MARK

0830 TEAM TO MW-12S STOPPING BY LOADING AREA TO PICK UP TRAFFIC CONTROL

0845 TEAM AT MW-12S/D AREA. TRAFFIC CONTROL SET UP. MW-12S IS DRY. VERIFIED THAT ONLY ACTION IS NOTING DOWN THAT THE WELL IS DRY.

0900 TEAM SETTING UP AT MW-12D

0921 PURGE START TIME AT MW-12D

0945 COLLECTED MW12D-GW031721 SAMPLES

1010 TEAM TO CONNEX TO DISPOSE OFF PURGE WATER

1035 TEAM AT MW-16S RESIDENT CAME OVER AND WAS CURIOUS ABOUT SAMPLING, GROUNDWATER AND DRINKING WATER SUPPLY AND TREATMENT FOR THE CITY.

1045 RESIDENT LEFT, SET UP MW-16S

1055 PURGE START TIME FOR MW-16S

1110 COLLECTED MW16S-GW031721

Location SLC VA Date 3/17/21

Project / Client 700 S 1600 E PCE PLUME

1120 SETTING UP MW-16D.

1125 PURGE START TIME AT MW-16D

1155 COLLECTED MW16D-GW031721

1205 TEAM TO CONNEX TO DISPOSE OFF PURGE WATER AFTER DEMOBILIZING FROM MW-16D.

1239 PICKING UP MAGNET FROM BEN, CONFIRMING MW-38S10 SAMPLING

1245 TEAM SETTING UP AT MW-37S

1258 PURGE START TIME AT MW-37S

1315 SAMPLES MW37S-GW031721 COLLECTED

1330 TEAM SETTING UP AT MW37D. TV 03/17

1341 PURGE START TIME AT MW-37D

1410 COLLECTED MW37D-GW031721 SAMPLES

1420 DEMOBILIZING FROM MW-37D

1439 TEA TO GET ICE, ANNA TO CONNEX TO DISPOSE PURGE WATER, WILL BE DOING MW-38S10 TODAY AS WELL

1500 TEAM SETTING UP AT MW-38S

1514 PURGE START TIME AT MW-38S. SOME TURBIDITY STABILIZATION ISSUES, ADJUSTED PRESSURE.

1630 SAMPLE TIME MW38S-GW031721

1655 DEMOBILIZING FROM ~~MW38S-GW031721~~ TV 03/17 MW-38S.

1705 STOPPING BY BEN TO PICK UP GATE KEYS

1715 UNLOADING EQUIPMENT, CHARGING BATTERIES, PREPARING EQUIPMENT TO SAMPLE TOMORROW.

1745 FIELD TEAM OFFSITE.

Location SLC VA Date 3/18/21

Project / Client 700 S 1600 E PCE PLUME

WEATHER PARTY CLOUDY, HIGH 63°F, LOW 49°F

TASK GW SAMPLING PLAN IS TO SAMPLE MW-38D, MW-14S AND MW-14D

PPE LEVEL D

PERSONNEL TEA (RTLAR (COMSMITH), ANNA FIRONI (WASATCH ENVIRONMENTAL)

0645 EQUIPMENT CALIBRATED IN THE HOTEL ROOM NO ISSUES

0800 ~~TEA~~ TEA ONSITE, ANNA TO WASATCH TO GRAB YSI THAT ARRIVED YESTERDAY.

0815 ANNA ARRIVES ONSITE LOADING EQUIPMENT

0825 HEALTH AND SAFETY MEETING WITH OTHER TEAMS

0900 TEAM TO MW-38D. CAN'T LOCATE MW-MAGNET. ANNA TO CONNEX TO PICK UP THE OTHER MAGNET.

0930 PURGE START TIME AT MW-38D

1025 COLLECTED MW38D-GW031821

1045 TEAM TO CONNEX TO DROP OFF PURGE WATER AND PICK UP MORE BUCKETS FOR MW-14D

1115 TEAM TO MW-14 WELLS

1130 TEAM AT MW-14S MW-14D HAS TAMPER-PROOF BOLTS SO ANNA WENT TO CONNEX TO GRAB THE DRILL AND DRILL BITS

1154 PURGE START TIME AT MW-14S. DRAWDOWN IS >0.3ft SO MESSAGE HAS BEEN REDUCED SO FLOW RATE IS 50mL IT WILL TAKE UNTIL 1241 TO OBTAIN MINIMUM PURGE VOLUME SO MEASUREMENTS WILL BE TAKEN EVERY 10MINS.

1310 COMMUNICATING WITH BEN AND MARK ABOUT OPTIONS TO COLLECT SAMPLES CONSIDERING DRAWDOWN EXCEEDING 0.3ft.

Location SLC VA Date 3/18/21

Project / Client 700 S 1600 E PCE PLUME

1335 COLLECTED MW14S-GW031821 (AFTER ATTEMPTS FROM BEN (TEL)

1340 GOT A GO AHEAD TO COLLECT MW-14D SAMPLES FROM BEN

1352 PURGE START TIME AT MW-14D (VARIES AN VARY)

1403 FLOWRATE DROPPED. USED 60S INTERVALS TO MEASURE FLOWRATE

1409 SWITCHED TO 30S INTERVALS TO MEASURE FLOWRATE SO THE VOLUME IS 2100 mL ON MEASURING CUP

1418 PARAMETERS STABLE

1419 COLLECTED MW14D-GW031821 AT MW-14D

1430 DEMOBILIZING FROM MW-14D

1500 SWINGING BY BEN TO PICK UP HIS SAMPLES. WENT TO SMITHS TO SMITH'S TO PICK UP ICE. MET WITH EMMANARIA TO PREPARE SAMPLES FOR SHIPPING

1630 ANNA TO SMITH'S TO PICK UP MORE ICE AS 6 COOLERS TOTAL ARE SHIPPED

1700 TEAM TO FEDEX TO SHIP SAMPLES

1735 ANNA OFFSITE, TEA UPDATING FIELD NOTEBOOK AND SENDING PICTURES OF THE FOCUS AND DAILY ACTIVITIES TO THE REST OF THE TEAM

1800 TEA OFFSITE

Rite in the Rain

Location SLC VA Date 03/19/21

Project / Client 700 S 1600 E PCE PLUME

WEATHER SUNNY TO PARTLY CLOUDY, HIGH 68 F, LOW 48 F

TASK GW SAMPLING 17S AND D, 20 SAND D, BIENNIALLY 15, 19, 22

SITE LEVEL D

PERSONNEL TEA VIRTUE (CON SMITH), KIEL KELLER

0730 FIELD TEAM DESITE. CALIBRATING EQUIPMENT AND LOADING SUPPLIES FOR SITE

0815 HEALTH AND SAFETY MEETING

0830 TEAM TO MW20S

0855 PURGE START TIME AT MW-20S

0940 COLLECTED MW20S-GW031921

0945 TEAM TO MW-20D

0952 PURGE START TIME AT MW-20D

1035 COLLECTED MW20D-GW031921

1045 TEAM TO CONNER TO DISPOSE OF PURGE WATER

11:5 TEAM AT MW-17S

130 PURGE START TIME AT MW-17S. HAVING DRAWDOWN ISSUES AGAIN FLOW AT 100, 50 mL/min.

1220 RETIRED ORIGINAL PUMP PURGE TIME AT MW-17S IN 03/19

~~TALKED~~ COMMUNICATED WITH PTL ABOUT DRAWDOWN ISSUE AND GOT APPROVAL AFTER PURGING EXTRA VOLUME ACCOUNTING FOR DRAWDOWN EXCEEDING 0.3 FT.

1240 PURGED PUMP PURGE TIME ACCOUNTING FOR DRAWDOWN AT THE TIME. CHECKED WITH PTL WE ARE CLEAR TO SAMPLE AFTER ONE MORE MEASUREMENT.

1245 TURBIDITY EXCEEDING STABILIZATION PARAMETERS, TAKING

Location SLC VA Date 03/19/21

Project / Client 700 S 1600 E PCE PLUME

READINGS EVERY 3 MINUTES

1251 STABILIZATION PARAMETERS MET, EXTRA PURGE VOLUME ACCOUNTING FOR DRAWDOWN AT THIS POINT. READY TO SAMPLE

1255 COLLECTED MW17S-GW031921

1305 CHECKING WITH PTL WHERE TO DEPLOY PUMP MID. PUMP WILL BE DEPLOYED AT 44 FT BELOW GROUND SURFACE AT MW-17D.

1310 DEPLOYING PUMP. REHOSING WE ARE MISSING ATTACHMENTS FOR DRIVE LINE. KIEL TO CONNER TO PICK THEM UP.

1340 KIEL BACK AT MW17D. CONNECTIONS WORK.

1348 PURGE START TIME. SIDE NOTE: THERE IS A BAD LOOKING KINK AT ABOUT 20 FT ON ONE OF THE LINES AIR DOESN'T SEEM TO BE MAKING IT INTO THE TUBING, AS THERE ARE NO BUBBLES IN THE DRIVE LINE.

1350 FIRST READINGS TAKEN TURBIDITY IS REALLY HIGH. TURBIDIMETER READING OVER RANGE.

1400 INCREASED PRESSURE TO 40 PSI TO BE CLOSER TO PURGATE FROM THE LAST SAMPLING EVENT

1430 WATER STARTING TO CLEAR UP, BUT IT IS TAKING SOME TIME SO REDUCED READINGS TO 20 MINS.

1445 MOVED ON THE MW17S, FLOW RATE INCREASED TO 300 mL/min

Location SLC VA Date 03/19/21

Project Client 700 S 1600 E PCE PLUME

1525 PUMP IS DROPPED BELOW 50 NOV STARTING RECORDING EVERY 5 MINS FOR PARAMETERS.

1550 AT TWO HOUR MARK FOR PURGING. DECIDED TO FT ABOUT TAKING SAMPLE AFTER AN ADDITIONAL TV 03/19 ~~DATA~~ READING.

1600 COLLECTED MW17D-GW031921

1610 DEMOBILIZING FROM MW-17D. THERE IS NO LOCK ON MW-17S FOR THE NEXT SAMPLING EVENT, DRIVE CAP/ LINE HAS BEEN MARKED WITH A SHARPIE TO AVOID HAVING TO RETRIEVE AND REDEVELOP THE PUMP, THUS RESUSPENDING SEDIMENT WHICH SETTLED AT THE BOTTOM.

1625 TEAM BACK AT CONNEX, DISPOSING PURGE WATER, CHARGING BATTERIES.

1630 KLEI OFFSITE

1700 TEA OFFSITE

Location SLC VA Date 03/21/21

Project / Client 700 S 1600 E PCE PLUME

WEATHER: PARTLY CLOUDY, HIGH 44°F, LOW 29°F, SNOW UNTIL TV 3/21 11AM

TASK GW SAMPLING PLANNING MW-18, MW-14, MW-22, MAYBE MW-24 & 23

PPE · GEAR D

PERSONNEL: TBA VIETZAR (COH SMITH), KEVIN MURPHY (WASATCH ENV.)

0645 CALIBRATING EQUIPMENT AT THE HOTEL

0800 TEAM ONSITE, LOADING EQUIPMENT

0830 HEALTH AND SAFETY MEETING

0845 TEAM TO MW-18. USING PUMP TO REMOVE EXCESS WATER

0908 PURGE START TIME AT MW-18

0945 COLLECTED MW18-GW032121

0955 TEAM DEMOBILIZING FROM MW-18, SETTING UP AT MW-14

1008 PURGE START TIME AT MW-14

1040 COLLECTED MW14-GW032121

1050 TEAM DEMOBILIZING FROM MW-14, HEADING TO MW-22

1100 PURGE START TIME AT MW-22

1220 COLLECTED MW22-GW032121

1230 DEMOBILIZING AND GOING BACK TO CONNEX. PC WANTS US TO START WITH MW-13 TO PURGE IF DRY IF NEEDED SO WENT TO CONNEX, ASSEMBLED KIT FOR MW-13, DISPOSED OF PURGE WATER. VEHICLE IS PARKED OVER MW-24 SO WON'T BE ABLE TO SAMPLE THAT TODAY

1345 TEAM AT MW-13S, SETTING UP TRAFFIC CONTROL AND TV 3/24

Rain on the Rain

Location SLC VA Date 03/21/21

Project / Client 700 S 1600 E PCE PLUME

1407 STARTING TO PURGE MW-13S. TEAM ALSO DEPLOYED PUMP AT MW-13L TO REDUCE TURBIDITY FOR PURGING MW-13L

1410 MINIMUM PURGE VOLUME MET. THERE IS A LOT OF DRAWDOWN GOING ON

1425 TALKED TO FTL. SINCE DRAWDOWN IS NOT CHANGING SUBSTANTIALLY, PURGING WILL ONLY UNTIL WE CAN NO LONGER TAKE A WATER LEVEL READING.

1435 INCREASED FLOWRATE TO 22 RPM, 20/80 CYCLES

1505 MW-13S HAS BEEN PURGED DRY. WATER LEVEL OF NOW THAN 16.54 FT BTOC HAS BEEN REACHED (PUMP AT THIS DEPTH)

503 STOPPED PURGING MW-13S. PURGED ABOUT 1.5 GALLONS

515 TEAM MOBILIZED TO MW-13D.

525 PURGE START TIME AT MW-13D

550 APPROVED BY FTL AFTER ACCOUNTING FOR EXTRA DRAWDOWN VOLUME TO SAMPLE

1620 PARAMETERS STABILIZED (DO WAS SLOW TO STABILIZE)

1625 COLLECTED MW13D - GW032121

1630 COLLECTED FD03 - GW032121

1640 TEAM DEMOBILIZING FROM MW-13D AND HEADED TO CONNEX. TRIED TO PURGE WATER OUT OF SECONDARY CONTAINMENT BUT PUMP IS UNKNOWN. TRIED SUBMERGING IT INTO BUCKET OF WATER AND CHANGING LEADS. NO LUCK. DISASSEMBLED PUMP, WATER ENTERING ELECTRICAL CONNECTIONS

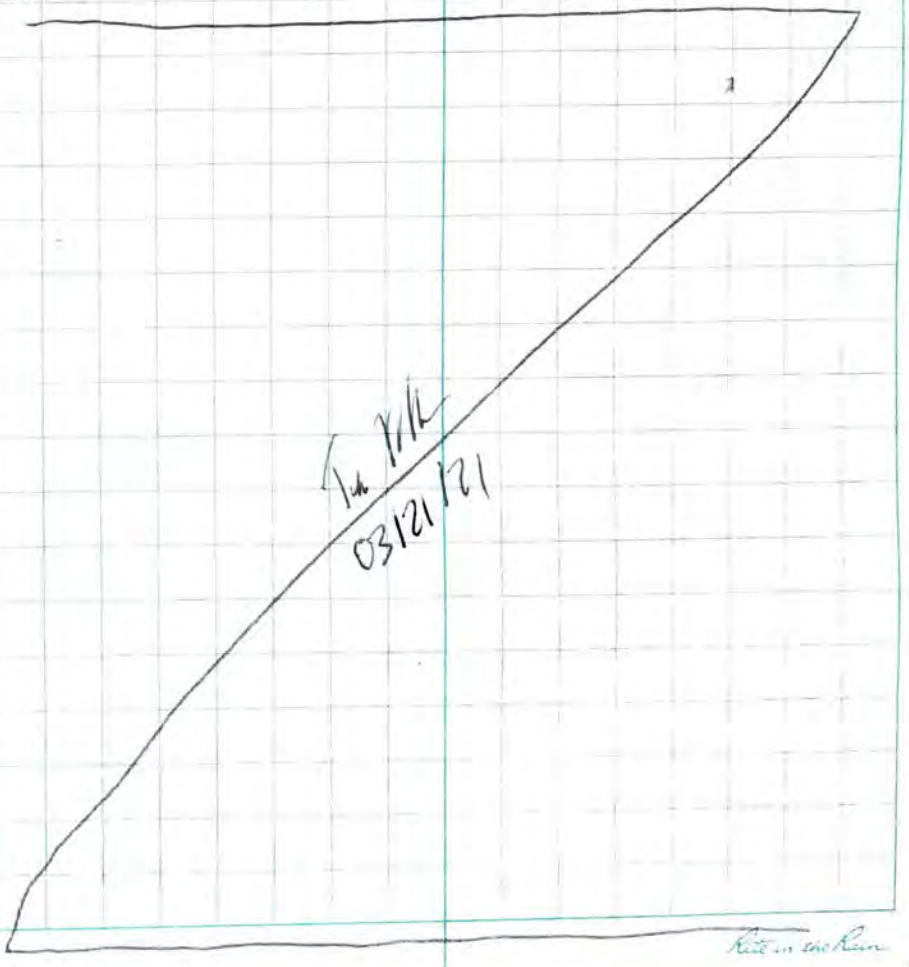
Location SLC VA Date 03/21/21

Project / Client 700 S 1600 E PCE PLUME.

LET THE PUMP TO DRY OUT AND HAVE LEFT IT IN THE CONNEX (IN CASE FREEZING ALSO WAS A PART OF THE PROBLEM). TALKED TO FTL KEVIN WILL TRY TO GET PUMP FROM WASATCH TOMORROW WHEN HE GRABS EXTRA COOLERS

1715 TEAM PUTTING EQUIPMENT BACK TO CONNEX.

1745 TEAM OFFSITE.



Location SLC VA Date 03/22/21

Project / Client 700S 1600E PCE PLUME

WEATHER PARTLY CLOUDY, HIGH 46°F, LOW 32°F, SOME SNOW

TASK GW SAMPLING MW35 AND MW-13L

PPE LEVEL D

PERSONNEL TEA VATUM (CON SMITH), KEVIN MURPHY (WASATCH ENVIRONMENTAL)

0630 EQUIPMENT CALIBRATION IN THE HOTEL. NO ISSUES ENCOUNTERED

0830 TEAM ON SITE. NO PROBE HAS BEEN ATTEMPTED TO BE CALIBRATED USING BAROMETRIC PRESSURE OF 703 mm Hg. THE READING WAS 30-60% (UNACCEPTABLE). TRIED FACTORY RESETTING THE SETTING FOR DO, DIDN'T HELP. DECIDED TO CHANGE THE YELLOW TIP ON YSI DO PROBE, BUT FTL REQUESTED ~~IVONE~~ US TO USE ALTERNATIVE YSI INSTEAD OF FURTHER TROUBLESHOOTING.

0830 HEALTH AND SAFETY MEETING

0900 TEAM TO MW-13S TO SAMPLE. SINCE YESTERDAY WE PURGED THE WELL DRY, WE WILL TAKE ONE SET OF READINGS AND THEN SAMPLE.

0929 PURGE START TIME AT MW-13S

0935 COLLECTED MW13S-GW032221

0945 TEAM AT MW-13L. HIGH TURBIDITY ENCOUNTERED BUT SEEMS TO BE DECREASING SUBSTANTIALLY. PURGE START TIME WAS AT 0956.

1050 INFORMED FTL OF ISSUES WITH TURBIDITY

1150 CHECKED WITH FTL, WILL CONTINUE TAKING ~~SAMPLES~~ TO 03RD READINGS EVERY 10 MINUTES FTL WILL BRING MORE GAS

Location SLC VA Date 03/22/21

Project / Client 700S 1600E PCE PLUME

1210 FTL STOPPED BY TO BRING ANOTHER GAS CYLINDER

1230 FTL COLLECTED FIELD BLANK EB01-GW032221

1300 GAS CYLINDER CHANGED

1310 PARAMETERS STABLE, READY TO SAMPLE

1315 COLLECTED MW13L-GW032221

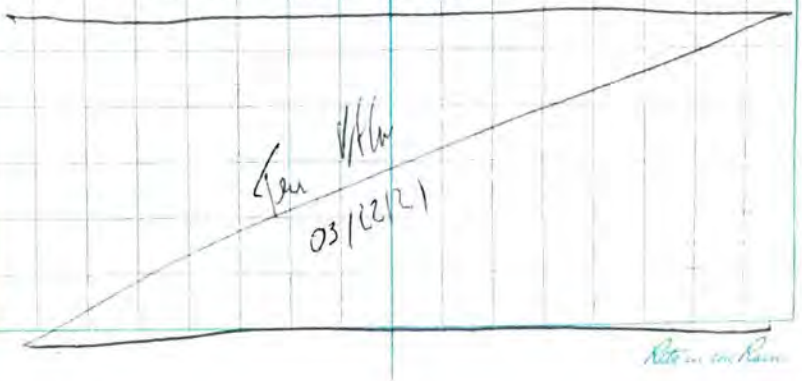
1320 COLLECTED PD04-GW032221

1530 DEMOBILIZING FROM MW-13L, HEADING TO CONTOS TO HELP WITH SAMPLE SHIPPING

1630 SAMPLES SENT TO FEDEX WITH TAKUMA AND LOVA. HELPING WITH PACKING EQUIPMENT. KEVIN HELPING WITH REMOVING WATER FROM SECONDARY CONTAINMENT AT PLUMBING (SNOW/RAIN MELTED). INVENTORY FOR JOE.

1800 TEA TO MW-17S TO PLACE A LOCK SN DON'T HAVE CORRECT SERIAL NUMBER OF THE LOCK (2201). WILL COME BACK TOMORROW WITH A CORRECT LOCK.

1815 TEAM OFFSITE. IN HOTEL, SORTING OUT FIELD NOTES TO PLACE THEM INTO BINDER AND INFORMING JOE OF INVENTORY TAKEN AT THE CONTOS.



14:

Location SLC V1 Date 02/23/21

Project / Client 70 x 160 C PW PLUME

WEATHER	MOSTLY CLOUDY, HIGH 46 F, LOW 28 F
TASK	GW RECORDS TASKS, SOIL GAS SAMPLING.
PPE	LEVEL D
PERSONNEL	TEA VETLAR (CDM SMITH), KEVIN DUNPHY (WASATCH ENVIRONMENTAL)
O&M	TEAM ONSITE. CALIBRATED EQUIPMENT FOR BEN AND WHITNEY. ISSUES WITH PID FOR WHITNEY, RECOMMEND SWITCHING IT OUT WITH BEN'S PID.
0830	HEALTH AND SAFETY MEETING
0900	TEAM SPLIT, KEVIN HELPING BEN WITH SAMPLING, TEA HELPING WHITNEY WITH SOIL GAS SAMPLING.
0905	~~BE~~ BENDER BENDER WITH KHUE. TOOK PICTURES, NOTIFIED FTL
0910	JOINING WHITNEY'S TEAM. SAMPLING MW 28-SG03 AND SG11. MW28-SG03 HAS 3 DEPTH INTERVALS. ALL NOTES TAKEN BY WHITNEY IN HER FIELD NOTEBOOK. OVERALL WE SAMPLED 11 LOCATIONS, ONE LOCATION WITH 3 DEPTH INTERVALS, FOR A TOTAL OF 13 SAMPLES COLLECTED. ONE LOCATION HAD ISSUES WITH OBTAINING SAMPLE. AFTER TROUBLESHOOTING IT WAS CONCLUDED THIS LOCATION COULDN'T BE SAMPLED. FOLLOWING SAMPLE COLLECTION, QC WAS PERFORMED TO ENSURE LABELS MATCH
1605	TEA TO MW-17S TO DETUM LOCK WITH CORRECT LOCK TYPE (2201). PICTURE TAKEN, FTL INFORMED.
1630	TEA TO CONNER TO ~~PROF OFF~~ TV 03/25 REMOVE FIELD EQUIPMENT FROM HER TRUCK. KEVIN WILL HELP SOIL GAS SAMPLING TEAM TOMORROW. TEA LEAVING SITE TOMORROW.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 3/15/2021	**Prepared by:** Ben Carreon

Personnel on site, including Contractors:	CDM Smith – Ben Carreon, Emma Rott Wasatch – Kiel Keller, Anna Fiorini
Visitors/Others:	None

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	0 To 32 º F
Wind	**Still**	**Moderate**	High		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Water level and low-flow groundwater sampling equipment

Description of Field Activities – including samples/data collected, etc:

- A H&S tailgate was conducted at the IDW yard area.
- Synoptic Water Level Event
  - All water levels measurements were completed.
- Groundwater Sampling
  - No groundwater samples were collected.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

- Cable detached from MW-14S pump – cable and ferrules will be replaced.
- Cable detached from MW-05R pump – ferrules will be replaced.
- Cable detached from MW-06 transducer and the transducer was downhole. Will attempt transducer recovery at a later date.
- The Denver based field team (Maria Day, Iona Campbell, and Tea Vrtlar) encountered weather delays and are tentatively expected to arrive at the site Tuesday, March 16th.
- Salt Lake County has a mandatory mask mandate in effect since Saturday, June 27th. Masks are required in public.

Projected Work – Near Term:

- Two teams will begin groundwater sampling.
- The third team will begin groundwater sampling once they arrive at the site.

Other Activities/Remarks:

Photos:

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 3/15/2021 **Location:** MW-34B **Description:** Panacea pump
	Date: 3/15/2021 **Location:** MW-34D **Description:** Panacea pump and transducer housing

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 3/16/2021	**Prepared by:** Ben Carreon

Personnel on site, including Contractors:	CDM Smith – Ben Carreon, Maria Day, Tea Vrtlar, Emma Rott, Iona Campbell Wasatch – Anna Fiorina, Kiel Keller
Visitors/Others:	VA – Shannon Smith, Wynn John

Weather	Sunny	**Partly Cloudy**	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	0 To 32 º F
Wind	**Still**	**Moderate**	High		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Low-flow groundwater sampling equipment

Description of Field Activities – including samples/data collected, etc:

- A H&S tailgate was conducted at the IDW yard area.
- Equipment was calibrated.
- Groundwater Sampling
    - Groundwater samples collected:
        - MW-15S (MW15S-GW031621)
            - For the following parameters:
                - VOCs
        - MW-15D (MW15D-GW031621)
            - For the following parameters:
                - VOCs
        - MW-21 (MW21-GW031621)
            - For the following parameters:
                - VOCs
        - MW-23A (MW23A-GW031621)
            - For the following parameters:
                - VOCs
                - Geochemistry
                    - Metals
                    - Dissolved gases
                    - Sulfate, chloride
                    - Nitrate + nitrite (total N)
                    - TOC
                    - Alkalinity
        - MW-23B (MW23A-GW031621)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-23C (MW23A-GW031621)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-27 (MW27-GW031621)
            - For the following parameters:

        - VOCs
        - Geochemistry
    - MW-30RA (MW30RA-GW031621 and FD05-GW031621)
        - For the following parameters:
            - VOCs
            - Geochemistry
    - MW-30RB (MW30RB-GW031621)
        - For the following parameters:
            - VOCs
            - Geochemistry
    - MW-30C (MW30C-GW031621)
        - For the following parameters:
            - VOCs
            - Geochemistry
    - MW-36 (MW36-GW031621 and FD07-GW031621)
        - For the following parameters:
            - VOCs
            - Geochemistry
- No samples were shipped to EMAX Labs.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

- Salt Lake County has a mandatory mask mandate in effect since Saturday, June 27. Masks are required in public.

Projected Work – Near Term:

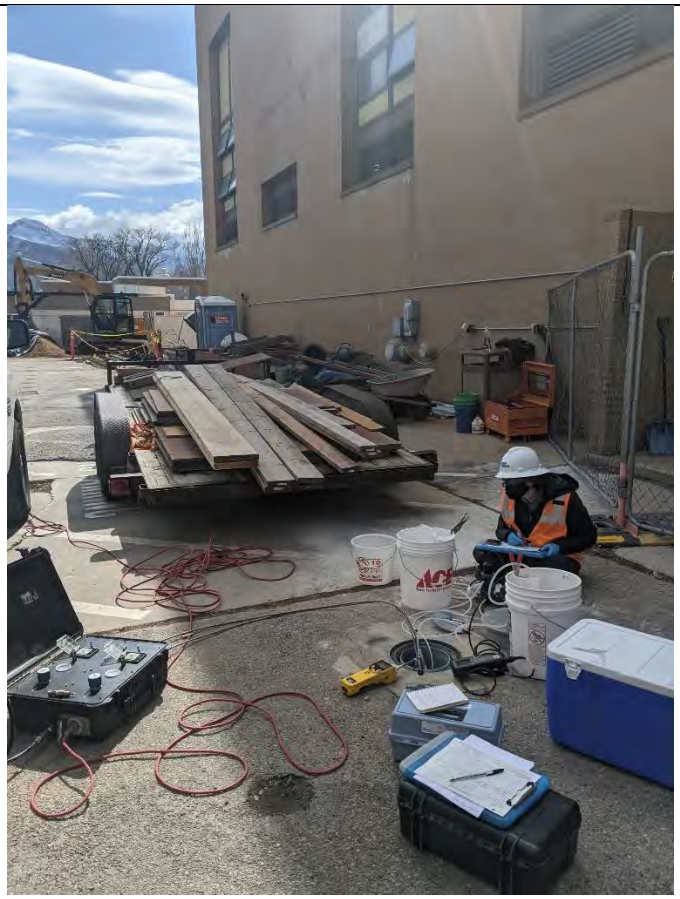
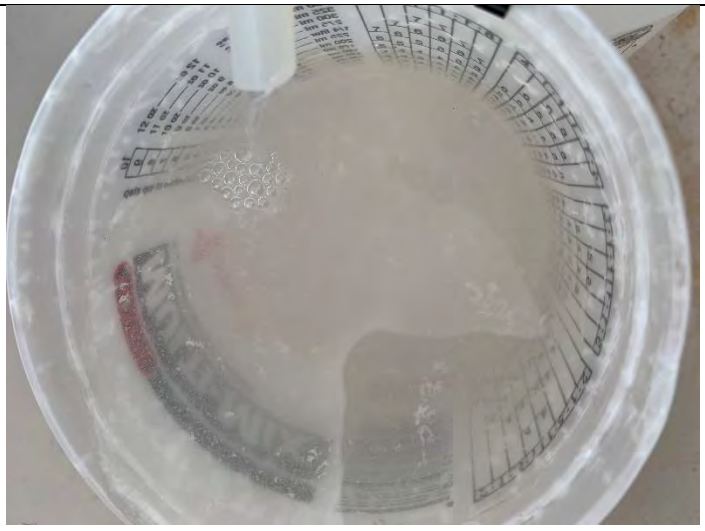
- Continue groundwater sampling.

Other Activities/Remarks:

- None.

Photos:

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	**Date:** 3/16/2021 **Location:** MW-23 **Description:** Equipment setup
	**Date:** 3/16/2021 **Location:** MW-30 **Description:** Groundwater early on during purge

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Date: 3/16/2021

Location: MW-336

Description: Equipment setup

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 3/17/2021	**Prepared by:** Ben Carreon

Personnel on site, including Contractors:	CDM Smith – Ben Carreon, Maria Day, Tea Vrtlar, Emma Rott, Iona Campbell Wasatch – Anna Fiorina
Visitors/Others:	VA – Wynn John

Weather	Sunny	**Partly Cloudy**	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	**50 to 70 º F**	**32 to 50 º F**	0 To 32 º F
Wind	**Still**	Moderate	High		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Low-flow groundwater sampling equipment

Description of Field Activities – including samples/data collected, etc:

- A H&S tailgate was conducted at the IDW yard area.
- Equipment was calibrated.
- Groundwater Sampling
    - Groundwater samples collected:
        - MW-08A (MW08A-GW031721, FD02-GW031721)
            - For the following parameters:
                - VOCs
        - MW-08B (MW08B-GW031721)
            - For the following parameters:
                - VOCs
        - MW-08C (MW08C-GW031721)
            - For the following parameters:
                - VOCs
        - MW-12D (MW12D-GW031721)
            - For the following parameters:
                - VOCs
        - MW-16D (MW16D-GW031721)
            - For the following parameters:
                - VOCs
        - MW-16S (MW16S-GW031721)
            - For the following parameters:
                - VOCs
        - MW-26A (MW26A-GW031721)
            - For the following parameters:
                - VOCs
                - Geochemistry
                    - Metals
                    - Dissolved gases
                    - Sulfate, chloride
                    - Nitrate + nitrite (total N)
                    - TOC
                    - Alkalinity

- MW-26B (MW26B-GW031721)
  - For the following parameters:
    - VOCs
    - Geochemistry
- MW-32A (MW32A-GW031721, FD06-GW031721)
  - For the following parameters:
    - VOCs
    - Geochemistry
- MW-32B (MW32B-GW031721)
  - For the following parameters:
    - VOCs
    - Geochemistry
- MW-32C (MW32C-GW031721)
  - For the following parameters:
    - VOCs
    - Geochemistry
- MW-37D (MW37D-GW031721)
  - For the following parameters:
    - VOCs
    - Geochemistry
- MW-37S (MW37S-GW031721)
  - For the following parameters:
    - VOCs
    - Geochemistry
- MW-38S (MW38S-GW031721)
  - For the following parameters:
    - VOCs
    - Geochemistry

- No samples were shipped to EMAX Labs. A sample shipment is planned for Thursday, March 18.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

- Salt Lake County has a mandatory mask mandate in effect since Saturday, June 27. Masks are required in public.
- MW-12S was dry. No groundwater samples were collected.

Projected Work – Near Term:

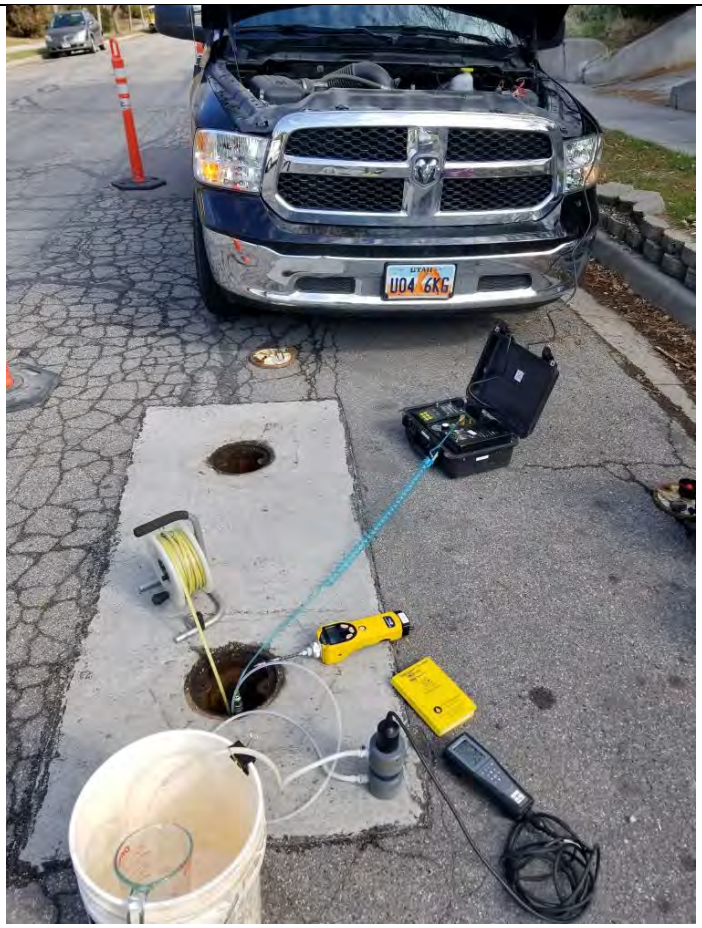
- Continue groundwater sampling.
- Ship samples.

Other Activities/Remarks:

- None.

Photos:

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 3/17/2021 **Location:** MW-08C **Description:** Turbid purge water
	**Date:** 3/17/2021 **Location:** MW-16S **Description:** Equipment setup

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Date: 3/17/2021

Location: MW-32

Description: Excessive moisture drawing back in air line during recharge cycle

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 3/18/2021	**Prepared by:** Ben Carreon

Personnel on site, including Contractors:	CDM Smith – Ben Carreon, Maria Day, Tea Vrtlar, Emma Rott, Iona Campbell Wasatch – Anna Fiorina
Visitors/Others:	VA – Wynn John

Weather	**Sunny**	**Partly Cloudy**	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	**50 to 70 º F**	**32 to 50 º F**	0 To 32 º F
Wind	**Still**	**Moderate**	High		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Low-flow groundwater sampling equipment

Description of Field Activities – including samples/data collected, etc:

- A H&S tailgate was conducted at the IDW yard area.
- Equipment was calibrated.
- Groundwater Sampling
    - Groundwater samples collected:
        - MW-14S (MW014S-GW031821)
            - For the following parameters:
                - VOCs
        - MW-14D (MW14D-GW031821)
            - For the following parameters:
                - VOCs
        - MW-26C (MW26C-GW031821)
            - For the following parameters:
                - VOCs
                - Geochemistry
                    - Metals
                    - Dissolved gases
                    - Sulfate, chloride
                    - Nitrate + nitrite (total N)
                    - TOC
                    - Alkalinity
                - 1,4-Dioxane
        - MW-26D (MW26D-GW031821)
            - For the following parameters:
                - VOCs
                - Geochemistry
                - 1,4-Dioxane
        - MW-31A (MW31A-GW031821)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-31B (MW31B-GW031821)
            - For the following parameters:

        - VOCs
        - Geochemistry
    - MW-31C (MW12C-GW031821)
        - For the following parameters:
            - VOCs
            - Geochemistry
    - MW-38D (MW38D-GW031821)
        - For the following parameters:
            - VOCs
            - Geochemistry
- The following samples were shipped to EMAX labs:
    - Collected 3/16/21
        - MW15S-GW031621
        - MW15D-GW031621
        - MW21-GW031621
        - MW23A-GW031621
        - MW23B-GW031621
        - MW23C-GW031621
        - MW27-GW031621
        - MW30RA-GW031621
        - FD05-GW031621
        - MW30RB-GW031621
        - MW30C-GW031621
        - MW36-GW031621
        - FD07-GW031621
    - Collected 3/17/21
        - MW08A-GW031721
        - FD02-GW031721
        - MW08B-GW031721
        - MW08C-GW031721
        - MW12D-GW031721
        - MW16D-GW031721
        - MW16S-GW031721
        - MW26A-GW031721
        - MW26B-GW031721
        - MW32A-GW031721
        - FD06-GW031721
        - MW32B-GW031721
        - MW32C-GW031721
        - MW37D-GW031721
        - MW37S-GW031721
        - MW38S-GW031721
    - Collected 3/18/21
        - MW14S-GW031821
        - MW14D-GW031821
        - MW26C-GW031821
        - MW26D-GW031821
        - MW38D-GW031821
- MW-31A pump was lowered to 143 ft bgs.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

- Salt Lake County has a mandatory mask mandate in effect since Saturday, June 27. Masks are required in public.
- MW-31A experienced breakthrough while purging. The pump was pulled in order to gauge the water level. Water level was 133.40 ft bgs (132.40 ft btoc). The pump depth was 138 ft bgs. Although MW-31A contains a volume booster in line with the panacea pump, the minimal water column was determined to be the reason for breakthrough. As there is no pump receiver at this location, the pump was lowered by 5 feet to 143 ft bgs. The water column was rebuilt, and the well was successfully sampled.

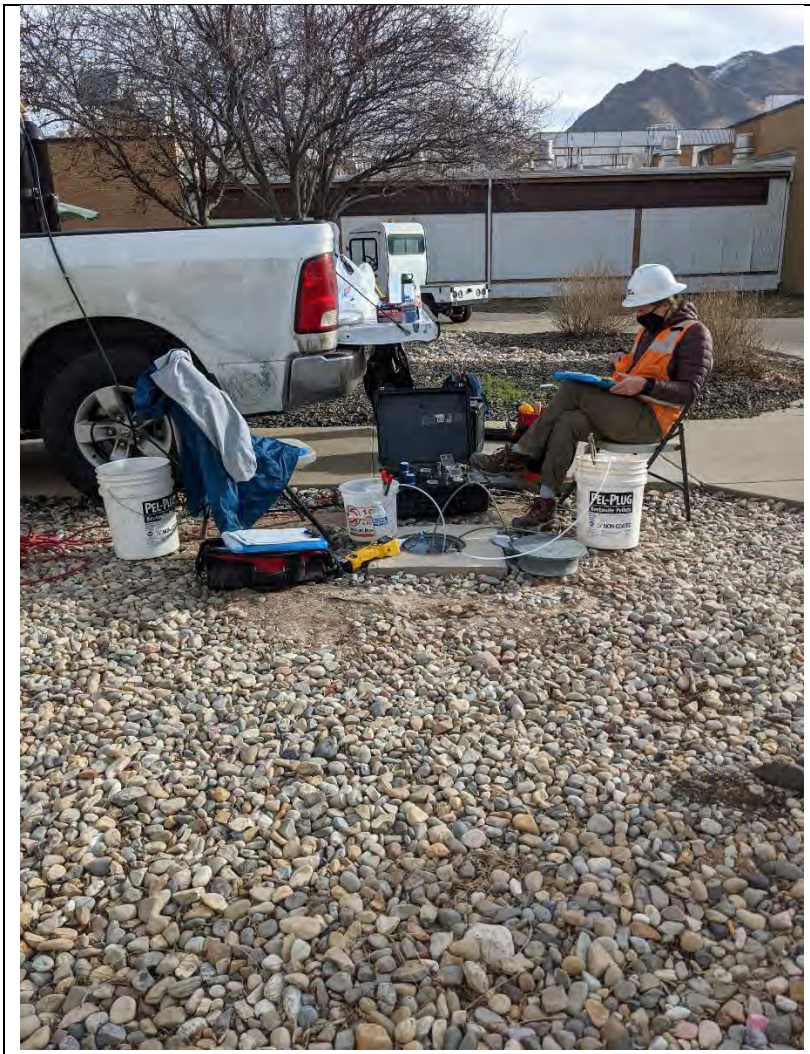
Projected Work – Near Term:

- Continue groundwater sampling.
- Rest day 3/20/21.

Other Activities/Remarks:

- None.

Photos:



Date: 3/18/2021

Location: MW-26

Description: Equipment setup

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 3/18/2021 **Location:** MW-31 **Description:** Equipment setup
	Date: 3/18/2021 **Location:** MW-31 **Description:** Pump condition
	Date: 3/18/2021 **Location:** MW-31A **Description:** Five-foot tubing extension to lower pump.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 3/19/2021	**Prepared by:** Ben Carreon

Personnel on site, including Contractors:	CDM Smith – Ben Carreon, Maria Day, Tea Vrtlar, Emma Rott, Iona Campbell Wasatch – Kiel Keller
Visitors/Others:	

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	**50 to 70 º F**	**32 to 50 º F**	0 To 32 º F
Wind	**Still**	Moderate	High		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Low-flow groundwater sampling equipment

Description of Field Activities – including samples/data collected, etc:

- A H&S tailgate was conducted at the IDW yard area.
- Equipment was calibrated.
- Groundwater Sampling
    - Groundwater samples collected:
        - MW-17S (MW17S-GW031921)
            - For the following parameters:
                - VOCs
        - MW-17D (MW17D-GW031921)
            - For the following parameters:
                - VOCs
        - MW-20S (MW20S-GW031921)
            - For the following parameters:
                - VOCs
        - MW-20D (MW20D-GW031921)
            - For the following parameters:
                - VOCs
        - MW-29A (MW29A-GW031921)
            - For the following parameters:
                - VOCs
                - Geochemistry
                    - Metals
                    - Dissolved gases
                    - Sulfate, chloride
                    - Nitrate + nitrite (total N)
                    - TOC
                    - Alkalinity
        - MW-29B (MW29B-GW031921)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-29C (MW29C-GW031921)
            - For the following parameters:

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

        - VOCs
        - Geochemistry
    - MW-34A (MW34A-GW031921)
        - For the following parameters:
            - VOCs
            - Geochemistry
    - MW-34B (MW34B-GW031921)
        - For the following parameters:
            - VOCs
            - Geochemistry
    - MW-34C (MW34C-GW031921)
        - For the following parameters:
            - VOCs
            - Geochemistry
    - MW-34D (MW34D-GW031921)
        - For the following parameters:
            - VOCs
            - Geochemistry
- No samples were shipped to EMAX.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

- Salt Lake County has a mandatory mask mandate in effect since Saturday, June 27. Masks are required in public.
- MW-29C purge water was drawing back down the discharge tubing during recharge cycles. Eventually, the well experienced breakthrough while purging. The pump was pulled, cleaned, and redeployed. The water column was rebuilt, and the well was successfully sampled.

Projected Work – Near Term:

- Rest day 3/20/21.
- Continue groundwater sampling 3/21/21.

Other Activities/Remarks:

- None.

Photos:

Date: 3/19/2021

Location: MW-20S

Description: Equipment setup

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Salt Lake City, Utah

	Date: 3/19/2021 **Location:** MW-34 **Description:** Equipment setup
	Date: 3/19/2021 **Location:** MW-29 **Description:** Equipment setup

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Salt Lake City, Utah

	Date: 3/19/2021 **Location:** MW-29C **Description:** Pump
	Date: 3/19/2021 **Location:** MW-29C **Description:** Pump internals

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 3/21/2021	**Prepared by:** Ben Carreon

Personnel on site, including Contractors:	CDM Smith – Ben Carreon, Maria Day, Tea Vrtlar, Emma Rott, Iona Campbell Wasatch – Kevin Murphy
Visitors/Others:	

Weather	Sunny	**Partly Cloudy**	Overcast	Rain	**Snow**
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	**0 To 32 º F**
Wind	**Still**	**Moderate**	High		
Humidity	Dry	Moderate	**Humid**		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Low-flow groundwater sampling equipment

Description of Field Activities – including samples/data collected, etc:

- A H&S tailgate was conducted at the IDW yard area.
- Equipment was calibrated.
- Groundwater Sampling
    - Groundwater samples collected:
        - MW-03RA (MW03RA-GW032121)
            - For the following parameters:
                - VOCs
        - MW-03RB (MW03RB-GW032121)
            - For the following parameters:
                - VOCs
        - MW-03RC (MW03RC-GW032121)
            - For the following parameters:
                - VOCs
        - MW-03RD (MW03RD-GW032121)
            - For the following parameters:
                - VOCs
        - MW-13D (MW13D-GW032121, FD03-GW032121)
            - For the following parameters:
                - VOCs
        - MW-18 (MW18-GW032121)
            - For the following parameters:
                - VOCs
        - MW-19 (MW19-GW032121)
            - For the following parameters:
                - VOCs
        - MW-22 (MW22-GW032121)
            - For the following parameters:
                - VOCs
        - MW-24 (MW24-GW032121)
            - For the following parameters:
                - VOCs
                - Geochemistry

        - Metals
        - Dissolved gases
        - Sulfate, chloride
        - Nitrate + nitrite (total N)
        - TOC
        - Alkalinity
    - MW-25A (MW25A-GW032121)
        - For the following parameters:
            - VOCs
            - Geochemistry
    - MW-25B (MW25B-GW032121)
        - For the following parameters:
            - VOCs
            - Geochemistry
    - MW-25C (MW25C-GW032121)
        - For the following parameters:
            - VOCs
            - Geochemistry
    - MW-28 (MW28-GW032121)
        - For the following parameters:
            - VOCs
            - Geochemistry
- No samples were shipped to EMAX.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

- Salt Lake County has a mandatory mask mandate in effect since Saturday, June 27. Masks are required in public.
- MW-05R, MW-24, and MW-28 pump cables were all found to be disconnected from their pumps. All pumps were able to be retrieved from lifting the pumps up by the tubing. Cables were replaced for MW-24 and MW-05R. MW-28 pump was pulled and will be redeployed with a new cable.

Projected Work – Near Term:

- Continue groundwater sampling 3/22/21.

Other Activities/Remarks:

- None.

Photos:

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 3/21/2021 **Location:** MW-05R **Description:** Cable reinstall
	Date: 3/21/2021 **Location:** MW-18 **Description:** Equipment setup

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 3/21/2021 **Location:** MW-24 **Description:** Pump
	Date: 3/21/2021 **Location:** MW-24 **Description:** Pump intake

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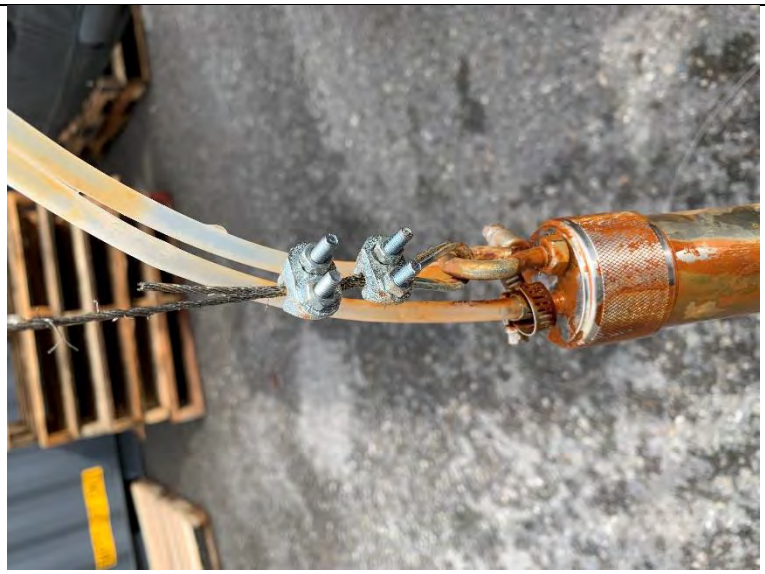
Salt Lake City, Utah

	**Date:** 3/21/2021 **Location:** MW-24 **Description:** Pump cable reinstall
	Date: 3/21/2021 **Location:** MW-25 **Description:** Equipment setup

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 3/22/2021	**Prepared by:** Ben Carreon

Personnel on site, including Contractors:	CDM Smith – Ben Carreon, Maria Day, Tea Vrtlar, Emma Rott, Iona Campbell, Whitney Treadway Wasatch – Kevin Murphy, Kiel Keller
Visitors/Others:	VA – Wynn John

Weather	**Sunny**	**Partly Cloudy**	Overcast	Rain	**Snow**
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	**0 To 32 º F**
Wind	**Still**	Moderate	High		
Humidity	Dry	Moderate	**Humid**		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Low-flow groundwater sampling equipment • Soil gas/vapor sampling equipment

Description of Field Activities – including samples/data collected, etc:

- A H&S tailgate was conducted at the IDW yard area.
- Equipment was calibrated.
- Groundwater Sampling
    - Groundwater samples collected:
        - MW-01S (MW01S-GW032221)
            - For the following parameters:
                - VOCs
        - MW-01D (MW01D-GW032221)
            - For the following parameters:
                - VOCs
        - MW-04 (MW04-GW032221, FD01-GW032221)
            - For the following parameters:
                - VOCs
        - MW-06 (MW06-GW032221)
            - For the following parameters:
                - VOCs
        - MW-13S (MW13S-GW032221)
            - For the following parameters:
                - VOCs
        - MW-13L (MW13L-GW032221, FD04-GW032221)
            - For the following parameters:
                - VOCs
                - Geochemistry
                    - Metals
                    - Dissolved gases
                    - Sulfate, chloride
                    - Nitrate + nitrite (total N)
                    - TOC
                    - Alkalinity
                - 1,4-Dioxane
    - The following samples were shipped to EMAX:

        - Collected 3/18/21
            - MW31A-GW031821
            - MW31B-GW031821
            - MW31C-GW031821
        - Collected 3/19/21
            - MW17S-GW031921
            - MW17D-GW031921
            - MW20S-GW031921
            - MW20D-GW031921
            - MW29A-GW031921
            - MW29B-GW031921
            - MW29C-GW031921
            - MW34A-GW031921
            - MW34B-GW031921
            - MW34C-GW031921
            - MW34D-GW031921
        - Collected 3/21/21
            - MW03RA-GW032121
            - MW03RB-GW032121
            - MW03RC-GW032121
            - MW03RD-GW032121
            - MW13D-GW032121
            - FD03-GW032121
            - MW18-GW032121
            - MW19-GW032121
            - MW22-GW032121
            - MW24-GW032121
            - MW25A-GW032121
            - MW25B-GW032121
            - MW25C-GW032121
            - MW28-GW032121
        - Collected 3/22/21
            - MW01S-GW032221
            - MW01D-GW032221
            - MW04-GW032221
            - FD01-GW032221)
            - MW06-GW032221
            - MW13S-GW032221
            - MW13L-GW032221
            - FD04-GW032221
    - MW-24 pump was redeployed with a new cable.
    - Calibration gasses were inventoried and empty and/or expired calibration gasses will be properly disposed.
    - Most of the groundwater sampling equipment was returned to Field Environmental.
- Soil Gas Sampling
    - Collected the following samples:
        - MW27-SG032221-28
        - SG60-SG032221
        - MW27-SG032221-113
        - SG3-SG032221
    - Shipped all four soil gas samples above to Eurofins Air Toxics for TO-15 analysis.
    - Reviewed indoor/outdoor air sampling locations for Buildings 6 and 7 with VA.

Daily Quality Control Report
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Salt Lake City, Utah

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

- Salt Lake County has a mandatory mask mandate in effect since Saturday, June 27. Masks are required in public.
- The pump at MW-02 was not functioning. The pump was cleaned and parts were replaced (o-rings, check balls, intake screen), but the pump remained nonfunctional. A non-dedicated QED sample pro pump will be used to attempt a sample on 3/23/21. A rinsate blank will be collected and submitted if a successful sample is collected using this pump. The issues encountered at this pump were consistent with some of the past issues (including MW-05R). The pitting and corrosion occurring within the pump internals is the presumed issue for pump problems, but Solinst will be contacted for further troubleshooting.
- Three depths at MW-27 (46 ft, 75 ft, and 155 ft) were too tight to properly purge or collect a soil gas sample. Two depths (28 ft and 113 ft) at this location were successfully purged and sampled.

Projected Work – Near Term:

- Finish groundwater sampling 3/22/21.
- Ship the remaining groundwater samples and return all groundwater sampling rental field equipment.
- Continue soil gas/indoor air sampling 3/23/21 to 3/26/21.

Other Activities/Remarks:

- None.

Photos:

Date: 3/22/2021

Location: MW-13L

Description: Equipment setup

Daily Quality Control Report
700 South 1600 East PCE Plume
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	Date: 3/22/2021 **Location:** MW-02 **Description:** Pump bladder in good condition
	Date: 3/22/2021 **Location:** MW-02 **Description:** Pump internals with significant staining and corrosion

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700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 3/22/2021 **Location:** MW-02 **Description:** Pump intake screen
	Date: 3/22/2021 **Location:** MW-02 **Description:** Pump internals

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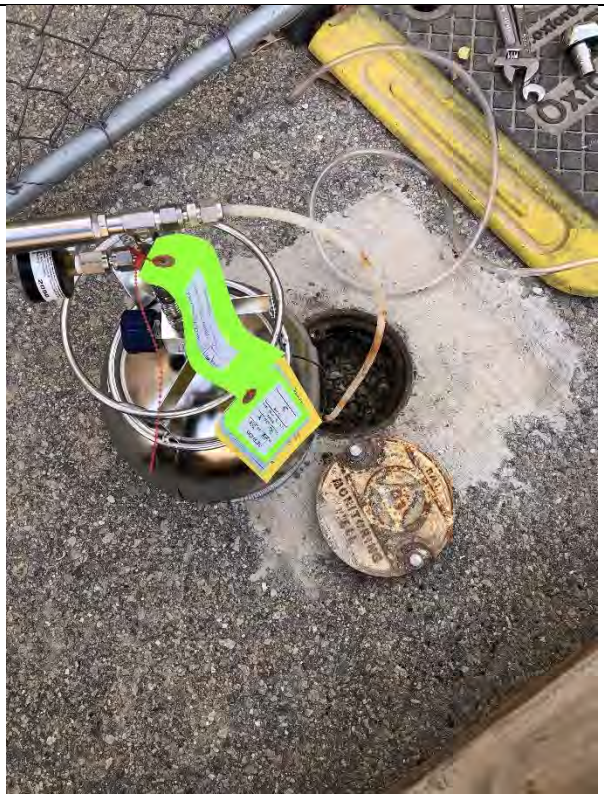
Salt Lake City, Utah

	Date: 3/22/2021 **Location:** MW-27-113' **Description:** Tightening soil gas tubing to summa canister prior to starting the collection.
	**Date:** 3/22/2021 **Location:** SG-03 **Description:** Soil gas probe sample collection.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Date: 3/22/2021

Location: MW-27-75'

Description: Attempting to purge soil gas probe tubing with air pump.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 3/23/2021	**Prepared by:** Ben Carreon

Personnel on site, including Contractors:	CDM Smith – Ben Carreon, Maria Day, Tea Vrtlar, Emma Rott, Iona Campbell, Whitney Treadway Wasatch – Kevin Murphy, Kiel Keller
Visitors/Others:	VA – Wynn John

Weather	**Sunny**	**Partly Cloudy**	Overcast	Rain	**Snow**
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	**0 To 32 º F**
Wind	**Still**	Moderate	High		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Low-flow groundwater sampling equipment • Soil gas/vapor sampling equipment

Description of Field Activities – including samples/data collected, etc:

- A H&S tailgate was conducted at the IDW yard area.
- Equipment was calibrated.
- Groundwater Sampling completed.
    - Groundwater samples collected:
        - MW-02 (MW02-GW032321)
            - For the following parameters:
                - VOCs
        - An equipment blank (EB01-GW032321) was collected from the nondedicated pump at MW-02
            - For the following parameters:
                - VOCs
    - The following samples were shipped to EMAX:
        - FB01-GW032221
            - Field blank collected at MW-13L for the following parameters:
                - VOCs
                - 1,4-dioxane
        - EB01-GW032321
        - MW02-GW032321
    - The remainder of the groundwater sampling equipment was returned to Field Environmental.
    - A j-plug was added to MW-05R since the malfunctioning pump was pulled and a protective housing was no longer in place.
    - Organization in the conex buildings and around the IDW yard was performed.
- Soil Gas Sampling
    - Collected the following samples:
        - SG10-SG032321
        - SG08-SG032321
        - SG13-SG032321
        - FD01-SG032321
        - MW28-SG032321-24
        - MW28-SG032321-48
        - MW28-SG032321-118
        - SG11-SG032321

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

- SG50-SG032321
- SG55-SG032321
- SG04-SG032321
- SG05-SG032321
- SG06-SG032321
- MW23-SG032321-135

o Shipped all 14 soil gas samples to Eurofins Air Toxics for TO-15 analysis.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

- Salt Lake County has a mandatory mask mandate in effect since Saturday, June 27. Masks are required in public.
- The three depths at MW-27 (46 ft, 75 ft, and 155 ft) which were too tight to properly purge or sample were troubleshooted. Troubleshooting consisted of applying pressure through a nitrogen cylinder, regulator, pneumatic hose, and a Swagelok fitted airline. Pressure was applied at approximately 1 PSI per foot of the SG probe length or 50 psi, 75 psi, and 150 psi, respectively. The SG locations were pressurized for five minutes at which point the tank valve was closed. The regulator pressure was monitored for loss in pressure. The 46 and 75 ft probes bled pressure at approximately 10 and 5 psi per minute, respectively. The 155 ft probe did not drop any pressure over a minute after the tank valve was closed. None of the three locations resulted in any change in tank pressure over the duration of the 5-minute injection tests. Attempts were then made to purge the SG locations with the vacuum pump, which were unsuccessful. Based on observations from injection testing and vacuum pump purging, blockage in these three lines is apparent.
- A breaker for the conex was tripped and reset from charging a PID and running lights.

Projected Work – Near Term:

- Continue soil gas/indoor air sampling 3/24/21 to 3/26/21.
- The groundwater sampling team with demobilize 3/24/2021.

Other Activities/Remarks:

- None.

Photos:

Date: 3/23/2021

Location: MW-02

Description: QED sample pro

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 3/23/2021 **Location:** MW-05R **Description:** J-plug at MW-05R
	Date: 3/23/2021 **Location:** SG-10 **Description:** Soil gas parent and duplicate sample collection with t-bar.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 3/23/2021 **Location:** SG-55 **Description:** Purging soil gas probe with hand pump. Calculated volume of soil gas inside the tubing and purged three times that volume.
	Date: 3/23/2021 **Location:** MW-23 **Description:** Collecting soil gas sample at 1-inch PVC probe with a screened interval of 130 to 140 ft bgs. Casing was sealed at the surface with ¼-inch tubing extending down into the casing approximately 8 feet.

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): MiniRae 3000 SN: 592-914802

Manufacturer: Rae Systems

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
3/15/21	0	Fresh air	—	No	0.00	pass	ER
↓	100	100 ppm isobutylene	KBJ-X02A199 34066-1 10/16/23	No	100.0	pass	ER
3/16/21	0.0	↓	↓	No	0.00	pass	ER
↓	100	↓	↓	No	100.0	pass	ER
3/17/21	0.0	↓	↓	No	0.00	Pass	[illegible]
↓	100	↓	↓	No	100.0	Pass	[illegible]
3/18/21	0.0	↓	↓	No	0.0	Pass	[illegible]
↓	100.0	↓	↓	No	100.0	Pass	[illegible]
3/19/21	0.0	↓	↓	No	0.0	Pass	[illegible]
↓	100.0	↓	↓	No	100.0	Pass	[illegible]
3/21/21	0.0	↓	↓	No	0.0	Pass	[illegible]
3/21/21	100.0	↓	↓	No	100.0	Pass	[illegible]
3/22/21	0.0	↓	↓	NO	0.0	Pass	[illegible]
3/22/21	100.0	↓	↓	NO	100.0	Pass	[illegible]

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): MiniRae 3000 SN: 592-910919

Manufacturer: Rae systems

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
3/15/21	0	Fresh air	—	No	0.00	pass	ER
↓	100	100 ppm Isobutylene	KBJ-X02A199CP 342066-1 10/16/23	No	100.1	pass	ER
3/16/21	0	↓	↓	No	0.00	pass	ER
↓	100.1	↓	↓	No	100.1	pass	ER
3/17/21	0	Fresh air	—	No	0.0	Pass	
3/17/21	100	100 ppm Isobutylene	KBJ-X02A199CP 342066-1 10/16/23	No	100.0	Pass	
3/18/21	0.0	Fresh air	—	No	0.0	Pass	
3/18/21	100.0	100 ppm Isobutylene	KBJ-X02A199CP 342066-1 10/16/23	No	100.1	Pass	
3/19/21	0.0	↓	↓	No	0.0	Pass	
3/19/21	100.0	↓	↓	No	100.1	Pass	
3/21/21	0.0	↓	↓	No	0.0	Pass	
3/21/21	100.0	↓	↓	No	100.1	Pass	
3/22/21	0.0	↓	↓	No	0.0	Pass	
3/22/21	100.0	↓	↓	No	100.0	Pass	

EQUIPMENT CALIBRATION LOG

SITE NAME: V-7 Plume

Instrument (Name/Model No./Serial No.): YSI Quattro 19H100748

Manufacturer: YSI

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
3/16/21	7.01	PH 7.0	20096980 10-19-22	no	7.00	pass	AF
↓	3.95	PH 4.0	20102280 1-23-22	no	4.00	pass	AF
	10.07	PH 10.0	20097500 10-7-22	no	10.00	pass	AF
	1003	1409 umho/cm	20112030 1-24-22	no	1408	fail	AF
	245	220 mV	20101232 10-24-21	no	220	pass	AF
	104.4	100% sat	N/A	no	98.4	pass	AF

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): YSI Quatro 16D100171

Manufacturer: YSI

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
3/16/21	7.10	PH 7.0	20091619 10-14-22	no	7.00	pass	AF
↓	3.99	PH 4.0	80:0228 1-23-22	no	4.00	pass	AF
	10.05	PH 10.0	8009500 10-7-22	no	10.00	pass	AF
	1399	1409 umho/cm	80:1203 11-24-22	no	1402	pass	AF
	243	220 mV	8:01232 10-24-21	no	220	pass	AF
	97.7	100% Sat.	N/A	no	99.6	pass	AF

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): YSI Quatro SN: 20F100086

Manufacturer: YSI INC

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
3/16/21	4.06	pH 4.0	7008398 9/2/22	No	3.99	pass	ER
↓	7.04	pH 7.0	7003167 3/1/22	No	7.03	pass	ER
↓	9.97	pH 10.0	7907178 7/1/21	No	9.99	pass	ER
↓	1369	1409 µS/cm	7003425 4/2/22	No	1408	pass	ER
↓	242.3	220mV	8101232 10/24/2021	No	220	pass	ER
3/21/21	3.93	↓	7007157 7/22/22	No	3.99	pass	ER
↓	7.11	↓	7003167 3/1/22	No	7.00	pass	ER
↓	10.12	↓	7005144 5/1/22	No	10.00	pass	ER
↓	1298	↓	7906763 6/1/21	No	1411	pass	ER
↓	209.7	↓	8101232 10/24/21	No	220.1	pass	ER
↓	74.7%	100% DO 760.98 mmHg	—	No	99.8%	pass	ER

EQUIPMENT CALIBRATION LOG

SITE NAME: SLC VA PLUME

Instrument (Name/Model No./Serial No.): YSI PRO DSS ~~22511~~ 22539

Manufacturer: YSI

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
03/16/21	7.10	pH 7	LOT# 20031K7 EXP. 3/1/22	None	7.00	PASS	
03/16/21	4.11	pH 4	LOT# 20033K8 EXP 9/2/22	None	4.00	PASS	
03/16/21	9.98	pH 10	LOT# 20078B EXP. 7/1/21	None	10.00	PASS	
03/16/21	1405	1409 µS/cm	LOT# 20034Z5 EXP. 4/2/22	None	1409	PASS	
03/16/21	250.9	220 mV	LOT# 8101232 EXP. 10/24/2021	None	220	PASS	
03/16/21	89%	100% SAT 754.9 mmHg	—	None	100%	PASS	
3/17/21	7.30	pH 7	Lot 20049K8 Exp 10/14/22	None	7.02	Pass	
3/17/21	3.99	pH 4	Lot 20005K5 Exp 9/30/2023	None	4.00	Pass	
3/17/21	10.10	pH 10	Lot 20081K4 Exp 5/21/2022	None	10.07	Pass	
3/17/21	~~1390~~ MOD	1409 µS/cm	Lot ~~20034Z5~~ 20034Z5 Exp ~~4/2/22~~ 4/2/22	None	~~220~~ 1409 MOD	Pass	
3/17/21	200.6	220 mV	Lot 8101232 Ex 10/24/2021	None	220.0	Pass	
3/17/21	96.4%	100% SAT 642.2 mmHg	—	None	100%	Pass	

EQUIPMENT CALIBRATION LOG

SITE NAME: 700 S 1600 E VA Plume

Instrument (Name/Model No./Serial No.): HACH 2100Q 21040 4x

Manufacturer: HACH

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
3/16/21	19.3	20 NTU	A0294 ~~A0254~~ Jan-22	No	19.3	P	
3/16/21	100	100 NTU	A0288 Jan-22	No	100	P	
3/16/21	797	800 NTU	A0286 Jan-22	No	797	P	
3/16/21	10.3	10 NTU	A0279 Jan-22	No	10.3	P	
3/23/21	21.7	20 NTU	Same as above (NA)	No	20	PASS	
3/23/21	105	100 NTU	SAA	No	100	PASS	
3/23/21	864	800 NTU	SAA	No	800	PASS	
3/23/21	9.91	10 NTU	SAA	No	9.91	PASS	
~~3/25/21~~							

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plvino

Instrument (Name/Model No./Serial No.): MiniRae 3000 SN: 592-928095

Manufacturer: Rae Systems

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
3/16/21	0.0	Fresh air	—	No	0.0	pass	ER
↓	100.0	100 ppm Isobutylene	KBJ-X02A1770340664 10/16/23	No	100.1	pass	ER
3/17/21	0.0	Fresh air	—	No	0.0	Pass	
3/17/21	100.0	100 ppm Isobutylene	KBJ-X02A1770340664 10/16/23	No	100.2	Pass	
3/18/21	0.0	Fresh air	—	No	0.0	Pass	
3/18/21	100.0	100 ppm Isobutylene	KBJ-X02A1770340664 10/16/23	No	100.0	Pass	
3/19/21	0.0	↓	↓	No	0.0	Pass	
3/19/21	100.0	↓	↓	No	100.0	Pass	
3/21/21	0.0	↓	↓	No	0.0	Pass	
3/21/21	100.0	↓	↓	No	100.2	Pass	
3/22/21	0.0	↓	↓	No	0.0	Pass	
3/22/21	100.0	↓	↓	No	100.2	Pass	

EQUIPMENT CALIBRATION LOG

SITE NAME: 700 S 1600 E VA Plume

Instrument (Name/Model No./Serial No.): HACH 2100 Q US9261X

Manufacturer: HACH

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
3/16/21	19.8	20 NTU	A0022 Apr-21	No	19.8	P	
3/16/21	101	100 NTU	A0041 May-21	No	101	P	
3/16/21	805	800 NTU	A0042 May-21	No	805	P	
3/16/21	10.1	10 NTU	A0041 May-21	No	10.1	P	
3/17/21	21.6	20 NTU	↓	No	21.6	P	
↓	105	100 NTU	↓	No	105	P	
↓	809	800 NTU	↓	No	809	P	
↓	9.65	10 NTU	↓	No	10.1	pass	
3/18/21	20.2	20 NTU	↓	No	20.2	Pass	
↓	99.9	100 NTU	↓	No	99.9	Pass	
↓	791	800 NTU	↓	No	791	Pass	
↓	9.40	10 NTU	↓	No	9.40	Pass	

EQUIPMENT CALIBRATION LOG

SITE NAME: SLC UA PLUME 700 - 1600 E

Instrument (Name/Model No./Serial No.): YSI PRO DSS ~~20529~~ for conductivity 22516

Manufacturer: YSI

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
03/16/21	7.00	pH 7	LOT# 700 3162 EXP: 3/1/22	None	7.00	PASS	
03/16/21	3.97	pH 4	LOT# 700 3248 EXP: 09/12/22	None	4.00	PASS	
03/16/21	10.04	pH 10	LOT# 700 3179 EXP: 7/1/21	None	10.00	PASS	
03/16/21	~~9.88~~ 1402	1409 µS/cm	LOT: 700 3425 EXP: 4/1/22	None	1409	PASS	
03/16/21	252.0	220 mV	LOT# 819232 EXP: 10/24/21	None	220	PASS	
03/16/21	92.7%	100% SAT AT 754.4 mm Hg	———	None	100%	PASS	
03/17/21	7.04	pH 7	SAT (same as above)	None	7.00	PASS	
03/17/21	4.05	pH 4	SAT	None	4.00	PASS	
03/17/21	9.93	pH 10	SAT	None	10.00	PASS	
03/17/21	1407	1409	SAT	None	1407	PASS	
03/17/21	197.3	220	SAT	None	220	PASS	
03/17/21	86.1%	100% SAT AT 765.27 mmHg	SAT	None	100%	PASS	
03/18/21	7.05	pH 7	SAT	None	7.00	PASS	
03/18/21	4.00	pH 4	SAT	None	4.00	PASS	

EQUIPMENT CALIBRATION LOG

SITE NAME: 7005 1600 E SCC VA PLANT

Instrument (Name/Model No./Serial No.): HACH 2100 Q

Manufacturer: HACH

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
3/16/21	20.6	20 NTU	LOT# A0294 EXP Jan-22	None	20	PASS	
3/16/21	103	100 NTU	LOT# A0288 EXP: Jan-22	None	100	PASS	
3/16/21	805	800 NTU	LOT# A0284 EXP Jan-22	None	800	PASS	
3/16/21	9.71	10 NTU	LOT# A0284 EXP Jan-22	None	9.71	PASS	
3/17/21	19.9	20 NTU	STA (same as above)	None	20	PASS	
3/17/21	99.6	100 NTU	"	None	100	PASS	
3/17/21	784	800 NTU	"	None	800	PASS	
3/17/21	10.2	10 NTU	"	None	10.2	PASS	
03/18/21	20.4	20	STA	None	20	PASS	
03/18/21	102	100	"	None	100	PASS	
03/18/21	795	800	"	None	800	PASS	
03/18/21	10.9	10	"	None	10.9	PASS	
03/19/21	19.4	20	STA	None	20	PASS	
03/19/21	101	100	STA	None	100	PASS	

EQUIPMENT CALIBRATION LOG

SITE NAME: SLC VA Phone

Instrument (Name/Model No./Serial No.): 451 Pro DDS RFW225100

Manufacturer: YSI

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
3/17/2021	7.34	pH 7.0	Lot 8007648 Exp 10/14/22	None	7.02	Pass	[illegible]
3/17/21	4.01	pH 4.0	Lot 8004395 Exp 4/30/2023	None	4.00	Pass	[illegible]
3/17/21	10.09	pH 10.0	Lot 7005154 Exp 8/21/2022	None	10.00	Pass	[illegible]
3/17/21	1367	1409 µS/cm	Lot ~~5025-25~~ 7003425 Exp ~~3/7/21~~ 4/2/22	None	1409	Pass	[illegible]
3/17/21	199.9	220 mV	Lot 8101232 Exp 10/24/2021	None	220.0	Pass	[illegible]
3/17/21	106.4%	100% DO @ 742.4 mmHg	—	None	100%	Pass	[illegible]
~~3/17/21~~ 3/16/21							
				ER 3/16/21			
	1348		8012061 ~~12/16/22~~	No	1410	pass	ER

EQUIPMENT CALIBRATION LOG

SITE NAME: SLC VA Plume

Instrument (Name/Model No./Serial No.): HACH 2100 Q Patable Turbidimeter 410 4104X

Manufacturer: HACH

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	(NTU) Final Reading	Comments Pass/Fail	Signature
3/17/21	—	20.0 NTU	A0294 Jan-22	—	21.4	Pass	
3/17/21	—	IC 3/17 2100.0 NTU	A0288 Jan-22	—	100.0	Pass	
3/17/21	—	800.0 NTU	A0286 Jan-22	—	791.0	Pass	
3/17/21	—	10.0 NTU	A0279 Jan-22	—	8.74	Fail	
3/18/21	—	10.0 NTU	same	—	9.72	Pass	
3/18/21	—	20.0 NTU	as 3/17/21	—	19.8	Pass	
3/18/21	—	100.0 NTU	↓	—	101	Pass	
3/18/21	—	800.0 NTU	↓	—	803	Pass	
3/19/21	—	10.0 NTU	same	—	10.3	Pass	
3/19/21	—	20.0 NTU	as 3/17/21	—	20.2	Pass	
3/19/21	—	100.0 NTU	↓	—	102	Pass	
3/19/21	—	800.0 NTU	↓	—	808	Fail out of range	
3/21/21	—	10.0 NTU	same as 3/17/21		10.7	Pass	
3/21/21	—	20.0 NTU	↓		13.9	Pass	
3/21/21	—	100.0 NTU	↓		96.9	Pass	
3/21/21	—	800.0 NTU	↓		777	Pass	

EQUIPMENT CALIBRATION LOG

SITE NAME: SLC VA Plume

Instrument (Name/Model No./Serial No.): Professional Plus 66199X

Manufacturer: YSI

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
3/17/21	NM	pH 4.0	8010228 1/23/22	—	4.09	Pass	
3/17/21	NM	pH 7.0	8009698 10/14/22	—	7.02	Pass	
3/17/21	NM	pH 10.0	8009500 10/7/22	—	9.73	Pass	
3/17/21	NM	1409 µmho/cm	8011203 11/24/22	—	1218	Pass	
3/17/21	NM	DO 100%	—	—	90.7%	Pass	
3/17/21	NM	30.14 in Hg	—	—	26.295 in Hg	Pass	
3/17/21	NM	220mV	8101232 10/24/21	—	197.2 mV	Pass	
3/18/21	7.14	pH 7.0		—	7.11	P	
3/18/21	4.37	pH 4.0	same	—	4.14	P	
3/18/21	9.95	pH 10.0	as 3/17.	—	10.05	P	
3/18/21	1427	1409 µmho/cm		—	1666 µmho/cm	P	
3/18/21	208.1	220mV		—	216.7 mV	P	
3/18/21	91.0%	100% @ 766.06 mm Hg		—	100%	P	
~~3/18/21~~			↓				

EQUIPMENT CALIBRATION LOG

SITE NAME: SLC VA Plume

Instrument (Name/Model No./Serial No.): YSI Professional Series Plus U95071X

Manufacturer: YSI

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
3/17/21	NM	pH 4.0	8010228 1/23/22	—	4.17	P	
3/17/21	NM	pH 7.0	8009698 10/14/22	—	6.98	P	
3/17/21	NM	pH 10.0	8009500 10/7/22	—	9.79	P	
3/17/21	NM	1409 umho/cm	8011203 11/24/22	—	1413 umho/cm	P	
3/17/21	NM	DO 100%	—	—	100%	P	
3/17/21	NM	30.14 in Hg	—	—	30.14 in Hg	P	
3/17/21	NM	220 mV	8101232 10/24/21	—	195.7 mV	P	
3/18/21	7.21	pH 7.0		—	7.18	P	
3/18/21	4.24	pH 4.0		—	4.20	P	
3/18/21	9.97	pH 10.0	same as	—	10.11	P	
3/18/21	1522 umho/cm	1409 umho/cm	3/17	—	1517 umho/cm	P	
3/18/21	217 mV	220 mV		—	216.9 mV	P	
3/18/21	86.3%	100% DO 766.06 mm Hg		—	100%	P	
~~3/18/21~~							

EQUIPMENT CALIBRATION LOG

SITE NAME: SLC VA PLUME 700 S 1600 E

Instrument (Name/Model No./Serial No.): YSI PRO DSS 22516

Manufacturer: YSI

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
03/18/21	9.93	pH 10	LOT# 7907177 EXP 7/1/21	None	10	PASS	
03/18/21	~~TV 0218 1409~~ 1410	1409 µS/cm	LOT: 7002425 EXP: 4/12/22	None	1409	PASS	
03/18/21	220.9	220 mV	LOT: 8101272 EXP: 10/24/21	None	220	PASS	
03/18/21	100.6	100% SAT AT 764.54 mmHg	———	None	100%	PASS	
03/19/21	7.09	pH 7	LOT#: 7003462 EXP: 3/1/22	None	7	PASS	
03/19/21	4.00	pH 4	LOT# 7008358 EXP# 9/2/22	None	4	PASS	
03/19/21	10.05	pH 10	SAA	None	10	PASS	
03/19/21	1448	1409 µS/cm	SAA	None	1409	PASS	
03/19/21	233.4	220 mV	SAA	None	220	PASS	
03/19/21	109.9	100% SAT AT mmHg 764.29	SAA	None	100	PASS	
03/21/21	6.99	pH 7	SAA	None	7	PASS TV 0221	
03/21/21	4.03	pH 4	SAA	None	4	PASS	
03/21/21	9.83	pH 10	SAA	None	10	PASS	
03/21/21	1353	1409 µS/cm	SAA	None	1409	PASS	

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): YSI Quatro SN: 19L100016

Manufacturer: YSI Inc

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
3/18/21	7.86	pH 7.0	80096 98 10/14/22	No	7.00	pass	QR
↓	9.75	pH 10.0	7005144 12/12/21	No	10.04	pass	QR
	3.98	pH 4.0	7909207 9/1/21	No	4.10	pass	QR
	1346	1409 µS/cm	8012061 12/16/22	No	1412	pass	QR
	197.9	220 mV	8101232 10/24/21	No	220.0	pass	QR
↓	97.7	100% DO 645.1 mm Hg	—	No	98.4	pass	QR
3/19/20		pH 7.0	↓				
		pH 10.0					
		pH 4.0					
		1409 µS/cm					
		220 mV					
		100% DO	↓				

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): YSI Quatro SN: 20F 1000 86

Manufacturer: YSI

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
3/18/21	7.54	pH 7.0	8009648 10/14/22	No	7.00	Pass	
↓	4.82	pH ~~7.0~~ 4.0	8C09373 9/30/2023	No	4.00	Pass	
	10.53	pH 10.0	~~7005~~ 8/21/2022	NO	10.00	Pass	
	114.6%	DO 645.19 mmHg	—	No	100.0	Pass	
	210.7	220.0 mV	8101232 10/24/2021	No	219.8	Pass	
↓	1348	1409 µS/cm	8012061 12-16-22	NO	1210	Pass	

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume SLC

Instrument (Name/Model No./Serial No.): YSI Quatro 19F100686

Manufacturer: YSI Inc.

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
3/19/21	7.15	pH 7.0	7003167 3/1/22	No	7.00	pass	ER
↓	4.13	pH 4.0	7007157 7/22/22	No	3.99	pass	ER
↓	9.84	pH 10.0	7005144 5/1/22	No	10.00	pass	ER
↓	1398	1409 µS/cm	7906263 6/1/21	1410 ⇄ No		pass	ER
↓	248.7	220 mV	8101232 10/24/2021	No	220.0	pass	ER
↓	84.9%	100% DO 645.16 mm Hg	—	No	100.3%	pass	ER
3/21/21	6.98	↓	↓	No	7.00	pass	ER
↓	4.00	↓	↓	No	4.00	pass	ER
↓	10.02	↓	↓	No	10.00	pass	ER
↓	1357	↓	↓	No	1410	pass	ER
↓	213.2	↓	↓	No	220.1	pass	ER
↓	82.2%	760.98 mm Hg	↓	No	100.0%	pass	ER

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): YSI Quatro 20F100086

Manufacturer: YSI Inc

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
3/19/21	6.89	pH 7.0	7008244 8/26/22	No	7.02	pass	ER
	3.94	pH 4.0	7909209 9/1/21	No	4.00	pass	ER
	10.07	pH 10.0	7005144 5/1/22	No	10.00	pass	ER
	1514	1409 µs/cm	8012061 12/16/22	No	1409	pass	ER
	239.9	220 mV	8012232 10/21/21	No	219.4	pass	ER
↓	101.5%	100% DO 615.1 mmHg	—	No	100.1%	pass	ER
3/22/21	6.97	↓	↓	No	7.01	pass	ER
↓	3.97			No	4.00	pass	ER
	10.08			No	10.01	pass	ER
	1417			No	1409	pass	ER
	211.0			No	219.9	pass	ER
↓	99.0%	736.5 mmHg	↓	No	100.0%	pass	ER

EQUIPMENT CALIBRATION LOG

SITE NAME: SLC VIA Plume

Instrument (Name/Model No./Serial No.): YSI ProFessional Plus 95071X

Manufacturer: YSI

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
3/19/21	3.75	pH 4	301022 8 1/23/22	—	4.0	Pass	BSC
3/19/21	7.17	pH 7	8009698 10/14/22	—	7.00		BSC
3/19/21	10.08	pH 10	8009500 10/7/22	—	10.00		BSC
3/19/21	1409	1409 µs/cm	8011203 11/2-/22	—	1403		BSC
3/19/21	231.2	220mV	8101232 10/24/21	—	244.7		BSC
3/19/21	768.3	645.16	—	—	—		BSC
3/19/21	97.4	100% Sat	100%DO	—	85.0	✓	BSC

EQUIPMENT CALIBRATION LOG

SITE NAME: SLC VA Plume

Instrument (Name/Model No./Serial No.): YSI Professional Plus 06199X

Manufacturer: YSI

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
3/19/21	3.89	4pH	8010228 1/23/22	—	4.0	Pass	BSC
3/19/21	7.03	pH 7	8009698 10/14/22	—	7.03		BSC
3/19/21	9.94	pH 10	8009500 10/7/22	—	10.14		BSC
3/19/21	BC ~~1409~~ 1404	1409 µs/cm	8011263 11/24/22	—	1403		BSC
3/19/21	229.1	220mV	8011232 10/29/21	—	243.4		BSC
3/19/21	~~768.3~~ 768.0 BC 3/19	645.16 mmHg	—	—	—		BSC
3/19/21	112.9	100% sat	100% DO	—	85.5	↓	BSC

EQUIPMENT CALIBRATION LOG

SITE NAME: 700S 1600E VA Plume

Instrument (Name/Model No./Serial No.): Hach 2100 Q 18926 1X

Manufacturer: HACH

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
3/19/21	19.6	20 NTU	A0022 Apr-21	No	19.6	Pass	
3/19/21	97.6	100 NTU	A0041 May-21	No	97.6	Pass	
3/19/21	799	800 NTU	A0042 May-21	No	799	Pass	
3/19/21	9.61	10 NTU	A0041 - May-21	No	9.61	Pass	
3/21/21	19.2	20 NTU	↓	No	19.2	Pass	
3/21/21	105	100 NTU	↓	No	105	Pass	
3/21/21	805	800 NTU	↓	No	805	Pass	
3/21/21	11.1	10 NTU	↓	No	11.1	Pass	
3/22/21	20.8	20 NTU	↓	No	20.8	Pass	
↓	98.4	100 NTU	↓	No	98.4	Pass	
↓	773	800 NTU	↓	No	773	Pass	
↓	10.1	10 NTU	↓	No	10.1	Pass	

EQUIPMENT CALIBRATION LOG

SITE NAME: 700 S 1600 E Salt VA Plant

Instrument (Name/Model No./Serial No.): Hach 2100Q

Manufacturer: HACH

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
03/19/21	766	800 NTU	LOT: A0234 EXP: Jun-22	None	800	PASS	
03/19/21	10.3	10 NTU	LOT # A0234 EXP: Jun-22	None	10.3	PASS	
03/21/21	20.2	~~200~~ 20 NTU	LOT# A0234 EXP: Jun-22	None	20	PASS	
03/21/21	96.0	100 NTU	LOT: A0234 EXP: Jun-22	None	100	PASS	
03/21/21	839	800 NTU	SAM	None	800	PASS	
03/21/21	10.5	10 NTU	SAM	None	10.5	PASS	
03/22/21	20.9	20 NTU	SAM	None	20	PASS	
03/22/21	99.1	100 NTU	SAM	None	100	PASS	
03/22/21	764	800 NTU	SAM	None	800	PASS	
03/22/21	9.48	10 NTU	SAM	None	9.48	PASS	

EQUIPMENT CALIBRATION LOG

SITE NAME: TOOS 16 DE ~~Hill~~ SVRDRA SLC 1/4 PUMP

Instrument (Name/Model No./Serial No.): YSI PRO DO 22514

Manufacturer: YSI

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
03/21/21	208.2	220mV	Lot # 8109232 Exp 10/27/21	None	220	PASS	[signature]
03/21/21	88%	100% sat @ 764.5 mm Hg	—	None	100	PASS	[signature]
03/22/21	7.01	pH 7	LOT# 7003167 Exp: 5/1/22	None	7	PASS	[signature]
03/22/21	4.04	pH 4	LOT# 7008398 Exp: 9/2/22	None	4	PASS	[signature]
03/22/21	9.98	pH 10	LOT# 7497178 Exp 7/1/21	None	10	PASS	[signature]
03/22/21	1409	1409 uS/cm	Lot: 7003425 Exp. 4/2022	None	1409	PASS	[signature]
03/22/21	216.5	220mV	STAR	None	220	PASS	[signature]
03/22/21	60.4	100% sat @ 763.27 mm Hg	—	Cleaned the DO Probe & Recalibrated	Error with cable	FAIL	[signature]

EQUIPMENT CALIBRATION LOG

SITE NAME: SLC VA Plume

Instrument (Name/Model No./Serial No.): Professional Plus U6G199X

Manufacturer: YSI

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
3/21/21	7.04	pH 7.0	~~8010228 1/23~~ 8009698 10/14/22 IC 3/21	—	6.97	Pass	
3/21/21	4.75	pH 4.0	8010228 1/23/22	—	4.18		
3/21/21	9.78	pH 10.0	8009500 10/7/22	—	10.02		
IC 3/21	~~1667~~	~~1409~~			~~1612~~		
3/21/21	1563 µmho/cm	1409 µmho/cm	8011203 11/24/22	—	152 µmho/cm		
3/21/21	74.6%	100% DO 767.59 mm Hg	—	—	100%		
3/21/21	~~231.9~~ 224.6 mV	220 mV IC 3/21	8101232 10/29/21	—	220.2 mV		
3/22/21 IC	6.89	pH 7.0	same as 3/21/21	—	7.31	Pass	
3/22/21 IC	4.37	pH 4.0		—	4.10		
3/22/21 IC	9.91	pH 10.0		—	9.99		
3/22/21 IC	1336	1409 µmho/cm		—	1379		
3/22/21 IC	99.4%	100% DO 765.81		—	100%		
3/22/21 IC	208.7	220 mV		—	219.6		

3/22/21 IC 3/21

NV

EQUIPMENT CALIBRATION LOG

SITE NAME: SLC VA Plume

Instrument (Name/Model No./Serial No.): YSI Professional Plus U95071X

Manufacturer: YSI

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
3/21/21	6.99	pH 7.0	8009698 10/14/22	—	7.00	Pass	
↓	4.47	pH 4.0	8010238 11/23/22	—	4.20	↓	
	9.18	pH 10.0	8009500 10/7/22	—	9.97		
	1667 µmho/cm	1409 µmho/cm	8011203 11/24/22	—	1612 µmho/cm		
	98.2%	100% DO 767.59 mmHg	—	—	100%		
↓	231.3mV	220mV	8101232 10/24/21	—	231.3mV	↓	
3/22/21	7.35	pH 7.0	↓ same	—	7.04	Pass	
3/22/21	4.45	pH 4.0	as	—	4.27	↓	
3/22/21	9.60	pH 10.0	3/21/21	—	9.91		
3/22/21	1366	1409 µmho/cm	↓	—	1583		
3/22/21	85.4%	100% DO 765.81	↓	—	100%	↓	
3/22/21	208.9	220mV	↓	—	219.7	↓	

EQUIPMENT CALIBRATION LOG

SITE NAME: SLC VA Plume

Instrument (Name/Model No./Serial No.): HACH 2100Q Turbidimeter

Manufacturer: HACH

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
3/22/21	—	20.0 NTU	A0294 Jan-22	—	25.3	Pass	
3/22/21	—	100.0 NTU	A0288 Jan-22	—	98.6	Pass	
3/22/21	—	800.0 NTU	A0286 Jan-22	—	751	Pass	
3/22/21	—	10.0 NTU	A0279 Jan-22	—	11.1	Fail	
3/22/21	—	20.0 NTU	↓	—	20.3	Pass	
3/22/21	—	100.0 NTU	↓	—	100	Pass	
3/22/21	—	800.0 NTU	↓	—	804	Pass	
3/22/21	—	10.0 NTU	↓	changed acceptance range from 10 ± 1 to 13%	11.0	Pass	

re-do b/c 10 failed

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume SLC

Instrument (Name/Model No./Serial No.): YSI Quatro SN: 19F100686

Manufacturer: YSI Inc

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
3/22/21	7.33	pH 7.0	7008244 8/26/22	No	7.03	pass	ER
↓	3.94	pH 4.0	7909209 9/1/21	No	4.00	pass	ER
↓	9.94	pH 10.0	7005144 3/1/22	No	10.02	pass	ER
↓	1374	1409 µS/cm	801206 12/16/22 810232	No	1409	pass	ER
↓	209.0	220 mV	10/21/21	No	220.0	pass	ER
↓	101.7%	100% DO 765.0 mm Hg	—	No	100%	pass	ER

EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): RFW 22310 , Probe 20F100080 YSI

Manufacturer: YSI

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
5/23/21	7.13	7.0 pH	7003167 3-1-22	No	7.00	Pass	
↓	4.12	pH 4.0	7007157 7/22/22	No	4.01	Pass	
↓	10.15	pH 10.0	7005424 5/1/22	No	10.00	Pass	
↓	1390	1409 µmhos/cm	7906763 8/1/21	No	1409	Pass	
↓	106.5%	763.3 mmHg 100% DO	—	No	100%	Pass	
↓	243.3	220.0 mV	8101252 10/22/2021	No	219.7	Pass	

EQUIPMENT CALIBRATION LOG

SITE NAME: VA BLUE

Instrument (Name/Model No./Serial No.): TruRae 3000 SN: 592-914802

Manufacturer: Rae Systems

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
05/23/24	0.0	Fresh air	—	None	0	PASS	
05/23/24	102.9	Isobutylene 100 ppm	LOT: 324-6018303354 EXP: 03/20/2026	None	100	PASS	

DECONTAMINATION CHECKLIST

Activity: Groundwater Sampling **Date:** 3/15/2021

Answer each question by checking the appropriote column (yes, no, not observed [N/O] or not applicable [N/A]). If "no" is checked, provide an explanation on the form.

Equipment	Yes	No	N/O	N/A
1. Was the decontamination pad constructed onsite per the UFP-QAPP?				X
2. Was all sampling equipment decontaminated properly prior to use and between sample intervals?	X			
3. Was each decontamination event recorded in the log book?	X			
4. Was clean equipment stored separately from non-decontaminated equipment?	X			
5. Was phosphate-free detergent and/or steam cleaning used?				X
6. Was IDW handled in accordance with the approved work plan?	X			

Comments and Corrective Actions

Initial and date when corrective actions have been implemented.

The Field Team Leader and Project Manager shall sign this checklist upon completion of all items on the checklist.

Field Team Leader: Emma Pratt Date 3/15/21

Project Manager: _____ Date _____

FIELD DOCUMENTATION CHECKLIST

Activity: Groundwater Sampling / Water Levels Date: 3/15/21

Answer each question by checking the appropriate column (yes, no, or not applicable [N/A]). If "no" or "N/A" are checked, provide an explanation in the comments section.

Field Documentation	Yes	No	N/A
1. Was all original field data recorded in indelible ink?	X		
2. Were log books and field forms (including DQCRs) filled out properly, accurately recounting the day's events? This includes documenting activities performed, weather conditions, personal protective equipment used, problems encountered, details of samples collected, site visitors, descriptions of photos taken, notes of conversations with Project Manager/Field Team Leader/Project Geologist, decontamination procedures used, etc.	X		
3. Were deficiencies reported to the Project Manager?	X		X
4. Were the equipment arrival date, equipment type, onsite storage location, and serial number recorded on the log for each field instrument?	X		
5. Were factory calibration certificates received with the field instruments and recorded on the log?	X		
6. Are instruments being calibrated before and after use when necessary, and against know standards and/or per manufacturer specifications? (Passing calibration is within 10% of the standard.)	X		
7. Are all instrument calibrations being accurately documented on the appropriate logs, including frequency of calibration checks, calibration acceptance criteria, and corrective actions for calibration failures?	X		
8. Was the date that the field instrument left the site recorded in the logbook or on the instrument's log?	X		
9. Was all IDW segregated by matrix/type to facilitate analysis and disposal? Were all IDW containers properly labeled as required in the QAPP?	X		

Comments and Corrective Actions

List all corrective actions. Initial and date when corrective actions have been implemented.

The Field Team Leader and Project Manager shall sign this checklist upon completion of all items on the checklist.

Field Team Leader: Emma Pratt Date 3/15/21

Project Manager: _____ Date _____

PREPARATORY INSPECTION/MOBILIZATION CHECKLIST

Activity: Groundwater Sampling/Water Levels Date: 3/15/2021

Answer each question by checking the appropriate column (yes, no, not observed [N/O] or not applicable [N/A]). If "no" is checked, provide an explanation on the form.

Activity	Yes	No	N/O	N/A	Remarks
1. Have copies of all work plans, including the health and safety plan, been printed for availability onsite? Have appropriate copies of all forms in the plans been prepared for site use?	X				
2. Have pertinent work plans and requirements been explained to project personnel, including project documentation and recordkeeping requirements?	X				
3. Have all personnel working onsite read over the health and safety plan provided by CDM Smith (acknowledgement is by signing the health and safety plan signature form from the SSHP)?	X				
4. Are the required materials, supplies, and equipment available, on-hand, in working order, and in accordance with plans and technical specifications?	X				
5. Have all applicable Safety Data Sheets been made available at the site?	X				
6. Has all equipment been properly calibrated per manufacturer's requirements?	X				
7. Have sample locations been marked out using a GPS unit or by a surveyor, as appropriate?				X	
8. Have all applicable permits, licenses, and certificates been identified and/or obtained?	X				
9. Have all utilities been marked out prior to the start of activities?				X	
10. Does the subcontractor need to clear heavy underbrush or any overhead obstructions to access any locations?				X	
11. Was all subcontractor equipment thoroughly checked, including inspection and testing of the emergency shutdown button on the drilling rig, generators, etc.?				X	
12. Have the necessary laboratories been contracted to perform the requested analyses?	X				
13. Has a designated staging area been established to store IDW and hold the decontamination pad?	X				
14. For sample locations not in public right-of-way, have all appropriate access agreements ben obtained?	X				
15. For existing wells, have keys been obtained?	X				

WATER LEVEL AND MONITORING WELL SAMPLING CHECKLIST

Activity: Groundwater Sampling / Water Levels Date: 3/15/21

Answer each question by checking the appropriate column (yes, no, or not applicable [N/A]). If "na" or "N/A" are checked, provide an explanation in the comments section.

Synoptic Water Level Measurements	Yes	No	N/A
1. Were synoptic water level measurements collected prior to each groundwater sampling event, with all measurements for the event collected within the required 24-hour period?	X		
Monitoring Well Sampling Procedures			
2. Was sampling equipment appropriate for the purpose and site conditions?	X		
3. Were new protective gloves worn between sampling locations and/or intervals?	X		
4. Was sampling equipment decontaminated between each location and/or sampling intervals, or dedicated/disposable equipment used?	X		
5. Was the correct technique/method used to purge each well prior to sample collection?	X		
6. If using a submersible pump, was the depth to which the pump was lowered recorded in the logbook or field form?			X
7. Was low-flow sampling conducted in accordance with the approved UFP-QAPP and SOP?	X		
8. Were field water quality monitoring instruments (e.g., YSI) calibrated per the UFP-QAPP?	X		
9. Was a steady pumping rate reached and maintained so that total drawdown in the well was < 0.3 feet; or was the pump kept at a flow rate between 200 to 500 mL per minute?	X		
10. Were wells purged until parameters stabilized before collecting samples?	X		
11. Were purge parameters recorded in the logbook or on the well sampling form?	X		
12. Was the purge line disconnected from the flow-through cell prior to sample collection and the flow rate < 250 mL per minute?	X		
13. Were the bottles pre-preserved as required in the UFP-QAPP?	X		
14. Were bottles adequately protected prior to sample collection to prevent cross-contamination?	X		
15. Was headspace in sample containers for volatiles eliminated?	X		
16. Were the appropriate QA/QC samples collected (duplicates, rinsate blanks, MS/MSD)?	X		
17. Were sample containers filled in the correct order – VOCs, hydrocarbons, metals, geochemical parameters?	X		
18. Was purge water properly containerized as IDW?	X		
Sample Shipment			
19. Was the following information recorded on each sample label and in the logbook and/or field form – sample ID (including sample depth interval), location, analysis, date, time, preservative, sampler initials, and any other relevant information?	X		
20. Were adhesive labels placed on each sample using indelible ink, or covered with clear tape?	X		
21. Were duplicate samples labeled such that they would be "blind" to the laboratory?	X		

Sample Shipment (continued)	Yes	No	N/A
22. Were MS/MSD samples noted in the logbook/field form and on the COC?	X		
23. Were the COCs properly filled out, readable, and signed?	X		
24. Were the sample coolers properly packed, including ice, trip blank (if appropriate), temperature blank, and a COC unique to the cooler?	X		
25. Were copies of the COCs retained by field personnel?	X		
26. Were custody seals signed, dated, and placed on each cooler prior to shipment?	X		
27. Were the coolers shipped priority overnight for next day delivery to the laboratory?	X		

Comments and Corrective Actions

List all corrective actions. Initial and date when corrective actions have been implemented.

The Field Team Leader and Project Manager shall sign this checklist upon completion of all items on the checklist.

Field Team Leader: Gina Pitt Date 3/15/21

Project Manager: _____ Date _____

Field Health and Safety Meeting Record

CDM Smith Trainer: Ben Cressen Date: 3/15/21 Time: 0830

Site: SLC VA

Review:

- Health & Safety Plan
- Buddy Teams
- Hospital Route/Nearest Phone Location
- Weather Concerns
- Potential Problems
- Problems Previously Occurred

Action Levels: 10 PPM *Other:*

Protective Clothing/Equipment: Level D PPE. High vis, boots, gloves, glasses

Special Equipment: Masters

Chemical Hazards: PCE, TCE, VC

Physical Hazards: hitting, STE, traffic, right driving areas/backing up

Emergency Actions: 911 or VA Emergency 801-582-1565 x 5555

Other Issues: COVID

Check:

- H&S Monitoring Equipment/Calibration
- First Aid Kit/Eye Wash Station
- Fire Extinguisher Communications/Radio Check
- H&S Plan (each item) Respiratory Protection/Cartridges

Name/Firm/Office (Please Print)		***Signature***
Ben Cressen	CDM Smith HLN	
Anna Fiorini	Wasatch	Anna Fiorini
Emma Redd	CDM Smith HLN	Emma Redd
~~Tec Keller~~ JV 318	~~CDM Smith~~	
Kel C Keller	Wasatch	

Field Health and Safety Meeting Record

CDM Smith Trainer: EMMA ROTT Date: 3/16/21 Time: 0930

Site: SLC VA Purine

Review:

- Health & Safety Plan
- Buddy Teams
- Hospital Route/Nearest Phone Location
- Weather Concerns
- Potential Problems
- Problems Previously Occurred

Action Levels: 10 ppm *Other:*

Protective Clothing/Equipment: Level D PPE, high vis, boots, safety glasses, gloves

Special Equipment: Masking

Chemical Hazards: PCE / TCE / VC

Physical Hazards: lifting, traffic, driving in tight spaces, slips/trips/falls

Emergency Actions: 911 or VA Emergency 801-582-1565 x5555

Other Issues: COVID

Check:

- H&S Monitoring Equipment/Calibration
- First Aid Kit/Eye Wash Station
- Fire Extinguisher Communications/Radio Check
- H&S Plan (each item) Respiratory Protection/Cartridges

Name/Firm/Office (Please Print)	***Signature***
EMMA ROTT CDMSmith HCN	EmmaRott
Ben Carreon CDM Smith HCN	
[illegible] Nixon	
Ten Vanar CDM Smith DEN	
Kiel C Keller Wasatch	
Maria Day CDM Smith	

Field Health and Safety Meeting Record

CDM Smith Trainer: Emma Rat Date: 3/17/21 Time: 0821

Site: SLC VA Plume

Review:

- Health & Safety Plan
- Buddy Teams
- Hospital Route/Nearest Phone Location
- Weather Concerns
- Potential Problems
- Problems Previously Occurred

Action Levels: 10 ppm *Other:*

Protective Clothing/Equipment: Level D modified, high vis, boots, safety vest, glasses, masks, gloves

Special Equipment:

Chemical Hazards: PCE, TCE, VC

Physical Hazards: Lifting, traffic, driving/parking in small places

Emergency Actions: 911 or VA emergency 801-582-XXXX x5555

Other Issues: COVID

Check:

- H&S Monitoring Equipment/Calibration
- First Aid Kit/Eye Wash Station
- Fire Extinguisher Communications/Radio Check
- H&S Plan (each item) Respiratory Protection/Cartridges

Name/Firm/Office (Please Print)		***Signature***
Emma Rat	CDM Smith HLN	Emma Rat
Ilona Campbell	CDM Smith DEN	Ilona Campbell
Anna Fiorini	Wasatch	Anna Fiorini
Ben Cannon	WLA	
Tea Vrtlar	CDM Smith DEN	
Margin Day	CDM Smith Den	

Field Health and Safety Meeting Record

CDM Smith Trainer: Tea Villa Date: 3/18/21 Time: 0830

Site: SLC VA PLUME

Review:

- Health & Safety Plan
- Buddy Teams
- Hospital Route/Nearest Phone Location
- Weather Concerns
- Potential Problems
- Problems Previously Occurred

Action Levels: 10 ppm *Other:*

Protective Clothing/Equipment: Level D PPE, high vis, b,l's, safety glasses, gloves

Special Equipment: Masking

Chemical Hazards: PCE/TCE/VC

Physical Hazards: lifting, traffic, driving in tight spaces trips/slips/falls

Emergency Actions: 911 or VA Emergency 801-582-1565 x5555

Other Issues: COVID

Check:

- H&S Monitoring Equipment/Calibration
- First Aid Kit/Eye Wash Station
- Fire Extinguisher Communications/Radio Check
- H&S Plan (each item) Respiratory Protection/Cartridges

Name/Firm/Office (Please Print)	***Signature***
Tea Villa CDM Smith DEN	Tea Villa
Ben Carreon CDM Smith ALN	
Ilona Campbell CDM Smith DEN	Ilona Campbell
Maria Day CDM Smith Den	
EMMA PRATT CDM Smith Den	Emma Pratt
Anna Fiorini Wasatch	Anna Fiorini

Field Health and Safety Meeting Record

CDM Smith Trainer: Emma Rott Date: 3/19/2021 Time: 0814

Site: SLC VA Plume

Review:

- Health & Safety Plan
- Buddy Teams
- Hospital Route/Nearest Phone Location
- Weather Concerns
- Potential Problems
- Problems Previously Occurred

Action Levels: 10 ppm *Other:*

Protective Clothing/Equipment: Level D PPE, high vis vests, boots, hardhats, safety glasses

Special Equipment: Masks

Chemical Hazards: PCE, TCE, VC

Physical Hazards: Lifting, traffic, parking/driving in small spaces, slips/trips/falls

Emergency Actions: 911 or VA emergency 801-582-1565 x 5555

Other Issues: COVID

Check:

- H&S Monitoring Equipment/Calibration
- First Aid Kit/Eye Wash Station
- Fire Extinguisher Communications/Radio Check
- H&S Plan (each item) Respiratory Protection/Cartridges

Name/Firm/Office (Please Print)	***Signature***
Emma Rott CDM Smith HLN	Emma Rott
Iona Campbell CDM Smith DEN	Iona Campbell
Maria Day CDM Smith Den	
Ben Carreon CDM Smith Den	
Kiel G Kell...	
Tea Vitko CDM Smith Den	Tea Vitko

Field Health and Safety Meeting Record

CDM Smith Trainer: EMMA Rott Date: 3/21/21 Time: 0830

Site: VA Provo SLC

Review:

- Health & Safety Plan
- Buddy Teams
- Hospital Route/Nearest Phone Location
- Weather Concerns
- Potential Problems
- Problems Previously Occurred

Action Levels: 10 ppm *Other:*

Protective Clothing/Equipment: Level D PPE, high vis vests, boots, hard hats, safety glasses

Special Equipment: macks

Chemical Hazards: PCE, TCE, VC

Physical Hazards: Lifting, weather, traffic, parking, slips/trips/falls

Emergency Actions: 911 or VA emergency 801-582-1565 x5555

Other Issues: COVID

Check:

- H&S Monitoring Equipment/Calibration
- First Aid Kit/Eye Wash Station
- Fire Extinguisher Communications/Radio Check
- H&S Plan (each item) Respiratory Protection/Cartridges

Name/Firm/Office (Please Print)			***Signature***
EMMA Rott	CDM Smith	HLN	Emma Rott
Iona Campbell	CDM Smith	DEN	Iona Campbell
Pam Carreon	CDM Smith	HLN	
Marie Day	CDM Smith	Den	
Kevin Murphy	Wasatch Environmental	SLC	
Tea Villa	CDM Smith	Den	

Field Health and Safety Meeting Record

CDM Smith Trainer: Emma Kott Date: 3/22/21 Time: 0830

Site: SLC VA Plume

Review:

- Health & Safety Plan
- Buddy Teams
- Hospital Route/Nearest Phone Location
- Weather Concerns
- Potential Problems
- Problems Previously Occurred

Action Levels: 10 ppm *Other:*

Protective Clothing/Equipment: Level D PPE, masks, steel toes, high vis, safety glasses

Special Equipment: masks

Chemical Hazards: PCE, TCE, VC

Physical Hazards: COVID, Lifting, traffic, Driving in small spaces, slips/trips/falls

Emergency Actions: 911 or VA emergency 801-582-1565 X 5555

Other Issues: COVID

Check:

- H&S Monitoring Equipment/Calibration
- First Aid Kit/Eye Wash Station
- Fire Extinguisher Communications/Radio Check
- H&S Plan (each item) Respiratory Protection/Cartridges

Name/Firm/Office (Please Print)	***Signature***
Tona Campbell CDM Smith DEN	Tona Campbell
Maria Dang CDM Smith Den	
Ben Carreon CDM Smith HLN	
Kevin Murphy Wendel Environmental SLC	
Tea Kibler CDM Smith DEN	Tea Kibler
[illegible]	
[illegible]	
Emma Pitt CDM Smith DEN	Emma Pitt

Field Health and Safety Meeting Record

CDM Smith Trainer: Emma Rott Date: 3/23/21 Time: 0845

Site: SLC VA

Review:

- Health & Safety Plan
- Buddy Teams
- Hospital Route/Nearest Phone Location
- Weather Concerns
- Potential Problems
- Problems Previously Occurred

Action Levels: 10 ppm *Other:*

Protective Clothing/Equipment: Level D, steel toes, high vis, safety glasses,

Special Equipment: masks

Chemical Hazards: PCE, TCE, VC

Physical Hazards: Lifting, traffic, slips/trips/falls

Emergency Actions: 911 or VA Emergency 801-582-1565 x 5555

Other Issues: COVID

Check:

- H&S Monitoring Equipment/Calibration
- First Aid Kit/Eye Wash Station
- Fire Extinguisher Communications/Radio Check
- H&S Plan (each item) Respiratory Protection/Cartridges

Name/Firm/Office (Please Print)		***Signature***
Emma Rott	CDM Smith HLN	EmmaRM
Tia Wilkes	CDM Smith DEN	Tia Wilkes
Ben Carreon	CDM Smith HLN	
Maria Day	CDM Smith Den	
Iona Campbell	CDM Smith DEN	Iona Campbell
Whitney Treadway	CDM Smith	WTA
Kevin Murphy	Wasatch Environmental SLC	
Kiel Keller	Wasatch	

Appendix C

Quality Control Summary Report

Quality Control Summary Report

Q1 2021 Groundwater Sampling Event

Operable Unit 1 Remedial Investigation
700 South 1600 East PCE Plume,
Salt Lake City, Utah

June 2021

CDM Smith

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Attachments

Attachment 1 Data Validation Reports
Attachment 2 Data Package Completeness Review Checklists
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Acronyms

CCV	continuing calibration verification
CDM Smith	CDM Federal Programs Corporation
COC	chain-of-custody
DQI	data quality indicator
DQO	data quality objective
EPA	U.S. Environmental Protection Agency
ICP	inductively coupled plasma
ICP-MS	inductively coupled plasma mass spectrometry
ICV	initial calibration verification
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
EMAX	EMAX Laboratories, Inc.
MDL	method detection limit
MRL	method reporting limit
MS	matrix spike
MS	matrix spike duplicate
NTU	nephelometric turbidity unit
PARCCS	precision, accuracy, representativeness, comparability, completeness, and sensitivity
PCE	tetrachloroethene
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
QCSR	quality control summary report
RPD	relative percent difference
RSD	relative standard deviation
SDG	sample delivery group
Site	700 South 1600 East Tetrachloroethene Plume Superfund Site
SM	standard method
USACE	U.S. Army Corps of Engineers
VOC	volatile organic compound
%	percent
%D	percent difference
%R	percent recovery

Section 1

Data Usability and Assessment Review

Under the U.S. Army Corps of Engineers (USACE), Kansas City District, Contract No. W912DQ-18-D-3008, Task Order No. W912DQ19F3048, CDM Federal Programs Corporation (CDM Smith) was directed to perform a remedial investigation for Operable Unit 1 of the 700 South 1600 East Tetrachloroethene (PCE) Plume Superfund Site (Site) in Salt Lake City, Utah. To assist in the ongoing remedial investigation at the Site, groundwater samples were collected from March 16 to 23, 2021 and shipped to EMAX Laboratories, Inc. (EMAX) in Torrance, California for analysis.

The purpose of this quality control summary report (QCSR) is to summarize the data validation and determine whether the sample results meet the data quality objective (DQO) of the data usability outlined in the *Phase 2 OU1 Quality Assurance Project Plan (QAPP),* (CDM Smith 2020).

1.1 Usability Summary

Data collected and validated during this field investigation are usable as reported. Applicable data validation qualifiers were added if required. No sample results were rejected. Specific details are provided in the data validation reports summarized in Section 5 and presented in **Attachment 1** of this report.

Section 2
Quality Assurance Objectives

Quality assurance (QA) objectives for measurement data are expressed in terms of precision, accuracy, representativeness, comparability, completeness, and sensitivity (PARCCS). The PARCCS parameters characterize the quality of the data and as such are called data quality indicators (DQIs). The DQIs provide a mechanism for ongoing quality control (QC) and evaluating and measuring data quality throughout the project.

A review of the collected data is necessary to determine if data measurement objectives established in the QAPP (CDM Smith 2020) were met. In general, the following data measurement objectives were considered:

- Achievement of analytical method and reporting limit requirements
- Adherence to and achievement of appropriate laboratory analytical and field QC requirements
- Achievement of required measurement performance criteria for DQIs (the PARCCS parameters)
- Adherence to sampling and sample handling procedures
- Adherence to the sampling design and deviations documented on field change notifications, if required

The data validation review of the DQIs and other QA objectives determines if the data are of sufficient quality to support their intended use.

Section 3

Field and Laboratory Quality Assurance Activities

CDM Smith completed field sampling activities between March 16 and March 23, 2021. The following table provides a summary of the number of samples collected and the dates each sampling event occurred:

EMAX SDG* 21C208 – Groundwater – March 16 through 18, 2021
15 samples
2 field duplicate samples
2 trip blank samples
EMAX SDG 21C209 – Groundwater - March 16 through 18, 2021
15 samples
2 field duplicate samples
3 trip blank samples
EMAX SDG 21C248– Groundwater – March 18 through 22, 2021
12 samples
1 field duplicate sample
3 trip blank samples
EMAX SDG 21C250 – Groundwater – March 19 through 22, 2021
21 samples
2 field duplicate samples
2 trip blank samples
EMAX SDG 21C281 – Groundwater – March 22 and 23, 2021
1 sample
1 field blank sample
1 equipment blank sample
1 trip blank sample

*SDG – sample delivery group

All samples were received intact with proper chain-of-custody (COC) documentation at EMAX. Sample identification was accurately documented with the exception of three samples in SDG 21C250. Samples were misidentified as MW34B-GW031922, MW34C-GW031923, MW34D-GW031924 in both the laboratory report and electronic data deliverable file. The correct sample names are MW34B-GW031921, MW34C-GW031921, and MW34D-GW031921 respectively. The laboratory was contacted and a revised data package and electronic data deliverable was resubmitted.

Table 3-1 presents a list of the samples collected and the analyses performed. **Attachment 2** presents the completeness review checklists of the data packages. **Attachment 3** includes the analytical data packages.

Sample preparation and analyses were conducted within the method-specified holding times.

The QAPP (CDM Smith 2020) defined the procedures to be followed and the data quality requirements for the field sampling events and associated analytical work.

3.1 Deviations from Field Procedures

As discussed in the Data Summary Report, the following deviations were encountered during the sampling events:

- Purge parameter stabilization criteria for turbidity (either less than 10 nephelometric turbidity unit [NTU] or less than 50 NTU and within 10 percent) were not met at MW-14S and MW-23B. Turbidity at these locations was less than 50 NTU, but not within 10 percent. As all other purge parameter stabilization criteria were met and turbidity was below 50 NTU, there is no expected impact upon data quality at these locations.
- Purge parameter stabilization criteria for turbidity and conductivity (within 10 percent) was not met for MW-08C. As three times the minimum purge volume had been removed and all other purge parameter stabilization criteria were met, there is no expected impact upon data quality at this location.
- As MW-13S was purged dry, a sample was collected the next day once sufficient recharge was observed without meeting purge parameter stabilization. This is an acceptable deviation in the low-flow groundwater sampling standard operating procedure, and there is no impact upon data quality at this location.
- Because of a malfunctioning pump at MW-05R, groundwater samples could not be obtained. At MW-12S, there was insufficient water to collect a groundwater sample. As both of these locations have been successfully sampled in the past, there is no significant impact on the groundwater plume delineation DQO.
- Water level elevations could not be measured at MW-29A, MW-31A, and MW-34A because the water level was above the pump intake but below the volume booster. As the water level of the shallow aquifer could be measured at other screened intervals at each of these locations, there is no impact upon data quality.

These deviations do not impact the DQOs and these well locations and analyses will be sampled during upcoming sampling events.

3.2 Field Quality Assurance/Quality Control

Seven field duplicate pairs, and 10 matrix spike/matrix spike duplicate (MS/MSD) samples were analyzed with the 64 environmental groundwater samples. Four MS/MSD samples were analyzed for volatiles and six other MS/MSD samples were analyzed for nitrate/nitrite, total organic carbon, sulfate, chloride, metals and mercury. The QC sample collection frequency requirements in the QAPP (CDM Smith 2020) of 10 percent for field duplicates and 5 percent for MS/MSD samples were met.

One equipment blank and one field blank sample were collected. Trip blanks were submitted with each cooler sent to the laboratory, for a total of 11 trip blank samples. **Table 3-2** presents the results for the field and trip blank sample results.

Field QA/QC objectives were accomplished through the use of appropriate sampling techniques and collection of the required QC samples at the required frequencies.

3.3 Laboratory Quality Assurance/Quality Control

Analytical QA/QC was assessed by laboratory QC checks, method blanks, sample custody tracking, sample preservation, adherence to holding times, laboratory control samples (LCSs), MS samples, calibration verifications, surrogates, inductively coupled plasma (ICP) interference checks, and other applicable QC parameters. As presented in the data validation reports in **Attachment 1** of this report, the laboratory QC samples met project criteria requirements with the appropriate qualifiers applied. All data are considered usable.

3.3.1 Laboratory Methods

Samples were analyzed using the following U.S. Environmental Protection Agency (EPA) method or Standard Method (SM) (EPA 2004):

Groundwater

- EPA Method SW8260C – volatile organic compound (VOCs)
- EPA Method SW8270D selective ion monitoring – semivolatile organic compounds – (1,4-Dioxane)
- EPA Method SW6020A – Metals
- EPA Method SW7470A – Mercury
- Method RSK-175 – Dissolved gases (ethane, ethene, methane)
- EPA Method E300.0 – Chloride, sulfate
- Method SM2320B – Total alkalinity
- Method SM4500-NO3E – Nitrogen, nitrate-nitrite
- EPA Method SW9060 – Total organic carbon

The methods used met project objectives.

Table 3-1
Sample List and Analyses

Field Sample ID	Matrix	Date Sampled	Laboratory SDG	Method
EB01-GW032321	WG	3/23/2021	21C281	SW8260C
FB01-GW032221	WG	3/22/2021	21C281	SW8270D SIM SW8260C
FD01-GW032221	WG	3/22/2021	21C250	SW8260C
FD02-GW031721	WG	3/17/2021	21C209	SW8260C
FD03-GW032121	WG	3/21/2021	21C250	SW8260C
FD04-GW032221	WG	3/22/2021	21C248	SW8270D SIM A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
FD05-GW031621	WG	3/16/2021	21C208	SW8270D SIM A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
FD06-GW031721	WG	3/17/2021	21C209	SW8270D SIM A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
FD07-GW031621	WG	3/16/2021	21C208	SW8270D SIM A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW01D-GW032221	WG	3/22/2021	21C250	SW8260C
MW01S-GW032221	WG	3/22/2021	21C250	SW8260C
MW02-GW032321	WG	3/23/2021	21C281	SW8260C
MW03RA-GW032121	WG	3/21/2021	21C250	SW8260C
MW03RB-GW032121	WG	3/21/2021	21C250	SW8260C
MW03RC-GW032121	WG	3/21/2021	21C250	SW8260C
MW03RD-GW032121	WG	3/21/2021	21C250	SW8260C
MW04-GW032221	WG	3/22/2021	21C250	SW8260C
MW06-GW032221	WG	3/22/2021	21C250	SW8260C
MW08A-GW031721	WG	3/17/2021	21C209	SW8260C
MW08B-GW031721	WG	3/17/2021	21C209	SW8260C

Table 3-1
Sample List and Analyses

Field Sample ID	Matrix	Date Sampled	Laboratory SDG	Method
MW08C-GW031721	WG	3/17/2021	21C209	SW8260C
MW12D-GW031721	WG	3/17/2021	21C208	SW8260C
MW13D-GW032121	WG	3/21/2021	21C250	SW8260C
MW13L-GW032221	WG	3/22/2021	21C248	SW8270D SIM A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW13S-GW032221	WG	3/22/2021	21C250	SW8260C
MW14D-GW031821	WG	3/18/2021	21C208	SW8260C
MW14S-GW031821	WG	3/18/2021	21C208	SW8260C
MW15D-GW031621	WG	3/16/2021	21C208	SW8260C
MW15S-GW031621	WG	3/16/2021	21C208	SW8260C
MW16D-GW031721	WG	3/17/2021	21C208	SW8260C
MW16S-GW031721	WG	3/17/2021	21C208	SW8260C
MW17D-GW031921	WG	3/19/2021	21C250	SW8260C
MW17S-GW031921	WG	3/19/2021	21C250	SW8260C
MW18-GW032121	WG	3/21/2021	21C250	SW8260C
MW19-GW032121	WG	3/21/2021	21C250	SW8260C
MW20D-GW031921	WG	3/19/2021	21C248	SW8260C
MW20S-GW031921	WG	3/19/2021	21C248	SW8260C
MW21-GW031621	WG	3/16/2021	21C208	SW8260C
MW22-GW032121	WG	3/21/2021	21C248	SW8260C
MW23A-GW031621	WG	3/16/2021	21C208	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW23B-GW031621	WG	3/16/2021	21C208	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW23C-GW031621	WG	3/16/2021	21C208	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060

Table 3-1
Sample List and Analyses

Field Sample ID	Matrix	Date Sampled	Laboratory SDG	Method
MW24-GW032121	WG	3/21/2021	21C248	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW25A-GW032121	WG	3/21/2021	21C248	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW25B-GW032121	WG	3/21/2021	21C248	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW25C-GW032121	WG	3/21/2021	21C248	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW26A-GW031721	WG	3/17/2021	21C209	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW26B-GW031721	WG	3/17/2021	21C209	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW26C-GW031821	WG	3/18/2021	21C209	SW8270D SIM A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060

Table 3-1
Sample List and Analyses

Field Sample ID	Matrix	Date Sampled	Laboratory SDG	Method
MW26D-GW031821	WG	3/18/2021	21C209	SW8270D SIM A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW27-GW031621	WG	3/16/2021	21C208	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW28-GW032121	WG	3/21/2021	21C248	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW29A-GW031921	WG	3/19/2021	21C250	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW29B-GW031921	WG	3/19/2021	21C250	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW29C-GW031921	WG	3/19/2021	21C250	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW30C-GW031621	WG	3/16/2021	21C209	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060

Table 3-1
Sample List and Analyses

Field Sample ID	Matrix	Date Sampled	Laboratory SDG	Method
MW30RA-GW031621	WG	3/16/2021	21C209	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW30RB-GW031621	WG	3/16/2021	21C209	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW31A-GW031821	WG	3/18/2021	21C248	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW31B-GW031821	WG	3/18/2021	21C248	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW31C-GW031821	WG	3/18/2021	21C248	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW32A-GW031721	WG	3/17/2021	21C209	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW32B-GW031721	WG	3/17/2021	21C209	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060

Table 3-1
Sample List and Analyses

Field Sample ID	Matrix	Date Sampled	Laboratory SDG	Method
MW32C-GW031721	WG	3/17/2021	21C209	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW34A-GW031921	WG	3/19/2021	21C250	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW34B-GW031921	WG	3/19/2021	21C250	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW34C-GW031921	WG	3/19/2021	21C250	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW34D-GW031921	WG	3/19/2021	21C250	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW36-GW031621	WG	3/16/2021	21C208	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW37D-GW031721	WG	3/17/2021	21C208	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060

Table 3-1
Sample List and Analyses

Field Sample ID	Matrix	Date Sampled	Laboratory SDG	Method
MW37S-GW031721	WG	3/17/2021	21C208	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW38D-GW031821	WG	3/18/2021	21C209	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
MW38S-GW031721	WG	3/17/2021	21C209	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
TB01-GW031821	WG	3/18/2021	21C208	SW8260C
TB01-GW032221	WG	3/22/2021	21C250	SW8260C
TB01-GW032321	WG	3/23/2021	21C281	SW8260C
TB02-GW031821	WG	3/18/2021	21C209	SW8260C
TB02-GW032221	WG	3/22/2021	21C250	SW8260C
TB03-GW031821	WG	3/18/2021	21C209	SW8260C
TB03-GW032221	WG	3/22/2021	21C248	SW8260C
TB04-GW031821	WG	3/18/2021	21C208	SW8260C
TB04-GW032221	WG	3/22/2021	21C248	SW8260C
TB05-GW031821	WG	3/18/2021	21C209	SW8260C
TB05-GW032221	WG	3/22/2021	21C248	SW8260C

Acronyms:
ID - identificaton
SDG - sample delivery group
WG - groundwater
SW8260C - volatile organic compounds
SW8270D SIM - semivolatile organic compounds - selective ion monitoring
SW6020A - metals
SW7470A - mercury
RSK-175 - dissolved gases - methane, ethane, ethene
E300.0 - chloride, sulfate
SM2320B - total alkalinity
A4500NE - nitrogen, nitrate-nitrite
SW9060 - total organic carbon

Table 3-2
Blank Sample Results

		Sample ID	EB01-GW032321		FB01-GW032221		TB01-GW031821		TB01-GW032221		TB01-GW032321		TB02-GW031821		TB02-GW032221		TB03-GW031821	
		Sample Type	EB		FB		TB		TB		TB		TB		TB		TB	
		Sample Date	3/23/2021		3/22/2021		3/18/2021		3/22/2021		3/23/2021		3/18/2021		3/22/2021		3/18/2021	
		SDG	21C281		21C281		21C208		21C250		21C281		21C209		21C250		21C209	
Method	Analyte	Units	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
8270DSIM	1,4-Dioxane	µg/L	--	--	0.43	U	--	--	--	--	--	--	--	--	--	--	--	--
SW8260C	1,1,1-Trichloroethane	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	1,1,2,2-Tetrachloroethane	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	1,1,2-Trichloroethane	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	1,1,2-Trichlorotrifluoroethane	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	1,1-Dichloroethane	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	1,1-Dichloroethene	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2,3-Trichlorobenzene	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2,4-Trichlorobenzene	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2,4-Trimethylbenzene	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2-Dibromo-3-Chloropropane	µg/L	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
SW8260C	1,2-Dibromoethane	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2-Dichlorobenzene	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2-Dichloroethane	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2-Dichloropropane	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	1,3,5-Trimethylbenzene	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	1,3-Dichlorobenzene	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	1,4-Dichlorobenzene	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	2-Butanone (MEK)	µg/L	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
SW8260C	2-Hexanone	µg/L	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
SW8260C	4-Methyl-2-Pentanone (MIBK)	µg/L	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
SW8260C	Acetone	µg/L	**3.9**	**J**	20	U	20	U	20	U	20	U	20	U	20	U	20	U
SW8260C	Benzene	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	Bromochloromethane	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	Bromodichloromethane	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	Bromoform	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	Bromomethane	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	Carbon Disulfide	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	Carbon Tetrachloride	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	Chlorobenzene	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	Chloroethane	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	Chloroform	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	Chloromethane	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	cis-1,2-Dichloroethene	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	cis-1,3-Dichloropropene	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	Dibromochloromethane	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	Dichlorodifluoromethane	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	Ethylbenzene	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	Isopropylbenzene	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	m/p-Xylenes	µg/L	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
SW8260C	Methyl Acetate	µg/L	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
SW8260C	Methyl Tert-Butyl Ether	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	Methylene Chloride	µg/L	2	U	2	U	2	U	2	U	2	U	**0.54**	**J**	2	U	2	U

Table 3-2
Blank Sample Results

		Sample ID	EB01-GW032321		FB01-GW032221		TB01-GW031821		TB01-GW032221		TB01-GW032321		TB02-GW031821		TB02-GW032221		TB03-GW031821	
		Sample Type	EB		FB		TB		TB		TB		TB		TB		TB	
		Sample Date	3/23/2021		3/22/2021		3/18/2021		3/22/2021		3/23/2021		3/18/2021		3/22/2021		3/18/2021	
		SDG	21C281		21C281		21C208		21C250		21C281		21C209		21C250		21C209	
SW8260C	o-Xylene	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	Styrene	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	Tetrachloroethene	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	Toluene	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	trans-1,2-Dichloroethene	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	trans-1,3-Dichloropropene	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	Trichloroethene	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	Trichlorofluoromethane	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SW8260C	Vinyl Acetate	µg/L	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
SW8260C	Vinyl Chloride	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U

Acronyms:

SW8260C - volatile organic compounds

8270DSIM - semivolatile organic compounds selective ion monitoring

µg/L - microgram per liter

EB - equipment blank

FB - field blank

ID - identification

J - estimated

Q - qualifier

SDG - sample delivery group

TB - trip blank

U - nondetect

Highlighted and bolded results are detect.

-- - not analyzed

Table 3-2
Blank Sample Results

		Sample ID	TB03-GW032221		TB04-GW031821		TB04-GW032221		TB05-GW031821		TB05-GW032221	
		Sample Type	TB		TB		TB		TB		TB	
		Sample Date	3/22/2021		3/18/2021		3/22/2021		3/18/2021		3/22/2021	
		SDG	21C248		21C208		21C248		21C209		21C248	
Method	Analyte	Units	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
8270DSIM	1,4-Dioxane	µg/L	--	--	--	--	--	--	--	--	--	--
SW8260C	1,1,1-Trichloroethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,1,2,2-Tetrachloroethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,1,2-Trichloroethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,1,2-Trichlorotrifluoroethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,1-Dichloroethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,1-Dichloroethene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2,3-Trichlorobenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2,4-Trichlorobenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2,4-Trimethylbenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2-Dibromo-3-Chloropropane	µg/L	2	U	2	U	2	U	2	U	2	U
SW8260C	1,2-Dibromoethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2-Dichlorobenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2-Dichloroethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,2-Dichloropropane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,3,5-Trimethylbenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,3-Dichlorobenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	1,4-Dichlorobenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	2-Butanone (MEK)	µg/L	20	U	20	U	20	U	20	U	20	U
SW8260C	2-Hexanone	µg/L	20	U	20	U	20	U	20	U	20	U
SW8260C	4-Methyl-2-Pentanone (MIBK)	µg/L	20	U	20	U	20	U	20	U	20	U
SW8260C	Acetone	µg/L	20	U	20	U	20	U	20	U	20	U
SW8260C	Benzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Bromochloromethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Bromodichloromethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Bromoform	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Bromomethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Carbon Disulfide	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Carbon Tetrachloride	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Chlorobenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Chloroethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Chloroform	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Chloromethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	cis-1,2-Dichloroethene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	cis-1,3-Dichloropropene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Dibromochloromethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Dichlorodifluoromethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Ethylbenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Isopropylbenzene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	m/p-Xylenes	µg/L	2	U	2	U	2	U	2	U	2	U
SW8260C	Methyl Acetate	µg/L	2	U	2	U	2	U	2	U	2	U
SW8260C	Methyl Tert-Butyl Ether	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Methylene Chloride	µg/L	2	U	2	U	2	U	**0.54**	**J**	2	U

Table 3-2
Blank Sample Results

		Sample ID	TB03-GW032221		TB04-GW031821		TB04-GW032221		TB05-GW031821		TB05-GW032221	
		Sample Type	TB		TB		TB		TB		TB	
		Sample Date	3/22/2021		3/18/2021		3/22/2021		3/18/2021		3/22/2021	
		SDG	21C248		21C208		21C248		21C209		21C248	
SW8260C	o-Xylene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Styrene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Tetrachloroethene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Toluene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	trans-1,2-Dichloroethene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	trans-1,3-Dichloropropene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Trichloroethene	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Trichlorofluoromethane	µg/L	1	U	1	U	1	U	1	U	1	U
SW8260C	Vinyl Acetate	µg/L	2	U	2	U	2	U	2	U	2	U
SW8260C	Vinyl Chloride	µg/L	1	U	1	U	1	U	1	U	1	U

Acronyms:

SW8260C - volatile organic compounds

8270DSIM - semivolatile organic compounds selective ion monitoring

µg/L - microgram per liter

EB - equipment blank

FB - field blank

ID - identification

J - estimated

Q - qualifier

SDG - sample delivery group

TB - trip blank

U - nondetect

Highlighted and bolded results are detect.

-- - not analyzed

Section 4
Data Validation Procedures

For this QCSR, there were five laboratory SDGs. Qualified CDM Smith data validators not associated with project sampling activities validated the data reported in the five SDGs. Data validation was performed in accordance with specified analytical methods and performance criteria outlined in the QAPP (CDM Smith 2020) and in the EPA *National Functional Guidelines for Inorganic Superfund Methods Data Review* (EPA 2017a) and EPA *National Functional Guidelines for Organic Superfund Methods Data Review* (EPA 2017b). Validation reports were prepared and are presented in **Attachment 1**. The following SDG data packages were validated:

- EMAX – SDG 21C208
- EMAX – SDG 21C209
- EMAX – SDG 21C248
- EMAX – SDG 21C250
- EMAX – SDG 21C281

Table 4-1 presents the results that were qualified and the reasons for the qualifications. Qualifiers applied are defined as follows:

- J → Result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- J- → Result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample and is considered biased low.
- U → Analyte was analyzed for but was not detected above the level of the sample method reporting limit (MRL).
- UJ → Analyte was analyzed for but was not detected above the level of the sample MRL. The MRL is approximate.

Table 4-1
Qualification Summary

Field Sample ID	Lab SDG	Method	Analyte	CAS #	Final Result	Unit	Validation Qualifier	Interpreted Qualifier	Qualifier Reason
FD04-GW032221	21C248	A4500NE	Nitrate/Nitrite	7727-37-9	4.1	mg/L	J	J	FD
FD04-GW032221	21C248	E300.0	Chloride	16887-00-6	182	mg/L	J-	J-	MS
FD04-GW032221	21C248	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	ICB
FD05-GW031621	21C208	E300.0	Chloride	16887-00-6	272	mg/L	J	J	ICV
FD06-GW031721	21C209	E300.0	Chloride	16887-00-6	175	mg/L	J	J	ICV
FD07-GW031621	21C208	E300.0	Chloride	16887-00-6	188	mg/L	J	J	ICV
MW02-GW032321	21C281	SW8260C	Acetone	67-64-1	20	µg/L	U-RL	U	EB
MW13L-GW032221	21C248	A4500NE	Nitrate/Nitrite	7727-37-9	1.22	mg/L	J	J	FD
MW13L-GW032221	21C248	E300.0	Chloride	16887-00-6	182	mg/L	J-	J-	MS
MW13L-GW032221	21C248	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	ICB
MW23A-GW031621	21C208	E300.0	Chloride	16887-00-6	329	mg/L	J	J	ICV
MW23A-GW031621	21C208	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	ICB
MW23B-GW031621	21C208	E300.0	Chloride	16887-00-6	184	mg/L	J	J	ICV
MW23B-GW031621	21C208	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	ICB
MW23C-GW031621	21C208	E300.0	Chloride	16887-00-6	62.9	mg/L	J	J	ICV
MW24-GW032121	21C248	E300.0	Chloride	16887-00-6	311	mg/L	J-	J-	MS
MW25A-GW032121	21C248	E300.0	Chloride	16887-00-6	322	mg/L	J-	J-	MS
MW25A-GW032121	21C248	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	ICB
MW25B-GW032121	21C248	E300.0	Chloride	16887-00-6	187	mg/L	J-	J-	MS
MW25C-GW032121	21C248	E300.0	Chloride	16887-00-6	86.5	mg/L	J-	J-	MS
MW25C-GW032121	21C248	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	ICB
MW26A-GW031721	21C209	E300.0	Chloride	16887-00-6	352	mg/L	J	J	ICV
MW26B-GW031721	21C209	E300.0	Chloride	16887-00-6	189	mg/L	J	J	ICV
MW26C-GW031821	21C209	E300.0	Chloride	16887-00-6	81.2	mg/L	J	J	ICV
MW26D-GW031821	21C209	E300.0	Chloride	16887-00-6	59.3	mg/L	J	J	ICV
MW27-GW031621	21C208	E300.0	Chloride	16887-00-6	309	mg/L	J	J	ICV
MW28-GW032121	21C248	E300.0	Chloride	16887-00-6	385	mg/L	J-	J-	MS
MW28-GW032121	21C248	SW7470A	Mercury	7439-97-6	0.5	µg/L	U-RL	U	CCB
MW29A-GW031921	21C250	E300.0	Chloride	16887-00-6	203	mg/L	J	J	ICV
MW29A-GW031921	21C250	SW6020A	Chromium	7440-47-3	1	µg/L	U-RL	U	LB
MW29B-GW031921	21C250	E300.0	Chloride	16887-00-6	372	mg/L	J	J	ICV
MW29B-GW031921	21C250	SW6020A	Chromium	7440-47-3	1	µg/L	U-RL	U	LB
MW29C-GW031921	21C250	E300.0	Chloride	16887-00-6	147	mg/L	J	J	ICV
MW29C-GW031921	21C250	SW6020A	Chromium	7440-47-3	1	µg/L	U-RL	U	LB
MW30C-GW031621	21C209	E300.0	Chloride	16887-00-6	249	mg/L	J	J	ICV
MW30RA-GW031621	21C209	E300.0	Chloride	16887-00-6	301	mg/L	J	J	ICV
MW30RB-GW031621	21C209	E300.0	Chloride	16887-00-6	276	mg/L	J	J	ICV
MW31A-GW031821	21C248	E300.0	Chloride	16887-00-6	190	mg/L	J-	J-	MS
MW31A-GW031821	21C248	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	ICB
MW31B-GW031821	21C248	E300.0	Chloride	16887-00-6	129	mg/L	J-	J-	MS

Table 4-1
Qualification Summary

Field Sample ID	Lab SDG	Method	Analyte	CAS #	Final Result	Unit	Validation Qualifier	Interpreted Qualifier	Qualifier Reason
MW31C-GW031821	21C248	E300.0	Chloride	16887-00-6	85.5	mg/L	J-	J-	MS
MW32A-GW031721	21C209	E300.0	Chloride	16887-00-6	198	mg/L	J	J	ICV
MW32B-GW031721	21C209	E300.0	Chloride	16887-00-6	106	mg/L	J	J	ICV
MW32C-GW031721	21C209	E300.0	Chloride	16887-00-6	61.3	mg/L	J	J	ICV
MW34A-GW031921	21C250	E300.0	Chloride	16887-00-6	157	mg/L	J	J	ICV
MW34B-GW031921	21C250	E300.0	Chloride	16887-00-6	132	mg/L	J	J	ICV
MW34B-GW031921	21C250	SW6020A	Chromium	7440-47-3	1	µg/L	U-RL	U	LB
MW34C-GW031921	21C250	E300.0	Chloride	16887-00-6	30.7	mg/L	J	J	ICV
MW34C-GW031921	21C250	SW6020A	Chromium	7440-47-3	1	µg/L	U-RL	U	LB
MW34D-GW031921	21C250	E300.0	Chloride	16887-00-6	44.6	mg/L	J	J	ICV
MW34D-GW031921	21C250	SW6020A	Chromium	7440-47-3	1	µg/L	U-RL	U	LB
MW36-GW031621	21C208	E300.0	Chloride	16887-00-6	186	mg/L	J	J	ICV
MW36-GW031621	21C208	SW6020A	Lead	7439-92-1	1	µg/L	U-RL	U	ICB
MW37D-GW031721	21C208	E300.0	Chloride	16887-00-6	272	mg/L	J	J	ICV
MW37S-GW031721	21C208	E300.0	Chloride	16887-00-6	360	mg/L	J	J	ICV
MW38D-GW031821	21C209	E300.0	Chloride	16887-00-6	156	mg/L	J	J	ICV
MW38S-GW031721	21C209	E300.0	Chloride	16887-00-6	235	mg/L	J	J	ICV

Acronyms:

ID - identification
SDG - sample delivery group
CAS - Chemical Abstract Service
SW8260C - volatile organic compounds
SW6020A - metals
E300.0 - chloride, sulfate
A4500NE - nitrogen, nitrate-nitrite
SW-7470A - mercury
µg/L - microgram per liter
mg/L - milligram per liter
U - nondetect
UJ - estimated nondetect
J - estimated
J- - estimated value, biased low
U-RL - result is qualified as nondetect at the method reporting limit value
RL - reporting limit
MS - matrix spike criteria
FD - field duplicate criteria
EB - equipment blank criteria
ICB - initial calibration blank criteria
ICV - initial calibration verification criteria
CCB - continuing calibration blank criteria
CCV - continuing calibration verification criteria
LB - laboratory blank criteria

Section 5
Data Quality Indicators

This section summarizes the validation performed and the overall quality of the data. The validation reports are provided in **Attachment 1**.

Achievement of the DQO regarding data usability was determined by the use of DQIs. These DQIs are expressed in terms of PARCCS. The DQIs provide a mechanism to evaluate and measure data quality throughout the project. These criteria are defined in **Table 5-1** and in the following subsections.

5.1 Precision

Precision is a quantitative term that estimates the reproducibility of a set of replicate measurements under a given set of conditions. It is defined as a measurement of mutual agreement between measurements of the same property and is expressed in terms of relative percent difference (RPD) between duplicate determinations.

RPD is calculated as follows:

$$\mathbf{RPD = absolute\ value\ [(C1 - C2)/\{(C1 + C2)/2)\}] \times 100\%}$$

Where:

C1 = concentration of primary sample
C2 = concentration of duplicate sample

Field and analytical precision were determined from review of the field duplicate results, MS/MSDs, LCS/laboratory control sample duplicate (LCSDs), laboratory duplicates and ICP serial dilution tests. The duplicate sample results were compared after calculating their RPDs. Field duplicate samples were collected in the same manner as the original samples but collected in separate individual containers, given separate sample identifiers, and treated as unique samples by the laboratory.

Table 5-2 presents the field duplicate sample results. A control limit of 30 percent RPD was used for the groundwater field duplicate samples when both sample concentrations were greater than five times the MRL. If the sample concentrations were below five times the MRL, the absolute difference between the samples is calculated; if that value is below the MRL, no qualification is required. Laboratory RPDs are specific to the QC parameter. RPD results are summarized below:

- Field duplicate RPDs or the absolute criteria results were within control limits except for nitrate/nitrite in field duplicate pair MW13L-GW032221/FD04-GW032221 (absolute criteria not met) in SDG 21C248. The nitrate/nitrite results for these samples were qualified as estimated "J." The difference between the sample results was greater than the MRL.

- Laboratory duplicate sample RPDs were within the control limits.
- LCS/LCSD RPDs were within control limits.
- MS/MSD RPDs were within control limits.
- ICP serial dilution results were within criteria.

No field or laboratory issues were identified from the RPD results outside criteria; the exceedances are reasonable for this type of sampling activity.

5.2 Accuracy

Accuracy is the degree of agreement of a measurement with an accepted reference or true value and is a measure of the bias in a system. Two different metrics are evaluated to assess result accuracy—calculation of percent recovery (%R) for spiked analytes with known concentrations, and review of blank results for cross-contamination.

5.2.1 Percent Recovery

Accuracy of the data was assessed by comparing recoveries of LCSs, MSs, calibration standards, surrogates, internal standards, and from ICP interference checks during metals analyses. Accuracy is expressed as %R, which is calculated as:

$$\textbf{Percent Recovery} = \frac{\textbf{(Total Analyte Found – Analyte Originally Present)} \times \textbf{100}}{\textbf{Analyte Added}}$$

Analytical accuracy for the entire data collection activity is difficult to measure because several sources of error exist. Errors can be introduced by any of the following:

- Sampling procedure and duration of sampling
- Field contamination
- Sample preservation and handling
- Sample matrix
- Sample preparation
- Analytical techniques

Accuracy is maintained by adhering to the laboratory method and approved field and analytical standard operating procedures.

The following is a summary of the accuracy parameters reviewed and the resulting qualifications for the data collected:

SDG 21C208

- LCS/LCSD %Rs were within criteria.
- MS/MSD %Rs were within criteria.
- Initial calibration verifications (ICVs) and continuing calibration verifications (CCVs) were within criteria except for chloride, with an ICV %R of 89.7 percent. Associated results were qualified as estimated "J/UJ."
- Surrogate results were within criteria.
- ICP interference checks were within criteria.
- Inorganic and organic tune results were within criteria.
- Internal standard results were within criteria.

SDG 21C209

- LCS/LCSD %Rs were within criteria.
- MS/MSD %Rs were within criteria.
- ICVs and CCVs were within criteria except for chloride, with an ICV %R of 89.7 percent. Associated results were qualified as estimated "J/UJ."
- Surrogate results were within criteria.
- ICP interference checks were within criteria.
- Inorganic and organic tune results were within criteria.
- Internal standard results were within criteria.

SDG 21C248

- LCS/LCSD %Rs were within criteria.
- MS/MSD %Rs were within criteria except for chloride (78/78 percent). Associated results were qualified as estimated "J-/UJ."
- ICVs and CCVs were within criteria.
- Surrogate results were within criteria.
- ICP interference checks were within criteria.
- Inorganic and organic tune results were within criteria.
- Internal standard results were within criteria.

SDG 21C250

- LCS/LCSD %Rs were within criteria.
- MS/MSD %Rs were within criteria.
- ICVs and CCVs were within criteria except for chloride, with an ICV %R of 89.7 percent. Associated results were qualified as estimated "J/UJ".
- Surrogate results were within criteria.
- ICP interference checks were within criteria.
- Inorganic and organic tune results were within criteria.
- Internal standard results were within criteria.

SDG 21C281

- LCS/LCSD %Rs were within criteria.
- MS/MSD %Rs were within criteria.
- ICVs and CCVs were within criteria.
- Surrogate results were within criteria.
- ICP interference checks were within criteria.
- Inorganic and organic tune results were within criteria.
- Internal standard results were within criteria.

Sample preservation, handling, and holding times are additional measures of accuracy of the data. All cooler temperatures, sample handling information, and holding times were acceptable except for the three samples that were mislabeled as discussed in Section 3.

5.2.2 Blank Contamination

Blanks are used to determine the level of laboratory and field contamination introduced into the samples, independent of the level of target analytes found in the sample source. Sources of sample contamination can include the containers and equipment used to collect the sample, preservatives added to the sample, other samples in transport coolers, laboratory sample storage refrigerators, standards and solutions used to calibrate instruments, glassware and reagents used to process samples, airborne contamination in the laboratory preparation area, and the analytical instrument sample introduction equipment. Each analyte group has its own particular suite of common laboratory contaminants. Active measures must be performed to continually measure the ambient contamination level, and steps taken to discover the source of the contamination to eliminate or minimize the levels. Random spot contamination can also occur from analytes that are not common laboratory problems but arise as a problem for a specific project or over a short period. Field blanks, equipment blanks, trip blanks, and laboratory method blanks are analyzed to identify possible sources of contamination.

For this project, one field blank sample was collected to assess potential ambient background cross-contamination of sampled media. One equipment blank sample was collected to assess decontamination procedures. Eleven trip blank samples were sent with the coolers to assess potential cooler transportation cross contamination. VOC results for the field, equipment, and trip blank samples are presented in **Table 3-2**. The following text discusses validation actions required as a result of laboratory, field, and/or trip blank contamination.

SDG 21C208

- Lead was detected in the initial calibration blank. Applicable sample results for lead were qualified as nondetect "U" at the MRL. The remaining associated sample results were either nondetect or greater than the MRL and did not require qualification.
- Mercury was detected in some of the laboratory blanks. Associated sample results were either nondetect, greater than the MRL, or the negative blank result was greater than the negative MRL value and did not require qualification.

SDG 21C209

- Methylene chloride was detected in some of the trip blank samples. Associated sample results were nondetect and did not require qualification.
- Mercury was detected in some of the laboratory blanks. Associated sample results were either nondetect, greater than the MRL, or the negative blank result was greater than the negative MRL value and did not require qualification.

SDG 21C248

- Mercury and lead were detected in some of the laboratory blank samples. Applicable sample results for lead and mercury were qualified as nondetect "U" at the MRL. The remaining associated sample results were either nondetect, greater than the MRL, or the negative blank result was greater than the negative MRL value and did not require qualification.

SDG 21C250

- Chromium and mercury were detected in some of the laboratory blank samples. Applicable sample results for chromium were qualified as nondetect "U" at the MRL. The remaining associated sample results were either nondetect, greater than the MRL, or the negative blank result was greater than the negative MRL value and did not require qualification.

SDG 21C281

- Acetone was detected in the equipment blank sample. The associated acetone result was qualified as nondetect "U" at the MRL.

Ideally, no contaminants should be found in the blank samples. Blank samples are used to determine the validity of the analytical results by determining the existence and magnitude of contamination resulting from laboratory (or field) activities or baseline drift during analysis. As discussed above, analytes were detected in some of the laboratory blank samples and/or field and trip blank samples. Concentrations were below the MRLs for all detected blank results. Analytes detected in laboratory blanks are common with laboratory analyses and almost unavoidable.

Associated sample results for the laboratory blanks and/or field and trip blank samples were qualified following the appropriate guidelines. Detected blank concentrations were below the MRLs and the resulting sample qualifications as nondetect or "U" does not falsely diminish identification of site-related contaminants.

5.3 Representativeness

Representativeness is a qualitative term that expresses the degree to which the sample data accurately and precisely represent the environmental conditions corresponding to the location and/or depth interval of sample collection. Requirements and procedures for sample collection were designed to maximize sample representativeness.

Representativeness can be monitored by reviewing field documentation and/or performing field audits. For this report, a detailed review was performed on the COC and field data collection forms. Appropriate laboratory QA/QC requirements were described in the QAPP (CDM Smith 2020) and laboratory statement of work to confirm that the laboratory analytical results were representative of true field conditions.

Field sampling representativeness was attained through strict adherence to the sampling design and the approved QAPP (CDM Smith 2020) procedures and by using EPA-approved analytical methods for sample analyses. As a result, the data represent as near as possible the actual field conditions at the time of sampling.

Representativeness, as defined above, was met for the fieldwork and laboratory analyses. The data collected are suitable for project use.

5.4 Comparability

Comparability is a qualitative term that expresses the confidence with which a data set can be compared with another. Strict adherence to standard sample collection procedures, analytical detection limits, and analytical methods is necessary so data from similar samples and sample conditions are comparable. This comparability is independent of laboratory personnel, data reviewers, or sampling personnel. Comparability criteria are met for the project if, based on data review, the sample collection and analytical procedures used are similar and are determined to have been followed.

To achieve comparability of data generated for the Site, CDM Smith followed standard sample collection procedures and EPA-approved analytical methods during sampling activities. The sample analyses were performed by EMAX using approved standard operating procedures and reporting units. Utilizing such procedures and methods enables the current data to be comparable to future data sets generated with similar methods and units.

5.5 Completeness

Completeness of the field program is defined as the percentage of samples planned for collection, as listed in the QAPP (CDM Smith 2020), versus the actual number of samples collected during the field program (see equation A).

Completeness for acceptable data is defined as the percentage of acceptable data obtained judged to be valid versus the total quantity of data generated (see equation B). Acceptable data include both data that pass all the QC criteria (unqualified data) and data that may not pass all the QC criteria but had appropriate corrective actions taken (qualified but usable data).

A. $$\%Completeness = Cx\frac{100}{n}$$

Where:

C = actual number of samples collected
n = total number of samples planned

B. $$\%Completeness = Vx\frac{100}{n'}$$

Where:

V = number of measurements judged valid
n' = total number of measurements made

The overall completeness goal for this sampling event was 90 percent for all project data.

Not all samples outlined in the QAPP (CDM Smith, 2020) were able to be collected as planned; this is discussed in Section 3.1. Sixty-six samples were planned to be collected (not including field duplicates). Sixty-four samples were collected. The completeness for the number of samples planned to be collected versus the number of samples collected was 97 percent, thus exceeding the 90 percent goal. The two samples that were not able to be collected have sufficient previous sample results in order to evaluate the groundwater plume delineation data quality objective.

Analyses for the sampling event exceeded the 90 percent completeness goal of acceptable data for the number of measurements judged to be valid versus the total number of measurements made.

One hundred percent of the data validated and reported are suitable for their intended use for site characterization. No results were rejected, and all data collected met the overall project objective for data usability. The completeness goals were met for both the number of samples collected for all sampling events and the number of measurements judged to be valid.

The data usability DQO was achieved; the data reported are suitable for their intended use as stated in the QAPP (CDM Smith 2020). The achievement of the completeness goals for the data provides sufficient data for project decisions.

5.6 Sensitivity

Sensitivity is related to the ability to compare analytical results with project-specific levels of interest such as delineation levels or action levels. Analytical quantitation limits for the various sample analytes should be below the level of interest to allow an effective comparison.

The method detection limit (MDL) study attempts to answer the question, “What is the minimum concentration of a substance that can be measured and reported with 99 percent confidence that

the analyte concentration is greater than zero?" The study is based upon repetitive analysis of an interference-free sample spiked with a known amount of the target analyte. The MDL is a measure of the ability of the test procedure to generate a positive response for the target analyte in the absence of any other interferences from the sample.

The MRL is generally defined as the lowest concentration at which an analyte can be confidently reported in a sample and its concentration reported with a reasonable degree of accuracy and precision. For samples that do not pose a particular matrix problem, the MRL is typically about three to five times higher than the MDL.

Laboratory results are reported according to rules that provide established certainty of detection. The result for an analyte is flagged with a "U" if that analyte was not detected and reported at the MRL value or qualified with a "J" flag if associated QC results fall outside the appropriate QC criteria. Additionally, if an analyte is present at a concentration between the MDL and the MRL, the analytical result is flagged with a "J," indicating an estimated quantity. Qualifying the result as an estimated concentration reflects uncertainty in the reported value.

When required, dilutions were performed and accounted for in the reported MRLs. All MRLs were met as specified in the QAPP, (CDM Smith 2020), however, due to the low screening level for 1,2-dibromo-3-chloropropane, 1,2-dicbromoethane, 1,1,2,2-tetrachloroethane, cis-1,3-dichloropropene, and trans-1,3-dichloropropene, the MRL is greater than the screening level. However, these analytes are not a known constituent of potential concern for the site.

Table 5-1 DQIs and Corresponding QC Parameters

Data Quality Indicators	QC Parameters Evaluation in Data Review/Validation
Precision	RPD values of: 1) Laboratory duplicates 2) Field duplicates 3) MS/MSD 4) LCS/LCSD 5) Serial dilution (ICP metals) Relative standard deviation (RSD) values of: 1) Initial calibration verifications
Accuracy/Bias	%R or percent difference (%D) values of: 1) LCS/LCSD %R 2) MS/MSD %R 3) ICV/CCV %R 4) ICP interference check standards 5) ICP-mass spectrometry (MS) tune percent RSD 6) ICP-MS internal standard %R intensity 7) Surrogates 8) Internal standards Results of: 1) Instrument and calibration blanks 2) Method (preparation) blanks 3) Field blanks 4) Trip blanks
Representativeness	Results of all blanks Adherence to field standard operating procedures Sample integrity (COC and sample receipt forms) Holding times
Comparability	Similar reporting limits and units Similar sample collection methods Similar laboratory analytical methods
Completeness	Data qualifiers Laboratory deliverables Requested/Reported valid results Field sample collection (primary and QC samples) Contract compliance (i.e., method and instrument QC within limits)
Sensitivity	Sample method reporting limits meet QAPP criteria Adequacy of sample dilution

Table 5-2
Summary of Field Duplicate Sampling Results

		Location	MW-04		MW-04		RPD (%)	MW-08A		MW-08A		RPD (%)
		Sample ID	MW04-GW032221		FD01-GW032221			MW08A-GW031721		FD02-GW031721		
		Sample Type	N		FD			N		FD		
		Parent Sample ID			MW04-GW032221					MW08A-GW031721		
		Sample Date	3/22/2021		3/22/2021			3/17/2021		3/17/2021		
		SDG	21C250		21C250			21C209		21C209		
Method		Units	Result	Q	Result	Q		Result	Q	Result	Q	
Volatile Organic Compounds												
SW8260C	1,1,1-Trichloroethane	µg/L	1	U	1	U	NC	0.49	J	0.49	J	ABS Criteria
SW8260C	1,1,2,2-Tetrachloroethane	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,1,2-Trichloroethane	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,1,2-Trichlorotrifluoroethane	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,1-Dichloroethane	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,1-Dichloroethene	µg/L	1	U	1	U	NC	0.18	J	0.14	J	ABS Criteria
SW8260C	1,2,3-Trichlorobenzene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,2,4-Trichlorobenzene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,2,4-Trimethylbenzene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,2-Dibromo-3-Chloropropane	µg/L	2	U	2	U	NC	2	U	2	U	NC
SW8260C	1,2-Dibromoethane	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,2-Dichlorobenzene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,2-Dichloroethane	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,2-Dichloropropane	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,3,5-Trimethylbenzene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,3-Dichlorobenzene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,4-Dichlorobenzene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	2-Butanone (MEK)	µg/L	20	U	20	U	NC	20	U	20	U	NC
SW8260C	2-Hexanone	µg/L	20	U	20	U	NC	20	U	20	U	NC
SW8260C	4-Methyl-2-Pentanone (MIBK)	µg/L	20	U	20	U	NC	20	U	20	U	NC
SW8260C	Acetone	µg/L	4	J	4.1	J	ABS Criteria	20	U	2.5	J	ABS Criteria
SW8260C	Benzene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Bromochloromethane	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Bromodichloromethane	µg/L	0.3	J	0.29	J	ABS Criteria	0.46	J	0.47	J	ABS Criteria
SW8260C	Bromoform	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Bromomethane	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Carbon Disulfide	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Carbon Tetrachloride	µg/L	1	U	1	U	NC	1	U	1	U	NC

Table 5-2
Summary of Field Duplicate Sampling Results

			Location									
			Sample ID	MW-04 MW04-GW032221		MW-04 FD01-GW032221		RPD (%)	MW-08A MW08A-GW031721		MW-08A FD02-GW031721		RPD (%)
			Sample Type	N		FD			N		FD		
			Parent Sample ID			MW04-GW032221					MW08A-GW031721		
			Sample Date	3/22/2021		3/22/2021			3/17/2021		3/17/2021		
			SDG	21C250		21C250			21C209		21C209		
SW8260C	Chlorobenzene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Chloroethane	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Chloroform	µg/L		4		4		ABS Criteria	4.3		4.1		ABS Criteria
SW8260C	Chloromethane	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	cis-1,2-Dichloroethene	µg/L		1	U	1	U	NC	0.19	J	0.18	J	ABS Criteria
SW8260C	cis-1,3-Dichloropropene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Dibromochloromethane	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Dichlorodifluoromethane	µg/L		1	U	1	U	NC	0.17	J	1	U	ABS Criteria
SW8260C	Ethylbenzene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Isopropylbenzene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	m/p-Xylenes	µg/L		2	U	2	U	NC	2	U	2	U	NC
SW8260C	Methyl Acetate	µg/L		2	U	2	U	NC	2	U	2	U	NC
SW8260C	Methyl Tert-Butyl Ether	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Methylene Chloride	µg/L		2	U	2	U	NC	2	U	2	U	NC
SW8260C	o-Xylene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Styrene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Tetrachloroethene	µg/L		42		42		0%	58		56		3.51
SW8260C	Toluene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	trans-1,2-Dichloroethene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	trans-1,3-Dichloropropene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Trichloroethene	µg/L		0.19	J	0.2	J	ABS Criteria	0.37	J	0.38	J	ABS Criteria
SW8260C	Trichlorofluoromethane	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Vinyl Acetate	µg/L		2	U	2	U	NC	2	U	2	U	NC
SW8260C	Vinyl Chloride	µg/L		1	U	1	U	NC	1	U	1	U	NC
Semivolatile Organic Compounds SIM (1,4-Dioxane)													
8270DSIM	1,4-Dioxane	µg/L		----	----	----	----	----	----	----	----	----	----
Total Metals													
SW6020A	Aluminum	µg/L		----	----	----	----	----	----	----	----	----	----
SW6020A	Antimony	µg/L		----	----	----	----	----	----	----	----	----	----

Table 5-2
Summary of Field Duplicate Sampling Results

		Location	MW-04		MW-04		RPD (%)	MW-08A		MW-08A		RPD (%)
		Sample ID	MW04-GW032221		FD01-GW032221			MW08A-GW031721		FD02-GW031721		
		Sample Type	N		FD			N		FD		
		Parent Sample ID			MW04-GW032221					MW08A-GW031721		
		Sample Date	3/22/2021		3/22/2021			3/17/2021		3/17/2021		
		SDG	21C250		21C250			21C209		21C209		
SW6020A	Arsenic	µg/L	----	----	----	----	----	----	----	----	----	----
SW6020A	Barium	µg/L	----	----	----	----	----	----	----	----	----	----
SW6020A	Beryllium	µg/L	----	----	----	----	----	----	----	----	----	----
SW6020A	Cadmium	µg/L	----	----	----	----	----	----	----	----	----	----
SW6020A	Calcium	µg/L	----	----	----	----	----	----	----	----	----	----
SW6020A	Chromium	µg/L	----	----	----	----	----	----	----	----	----	----
SW6020A	Cobalt	µg/L	----	----	----	----	----	----	----	----	----	----
SW6020A	Copper	µg/L	----	----	----	----	----	----	----	----	----	----
SW6020A	Iron	µg/L	----	----	----	----	----	----	----	----	----	----
SW6020A	Lead	µg/L	----	----	----	----	----	----	----	----	----	----
SW6020A	Magnesium	µg/L	----	----	----	----	----	----	----	----	----	----
SW6020A	Manganese	µg/L	----	----	----	----	----	----	----	----	----	----
SW6020A	Nickel	µg/L	----	----	----	----	----	----	----	----	----	----
SW6020A	Potassium	µg/L	----	----	----	----	----	----	----	----	----	----
SW6020A	Selenium	µg/L	----	----	----	----	----	----	----	----	----	----
SW6020A	Silver	µg/L	----	----	----	----	----	----	----	----	----	----
SW6020A	Sodium	µg/L	----	----	----	----	----	----	----	----	----	----
SW6020A	Thallium	µg/L	----	----	----	----	----	----	----	----	----	----
SW6020A	Vanadium	µg/L	----	----	----	----	----	----	----	----	----	----
SW6020A	Zinc	µg/L	----	----	----	----	----	----	----	----	----	----
SW7470A	Mercury	µg/L	----	----	----	----	----	----	----	----	----	----
Dissolved Gases												
RSK-175	Ethane	µg/L	----	----	----	----	----	----	----	----	----	----
RSK-175	Ethene	µg/L	----	----	----	----	----	----	----	----	----	----
RSK-175	Methane	µg/L	----	----	----	----	----	----	----	----	----	----
General Chemistry Parameters												
A4500NE	Nitrate/Nitrite	mg/L	----	----	----	----	----	----	----	----	----	----
E300.0	Chloride	mg/L	----	----	----	----	----	----	----	----	----	----
E300.0	Sulfate	mg/L	----	----	----	----	----	----	----	----	----	----

Table 5-2
Summary of Field Duplicate Sampling Results

			Location	MW-04		MW-04		RPD (%)	MW-08A		MW-08A		RPD (%)
			Sample ID	MW04-GW032221		FD01-GW032221			MW08A-GW031721		FD02-GW031721		
			Sample Type	N		FD			N		FD		
			Parent Sample ID			MW04-GW032221					MW08A-GW031721		
			Sample Date	3/22/2021		3/22/2021			3/17/2021		3/17/2021		
			SDG	21C250		21C250			21C209		21C209		
SM2320B	Alkalinity	mg/L	----	----		----	----	----	----	----	----	----	----
SW9060	Total Organic Carbon	mg/L	----	----		----	----	----	----	----	----	----	----

Notes:
---- not evaluated
% - percent
µg/L - microgram per liter
ABS - absolute difference
FD- field duplicate
ID - identification
mg/L - milligram per liter
N - normal sample
NC - not calculated
Q - qualifier
RPD - relative percent difference
SDG - sample delivery group
SIM - selective ion monitoring
U - nondetect
J - estimated value
J- - estimated value, biased low
ABS Criteria - One or both of the sample results are less than 5 times the
Yellow highlighting - RPD value is outside of 30% criteria and/or the ABS Criteria is outside of control

Table 5-2
Summary of Field Duplicate Sampling Results

			Location	MW-13D		MW-13D		RPD (%)	MW-13L		MW-13L		RPD (%)
			Sample ID	MW13D-GW032121		FD03-GW032121			MW13L-GW032221		FD04-GW032221		
			Sample Type	N		FD			N		FD		
			Parent Sample ID			MW13D-GW032121					MW13L-GW032221		
			Sample Date	3/21/2021		3/21/2021			3/22/2021		3/22/2021		
			SDG	21C250		21C250			21C248		21C248		
Method		Units		Result	Q	Result	Q		Result	Q	Result	Q	
Volatile Organic Compounds													
SW8260C	1,1,1-Trichloroethane	µg/L		0.43	J	0.44	J	ABS Criteria	0.58	J	0.59	J	ABS Criteria
SW8260C	1,1,2,2-Tetrachloroethane	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,1,2-Trichloroethane	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,1,2-Trichlorotrifluoroethane	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,1-Dichloroethane	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,1-Dichloroethene	µg/L		0.21	J	0.21	J	ABS Criteria	0.17	J	0.23	J	ABS Criteria
SW8260C	1,2,3-Trichlorobenzene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,2,4-Trichlorobenzene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,2,4-Trimethylbenzene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,2-Dibromo-3-Chloropropane	µg/L		2	U	2	U	NC	2	U	2	U	NC
SW8260C	1,2-Dibromoethane	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,2-Dichlorobenzene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,2-Dichloroethane	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,2-Dichloropropane	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,3,5-Trimethylbenzene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,3-Dichlorobenzene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,4-Dichlorobenzene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	2-Butanone (MEK)	µg/L		20	U	20	U	NC	20	U	20	U	NC
SW8260C	2-Hexanone	µg/L		20	U	20	U	NC	20	U	20	U	NC
SW8260C	4-Methyl-2-Pentanone (MIBK)	µg/L		20	U	20	U	NC	20	U	20	U	NC
SW8260C	Acetone	µg/L		20	U	5.6	J	ABS Criteria	3	J	20	U	ABS Criteria
SW8260C	Benzene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Bromochloromethane	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Bromodichloromethane	µg/L		0.2	J	0.21	J	ABS Criteria	0.22	J	0.23	J	ABS Criteria
SW8260C	Bromoform	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Bromomethane	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Carbon Disulfide	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Carbon Tetrachloride	µg/L		1	U	1	U	NC	1	U	1	U	NC

Table 5-2
Summary of Field Duplicate Sampling Results

			Location	MW-13D		MW-13D		RPD (%)	MW-13L		MW-13L		RPD (%)
			Sample ID	MW13D-GW032121		FD03-GW032121			MW13L-GW032221		FD04-GW032221		
			Sample Type	N		FD			N		FD		
			Parent Sample ID			MW13D-GW032121					MW13L-GW032221		
			Sample Date	3/21/2021		3/21/2021			3/22/2021		3/22/2021		
			SDG	21C250		21C250			21C248		21C248		
SW8260C	Chlorobenzene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Chloroethane	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Chloroform	µg/L		1.9		2		ABS Criteria	2.2		2.2		ABS Criteria
SW8260C	Chloromethane	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	cis-1,2-Dichloroethene	µg/L		0.26	J	0.28	J	ABS Criteria	0.5	J	0.51	J	ABS Criteria
SW8260C	cis-1,3-Dichloropropene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Dibromochloromethane	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Dichlorodifluoromethane	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Ethylbenzene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Isopropylbenzene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	m/p-Xylenes	µg/L		2	U	2	U	NC	2	U	2	U	NC
SW8260C	Methyl Acetate	µg/L		2	U	2	U	NC	2	U	2	U	NC
SW8260C	Methyl Tert-Butyl Ether	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Methylene Chloride	µg/L		2	U	2	U	NC	2	U	2	U	NC
SW8260C	o-Xylene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Styrene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Tetrachloroethene	µg/L		55		56		1.80	51		51		0.00
SW8260C	Toluene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	trans-1,2-Dichloroethene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	trans-1,3-Dichloropropene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Trichloroethene	µg/L		0.44	J	0.43	J	ABS Criteria	0.29	J	0.29	J	ABS Criteria
SW8260C	Trichlorofluoromethane	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Vinyl Acetate	µg/L		2	U	2	U	NC	2	U	2	U	NC
SW8260C	Vinyl Chloride	µg/L		1	U	1	U	NC	1	U	1	U	NC
Semivolatile Organic Compounds SIM (1,4-Dioxane)													
8270DSIM	1,4-Dioxane	µg/L		----	----	----	----	----	0.42	U	0.44	U	NC
Total Metals													
SW6020A	Aluminum	µg/L		----	----	----	----	----	143		151		ABS Criteria
SW6020A	Antimony	µg/L		----	----	----	----	----	1	U	1	U	NC

Table 5-2
Summary of Field Duplicate Sampling Results

			Location	MW-13D		MW-13D		RPD (%)	MW-13L		MW-13L		RPD (%)
			Sample ID	MW13D-GW032121		FD03-GW032121			MW13L-GW032221		FD04-GW032221		
			Sample Type	N		FD			N		FD		
			Parent Sample ID			MW13D-GW032121					MW13L-GW032221		
			Sample Date	3/21/2021		3/21/2021			3/22/2021		3/22/2021		
			SDG	21C250		21C250			21C248		21C248		
SW6020A	Arsenic	µg/L	----	----	----	----	----	0.747	J	0.741	J	ABS Criteria
SW6020A	Barium	µg/L	----	----	----	----	----	48.2		47		2.52
SW6020A	Beryllium	µg/L	----	----	----	----	----	1	U	1	U	NC
SW6020A	Cadmium	µg/L	----	----	----	----	----	1	U	1	U	NC
SW6020A	Calcium	µg/L	----	----	----	----	----	144000		137000		4.98
SW6020A	Chromium	µg/L	----	----	----	----	----	1.24		1.19		ABS Criteria
SW6020A	Cobalt	µg/L	----	----	----	----	----	0.593	J	0.585	J	ABS Criteria
SW6020A	Copper	µg/L	----	----	----	----	----	2	U	2	U	NC
SW6020A	Iron	µg/L	----	----	----	----	----	284		303		ABS Criteria
SW6020A	Lead	µg/L	----	----	----	----	----	1	U	1	U	NC
SW6020A	Magnesium	µg/L	----	----	----	----	----	52800		53000		0.38
SW6020A	Manganese	µg/L	----	----	----	----	----	175		172		1.73
SW6020A	Nickel	µg/L	----	----	----	----	----	1.54		1.55		ABS Criteria
SW6020A	Potassium	µg/L	----	----	----	----	----	2310		2300		0.43
SW6020A	Selenium	µg/L	----	----	----	----	----	0.884	J	0.901	J	ABS Criteria
SW6020A	Silver	µg/L	----	----	----	----	----	1	U	1	U	NC
SW6020A	Sodium	µg/L	----	----	----	----	----	37700		37800		0.26
SW6020A	Thallium	µg/L	----	----	----	----	----	1	U	1	U	NC
SW6020A	Vanadium	µg/L	----	----	----	----	----	1.67		1.66		ABS Criteria
SW6020A	Zinc	µg/L	----	----	----	----	----	75.3		69.7		ABS Criteria
SW7470A	Mercury	µg/L	----	----	----	----	----	0.5	U	0.5	U	NC
Dissolved Gases												
RSK-175	Ethane	µg/L	----	----	----	----	----	2	U	2	U	NC
RSK-175	Ethene	µg/L	----	----	----	----	----	2	U	2	U	NC
RSK-175	Methane	µg/L	----	----	----	----	----	0.28	J	0.36	J	ABS Criteria
General Chemistry Parameters												
A4500NE	Nitrate/Nitrite	mg/L	----	----	----	----	----	1.22	J	4.1	J	**ABS Criteria**
E300.0	Chloride	mg/L	----	----	----	----	----	182	J-	182	J-	ABS Criteria
E300.0	Sulfate	mg/L	----	----	----	----	----	90.9		90.3		0.66

Table 5-2
Summary of Field Duplicate Sampling Results

			Location	MW-13D		MW-13D		RPD (%)	MW-13L		MW-13L		RPD (%)
			Sample ID	MW13D-GW032121		FD03-GW032121			MW13L-GW032221		FD04-GW032221		
			Sample Type	N		FD			N		FD		
			Parent Sample ID			MW13D-GW032121					MW13L-GW032221		
			Sample Date	3/21/2021		3/21/2021			3/22/2021		3/22/2021		
			SDG	21C250		21C250			21C248		21C248		
SM2320B	Alkalinity	mg/L	----	----	----	----	----	----	216		217		0.46
SW9060	Total Organic Carbon	mg/L	----	----	----	----	----	----	0.735	J	0.805	J	ABS Criteria

Notes:
---- not evaluated
% - percent
µg/L - microgram per liter
ABS - absolute difference
FD- field duplicate
ID - identification
mg/L - milligram per liter
N - normal sample
NC - not calculated
Q - qualifier
RPD - relative percent difference
SDG - sample delivery group
SIM - selective ion monitoring
U - nondetect
J - estimated value
J- - estimated value, biased low
ABS Criteria - One or both of the sample results are less
Yellow highlighting - RPD value is outside of 30% criteria

Table 5-2
Summary of Field Duplicate Sampling Results

		Location	MW-30RA		MW-30RA		RPD (%)	MW-32A		MW-32A		RPD (%)
		Sample ID	MW30RA-GW031621		FD05-GW031621			MW32A-GW031721		FD06-GW031721		
		Sample Type	N		FD			N		FD		
		Parent Sample ID			MW30RA-GW031621					MW32A-GW031721		
		Sample Date	3/16/2021		3/16/2021			3/17/2021		3/17/2021		
		SDG	21C209		21C208			21C209		21C209		
Method		Units	Result	Q	Result	Q		Result	Q	Result	Q	
Volatile Organic Compounds												
SW8260C	1,1,1-Trichloroethane	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,1,2,2-Tetrachloroethane	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,1,2-Trichloroethane	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,1,2-Trichlorotrifluoroethane	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,1-Dichloroethane	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,1-Dichloroethene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,2,3-Trichlorobenzene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,2,4-Trichlorobenzene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,2,4-Trimethylbenzene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,2-Dibromo-3-Chloropropane	µg/L	2	U	2	U	NC	2	U	2	U	NC
SW8260C	1,2-Dibromoethane	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,2-Dichlorobenzene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,2-Dichloroethane	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,2-Dichloropropane	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,3,5-Trimethylbenzene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,3-Dichlorobenzene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	1,4-Dichlorobenzene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	2-Butanone (MEK)	µg/L	20	U	20	U	NC	20	U	20	U	NC
SW8260C	2-Hexanone	µg/L	20	U	20	U	NC	20	U	20	U	NC
SW8260C	4-Methyl-2-Pentanone (MIBK)	µg/L	20	U	20	U	NC	20	U	20	U	NC
SW8260C	Acetone	µg/L	3.8	J	20	U	ABS Criteria	20	U	4.6	J	ABS Criteria
SW8260C	Benzene	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Bromochloromethane	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Bromodichloromethane	µg/L	0.54	J	0.54	J	ABS Criteria	0.34	J	0.35	J	ABS Criteria
SW8260C	Bromoform	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Bromomethane	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Carbon Disulfide	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW8260C	Carbon Tetrachloride	µg/L	1	U	1	U	NC	1	U	1	U	NC

Table 5-2
Summary of Field Duplicate Sampling Results

			Location	MW-30RA		MW-30RA		RPD (%)	MW-32A		MW-32A		RPD (%)
			Sample ID	MW30RA-GW031621		FD05-GW031621			MW32A-GW031721		FD06-GW031721		
			Sample Type	N		FD			N		FD		
			Parent Sample ID			MW30RA-GW031621					MW32A-GW031721		
			Sample Date	3/16/2021		3/16/2021			3/17/2021		3/17/2021		
			SDG	21C209		21C208			21C209		21C209		
SW8260C	Chlorobenzene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Chloroethane	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Chloroform	µg/L		6.4		6.5		1.55	5.4		5.6		3.64
SW8260C	Chloromethane	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	cis-1,2-Dichloroethene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	cis-1,3-Dichloropropene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Dibromochloromethane	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Dichlorodifluoromethane	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Ethylbenzene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Isopropylbenzene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	m/p-Xylenes	µg/L		2	U	2	U	NC	2	U	2	U	NC
SW8260C	Methyl Acetate	µg/L		2	U	2	U	NC	2	U	2	U	NC
SW8260C	Methyl Tert-Butyl Ether	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Methylene Chloride	µg/L		2	U	2	U	NC	2	U	2	U	NC
SW8260C	o-Xylene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Styrene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Tetrachloroethene	µg/L		0.18	J	0.18	J	ABS Criteria	0.44	J	0.39	J	ABS Criteria
SW8260C	Toluene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	trans-1,2-Dichloroethene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	trans-1,3-Dichloropropene	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Trichloroethene	µg/L		0.29	J	0.29	J	ABS Criteria	1	U	1	U	NC
SW8260C	Trichlorofluoromethane	µg/L		1	U	1	U	NC	1	U	1	U	NC
SW8260C	Vinyl Acetate	µg/L		2	U	2	U	NC	2	U	2	U	NC
SW8260C	Vinyl Chloride	µg/L		1	U	1	U	NC	1	U	1	U	NC
Semivolatile Organic Compounds SIM (1,4-Dioxane)													
8270DSIM	1,4-Dioxane	µg/L		----	----	----	----	----	----	----	----	----	----
Total Metals													
SW6020A	Aluminum	µg/L		100	U	100	U	NC	41.4	J	33.1	J	ABS Criteria
SW6020A	Antimony	µg/L		1	U	1	U	NC	1	U	1	U	NC

Table 5-2
Summary of Field Duplicate Sampling Results

			Location								
			Sample ID								
			Sample Type								
			Parent Sample ID								
			Sample Date								
			SDG								
SW6020A	Arsenic	µg/L	0.522	J	0.482	J	ABS Criteria	0.965	J	0.902	J	ABS Criteria
SW6020A	Barium	µg/L	81.8		78.3		4.37	59.4		60.1		1.17
SW6020A	Beryllium	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW6020A	Cadmium	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW6020A	Calcium	µg/L	176000		176000		0.00	124000		123000		0.81
SW6020A	Chromium	µg/L	0.788	J	0.699	J	ABS Criteria	1.44		1.56		ABS Criteria
SW6020A	Cobalt	µg/L	0.177	J	0.162	J	ABS Criteria	0.25	J	0.274	J	ABS Criteria
SW6020A	Copper	µg/L	2	U	2	U	NC	2	U	2	U	NC
SW6020A	Iron	µg/L	100	U	100	U	NC	148		119		ABS Criteria
SW6020A	Lead	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW6020A	Magnesium	µg/L	66900		71600		6.79	47600		47100		1.06
SW6020A	Manganese	µg/L	26.6		25.5		4.22	77.9		84.7		8.36
SW6020A	Nickel	µg/L	0.623	J	0.528	J	ABS Criteria	0.529	J	0.614	J	ABS Criteria
SW6020A	Potassium	µg/L	2800		2820		0.71	2680		2680		0.00
SW6020A	Selenium	µg/L	0.643	J	0.607	J	ABS Criteria	0.61	J	0.636	J	ABS Criteria
SW6020A	Silver	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW6020A	Sodium	µg/L	66600		68000		2.08	85300		88700		3.91
SW6020A	Thallium	µg/L	1	U	1	U	NC	1	U	1	U	NC
SW6020A	Vanadium	µg/L	1.31		1.27		ABS Criteria	1.92		1.9		ABS Criteria
SW6020A	Zinc	µg/L	20	U	20	U	NC	20	U	20	U	NC
SW7470A	Mercury	µg/L	0.5	U	0.5	U	NC	0.5	U	0.5	U	NC
Dissolved Gases												
RSK-175	Ethane	µg/L	2	U	2	U	NC	2	U	2	U	NC
RSK-175	Ethene	µg/L	2	U	2	U	NC	2	U	2	U	NC
RSK-175	Methane	µg/L	2	U	2	U	NC	2	U	2	U	NC
General Chemistry Parameters												
A4500NE	Nitrate/Nitrite	mg/L	2.95		3.17		7.19	2.21		2.17		1.83
E300.0	Chloride	mg/L	301	J	272	J	10.12	198	J	175	J	ABS Criteria
E300.0	Sulfate	mg/L	73.9		72.8		1.50	93.7		98.3		4.79

Table 5-2
Summary of Field Duplicate Sampling Results

			Location	MW-30RA		MW-30RA		RPD (%)	MW-32A		MW-32A		RPD (%)
			Sample ID	MW30RA-GW031621		FD05-GW031621			MW32A-GW031721		FD06-GW031721		
			Sample Type	N		FD			N		FD		
			Parent Sample ID			MW30RA-GW031621					MW32A-GW031721		
			Sample Date	3/16/2021		3/16/2021			3/17/2021		3/17/2021		
			SDG	21C209		21C208			21C209		21C209		
SM2320B	Alkalinity	mg/L		283		285		0.70	276		278		0.72
SW9060	Total Organic Carbon	mg/L		1.02		0.926	J	ABS Criteria	0.918	J	0.898	J	ABS Criteria

Notes:
---- not evaluated
% - percent
µg/L - microgram per liter
ABS - absolute difference
FD- field duplicate
ID - identification
mg/L - milligram per liter
N - normal sample
NC - not calculated
Q - qualifier
RPD - relative percent difference
SDG - sample delivery group
SIM - selective ion monitoring
U - nondetect
J - estimated value
J- - estimated value, biased low
ABS Criteria - One or both of the sample results are less
Yellow highlighting - RPD value is outside of 30% criteria

Table 5-2
Summary of Field Duplicate Sampling Results

		Location	MW-36		MW-36		RPD (%)
		Sample ID	MW36-GW031621		FD07-GW031621		
		Sample Type	N		FD		
		Parent Sample ID			MW36-GW031621		
		Sample Date	3/16/2021		3/16/2021		
		SDG	21C208		21C208		
Method		Units	Result	Q	Result	Q	
Volatile Organic Compounds							
SW8260C	1,1,1-Trichloroethane	µg/L	1	U	1	U	NC
SW8260C	1,1,2,2-Tetrachloroethane	µg/L	1	U	1	U	NC
SW8260C	1,1,2-Trichloroethane	µg/L	1	U	1	U	NC
SW8260C	1,1,2-Trichlorotrifluoroethane	µg/L	1	U	1	U	NC
SW8260C	1,1-Dichloroethane	µg/L	1	U	1	U	NC
SW8260C	1,1-Dichloroethene	µg/L	1	U	1	U	NC
SW8260C	1,2,3-Trichlorobenzene	µg/L	1	U	1	U	NC
SW8260C	1,2,4-Trichlorobenzene	µg/L	1	U	1	U	NC
SW8260C	1,2,4-Trimethylbenzene	µg/L	1	U	1	U	NC
SW8260C	1,2-Dibromo-3-Chloropropane	µg/L	2	U	2	U	NC
SW8260C	1,2-Dibromoethane	µg/L	1	U	1	U	NC
SW8260C	1,2-Dichlorobenzene	µg/L	1	U	1	U	NC
SW8260C	1,2-Dichloroethane	µg/L	1	U	1	U	NC
SW8260C	1,2-Dichloropropane	µg/L	1	U	1	U	NC
SW8260C	1,3,5-Trimethylbenzene	µg/L	1	U	1	U	NC
SW8260C	1,3-Dichlorobenzene	µg/L	1	U	1	U	NC
SW8260C	1,4-Dichlorobenzene	µg/L	1	U	1	U	NC
SW8260C	2-Butanone (MEK)	µg/L	20	U	20	U	NC
SW8260C	2-Hexanone	µg/L	20	U	20	U	NC
SW8260C	4-Methyl-2-Pentanone (MIBK)	µg/L	20	U	20	U	NC
SW8260C	Acetone	µg/L	5.5	J	20	U	ABS Criteria
SW8260C	Benzene	µg/L	1	U	1	U	NC
SW8260C	Bromochloromethane	µg/L	1	U	1	U	NC
SW8260C	Bromodichloromethane	µg/L	1	U	1	U	NC
SW8260C	Bromoform	µg/L	1	U	1	U	NC
SW8260C	Bromomethane	µg/L	1	U	1	U	NC
SW8260C	Carbon Disulfide	µg/L	1	U	1	U	NC
SW8260C	Carbon Tetrachloride	µg/L	1	U	1	U	NC

Table 5-2
Summary of Field Duplicate Sampling Results

			Location		MW-36		RPD (%)
			Sample ID		MW36-GW031621		
			Sample Type		N		
			Parent Sample ID				
			Sample Date		3/16/2021		
			SDG		21C208		
SW8260C	Chlorobenzene	µg/L	1	U	1	U	NC
SW8260C	Chloroethane	µg/L	1	U	1	U	NC
SW8260C	Chloroform	µg/L	0.38	J	0.43	J	ABS Criteria
SW8260C	Chloromethane	µg/L	1	U	1	U	NC
SW8260C	cis-1,2-Dichloroethene	µg/L	1	U	1	U	NC
SW8260C	cis-1,3-Dichloropropene	µg/L	1	U	1	U	NC
SW8260C	Dibromochloromethane	µg/L	1	U	1	U	NC
SW8260C	Dichlorodifluoromethane	µg/L	1	U	1	U	NC
SW8260C	Ethylbenzene	µg/L	1	U	1	U	NC
SW8260C	Isopropylbenzene	µg/L	1	U	1	U	NC
SW8260C	m/p-Xylenes	µg/L	2	U	2	U	NC
SW8260C	Methyl Acetate	µg/L	2	U	2	U	NC
SW8260C	Methyl Tert-Butyl Ether	µg/L	1	U	1	U	NC
SW8260C	Methylene Chloride	µg/L	2	U	2	U	NC
SW8260C	o-Xylene	µg/L	1	U	1	U	NC
SW8260C	Styrene	µg/L	1	U	1	U	NC
SW8260C	Tetrachloroethene	µg/L	1	U	1	U	NC
SW8260C	Toluene	µg/L	1	U	1	U	NC
SW8260C	trans-1,2-Dichloroethene	µg/L	1	U	1	U	NC
SW8260C	trans-1,3-Dichloropropene	µg/L	1	U	1	U	NC
SW8260C	Trichloroethene	µg/L	1	U	1	U	NC
SW8260C	Trichlorofluoromethane	µg/L	1	U	1	U	NC
SW8260C	Vinyl Acetate	µg/L	2	U	2	U	NC
SW8260C	Vinyl Chloride	µg/L	1	U	1	U	NC
Semivolatile Organic Compounds SIM (1,4-Dioxane)							
8270DSIM	1,4-Dioxane	µg/L	----	----	----	----	----
Total Metals							
SW6020A	Aluminum	µg/L	100	U	100	U	NC
SW6020A	Antimony	µg/L	1	U	1	U	NC

Table 5-2
Summary of Field Duplicate Sampling Results

		Location	MW-36		MW-36		RPD (%)
		Sample ID	MW36-GW031621		FD07-GW031621		
		Sample Type	N		FD		
		Parent Sample ID			MW36-GW031621		
		Sample Date	3/16/2021		3/16/2021		
		SDG	21C208		21C208		
SW6020A	Arsenic	µg/L	0.541	J	0.531	J	ABS Criteria
SW6020A	Barium	µg/L	103		103		0.00
SW6020A	Beryllium	µg/L	1	U	1	U	NC
SW6020A	Cadmium	µg/L	1	U	1	U	NC
SW6020A	Calcium	µg/L	160000		161000		0.62
SW6020A	Chromium	µg/L	0.533	J	0.415	J	ABS Criteria
SW6020A	Cobalt	µg/L	0.504	J	0.487	J	ABS Criteria
SW6020A	Copper	µg/L	2	U	2	U	NC
SW6020A	Iron	µg/L	172		150		ABS Criteria
SW6020A	Lead	µg/L	1	U	1	U	NC
SW6020A	Magnesium	µg/L	50400		50000		0.80
SW6020A	Manganese	µg/L	178		189		5.99
SW6020A	Nickel	µg/L	1.85		1.74		ABS Criteria
SW6020A	Potassium	µg/L	3010		2940		2.35
SW6020A	Selenium	µg/L	0.745	J	0.605	J	ABS Criteria
SW6020A	Silver	µg/L	1	U	1	U	NC
SW6020A	Sodium	µg/L	94700		96000		1.36
SW6020A	Thallium	µg/L	1	U	1	U	NC
SW6020A	Vanadium	µg/L	0.601	J	0.807	J	ABS Criteria
SW6020A	Zinc	µg/L	8.18	J	9.06	J	ABS Criteria
SW7470A	Mercury	µg/L	0.5	U	0.5	U	NC
Dissolved Gases							
RSK-175	Ethane	µg/L	2	U	2	U	NC
RSK-175	Ethene	µg/L	2	U	2	U	NC
RSK-175	Methane	µg/L	2	U	0.21	J	ABS Criteria
General Chemistry Parameters							
A4500NE	Nitrate/Nitrite	mg/L	0.695		0.842		ABS Criteria
E300.0	Chloride	mg/L	186	J	188	J	ABS Criteria
E300.0	Sulfate	mg/L	129		122		5.58

Table 5-2
Summary of Field Duplicate Sampling Results

			Location		MW-36		RPD (%)
			Sample ID		MW36-GW031621		FD07-GW031621		
			Sample Type		N		FD		
			Parent Sample ID				MW36-GW031621		
			Sample Date		3/16/2021		3/16/2021		
			SDG		21C208		21C208		
SM2320B	Alkalinity	mg/L		330		331		0.30
SW9060	Total Organic Carbon	mg/L		1	U	1.09		ABS Criteria

Notes:
---- not evaluated
% - percent
µg/L - microgram per liter
ABS - absolute difference
FD- field duplicate
ID - identification
mg/L - milligram per liter
N - normal sample
NC - not calculated
Q - qualifier
RPD - relative percent difference
SDG - sample delivery group
SIM - selective ion monitoring
U - nondetect
J - estimated value
J- - estimated value, biased low
ABS Criteria - One or both of the sample results are less
Yellow highlighting - RPD value is outside of 30% criteria

Section 6
Data Usability Assessment

One hundred percent of the data reported and validated in this QCSR are suitable for their intended use as stated in the QAPP (CDM Smith 2020). No sample results were rejected.

The achievement of the completeness goals for the number of samples collected and the number of sample results acceptable for use provides sufficient quality data to support project decisions. Sample results that were qualified as estimated are usable for project decisions.

Section 7
References

CDM Smith. 2020. *Phase 2 Quality Assurance Project Plan, Operable Unit 1, 700 South 1600 East PCE Plume, Salt Lake City, Utah.* Prepared for the U.S. Army Corps of Engineers, Kansas City District. December 2020.

EPA. 2017a. *National Functional Guidelines for Inorganic Superfund Methods Data Review*, EPA-540-R-2017-001, January 2017.

EPA. 2017b. *National Functional Guidelines for Organic Superfund Methods Data Review*, EPA-540-R-2017-002, January 2017.

EPA 2004. EPA's *Test Methods for Evaluating Solid Wastes: Physical/Chemical Methods* (SW-846 2nd edition 1982, revised 1984; 3rd edition 1986; and Updates I, II, IIA, III, IIIA, and IIIB, 1996, 1998, and 2004.

Attachment 1

Data Validation Reports

VA Salt Lake City
Salt Lake City, Utah
Groundwater Validation Report

Sample Delivery Group (SDG) Number: 21C208
Laboratory: EMAX Laboratories, Inc.

Matrix: Groundwater
Collection date: 03/16/2021 through 03/18/2021
Analysis/Methods:

Volatile Organic Compounds SW 846 8260C
Metals SW 846 6020A
Mercury SW 846 7470A
Dissolved Gases - RSK 175
Wet Chemistry Parameters:
Chloride EPA 300.0
Sulfate EPA 300.0
Total Alkalinity SM 2320B
Nitrate / Nitrite - N SM 4500 NO3E
Total Organic Carbon (TOC) SW 9060

Samples in SDG:

Lab ID	Sample Number	Lab ID	Sample Number
C208-01	MW12D-GW031721	C208-11	MW37D-GW031721
C208-02	MW14D-GW031821	C208-12	FD07-GW031621
C208-03	MW14S-GW031821	C208-13	TB01-GW031821
C208-04	MW15D-GW031621	C208-14	MW23A-GW031621
C208-05	MW15S-GW031621	C208-15	MW23B-GW031621
C208-06	MW16D-GW031721	C208-16	MW23C-GW031621
C208-07	MW16S-GW031721	C208-17	MW27-GW031621
C208-08	MW21-GW031621	C208-18	FD05-GW031621
C208-09	MW36-GW031621	C208-19	TB04-GW031821
C208-10	MW37S-GW031721		

Data validation was performed in accordance with the specific analytical methods, National Functional Guidelines for Organic Superfund Methods Data Review (EPA January 2017), and the National Functional Guidelines for Inorganic Superfund Methods Data Review (EPA January 2017).

Volatile Organic Compounds 8260C

Precision:

	Yes	No	N/A
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?	Yes		
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			N/A
Laboratory Control Spike Duplicates RPD within limits?	Yes		

Comments (note deviations):

Field Duplicates	8260C	Sample	Duplicate	%RPD	Qualifiers	Associated Samples
		MW36-GW031621	**FD07-GW031621**			
	Acetone	5.5 J	20 U	NC	None	Sample results < 5xs RL; ABS Diff. < RL
	Chloroform	0.38 J	0.43 J	NC	None	
		MW30RA-GW031621**	**FD05-GW031621**			
	Acetone	3.8 J	20 U	NC	None	Sample results < 5xs RL; ABS Diff. < RL
	Bromodichloromethane	0.54 J	0.54 J	NC	None	
	Trichloroethylene	0.29 J	0.29 J	NC	None	
	Tetrachloroethene	0.18 J	0.18 J	NC	None	

**Results reported in SDG 21C209

MS/MSD	8260C	%RPD	Limit	Qualifiers	Associated Samples
N/A					

LCS/LCSD	8260C	%RPD	Limits	Qualifiers	Associated Samples
LCS1W / LCSD1W		Acceptable			

Accuracy:	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?			**Yes**
Were the Laboratory Method Blank results all < RL?			**Yes**
Were the Field Blanks results all < RL?			**Yes**
Was the ICAL criteria met?			**Yes**
Was the CCV criteria met?			**Yes**
Was the Tuning criteria met?			**Yes**
Were the Surrogate % recoveries within laboratory determined control limits?			**Yes**
Were the Internal Standard areas within ± 50 - 150%?			**Yes**

Comments (note deviations):

Blanks	**8260C**	**Concentration**	**MDL /RL**	**Qualifiers**	**Associated Samples**
MBLK1W		Nondetect			

Field Blank	**8260C**	**Concentration**	**MDL /RL**	**Qualifiers**	**Associated Samples**
TB01-GW031821		Nondetect			
TB04-GW031821		Nondetect			

Surrogates	**8260C**	**%R**	**Limit**	**Qualifiers**	**Associated Samples**
		Acceptable			

MS/MSD	**8260C**	**%R**	**Limit**	**Qualifiers**	**Associated Samples**
N/A					

LCS/LCSD	**8260C**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
LCS1W / LCSD1W		Acceptable			

ICAL	**8260C**	**RRF**	**%RSD**	**Qualifiers**	**Associated Samples**
10/26/2020 13:44		Acceptable	Acceptable		
10/27/2020 10:49		Acceptable	Acceptable		

CCV	**8260C**	**RRF**	**%D**	**Limits**	**Qualifiers**	**Associated Samples**
03/24/21 14:37		Acceptable	Acceptable			
04/29/21 14:39		Acceptable	Acceptable			

Tune	**8260C**
	Acceptable

Internal Standards	**8260C**	**Area**	**Area Lower / Upper Limit**	**Qualifiers**	**Associated Samples**
		Acceptable			

Dissolved Gases RSK-175

Precision:

	Yes	No	N/A
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?	Yes		
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			N/A
Laboratory Control Spike Duplicates RPD within limits?	Yes		
Are the laboratory duplicate RPDs ≤ 20% for water ≤35% for soils or within CRQL criteria?			N/A

Comments (note deviations):

Field Duplicates	RSK-175	Sample	Duplicate	%RPD	Qualifiers	Associated Samples
		MW36-GW031621	FD07-GW031621			
	Methane	2.0 U	0.21 J	NC	None	Sample results < 5xs RL; ABS Diff. < RL
		MW30RA-GW031621**	FD05-GW031621			
		ND	ND			

**Results reported in SDG 21C209

MS/MSD	RSK-175	%RPD	Limit	Qualifiers	Associated Samples
N/A					

LCS/LCSD	RSK-175	%RPD	Limits	Qualifiers	Associated Samples
LCS1W / LCD1W		Acceptable			

Laboratory Duplicates	RSK-175	Sample (ug/L)	Duplicate (ug/L)	RPD	Qualifiers	Associated Samples
N/A						

Accuracy:

	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			N/A
Laboratory Control Sample criteria met?	Yes		
Were the Laboratory Method Blank results all < RL?	Yes		
Were the Field Blanks results all < RL?			N/A
Was the ICAL criteria met?	Yes		
Was the CCV criteria met?	Yes		
Was the Tuning criteria met?			N/A
Were the Surrogate % recoveries within laboratory determined control limits?			N/A
Were the Internal Standard areas within ± 50 - 150%?			N/A

Comments (note deviations):

Blanks	RSK-175	Concentration (ug/L)	MDL / RL	Qualifiers	Associated Samples
MBLK1W		Nondetect			

Field Blank	RSK-175	Concentration	MDL / RL	Qualifiers	Associated Samples
N/A					

Surrogates	RSK-175	%R	Limit	Qualifiers	Associated Samples
N/A					

MS/MSD	RSK-175	%R	Limits (%)	Qualifiers	Associated Samples
N/A					

LCS/LCSD	RSK-175	%R	Limits	Qualifiers	Associated Samples
LCS1W / LCD1W		Acceptable			

ICAL	RSK-175	RRF	%RSD	Qualifiers	Associated Samples
4/29/2020		Acceptable	Acceptable		

CCV	RSK-175	RRF	%D	Limits	Qualifiers	Associated Samples
4/29/2020 '14:39		Acceptable	Acceptable			

Tune	RSK-175
N/A	

Internal Standards	RSK-175	Area	Area Lower / Upper Limit	Qualifiers	Associated Samples
N/A					

Metals SW 6020A / Mercury 7470A

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?		**No**	
Are the laboratory duplicate RPDs ≤ 20% for (water / soil) or within CRQL criteria?			**N/A**
Are the matrix spike duplicates RPD ≤ 20%?			**N/A**
Are the laboratory control sample duplicates RPDs ≤ 20%?	**Yes**		

Comments (note deviations):

Field Duplicates		**Sample (ug/L)**	**Duplicate (ug/L)**	**%RPD**	**Qualifier**	**Associated Samples**
		MW36-GW031621	**FD07-GW031621**			
	Arsenic	0.541 J	0.531 J	NC	None	Sample results < 5xs RL; ABS Diff. < RL
	Chromium	0.533 J	0.415 J	NC	None	
	Cobalt	0.504 J	0.487 J	NC	None	
	Iron	172	150	NC	None	
	Nickel	1.85 J	1.74 J	NC	None	
	Selenium	0.745 J	0.605 J	NC	None	
	Vanadium	0.601 J	0.807 J	NC	None	
	Zinc	8.18 J	9.06 J	NC	None	
		MW30RA-GW031621**	**FD05-GW031621**			
	Arsenic	0.522 J	0.482 J	NC	None	Sample results < 5xs RL; ABS Diff. < RL
	Chromium	0.788 J	0.699 J	NC	None	
	Cobalt	0.177 J	0.162 J	NC	None	
	Nickel	0.623 J	0.528 J	NC	None	
	Selenium	0.643 J	0.607 J	NC	None	
	Vanadium	1.31	1.27	NC	None	

**Results reported in SDG 21C209

MS/MSD	**RPD**	**Qualifiers**	**Associated Samples**
N/A			

LCS / LCSD	**RPD**	**Qualifiers**	**Associated Samples**
LCS1W / LCD1W	Acceptable		
LCS1W / LCD1W (Hg)	Acceptable		

Laboratory Duplicate	**Sample**	**Duplicate**	**RPD**	**Qualifier**	**Associated Samples**
N/A					

Accuracy:	**Yes**	**No**	**N/A**
Were serial dilutions analyzed and within control limits of ±10% for waters (± for 15% for soils) or initial sample result less than 50x MDL?			**N/A**
Was matrix spike criteria met (frequency 20% and % recovery 75-125%)?			**N/A**
Was post digestion spike criteria met (if applicable)?			**N/A**
Was laboratory control sample criteria met?	**Yes**		
Was laboratory blank criteria met (within control limits)?		**No**	
Were ICV/CCV % recoveries within 90-110%?	**Yes**		
Were the Detection Limit PQL Standards within 70-130?			**N/A**
Was the %D on form 16-IN for the initial calibration instrument response and concentration data <30%?			**N/A**
Were ICSA/ICSAB % recoveries acceptable or within CRQL criteria?	**Yes**		
Was the tune %RPD <5% (Peak width < 0.75)?	**Yes**		
Was internal standard criteria met?	**Yes**		

Comments (note deviations):

Serial Dilution	**Analyte**	**Initial Sample Result**	**%D**	**50 x MDL**	**Qualifier**	**Associated Samples**
N/A						

MS/MSD	**Analyte**	**%R**	**Limits**	**Post Digestion**	**Qualifiers**	**Associated Samples**
N/A						

LCS/LCSD	Analyte	%R	Limits	Qualifiers	Associated Samples
LCS1W / LCD1W		Acceptable			
LCS1W / LCD1W (Hg)		Acceptable			

ICV/CCV	Analyte	%R	Limits	Qualifier	Associated Samples
		Acceptable			

Blanks

Prep Blank		Result (ug/L)	MDL/RL (ug/L)	Qualifier	Associated Samples
MBLK1W		Nondetect			

ICBs	Analyte	Result (ug/L)	MDL/RL (ug/L)	Qualifier	Associated Samples
	Lead	0.06	0.05 / 1	U-RL	C208-09, C208-14, C208-15
	Mercury	-0.036	0.1 / 0.5	None	-Blank result > - RL

CCBs	Analyte	Result (ug/L)	MDL/RL (ug/L)	Qualifier	Associated Samples
CCB1 through CCB4		Nondetect			
CCB5	Mercury	0.041	0.1 / 0.5	None	Sample results nondetect
CCB6	Mercury	-0.029	0.1 / 0.5	None	-Blank results > - RL
CCB7	Mercury	-0.007	0.1 / 0.5	None	-Blank results > - RL

Field Blank	6020A	Concentration (ug/L)	MDL/RL (ug/L)	Qualifiers	Associated Samples
N/A					

ICSA/AB	Analyte - Solution A	%R	Found Sol. A / True A	RL	Qualifier	Associated Samples
		Acceptable				

PQL Standard Check	%R	Qualifiers	Associated Samples
N/A			

Tune

Acceptable

Internal Standards	Qualifier	Associated Samples
Acceptable		

Wet Chemistry Parameters

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPD) ≤30% (soils / water) or within CRQL criteria?	**Yes**		
Are the laboratory duplicate RPDs ≤ 20% for water ≤35% for soils or within CRQL criteria?	**Yes**		
Are the matrix spike duplicates RPD ≤ 20%?			**N/A**
Are the laboratory control spike duplicates RPD ≤ 20%?	**Yes**		

Comments (note deviations):

Field Duplicates		**Sample (mg/L)**	**Duplicate (mg/L)**	**RPD**	**Qualifier**	**Associated Samples**
		MW36-GW031621	**FD07-GW031621**			
	Nitrate / Nitrite	0.695 J	0.842 J	NC	None	
	TOC	1.0 U	1.09	NC	None	Sample results < 5xs RL; ABS Diff. < RL
	Chloride	186 J	188 J	NC	None	
		MW30RA-GW031621**	**FD05-GW031621**			
	TOC	1.02	0.926 J	NC	None	

** Results reported in SDG 21C209

MS/MSD	**%R**	**Limits**	**RPD %**	**Qualifiers**	**Associated Samples**
MW23C-GW031621 MS/MSD (C208-16)			Acceptable		

LCS/ LCSD	**Limits**	**RPD**	**Qualifiers**	**Associated Samples**
		Acceptable		

** Numerous LCS/LCSDs performed / evaluated all QC data within acceptable criteria

Laboratory Duplicate	**Sample**	**Duplicate**	**RPD**	**Qualifiers**	**Associated Samples**
			Acceptable		

Accuracy:	**Yes**	**No**	**N/A**
Was matrix spike criteria met (frequency 20% and % recovery 75-125%)?	**Yes**		
Was post digestion spike criteria met (if applicable)?			**N/A**
Was laboratory control sample criteria met?	**Yes**		
Was laboratory blank criteria met (within control limits)?	**Yes**		
Were the Field Blanks results all < RL?			**N/A**
Were ICV/CCV % recoveries within 90-110%?		**No**	
Was the tune %RSD <5% ?			**N/A**
Was internal standard criteria met?			**N/A**

Comments (note deviations):

MS /MSD	**Analyte**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
MW23A-GW031621 MS (C208-14)		Acceptable			
MW23C-GW031621 MS/MSD (C208-16)		Acceptable			

LCS / LCSD	**Analyte**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
		Acceptable			

** Numerous LCS/LCSD performed / evaluated all QC data within acceptable criteria

ICV/CCV			**%R**	**Limits**	**Qualifiers**	**Associated Samples**
	ICV1	Chloride	89.70%	90-110	**J / UJ**	**All samples**

** Multiple ICV/CCVs were reported - all were within criteria with the exception of those noted above

Blanks	**Analyte**	**Result**	**MDL/RL**	**Qualifiers**	**Associated Samples**
		Nondetect			

** Numerous prep. blanks performed / evaluated all QC blanks were nondetect

ICB / CCBs	Analyte	Result	MDL/RL	Qualifier	Associated Samples
		Nondetect			

** Numerous ICB/CCBs performed / evaluated all QC blanks were nondetect

Field Blank	Analyte	Result (mg/L)	MDL/RL	Qualifiers	Associated Samples
N/A					

Tune	Analyte	%RSD	Limits	Qualifiers	Associated Samples
N/A					

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	Yes		
Were holding times met?	Yes		
Was preservation criteria met? (0° C - 6° C)	Yes		
Were Chain-of-Custody records complete and provided in data package?	Yes		

Comments (note

The cooler temperatures were 2.2 & 3.0 °C

Preservation	Cooler Temperature (Degrees C)	Preservation Criteria	Qualifier	Associated Samples
	Acceptable			

Holding Times	Analyte	Days to Extraction	HT Criteria	Qualifier	Associated Samples
		Acceptable			

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	Yes		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	Yes		

Comments (note deviations):

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	Yes		
Do the reporting limits meet project requirements?	Yes		

Comments (note deviations):

Comment:

Data is usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 4/29/2021

Data Reviewer: Cherie Zakowski Date: 5/2/2021

VA Salt Lake City
Salt Lake City, Utah
Groundwater Validation Report

Sample Delivery Group (SDG) Number: 21C209
Laboratory: EMAX Laboratories, Inc.

Matrix: Groundwater
Collection date: 03/16/2021 through 03/18/2021
Analysis/Methods:

Volatile Organic Compounds SW 846 8260C
Metals SW 846 6020A
Mercury SW 846 7470A
Dissolved Gases - RSK 175
Wet Chemistry Parameters:
Chloride EPA 300.0
Sulfate EPA 300.0
Total Alkalinity SM 2320B
Nitrate / Nitrite - N SM 4500 NO3E
Total Organic Carbon (TOC) SW 9060

Samples in SDG:

Lab ID	Sample Number	Lab ID	Sample Number
C209-01	MW08A-GW031721	C209-11	MW26C-GW031821
C209-02	FD02-GW031721	C209-12	MW26D-GW031821
C209-03	MW08B-GW031721	C209-13	MW38S-GW031721
C209-04	MW08C-GW031721	C209-14	MW38D-GW031821
C209-05	MW30RA-GW031621	C209-15	TB02-GW031821
C209-06	MW30RB-GW031621	C209-16	MW32A-GW031721
C209-07	MW30C-GW031621	C209-17	MW32B-GW031721
C209-08	TB03-GW031821	C209-18	MW32C-GW031721
C209-09	MW26A-GW031721	C209-19	TB05-GW031821
C209-10	MW26B-GW031721	C209-20	FD06-GW031721

Data validation was performed in accordance with the specific analytical methods, National Functional Guidelines for Organic Superfund Methods Data Review (EPA January 2017), and the National Functional Guidelines for Inorganic Superfund Methods Data Review (EPA January 2017).

Volatile Organic Compounds 8260C

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?	**Yes**		
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)	**Yes**		
Laboratory Control Spike Duplicates RPD within limits?	**Yes**		

Comments (note deviations):

Field Duplicates	**8260C**	**Sample**	**Duplicate**	**%RPD**	**Qualifiers**	**Associated Samples**
		MW08A-GW031721	**FD02-GW031721**			
	1,1,1-Trichloroethane	0.49 J	0.49 J	NC	None	
	1,1-Dichloroethene	0.18 J	0.14 J	NC	None	
	Acetone	20 U	2.5 J	NC	None	
	Bromodichloromethane	0.46 J	0.47 J	NC	None	Sample results < 5xs RL;
	Chloroform	4.3	4.1	NC	None	ABS Diff. < RL
	cis-1,2-Dichloroethylene	0.19 J	0.18 J	NC	None	
	Dichlorodifluoromethane	0.17 J	1 U	NC	None	
	Trichloroethylene	0.37 J	0.38 J	NC	None	
		MW32A-GW031721	**FD06-GW031721**			
	Acetone	20 U	4.6 J	NC	None	Sample results < 5xs RL;
	Bromodichloromethane	0.34 J	0.35 J	NC	None	ABS Diff. < RL
	Tetrachloroethene	0.44 J	0.39 J	NC	None	

MS/MSD	**8260C**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
MW08B-GW031721 (C209-03)		Acceptable			
MW32A-GW031721 (C209-16)		Acceptable			

LCS/LCSD	8260C	%RPD	Limits	Qualifiers	Associated Samples
LCS1W / LCSD1W		Acceptable			
LCS2W / LCSD2W		Acceptable			

Accuracy:	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)	Yes		
Laboratory Control Sample criteria met?	Yes		
Were the Laboratory Method Blank results all < RL?	Yes		
Were the Field Blanks results all < RL?		No	
Was the ICAL criteria met?	Yes		
Was the CCV criteria met?	Yes		
Was the Tuning criteria met?	Yes		
Were the Surrogate % recoveries within laboratory determined control limits?	Yes		
Were the Internal Standard areas within ± 50 - 150%?	Yes		

Comments (note deviations):

Blanks	8260C	Concentration	MDL /RL	Qualifiers	Associated Samples
MBLK1W		Nondetect			
MBLK2W		Nondetect			

Field Blank	8260C	Concentration	MDL /RL	Qualifiers	Associated Samples
TB02-GW031821	Methylene Chloride	0.54 J	0.5 / 2.0	None	Sample results nondetect
TB05-GW031821	Methylene Chloride	0.54 J	0.5 / 2.0	None	Sample results nondetect
TB03-GW031821		Nondetect			

Surrogates	8260C	%R	Limit	Qualifiers	Associated Samples
		Acceptable			

MS/MSD	8260C	%R	Limit	Qualifiers	Associated Samples
MW08B-GW031721 (C209-03)		Acceptable			
MW32A-GW031721 (C209-16)		Acceptable			

LCS/LCSD	8260C	%R	Limits	Qualifiers	Associated Samples
LCS1W / LCSD1W		Acceptable			
LCS2W / LCSD2W		Acceptable			

ICAL	8260C	RRF	%RSD	Qualifiers	Associated Samples
10/26/2020 13:44		Acceptable	Acceptable		
10/27/2020 10:49		Acceptable	Acceptable		

CCV	8260C	RRF	%D	Limits	Qualifiers	Associated Samples
03/25/21 13:00		Acceptable	Acceptable			
03/26/21 10:38		Acceptable	Acceptable			

Tune	8260C
	Acceptable

Internal Standards	8260C	Area	Area Lower / Upper Limit	Qualifiers	Associated Samples
		Acceptable			

Semivolatile Organic Compounds 8270D (1,4-Dioxane SIM)

Precision:

	Yes	No	N/A
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?			N/A
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			N/A
Laboratory Control Spike Duplicates RPD within limits?	Yes		

Comments (note deviations):

Field Duplicates	8270D SIM	Sample	Duplicate	RPD	Qualifiers	Associated Samples
N/A						

MS/MSD	8270D SIM	RPD	Limit	Qualifiers	Associated Samples
N/A					

LCS/LCSD	8270D SIM	RPD	Limit	Qualifiers	Associated Samples
LCS1W / LCSD1W		Acceptable			

Accuracy:

	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			N/A
Laboratory Control Sample criteria met?	Yes		
Were the Laboratory Method Blank results all < RL?	Yes		
Were the Field Blanks results all < RL?			N/A
Was the ICAL criteria met?	Yes		
Was the CCV criteria met?	Yes		
Was the Tuning criteria met?	Yes		
Were the Surrogate % recoveries within laboratory determined control limits?	Yes		
Were the Internal Standard areas within ± 50 - 150%?	Yes		

Comments (note deviations):

Blanks	8270D SIM	Concentration (ug/L)	MDL / RL	Qualifiers	Associated Samples
MBLK1W		Nondetect			

Field Blank	8270D SIM	Concentration	MDL / RL	Qualifiers	Associated Samples
N/A					

Surrogates	8270D SIM	%R	Limit	Qualifiers	Associated Samples
		Acceptable			

MS/MSD	8270D SIM	%R	Limits (%)	Qualifiers	Associated Samples
N/A					

LCS/LCSD	8270D SIM	%R	Limits	Qualifiers	Associated Samples
LCS1W / LCSD1W		Acceptable			

ICAL	8270D SIM	RRF	%RSD	Qualifiers	Associated Samples
6/3/2020 14:04		Acceptable	Acceptable		

CCV	8270D SIM	RRF	%D	Qualifiers	Associated Samples
03/25/2021 11:00		Acceptable	Acceptable		

Tune	8270D SIM
	Acceptable

Internal Standards	8270D SIM	Area	Area Lower / Upper Limit	Qualifiers	Associated Samples
		Acceptable			

Dissolved Gases RSK-175

Precision:

	Yes	No	N/A
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?	**Yes**		
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)	**Yes**		
Laboratory Control Spike Duplicates RPD within limits?	**Yes**		
Are the laboratory duplicate RPDs ≤ 20% for water ≤35% for soils or within CRQL criteria?			**N/A**

Comments (note deviations):

Field Duplicates	**RSK-175**	**Sample**	**Duplicate**	**%RPD**	**Qualifiers**	**Associated Samples**
		MW32A-GW031721	**FD06-GW031721**			
		ND	ND			

MS/MSD	**RSK-175**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
MW32A-GW031721 (C209-16)		Acceptable			

LCS/LCSD	**RSK-175**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
LCS1W / LCD1W		Acceptable			

Laboratory Duplicates	**RSK-175**	**Sample (ug/L)**	**Duplicate (ug/L)**	**RPD**	**Qualifiers**	**Associated Samples**
N/A						

Accuracy:

	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)	**Yes**		
Laboratory Control Sample criteria met?	**Yes**		
Were the Laboratory Method Blank results all < RL?	**Yes**		
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met?	**Yes**		
Was the CCV criteria met?	**Yes**		
Was the Tuning criteria met?			**N/A**
Were the Surrogate % recoveries within laboratory determined control limits?			**N/A**
Were the Internal Standard areas within ± 50 - 150%?			**N/A**

Comments (note deviations):

Blanks	**RSK-175**	**Concentration (ug/L)**	**MDL / RL**	**Qualifiers**	**Associated Samples**
MBLK1W		Nondetect			

Field Blank	**RSK-175**	**Concentration**	**MDL / RL**	**Qualifiers**	**Associated Samples**
N/A					

Surrogates	**RSK-175**	**%R**	**Limit**	**Qualifiers**	**Associated Samples**
N/A					

MS/MSD	**RSK-175**	**%R**	**Limits (%)**	**Qualifiers**	**Associated Samples**
MW32A-GW031721 (C209-16)		Acceptable			

LCS/LCSD	**RSK-175**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
LCS1W / LCD1W		Acceptable			

ICAL	**RSK-175**	**RRF**	**%RSD**	**Qualifiers**	**Associated Samples**
4/29/2020		Acceptable	Acceptable		

CCV	**RSK-175**	**RRF**	**%D**	**Limits**	**Qualifiers**	**Associated Samples**
4/29/2020 '14:39		Acceptable	Acceptable			

Tune	RSK-175
N/A	

Internal Standards	RSK-175	Area	Area Lower / Upper Limit	Qualifiers	Associated Samples
N/A					

Metals SW 6020A / Mercury 7470A

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?	**Yes**		
Are the laboratory duplicate RPDs ≤ 20% for (water / soil) or within CRQL criteria?			**N/A**
Are the matrix spike duplicates RPD ≤ 20%?	**Yes**		
Are the laboratory control sample duplicates RPDs ≤ 20%?	**Yes**		

Comments (note deviations):

Field Duplicates		**Sample (ug/L) MW32A-GW031721**	**Duplicate (ug/L) FD06-GW031721**	**%RPD**	**Qualifier**	**Associated Samples**
	Aluminum	41.4 J	33.1 J	NC	None	
	Arsenic	0.965 J	0.902 J	NC	None	
	Chromium	1.44	1.56	NC	None	
	Cobalt	0.25 J	0.274 J	NC	None	Sample results < 5xs RL;
	Iron	148	119	NC	None	ABS Diff. < RL
	Nickel	0.529 J	0.614 J	NC	None	
	Selenium	0.61 J	0.636 J	NC	None	
	Vanadium	1.92	1.9	NC	None	

MS/MSD	**RPD**	**Qualifiers**	**Associated Samples**
MW32A-GW031721 (C209-16)	Acceptable		

LCS / LCSD	**RPD**	**Qualifiers**	**Associated Samples**
LCS1W / LCD1W	Acceptable		
LCS1W / LCD1W (Hg)	Acceptable		

Laboratory Duplicate	**Sample**	**Duplicate**	**RPD**	**Qualifier**	**Associated Samples**
N/A					

Accuracy:	**Yes**	**No**	**N/A**
Were serial dilutions analyzed and within control limits of ±10% for waters (± for 15% for soils) or initial sample result less than 50x MDL?	**Yes**		
Was matrix spike criteria met (frequency 20% and % recovery 75-125%)?		**No**	
Was post digestion spike criteria met (if applicable)?	**Yes**		
Was laboratory control sample criteria met?	**Yes**		
Was laboratory blank criteria met (within control limits)?	**Yes**		
Were ICV/CCV % recoveries within 90-110%?	**Yes**		
Were the Detection Limit PQL Standards within 70-130?			**N/A**
Was the %D on form 16-IN for the initial calibration instrument response and concentration data <30%?			**N/A**
Were ICSA/ICSAB % recoveries acceptable or within CRQL criteria?	**Yes**		
Was the tune %RPD <5% (Peak width < 0.75)?	**Yes**		
Was internal standard criteria met?	**Yes**		

Comments (note deviations):

Serial Dilution	**Analyte**	**Initial Sample Result**	**%D**	**50 x MDL**	**Qualifier**	**Associated Samples**
			Acceptable			

MS/MSD	**Analyte**	**%R**	**Limits**	**Post Digestion**	**Qualifiers**	**Associated Samples**
MW32A-GW031721						
(C209-16)	Calcium	67 / 200	75-125	117	None	ISR > 4xs the spike added
	Magnesium	53 / 63	75-125	103	None	ISR > 4xs the spike added
	Sodium	63 / 167	75-125	112	None	ISR > 4xs the spike added
	Mercury	Acceptable				

ISR = Initial Sample Result

LCS/LCSD	**Analyte**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
LCS1W / LCD1W		Acceptable			
LCS1W / LCD1W (Hg)		Acceptable			

ICV/CCV	Analyte	%R	Limits	Qualifier	Associated Samples
		Acceptable			

Blanks

Prep Blank		Result (ug/L)	MDL/RL (ug/L)	Qualifier	Associated Samples
MBLK1W		Nondetect			

ICBs	Analyte	Result (ug/L)	MDL/RL (ug/L)	Qualifier	Associated Samples
		Nondetect			
	Mercury	-0.022	0.1 / 0.5	None	-Blank result > - RL

CCBs	Analyte	Result (ug/L)	MDL/RL (ug/L)	Qualifier	Associated Samples
CCB1 through CCB6		Nondetect			
CCB1	Mercury	0.005	0.1 / 0.5	None	Sample results nondetect
CCB2	Mercury	-0.013	0.1 / 0.5	None	-Blank results > - RL
CCB3	Mercury	-0.025	0.1 / 0.5	None	-Blank results > - RL

Field Blank	6020A	Concentration (ug/L)	MDL/RL (ug/L)	Qualifiers	Associated Samples
N/A					

ICSA/AB	Analyte - Solution A	%R	Found Sol. A / True A	RL	Qualifier	Associated Samples
		Acceptable				

PQL Standard Check	%R	Qualifiers	Associated Samples
N/A			

Tune

Acceptable

Internal Standards	Qualifier	Associated Samples
Acceptable		

Wet Chemistry Parameters

Precision:	Yes	No	N/A
Are the field duplicate relative percent differences (RPD) ≤30% (soils / water) or within CRQL criteria?	Yes		
Are the laboratory duplicate RPDs ≤ 20% for water ≤35% for soils or within CRQL criteria?	Yes		
Are the matrix spike duplicates RPD ≤ 20%?	Yes		
Are the laboratory control spike duplicates RPD ≤ 20%?	Yes		

Comments (note deviations):

Field Duplicates		Sample (mg/L) MW32A-GW031721	Duplicate (mg/L) FD06-GW031721	RPD	Qualifier	Associated Samples
	Chloride	198	175	NC	None	Sample results < 5xs RL;
	TOC	0.918 J	0.0.898 J	NC	None	ABS Diff. < RL

MS/MSD	%R	Limits	RPD %	Qualifiers	Associated Samples
MW32A-GW031721 (C209-16)			Acceptable		
MW26A-GW031721 (C209-09)			Acceptable		

LCS/ LCSD	Limits	RPD	Qualifiers	Associated Samples
		Acceptable		

** Numerous LCS/LCSDs performed / evaluated all QC data within acceptable criteria

Laboratory Duplicate	Sample	Duplicate	RPD	Qualifiers	Associated Samples
			Acceptable		

Accuracy:	Yes	No	N/A
Was matrix spike criteria met (frequency 20% and % recovery 75-125%)?	Yes		
Was post digestion spike criteria met (if applicable)?			N/A
Was laboratory control sample criteria met?	Yes		
Was laboratory blank criteria met (within control limits)?	Yes		
Were the Field Blanks results all < RL?			N/A
Were ICV/CCV % recoveries within 90-110%?		No	
Was the tune %RSD <5% ?			N/A
Was internal standard criteria met?			N/A

Comments (note deviations):

MS /MSD	Analyte	%R	Limits	Qualifiers	Associated Samples
MW32A-GW031721 (C209-16)		Acceptable			
MW26A-GW031721 (C209-09)		Acceptable			

LCS / LCSD	Analyte	%R	Limits	Qualifiers	Associated Samples
		Acceptable			

** Numerous LCS/LCSD performed / evaluated all QC data within acceptable criteria

ICV/CCV			%R	Limits	Qualifiers	Associated Samples
	ICV1	Chloride	89.70%	90-110	J / UJ	All samples

** Multiple ICV/CCVs were reported - all were within criteria with the exception of those noted above

Blanks	Analyte	Result	MDL/RL	Qualifiers	Associated Samples
		Nondetect			

** Numerous prep. blanks performed / evaluated all QC blanks were nondetect

ICB / CCBs	Analyte	Result	MDL/RL	Qualifier	Associated Samples
		Nondetect			

** Numerous ICB/CCBs performed / evaluated all QC blanks were nondetect

Field Blank	Analyte	Result (mg/L)	MDL/RL	Qualifiers	Associated Samples
N/A					

Tune	Analyte	%RSD	Limits	Qualifiers	Associated Samples
N/A					

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	Yes		
Were holding times met?	Yes		
Was preservation criteria met? (0° C - 6° C)	Yes		
Were Chain-of-Custody records complete and provided in data package?	Yes		

Comments (note

The cooler temperatures were 2.0, 2.8, 3.6 & 3.5 °C

Preservation	Cooler Temperature (Degrees C)	Preservation Criteria	Qualifier	Associated Samples
	Acceptable			

Holding Times	Analyte	Days to Extraction	HT Criteria	Qualifier	Associated Samples
		Acceptable			

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	Yes		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	Yes		

Comments (note deviations):

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	Yes		
Do the reporting limits meet project requirements?	Yes		

Comments (note deviations):

Comment:

Data is usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 5/1/2021

Data Reviewer: Cherie Zakowski Date: 5/3/2021

VA Salt Lake City
Salt Lake City, Utah
Groundwater Validation Report

Sample Delivery Group (SDG) Number: 21C248
Laboratory: EMAX Laboratories, Inc.

Matrix: Groundwater
Collection date: 03/18/2021 03/19/2021 03/21/2021 03/22/2021
Analysis/Methods:

Volatile Organic Compounds SW 846 8260C
Metals SW 846 6020A
Mercury SW 846 7470A
Dissolved Gases - RSK 175
Wet Chemistry Parameters:
Chloride EPA 300.0
Sulfate EPA 300.0
Total Alkalinity SM 2320B
Nitrate / Nitrite - N SM 4500 NO3E
Total Organic Carbon (TOC) SW 9060

Samples in SDG:

Lab ID	Sample Number	Lab ID	Sample Number
C248-01	MW20D-GW031921	C248-09	MW28-GW032121
C248-02	MW20S-GW031921	C248-10	MW31A-GW031821
C248-03	MW22-GW032121	C248-11	MW31B-GW031821
C248-04	MW24-GW032121	C248-12	MW31C-GW031821
C248-05	MW25A-GW032121	C248-13	TB04-GW032221
C248-06	MW25B-GW032121	C248-14	MW13L-GW032221
C248-07	MW25C-GW032121	C248-15	FD04-GW032221
C248-08	TB03-GW032221	C248-16	TB05-GW032221

Data validation was performed in accordance with the specific analytical methods, National Functional Guidelines for Organic Superfund Methods Data Review (EPA January 2017), and the National Functional Guidelines for Inorganic Superfund Methods Data Review (EPA January 2017).

Volatile Organic Compounds 8260C

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?	**Yes**		
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)	**Yes**		
Laboratory Control Spike Duplicates RPD within limits?	**Yes**		

Comments (note deviations):

Field Duplicates	**8260C**	**Sample MW13L-GW032221**	**Duplicate FD04-GW032221**	**%RPD**	**Qualifiers**	**Associated Samples**
	1,1,1-Trichloroethane	0.58 J	0.59 J	NC	None	Sample results < 5xs RL; ABS Diff. < RL
	1,1-Dichloroethene	0.17 J	0.23 J	NC	None	
	Acetone	3 J	20 U	NC	None	
	Bromodichloromethane	0.22 J	0.23 J	NC	None	
	Chloroform	2.2	2.2	NC	None	
	cis-1,2-Dichloroethylene	0.50 J	0.51 J	NC	None	
	Trichloroethylene	0.29 J	0.29 J	NC	None	

MS/MSD	**8260C**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
MW13L-GW032221 (C248-14)		Acceptable			

LCS/LCSD	**8260C**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
LCS1W / LCSD1W		Acceptable			
LCS2W / LCSD2W		Acceptable			

Accuracy:	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)	**Yes**		
Laboratory Control Sample criteria met?	**Yes**		
Were the Laboratory Method Blank results all < RL?	**Yes**		
Were the Field Blanks results all < RL?	**Yes**		
Was the ICAL criteria met?	**Yes**		
Was the CCV criteria met?	**Yes**		
Was the Tuning criteria met?	**Yes**		
Were the Surrogate % recoveries within laboratory determined control limits?	**Yes**		
Were the Internal Standard areas within ± 50 - 150%?	**Yes**		

Comments (note deviations):

Blanks	**8260C**	**Concentration**	**MDL /RL**	**Qualifiers**	**Associated Samples**
MBLK1W		Nondetect			
MBLK2W		Nondetect			

Field Blank	**8260C**	**Concentration**	**MDL /RL**	**Qualifiers**	**Associated Samples**
TB03-GW032221		Nondetect			
TB04-GW032221		Nondetect			
TB05-GW032221		Nondetect			

Surrogates	**8260C**	**%R**	**Limit**	**Qualifiers**	**Associated Samples**
		Acceptable			

MS/MSD	**8260C**	**%R**	**Limit**	**Qualifiers**	**Associated Samples**
MW13L-GW032221 (C248-14)		Acceptable			

LCS/LCSD	**8260C**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
LCS1W / LCSD1W		Acceptable			
LCS2W / LCSD2W		Acceptable			

ICAL	**8260C**	**RRF**	**%RSD**	**Qualifiers**	**Associated Samples**
02/23/2021 11:49		Acceptable	Acceptable		

CCV	**8260C**	**RRF**	**%D**	**Limits**	**Qualifiers**	**Associated Samples**
03/26/2021 11:47		Acceptable	Acceptable			
03/29/2021 9:31		Acceptable	Acceptable			

Tune	**8260C**
	Acceptable

Internal Standards	**8260C**	**Area**	**Area Lower / Upper Limit**	**Qualifiers**	**Associated Samples**
		Acceptable			

Semivolatile Organic Compounds 8270D (1,4-Dioxane SIM)

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?	**Yes**		
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)	**Yes**		
Laboratory Control Spike Duplicates RPD within limits?	**Yes**		

Comments (note deviations):

Field Duplicates	**8270D SIM**	**Sample**	**Duplicate**	**RPD**	**Qualifiers**	**Associated Samples**
		MW13L-GW032221	**FD04-GW032221**			
	1,4-Dioxane	ND	ND			

MS/MSD	**8270D SIM**	**RPD**	**Limit**	**Qualifiers**	**Associated Samples**
MW13L-GW032221 (C248-14)		Acceptable			

LCS/LCSD	**8270D SIM**	**RPD**	**Limit**	**Qualifiers**	**Associated Samples**
LCS1W / LCSD1W		Acceptable			

Accuracy:	**Yes**	**No**	**N/A**
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)	**Yes**		
Laboratory Control Sample criteria met?	**Yes**		
Were the Laboratory Method Blank results all < RL?	**Yes**		
Were the Field Blanks results all < RL?	**N/A**		
Was the ICAL criteria met?	**Yes**		
Was the CCV criteria met?	**Yes**		
Was the Tuning criteria met?	**Yes**		
Were the Surrogate % recoveries within laboratory determined control limits?	**Yes**		
Were the Internal Standard areas within ± 50 - 150%?	**Yes**		

Comments (note deviations):

Blanks	**8270D SIM**	**Concentration (ug/L)**	**MDL / RL**	**Qualifiers**	**Associated Samples**
MBLK1W		Nondetect			

Field Blank	**8270D SIM**	**Concentration**	**MDL / RL**	**Qualifiers**	**Associated Samples**
N/A					

Surrogates	**8270D SIM**	**%R**	**Limit**	**Qualifiers**	**Associated Samples**
		Acceptable			

MS/MSD	**8270D SIM**	**%R**	**Limits (%)**	**Qualifiers**	**Associated Samples**
MW13L-GW032221 (C248-14)		Acceptable			

LCS/LCSD	**8270D SIM**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
LCS1W / LCSD1W		Acceptable			

ICAL	**8270D SIM**	**RRF**	**%RSD**	**Qualifiers**	**Associated Samples**
6/3/2020 14:04		Acceptable	Acceptable		

CCV	**8270D SIM**	**RRF**	**%D**	**Qualifiers**	**Associated Samples**
03/29/2021 11:12		Acceptable	Acceptable		

Tune	**8270D SIM**
	Acceptable

Internal Standards	**8270D SIM**	**Area**	**Area Lower / Upper Limit**	**Qualifiers**	**Associated Samples**
		Acceptable			

Dissolved Gases RSK-175

Precision:

	Yes	No	N/A
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?	**Yes**		
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)	**Yes**		
Laboratory Control Spike Duplicates RPD within limits?	**Yes**		
Are the laboratory duplicate RPDs ≤ 20% for water ≤35% for soils or within CRQL criteria?			**N/A**

Comments (note deviations):

Field Duplicates	**RSK-175**	**Sample**	**Duplicate**	**%RPD**	**Qualifiers**	**Associated Samples**
		MW13L-GW032221	**FD04-GW032221**			
	Methane	0.28	0.36	NC	None	Sample results < 5xs RL; ABS Diff. < RL

MS/MSD	**RSK-175**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
MW13L-GW032221 (C248-14)		Acceptable			

LCS/LCSD	**RSK-175**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
LCS1W / LCD1W		Acceptable			

Laboratory Duplicates	**RSK-175**	**Sample (ug/L)**	**Duplicate (ug/L)**	**RPD**	**Qualifiers**	**Associated Samples**
N/A						

Accuracy:

	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)	**Yes**		
Laboratory Control Sample criteria met?	**Yes**		
Were the Laboratory Method Blank results all < RL?	**Yes**		
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met?	**Yes**		
Was the CCV criteria met?	**Yes**		
Was the Tuning criteria met?			**N/A**
Were the Surrogate % recoveries within laboratory determined control limits?			**N/A**
Were the Internal Standard areas within ± 50 - 150%?			**N/A**

Comments (note deviations):

Blanks	**RSK-175**	**Concentration (ug/L)**	**MDL / RL**	**Qualifiers**	**Associated Samples**
MBLK1W		Nondetect			

Field Blank	**RSK-175**	**Concentration**	**MDL / RL**	**Qualifiers**	**Associated Samples**
N/A					

Surrogates	**RSK-175**	**%R**	**Limit**	**Qualifiers**	**Associated Samples**
N/A					

MS/MSD	**RSK-175**	**%R**	**Limits (%)**	**Qualifiers**	**Associated Samples**
MW13L-GW032221 (C248-14)		Acceptable			

LCS/LCSD	**RSK-175**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
LCS1W / LCD1W		Acceptable			

ICAL	**RSK-175**	**RRF**	**%RSD**	**Qualifiers**	**Associated Samples**
4/29/2020		Acceptable	Acceptable		

CCV	**RSK-175**	**RRF**	**%D**	**Limits**	**Qualifiers**	**Associated Samples**
4/29/2020 '14:39		Acceptable	Acceptable			

Tune	**RSK-175**				
N/A					

Internal Standards	**RSK-175**	**Area**	**Area Lower / Upper Limit**	**Qualifiers**	**Associated Samples**
N/A					

Metals SW 6020A / Mercury 7470A

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?	**Yes**		
Are the laboratory duplicate RPDs ≤ 20% for (water / soil) or within CRQL criteria?			**N/A**
Are the matrix spike duplicates RPD ≤ 20%?	**Yes**		
Are the laboratory control sample duplicates RPDs ≤ 20%?	**Yes**		

Comments (note deviations):

Field Duplicates		**Sample (ug/L) MW13L-GW032221**	**Duplicate (ug/L) FD04-GW032221**	**%RPD**	**Qualifier**	**Associated Samples**
	Aluminum	143	151	NC	None	
	Arsenic	0.747 J	0.741 J	NC	None	
	Chromium	1.24	1.19	NC	None	
	Cobalt	0.593 J	0.585 J	NC	None	
	Iron	284	303	NC	None	Sample results < 5xs RL;
	Lead	0.393 J	0.37 J	NC	None	ABS Diff. < RL
	Nickel	1.54	1.55	NC	None	
	Selenium	0.884 J	0.901 J	NC	None	
	Vanadium	1.67	1.66	NC	None	
	Zinc	75.3	69.7	NC	None	

MS/MSD	**RPD**	**Qualifiers**	**Associated Samples**
MW13L-GW032221 MS / MSD (C248-14)	Acceptable		

LCS / LCSD	**RPD**	**Qualifiers**	**Associated Samples**
LCS1W / LCD1W	Acceptable		
LCS1W / LCD1W (Hg)	Acceptable		

Laboratory Duplicate	**Sample**	**Duplicate**	**RPD**	**Qualifier**	**Associated Samples**
N/A					

Accuracy:	**Yes**	**No**	**N/A**
Were serial dilutions analyzed and within control limits of ±10% for waters (± for 15% for soils) or initial sample result less than 50x MDL?	**Yes**		
Was matrix spike criteria met (frequency 20% and % recovery 75-125%)?		**No**	
Was post digestion spike criteria met (if applicable)?	**Yes**		
Was laboratory control sample criteria met?	**Yes**		
Was laboratory blank criteria met (within control limits)?		**No**	
Were ICV/CCV % recoveries within 90-110%?		**No**	
Were the Detection Limit PQL Standards within 70-130?			**N/A**
Was the %D on form 16-IN for the initial calibration instrument response and concentration data <30%?			**N/A**
Were ICSA/ICSAB % recoveries acceptable or within CRQL criteria?	**Yes**		
Was the tune %RPD <5% (Peak width < 0.75)?	**Yes**		
Was internal standard criteria met?	**Yes**		

Comments (note deviations):

Serial Dilution	**Analyte**	**Initial Sample Result**	**%D**	**50 x MDL**	**Qualifier**	**Associated Samples**
			Acceptable			

MS/MSD	**Analyte**	**%R**	**Limits**	**Post Digestion**	**Qualifiers**	**Associated Samples**
MW13L-GW032221 MS / MSD (C248-14)	Manganese	80 / 150%	75-125	103	None	ISR > 4xs the spike added
	Sodium	67 / 127%	75-125	107	None	ISR > 4xs the spike added
	Calcium	33 / 67%	75-125	113	None	ISR > 4xs the spike added
	Magnesium	287 / 147	75-125	120	None	ISR > 4xs the spike added
	Mercury	Acceptable				

ISR = Initial Sample Result

LCS/LCSD	**Analyte**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
LCS1W / LCD1W		Acceptable			
LCS1W / LCD1W (Hg)		Acceptable			

ICV/CCV	Analyte	%R	Limits	Qualifier	Associated Samples
CCV7	Selenium	111%	90-110	**J /UJ****	**C248-10I through C248-12I, C248-14I, C248-15I**

** No qualification required - CCV applies to diluted sample results - initial results reported

Blanks

Prep Blank		Result (ug/L)	MDL/RL (ug/L)	Qualifier	Associated Samples
MBLK1W		Nondetect			
MBLK1W	Mercury	Nondetect			

ICBs	Analyte	Result (ug/L)	MDL/RL (ug/L)	Qualifier	Associated Samples
	Lead	0.06	0.05 / 1.0	**U-RL**	**C248-05, C248-07, C248-10, C248-14, C248-15**
	Mercury	-0.036	0.1 / 0.5	None	-Blank result > - RL

CCBs	Analyte	Result (ug/L)	MDL/RL (ug/L)	Qualifier	Associated Samples
CCB1 through CCB7		Nondetect			
CCB4	Mercury	0.027	0.1 / 0.5	**U-RL**	**C248-09**
CCB5	Mercury	0.041	0.1 / 0.5	**U-RL**	**C248-09**
CCB6	Mercury	-0.029	0.1 / 0.5	None	-Blank results > - RL

Field Blank	6020A	Concentration (ug/L)	MDL/RL (ug/L)	Qualifiers	Associated Samples
N/A					

ICSA/AB	Analyte - Solution A	%R	Found Sol. A / True A	RL	Qualifier	Associated Samples
		Acceptable				

PQL Standard Check	%R	Qualifiers	Associated Samples
N/A			

Tune

Acceptable

Internal Standards	Qualifier	Associated Samples
Acceptable		

Wet Chemistry Parameters

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPD) ≤30% (soils / water) or within CRQL criteria?		**No**	
Are the laboratory duplicate RPDs ≤ 20% for water ≤35% for soils or within CRQL criteria?		**Yes**	
Are the matrix spike duplicates RPD ≤ 20%?			**N/A**
Are the laboratory control spike duplicates RPD ≤ 20%?		**Yes**	

Comments (note deviations):

Field Duplicates		**Sample (mg/L) MW13L-GW032221**	**Duplicate (mg/L) FD04-GW032221**	**RPD**	**Qualifier**	**Associated Samples**
	Nitrogen, Nitrate-Nitrite	1.22	4.1	NC	**J***	**MW13L-GW032221 & FD04-GW032221**
	Chloride	182	182	NC	None	Sample results < 5xs RL;
	Total Organic Carbon	0.735 J	0.805 J	NC	None	ABS Diff. < RL

* Sample results < 5xs RL; ABS Diff. > RL

MS/MSD	**%R**	**Limits**	**RPD %**	**Qualifiers**	**Associated Samples**
			Acceptable		

** Numerous MS/MSDs performed / evaluated all QC data within acceptable criteria

LCS/ LCSD	**Limits**	**RPD**	**Qualifiers**	**Associated Samples**
		Acceptable		

** Numerous LCS/LCSDs performed / evaluated all QC data within acceptable criteria

Laboratory Duplicate	**Sample**	**Duplicate**	**RPD**	**Qualifiers**	**Associated Samples**
			Acceptable		

Accuracy:	**Yes**	**No**	**N/A**
Was matrix spike criteria met (frequency 20% and % recovery 75-125%)?		**No**	
Was post digestion spike criteria met (if applicable)?			**N/A**
Was laboratory control sample criteria met?	**Yes**		
Was laboratory blank criteria met (within control limits)?	**Yes**		
Were the Field Blanks results all < RL?			**N/A**
Were ICV/CCV % recoveries within 90-110%?	**Yes**		
Was the tune %RSD <5% ?			**N/A**
Was internal standard criteria met?			**N/A**

Comments (note deviations):

MS /MSD	**Analyte**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
MW13L-GW032221 MS / MSD (C248-14)					
	Chloride	78 / 78	87-111	**J - / UJ**	**C248-04 through C248-07, C248-09 through C248-12, C248-14, C248-15**
MW24-GW032121 MS / MSD		Acceptable			

LCS / LCSD	**Analyte**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
		Acceptable			

** Numerous LCS/LCSD performed / evaluated all QC data within acceptable criteria

ICV/CCV	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
	Acceptable			

** Multiple ICV/CCVs were reported - all were within criteria

Blanks	**Analyte**	**Result**	**MDL/RL**	**Qualifiers**	**Associated Samples**
		Nondetect			

** Numerous prep. blanks performed / evaluated all QC blanks were nondetect

ICB / CCBs	Analyte	Result	MDL/RL	Qualifier	Associated Samples
		Nondetect			

** Numerous ICB/CCBs performed / evaluated all QC blanks were nondetect

Field Blank	Analyte	Result (mg/L)	MDL/RL	Qualifiers	Associated Samples
N/A					

Tune	Analyte	%RSD	Limits	Qualifiers	Associated Samples
N/A					

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	Yes		
Were holding times met?	Yes		
Was preservation criteria met? (0° C - 6° C)	Yes		
Were Chain-of-Custody records complete and provided in data package?	Yes		

Comments (note

The cooler temperatures were 1.1, 1.2, 1.3 & 1.9 °C

Preservation	Cooler Temperature (Degrees C)	Preservation Criteria	Qualifier	Associated Samples
	Acceptable			

Holding Times	Analyte	Days to Extraction	HT Criteria	Qualifier	Associated Samples
		Acceptable			

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	Yes		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	Yes		

Comments (note deviations):

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	Yes		
Do the reporting limits meet project requirements?	Yes		

Comments (note deviations):

Comment:

Data is usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 4/30/2021

Data Reviewer: Cherie Zakowski Date: 5/2/2021

VA Salt Lake City
Salt Lake City, Utah
Groundwater Validation Report

Sample Delivery Group (SDG) Number: 21C250
Laboratory: EMAX Laboratories, Inc.

Matrix: Groundwater
Collection date: 03/19/2021 03/21/2021 03/22/2021
Analysis/Methods:

Volatile Organic Compounds SW 846 8260C
Metals SW 846 6020A
Mercury SW 846 7470A
Dissolved Gases - RSK 175
Wet Chemistry Parameters:
Chloride EPA 300.0
Sulfate EPA 300.0
Total Alkalinity SM 2320B
Nitrate / Nitrite - N SM 4500 NO3E
Total Organic Carbon (TOC) SW 9060

Samples in SDG:

Lab ID	Sample Number	Lab ID	Sample Number
C250-01	MW01S-GW032221	C250-14	MW13D-GW032121
C250-02	MW01D-GW032221	C250-15	FD03-GW032121
C250-03	MW03RA-GW032121	C250-16	MW13S-GW032221
C250-04	MW03RB-GW032121	C250-17	MW17D-GW031921
C250-05	MW03RC-GW032121	C250-18	MW17S-GW031921
C250-06	MW03RD-GW032121	C250-19	MW18-GW032121
C250-07	MW04-GW032221	C250-20	MW19-GW032121
C250-08	FD01-GW032221	C250-21	MW34A-GW031921
C250-09	MW29A-GW031921	C250-22	MW34B-GW031921
C250-10	MW29B-GW031921	C250-23	MW34C-GW031921
C250-11	MW29C-GW031921	C250-24	MW34D-GW031921
C250-12	TB01-GW032221	C250-25	TB02-GW032221
C250-13	MW06-GW032221		

Data validation was performed in accordance with the specific analytical methods, National Functional Guidelines for Organic Superfund Methods Data Review (EPA January 2017), and the National Functional Guidelines for Inorganic Superfund Methods Data Review (EPA January 2017).

Volatile Organic Compounds 8260C

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?	**Yes**		
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)	**Yes**		
Laboratory Control Spike Duplicates RPD within limits?	**Yes**		

Comments (note deviations):

Field Duplicates	**8260C**	**Sample**	**Duplicate**	**%RPD**	**Qualifiers**	**Associated Samples**
		MW04-GW032221	**FD01-GW032221**			
	Acetone	4.0 J	4.1 J	NC	None	
	Bromodichloromethane	0.3 J	0.29 J	NC	None	Sample results < 5xs RL; ABS Diff. < RL
	Chloroform	4.0 J	4.0 J	NC	None	
	Trichloroethylene	0.19 J	0.20 J	NC	None	
		MW13D-GW032121	**FD03-GW032121**			
	1,1,1-Trichloroethane	0.43 J	0.44 J	NC	None	
	1,1-Dichloroethene	0.21 J	0.21 J	NC	None	
	Acetone	20 U	5.6 J	NC	None	Sample results < 5xs RL; ABS Diff. < RL
	Bromodichloromethane	0.2 J	0.21 J	NC	None	
	Chloroform	1.9	2.0	NC	None	
	cis-1,2-Dichloroethylene	0.26 J	0.28 J	NC	None	
	Trichloroethylene	0.44 J	0.43 J	NC	None	

MS/MSD	**8260C**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
MW01D-GW032221 (C250-02)		Acceptable			

LCS/LCSD	8260C	%RPD	Limits	Qualifiers	Associated Samples
LCS1W / LCSD1W		Acceptable			
LCS2W / LCSD2W		Acceptable			
LCS3W / LCSD3W		Acceptable			

Accuracy:	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)	Yes		
Laboratory Control Sample criteria met?	Yes		
Were the Laboratory Method Blank results all < RL?	Yes		
Were the Field Blanks results all < RL?	Yes		
Was the ICAL criteria met?	Yes		
Was the CCV criteria met?	Yes		
Was the Tuning criteria met?	Yes		
Were the Surrogate % recoveries within laboratory determined control limits?	Yes		
Were the Internal Standard areas within ± 50 - 150%?	Yes		

Comments (note deviations):

Blanks	8260C	Concentration	MDL /RL	Qualifiers	Associated Samples
MBLK1W		Nondetect			
MBLK2W		Nondetect			
MBLK3W		Nondetect			

Field Blank	8260C	Concentration	MDL /RL	Qualifiers	Associated Samples
TB01-GW032221		Nondetect			
TB02-GW032221		Nondetect			

Surrogates	8260C	%R	Limit	Qualifiers	Associated Samples
		Acceptable			

MS/MSD	8260C	%R	Limit	Qualifiers	Associated Samples
MW01D-GW032221 (C250-02)		Acceptable			

LCS/LCSD	8260C	%R	Limits	Qualifiers	Associated Samples
LCS1W / LCSD1W		Acceptable			
LCS2W / LCSD2W		Acceptable			
LCS3W / LCSD3W		Acceptable			

ICAL	8260C	RRF	%RSD	Qualifiers	Associated Samples
02/23/2021 11:49		Acceptable	Acceptable		

CCV	8260C	RRF	%D	Limits	Qualifiers	Associated Samples
03/29/2021 9:31		Acceptable	Acceptable			
03/30/2021 10:57		Acceptable	Acceptable			
03/31/2021 13:31		Acceptable	Acceptable			

Tune	8260C
	Acceptable

Internal Standards	8260C	Area	Area Lower / Upper Limit	Qualifiers	Associated Samples
		Acceptable			

Dissolved Gases RSK-175

Precision:	Yes	No	N/A
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?			**N/A**
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Laboratory Control Spike Duplicates RPD within limits?	**Yes**		
Are the laboratory duplicate RPDs ≤ 20% for water ≤35% for soils or within CRQL criteria?			**N/A**

Comments (note deviations):

Field Duplicates	**RSK-175**	**Sample**	**Duplicate**	**%RPD**	**Qualifiers**	**Associated Samples**
N/A						

MS/MSD	**RSK-175**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
N/A					

LCS/LCSD	**RSK-175**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
LCS1W / LCD1W		Acceptable			

Laboratory Duplicates	**RSK-175**	**Sample (ug/L)**	**Duplicate (ug/L)**	**RPD**	**Qualifiers**	**Associated Samples**
N/A						

Accuracy:	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?	**Yes**		
Were the Laboratory Method Blank results all < RL?	**Yes**		
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met?	**Yes**		
Was the CCV criteria met?	**Yes**		
Was the Tuning criteria met?			**N/A**
Were the Surrogate % recoveries within laboratory determined control limits?			**N/A**
Were the Internal Standard areas within ± 50 - 150%?			**N/A**

Comments (note deviations):

Blanks	**RSK-175**	**Concentration (ug/L)**	**MDL / RL**	**Qualifiers**	**Associated Samples**
MBLK1W		Nondetect			

Field Blank	**RSK-175**	**Concentration**	**MDL / RL**	**Qualifiers**	**Associated Samples**
N/A					

Surrogates	**RSK-175**	**%R**	**Limit**	**Qualifiers**	**Associated Samples**
N/A					

MS/MSD	**RSK-175**	**%R**	**Limits (%)**	**Qualifiers**	**Associated Samples**
N/A					

LCS/LCSD	**RSK-175**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
LCS1W / LCD1W		Acceptable			

ICAL	**RSK-175**	**RRF**	**%RSD**	**Qualifiers**	**Associated Samples**
4/29/2020		Acceptable	Acceptable		

CCV	**RSK-175**	**RRF**	**%D**	**Limits**	**Qualifiers**	**Associated Samples**
4/29/2020 '14:39		Acceptable	Acceptable			

Tune	**RSK-175**				
N/A					

Internal Standards	**RSK-175**	**Area**	**Area Lower / Upper Limit**	**Qualifiers**	**Associated Samples**
N/A					

Metals SW 6020A / Mercury 7470A

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?			**N/A**
Are the laboratory duplicate RPDs ≤ 20% for (water / soil) or within CRQL criteria?			**N/A**
Are the matrix spike duplicates RPD ≤ 20%?			**Yes**
Are the laboratory control sample duplicates RPDs ≤ 20%?			**Yes**

Comments (note deviations):

Field Duplicates	**Sample (ug/L)**	**Duplicate (ug/L)**	**%RPD**	**Qualifier**	**Associated Samples**
N/A					

MS/MSD		**RPD**	**Qualifiers**	**Associated Samples**
MW29A-GW031921 (C250-09)		Acceptable		
MW29B-GW031921 MS/MSD (C250-10)	Mercury	Acceptable		

LCS / LCSD	**RPD**	**Qualifiers**	**Associated Samples**
LCS1W / LCD1W	Acceptable		
LCS1W / LCD1W (Hg)	Acceptable		

Laboratory Duplicate	**Sample**	**Duplicate**	**RPD**	**Qualifier**	**Associated Samples**
N/A					

Accuracy:	**Yes**	**No**	**N/A**
Were serial dilutions analyzed and within control limits of ±10% for waters (± for 15% for soils) or initial sample result less than 50x MDL?			**Yes**
Was matrix spike criteria met (frequency 20% and % recovery 75-125%)?			**No**
Was post digestion spike criteria met (if applicable)?			**No**
Was laboratory control sample criteria met?			**Yes**
Was laboratory blank criteria met (within control limits)?			**No**
Were ICV/CCV % recoveries within 90-110%?			**Yes**
Were the Detection Limit PQL Standards within 70-130?			**N/A**
Was the %D on form 16-IN for the initial calibration instrument response and concentration data <30%?			**N/A**
Were ICSA/ICSAB % recoveries acceptable or within CRQL criteria?			**Yes**
Was the tune %RPD <5% (Peak width < 0.75)?			**Yes**
Was internal standard criteria met?			**Yes**

Comments (note deviations):

Serial Dilution	**Analyte**	**Initial Sample Result**	**%D**	**50 x MDL**	**Qualifier**	**Associated Samples**
			Acceptable			

MS/MSD	**Analyte**	**%R**	**Limits**	**Post Digestion**	**Qualifiers**	**Associated Samples**
MW29A-GW031921 MS/MSD						
(C250-09)	Magnesium	20 / 70%	75-125	30	None	ISR > 4xs the spike added
	Calcium	-67 / 167	75-125	107	None	ISR > 4xs the spike added
	Sodium	-23 / 147	75-125	113	None	ISR > 4xs the spike added
MW29B-GW031921 MS/MSD						
(C250-10)	Mercury	Acceptable				

ISR = Initial Sample Result

LCS/LCSD	**Analyte**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
LCS1W / LCD1W		Acceptable			
LCS1W / LCD1W (Hg)		Acceptable			

ICV/CCV	**Analyte**	**%R**	**Limits**	**Qualifier**	**Associated Samples**
		Acceptable			

Blanks

Prep Blank		Result (ug/L)	MDL/RL (ug/L)	Qualifier	Associated Samples
MBLK1W	Chromium	0.177 J	0.1 / 1.0	U-RL	C250-09 through C250-11, C250-22 through C250-24
	Mercury	Nondetect			

ICBs	Analyte	Result (ug/L)	MDL/RL (ug/L)	Qualifier	Associated Samples
	Metals	Nondetect			
	Mercury	-0.036	0.1 / 0.5	None	-Blank result > - RL

CCBs	Analyte	Result (ug/L)	MDL/RL (ug/L)	Qualifier	Associated Samples
CCB1 through CCB4		Nondetect			
CCB1	Mercury	0.02	0.1 / 0.5	None	Sample results nondetect
CCB2	Mercury	-0.019	0.1 / 0.5	None	-Blank results > - RL
CCB3	Mercury	0.003	0.1 / 0.5	None	Sample results nondetect

Field Blank	6020A	Concentration (ug/L)	MDL/RL (ug/L)	Qualifiers	Associated Samples
N/A					

ICSA/AB	Analyte - Solution A	%R	Found Sol. A / True A	RL	Qualifier	Associated Samples
		Acceptable				

PQL Standard Check	%R	Qualifiers	Associated Samples
N/A			

Tune

Acceptable

Internal Standards	Qualifier	Associated Samples
Acceptable		

Wet Chemistry Parameters

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPD) ≤30% (soils / water) or within CRQL criteria?			**N/A**
Are the laboratory duplicate RPDs ≤ 20% for water ≤35% for soils or within CRQL criteria?			**Yes**
Are the matrix spike duplicates RPD ≤ 20%?			**N/A**
Are the laboratory control spike duplicates RPD ≤ 20%?			**Yes**

Comments (note deviations):

Field Duplicates	**Sample (mg/L)**	**Duplicate (mg/L)**	**RPD**	**Qualifier**	**Associated Samples**
N/A					

MS/MSD	**%R**	**Limits**	**RPD %**	**Qualifiers**	**Associated Samples**
MW29A-GW031921 (C250-09)			Acceptable		

LCS/ LCSD	**Limits**	**RPD**	**Qualifiers**	**Associated Samples**
		Acceptable		

** Numerous LCS/LCSDs performed / evaluated all QC data within acceptable criteria

Laboratory Duplicate	**Sample**	**Duplicate**	**RPD**	**Qualifiers**	**Associated Samples**
			Acceptable		

Accuracy:	**Yes**	**No**	**N/A**
Was matrix spike criteria met (frequency 20% and % recovery 75-125%)?			**Yes**
Was post digestion spike criteria met (if applicable)?			**N/A**
Was laboratory control sample criteria met?			**Yes**
Was laboratory blank criteria met (within control limits)?			**Yes**
Were the Field Blanks results all < RL?			**N/A**
Were ICV/CCV % recoveries within 90-110%?			**No**
Was the tune %RSD <5% ?			**N/A**
Was internal standard criteria met?			**N/A**

Comments (note deviations):

MS /MSD	**Analyte**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
MW29A-GW031921 (C250-09)			Acceptable		

LCS / LCSD	**Analyte**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
		Acceptable			

** Numerous LCS/LCSD performed / evaluated all QC data within acceptable criteria

ICV/CCV			**%R**	**Limits**	**Qualifiers**	**Associated Samples**
	ICV1	Chloride	89.70%	90-110	**J / UJ**	**All samples**

** Multiple ICV/CCVs were reported - all were within criteria with the exception of those noted above

Blanks	**Analyte**	**Result**	**MDL/RL**	**Qualifiers**	**Associated Samples**
		Nondetect			

** Numerous prep. blanks performed / evaluated all QC blanks were nondetect

ICB / CCBs	**Analyte**	**Result**	**MDL/RL**	**Qualifier**	**Associated Samples**
		Nondetect			

** Numerous ICB/CCBs performed / evaluated all QC blanks were nondetect

Field Blank	**Analyte**	**Result (mg/L)**	**MDL/RL**	**Qualifiers**	**Associated Samples**
N/A					

Tune	Analyte	%RSD	Limits	Qualifiers	Associated Samples
N/A					

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	Yes		
Were holding times met?	Yes		
Was preservation criteria met? (0° C - 6° C)	Yes		
Were Chain-of-Custody records complete and provided in data package?	Yes		

Comments (note

The cooler temperatures were 2.6 & 4.3 °C

Preservation	Cooler Temperature (Degrees C)	Preservation Criteria	Qualifier	Associated Samples
	Acceptable			

Holding Times	Analyte	Days to Extraction	HT Criteria	Qualifier	Associated Samples
		Acceptable			

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	Yes		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	Yes		

Comments (note deviations):

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	Yes		
Do the reporting limits meet project requirements?	Yes		

Comments (note deviations):

Comment:

Sample results for tetrachloroethene for samples C250-01 and C250-04 were run at a dilution. The diluted results should be used in place of the initial results. There were three sample names that were wrong in the data package. The laboratory was contacted and provided updated information. The correct sample names are presented in this report.

Data is usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 4/29/2021

Data Reviewer: Cherie Zakowski Date: 5/1/2021

VA Salt Lake City
Salt Lake City, Utah
Groundwater Validation Report

Sample Delivery Group (SDG) Number: 21C281
Laboratory: EMAX Laboratories, Inc.

Matrix: Groundwater
Collection date: 03/22/2021, 03/23/2021
Analysis/Methods:

Volatile Organic Compounds SW 846 8260C
Semivolatile Organic Compounds SW 846 8270D (1,4-Dioxane)

Samples in SDG:

Lab ID	Sample Number
C281-01	TB01-GW032321
C281-02	MW02-GW032321
C281-03	FB01-GW032221
C281-04	EB01-GW032321

Data validation was performed in accordance with the specific analytical methods and the National Functional Guidelines for Organic Superfund Methods Data Review (EPA January 2017).

Volatile Organic Compounds 8260C

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?			**N/A**
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Laboratory Control Spike Duplicates RPD within limits?	**Yes**		

Comments (note deviations):

Field Duplicates	**8260C**	**Sample**	**Duplicate**	**%RPD**	**Qualifiers**	**Associated Samples**
N/A						

MS/MSD	**8260C**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
N/A					

LCS/LCSD	**8260C**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
LCS1W / LCSD1W		Acceptable			
LCS2W / LCSD2W		Acceptable			

Accuracy:	**Yes**	**No**	**N/A**
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?	**Yes**		
Were the Laboratory Method Blank results all < RL?	**Yes**		
Were the Field Blanks results all < RL?		**No**	
Was the ICAL criteria met?	**Yes**		
Was the CCV criteria met?	**Yes**		
Was the Tuning criteria met?	**Yes**		
Were the Surrogate % recoveries within laboratory determined control limits?	**Yes**		
Were the Internal Standard areas within ± 50 - 150%?	**Yes**		

Comments (note deviations):

Blanks	**8260C**	**Concentration**	**MDL /RL**	**Qualifiers**	**Associated Samples**
MBLK1W		Nondetect			
MBLK2W		Nondetect			

Field Blank	**8260C**	**Concentration**	**MDL /RL**	**Qualifiers**	**Associated Samples**
TB01-GW032321		Nondetect			
FB01-GW032221		Nondetect			
EB01-GW032321**	Acetone	3.9 J	2.5 / 20	**U- RL**	**C281-02**

** EB associated with sampling location MW-02.

Surrogates	8260C	%R	Limit		Qualifiers	Associated Samples
		Acceptable				

MS/MSD	8260C	%R	Limit		Qualifiers	Associated Samples
N/A						

LCS/LCSD	8260C	%R	Limits		Qualifiers	Associated Samples
LCS1W / LCSD1W		Acceptable				
LCS2W / LCSD2W		Acceptable				

ICAL	8260C	RRF	%RSD		Qualifiers	Associated Samples
2/23/2021 11:49		Acceptable	Acceptable			

CCV	8260C	RRF	%D	Limits	Qualifiers	Associated Samples
03/25/20 9:39		Acceptable	Acceptable			
03/26/20 11:47		Acceptable	Acceptable			

Tune	8260C
	Acceptable

Internal Standards	8260C	Area	Area Lower / Upper Limit		Qualifiers	Associated Samples
		Acceptable				

Semivolatile Organic Compounds 8270D (1,4-Dioxane SIM)

Precision:

	Yes	No	N/A
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?			N/A
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			N/A
Laboratory Control Spike Duplicates RPD within limits?	Yes		

Comments (note deviations):

Field Duplicates	8270D SIM	Sample	Duplicate	RPD	Qualifiers	Associated Samples
N/A						

MS/MSD	8270D SIM	RPD	Limit	Qualifiers	Associated Samples
N/A					

LCS/LCSD	8270D SIM	RPD	Limit	Qualifiers	Associated Samples
LCS1W / LCSD1W		Acceptable			

Accuracy:

	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			N/A
Laboratory Control Sample criteria met?	Yes		
Were the Laboratory Method Blank results all < RL?	Yes		
Were the Field Blanks results all < RL?	Yes		
Was the ICAL criteria met?	Yes		
Was the CCV criteria met?	Yes		
Was the Tuning criteria met?	Yes		
Were the Surrogate % recoveries within laboratory determined control limits?	Yes		
Were the Internal Standard areas within ± 50 - 150%?	Yes		

Comments (note deviations):

Blanks	8270D SIM	Concentration (ug/L)	MDL / RL	Qualifiers	Associated Samples
MBLK1W		Nondetect			

Field Blank	8270D SIM	Concentration	MDL / RL	Qualifiers	Associated Samples
FB01-GW032221		Nondetect			

Surrogates	8270D SIM	%R	Limit	Qualifiers	Associated Samples
		Acceptable			

MS/MSD	8270D SIM	%R	Limits (%)	Qualifiers	Associated Samples
N/A					

LCS/LCSD	8270D SIM	%R	Limits	Qualifiers	Associated Samples
LCS1W / LCSD1W		Acceptable			

ICAL	8270D SIM	RRF	%RSD	Qualifiers	Associated Samples
6/3/2020 14:04		Acceptable	Acceptable		

CCV	8270D SIM	RRF	%D	Qualifiers	Associated Samples
03/29/2021 11:12		Acceptable	Acceptable		

Tune	8270D SIM
	Acceptable

Internal Standards	8270D SIM	Area	Area Lower / Upper Limit	Qualifiers	Associated Samples
		Acceptable			

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	**Yes**		
Were holding times met?	**Yes**		
Was preservation criteria met? (0° C - 6° C)	**Yes**		
Were Chain-of-Custody records complete and provided in data package?	**Yes**		

Comments (note

The cooler temperature was 1.0 °C

Preservation	**Cooler Temperature (Degrees C)**	**Preservation Criteria**	**Qualifier**	**Associated Samples**
	Acceptable			

Holding Times	**Analyte**	**Days to Extraction**	**HT Criteria**	**Qualifier**	**Associated Samples**
		Acceptable			

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	**Yes**		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	**Yes**		

Comments (note deviations):

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	**Yes**		
Do the reporting limits meet project requirements?	**Yes**		

Comments (note deviations):

Comment:

Sample results for tetrachloroethene for sample C281-02 was run at a dilution. The diluted results should be used in place of the initial results.

Data is usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 4/13/2021

Data Reviewer: Cherie Zakowski Date: 4/15/2021

Attachment 2

Data Package Completeness Review Checklists

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 21C208

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt	X		2.2 °C & 3.0 °C
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)			Not Applicable
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)	X		
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)	X		
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)	X		
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)	X		
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks	X		

Data package complete and ready for Validation Cherie Zakowski Date: 4/30/2021

Signature

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 21C209

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt	X		2.0 °C, 2.8 °C, 3.5 °C, 3.6 °C
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)			Not Applicable
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)	X		
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)	X		
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)	X		
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)	X		
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks	X		

Data package complete and ready for Validation Cherie Zakowski Date: 5/1/2021

Signature

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 21C248

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt	X		1.1 °C, 1.2 °C, 1.3 °C & 1.9 °C
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)			Not Applicable
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)	X		
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)	X		
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)	X		
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)	X		
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks	X		

Data package complete and ready for Validation Cherie Zakowski Date: 5 /1/2021

Signature

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 21C250

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies		X	Three samples were mis-labeled in the laboratory report and EDD. The laboratory was contacted and a resubmittal was provided with the correct sample numbers.
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt	X		2.6 °C & 4.3 °C
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)			Not Applicable

Required Documentation	Yes	No	Comments
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)	X		
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)	X		
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)	X		
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)	X		
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks	X		

Data package complete and ready for Validation Cherie Zakowski Date: 4/30/2021

Signature

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 21C281

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt	X		1.0 °C
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)			Not Applicable
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)	X		
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)	X		
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)	X		
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)	X		
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks	X		

Data package complete and ready for Validation Cherie Zakowski Date: 4/12/2021

Signature

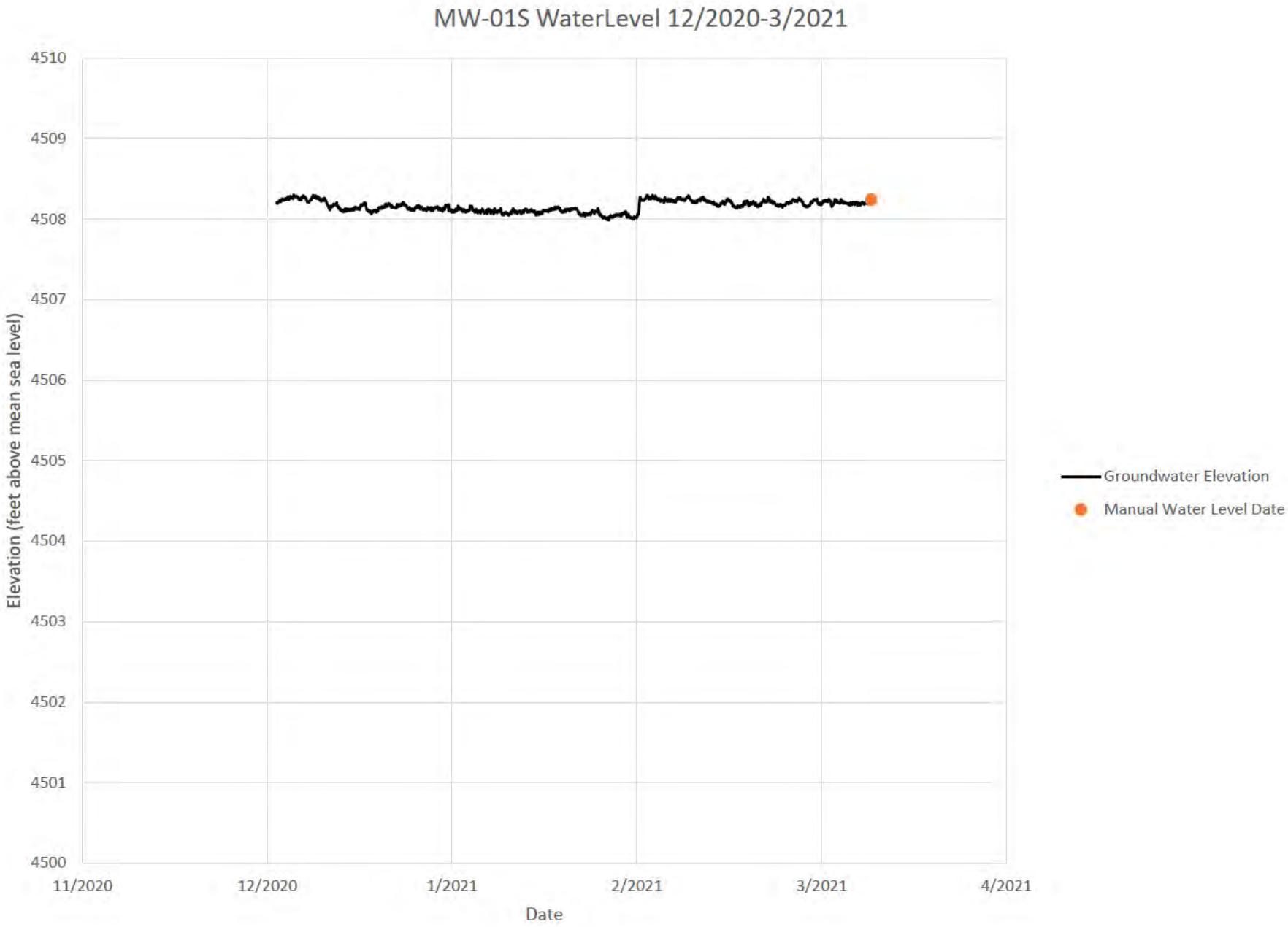
Attachment 3

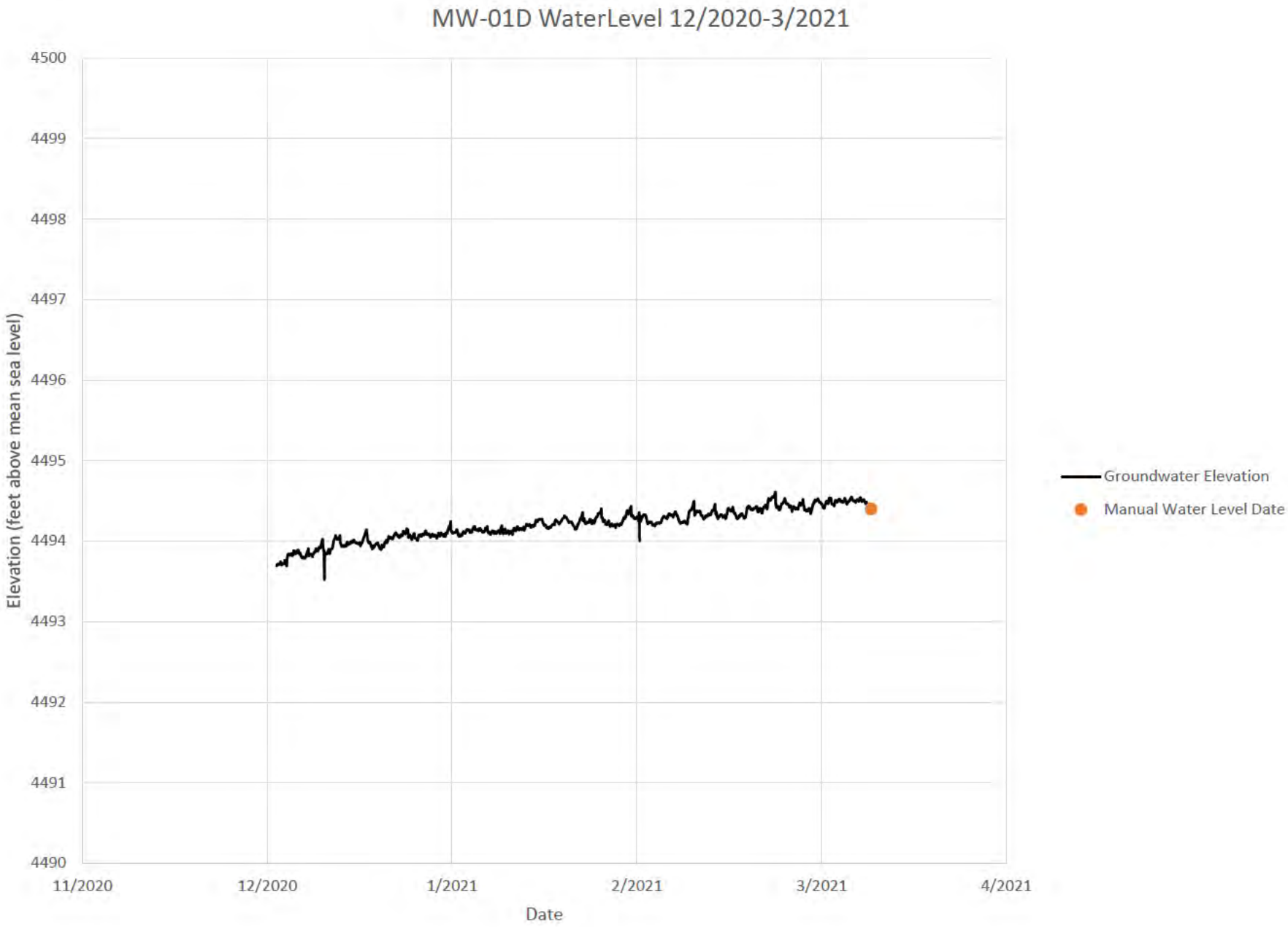
Analytical Data Packages

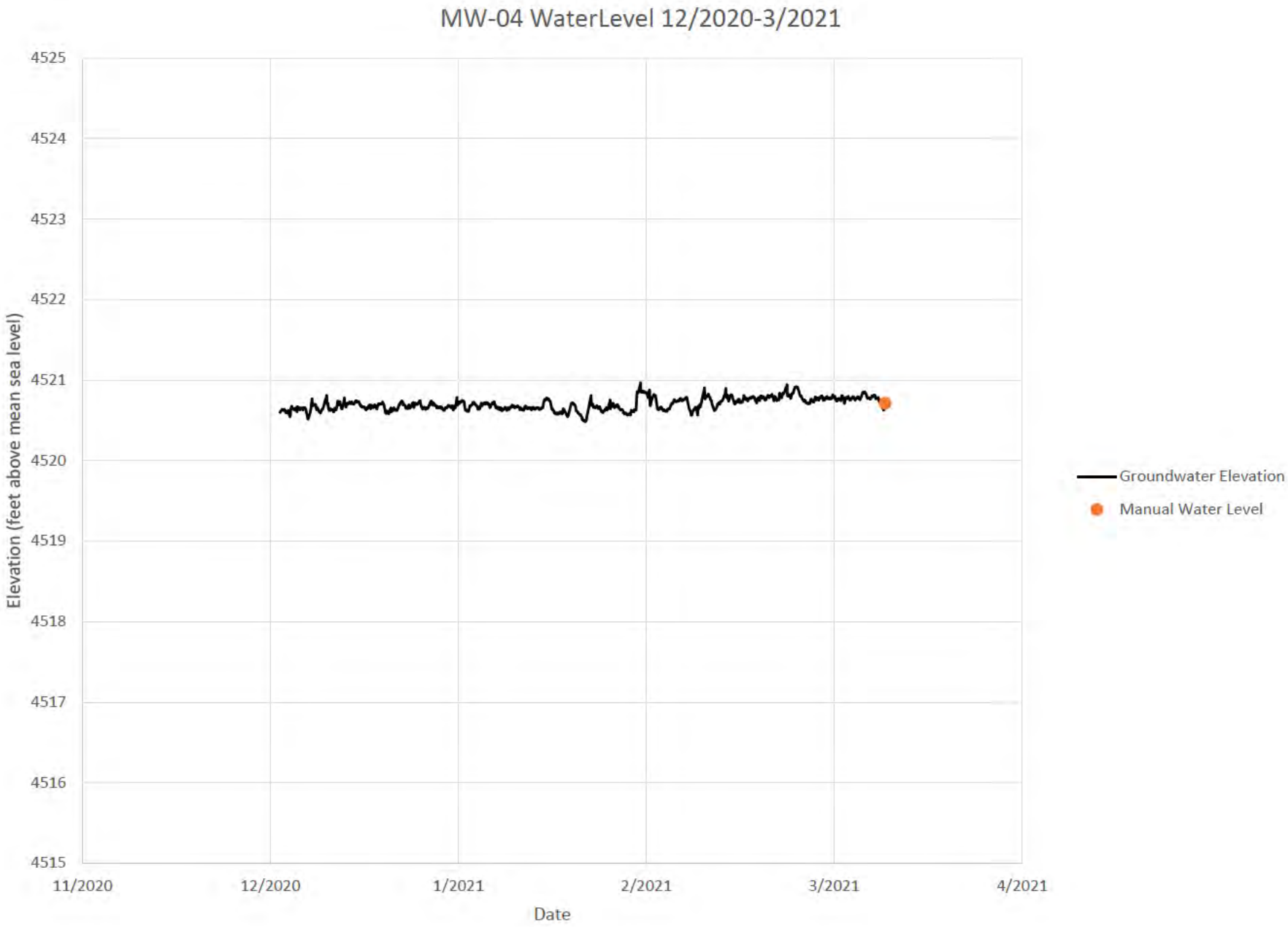
Note: Laboratory Data Reports removed from report and provided separately.

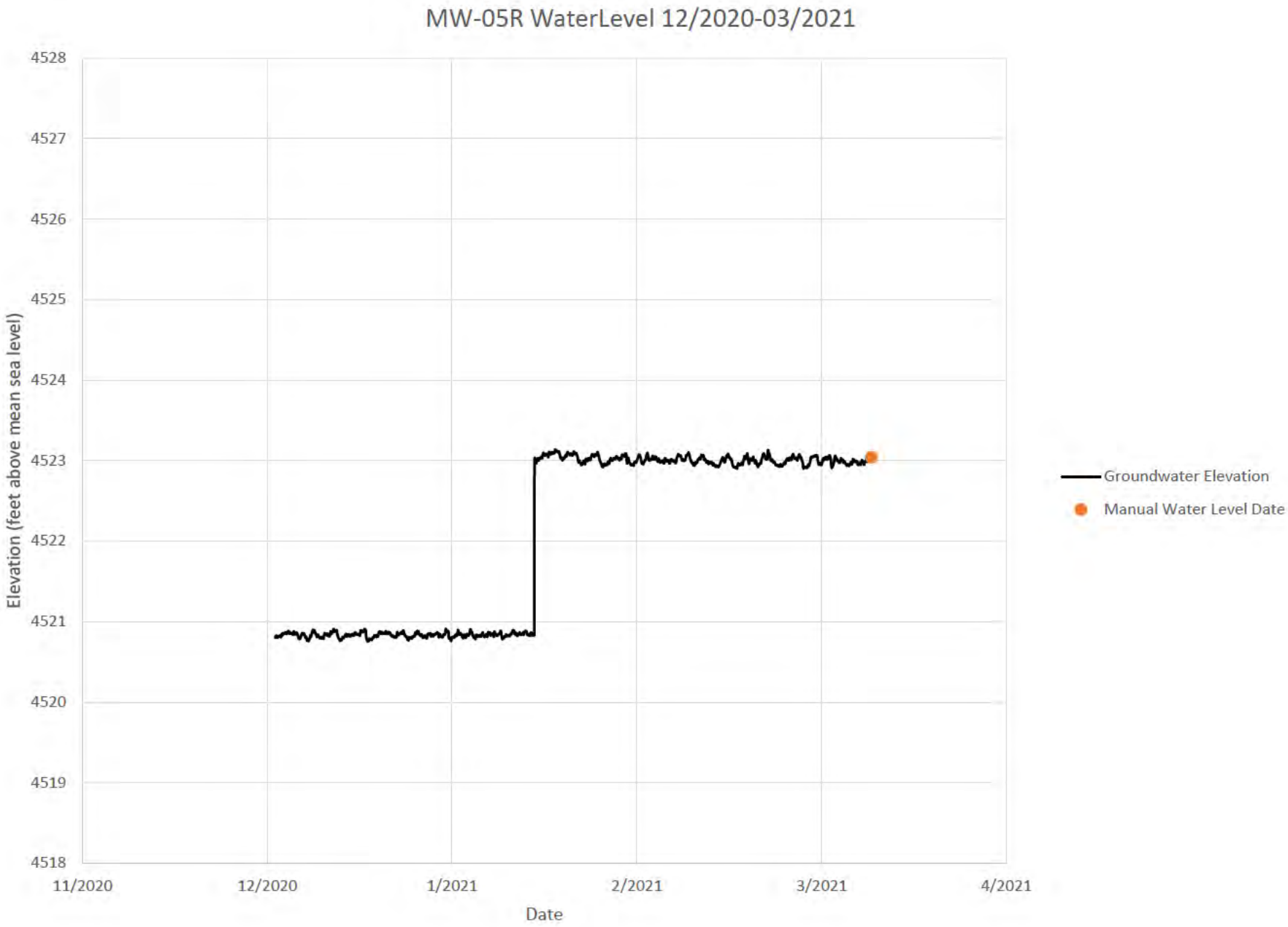
Appendix D

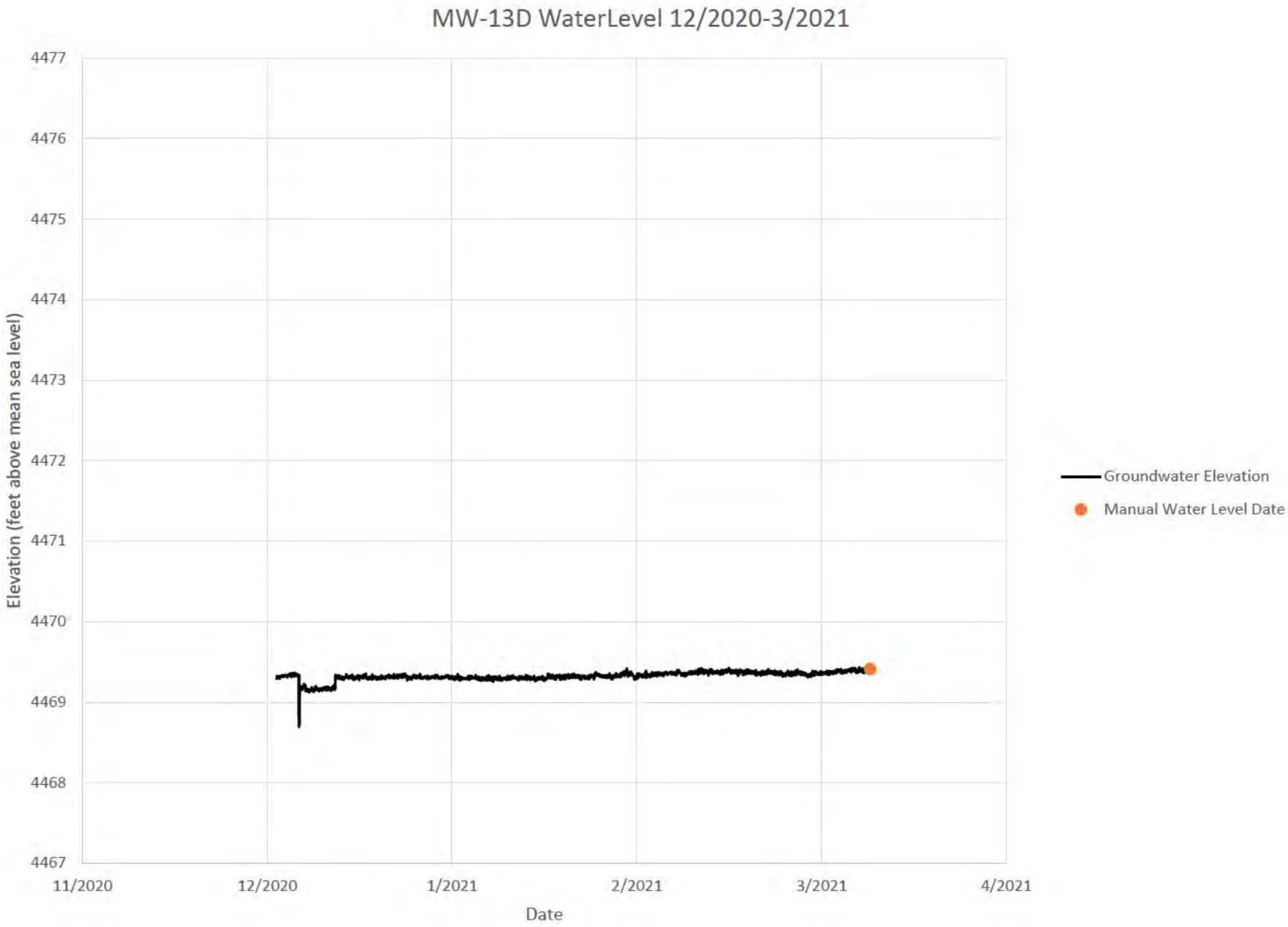
Transducer Hydrographs

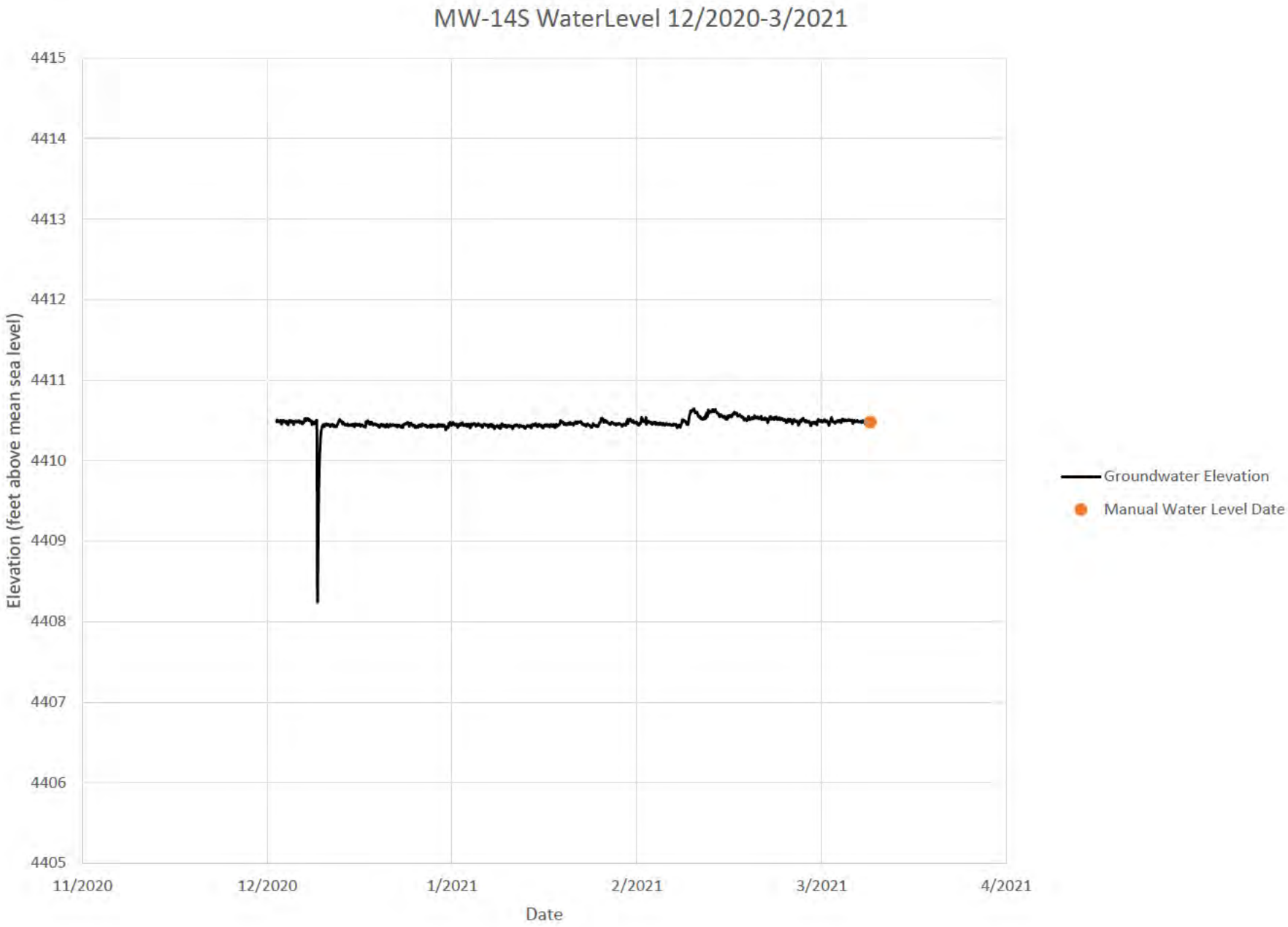

MW-01S WaterLevel 12/2020-3/2021
Elevation (feet above mean sea level)
4510
4509
4508
4507
4506
4505
4504
4503
4502
4501
4500
11/2020
12/2020
1/2021
2/2021
3/2021
4/2021
Date
Groundwater Elevation
Manual Water Level Date


MW-01D WaterLevel 12/2020-3/2021
4500
4499
4498
4497
4496
4495
4494
4493
4492
4491
4490
Elevation (feet above mean sea level)
11/2020
12/2020
1/2021
2/2021
3/2021
4/2021
Date
Groundwater Elevation
Manual Water Level Date


MW-04 WaterLevel 12/2020-3/2021
Elevation (feet above mean sea level)
4525
4524
4523
4522
4521
4520
4519
4518
4517
4516
4515
11/2020
12/2020
1/2021
2/2021
3/2021
4/2021
Date
Groundwater Elevation
Manual Water Level


MW-05R WaterLevel 12/2020-03/2021
Elevation (feet above mean sea level)
4528
4527
4526
4525
4524
4523
4522
4521
4520
4519
4518
11/2020
12/2020
1/2021
2/2021
3/2021
4/2021
Date
Groundwater Elevation
Manual Water Level Date


MW-13D WaterLevel 12/2020-3/2021
Elevation (feet above mean sea level)
4477
4476
4475
4474
4473
4472
4471
4470
4469
4468
4467
11/2020
12/2020
1/2021
2/2021
3/2021
4/2021
Date
Groundwater Elevation
Manual Water Level Date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Elevation (feet above mean sea level)
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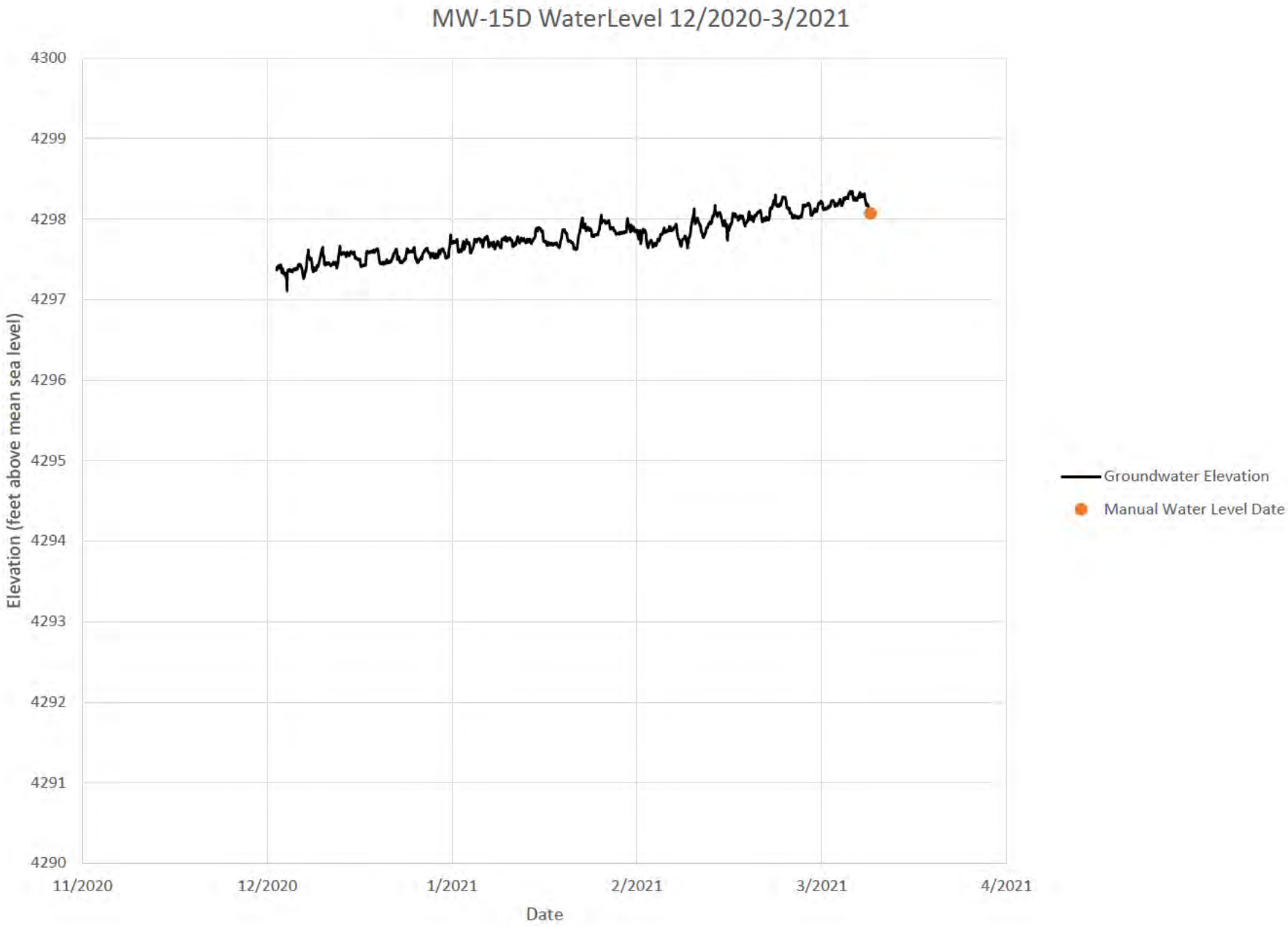
4414
4413
4412
4411
4410
4409
4408
4407
4406
4405
11/2020
12/2020
1/2021
2/2021
3/2021
4/2021
Date
Groundwater Elevation
Manual Water Level Date


MW-15D WaterLevel 12/2020-3/2021
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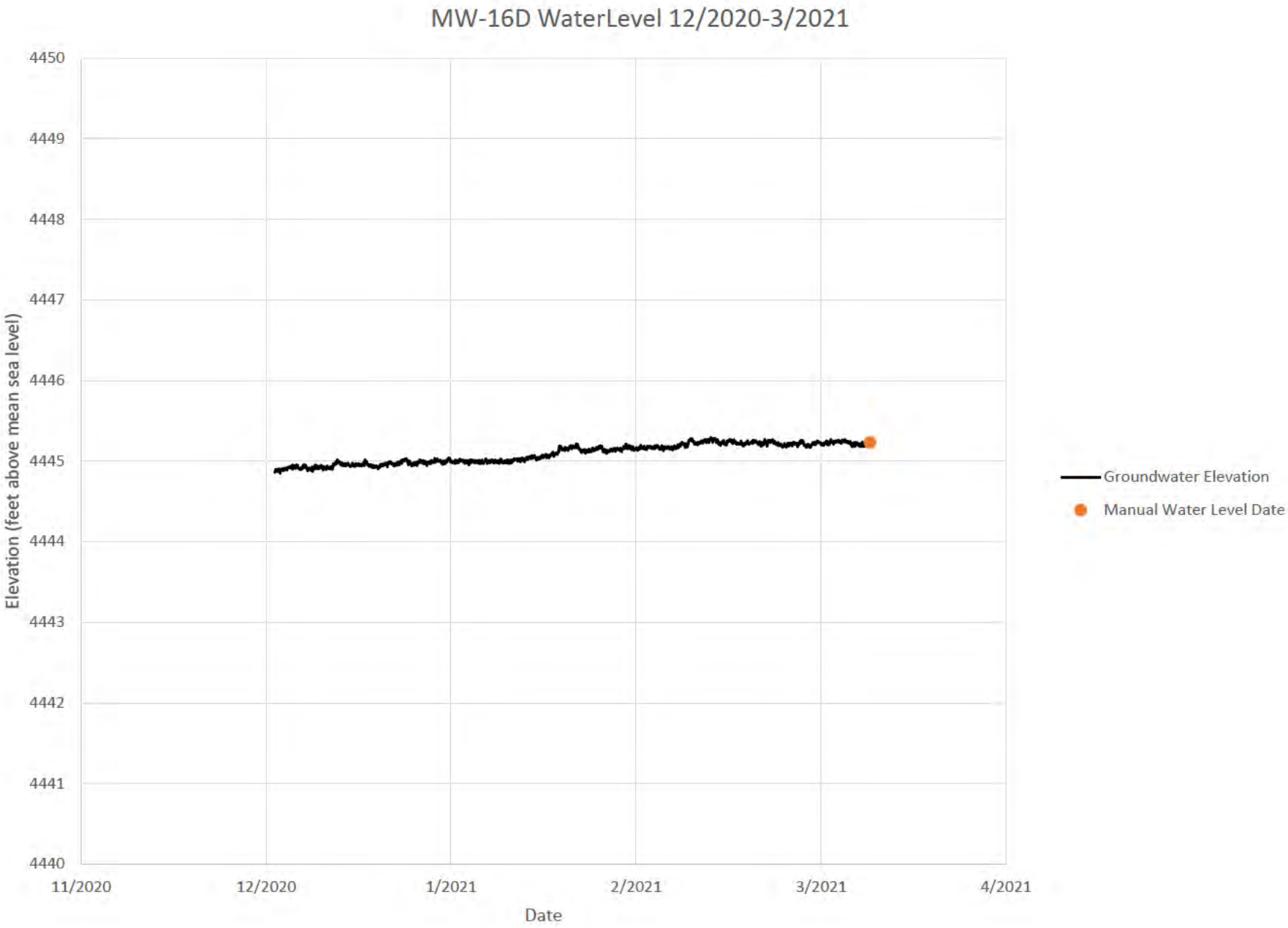
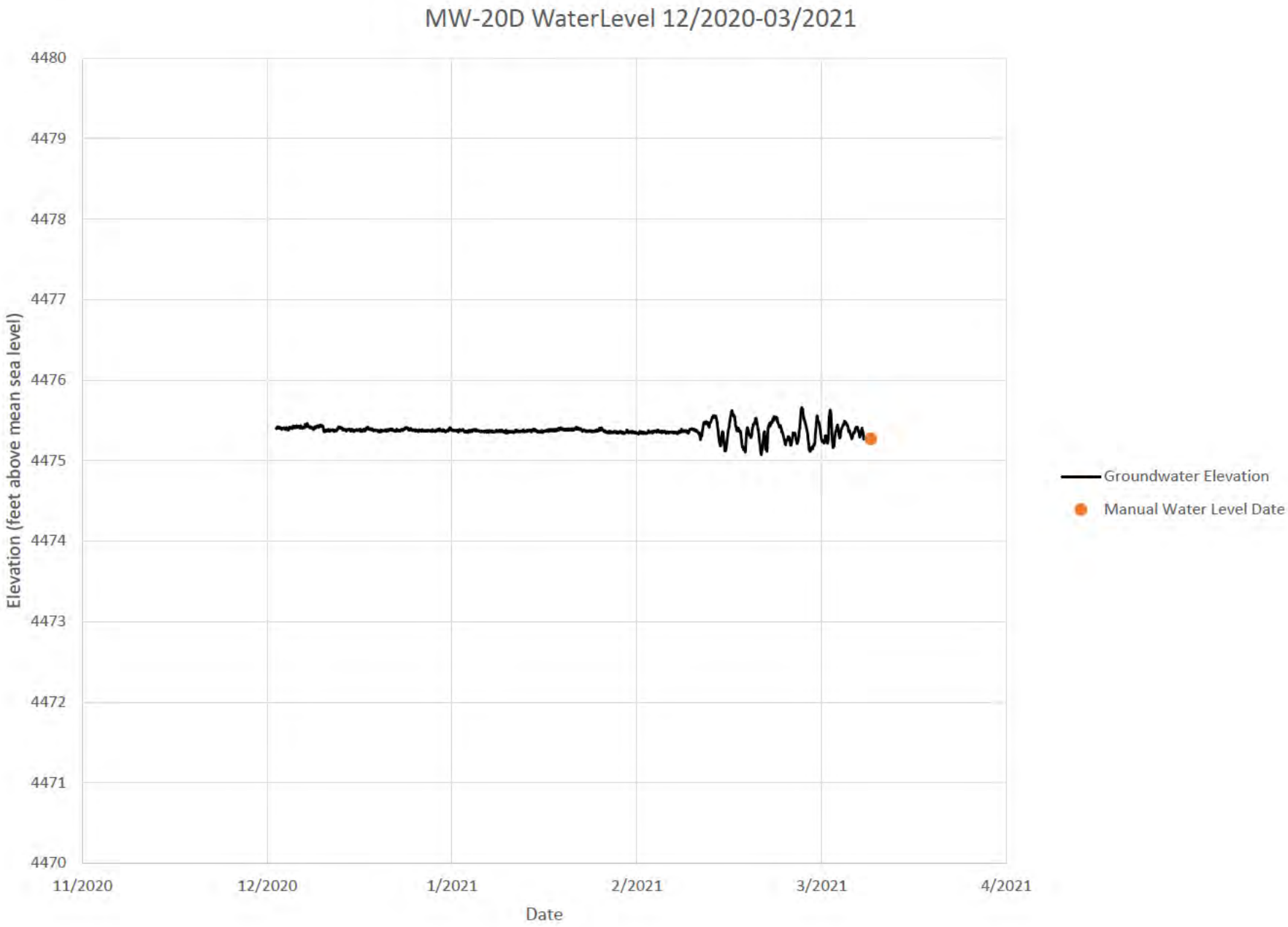
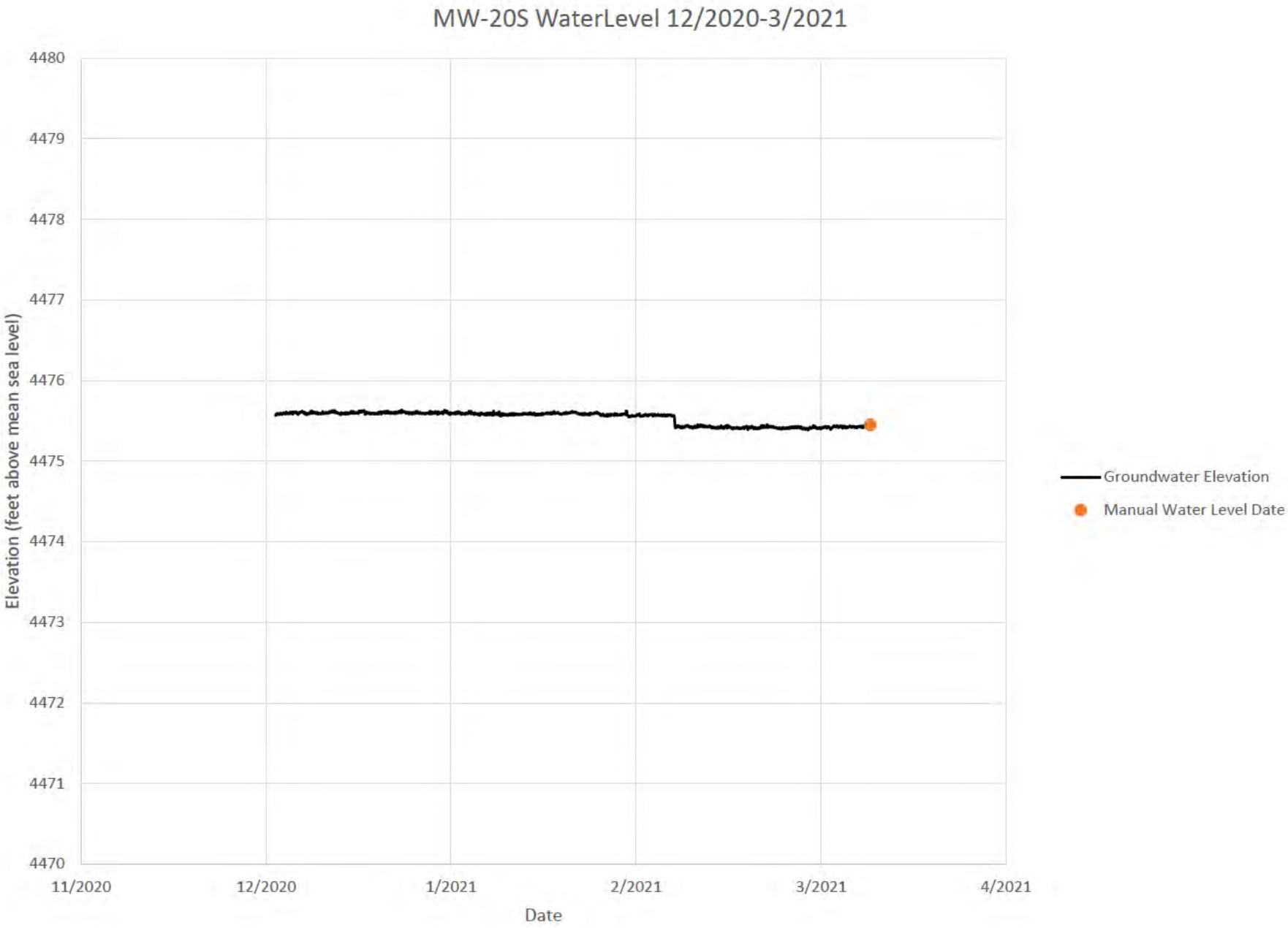
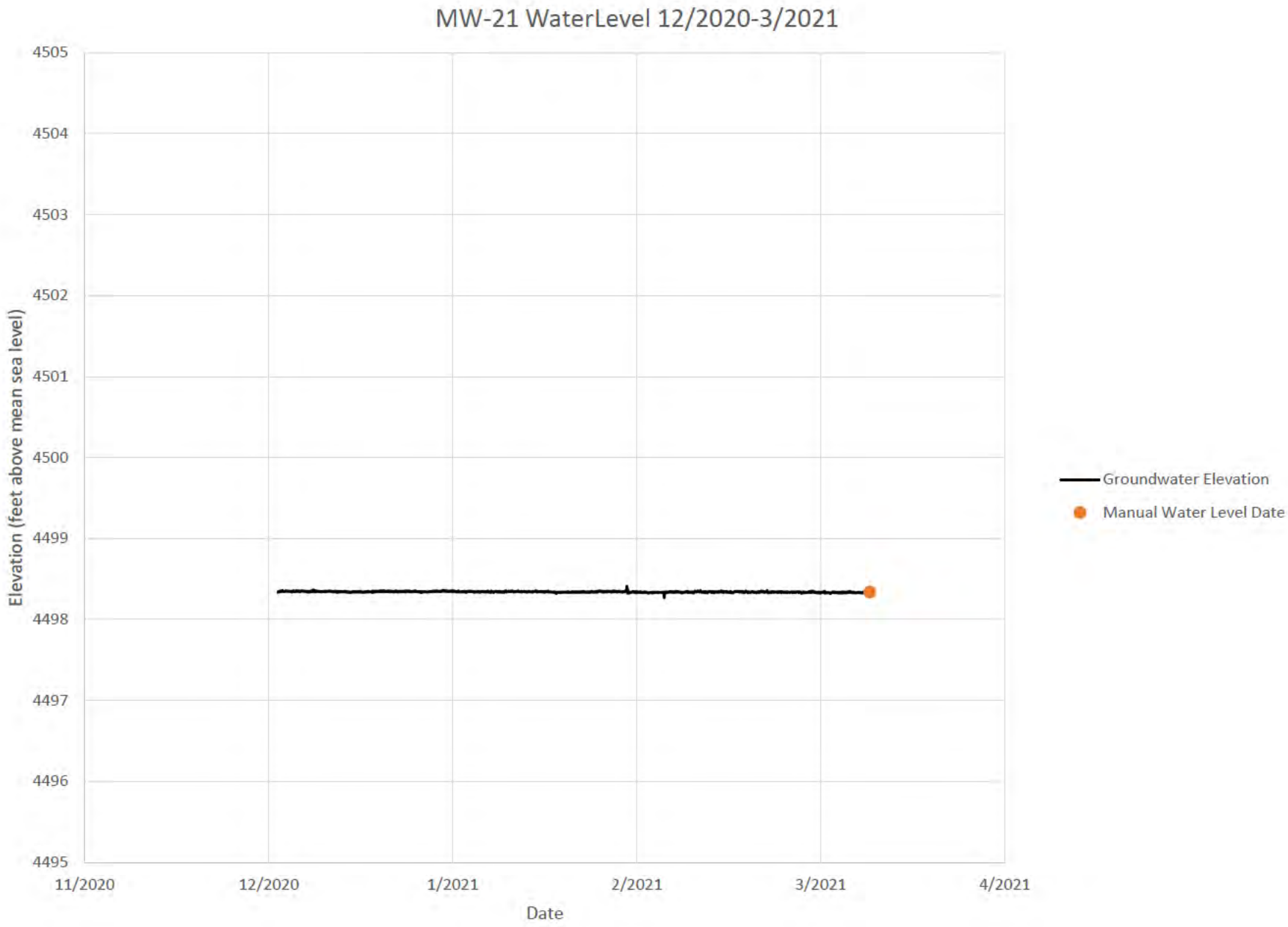
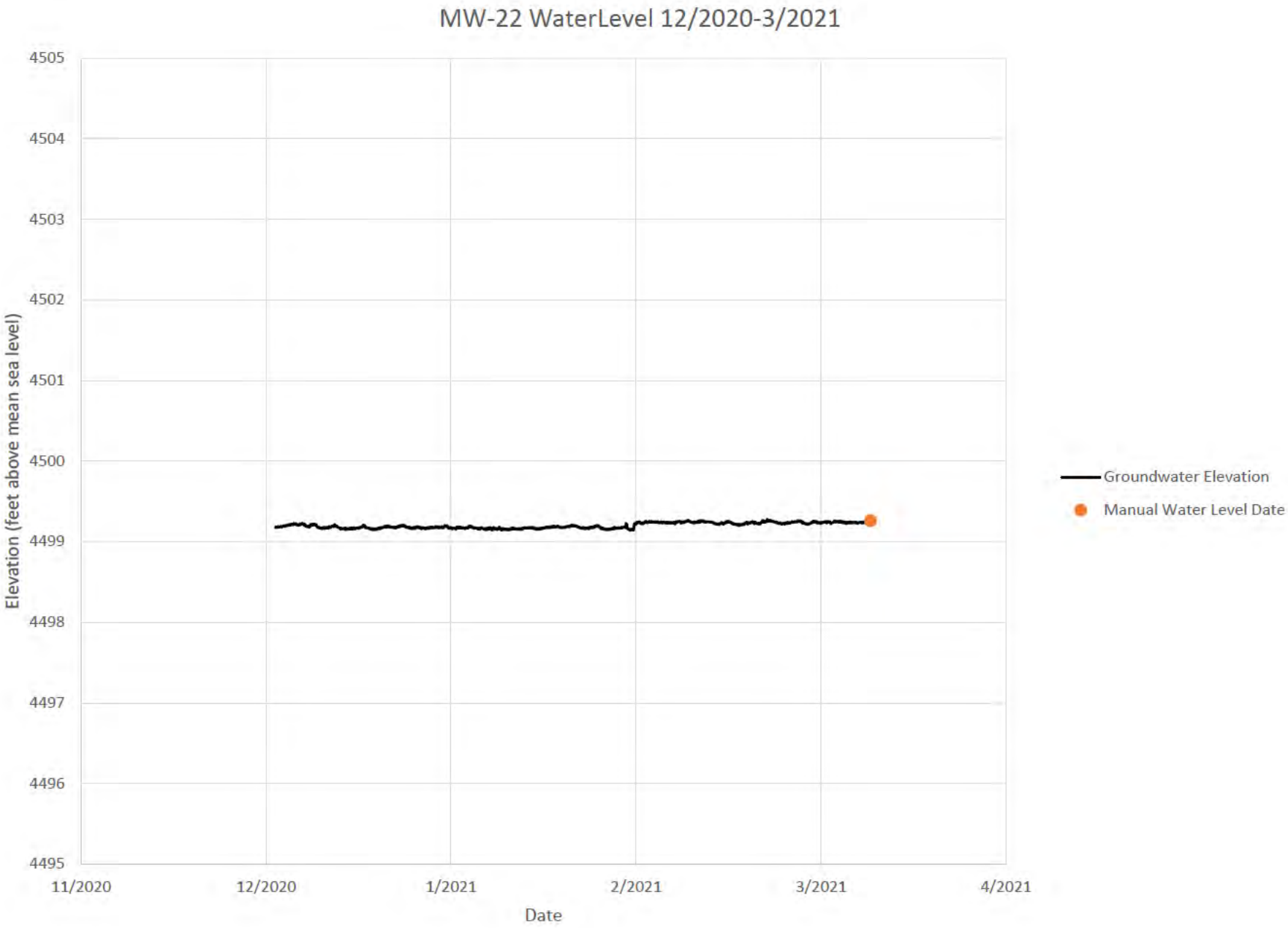
4299
4298
4297
4296
4295
4294
4293
4292
4291
4290
Elevation (feet above mean sea level)
11/2020
12/2020
1/2021
2/2021
3/2021
4/2021
Date
Groundwater Elevation
Manual Water Level Date

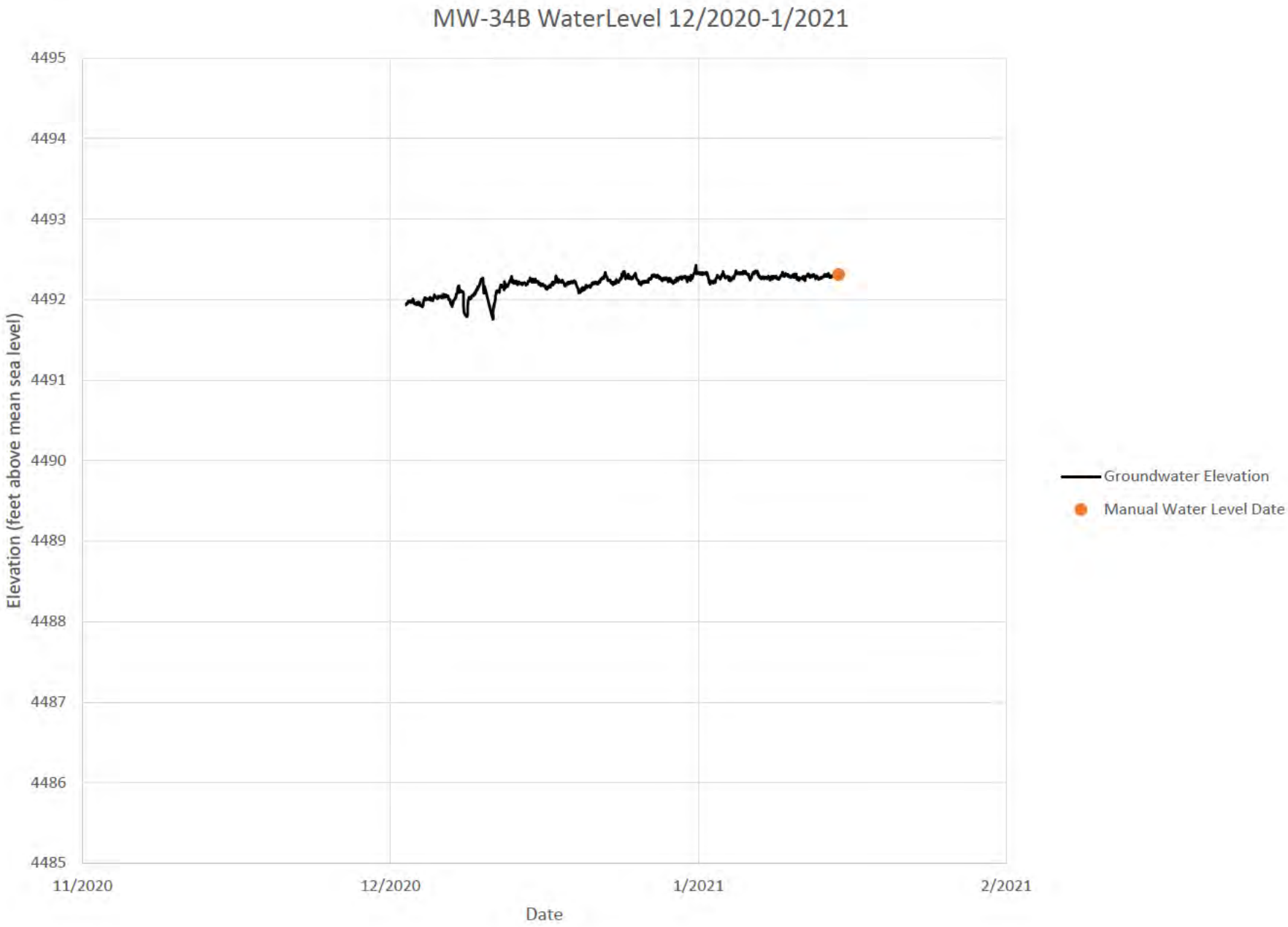

MW-16D WaterLevel 12/2020-3/2021
4450
4449
4448
4447
4446
4445
4444
4443
4442
4441
4440
Elevation (feet above mean sea level)
11/2020
12/2020
1/2021
2/2021
3/2021
4/2021
Date
Groundwater Elevation
Manual Water Level Date

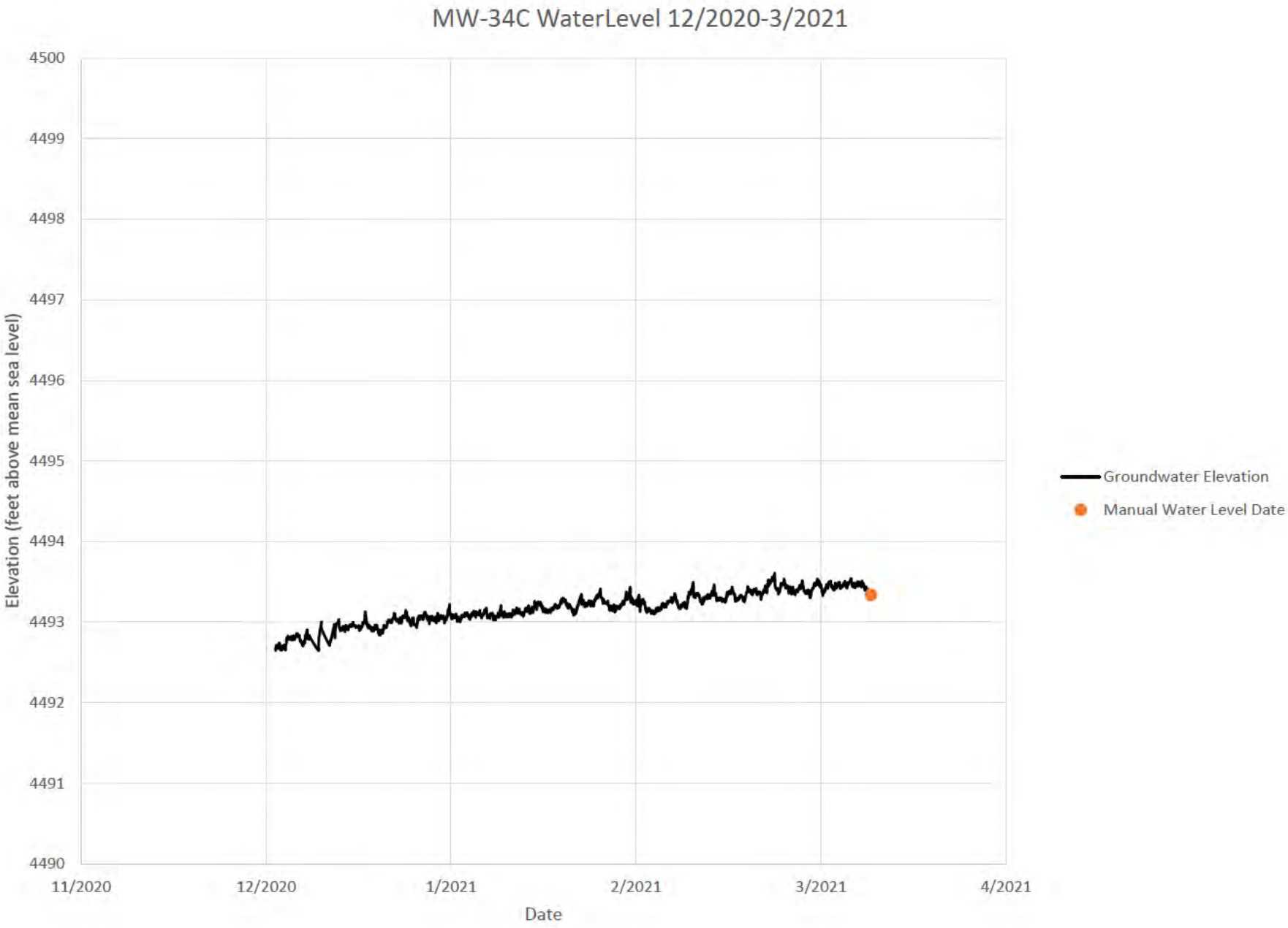

MW-20D WaterLevel 12/2020-03/2021
Elevation (feet above mean sea level)
4480
4479
4478
4477
4476
4475
4474
4473
4472
4471
4470
11/2020
12/2020
1/2021
2/2021
3/2021
4/2021
Date
Groundwater Elevation
Manual Water Level Date


MW-20S WaterLevel 12/2020-3/2021
4480
4479
4478
4477
4476
4475
4474
4473
4472
4471
4470
Elevation (feet above mean sea level)
11/2020
12/2020
1/2021
2/2021
3/2021
4/2021
Date
Groundwater Elevation
Manual Water Level Date


MW-21 WaterLevel 12/2020-3/2021
Elevation (feet above mean sea level)
4505
4504
4503
4502
4501
4500
4499
4498
4497
4496
4495
11/2020
12/2020
1/2021
2/2021
3/2021
4/2021
Date
Groundwater Elevation
Manual Water Level Date


MW-22 WaterLevel 12/2020-3/2021
4505
4504
4503
4502
4501
4500
4499
4498
4497
4496
4495
Elevation (feet above mean sea level)
11/2020
12/2020
1/2021
2/2021
3/2021
4/2021
Date
Groundwater Elevation
Manual Water Level Date


MW-34B WaterLevel 12/2020-1/2021
4495
4494
4493
4492
4491
4490
4489
4488
4487
4486
4485
Elevation (feet above mean sea level)
11/2020
12/2020
1/2021
2/2021
Date
Groundwater Elevation
Manual Water Level Date


MW-34C WaterLevel 12/2020-3/2021
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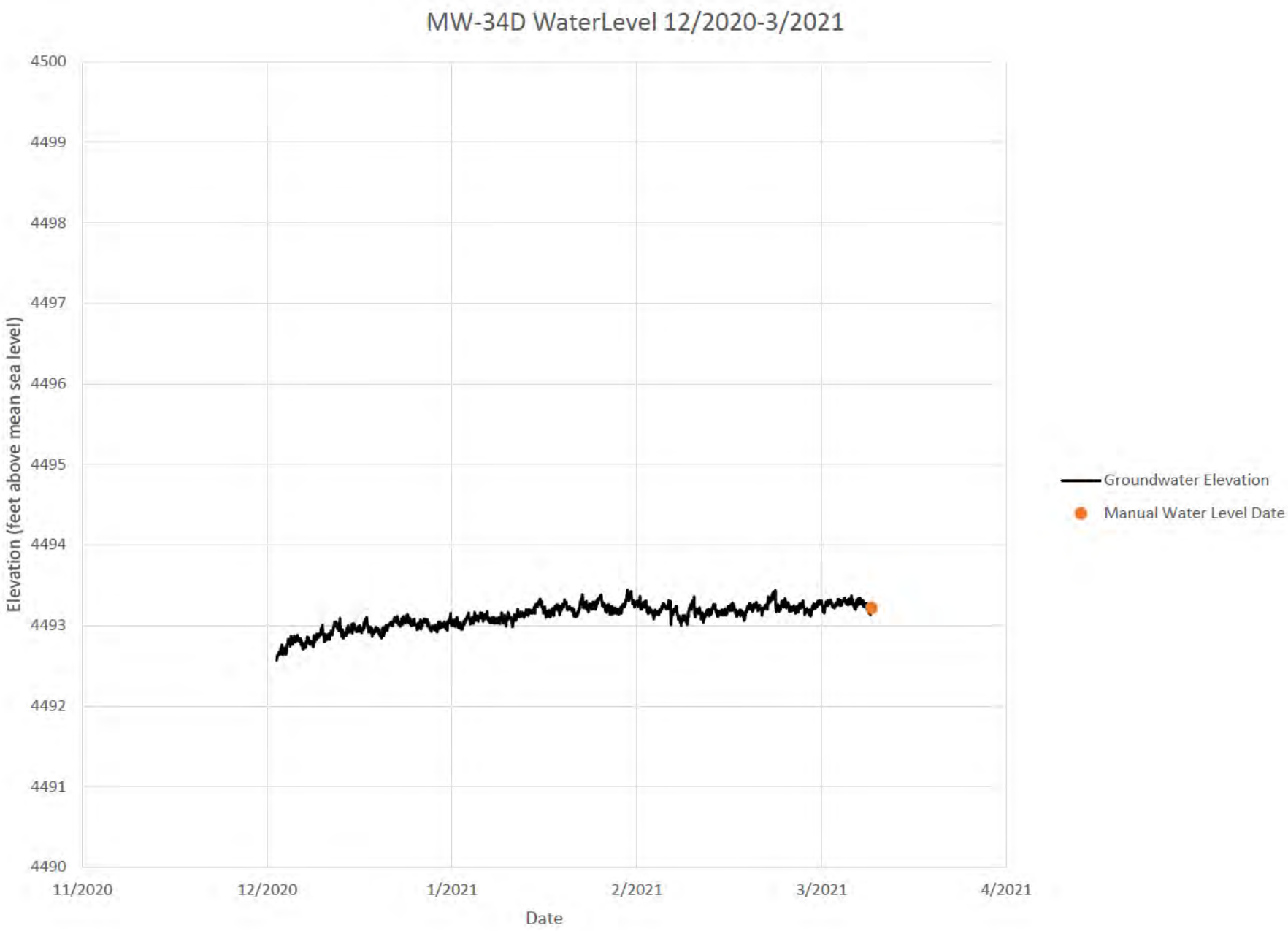
4499
4498
4497
4496
4495
4494
4493
4492
4491
4490
Elevation (feet above mean sea level)
11/2020
12/2020
1/2021
2/2021
3/2021
4/2021
Date
Groundwater Elevation
Manual Water Level Date


MW-34D WaterLevel 12/2020-3/2021
4500
4499
4498
4497
4496
4495
4494
4493
4492
4491
4490
Elevation (feet above mean sea level)
11/2020
12/2020
1/2021
2/2021
3/2021
4/2021
Date
Groundwater Elevation
Manual Water Level Date

Data Summary Report
Phase 2 2020 Drilling Investigation

CONTRACT NO.: W912DQ-18-D-3008
DELIVERY ORDER NO.: W912DQ19F3048

700 South 1600 East PCE Plume Site
Salt Lake City, Utah

U.S. Army Corps of Engineers
Kansas City District

Department of Veterans Affairs
Veterans Health Administration Salt Lake City Health Care System

July 7, 2021

CDM Smith

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Appendix J Survey Data
Appendix K Well Development
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Acronyms and Abbreviations

bgs	below ground surface
CDM Smith	CDM Federal Programs Corporation
DSR	data summary report
EPA	U.S. Environmental Protection Agency
ESS	East Side Springs
IDW	investigation-derived waste
Jacobs	Jacobs Engineering Group Inc.
OU	operable unit
PCE	tetrachloroethene
PID	photoionization detector
PVC	polyvinyl chloride
QAPP	quality assurance project plan
RI	remedial investigation
ROW	right-of-way
SOP	standard operating procedure
SVP	soil vapor probe
USACE	U.S. Army Corps of Engineers
VAMC	Veterans Affairs Medical Center
VHA	Veterans Health Administration
VOC	volatile organic compound
ZIST	zone isolation sampling technology

Section 1
Introduction

Under the U.S. Army Corps of Engineers (USACE), Kansas City District, Contract No. W912DQ-18-D-3008, Task Order No. W912DQ19F3048, CDM Federal Programs Corporation (CDM Smith) was directed to perform a remedial investigation (RI) for Operable Unit (OU) 1 of the 700 South 1600 East Tetrachloroethene (PCE) Plume Superfund Site in Salt Lake City, Utah. CDM Smith prepared this data summary report (DSR) to present the results of the Phase 2 2020 drilling investigation as part of the RI field characterization activities.

1.1 Background

The Salt Lake City Healthcare System George E. Wahlen Veterans Affairs Medical Center (VAMC) is in Salt Lake City, Utah (**Figure 1**). PCE contamination was first identified in groundwater in 1990 at the nearby Mt. Olivet Cemetery irrigation well during routine monitoring by the Salt Lake City Department of Public Utilities. This led to U.S. Environmental Protection Agency (EPA) and Utah Department of Environmental Quality involvement at the site and the preliminary determination that the source of PCE in groundwater was the historic dry cleaning facility at the VAMC. The Veterans Health Administration (VHA) operated a part-time dry cleaning operation that used PCE over a 6-year period in the late 1970s and early 1980s. During this period, dry cleaning residuals were disposed in the sanitary sewer. The PCE plume is present beneath the VAMC property and in areas hydraulically downgradient, extending to the East Side Springs (ESS) neighborhood.

In 2018, as part of the RI for the former OU2, 18 shallow monitoring wells (including 7 monitoring well pairs and 4 individual wells) were constructed at the site. Additionally, two deep monitoring wells were installed: MW-03R on the VAMC campus, installed as a multilevel completion with four screened intervals, and MW-08, installed on 700 South near 1300 East as a multilevel completion with three screened intervals (Jacobs Engineering Group Inc. [Jacobs] 2019).

Soil vapor investigations and surface water and groundwater sampling were also conducted as part of the RI effort. The soil vapor investigation identified elevated PCE concentrations around Buildings 6 and 7 on the VAMC campus and along the sanitary sewer line that runs from Building 7 through Sunnyside Park to the main sewer line on 900 South, specifically near a manhole in Sunnyside Park (Jacobs 2019).

As part of the Phase 1 RI field investigation, 27 groundwater monitoring wells were installed at 11 boring locations. Seven boring locations (MW-23 through MW-29) were selected to evaluate conditions in and immediately downgradient of suspected source areas. Four boring locations (MW-30, MW-31, MW-32, and MW-34) were advanced to laterally and vertically delineate the plume (CDM Smith 2021a).

1.2 Purpose and Scope

The purpose of this DSR is to present the field work conducted and data collected during the 2020 Phase 2 groundwater monitoring well installation event. The rationale and approach for completing the Phase 2 groundwater monitoring well installation were presented in the Final Phase 2 OU1 RI Work Plan (CDM Smith 2020a), and minor field modification #1 to the Phase 2 Field Sampling Plan (CDM Smith 2020b). The well installation described in the Phase 2 OU1 RI Work Plan was planned to delineate the extent of the PCE plume to the north, northwest, and south within the ESS area, as well as any additional locations that were not adequately delineated by wells installed during Phase 1. Following completion of Phase 1 drilling activities, the remaining investigation activities included installation of wells in the ESS area for plume delineation and replacement of two wells at MW-30 which were damaged during installation. While Phase 1 included the collection and analysis of groundwater and soil samples during drilling to characterize the subsurface in suspected source areas and inform the monitoring well installation, Phase 2 well installation was primarily focused on lateral delineation of the plume outside of the suspected source areas; therefore, limited soil or groundwater sampling was necessary during Phase 2.

Two monitoring wells were installed as replacement wells for MW-30A and MW-30B, which were damaged during installation in the Phase 1 well installation event. A total of seven new groundwater monitoring wells were installed at four boring locations. The boring locations were selected to evaluate subsurface conditions in the downgradient area (ESS) to vertically and spatially delineate the extent of the plume. Soil profiling included field screening of soil cores using a photoionization detector (PID). Push-ahead groundwater samples were collected at one location and screened using AQ Colortec and submitted for laboratory volatile organic compound (VOC) analysis to evaluate the vertical distribution of VOCs in the aquifer (CDM Smith 2019). This report summarizes the field work conducted and presents the field data collected during the event. **Appendix A** includes the daily quality control reports submitted to USACE and VHA during the event. **Appendix B** includes copies of field logbook notes for the field work.

Section 2
Monitoring Well Installation

The following sections outline the field activities completed during the Phase 2 2020 drilling event. The field activities were conducted per the agency-approved OU1 Phase 2 OU1 RI Work Plan and Quality Assurance Project Plan (QAPP) (CDM Smith 2020a) and Modification #1 to the Phase 2 Field Sampling Plan (CDM Smith 2020b), with deviations outlined in Section 2.7.

2.1 Utility Clearance and Permitting

Prior to drilling, all locations were surveyed for utilities using geophysical survey methods. Location clearance requests were submitted to Blue Stakes of Utah, and the utility location notifications were updated as required during the drilling event. TWS Environmental conducted the geophysical surveys for the boring locations in the ESS area. GPRS conducted the geophysical survey for MW-13 near East High School. Utility locate reports are included in **Appendix C.**

2.1.1 Borehole Preclearing

Prior to drilling, all of the boring locations were precleared using a hydrovac-excavation or hand auger. Excavation to 15 feet below ground surface (bgs) was attempted on the VAMC campus at MW-30R. VHA safety staff approved the location prior to drilling and issued an excavation permit. The ESS boring locations were hydrovac-excavated to at least 5 feet bgs. The MW-13L location was precleared with a hand auger to 5 feet bgs. The preclearing cuttings were managed as soil and water investigation-derived waste (IDW).

Table 1 summarizes the well locations, dates, depths, and issues/comments related to the hydrovac excavation.

Table 1 Hydrovac Summary

Well ID	Date	Depth (feet bgs)	Issues/Comments
MW-30R	11/4/2020	9	Unable to advance to 15 feet bgs. Approved by VHA Safety
MW-13L	12/1/2020	5	Hand-augured; Off campus well located near East High School
MW-36	11/11/2020	7	Off campus well located on Herbert Avenue
MW-37	11/11/2020	7	Off campus well located on 1000 East; due to marked utilities boring location moved to planting strip on west side of road
MW-38	1/11/2020	5.5	Off campus well located on 1200 East

2.1.2 Permitting

The Salt Lake City Corporation Engineering Division issued a right-of-way (ROW) permit for MW-36, MW-37, MW-38, and MW-13L in the ESS area. A performance bond and certificate of liability insurance accompanied the ROW permit application. Utah Barricade created traffic control plans, included in **Appendix D**, which were submitted to the Salt Lake City Division of Transportation for traffic control permits at the boring locations.

Copies of the ROW permit, traffic control permit, and associated documents can be found in **Appendix E**. Excavation permits were issued by VHA Safety for the duration of MW-30R on the VAMC campus. Daily excavation checklists were completed by CDM Smith and are included in **Appendix F**.

2.2 Drilling

Drilling occurred between November 5 and December 3, 2020. MW-30R was drilled to replace the A and B well zones of MW-30, which were damaged during the Phase 1 installation (CDM Smith 2021a). Four plume delineation borings were advanced in the ESS area and completed as either multilevel wells or single-screen intervals (CDM Smith 2020a). MW-13L was installed near MW-13S/D south of East High School along 900 South (CDM Smith 2020b). MW-36 is on Herbert Avenue, near the intersection with 1200 East. MW-37S/D is along 1000 East, north of 800 South. MW-38 S/D is on 1200 East, north of 700 South. New and existing monitoring well locations are presented on **Figure 1**.

Holt Services used a Terrasonic 150 track-mounted mini-rotosonic drill rig to advance the borings. Continuous soil cores were collected and field screened using a PID. The lithology was logged and photos were taken of the core intervals. Borehole logs are included in **Appendix G** and photos of the soil cores are included in **Appendix H**. Well construction details are discussed in Section 2.4 and presented in **Table 2**. Soil cuttings were managed as IDW.

The plume delineation wells include MW-30, in the northwest corner of the VAMC campus near Foothill Drive, north of MW-03R, and is part of the Guardsman Way transect to delineate the plume to the north. MW-30 A and B zones were damaged during installation and were abandoned by grouting in place. The MW-30C zone and the soil vapor point remain installed at the original location. MW-30R was relocated approximately 20 feet south of the original location. The hydrovac excavation encountered refusal at 9 feet bgs. The rotosonic drilling began November 5, 2020 and reached a total depth of 295 feet bgs on November 10, 2020. Groundwater was encountered at approximately 235 feet bgs. MW-30R was installed with two well screens on November 11, 2020.

MW-36, on Herbert Avenue, is south of MW-14S/D and east of MW-15S/D. MW-36 was installed to delineate the plume to the south-southwest. The hydrovac excavation was completed to 7 feet bgs. The rotosonic drilling occurred November 17, 2020 and reached a total depth of 110 feet bgs. Groundwater was encountered at approximately 32 feet bgs. MW-36 was installed with one screen interval on November 18, 2020.

MW-37, on 1000 East, is north of 800 South and west of MW-16S/D. MW-37 was installed to delineate the plume to the west of MW-16. The hydrovac excavation was completed to 7 feet bgs. The rotosonic drilling began and reached a total depth of 70 feet bgs on November 12, 2020. Groundwater was encountered at approximately 20 feet bgs. MW-37 was completed with two screen intervals and one soil vapor point on November 13, 2020.

MW-38, on 1200 East, is north of 700 South. MW-38 was installed to delineate the plume northwest of MW-08 and northeast of MW-16. The hydrovac excavation was completed to 5.5 feet bgs. The rotosonic drilling reached a total depth of 80 feet bgs on November 14, 2020.

Groundwater was encountered at approximately 18 feet bgs. MW-36 was completed with two screened intervals and one soil vapor point on November 15, 2020.

MW-13L (lower), located along 900 South near East High School, was installed to vertically delineate the plume in an area with known PCE (MW-13S/D) (CDM Smith 2021b). MW-13D is screened from 79-84 feet bgs and has had a PCE concentration greater than 50 µg/L. The rotosonic drilling began on December 2, 2020 and reached a total depth of 160 feet bgs on December 3, 2020. MW-13L was completed with one screened interval on December 3, 2020.

2.3 Groundwater Sampling

Two push-ahead groundwater samples were collected during the MW-37 boring in the water-bearing zones (CDM Smith 2019). These samples were used to determine if the MW-37 boring was outside the boundary of the plume and verify whether a step-out boring to the north was necessary. Push-ahead grab groundwater samples were collected for laboratory VOC analysis by EPA method 8260C with a 24-hour turnaround. There was no detectable PCE or trichloroethene in the groundwater samples. The data validation report and complete laboratory package for these data is included in the **Appendix I**.

2.4 Well Construction

Final well construction designs were determined following a review of the lithology. A summary of the well construction information for the wells installed during this event is presented in **Table 2**. Two-inch-diameter polyvinyl chloride (PVC) well casings were installed with the rotosonic drill casing in place. Wells were installed according to the procedures described in the Phase 2 OU1 RI Work Plan (CDM Smith 2020a). Screens consisted of a 0.02-inch slot screen in 5- or 10-foot intervals. The filter pack was constructed using 10/20 silica sand and extended 2 to 3 feet above the top of the screened intervals. At locations where multilevel wells were installed, hydrated bentonite chips were installed between filter pack intervals to seal the borehole between intervals. Hydrated bentonite chips were installed above the shallowest sand filter pack interval to approximately 3 feet bgs.

Soil vapor probes (SVPs) were installed at MW-37S and MW-38S at 8 feet bgs to assess potential vapor hazards in the ESS. SVPs are AMS, 6-inch-long, double-woven stainless-steel wire screens (0.0057-inch pore) with Swagelok fittings connected to 0.25-inch outer diameter Teflon-lined tubing. SVPs were installed within a 2-foot sand pack using 10/20 silica sand.

Each monitoring well location was completed at the surface with a flush-mounted manhole vault. MW-36 and MW-38 required a Salt Lake City-approved concrete batch mix for the surface completion because the location was in the ROW. Well completion diagrams, including screen, sand, and bentonite intervals, and SVP depths, are included on the boring logs in **Appendix G**. Survey data for the well locations are presented in **Appendix J.**

2.4.1 MW-13L

The MW-13L well design consists of one 2-inch conventional well to allow for monitoring groundwater chemistry and water level to assess deeper groundwater in the ESS area.

- A 2-inch PVC monitoring well was installed with a 0.020 slot screen from 150 to 160 ft bgs in a saturated zone deeper than the screened interval at MW-13D (79 to 84 feet bgs).

2.4.2 MW-30R

The well design at MW-30R consists of two 2-inch conventional wells to replace the A and B zones at MW-30, which were damaged during installation.

- Zone A was installed with 0.020 slot screen from 240 to 250 feet bgs.
- Zone B was installed with 0.020 slot screen from 280 to 290 feet bgs.

2.4.3 MW-36

The well design at MW-36 consists of one 2-inch conventional well.

- A 2-inch PVC monitoring well was installed with a 0.020 slot screen from 47 to 52 feet bgs. The boring was advanced to 110 feet bgs. No significant water-bearing zones were encountered deeper than the screened interval.

2.4.4 MW-37 S/D

The well design at MW-37S/D consists of two 2-inch conventional wells with one SVP installed at the following intervals:

- MW-37S (shallow) was installed with 0.020 slot screen from 25 to 35 feet bgs.
- MW-37D (deep) was installed with 0.020 slot screen from 60 to 70 feet bgs.
- The SVP was installed at 8 feet bgs with sand pack from 7 to 9 feet bgs.

2.4.5 MW-38 S/D

The well design at MW-38S/D consists of two 2-inch conventional wells with one SVPs installed at the following intervals:

- MW-38S (shallow) was installed with 0.020 slot screen from 27 to 37 feet bgs.
- MW-38D (deep) was installed with 0.020 slot screen from 60 to 70 feet bgs.
- The SVP was installed at 8 feet bgs with sand pack from 7 to 9 feet bgs.

2.5 Well Development

The 2-inch monitoring wells installed during Phase 2 were developed by purging with a bailer (to remove sediment from the screened interval) and a pump, according to methods described in Section 3.2.4 of the OU1 RI Work Plan (CDM Smith 2020a). A minimum purge volume was calculated prior to development. The wells were purged until the minimum volume had been removed and parameter stabilization and turbidity requirements were met. **Table 3** lists the development technique used and volume purged from each well. Well development field forms are included in **Appendix K**. The development water was handled as IDW. Because of accumulated sediment in the well screen and the depth of the well, MW-13L required additional

development using a development rig with a winch line to bail sediment, followed by pumping until parameter stabilization and turbidity requirements were met.

Additional development was required for some of the zone isolation sampling technology (ZIST) wells installed during spring and summer 2020, specifically MW-26B/C/D and MW-34B/C. The ZIST wells were developed in accordance with manufacturer recommendations (**Appendix K**), using a gas lifting method with compressed nitrogen to purge water and sediment from the well casing while simultaneously surging the well to remove sediment from the filter pack. The gas lifting method consists of lowering a stinger tube to approximately the center of the water column above the well screen, delivering nitrogen to the water column and lifting the water in the well casing to the surface and into a tote. At locations requiring a more aggressive approach, gas lifting was completed by delivering nitrogen into the well casing and forcing water to the surface through the stinger tubing and into a tote. As ZIST wells have a receiver that restricts the placement of any objects into the well screen, surging refers to the agitation that occurs during gas lifting. Gas lifting continued until visible clearing of the extracted water. Water quality parameters were not measured during gas lifting because of the disturbance to the water during the process. For ZIST wells in which air lifting development was insufficient or unsuccessful, development was attempted with a Waterra inertial pump (MW-34A).

2.6 Decontamination and Investigation-Derived Waste

All decontamination waste produced during the drilling effort was collected and managed in accordance with Standard Operating Procedure (SOP) 4-5, *Field Equipment Decontamination at Nonradioactive Sites* (CDM Smith 2020a). Waste was produced from decontaminating all downhole drilling equipment prior to drilling activities, between boreholes, and after the drilling investigation, and the decontamination of the push-ahead groundwater sampler after each use. Additional equipment decontaminated after each use include the drilling tag line, water level meters, development pump, swab, and nondedicated bailer.

All IDW was handled per SOP 2-2, *Guide to Handling Investigation-Derived Waste* (CDM Smith 2020a). All decontamination, hydrovac, and purge/development water was transferred to the holding tanks at the VAMC campus IDW yard. The excavated soils from drilling and pre-clearing were placed in lined roll-off bins. Prior to disposal, groundwater and soil were characterized and determined to be nonhazardous. Approximately 1,800 gallons of decontamination and IDW water and approximately 19 tons of soil, contained in three soil roll-off bins, were disposed off-site at Wasatch Regional Landfill.

Waste profiles and nonhazardous manifests are included in **Appendix L.**

2.7 Deviations from the Quality Assurance Project Plan

Monitoring well MW-13L was developed by bailing with a PVC bailer and submersible pump. A well development form was not completed during development of this well. Purging was conducted until the water was clear. Approximately 550 gallons of water was purged during development. Well development forms were also not completed during development of some of the ZIST wells. The work that was completed is recorded in the field logbook and a summary is provided in **Table 3**. As sufficient detail of the development activities were recorded in the field logbook, data quality objectives were met.

Soil samples were not collected for total ferrous mineral analysis as described in the OU1 RI Work Plan (CDM Smith 2020a, Appendix A, Section 3.3) during the Phase 2 drilling investigation. It was determined that an adequate number of samples to meet data quality objectives had been collected during the Phase 1 drilling investigation.

As soil and groundwater samples were collected at MW-30 during the Phase 1 2020 drilling investigation, no samples were collected during the Phase 2 drilling of the replacement well MW-30R.

Section 3
Summary

This report presents a summary of field activities, monitoring well construction details, and observed lithology from the Phase 2 groundwater monitoring well installation event. Further analysis and evaluation of these results will be presented in the RI report.

The MW-30 A and B zones installed during the summer 2020 drilling, which were determined to be damaged, were abandoned by grouting in place. MW-30R was drilled to replace the zones with 2-inch conventional wells.

Four plume delineation borings were installed as part of this investigation. MW-13L was installed near East High School along 900 South. MW-36 was installed along Herbert Avenue near the intersection with 1200 East. MW-37 S/D were installed along 1000 East, north of 800 South. MW-38 S/D were installed along 1200 East, north of 700 South. SVPs were installed at MW-37S and MW-38S.

The addition of these eight sampling points at five locations will lead to a better understanding of the groundwater gradients and lateral and vertical extent of the PCE plume. Data collected during this investigation will be evaluated further to refine the conceptual site model and will be summarized in the RI report.

Section 4
References

CDM Smith. 2021a. *Data Summary Report Spring and Summer 2020 Drilling Investigation, 700 South 1600 East PCE Plume, Salt Lake City, Utah*. Prepared for the U.S. Army Corps of Engineers.

CDM Smith. 2021b. *Data Summary Report Q3 2020 Groundwater Sampling Event, 700 South 1600 East PCE Plume, Salt Lake City, Utah*. Prepared for the U.S. Army Corps of Engineers.

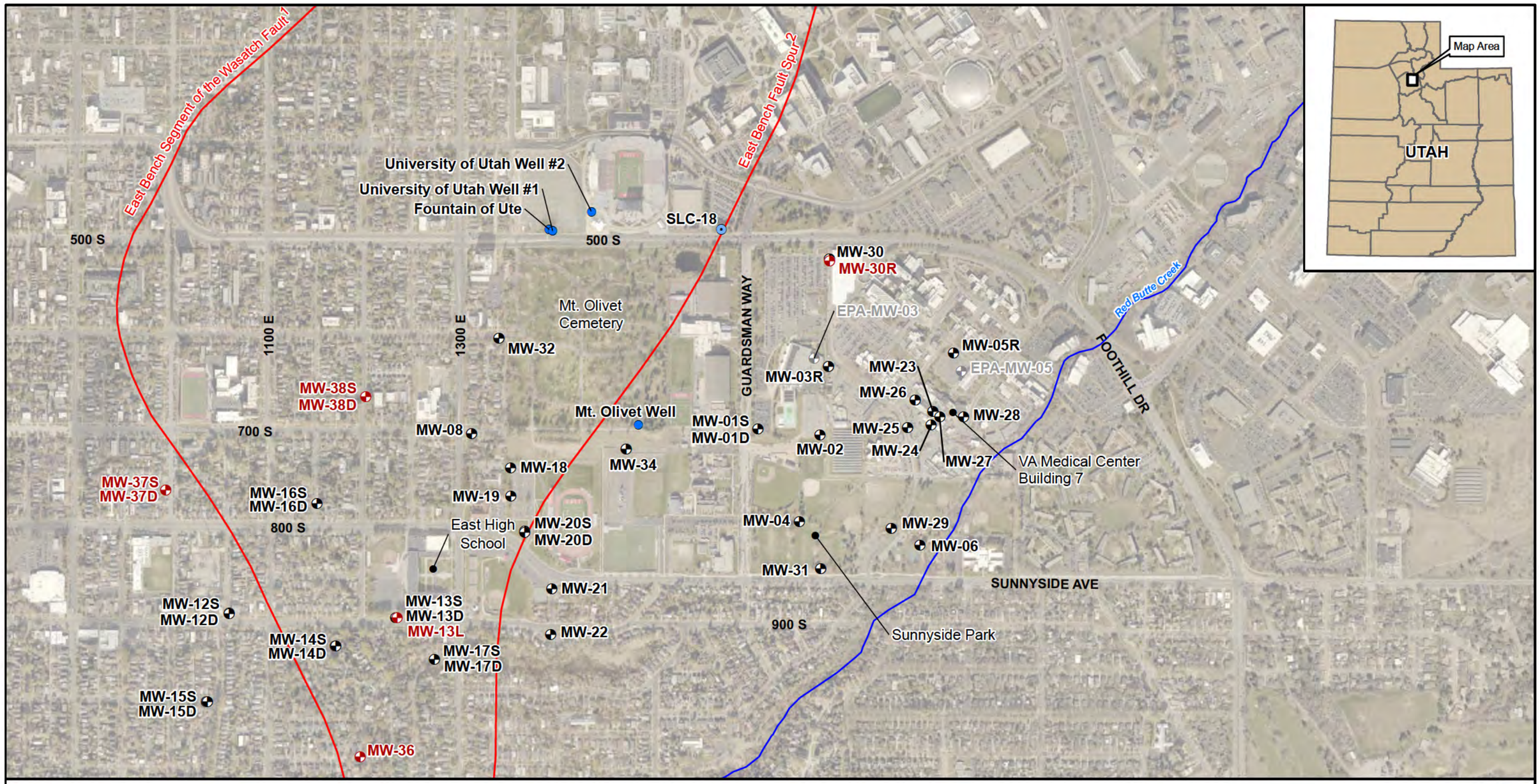
CDM Smith. 2020a. *Final Phase 2 Remedial Investigation Work Plan, Operable Unit 1, 700 South 1600 East PCE Plume, Salt Lake City, Utah*. Prepared for the U.S. Army Corps of Engineers.

CDM Smith. 2020b. *Minor Field Modification #1 to the Phase 2 Field Sampling Plan, 700 South 1600 East PCE Plume, Salt Lake City, Utah.* Prepared for the U.S. Army Corps of Engineers.

CDM Smith. 2019. Modification #3 to *OU-2 Remedial Investigation Work Plan and Sampling and Analysis Plan, 700 South 1600 East PCE Plume, Salt Lake City, Utah*. Prepared for the U.S. Army Corps of Engineers.

Jacobs. 2019. *OU-2 Data Summary Report, Operable Unit 2 Remedial Investigation 700 South 1600 East PCE Plume, Salt Lake City, Utah*. Prepared for the U.S. Army Corps of Engineers.

Figures



Legend

- Monitoring Well
- Monitoring Well installed during Phase 2
- Abandoned Monitoring Well
- Drinking Water Supply Well
- Irrigation Well
- Landmark
- Red Butte Creek
- Fault Line

Notes:
(1) Location of University of Utah Well #1 is approximate; well is located less than 100 feet east of Fountain of Ute.
(2) Proposed monitoring wells MW-07, MW-09, MW-10, MW-11, MW-33, and MW-35 were not installed.

OU = operable unit
PCE = tetrachloroethene
VHA = Veterans Health Administration

[1] Davis, F.D. 1983. Geologic Map of the Central Wasatch Front, Utah. Utah Geological and Mineral Survey. Map 54-A – Wasatch Front Series. May.
[2] Personius, S.F. and Scott, W.E. 2009. Surficial Geologic Map of the Salt Lake City Segment and Parts of Adjacent Segments of the Wasatch Fault Zone, Davis, Salt Lake, and Utah Counties, Utah

N W E S

0 500 1,000 Feet

1 inch = 800 feet

CDM Smith

Figure 1
Site Location Map

Phase 2 Drilling DSR
OU1 700 South 1600 East PCE Plume
Salt Lake City, Utah

File Path: J:\238824_VA_Medical_Salt_Lake\MXD\Drilling_Field_Modification\Fig1_DrillingPh2_DSR_SiteMap.mxd WAGNERA 4/21/2021

Tables

Table 2
Monitoring Well Survey Data and Construction Details

Location	Sample Interval	Soil Vapor Point Depth (ft bgs)	X Coordinate (Utah State Plane, ft)[1]	Y Coordinate (Utah State Plane, ft)[1]	Surface Elevation (ft amsl)[2]	Top of Casing Elevation (ft amsl)[2]	Total Well Depth (ft bgs)	Screen Start (ft bgs)	Screen End (ft bgs)	Pump Depth (ft bgs)	Pump Type
MW-13L	-	-	1541851.01	7442106.30	4483.67	4483.23	160	150	160	155	Solinst bladder pump
MW-30R	A	-	1545425.12	7445055.62	4722.89	4722.60	252	240	250	245	Solinst bladder pump
	B	-				4722.36	291	280	290	285	Solinst bladder pump
MW-36	-	-	1541547.17	7440955.06	4429.01	4428.49	54	47	52	50	Solinst bladder pump
MW-37D	-	-	1539938.63	7443160.46	4348.36	4347.97	70	60	70	65	Solinst bladder pump
MW-37S	-	8				4348.00	35	25	35	30	Solinst bladder pump
MW-38D	-	-	1541593.58	7443931.79	4498.56	4497.80	70	60	70	65	Solinst bladder pump
MW-38S	-	8				4497.64	37	27	37	32	Solinst bladder pump

Notes:
[1] X/Y coordinates measured using NAD 83 State Plane Coordinate System
[2] Elevations measured using NAVD 88 vertical datum
Acronyms:
amsl = above mean sea level
bgs = below ground surface
ft = feet

Table 3
Monitoring Well Development Summary

Location	Sample Interval	Development Approach	Date Developed	Volume of Water Added During Drilling (gallons)	Volume of Water Removed During Development (gallons)	Pump Type
MW-23	A	Not developed	NA	300	NA	ZIST w/ reciever
	B	Not developed	NA		NA	ZIST w/ reciever
	C	Air lift	6/12/2020		NR	ZIST w/ reciever
MW-24	-	Bail and pump (submersible) by Holt	6/18/2020	200	640	Solinst bladder pump
MW-25	A	Pump (Panacea) by CDM Smith	6/9/2020	0	4	ZIST w/ reciever
	B	Air lift	6/8/2020		NR	ZIST w/ reciever
	C	Pump (Panacea) by CDM Smith	6/9/2020		4	ZIST w/ reciever
MW-26	A	Bailer	11/10/2020	0	0	ZIST w/ reciever
	B	Air lift	12/9/2020		27	ZIST w/ reciever
	C	Air lift	11/10/2020		60	ZIST w/ reciever
			1/20/2021		125	
	D	Air lift	6/11/2020		NR	ZIST w/ reciever
		Air lift	11/10/2020		70	
		Air lift	1/18/2021		95	
MW-27	-	Bail and pump by Holt	6/17/2020	0	360	Solinst bladder pump
MW-28	-	Bail and pump by Holt	6/18/2020	0	370	Solinst bladder pump
MW-29	A	Pump (Panacea) by CDM Smith	7/31/2020	0	NR	ZIST w/o reciever
	B	Pump (Panacea) by CDM Smith	7/31/2020		NR	ZIST - w/ reciever
	C	Air lift	7/29/2020		20	ZIST - w/ reciever
MW-30	RA	Bail and pump by Holt	12/1/2020	0	28	Solinst bladder pump
	RB	Bail and pump by Holt	12/2/2020		62	Solinst bladder pump
	C	Air lift	7/27/2020		20	ZIST w/ reciever
MW-31	A	Pump (Panacea) by CDM Smith	7/29/2020	0	NR	ZIST w/o reciever
	B	Pump (Panacea) by CDM Smith	7/29/2020		NR	ZIST w/ reciever
	C	Air lift	7/29/2020		27	ZIST w/ reciever
MW-32	A	Bail and pump by CDM Smith	7/31/2020	0	47	Solinst bladder pump
	B	Air lift	7/31/2020		20	ZIST w/o reciever
	C	Air lift	7/31/2020		30	ZIST w/o reciever
MW-34	A	Waterra Pump	12/7/2020	0	89	ZIST w/o reciever
	B	Pump (Panacea) by CDM Smith	7/30/2020		NR	ZIST w/o reciever
		Air lift	1/19/2021		30	
			1/21/2021		95	
	C	Air lift	7/30/2020		20	ZIST w/o reciever
		Air lift	1/19/2021		20	
	D	Air lift	7/30/2020		40	ZIST w/o reciever
MW-36	-	Bail and pump	12/3/2020	0	46	Solinst bladder pump
MW-37S	-	Bail and pump	12/5/2020	0	64	Solinst bladder pump
MW-37D	-	Bail and pump	12/6/2020	0	68	Solinst bladder pump
MW-38S	-	Bail and pump	12/4/2020	0	46	Solinst bladder pump
MW-38D	-	Bail and pump	12/4/2020	0	116	Solinst bladder pump
MW-13L	-	Bail and pump (submersible) by CDM Smith	12/7/2020	0	120	Solinst bladder pump
	-	Bail and pump (submersible) by Conetec	2/3/2021	0	550	Solinst bladder pump

Notes:
Grey shading indicates wells that were developed during Phase 2

Acronyms:
amsl = above mean sea level
bgs = below ground surface
ft = feet
NA = not applicable
NR = not recorded
ZIST = zone isolation sampling technology

Appendix A

Daily Quality Control Reports

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 11/3/2020	**Prepared by:** Whitney Treadway

Personnel on site, including Contractors:	CDM Smith – Whitney Treadway Wasatch Env. – Kevin Murphy Badger – Levi Patterson TWS – Jeff Baker Holt Services – Jeff Jones (Driller) Holt Services – Andrew Mengle Holt Services – Alex Langdon VA Safety – Linda Gallegor
Visitors/Others:	

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	**50 to 70 º F**	32 to 50 º F	To 32 º F
Wind	**Still**	Moderate	High		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Terrasonic 150 mini-sonic drill rig (x2) (mobilized, not used) • Skid Steer (Bobcat) • Rig Hauler • Air Vac Truck • HNu PID

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

H&S tailgate was conducted at MW-30R and laydown area

Drilling:

MW-30R:
Borehole was cleared by vac truck (Badger) to 9 ft bgs. Large cobbles and boulders encountered at 9 ft bgs. Kevin with Wasatch oversaw. VA approved excavation permit.
MW-30 A and B wells were tagged for total depth to ensure correct wells will be abandoned tomorrow.

Utility Markout:

TWS encountered vehicles on/near some locations, so markings had to be completed around the vehicles.

MW-36 S/D: TWS identified and unmarked linear anomaly near the proposed MW-36 location. This boring will be shifted closer to the curb (north) to avoid this anomaly.

MW-37 S/D: 1000 East has utilities on both sides of the road. Without closing the lanes of traffic for installation and sampling, after TWS marking and consultation with Jeff (driller) from Holt, the best place to completed MW-37 would be on the grass planter strip (near sidewalk) to the west of the street.

MW-38 S/D: TWS located both proposed locations for MW-38. The location on Elizabeth street north of 700 S had identifiable utilities. TWS did not identify any underground utilities on 1200 E north of 700 S.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):
United Site Services did not deliver porta-potty or fencing today.

Projected Work – Near Term:

11/4/2020 – abandon MW-30 A and B wells.

11/4/2020 through end of week – drill MW-30R to 295 ft bgs

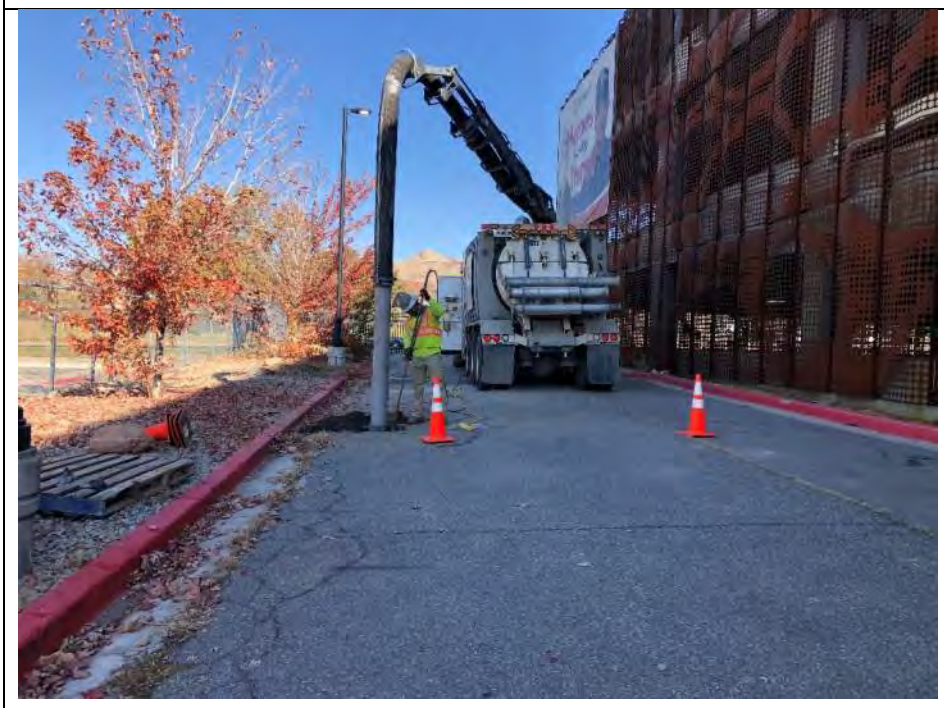
Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Other Activities/Remarks:

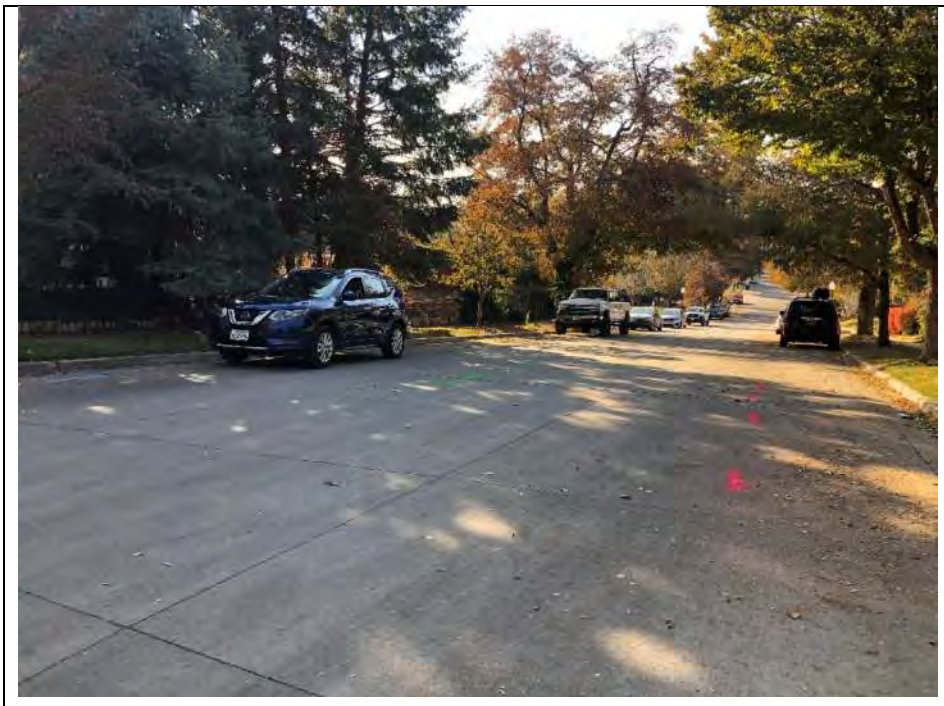
Holt Crew arrived onsite, unloaded equipment and supplies, and decontaminated drill steel.

TWS located utilities at MW-37, 2 MW-38 alternate locations, MW-36, GW-10, GW-11, GW-16, GW-20, GW-49, GW-50, GW-52, GW-53, GW-59, and GW-61.

Photos:

	Date: 11/3/2020 **Location:** MW-30R **Description:** Rolloff delivered to MW-30R
	**Date: 11/3/2020** **Location:** MW-30R **Description:** Air vac clearing by Badger

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	**Date: 11/3/2020** **Location:** MW-36 **Description:** Utility markings
	Date: 11/3/2020 **Location:** MW-36 **Description:** Utility markings where proposed boring location was selected. Will shift boring towards the curb.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 11/4/2020	**Prepared by:** Whitney Treadway

Personnel on site, including Contractors:	CDM Smith – Whitney Treadway Holt Services – Jeff Jones (Driller) Holt Services – Andrew Mengle Holt Services – Alex Langdon
Visitors/Others:	

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	**50 to 70 º F**	32 to 50 º F	To 32 º F
Wind	**Still**	Moderate	High		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Terrasonic 150 mini-sonic drill rig • Skid Steer (Bobcat) • Rig Hauler • HNu PID

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

H&S tailgate was conducted at laydown area.

Drilling:

MW-30:
Zones A and B at original MW-30 location were grouted using Quik Grout through ½-inch tubing with hand pump. Grout was brought to top of casing. Will top off later, if needed, and capped with cement. A and B zones were checked for total depth yesterday and again today. MW-30A tagged at approx. 240 ft bgs and MW-30B was tagged at approx. 282 ft bgs (both top of screen).

MW-30R:
Holt drill crew moved 200 feet of 8-inch casing, drill pipe, and other equipment to site. Rig was set up on MW-30R, but no footage drilled today. See below.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):
United Site Services did not deliver porta-potty or fencing today.

At approx. 13:15, rig was set up on hole and it was noticed that it had been dripping diesel. It was a small leak, Shannon Smith was notified. Sorbent rags were used to wipe up the spilled fuel. Holt added plastic under rig. Holt crew left site to purchase casing and new part for rig. Holt replaced the part that leaked and identified another piece that needs repaired or replaced. Rig maintenance will resume in the morning.

Projected Work – Near Term:

11/5/2020 – complete part replacement and start up rig

11/5/2020 through end of week – drill MW-30R to 295 ft bgs

Other Activities/Remarks:

Photos:

Daily Quality Control Report
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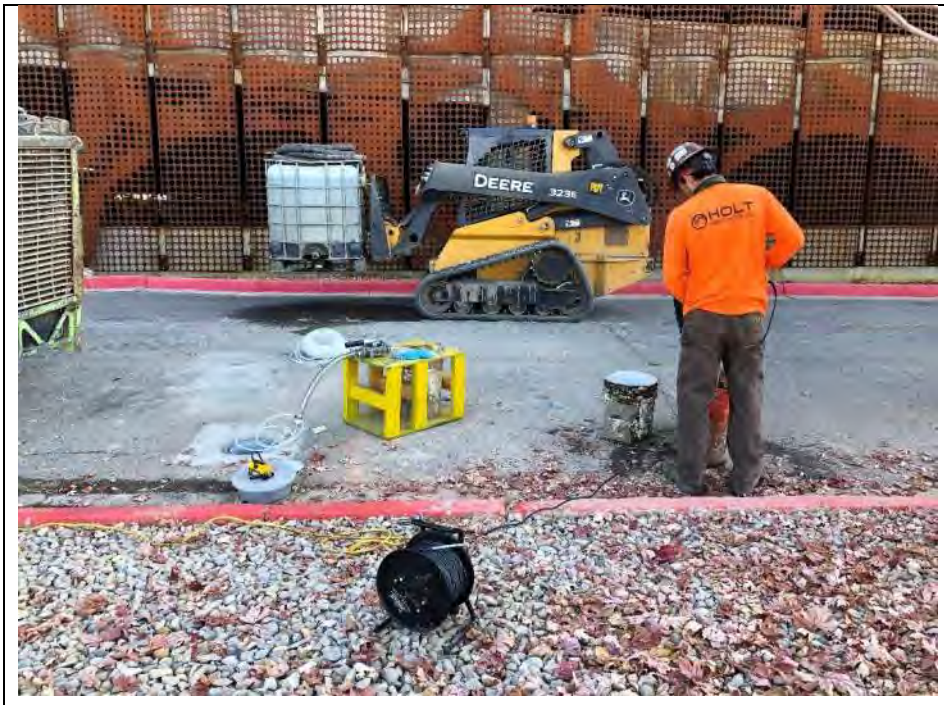
Salt Lake City, Utah

	**Date: 11/4/2020** **Location:** MW-30 A/B **Description:** Mixing and pumping grout through tubing in MW-30A and MW-30B. Grout was mixed with water and a paddle mixer was used to agitate. Grout was poured into bucket in yellow holding box and hand-pumped down well through tubing.
	Date: 11/4/2020 **Location:** MW-30 **Description:** MW-30C is covered with ZIST tubing. MW-30A and MW-30B are open and were tagged for total depth prior to grouting.

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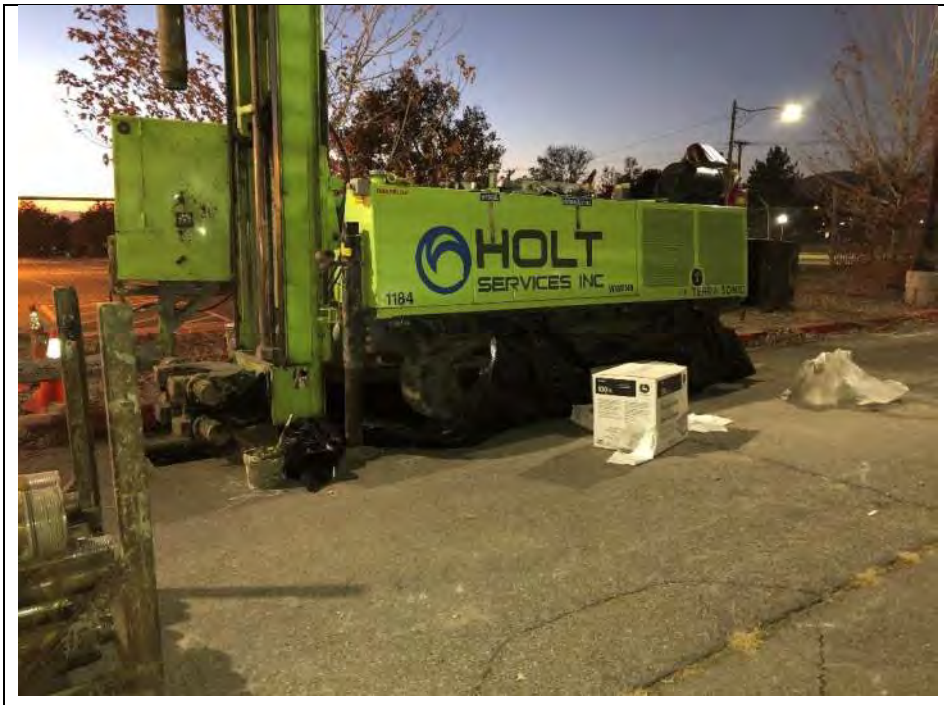

Date: 11/4/2020

Location: MW-30R

Description: Drill set up on MW-30R. Plastic sheeting underneath length of rig in order to catch any leaks during part replacement.

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DATE: 11/5/2020	**Prepared by:** Whitney Treadway

Personnel on site, including Contractors:	CDM Smith – Whitney Treadway Holt Services – Jeff Jones (Driller) Holt Services – Andrew Mengle Holt Services – Alex Langdon
Visitors/Others:	

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	**50 to 70 º F**	32 to 50 º F	To 32 º F
Wind	**Still**	Moderate	High		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Terrasonic 150 mini-sonic drill rig • Skid Steer (Bobcat) • Rig Hauler • HNu PID

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

H&S tailgate was conducted at laydown area.

Drilling:

MW-30R:
Rig repairs were completed and Holt resumed drilling from 9 ft bgs (previously cleared to 9 ft bgs by Badger). The boring was advanced to 110 ft bgs with the 7-inch core barrel and 8" sonic casing (currently to 100'). The soil cores were screened with a PID and logged. No laboratory samples were collected. Grab samples were collected for magnetic susceptibility screening.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):
United Site Services did not deliver porta-potty or fencing today.

Magnetic susceptibility meter will be delivered to Wasatch on Friday, 11/6.

Projected Work – Near Term:

11/6/2020 through end of week – continue to drill MW-30R to 295 ft bgs

Other Activities/Remarks:

Photos:

Daily Quality Control Report
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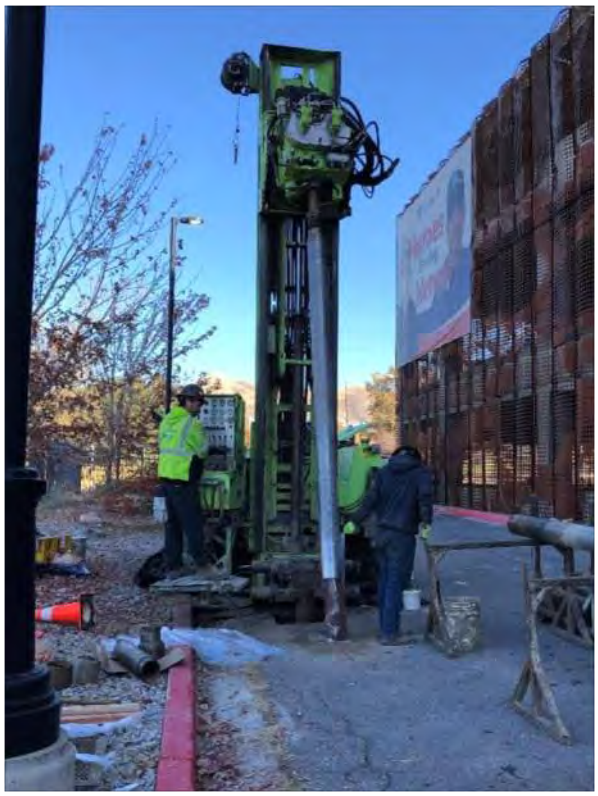
Salt Lake City, Utah

	**Date: 11/5/2020** **Location:** MW-30R **Description:** Soil collection from core barrel to bags for description.
	Date: 11/5/2020 **Location:** MW-30R **Description:** Drilling set-up.

Daily Quality Control Report
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	Date: 11/5/2020 **Location:** MW-30R **Description:** Core barrel drill bit (7-inch).
	Date: 11/5/2020 **Location:** MW-30R **Description:** Soil cores laid out on plastic sheeting for easy description, screening, and photos.

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700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 11/6/2020	**Prepared by:** Whitney Treadway

Personnel on site, including Contractors:	CDM Smith – Whitney Treadway Holt Services – Jeff Jones (Driller) Holt Services – Andrew Mengle Holt Services – Alex Langdon
Visitors/Others:	

Weather	Sunny	**Partly Cloudy**	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	**50 to 70 º F**	32 to 50 º F	To 32 º F
Wind	Still	**Moderate**	High		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Terrasonic 150 mini-sonic drill rig • Skid Steer (Bobcat) • Rig Hauler • HNu PID

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

H&S tailgate was conducted at MW-30R well site.

Drilling:

MW-30R:
Drilling was advanced from 110 ft bgs to 183 ft bgs. The soil cores were screened with PID and logged. No laboratory samples were collected. Grab samples were collected for magnetic susceptibility screening. Drilling was completed using a 7-inch core barrel and 8-inch casing (currently at 170 ft bgs).

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):
United Site Services delivered the jobsite toilet today. The temporary fencing will be delivered on Monday, 11/9.

Projected Work – Near Term:

11/7/2020 and 11/9/2020: Continue to drill MW-30R to 295 ft bgs.

11/9/2020: Meet with ELM locating services to confirm MW-37 location clear to drill. There is a 16" natural gas line approximately 20 feet from the proposed boring location.

Other Activities/Remarks:

Vac truck soil from MW-30R in containment area was transferred into the rolloff at MW-30R.

Driller took measurements of drilling set up at MW-36 and MW-37 in order to decide the most appropriate well location for pre-clearing.

Photos:

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Salt Lake City, Utah

	Date: 11/6/2020 **Location:** MW-30R **Description:** Clearing core barrel during drilling.
	Date: 11/6/2020 **Location:** MW-36R **Description:** Photo from near potential well location to back of drill pipes to estimate footprint of drilling set-up.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 11/6/2020 **Location:** MW-37R **Description:** Measuring from sewer line to potential well location.
	Date: 11/6/2020 **Location:** MW-30R **Description:** Photo of soil core with large cobble with diameter of core barrel (7 inches) cut by sonic drill bit, at 167 ft bgs.

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Salt Lake City, Utah

DATE: 11/7/2020	**Prepared by:** Whitney Treadway

Personnel on site, including Contractors:	CDM Smith – Whitney Treadway Holt Services – Jeff Jones (Driller) Holt Services – Andrew Mengle Holt Services – Alex Langdon
Visitors/Others:	

Weather	Sunny	Partly Cloudy	Overcast	**Rain**	Snow
Temperature	85+ º F	70 to 85º F	**50 to 70 º F**	**32 to 50 º F**	To 32 º F
Wind	Still	**Moderate**	High		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Terrasonic 150 mini-sonic drill rig • Skid Steer (Bobcat) • Rig Hauler • HNu PID

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

H&S tailgate was conducted at MW-30R well site.

Drilling:

MW-30R:
Drilling was completed from 183 ft bgs to 250 ft bgs. Lithology was logged and soil was screened with PID. No laboratory samples were collected. Grab samples were collected for magnetic susceptibility screening. Drilling was completed using a 7-inch core barrel and 8-inch casing (currently at 250 ft bgs).

Crew offloaded fresh water totes and winterized their decontamination unit in preparation for freezing temperatures.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):
United Site Services delivered the jobsite toilet today. The temporary fencing will be delivered on Monday, 11/9.

Projected Work – Near Term:

11/9/2020 – continue to drill MW-30R to 295 ft bgs, now with 4-inch core barrel and 6-inch casing

11/10-2020 – set and install dual nested wells at MW-30R

Other Activities/Remarks:

Photos:

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Date: 11/7/2020

Location: MW-30R

Description: Tripping in drill pipe with core barrel for sampling.

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Salt Lake City, Utah

	Date: 11/7/2020 **Location:** MW-30R **Description:** Offloading soil from tilt hopper to rolloff onsite.
	Date: 11/7/2020 **Location:** MW-30R **Description:** Tripping out drill pipe to collect lithology sample. Rainy weather.

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Salt Lake City, Utah

DATE: 11/9/2020	**Prepared by:** Whitney Treadway

Personnel on site, including Contractors:	CDM Smith – Whitney Treadway Holt Services – Jeff Jones (Driller) Holt Services – Andrew Mengle Holt Services – Alex Langdon
Visitors/Others:	

Weather	Sunny	Partly Cloudy	Overcast	Rain	***Snow***
Temperature	85+ º F	70 to 85º F	50 to 70 º F	32 to 50 º F	**To 32 º F**
Wind	***Still***	Moderate	High		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Terrasonic 150 mini-sonic drill rig • Skid Steer (Bobcat) • Rig Hauler • HNu PID

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

H&S tailgate was conducted at MW-30R well site.

Drilling:

MW-30R:
Trip in 6-inch casing to 250 feet.

Drilling was completed from 250 ft bgs to 295 ft bgs. Lithology was logged and soil was screened with PID. No laboratory samples were collected. Grab samples were collected for magnetic susceptibility screening. Drilling was completed using a 4-inch core barrel and 6-inch casing (currently at 290 ft bgs).

MW-37:
Reviewed utilities onsite with ELM and Jeff Jones. There is an abandoned, underground gas line near our proposed location, but based on measurements from ELM, our proposed location is still ok (2 feet to the east of sidewalk in planter strip).

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):
United Site Services delivered fencing today.

Rig had trouble starting up this morning due to cold weather. Crew had to take some this morning to troubleshoot before they got it working properly.

Projected Work – Near Term:

11/10/2020 – set and install dual nested wells at MW-30R

11/11/2020 – decontamination, clean-up and demobilize from MW-30R.

Other Activities/Remarks:

Photos:

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Salt Lake City, Utah

	Date: 11/9/2020 **Location:** MW-30R **Description:** Snowy weather onsite. 6-inch casing in foreground.
	Date: 11/9/2020 **Location:** MW-30R **Description:** Water-bearing clayey sand zone near 280 feet bgs.

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Date: 11/9/2020

Location: MW-30R

Description: Collecting soil sample in bags from 4-inch core barrel.

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700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 11/10/2020	**Prepared by:** Whitney Treadway

Personnel on site, including Contractors:	CDM Smith – Whitney Treadway CDM Smith – Emma Rott Holt Services – Jeff Jones (Driller) Holt Services – Andrew Mengle Holt Services – Alex Langdon Wasatch Env. – Anna Fiorni
Visitors/Others:	

Weather	Sunny	Partly Cloudy	Overcast	Rain	***Snow***
Temperature	85+ º F	70 to 85º F	50 to 70 º F	32 to 50 º F	**To 32 º F**
Wind	**Still**	Moderate	High		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Terrasonic 150 mini-sonic drill rig • Skid Steer (Bobcat) • Rig Hauler • HNu PID • Water level meter • Compressed gas for development

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

H&S tailgate was conducted at MW-30R well site.

Drilling: (Whitney Treadway and Holt crew)

MW-30R:
Well zones A and B were installed as follows:

Zone A:	2-inch SCH 40 blank PVC	0 – 240 ft bgs
	2-inch SCH 40 0.020 slot PVC screen	240 – 250 ft bgs
	Hydrated bentonite chip seal	8 – 237 ft bgs
	10/20 sand filter pack	237 – 252 ft bgs
Zone B:	2-inch SCH 40 blank PVC	0 – 280 ft bgs
	2-inch SCH 40 0.020 slot PVC screen	280 – 290 ft bgs
	Hydrated bentonite chip seal	252– 277 ft bgs
	10/20 sand filter pack	277 – 291 ft bgs

MW-37:
MP Environmental roll-off delivered.

Development: (Emma Rott and Anna Fiorni)
Air lifting was used to remove sediment and water from MW-26D and MW-26C.
Approximately 60 gallons of water was removed from MW-26D. Parameter stabilization was not reached (turbidity continued to decrease), however, the team purged 10x the well volume and saw visible decrease in turbidity.
Approximately 40 gallons of water was removed from MW-26C. The team will continue to develop at this location tomorrow.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):
The development team attempted to develop MW-26A using a stainless steel bailer. The team was unable to get the bailer past approximately 206' below top of casing. The team does not plan on returning to develop this interval.

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Salt Lake City, Utah

Projected Work – Near Term:

11/11/2020 – Drilling: decontamination, clean-up and demobilize from MW-30R. Development: return to MW-26 for development of the C and B intervals. Plan to develop MW-34A.

11/12/2020 – mobilize to MW-37 and begin drilling

Other Activities/Remarks:

Photos:

Date: 11/10/2020

Location: MW-30R

Description: Installation of 10/20 sand filter pack through 6-inch casing.

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Salt Lake City, Utah

	Date: 11/10/2020 **Location:** MW-30R **Description:** Installation of medium bentonite chips through 6-inch casing.
	Date: 11/10/2020 **Location:** MW-30R **Description:** Installation of 2-inch PVC well casing.

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Salt Lake City, Utah

Date: 11/10/2020

Location: MW-326C

Description: Development set-up with compressed gas and purge water collected in 55-gallon drums.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 11/11/2020	**Prepared by:** Whitney Treadway

Personnel on site, including Contractors:	CDM Smith – Whitney Treadway CDM Smith – Emma Rott Holt Services – Jeff Jones (Driller) Holt Services – Andrew Mengle Holt Services – Alex Langdon Wasatch Env. – Anna Fiorni Wasatch Env. – Kiel Keller Badger – Trevor Kindschy
Visitors/Others:	

Weather	Sunny	Partly Cloudy	Overcast	Rain	**Snow**
Temperature	85+ º F	70 to 85º F	50 to 70 º F	32 to 50 º F	**To 32 º F**
Wind	**Still**	Moderate	High		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Terrasonic 150 mini-sonic drill rig • Skid Steer (Bobcat) • JCB 550-170 forklift • Rig Hauler • HNu PID • Water level meter • Compressed gas for development

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

H&S tailgate was conducted at MW-30R well site and MW-37 with Badger.

Drilling: (Whitney Treadway, Kiel Keller, and Holt crew)

MW-30R:
Add pea gravel from 8 ft bgs to 2 ft bgs
Completed 12-inch traffic-rated flush-mount well box with concrete from 2 ft bgs.
8-inch casing, core barrels, and drill pipe decontaminated on decontamination pad.

MW-36:
Cleared to 7 ft bgs by vac truck (Kiel oversaw).
Steel plate placed on top of open hole.
Soil offloaded to containment area on VA campus.

MW-37:
Cleared to 7 ft bgs by vac truck (Kiel oversaw).
Mobilized rig, Bobcat, and fencing to site.
Soil offloaded to containment area on VA campus.

MW-38:
Cleared to 5.5 ft bgs by vac truck (Kiel oversaw).
Steel plate placed on top of open hole.
Soil offloaded to containment area on VA campus.

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Development: (Emma Rott and Anna Fiorni)

MW-26C:
Air lifting was used to remove sediment and water. Approximately 60 gallons total of water was removed. Decreasing turbidity values were observed.

MW-26B:
Development using air lifting was attempted, however, there was not enough water column available to produce the lift needed for water to surface. The team then attempted to develop using the ZIST pump (with the filter removed); but they were unable to produce water through this method. Lastly, the team attempted to use a stainless-steel bailer, but was unable to get the bailer past approximately 114 ft below top of casing.

MW-34A:
Attempted development using a stainless-steel bailer but was unable to get the bailer past approximately 130' below top of casing.

MW-34B, MW-34C, and MW-34D:
Transducers were installed at all three zones.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):
See issues with development above.

Second forklift was delivered onsite for Holt crew.

There were three VA vehicles blocking the entrance to the containment area onsite for the Badger pre-clearing crew. We were able to find someone who found the keys and was able move the three vehicles.

Projected Work – Near Term:

11/12/2020 – begin drilling at MW-37, begin development at MW-30RA and MW-30RB

Other Activities/Remarks:

Photos:

Date: 11/11/2020

Location: MW-37

Description: Rig, bobcat, and drill rods mobilized at MW-37 with fencing.

Daily Quality Control Report
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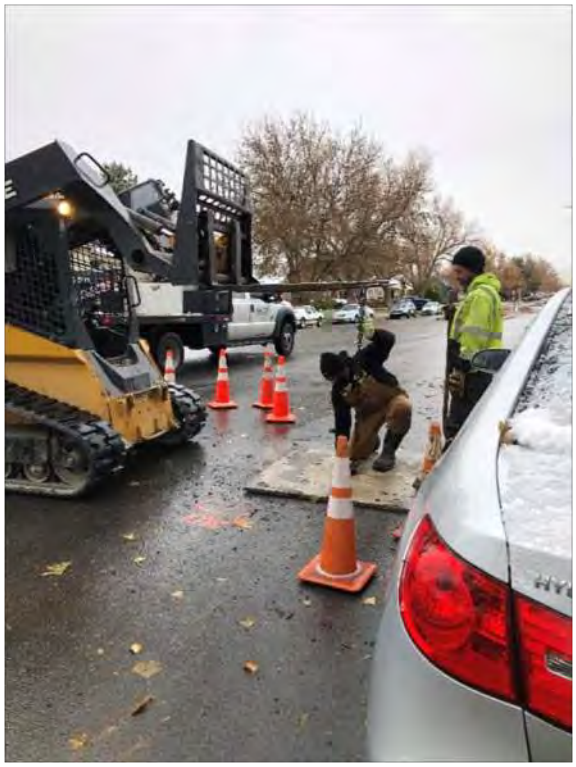
Salt Lake City, Utah

	Date: 11/11/2020 **Location:** MW-30R/laydown area **Description:** Decontamination of sonic casing and drill rods.
	**Date: 11/11/2020** **Location:** MW-38 **Description:** Installation of steel plate at MW-38 after pre-clearing.

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Date: 11/10/2020

Location: MW-30R

Description: Installation of concrete at well box.

Date: 11/10/2020

Location: MW-34B

Description: IntelliPump attachment added on to the ZIST pump to house transducer.

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Salt Lake City, Utah

DATE: 11/12/2020	**Prepared by:** Whitney Treadway

Personnel on site, including Contractors:	CDM Smith – Whitney Treadway CDM Smith – Joe Miller CDM Smith – Emma Rott Holt Services – Jeff Jones (Driller) Holt Services – Andrew Mengle Holt Services – Alex Langdon Wasatch Env. – Anna Fiorni
Visitors/Others:	

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	To 32 º F
Wind	**Still**	Moderate	High		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Terrasonic 150 mini-sonic drill rig • Skid Steer (Bobcat) • JCB 550-170 forklift • Rig Hauler • HNu PID • Water level meter • Compressed gas for development

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

H&S tailgate was conducted at laydown area on VA campus.

Drilling: (Whitney Treadway, Joe Miller, and Holt crew)

MW-37:
Drilled to 70 ft bgs using 7-inch core barrel and 8-inch sonic casing (to 70 ft bgs).
One groundwater sample was collected at 30 ft bgs using a bailer in a push-ahead sampler.
Two other samples were attempted: one at 20 ft bgs and one at 70 ft bgs. Both were muddy, but no water. Casing was pushed to 70 ft bgs and borehole was cleaned out at end of day. Another attempt at collecting groundwater sample at 70 ft bgs will occur tomorrow morning. Samples were labeled, bagged, and on ice.
Lithology was logged, and soil was screened with a PID and magnetic susceptibly meter. Lithology included sandy clay with wet sand lenses, and a hard clay confining layer at 45 ft bgs to approximately 54 ft bgs.
Site was contained in fencing and rolloff locked and end of day.

Development: (Emma Rott and Anna Fiorni)

MW-30RB:
Began development at MW-30RB. The team encountered issues with removing sediment and water with a bailer and the Grundfos pump. The team plans to continue troubleshooting these issues tomorrow.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):
See issues with development above.

Due to the soft, flowing nature of the lithology, in some cases the soil sample in the core barrel was lost back down the borehole. The drill crew used a "flapper" drill bit to contain sample in core barrel, and when possible, retrieve unrecovered interval.

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Salt Lake City, Utah

Projected Work – Near Term:

11/13/2020 – install MW-37, demobilize from MW-37 and mobilize to MW-38, continue development at MW-30RA and MW-30RB.

Other Activities/Remarks:

Photos:

Date: 11/12/2020

Location: MW-37

Description: Push-ahead sampler screen.

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Salt Lake City, Utah

	Date: 11/12/2020 **Location:** MW-37 **Description:** Hard clay layer at 45 ft bgs.
	Date: 11/12/2020 **Location:** MW-37 **Description:** Collecting soil from core barrel in plastic bags.

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Salt Lake City, Utah

Date: 11/12/2020

Location: MW-37

Description: Bailer for groundwater sampling lowered down into drill pipe and push-ahead sampler.

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700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 11/13/2020	**Prepared by:** Joe Miller

Personnel on site, including Contractors:	CDM Smith – Joe Miller CDM Smith – Emma Rott Holt Services – Jeff Jones (Driller) Holt Services – Andrew Mengle Holt Services – Alex Langdon Wasatch Env. – Anna Fiorni
Visitors/Others:	MP Environmental

Weather	Sunny	**Partly Cloudy**	**Overcast**	**Rain**	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	To 32 º F
Wind	Still	**Moderate**	**High**		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Terrasonic 150 mini-sonic drill rig • Skid Steer (Bobcat) • JCB 550-170 forklift • Rig Hauler • HNu PID • Water level meter • Compressed gas for development

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

H&S tailgate was conducted at laydown area on VA campus.

Drilling: (Joe Miller, and Holt crew)

MW-37:
Depth to water was in tagged at 50.96' with 8" sonic casing to 70' bgs. A groundwater sample was collected at the 70' bgs interval.

The MW-37D zone was installed with 2" PVC 0.020 slot screen from 60-70' bgs and a sand pack from 57-70' bgs.
The MW-37S zone was installed with 2" PVC 0.020 slot screen from 25-35' bgs and a sand pack from 22-39' bgs.
A soil vapor probe was installed on the MW-37S casing at 8' bgs with a sand pack from 6.5-9' bgs.

MW-38:
The drill rig and support equipment was mobilized to the MW-38 location. MP Environmental relocated the rolloff from MW-37 to MW-38. MP also staged a roll off near the MW-36 location.

Development: (Emma Rott and Anna Fiorni)
Began development at MW-30RA. The team attempted to use the Grundfos pump and a Solinst pump to remove sediment from the well. Both pumps were unable to due to filter and valve clogging in the pumps.

Installed tamper proof bolts at MW-17D.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):
See issues with development above.

Projected Work – Near Term:

11/14/2020 – Drill MW-38. Development crew will mobilize from the site.

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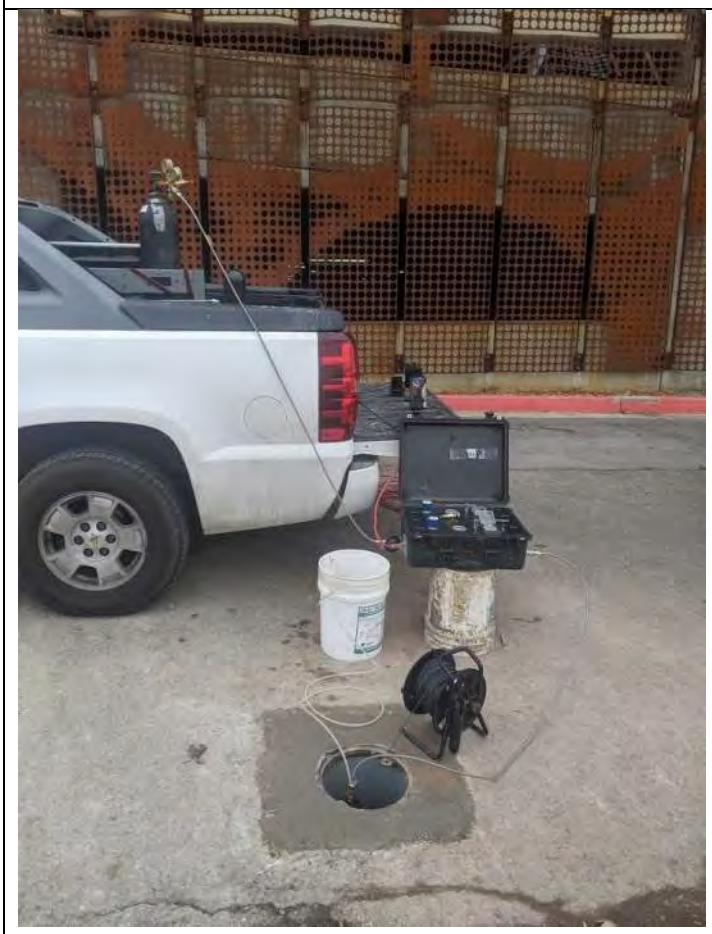
Salt Lake City, Utah

Other Activities/Remarks:

Photos:

	Date: 11/13/2020 **Location:** MW-37 **Description:** Holt installing bentonite between MW-37D and MW-37S zones.
	Date: 11/13/2020 **Location:** MW-37 **Description:** Wells installed prior to installing surface completion.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 11/13/2020 **Location:** MW-38 **Description:** MP Environmental delivering roll off to MW-38 location.
	**Date: 11/13/2020** **Location:** MW-30R **Description:** Bladder pump installation and purge attempt at MW-30RA.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 11/14/2020	**Prepared by:** Joe Miller

Personnel on site, including Contractors:	CDM Smith – Joe Miller Holt Services – Jeff Jones (Driller) Holt Services – Andrew Mengle Holt Services – Alex Langdon
Visitors/Others:	None

Weather	Sunny	Partly Cloudy	**Overcast**	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	To 32 º F
Wind	Still	**Moderate**	High		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Terrasonic 150 mini-sonic drill rig • Skid Steer (Bobcat) • JCB 550-170 forklift • Rig Hauler • HNu PID • Water level meter

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

H&S tailgate was conducted at laydown area on VA campus.

Drilling: (Joe Miller and Holt crew)

The MW-38 boring was advanced to 80 feet bgs with the 7-inch core barrel. The 8-inch sonic casing is installed to 70 feet bgs. The soil cores were screened and logged. There were no elevated PID readings and no samples were collected. With the boring drilled and cased to 70 feet bgs, the DTW was 27.23 feet bgs.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):
None

Projected Work – Near Term:

11/15/2020 – Rest Day

11/16/2020 – Install MW-38; mob to MW-36

Other Activities/Remarks:

None

Photos:

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 11/14/2020 **Location:** MW-38 **Description:** Holt setting up work zone at MW-38.
	Date: 11/14/2020 **Location:** MW-38 **Description:** Saturated soil cuttings at 30-32 feet bgs interval.

Daily Quality Control Report
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Salt Lake City, Utah

	Date: 11/14/2020 **Location:** MW-38 **Description:** Soil cuttings from 46-48 feet bgs. Dry lean clay, very stiff, trace fine gravel.
	Date: 11/14/2020 **Location:** MW-38 **Description:** Soil cuttings from 60-62 feet bgs. Wet gravel with sand and clay.

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700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 11/16/2020	**Prepared by:** Joe Miller

Personnel on site, including Contractors:	CDM Smith – Joe Miller Holt Services – Jeff Jones (Driller) Holt Services – Andrew Mengle Holt Services – Alex Langdon
Visitors/Others:	USACE – Greg Hattan

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	**50 to 70 º F**	32 to 50 º F	To 32 º F
Wind	**Still**	Moderate	High		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Terrasonic 150 mini-sonic drill rig • Skid Steer (Bobcat) • JCB 550-170 forklift • Rig Hauler • HNu PID • Water level meter

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

H&S tailgate was conducted at laydown area on VA campus.

Drilling:

The MW-38 S/D wells were installed in the boring. MW-38D was installed with 0.020 slot screen from 60-70 feet bgs. The sand pack was installed from 57-71 feet bgs.

MW-38S was installed with 0.020 slot screen from 27-37 feet bgs. The filter pack was installed from 25-39 feet bgs. A soil vapor probe was installed at 8 feet bgs on the MW-38S casing.

Holt mobilized the drill rig and bobcat to the MW-36 boring location.

The 8" casing and drill rods were deconned back at the VA.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):
None

Projected Work – Near Term:

11/17/2020 – Drill MW-36 boring

Other Activities/Remarks:

Greg Hattan verified one of the piezometer replacement locations.

Photos:

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 11/16/2020 **Location:** MW-38 **Description:** Holt crew installing MW-38S
	Date: 11/16/2020 **Location:** MW-36 **Description:** Work zone setup at MW-36 location.

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Date: 11/16/2020

Location: MW-36

Description: Precleared boring location after road plate was removed.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 11/17/2020	**Prepared by:** Joe Miller

Personnel on site, including Contractors:	CDM Smith – Joe Miller Holt Services – Jeff Jones (Driller) Holt Services – Andrew Mengle Holt Services – Alex Langdon
Visitors/Others:	USACE – Greg Hattan

Weather	Sunny	**Partly Cloudy**	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	**50 to 70 º F**	32 to 50 º F	To 32 º F
Wind	Still	**Moderate**	High		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Terrasonic 150 mini-sonic drill rig • Skid Steer (Bobcat) • JCB 550-170 forklift • Rig Hauler • HNu PID • Water level meter

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

H&S tailgate was conducted at laydown area on VA campus.

Drilling:

MW-36 boring was drilled to 110 feet bgs. The soil cores were screened and logged. No soil samples were collected. Groundwater was encountered during the 30-40 feet run. The soil below 52 feet bgs was mostly silt and clay and did not have a good water bearing zone. Discussion with the VA and USACE decided to install a 5' screen from 47-52 feet bgs.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):
None

Projected Work – Near Term:

11/18/2020 – Install MW-36 well, mobilize equipment back to the VA laydown.

Other Activities/Remarks:

Photos:

Daily Quality Control Report
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	Date: 11/17/2020 **Location:** MW-36 **Description:** Soil core from 50-52.5 feet bgs was a saturated gravel with sand.
	Date: 11/17/2020 **Location:** MW-36 **Description:** Soil core from 102-104 feet bgs was laminated clayey silt.

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Date: 11/17/2020

Location: MW-36

Description: Holt extracting soil core from sonic core barrel.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 11/18/2020	**Prepared by:** Joe Miller

Personnel on site, including Contractors:	CDM Smith – Joe Miller Holt Services – Jeff Jones (Driller) Holt Services – Andrew Mengle Holt Services – Alex Langdon
Visitors/Others:	USACE – Greg Hattan

Weather	Sunny	Partly Cloudy	**Overcast**	Rain	Snow
Temperature	85+ º F	70 to 85º F	**50 to 70 º F**	32 to 50 º F	To 32 º F
Wind	Still	Moderate	**High**		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Terrasonic 150 mini-sonic drill rig • Skid Steer (Bobcat) • JCB 550-170 forklift • Rig Hauler • HNu PID • Water level meter

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

H&S tailgate was conducted at laydown area on VA campus.

Drilling:

The MW-36 well was installed with 0.020 slot screen from 47-52 feet bgs. The sand filter pack was installed from 44-54 feet bgs. Holt mobilized equipment back to the VA laydown area.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

Holt planned to complete MW-38 and MW-36 surface completions in the road, however due to ROW concrete requirements they could not schedule a delivery this week. The wells are secured with road 5x5' steel road plates and cones indicating the hazard. The concrete truck has been scheduled for when Holt returns from Thanksgiving.

Projected Work – Near Term:

11/19/2020 – Develop MW-30R A/B with 5' PVC bailer; decon drill steel

Other Activities/Remarks:

Photos:

Daily Quality Control Report
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	Date: 11/18/2020 **Location:** MW-36 **Description:** Holt preparing to install 2" PVC at MW-36.
	Date: 11/18/2020 **Location:** MW-36 **Description:** Holt towered down rig and preparing to move it to install the road plate.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 11/19/2020	**Prepared by:** Joe Miller

Personnel on site, including Contractors:	CDM Smith – Joe Miller Holt Services – Jeff Jones (Driller) Holt Services – Andrew Mengle Holt Services – Alex Langdon
Visitors/Others:	

Weather	Sunny	**Partly Cloudy**	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	To 32 º F
Wind	Still	Moderate	**High**		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Terrasonic 150 mini-sonic drill rig • Skid Steer (Bobcat) • JCB 550-170 forklift • Rig Hauler • HNu PID • Water level meter

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

H&S tailgate was conducted at laydown area on VA campus.

Development:
Holt used a 5-foot weighted PVC bailer to develop MW-30RA. Prior to bailing the depth to bottom was 250.56 feet BTOC. After bailing ~16 gallons, the depth to bottom was 251.23 feet BTOC. Bailing removed 0.67 feet of accumulated sediment.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):
Holt had drill issues turning the spool to lift the bailer. Wasatch Environmental provided a generator that helped run the corded drill to lift the bailer.

Projected Work – Near Term:

11/20/2020 – Holt crew mob home for days off; MP stage roll off bins at VA campus laydown.

Other Activities/Remarks:

Holt topped of the grout at MW-30 A and B abandonments.

Photos:

Daily Quality Control Report
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Date: 11/19/2020

Location: MW-30R

Description: Holt spooling cable to lift the PVC bailer.

Daily Quality Control Report
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Salt Lake City, Utah

Date: 11/19/2020

Location: MW-30R

Description: Sediment filled water removed by bailer.

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700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 11/20/2020	**Prepared by:** Joe Miller

Personnel on site, including Contractors:	CDM Smith – Joe Miller
Visitors/Others:	MP Environmental

Weather	Sunny	**Partly Cloudy**	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	To 32 º F
Wind	Still	Moderate	**High**		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Terrasonic 150 mini-sonic drill rig • Skid Steer (Bobcat) • JCB 550-170 forklift • Rig Hauler • HNu PID • Water level meter

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

H&S tailgate was conducted at laydown area on VA campus.

No Drilling activities occurred on 11/20/2020.

MP Environmental relocated roll offs from MW-30R, MW-36 and MW-38 S/D locations to the VA campus laydown area for staging during drilling break.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

Holt had drill issues turning the spool to lift the bailer. Wasatch Environmental provided a generator that helped run the corded drill to lift the bailer.

Projected Work – Near Term:

11/30/2020 – Holt crew return to Salt Lake.

12/1/2020 – Develop MW-30RB zone and set up drill rig at MW-13 additional well; Install flush mount Augustyn vaults at MW-36 and MW-38 S/D.

Other Activities/Remarks:

Photos:

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	Date: 11/20/2020 **Location:** MW-38 S/D **Description:** MP Environmental picking up Roll off bin.
	Date: 11/20/2020 **Location:** VA Laydown Area **Description:** MP Environmental staging bin from MW-36 at laydown area.

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Salt Lake City, Utah

DATE: 11/30/2020	**Prepared by:** Joe Miller

Personnel on site, including Contractors:	Wasatch Environmental – Kevin Murphy Holt Services – Jeff Jones (Driller) Holt Services – Andrew Mengle Holt Services – Alex Langdon
Visitors/Others:	Ready Made Concrete

Weather	Sunny	**Partly Cloudy**	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	To 32 º F
Wind	Still	Moderate	**High**		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Terrasonic 150 mini-sonic drill rig • Skid Steer (Bobcat) • JCB 550-170 forklift • Rig Hauler • HNu PID • Water level meter

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

H&S tailgate was conducted at laydown area on VA campus.

Ready Made Concrete arrived and Holt installed the Augustyn flush mount vaults at MW-36 and MW-38 boring locations.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

Projected Work – Near Term:

12/1/2020 – Develop MW-30RB with a bailer, develop MW-30RA with a development pump, complete geophysical survey at MW-13L, and mobilize drilling equipment to MW-13L.

Other Activities/Remarks:

Photos:

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	Date: 11/30/2020 **Location:** MW-36 **Description:** Augustyn vault installed at MW-36
	Date: 11/30/2020 **Location:** MW-38 **Description:** Augustyn Vault installed at MW-38 location.

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700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 12/1/2020	**Prepared by:** Joe Miller

Personnel on site, including Contractors:	CDM Smith – Joe Miller CDM Smith – Tea Vrtlar Wasatch Environmental – Kevin Murphy Holt Services – Jeff Jones (Driller) Holt Services – Andrew Mengle Holt Services – Alex Langdon
Visitors/Others:	MP Environmental GPRS – Geophysical survey

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	To 32 º F
Wind	**Still**	Moderate	High		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Terrasonic 150 mini-sonic drill rig • Skid Steer (Bobcat) • JCB 550-170 forklift • Rig Hauler • HNu PID (x2) • Water level meter

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

H&S tailgate was conducted at laydown area on VA campus.

Development:
The Holt crew used a bailer to develop MW-30RB. Approximately 25 gallons of water was bailed from MW-30RB.
CDM Smith and Wasatch developed MW-30RA with a Geotech double valve pump. Approximately 12 gallons was purged.

Drilling at MW-13L:
GPRS performed a geophysical locate at MW-13L. They identified a potential irrigation line south of the proposed boring area. MP Environmental relocated one of the roll-off bins from the VA to the boring location. Holt set up the drill rig, fencing and traffic control at the MW-13L drill location.

The MW-13L boring was hand augured to 5 feet bgs.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

Upon arrival at the IDW area connex there was no electricity. The breakers were checked and had not been tripped. Maintenance shop personnel were contacted, and they had flipped the breaker in the shop across from the IDW area.

Projected Work – Near Term:

12/2/2020 – Develop MW-30RB zone with Geotech double valve pump and install dedicated pumps at MW-30RA/B

12/2/2020 – Drill MW-13L

Other Activities/Remarks:

None.

Photos:

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	Date: 12/1/2020 **Location:** MW-13L **Description:** GPRS identified potential irrigation lines and estimated less than 1 foot bgs.
	Date: 12/1/2020 **Location:** MW-30RB **Description:** Silty water from bailer development at MW-30RB.

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Date: 12/1/2020

Location: MW-13L

Description: Holt hand digging MW-13L to 5 feet bgs.

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Salt Lake City, Utah

DATE: 12/2/2020	**Prepared by:** Joe Miller

Personnel on site, including Contractors:	CDM Smith – Joe Miller CDM Smith – Tea Vrtlar Wasatch Environmental – Kevin Murphy Holt Services – Jeff Jones (Driller) Holt Services – Andrew Mengle Holt Services – Alex Langdon
Visitors/Others:	

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	**To 32 º F**
Wind	Still	**Moderate**	High		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Terrasonic 150 mini-sonic drill rig • Skid Steer (Bobcat) • JCB 550-170 forklift • Rig Hauler • HNu PID (x2) • Water level meter • YSI Multiparameter meter • Apera instruments pH60 pH meter • Geotech Reclaimer pump • QED Model 3020 Driver Compressor • Solinst bladder pump

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

H&S tailgate was conducted at laydown area on VA campus.

Development:
CDM Smith and Wasatch developed MW-30RB with the Geotech Reclaimer double valve pump and removed approximately 37 gallons of water. The dedicated Solinst bladder pump was deployed at MW-30RA.

Drilling at MW-13L:
The MW-13L boring was advanced to 150 feet bgs. The 6-inch sonic casing has also been advanced to the bottom of the borehole. The soil cores were screened and logged no samples were collected. Groundwater was first encountered about 23 feet bgs. A clay confining unit was encountered about 104 feet bgs. There were wet sand stringers below the confining unit, but no distinct layer. All PID readings were less than 5 ppm.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

No electricity at connex after attempting to plug in a single heater. The breakers were checked and had not been tripped. Maintenance shop personnel will be attempted to be contacted again tomorrow, they need to flip the breaker again in the shop across from the IDW area.

Projected Work – Near Term:

12/3/2020 – Develop MW-36, MW-38S and potentially MW-38D zone by bailing and pumping with Geotech Reclaimer pump.

12/3/2020 – Drill MW-13L to 160 feet. Discuss well design and begin installation at MW-13L.

Other Activities/Remarks:

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None.

Photos:

	Date: 12/2/2020 **Location:** MW-13L **Description:** Holt work zone setup at MW-13L. Preparing to resume drilling.
	Date: 12/2/2020 **Location:** MW-13L **Description:** Soil cuttings from 102.5-105 feet bgs. Encountered clay confining layer.

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Date: 12/2/2020

Location: MW-13L

Description: Soil cuttings from 135-137 feet bgs. Moist to we gravelly sand stringer at ~136 feet bgs.

Date: 12/2/2020

Location: MW-30RB

Description: Pump development discharge water prior to development (final turbidity reading after purging additional 37 gallons was <20NTU).

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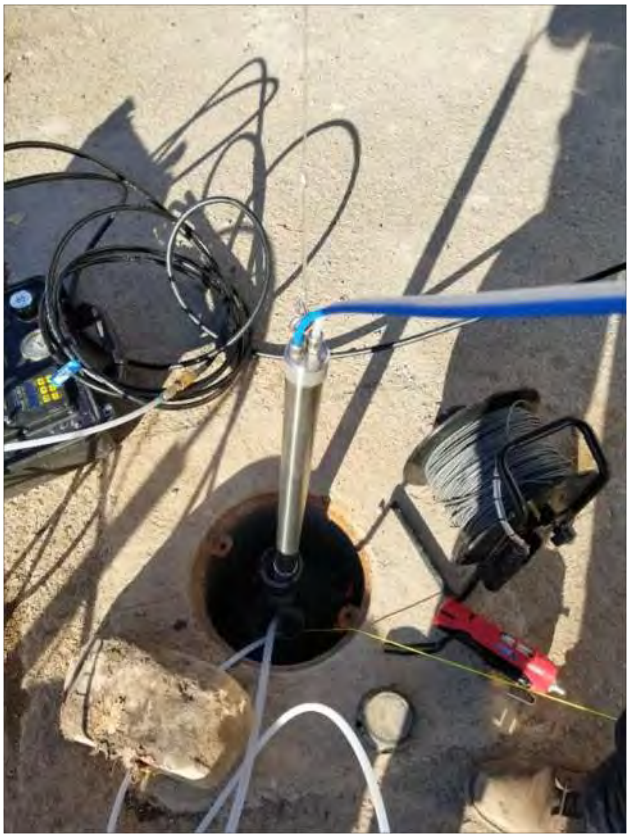
Salt Lake City, Utah

	**Date: 12/2/2020** **Location:** MW-30RA **Description:** Deployment of dedicated bladder pump at MW-30RA.
	Date: 12/2/2020 **Location:** MW-30RA **Description:** Completed deployment of dedicated bladder pump at MW-30RA.

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700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 12/3/2020	**Prepared by:** Joe Miller and Tea Vrtlar

Personnel on site, including Contractors:	CDM Smith – Joe Miller CDM Smith – Tea Vrtlar Wasatch Environmental – Kevin Murphy Holt Services – Jeff Jones (Driller) Holt Services – Andrew Mengle Holt Services – Alex Langdon
Visitors/Others:	

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	**To 32 º F**
Wind	Still	**Moderate**	High		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Terrasonic 150 mini-sonic drill rig • Skid Steer (Bobcat) • JCB 550-170 forklift • Rig Hauler • HNu PID (x2) • Water level meter • YSI Multiparameter meter • Apera instruments pH60 pH meter • Geotech Reclaimer pump • QED Model 3020 Driver Compressor • Solinst bladder pump

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

H&S tailgate was conducted at laydown area on VA campus.

Development:
CDM Smith and Wasatch developed MW-36: they surged with the bailer, removed approximately 25 gallons by bailing, and removed approximately 21 gallons by pumping. The dedicated Solinst bladder pump was deployed at MW-30RB. Locks were added to MW-30RA and MW-36.

MW-13L:
The MW-13L boring was advanced to 160 feet bgs. The zone from 156-160 feet bgs was a saturated sandy gravel. Following discussion with the VA, the 2-inch PVC well was set with 10 feet of 0.020 slot screen from 150-160 feet bgs. The sand pack was installed from 147-160 feet bgs. Holt completed backfilling and the surface completion at MW-13L. The drill rig and drilling equipment was mobilized back to the VA laydown area. Holt decontaminated the drill steel used for MW-13L.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

No electricity at connex. The breakers behind the connex were checked and had not been tripped. Maintenance shop personnel were contacted. The connex breaker in the shop across from the IDW area was checked and had not been tripped, but the breaker was flipped off and on again to try to resolve the issue. The same procedure was repeated at the breakers behind the connex. Still unable to get electricity to connex.

Casings for MW-30RA and MW-30RB are too close to each other where Solinst well cap assembly couldn't be placed on MW-30RB. No lock was placed on MW-30RB since the lid couldn't be closed.

Projected Work – Near Term:

12/4/2020 – Develop MW-38S/D. Deploy dedicated Solinst bladder pump at MW-36 and potentially MW-38S and D.

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12/4/2020 – Move fencing from MW-13L location back to VA; load equipment and mobilize home.

Other Activities/Remarks:

None.

Photos:

	Date: 12/3/2020 **Location:** MW-13L **Description:** Soil core from MW-13L from 157-160 feet bgs. Saturated sandy gravel layer.
	Date: 12/3/2020 **Location:** MW-13L **Description:** Holt preparing to install 2" PVC at MW-13L.

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	Date: 12/3/2020 **Location:** MW-36 **Description:** Pump discharge water during development.
	Date: 12/3/2020 **Location:** MW-36 **Description:** Pump discharge water after development.

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Date: 12/3/2020

Location: MW-30RB

Description: Dedicated pump deployment at MW-30RB complete.

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700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 12/4/2020	**Prepared by:** Joe Miller and Tea Vrtlar

Personnel on site, including Contractors:	CDM Smith – Joe Miller CDM Smith – Tea Vrtlar Wasatch Environmental – Kevin Murphy Holt Services – Jeff Jones (Driller) Holt Services – Andrew Mengle Holt Services – Alex Langdon
Visitors/Others:	

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	**To 32 º F**
Wind	Still	**Moderate**	High		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Terrasonic 150 mini-sonic drill rig • Skid Steer (Bobcat) • JCB 550-170 forklift • Rig Hauler • HNu PID (x2) • Water level meter • YSI Multiparameter meter • Apera instruments pH60 pH meter • Geotech Reclaimer pump • QED Model 3020 Driver Compressor • Solinst bladder pump

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

H&S tailgate was conducted at laydown area on VA campus.

Development:
CDM Smith and Wasatch developed MW-38S by bailing approximately 10 gallons and pumping (with the Geotech Reclaimer pump) approximately 36 gallons. At MW-38D, 18 gallons were bailed, and 40 gallons were pumped, however, well development was not complete and will continue tomorrow. The dedicated Solinst bladder pump was installed at MW-38S

Drilling Demob:
Holt picked up fencing and remaining equipment from MW-13L. They loaded all their equipment and mobilized from site.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

VA Electricians informed us that the connex boxes have been tripping the breaker at the main circuit. They reset the breaker and asked us to reduce our load on the circuits. All equipment has been unplugged and only minimal equipment will be allowed to be plugged in at the connex boxes (eg printer/copier, battery chargers).

Projected Work – Near Term:

12/5/2020 – Complete development at MW-38D. Develop MW-37S and, if time permits develop MW-37D and deploy dedicated Solinst bladder pumps at MW-36, MW-38S and MW-38D.

Other Activities/Remarks:

None.

Photos:

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	Date: 12/4/2020 **Location:** MW-13L **Description:** SMW-13L pad near the MW-13 S/D pads. The well was offset due to underground utilities identified during the geophysical survey.
	Date: 12/4/2020 **Location:** VA laydown area **Description:** Holt has loaded casing, the drill rig and bobcat for demobilization.

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Salt Lake City, Utah

	Date: 12/4/2020 **Location:** MW-38S **Description:** Pump discharge water during development.
	Date: 12/4/2020 **Location:** MW-38S **Description:** Pump discharge water after development.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 12/5/2020	**Prepared by:** Joe Miller and Tea Vrtlar

Personnel on site, including Contractors:	CDM Smith – Joe Miller CDM Smith – Tea Vrtlar Wasatch Environmental – Kevin Murphy
Visitors/Others:	

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	**To 32 º F**
Wind	Still	**Moderate**	High		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• HNu PID (x2) • Water level meter • YSI Multiparameter meter • Apera instruments pH60 pH meter • Geotech Reclaimer pump • QED Model 3020 Driver Compressor • Solinst bladder pump

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

H&S tailgate was conducted at connex.

Development:
The development at MW-38D was completed; approximately 116 gallons were pumped from the well. CDM Smith and Wasatch developed MW-37S by bailing approximately 16 gallons and pumping approximately 48 gallons. Development was initiated at MW-37D; 20 gallons were bailed. The dedicated Solinst bladder pump was deployed at MW-36. Locks were placed on MW-36 and MW-38S/D.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

None.

Projected Work – Near Term:

12/6/2020 –Complete development at MW-37D, and initiate development at MW-13L. If time permits, deploy dedicated Solinst bladder pumps at MW-38S/D.

Other Activities/Remarks:

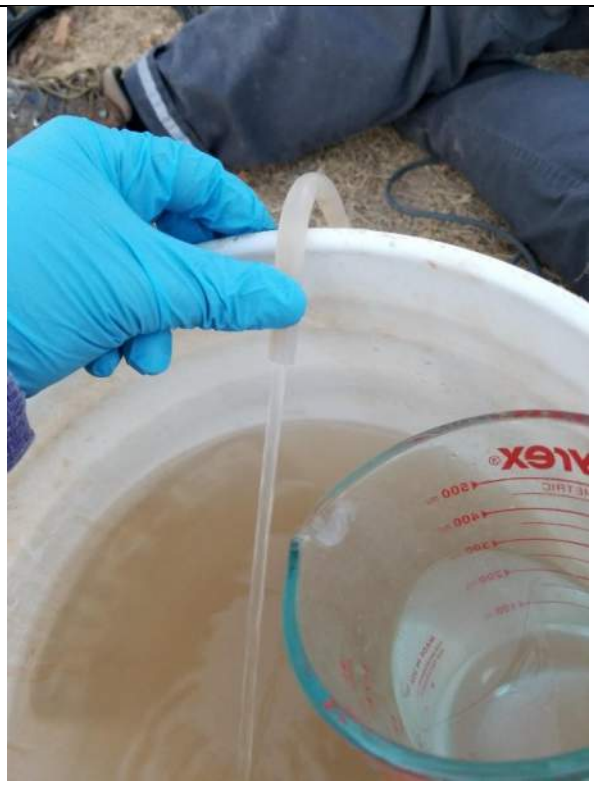
None.

Photos:

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 12/5/2020 **Location:** MW-37S and MW-37D **Description**: MW-37S (right) and MW-37D (left) wells.
	Date: 12/5/2020 **Location:** MW-37S **Description:** Pump discharge water prior to development.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	**Date: 12/5/2020** **Location:** MW-37S **Description:** Pump discharge water after development.
	Date: 12/5/2020 **Location:** MW-36 **Description:** Dedicated pump deployment

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 12/6/2020	**Prepared by:** Joe Miller and Tea Vrtlar

Personnel on site, including Contractors:	CDM Smith – Joe Miller CDM Smith – Tea Vrtlar
Visitors/Others:	

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	**To 32 º F**
Wind	Still	**Moderate**	High		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• HNu PID • Water level meter • YSI Multiparameter meter • Hach 2100Q turbiditimeter • Geotech Reclaimer pump • QED Model 3020 Driver Compressor

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

H&S tailgate was conducted at connex.

Development:
CDM Smith completed development of MW-37D by pumping approximately 48 gallons. Development was initiated at MW-13L by bailing approximately 8 gallons and pumping approximately 17 gallons. The development was paused due to lack of sunlight and will be continued tomorrow.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):
None

Projected Work – Near Term:

Development:
12/7/2020 – Complete development at MW-13L. Initiate development of MW-34A or MW-26B with Waterra pump. If time permits, deploy dedicated Solinst bladder pumps at MW-37S/D and MW-38S/D.

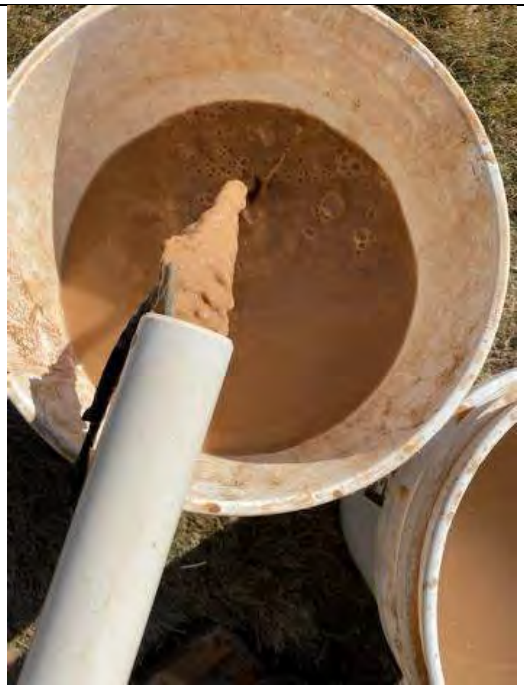
Groundwater Sampling:
12/7/2020 – Complete synoptic water level measurements. Obtain/renew all badges for groundwater sampling team. Confirm receipt of all groundwater sampling equipment.

Other Activities/Remarks:

None.

Photos:

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 12/6/2020 **Location:** MW-37D **Description**: Development of MW-37D.
	**Date: 12/6/2020** **Location:** MW-13L **Description:** Bailing of MW-13L.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Date: 12/6/2020

Location: MW-13L

Description: Development of MW-13L.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 12/7/2020	**Prepared by:** Ben Carreon

Personnel on site, including Contractors:	CDM Smith – Ben Carreon, Maria Day, Tea Vrtlar, Emma Rott, Joe Miller, Iona Campbell, Connor Kelley Wasatch – Kevin Murphy
Visitors/Others:	None

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	**0 To 32 º F**
Wind	**Still**	Moderate	High		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Development equipment • Water level and low-flow groundwater sampling equipment

Description of Field Activities – including samples/data collected, etc:

- A H&S tailgate was conducted at the IDW yard area.
- Equipment was calibrated.
- Synoptic Water Level Event
    - All water levels were completed except at monitoring wells: MW-08A/B/C, MW-14D, MW-17S, MW-28, MW-29 A/B/C, and MW-32A/B/C. These locations will be completed 12/8/20.
- Groundwater Sampling
    - No groundwater samples were collected.
- Development
    - MW-13L
        - Prior to development, the total depth at MW-13L was 151.06' below top of casing; anticipated depth should be 160' below top of casing. Eight gallons bailed and 17 gallons were pumped on 12/6/20. Depth to bottom was measured at 152.1' below top of casing. Today (12/7/20), surging and pumping with the Geotech reclaimer pump removed approximately 100 gallons and depth to water at the end of the day was 154.15' below top of casing. Depth to bottom will be measured tomorrow (12/8/20), at that time we will assess how to move forward with further development and sampling during this event.
    - MW-34A
        - Development was initiated at MW-34A using the Waterra pump, and 15 gallons were removed. At the end of the day turbidity was still high; development will continue tomorrow.
    - MW-38S/D
        - Dedicated pumps were deployed.
- Samples collected:
    - IDW15-GW120720 – Poly water tank
    - IDW16-GW120720 – Drum with sediment water and hydraulic fluid from phase I of investigation
- Samples to be collected tomorrow:
    - 2x IDW soil samples from remaining roll off bins.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

- MP10H controller solenoid was sticking until the temperature was above 35F. All controllers will be kept in the hotel rooms to prevent any moisture build up and reduce sticking at low temperatures.
- Development at MW-13L (see above).
- The teams were short one water level meter due to a shipping issue with Field Environmental. Everything else shipped for the groundwater sampling event was accounted for except 50' of silicone and a regulator. The missing equipment and supplies are expected to arrive 12/7/20.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

- Salt Lake County has a mandatory mask mandate in effect since Saturday, June 27. Masks are required in public.

Projected Work – Near Term:

- One team will continue development of MW-34A and will begin development of MW-26B. Following development, pumps will be deployed at MW-37S/D (time permitting).
- One team will complete the synoptic water level event and then begin sampling.
- Two teams will begin groundwater sampling.

Other Activities/Remarks:

Photos:

	Date: 12/7/2020 **Location:** MW-06 **Description:** Measuring water level
	Date: 12/7/2020 **Location:** MW-02 **Description:** Stockpile of salt/gravel near well

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 12/8/2020	**Prepared by:** Ben Carreon

Personnel on site, including Contractors:	CDM Smith – Ben Carreon, Maria Day, Tea Vrtlar, Emma Rott, Joe Miller, Iona Campbell, Connor Kelley Wasatch – Kevin Murphy
Visitors/Others:	None

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	**0 To 32 º F**
Wind	**Still**	Moderate	High		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Development equipment • Water level and low-flow groundwater sampling equipment

Description of Field Activities – including samples/data collected, etc:

- A H&S tailgate was conducted at the IDW yard area.
- Equipment was calibrated.
- Synoptic Water Level Event
    - The remaining water levels were measured.
- Groundwater Sampling
    - Groundwater samples collected:
        - MW-05R (MW05R-GW120820 and FD05-GW120820)
            - For the following parameters:
                - VOCs
                - Geochemistry
                    - Metals
                    - Dissolved gases
                    - Sulfate, chloride
                    - Nitrate + nitrite (total N)
                    - TOC
                    - Alkalinity
        - MW-24 (MW24-GW120820)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-27 (MW27-GW120820)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-28 (MW28-GW120820)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-30RA (MW30RA-GW120820)
            - For the following parameters:
                - VOCs
                - 1,4-Dioxane

        - Geochemistry
    - MW-30RB (MW30RB-GW120820)
        - For the following parameters:
            - VOCs
            - 1,4-Dioxane
            - Geochemistry
  - No samples were shipped to EMAX Labs.
- Development
  - MW-13L
    - DTB was measured at 153.91' BTOC.
  - MW-34A
    - Development was completed. A total of 88.5 gallons were purged with the Waterra pump.
  - MW-26B
    - Began development however not much progress was made with the limited daylight available.
- Drilling IDW
  - Samples collected:
    - Roll off bin #5843
    - Roll off bin #6030
  - IDW samples collected 12/7 and 12/8 were shipped to the lab.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

- At the beginning of purging MW-30RB, water did not surface at expected pressures. The pump was pulled and rinsed to remove sediment which corrected the issue and the well was sampled.
- MW-12S was dry. Water level was not measured, and samples will not be collected.
- The water level at MW-31A was below the top of the volume booster. As the installation of the volume booster was difficult at this location, the pump was not pulled, and a water level was not measured.
- The water level at MW-29A was below the top of the volume booster. After pulling the pump, the airline was noted to be twisted. Spare swagelok fittings will be purchased should any issues be encountered while sampling. The tubing was straightened however the tubing should be trimmed as preventative maintenance in the near future.
- MP10H controller solenoids were again sticking despite keeping the controllers in hotel rooms overnight.
- One YSI had a pH sensor in need of replacement. A replacement YSI was requested and will arrive 12/9/20.
- Salt Lake County has a mandatory mask mandate in effect since Saturday, June 27. Masks are required in public.

Projected Work – Near Term:

- Continue development of MW-26B. Following development, pumps will be deployed at MW-37S/D.
- Continue groundwater sampling.

Other Activities/Remarks:

- United services picked up the fencing and jobsite toilet.
- Drilling PIDs and Mag Sep meters were packed for shipment.

Photos:

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 12/8/2020 **Location:** MW-29A **Description:** Twisted tubing
	Date: 12/8/2020 **Location:** MW-26B **Description:** Waterra foot valve

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Date: 12/8/2020

Location: MW-26B

Description: Development setup

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 1/18/2021	**Prepared by:** Karla Leslie

Personnel Onsite, including Contractors:	Wasatch Environmental – Kevin Murphy
Visitors/Others:	

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	To 32 º F
Wind	**Still**	Moderate	High		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Development Equipment

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

MW-26D was developed using air lifting techniques until turbidity was below 50 NTU. A total of 95 gallons of water was removed. Initial total depth was 353.40 feet below top of casing (btoc) and after development the new total depth was 358.30 feet btoc, suggesting approximately 5 feet of sediment was removed from the well.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

Work had been planned at MW-34, however, as Rowland Hall was closed for the holiday and the gate was closed but not locked, the field team was concerned about accidently getting locked in. Development at MW-34 will begin tomorrow (Tuesday January 19).

Projected Work – Near Term:

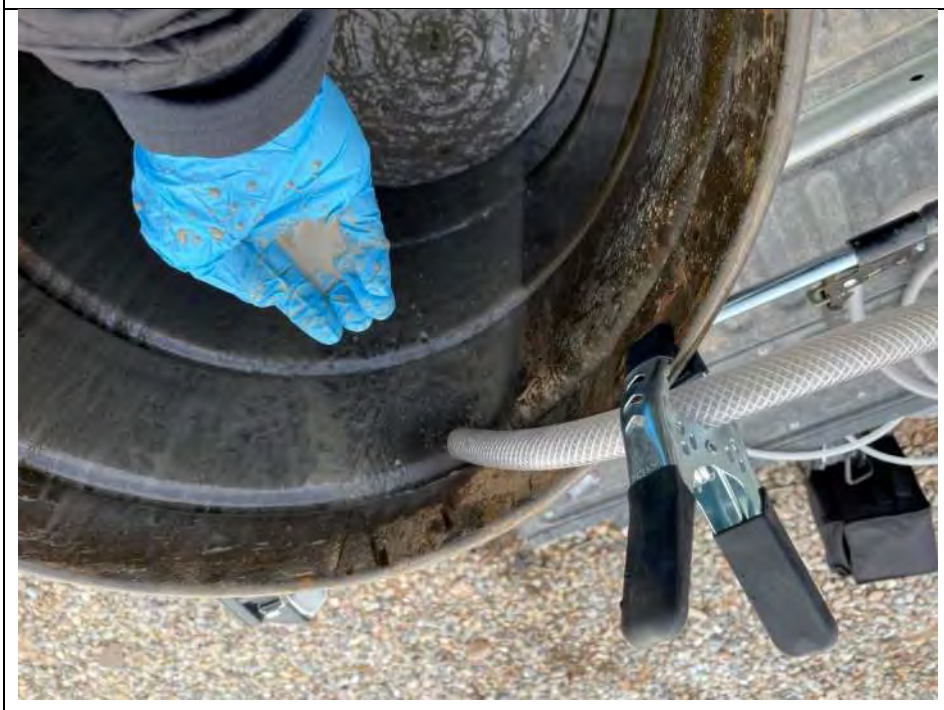
Development of MW-34B/C.

Other Activities/Remarks:

None.

Photos:

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 1/18/2021 **Location:** MW-26D **Description:** Development equipment set up at MW-26D
	**Date**: 1/18/2021 **Location**: MW-26D **Description**: Purge water at the start of development

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 1/19/2021	**Prepared by:** Karla Leslie

Personnel Onsite, including Contractors:	Wasatch Environmental – Kevin Murphy VA – Wynn John
Visitors/Others:	None

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	To 32 º F
Wind	**Still**	Moderate	High		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Development Equipment

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

MW-34C was developed using air lifting techniques until turbidity was below 50 NTU. A total of 20 gallons of water was removed. Initial total depth was 262.5 feet below top of casing (btoc) and after development the total depth was 263.1 feet btoc, suggesting less than 1 foot of sediment was removed from the well.

Development was initiated at MW-34B using air lifting techniques. A total of 30 gallons was removed. Initial total depth was 186.9 ft btoc, and after removing 30 gallons the total depth was 188.8 ft btoc. As turbidity was not improving, this well will be further developed on Thursday (1/21).

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

Development was not completed at MW-34B and will be continued on Thursday (January 21).

Projected Work – Near Term:

Development of MW-26C on Wednesday, January 20.

Development of MW-34B and surveying of new well locations on Thursday, January 21.

Other Activities/Remarks:

None.

Photos:

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 1/19/2021 **Location:** MW-34C **Description:** Development purge water
	Date: 1/19/2021 **Location**: MW-34B **Description**: Sediment that was dried from the purge water

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 1/20/2021	**Prepared by:** Karla Leslie

Personnel Onsite, including Contractors:	Wasatch Environmental – Kevin Murphy
Visitors/Others:	

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	To 32 º F
Wind	**Still**	Moderate	High		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Development Equipment

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

MW-26C was developed using air lifting techniques. A total of 125 gallons of water was removed. Initial total depth was 320.05 feet below top of casing (btoc) and after development the total depth was 327.57 feet btoc, suggesting approximately 7.5 feet of sediment was removed from the well. Turbidity did not stabilize below 50 NTU, however, however, due to the large volume removed and time spent developing this location, development is considered complete.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

Development was completed at MW-26C; however, turbidity did not stabilize below 50 NTU.

Projected Work – Near Term:

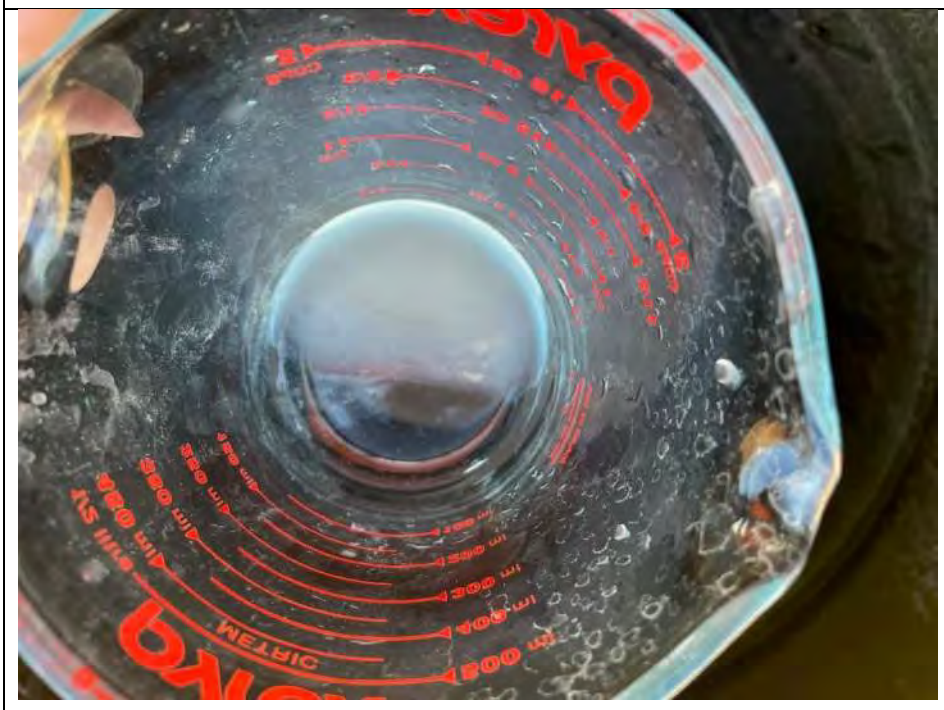
Development of MW-34B and surveying of new well locations on Thursday, January 21.

Other Activities/Remarks:

None.

Photos:

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 1/20/2021 **Location:** MW-26C **Description:** Purge water at the start of development.
	**Date**: 1/20/2021 **Location**: MW-26C **Description**: Purge water at the end of development

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 1/21/2021	**Prepared by:** Karla Leslie

Personnel Onsite, including Contractors:	Wasatch Environmental – Kevin Murphy RECON Land Surveying – Tony Marturello and Jack Nisogi
Visitors/Others:	

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	To 32 º F
Wind	**Still**	Moderate	High		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Development Equipment • Surveying Equipment

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

New wells (MW-36, MW-37S/D, MW-38S/D, MW-30RA/B, and MW-13L) were surveyed by REDCON Land Surveying.

Development at MW-34B was completed using air lifting techniques. A total of 125 gallons of water was removed (30 gallons on 1/19 and 95 gallons on 1/21). Initial total depth on 1/19 was 186.9 ft btoc, and after removing 30 gallons the total depth was 188.8 ft btoc. The initial and final total depth on 1/21 was 188.8 feet btoc. Turbidity did not stabilize below 50 NTU, however, however, due to the large volume removed and time spent developing this location, development is considered complete.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

Development was completed at MW-34B; however, turbidity did not stabilize below 50 NTU.

Projected Work – Near Term:

None.

Other Activities/Remarks:

None.

Photos:

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 1/21/2021 **Location:** MW-34B **Description:** Purge water at the start of development on 1/21/2021.
	Date: 1/21/2021 **Location**: MW-34B **Description**: Purge water at the end of development

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Date: 1/21/2021

Location: MW-13L

Description: Surveying new well MW-13L

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 2/12/2021	**Prepared by:** Joe Miller

Personnel Onsite, including Contractors:	CDM Smith – Whitney Treadway Wasatch Environmental – Kiel Keller VA- Shannon Smith MP Environmental
Visitors/Others:	

Weather	Sunny	Partly Cloudy	Overcast	**Rain**	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	To 32 º F
Wind	**Still**	Moderate	High		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Skid Steer for soil transfer

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

CDM Smith redeployed pumps from MW-26A and MW-13S, and shipped slug testing equipment to vendors and wrapped up site activities.

Wasatch Environmental transferred soil generated from hydrovacing into roll off bin. MP Environmental hauled soil roll off bin #6030 from site. MP also hauled 1800 gallons of IDW water from one of the poly tanks onsite.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

None.

Projected Work – Near Term:

None.

Other Activities/Remarks:

None.

Photos:

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Date: 2/12/2021

Location: VA IDW area

Description: MP environmental connected to poly IDW water tank.

Appendix B

Field Logbook Notes

VA PCE Plume

@ 700 S 1600 E

Rite in the Rain.

ALL-WEATHER

ENVIRONMENTAL

Nº 550F

11/3/20 -

Book 5

Pine Environmental Services LLC

The Environmental Supply and Support People

Rentals - Sales - Repairs

www.pine-environmental.com

CONTENTS

PAGE	REFERENCE	DATE

Location VA Campus - MW-30R Date 11/3/20

Project / Client PCE Plume 700S 1600E / VA / USACE

W. Treadway

Weather: Sunny, 50's°F - 70s°F

Personnel: W. Treadway (CDM Smith)
Kevin Murphy (Wasatch)

Task: Mobilize to MW-30R, utility locate, pre-clear MW-30R

H&S: Site-specific plan; traffic, VOCs, S/T/FS, masks

PPE: level D + mask

0710 WT + KM onsite at conex.

0715 H&S tailgate meeting.

0730 Begin cutting concrete/asphalt at MW-30R.

0800 Roll off arrives at [#5919 MW-30R.]

0820 Left w/ TWS onsite at MW-37.

0830 Complete cutting at MW-30R.

0845 WT to meet Jeff @ MW-37.
KM to Home Depot for plastic sheeting.

0900 MW-37: utilities on both sides of street + in planter strip.

0915 Mark alternate MW-38 locations w/ Jeff. on Elizabeth + 700S + 1200E + 700S.

WMA 11/3/20

Rite in the Rain

Location VA Campus - MW-30R Date 11/3/20

Project / Client PCE Plume 7005 1600E / VA / USACE

W. Treadway

0930 WT + KM back at Corex. Re-do containment system.

1000 Levi Patterson w/ Badger onsite

1010 At MW-30R w/ Levi. HHS meeting.
I asked him to pre clear ~9-10 inches in diameter to 15 ft.

1030 KM at mw-30R. Start vacuum.

1045 Levi said there is a boken valve and he can't turn vac on/off. His supervisor is coming to check it out.
WT to locate piezometers.

1053 Badger Sup. showed up.

1100 At MW-36 w/ Jeff. Many utilities here, along North side, down middle, in planter strip, along south side.

1130 Per J. Miller looking at map, GW-59 is between retaining wall and sidewalk, 1-2 sidewalk blocks from corner. There is white

WMA 11/3/20

Location VA Campus - MW-30R Date 11/3/20

Project / Client PCE Plume 7005 1600E / VA / USACE

W. Treadway

markings from Kiel, but cannot locate actual piezometer.

1145 GW-20 Not located; too much vegetation. Kiel marked a "locate" arrow where we think it should be

1200 Hoot onsite. Unload at laydown area.

1350 WT at MW-30R. KM said Badger can't get past 9 ft.
WT called Brian Treasure. He will send some one to issue permit.
Needed to find H_2O source for Hoot. Previous source is locked in fencing. I asked a shop? VA employee and he said to use faucet on same bldg, to east on east side of double doors near alley / road. Hoot is filling polys and getting supplies at Home Depot.
Also Jeff w/ TWS wants me to go back and mark all piezos, even ones not found.

WMA 11/3/20

Rite in the Rain

Location VA Campus - MW-30R Date 11/3/20

Project / Client PCE Plume 700S 1600E/VA/USACE

W. Treadway

Will talk to Joe about piezo locations.

1530 Decon pad is complete.

Holt begins deconning piped.

KM to measure MW-30 A/B.

A = 242.55 ft BTOC

B = 282.17 ft BTOC

C has 21ST pump.

WT to mark more GW locations for Jeff w/ TWS

** Earlier, Jeff w/ Holt + WT walk MW-37, 36, and 2-38s.

MW-37 = west side in grass planter strip (away from sewer)

MW-38 on 1200 E + 700S is OK.

MW-36 can only be in middle of street and will be tough if it's snowy/icey.

1615 KM offsite.

1630 Jeff w/ Holt and WT track rig to MW-30R.

Shannon Smith stops by

WMA 11/3/20

Location VA Campus MW-30R Date 11/3/20

Project / Client PCE Plume 700S 1600E/VA/USACE

W-Treadway.

She said to let her know "the big/intersting stuff" or/and when we move off a well.

1700 Decon complete.

1715 Holt offsite. WT to charge PIDs + lock cores and gates. Shop gate was open so I left it open.

1730 Jeff w/ TWS complete.

WT to add caution tape + cones to MW-30R.

** Jeff said he'll need to move roll off bin.

** 2nd containment w/ vac truck soil hay not been pumped. Waiting to let it settle.

1745 WT offsite.

WMA 11/3/20

Rite in the Rain

Location VA Campus MW-30R Date 11/4/20

Project / Client PCE Plume 7005 1600E / VA / USACE

W. Treadway

Weather: Sunny, 50's °F - 70's °F

Personnel: W. Treadway (COM Smith)
J. Jones
Andy Mangle } Holt
Alex Langdon

TASK: grout abandon MW-30 A/B
begin drilling at MW-30R

HAS: Site specific, VOCs, traffic, S/T/FS, heavy equip, machinery

PPE: Level D + mask

0650 WT onsite at Corex.
Load supplies.

0715 H&S tailgate at laydown yard.
Gather supplies

0800 At MW-30, Jeff needs different parts to grout 1".

0830 Andy + WT to badging office.
Jeff + Alex to hardware store.

0900 Andy + WT onsite @ MW-30

0924 Calibrate PID. See separate sheet.

0937 Jeff + Alex back onsite.
1 pallet of 10/20 sand, 1 pallet of med. Chips

1000 Check A + B depths one more time

A ≈ 242 ft (top of screen)
B ≈ 282 ft. (top of screen).

WT
~~Start~~ of Sediment on tip of sounder.

1005 Start grouting B w/ Baroid Quik-Grout + H2O. Mixing by hand in 5-gallon buckets then pumping through ½ inch tubing w/ hand pump.

1030 Having some issues pumping it through tubing. It's clogging up.

1044 B is full, begin pumping in A.

1145 Grout at surface at A.
Put caps on. Will put concrete caps on later. Lock + secure.

WT
~~1200~~ Drillers break for lunch.

1200 Drillers to laydown yard to pick up pipe (11 x 10ft).

1315 Set up rig on MW-30R
20 x 10 ft of 8" casing.

1340 Jeff let me know they have a diesel leak. A small puddle was under the rig. <6" in diameter.
Plastic under rig now. Called Shannon Smith.

WMA 11/4/20

Location VA Campus MW-30R Date 11/4/20

Project / Client PCE Plume 7005 1600E / VA / USACE

W. Treadway

WMA 11/4/20

Location VA Campus MW-30R Date 11/4/20
Project / Client 700S 1600E PCE Plume / VA / USACE
W. Treadway

1410 Waiting on call back about a part for the rig.
1430 Holt offsite to purchase screen + casing.
1620 Holt back onsite. They got a part to replace on rig. Will attempt to replace it now.
1730 While installing new part, a connection broke. They'll have to get a piece tomorrow. Also, they got the wrong slot size. Store loaded wrong box.
1750 Holt offsite. We will meet later tomorrow. WT secures site, locks conxes and gates.
** Jeff had clamped fuel lines w/ vice grips to keep from leaking. OK overnight.
1805 WT offsite.

WSA 11/4/20

Location VA Campus MW-30R Date 11/5/20
Project / Client PCE Plume 700S 1600E / VA / USACE
W. Treadway

Weather: Sunny, 40's°F – 70's°F
Personnel: W. Treadway (COM Smith)
J. Jones
Andy Mengle > Holt
Alex Langdon
Task: rig repair; begin drilling MW-30R
H+S: Site-specific plan, VOCs, traffic, SI/TFs, heavy machinery
PPE: Level D + mask
0650 WT onsite. Calibrate PID (separate sheet) Holt picking up rig part.
0740 Holt onsite.
0745 H+S tailgate meeting.
0755 Finished ~~part~~ fixing part in rig
0800 Fixed!
0828 Begin drilling at MW-30R @ 9 ft bgs.
1215 Break for lunch. at 67 ft bgs.
1305 Begin drilling again at 67 ft bgs.
1400 At 70 ft, Jeff broke up a large cobble/boulder, when it came out it was pulverized w/ large chunks

WSA 11/5/20

Rite in the Rain

of gray limestone. This limestone is only from ~70 - 70.5 ft. Could be fallen from another depth. - Possibly 60 ft.

1615 Jeff is switching out core barrels. He said they weren't screwing together well + he didn't want to break them. Instead of 2 x 10 ft, he will have 4 x 5 ft core barrels.

1705 Last run 100 to 110 ft bgs. Trip in 1 more 10 ft casing to 100 ft. Clean up and wait for Bobcat to regen. I mentioned to Jeff about marking MW-36 + MW-37 and cleaning secondary containment.

1745 Now refueling rig.

1755 WT to conex to unload + lock up. Holt offsite.

1805 All gates locked, WT offsite.

WhA 11/5/20

Weather: 50's °F - cloudy
Personnel: W. Treadway (COM Smith)
J. Jones
Andy Mengle > Holt
Alex Langdon
Task: drill @ MW-30R from 110 ft
clean containment, rain prep, Mark location
H+S: site-specific H+S plan, heavy equip, S/T/Fs, traffic
PPE: Level D + mask

0640 WT onsite. Calibrate PID, scan Utm logs, update paperwork.

0711 Holt crew onsite @ MW-30R Start up rig.

0730 H+S tailgate meeting. Talk about tasks for today.

0745 Begin drilling at MW-30R @ 110 ft.

0900 Slow drilling, only 110 to 117 ft so far.

1215 United Services onsite with 1 porta-potty

1255 @ 157 ft, Stop for lunch.

1340 Jeff + WT to MW-36. A + A to containment area

WhA 11/6/20

Rite in the Rain

Location VA Campus MW-30R Date 11/6/20

Project / Client 700S 1600E PCE Plume/VA/USACE

W. Treadway

Jeff and I measured out set up at MW-36. Worried about runoff rolling down hill put on 1200E around corner? Tight for traffic. Worried about slippery snow. Spoke w/ J. Miller about these issues.

A+A scooped soil from containment in hopper.

1425 Started pump in containment area, head back to MW-30R to offload soil + start drilling. Will check on pump frequently.

1445 Start drilling at 157 ft.

1450 WT checks on pump slowly going.

1455 WT @ MW-30R

1555 Still pumping at containment area.

1615 Still pumping at containment.

1700 Still pumping " ".

1730 Stop drilling at 183 ft bgs. Clean up, refuel rig.

WHA 11/6/20

Location VA Campus MW-30R Date 11/6/20

Project / Client 700S 1600E PCE Plume/VA/USACE

W. Treadway

1745 To corex to clean pump + turn off.

Secured MW-30R (caution tape + cones, "DETOUR" BARRIERS (every night).

PID charge, pump off, corex + gates locked.

1800 All offsite.

WHA 11/6/20

Rite in the Rain

Location VA Campus MW-30R Date 11/7/20

Project / Client 700S 1600E PCE Plume / VA / US ACE

W. Treadway

Weather: partly cloudy, 50s-

Personnel: W. Treadway (CDM Smith)

J. Jones
Alex Langdon } Holt
Andy Mengle

TASK: drill MW-30R

HnS: Site-specific plan: S/T/Fs, traffic, weather, heavy equipment

PPE: Level D. + mask

0645 WT onsite. Calibrate PID. Load supplies.

0700 Holt onsite loading 8" casing for MW-30R.

~~3+8~~ They had 170' in yesterday w/ 3 x 10ft broken joints. Today they have 7 x 10ft at site.

Unload, warm up rig.

0730 H+S tailgate meeting.

0745 Start drilling @ 183-ft bgs. I mentioned to crew about watching the storm drain when things get wet.

WMA 11/7/20

Location VA Campus MW-30R Date 11/7/20

Project / Client 700S 1600E PCE Plume / VA / US ACE

W. Treadway

They have a silt sock around the drain now.

1300 @ 228-ft bgs. Break for lunch. Weather is turning, rain coming soon & possibly lightning.

1340 Begin drilling again @ 228 ft. Rainy off and on through afternoon; closest lightning 1 time at 6 miles away, otherwise further than 10 miles.

1620 Reached 250ft bgs. Left clean out hole.

1635 Trips in 8" casing to 250ft. Clean out again. Clean up & offload soil into rolloff. Empty fresh water poly. Close rolloff. Lock up rig.

1725 Refuel rig.

1737 Empty fresh water tank & decon unit. Charge PID & load gates. MW-30R site secure w/ cones, caution tape & barricades.

1800 All offsite.

WMA 11/7/20

Rite in the Rain

Location VA Campus MW-30R Date 11/9/20

Project / Client PCE Plume 700S 1600E / VA / USACE

W. Treadway

Weather: Snowy, cloudy; 30's°F

Personnel: W. Treadway > CDM Smith
~~E. Pott~~ WT
J. Jones
Andy Mengle > Holt
Alex Langdon
WT

TASK: drill MW-30R, ~~develop~~ WT

H+S: Slips (icy), cold stress, traffic, heavy lifting, heavy equipment.

PPE: Level D. + mask

0640 WT onsite. Calibrate PID. Scan with logs.

0700 Holt onsite. Begin moving 6" casing from laydown yard to MW-30R. H+S Tailgate meeting

0750 A+A to exchange screen. WT + JJ to meet ELM @ MW-37. We noticed another (2") gas line in sidewalk. Try to split difference btwn sewer ii gas + 2" gas in sidewalk. ELM said

WM 11/9/20

Location VA Campus MW-30R Date 11/9/20

Project / Client PCE Plume 700S 1600E / VA / USACE

maps of utilities may be wrong, and there is an abandoned line somewhere. They are going to take measurements + confirm some locations.

0845 All back onsite.

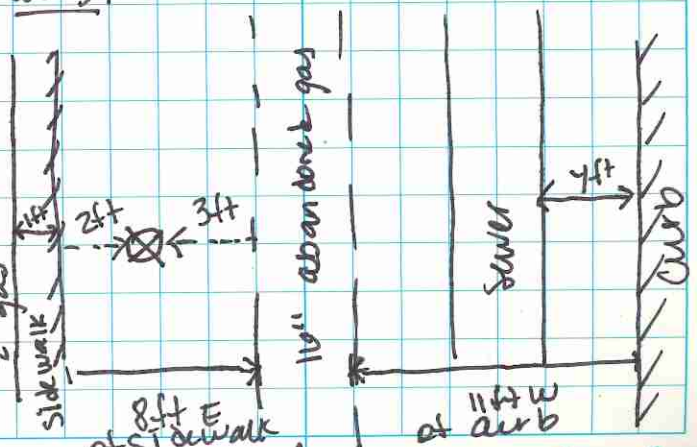
0855 Warming rig up.

0925 Jeff let me know the rig isn't holding air because of a ~~SP~~ WT spring (cold or broke?)

1000 Jeff said he's working w/ TerraSonic to try some things to fix the screen.

From Michael @ ELM:

MW-37



WM 11/9/20

Rite in the Rain

Location VA Campus MW-30R Date 11/9/20

Project / Client PCE Plume 7005 1600E/VA/USACE

W. Treadway

1000	Fencing delivered to laydown area.
1100	Holt is able to start working. Begin tripping in 6" casing.
1150	Break for lunch. 6" casing at 250 ft. Had 290 ft of 6" casing on site.
1220	Begin tripping in drill pipe to drill at 250 ft w/ 4" core barrel. Jeff said air spring is working ok for now. He will keep his eye on it.
1518	A drill rod broke while tripping out core barrel. Will need to trip back in to fish it out.
1340-1355	Stop drilling to refuel rig.
1645	Reached TD of 295 ft bgs. Reviewed B zone lithology w/ N. Smith. Will decide final depth for installation tomorrow.
1705	Holt offsite. Lt locks corners, secures site.
1730	Offsite.

11/9/20

Location VA Campus MW-30R Date 11/10/20

Project / Client PCE Plume 7005 1600E/VA/USACE

W. Treadway

Weather: partly cloudy, 30's °F

Personnel: W. Treadway, E. Rath > CDM Smith
J. Jones, A. Mengle, A. Langdon > Holt
Anna Fiani — Wasatch

TASK: install MW-30R, develop

H+S: site-specific plan, S/T/Fs, cold stress, traffic, heavy lifting

PPE: Level D + mask

0645 LT onsite. Calibrate PID. Load/unload.

0700 Holt crew onsite. Bring well materials to MW-30R.
1 pallet 10×20 Sand (64 x lb)
1 pallet bentonite chips (48 x lb)
Dispose of garbage bags, warm up rig, H+S meeting

0814 TD = 291 ft bgs.

0825 Tool for foot clamp. Holt is using our orange foot-clamp.

0839 1×10 ft SCH40 0.010 slot screen + end cap
28×10 ft SCH40 Blank PVC

11/10/20

Rain

Location VA Campus MW-30R Date 11/10/20

Project / Client PCE Plume 7005 16005E/VA/USACE

W. Treadway

0900 Begin adding 10/20 sand. Then stop to pull casing a little bit. Jeff took many measurements and adjusting to make sure casing (PVC) is where it is supposed to be. It took them a little time to string cable through head to hang casing.

1000 Begin adding Sand again.

1015 Pull 10ft of casing, add Sand

1025 Pull 10ft of casing. Sand at 237 ft bgs. (4 x 50 lb bags)

1032 Start adding medium bentonite chips (PureGold)

1045 Pull 10ft, add bent.

1100 Pull 10ft, add bent. (250ft 6" in)

1134 Bentonite at 252 ft bgs, 5.5 x 50lbs Pull 250 ft of 6" casing.

1205 Still pulling casing, then break for lunch. VT to MW-37 rolloff delivery.

VA had another field trailer delivered in this area.

WMA 11/10/20

Location VA Campus MW-30R Date 11/10/20

Project / Client PCE Plume 7005 16005E/VA/USACE

W. Treadway

1224 Delivery of rolloff #5483 at MW-37

1234 VT back at MW-30R

1250 Prepare pvc casing for A zone.

1310 Install 1 x 10ft SCH40 0.020slot screen + 24 x 10ft blank SCH40 + endcap.

1325 Add 10/20 Sand. Take measurements, pull casing slightly. Add more Sand

1345 Pull 10ft of 8" casing. Continue adding Sand.

1400 Alex to get water in poly tank.

1409 Pull 10ft casing, Sand @ 237 ft bgs, 8 x 50 lb bags Begin adding bentonite chips

1416 Pull casing; at 220ft.

1515 Alex left earlier for more bentonite. Jeff + Andy have been adding chips + pulling casing. 80ft out, 170ft still in.

1525 Alex back onsite w/ 2 pallets of PureGold Medium Bentonite chips

1000 120ft out, 130ft casing in.

1040 180ft out, 70ft casing in.

WMA 11/10/20

Rite in the Rain

Location VA Campus MW-30R Date 11/10/20

Project / Client PCE Plume 7005 1000 E / VA / USACE

W. Treadway

1725 All casing out. Bentonite to 8 ft bgs. will finish during well box instalation

120 x 50 lb bags used.

1745 All offsite.

NOTE: Anna + Emma were at MW-21 for development today.

11/10/20

Location VA Campus / Neighborhood locations Date 11/11/20

Project / Client PCE Plume 7005 1600 E / VA / USACE

W. Treadway

Weather: Snowy 30's °F

Personnel: W. Treadway, E. Rott > COM Smith

Anna Fiorni, Kiel Keller > Woodrich

Jeff Jones, Alex Langdon, Andy Mengle > HOLT

Trevor WT > Badger

0640 WT onsite. Load / unload

0700 Holt crew onsite.

Kiel Keller onsite.

~~H&S~~ meeting.

0715 Kiel + WT to MW-37, 36, 38 to confirm locations.

3 Steel plate at MW-36.

Car near MW-38.

Traffic cones + sign will be moves from MW-36 to MW-37.

0800 WT back to site.

Holt moving equipment to laydown area.

1000 Holt to Home Depot now.

11/11/20

Rite in the Rain

Location VA Campus / Neighborhood locations Date 11/11/20

Project / Client PCE Plume 700S 1600E / VA / USACE

W. Treadway

1000 Kiel completed cutting MW-36. At MW-38 now. Jeff wants a 2nd forklift for neighborhood location. J. Miller said ok.

1125 Holt back onsite, Kiel onsite.

1135 Kiel to his office until Badger calls.
Holt adds gravel to MW-30R from 8ft to 2ft bgs.

1200 Holt prepping for decon.

1210 Break for lunch.

1240 Heard from Badger. At MW-37 w/ Kiel to meet Badger.

1315 WT back at laydown. Holt is deconning. Jeff out to get well box.

** There are 2 vehicles + a golf cart in the way of our connex's + containment. I called Shannon. She suggested building another containment at laydown area, or calling Boiler plant, VA police. J. Miller suggests hauling offsite.

WMA 11/11/20

Location VA Campus / Neighborhood locations Date 11/11/20

Project / Client PCE Plume 700S 1600E / VA / USACE

W. Treadway

Left voicemail for Neil.

1345 Spoke w/ Boiler Plant employee. He said someone is looking for keys for the 3 vehicles to move.

1355 Jeff is loading up the rig. Andy + Alex are finishing deconning.

@1345, MW-37 cleared to 7ft.

1420 MW-38 cleared to 5.5 ft.

1430 Move rig hauler w/ rig, drill pipe and fencing to MW-37.

1450 MW-36 is 7ft bgs from surface, 1ft bgs below concrete bottom.

1500 fencing set up around rig @ MW-37.
Plate put on MW-36 / Kiel did this
Holt picked up other 2 and put one on MW-38, other at laydown yard.
Bobcat in fencing w/ rig, plywood over hole @ MW-37

1600 Kiel offsite, Holt + WT @ laydown. Badger offloaded soil @ containment.

WMA 11/11/20

Rite in the Rain

Location VA Campus Date 11/11/20

Project / Client PCE Plume 7005 1600E / VA / USACE

W. Treadway

~1500	JCB 550-170 forklift delivered. (Sunbelt Rentals)
1620	Prepare to set well box at MW-30R. Add 6" of PVC to A. A is higher. B is lower.
1625	Well box complete, covered w/ plastic from snow.
1730	Holt crew unloads materials at laydown.
1740	Holt offsite.
1750	WT offsite. Connex + gates locked.

WMA 11/11/20

Location WT ~~VA Campus~~ MW-37 Date 11/12/20

Project / Client PCE Plume 7005 1600E / VA / USACE

W. Treadway

Weather: cold, sunny < 30°F

Personnel: W. Treadway, J. Miller, E. Roth } CDM Smith

J. Jones, A. Mengle, A. Langdon } Holt

A. Fiorni - Wasatch

TASK: drill MW-37, develop MW-30R

H+S: Site-specific plan, STT/Fs, cold stress, traffic.

PPE: Level D+ mask

0620 Mt WT onsite. Prep for day. Calibrate PID. Spread salt around Connex area. Start measuring mag sus. w/ meter.

0720 H+S meeting w/ ~~Holt~~ at laydown. Holt warms equipment, loads supplies and equipment to bring to MW-37. Multiple trips.

0900 Still loading / mixing supplies and warming up rig.

WMA 11/12/20

Rite in the Rain

Location MW-37 Date 11/12/20

Project / Client PCE Plume 7005 1600E/VA/USACE W. Treadway.

0950	Begin drilling at 7 ft bgs at MW-37.
1030	Attempted H_2O sample at 20 ft bgs, only mud.
1045	Jeff said they need a flapper bit because soil isn't staying in core barrel. They will push sampler down to 30 ft bgs, but we don't have sample from 20-30 ft. It fell out.
1100	Push ahead @ 30 ft bgs. Wait. Andy + Alex to pick up flapper bit.
1120	Collect MW37-GW111220-30
	No soil description 20-30 ft.
1000	Collect TB56-GW111220
1145	Andy + Alex onsite.
1211	Begin drilling again.
1317	There is hard clay at 50 ft bgs and Jeff is switching back to auger bit because flapper bit won't work well in hard clay.
1338	From 50-60 ft, rock in shoe, no sample in core barrel.

WMA 11/12/20

Location MW-37 Date 11/12/20

Project / Client PCE Plume 7005 1600E

W. Treadway

	Jeff pushed casing down + said hard clay ends at approx 54 ft bgs.
1425	J. Miller Field Book At the Holt Mob to decon Sample 60' casing has slid to 62' drilled to 70' w/ Boring open to 68'. Flapper Bit Recovery 12' from ~~55~~ JM to 60→70'
*NOTE:	MW-30 A + B will need to be topped off. Well box was full of water (~1.5-2 gal removed) and vapor probe + MW-30C tubing were submerged. Zone A cap came off while purging out well box + some surface water went down into Zone A, which means it needs to be topped off. Need 2 people to pull pump in Zone C to check total depth, i.e. if grout is in Zone C or not.
1518	Holt back onsite.

WMA 11/12/20

Rite in the Rain

Location MW-37 Date 11/12/20

Project / Client PCE Plume 7005 1600 E/VA/USACE

W. Treadway

1525 Collect EB49-111220 (after MW37-GW111220-30)

decon from

1545 DTW in push ahead Sampler ~35 ft bgs. Try collecting GW sample in push ahead at 70ft bgs. Tried and vibed sampler 3 times and still no water, just mud.

1620 Casing is only at 60 ft bgs, so push casing to 70 ft bgs, clean out, + will try again.

1655 DTW: 50.97 ft bgs, after clean out, w/ casing to 70 ft bgs. Collect sample tomorrow. Clean up at site.

1711 All offsite. Holt decons push ahead sampler, WT + JM to Connex.

1725 E. Roth + JM to MW-30R + MW-30. MW-30C has H2O in well box again. Some went down the well.

1820 Gates/connex locked. All offsite.

WMA 11/12/20

Location MW-37 Date 11/13/20

Project / Client SLC VA 7005 1600E PCE Plume

J. Miller

0625 J. Miller Onsite

0700 Holt Onsite H+S Tailgate

weather 25-40°F Clear

Attendees:

Joe Miller

Jeff Jones

Alex Langdon

Andy Trengle

Emma Roth

Aaron Fiorini

Topics: Why near miss Safe

Crush points, Slips, cold,

Task: Sample MW37 & 70

Build well

0720 Check out vac container

0730 Mob to drill site

0745 Warm up Rig Inspection

0750 DTW 50.96

0800 Trip in Sample

0810 MP Disp Rolloff @ MW36 #6030

0820 Move Rolloff MW37 to MW-35

0830 Holt to Campus for well Meeting

J Miller Call about well design

Rite in the Rain

Location MW37 Date 11/13/20

Project / Client 700S 1600E PCE Plume
SLC VA

0910	Holt Returns w/ well materials
0915	Collect MW37-GW111320-70 GW Sample
	well Plan is MW-37S Screen 25-35
	MW 37D 60-70' screen
	SVP @
	well 2" Sch. 40 0.020 Slot
0945	MW-37D Installed Begin backing out casing and installing sand pack 10/20 Silica Sand
0955	pull 10' casing continue to add Sand
1005	8 bags Sand to 57' pull casing begin adding Bentonite Chips
1020	pull 10' casing
	Emma / Anna take Samples to FedEx
1045	Install MW-37S Screen 25-35 w/SVP @ 8' Bgs ~~Start~~ Bentonite to ~~39~~ 34' Begin adding Sand from 34'
1120	11/13/20 Neighbor from Lowell Ave Inquiring about well. provided flier
1130	Holt Break for lunch
1215	Holt Back on site
1230	Sand 9-6.5' for SVP

Location MW-37S/D Date 11/13/20

Project / Client 700 S 1600 E PCE Plume
SLC UA

1245	Mob Rig from hole prep for Surface completion
1315	Begin installing well completion
1330	Jeff walk rig to MW-38
1345	Rig to MW-38
1400	Run Hopper to MW-38
1420	Holt Finish Surface Completion Mob mate-tote + well building materials back to layday
1445	~~Sam~~ Holt Returns to load casing ~~Andy~~ to Sunbelt
1500	Holt continue to Mob Equipment to MW-38
1530	Begin pumping out Containment IDW Manager
1700	Holt Offsite / CDM Offsite

11/13/20

Rite in the Rain

Location SLC VA MW-38 Date 11/14/20

Project / Client 700 S 1600 E PCE Plume

0630	J. Miller CDM Smith Onsite
0700	H+S tailgate weather 34-45°F Overcast
	Task: drill @ MW-38
	Attendees: Joe Miller CDM Smith
	Jeff Jones - Holt
	Alex Langdon - Holt
	Andy Meighe - Holt
	Topics: Cold, Traffic, Focus, Lifting crush points
0715	Mob to MW-38
0730	Warm up Equipment Holt moves to get 8" casing from Langdon
0815	Holt offloads 8" casing
0845	Holt Returns w/ Drill Rods/core Barrels
0855	Begin Drilling
1000	Drilling 30-40' water present
	DTW 22.04'
1120	Boring + Casing to 70' less moist
	waiting to log + check water
1130	Holt breaks for Lunch
1150	DTW 27.23
1230	Call from Neil determine go to 80'
1245	Resume drilling
1315	Boring TD'd @ 80'

Location SLC VA MW-38 Date 11/14/20

Project / Client 700 S 1600 E PCE Plume

1320	Clean up Cuttings
1345	Secure Fencing + Rolloff
1400	Joe To Campus Holt Finishing site wrapup
1430	CDM + Holt Mob from Site

11/14/20

Rite in the Rain

Location SLC VA MW-38 Date 11/16/20

Project / Client 700 S 1600 E PCE Plume Site

0630 CDM Smith Onsite - J. Miller

0700 H+S tailgate
Weather: 35-50°F Clear
Task: Install MW-38
Attendees:
Joe Miller - CDM Smith
Jeff Jones - Holt
Alex Langdon - Holt
Andy Mengle - Holt
Topics: Lifting, Crush Points, Traffic
Cold Stress

0715 Holt load up well materials transport to MW-38

0730 Holt to B+B well supply for Bentonite

0805 Holt Returns to MW-38
Begin warm up + Inspections

0830 Call w/ VA USACE about well design

0915 Mob to Laydown Holt to pump out containment

0940 ~~to~~ Some water pumped still Mucky

0945 Call w/ Shannon & Neil.
MW38D Screen 60-70
MW38S Screen 27-37

Tom 11/16/20

Location SLC VA MW-38 Date 11/16/20

Project / Client 700 S 1600 E PCE Plume

1015 Begin installing MW-38D
Sch40 PVC 2" 0.020 screen Run
60-70' Bgs
Add 10/20 silica Sand

1036 Sand to 58' Begin adding
medium Bentonite chips
pull 10' casing 1/1

1100 Install MW-38S w/ SVP 8'

1110 Begin adding 10/20 Sand 39-25'

1127 pull 10' casing 1'
Bentonite chips added
SVP 8' sand 9-7'

1145 Bentonite to 4'

1150 Holt Break for lunch

1230 Holt Returns from Lunch Load up

1255 Holt Mob Equipment to Laydown

1315 Holt Returns Loads up casing
Mob to Laydown

1330 G. Hatton Onsite

1350 Holt Returns load up drill steel

1355 Holt Mob Steel to laydown

1415 Holt loading Fencing

1420 Holt walk Rig to MW-38

TM 11/16/20

Rite in the Rain

Location SLC VA MW-36 Date 11/16/20

Project / Client 700S 1600E PCE Plume

1500	Holt Setup @ MW-36 Fencing
1510	Holt picks up Extra Cones from MW-37 for MW-36
1520	Holt Back w/ cones
1545	Holt Back w/ Hopper
1600	Mob to VA
1615	Holt Setup to decon drill Steel
1620	Fill H_2O tote
1640	Holt Begins decon 8"
~~17~~	~~Dm~~
1730	off Site

11/16/20

Location SLC VA MW-36 Date 11/17/20

Project / Client 700S 1600E PCE Plume

35-60°F Clear

0630	J. Miller CDM Smith Onsite
0700	H+S tailgate
	Topics: traffic, Fatigue, Lifting, uneven ground, Crushpoints
	4 Hearbees:
	Joe Miller CDM Smith
	Holt - Jeff Jones
	Alex Langdon
	Andy Mengle
	Greg Hutton - USACE
	Task: Drill MW-36
0725	Holt mob to MW-36
0740	Holt warm up Equipment / Return for Casing
0800	Open / Label Rolloff 6030
0805	Holt Returns w/ casing
	Setup Rig over Boring
0820	Greg Onsite
0840	Begin drilling
0930	Boring 40' Sample Slid out Random w/ flapper Bit Driller thinks set at 32'
1000	DTW 30.82'

11/17

Rite in the Rain

Location SLC VA MW-36 Date 11/17/20

Project / Client 700 S 1600 E PCE Plume

1010	Due to loss of sample Hard to tell location of wet zone Likely 32-35'
1155	Boring to 80' cased to 70' Holt takes lunch brings Back 30' casing
1300	Holt Resumes adds casing to 80'
1400	Boring to 100' Bgs ~~No water~~ Some wet zones but nothing looks like it will make great water
1440	Greg to VA to visit shannon
1510	Call from Neil Discuss 10' deeper He will Notify shannon
1520	Holt presume drilling
1540	Holt Fuel Rig
1600	Dump cores wrapup Site
1630	Call w/ Shannon, Neil, Greg about well screen decide 48-52' w/5' screen
1710	Mob Back to VA
1720	Off Site

11/17/20

Location SLC VA MW-36 Date 11/18/20

Project / Client 700 S 1600 E PCE Plume

65°F windy

0640	CDM Onsite - J. Mille
0700	H+S tailgate at Laydown Topics: Focus, Fatigue, Lifting Traffic Attendees: Jae Mille - CDM Smith Greg Hatton - USACE Jeff Jones - Holt Alex Langdon - Holt Andy Neagle - Holt Task: ~~MW~~ Install MW-36 Mob Equipment Back to VA
0715	Holt to MW-36 w/ pallet of Bentonite
0730	Holt Mobs fence back to VA then heads to B+B for supplies
0820	Holt Returns to MW-36
0830	Boring tagged to 105'
0845	Begin adding bentonite chips
0855	pull 10' casing
0905	~~Beginning~~ Pull 10' casing
0925	Pull 10' casing
0945	Pull 10' casing
1005	Pull 10' Casing Bentonite to 54'

Rite in the Rain

Location SLC VA MW-36 Date 11/18/20

Project / Client 700 S 1600 E PCE Plume

65°F

1010	Install MW-36 w/ 5' sch 40 0.020 slot Screen. 47-52'
1020	Begin adding 10/20 silica Sand Sand from 54- 44'
1050	pull 10' casing
1100	Greg Hatton Offsite
1115	All casing pulled from Boring
1130	Holt Mob casing to VA
1210	Holt Returns to load up more Equipment Hydrate chips
1230	Holt takes load to VA
1300	Holt Returns to Load More Equipment
1320	Holt Mobs Rig to VA
1355	Holt @ VA w/ Rig
1410	Holt to get Backhoe and Cable for Development
1610	Holt Back Onsite pump Hose from Container
1640	Holt & CDM offsite

Location MW-30R SLC VA Date 11/19/20

Project / Client 700 S 1600E PCE plume

55°F Overcast

0630	J. Miller CDM Smith Onsite
0645	H&S Tailgate Task: Bail development at MW-30R Attendees: Joe Miller - CDM Smith Jeff Jones - Holt Alex Longdon Andy Mengle Topics: Fatigue, Focus, Lifting Crushpoints Hand placement
0715	Arrive MW30R MW-30R DTW 229.56 DTB 288.03
0730	MW30RA DTW 227.57 DTB 250.56
0735	Begin Bailing MW-30RA
0900	Return to Excavation Permit to Logan @ VA Safety
1015	Drill batteries dead Bail by Hand
1100	Holt Back for Inv'g Recharge Batteries
1145	try Drill Rig Inverter
1250	Joe Back w/ Wasatch Gear

Rite in the Rain

Location SLC VA Date 11/19/20

Project / Client 700 S 1600 E PCE Plume

1315	Demo'd Drill dead
1430	Return w/ New drill
1610	DTB ~~25.03~~ 25.23
1630	Wrap up site for days off
	Backfill ~12 gallons
1645	Off site

11/19/20

Location SLC VA Date 11/20/2020

Project / Client 700 S 1600 E PCE Plume

0800	J. Milk Onsite
	H+S tailgate
	Topics: Lone worker, traffic, cold stress
	Focus
	Weather 30-50°F Clear
	Tasks: Site mapping
0900	MP @ MW-36 to haul
	Rolloff Back to the VA
0930	MW-38 Rolloff picked up
0940	Delivered to VA
0950	Move MW-30R Rolloff to VA
	Laydown
1010	Clean up IDW area/Conex
1045	J. Milk Offsite

11/20/2020

Rite in the Rain

Location SLC VA Date 12/1/20

Project / Client 700 S 1600 E PCE Plume

0700	Onsite Carney Power is Out
0715	H+S Tailgate
	Task: Develop MW-30R
	Weather 28-40°F Clear
	Attendees
	Joe Miller
	Tea Vitko
	Kevin Murphy
	Jeff Jones
	Alex Longden
	Andy Mangold
	Topics Focus, Covid, Lifting, Traffic
0730	Arrive MW30R
	MW30R B DTW 229.38
	MW30R B DTB tank at 288.20'
	worked down to 289.20'
0750	Drillers Begin Bailing
	Break pull Cord on generator
0800	J. Miller Head to MW-13L for GPR
	Ivan ~~GPR~~ GPRS Onsite
	Identified irrigation line ~1' deep
	South of well pair
0830	J. Miller Head Back to Camper
	Generator Running

Location SLC VA Date 12/1/20

Project / Client 700 S 1600 E PCE Plume

0900	J. Miller + Jeff Jones scout
	setup at MW-13L
0930	Return to well hold still bailing
1020	MP Onsite to move Rolloff
1430	End Bailing ~2 Gallons
1445	Pump purge into Tote
1500	Load up Rig and Equipment for MW-13L
1530	Unload Equipment @ 13L
1600	Begin to Hand Auge — Need More
	Equipment
1700	MW-13L prechared to 5' bgs
1735	Joe Help w/ development Crew
1830	Offsite

12/1/20

Rite in the Rain

Location SLCVA MW-13L Date 12/2/20

Project / Client 700S 1600E PCE Plume Site

0615	Joe Miller CDM Smith Onsite
0625	Collect IDW13-SB20220 from Vac truck Cuttings
0640	Collect IDW14-SB120220 from MW-30R Rolloffbin 5914
0650	Calibrate PID
0700	H+S Tailgate Weather 20-40°F Clear Task: Drill MW-13L / Develop MW-30R/B Topics: COVID, Fatigue, Cold, Crush points Lifting Attendees: Joe Miller Tea Vetter Kevin Murphy Andy Mengle Alex Longden Jeff Jones
0720	Drill Crew Arrive MW-13L Begin Warm up/Inspections Need to charge Rig Batteries
0815	Rig JM started
0845	Tower up

Location SLCVA MW-13L Date 12/2/20

Project / Client 700S 1600E PCE Plume

0905	Begin ~~drilling~~ JM Running Rig through it's movements
0930	Begin drilling MW-13L
1030	Halt heads to VA for Move plywood
1120	Resume drilling
1235	Halt Breaks for lunch Boring to 90'
1315	Resume drilling
1615	Boring to 150' cased to 150' Halt Fuel Rig
1645	Site wrapped up Halt Offsite
1700	J. Miller to convey to Offloop

12/2/20

Rite in the Rain

Location SLC VA MW-13L Date 12/3/20

Project / Client 700 S 1600 E PCE Plume

0645	J Miller onsite
0700	H&S Tailgate
	Task: Drill Install MW-13L
	Develop MW36 and MW38S/D
	Weather 25-40°F Clear
	Attendees:
	Joe Miller
	Trea Vathaw
	Kevin Murphy
	Jeff Jones
	Andy Mungle
	Alex Langdon
	Topics: traffic Fatigue cold stress
	Stop work authority
0730	Holt load up well Materials
0740	Arrive @ well site Begin Warming
	Equipment
0805	DTH 342C
0910	Resume drilling Head not holding pressure
	allow it to warm more
0400	Resume drilling
0930	Core from 150-160
0940	Holt Break while deciding interval
1030	Holt Cleanout to 160'

Location SLC VA MW-13L Date 12/3/20

Project / Client 700 S 1600 E PCE Plume

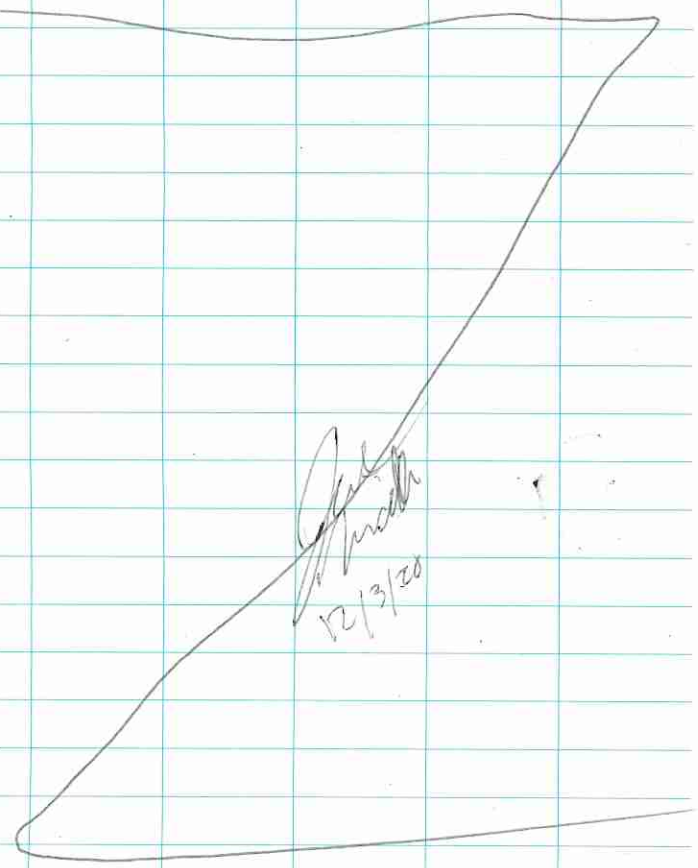
1045	Call w/ Neil, Nathan, and Shannon
	decide to set well @ 150-160'
1100	Holt to B+B for well supplies
1200	Holt beginning telling well with 10' screen
	from 150-160' Bgs 0.020 slot Schedule
1215	Begin adding 10/20 Sand
1230	pull 10' casing continue to add Sand
1235	Sand to 147
1240	pull 10' casing begin adding Medium
	Bentonite chips
1250	pull 10' casing resume adding Bentonite
1300	pull 10' casing add Bentonite
1315	pull 10' casing add Bentonite
1325	pull 10' casing add Bentonite
1335	pull 10' casing add Bentonite
1345	pull 10' casing add Bentonite
1353	pull 10' casing add Bentonite
1358	pull 10' casing add Bentonite
1405	pull 10' casing add Bentonite ~Pengrout
1410	pull last 10' section add Bentonite to 5' Bgs
1420	Holt takes load to VA
1440	Holt Returns for another load
1450	Holt load Rig and Bobcat

Rite in the Rain

Location SLC VA Date 12/3/20

Project / Client 700 S 1600 E PCE Plum

1500	Holt	Mob Rig to VA
1530	Holt	begin surface completion
1600	Holt	Mob back to VA Begin Decon
		while holes of water are liquid
1730		Off site



12/3/20

Location SLC VA Date 12/4/20

Project / Client 700 S 1600 E PCE Plume

0645	Onsite
0700	H+S Tailgate
	Task: Loadup/Clean up site/Development
	Topics: Fatigue, crush points, lifting, Eyes
	Hand placement
	Attendees:
	Joe Miller
	Jeff Jones
	Alex Langdon
	Andy Mengle
	weather 20-40°F Clear
0730	Head to MW-13C to load Fencing
0806	Return to VA, warm Equipment,
	Pipe Hauler Onsite
0815	Tea Vitlar / Kevin Murphy Onsite
	H+S tailgate
0830	Call Baile- plant about power
	Connex
0930	Pipe Hauler Offsite
1000	Holt Offload Fencing
1010	load up drill Rig
1030	Dump 2 remaining Soil drums from
	phase I in Roll off

Rite in the Rain

Location SLC VA Date 12/4/20

Project / Client 700S 1600E PCE Plume

1100	Holt continues to load up Equipmen
1215	Holt heads offsite
1230	Place Cones @ MW-12, 15, 32, 08
1300	Airgas Onsite exchange 5 cylinders
1315	Call to the Boiler plant again to see about Electricity talked to Dave he is going to call an electrician to see about getting service.
1345	Head to MW-38 to see if Tea/Kevin need Help
1400	Badging office for Renewal
1500	Offsite

12/4/20

Location SLC VA Date 12/5/20

Project / Client 700S 1600E PCE Plume

0745	Arrive Onsite - J. Mills
0800	H+S tailgate w/ Tea + Kevin Task: Joe Bail MW-37S/D
0900	Arrive MW-37S DTW 18.32' BTOC (Casing Riser Bias DTB 33.55' BTOC ~3" mud on Bottom of Bail
0940	Bailed ~5 gallon DTW 19.80' DTB 34.50' BTOC
1030	Bailed ~16 gallon from MW-37S
1035	MW-37D DTW 42.30' BTOC TOC ~0.55' BGS DTB 69.29' BTOC
1220	Bailed ~20 Gallon DTW 42.51 DTB 69.31 BTOC
1330	Head to MW-38S/D Help on Tea
1400	Offsite

12/5/20

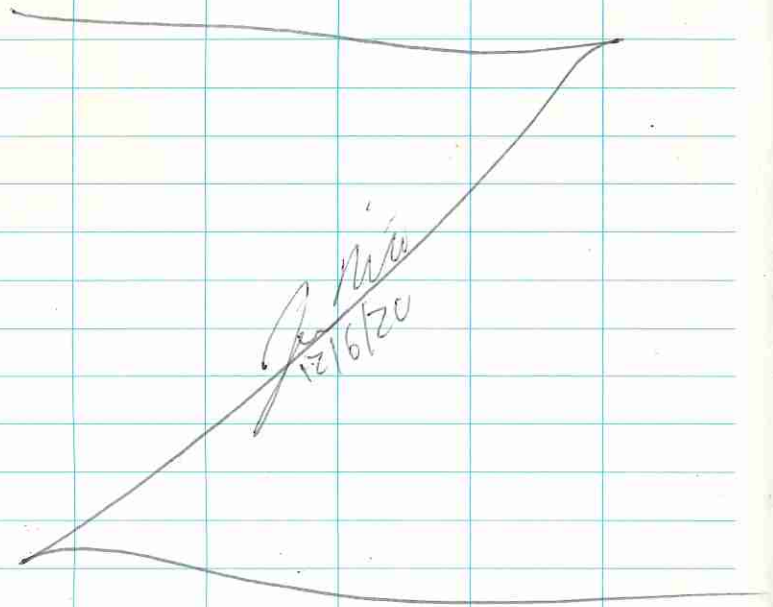
Rite in the Rain

58

Location SCLVA Date 12/6/20

Project / Client 700S 1600E PCE

1045 Arrive MW-13 cluster
1050 MW-13S DTW 14.16' BMP
1055 MW-13D DTW 13.56' BMP
1100 MW-13L DTW 22.09 BTOC
DTB 151.06 BTOC
TOC 0.83' BGS
1105 Begin Bailing
1145 Call to Neil about dtb of well
decide to keep Bailing and Reasses
1240 ~8 gallons Bailed
DTW 21.55'



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Location SCLVA Develop Date 12/7/20

Project / Client 700S 1600E PCE Plume

Task MW-13L Development

0720 Onsite load up
0815 H+S tailgate w/ GW Team
0835 Arrive MW-13
0845 MW-13S DTW 14.03' BMP
0850 MW-13D DTW 13.38' BMP
0855 MW-13L DTW 14.83' BTOC
DTB 151.70' BTOC
0910 Deploy pump @ MW-13L
0917 Begin pumping
0930 Pump controller Freezing + tubing warm up in truck
Kevin to connect to compress tubing
1015 Emma Onsite w/ MP10H
1115 Troubleshooting MP10H delay in pump discharge Call Karla
Purging @ 800ml/min
1145 Surge w/ pump
1200 Increase flow rate to 1200ml/min
1215 Surge w/ pump
1228 Surge w/ pump
1250 Surge w/ pump
1315 Surge w/ pump

12/7/20

Rite in the Rain

Location SLC VA Date 12/7/20

Project / Client 700S 1600 PCE Plum

Task: MW-13L Development

1330	Surge w/ pump Swap drums 50 gal purged
1350	Surge w/ pump
1400	Surge w/ pump
1410	Surge w/ pump
1420	Surge w/ pump
1425	Down load MW-13D Transducer Samples 1848 Battery 94%
1430	Surge w/ pump
1440	Surge w/ pump
1450	Surge w/ pump
1500	Surge w/ pump
1510	Surge w/ pump
	Call to Neil about development Goals
	Surging w/ pump is not freeing
	Sediment from the screen, But water
	is still being produced.
	Decide to continue to purge but
1610	MW-13L DTW 19.80' BTOC Pump off
1626	DTB 154.15' purged 100 gal
1730	Collect IDW 15 - GW 120720
	Water tote
1800	Collect IDW 16 - GW 120720
	Hydraulic Oil drums w/ water
1900	offsite

12/7/20

Location SLC VA Date 12/8/20

Project / Client 700S 1600E

1310	Collect IDW17-SB120820
	from Rolloff Bin # 5483
1345	Collect IDW18-SB120820
	from Rolloff Bin # 6030
1400	MW-13L DTB 153.91
1430	TB01 - SB120820 w/ soil
1440	TB02 - SB120820 w/ IDW's
1500	Ship samples @ Fedex
1530	Organize Equipment @ Conex
1600	help GW team
1800	offsite

12/8/20

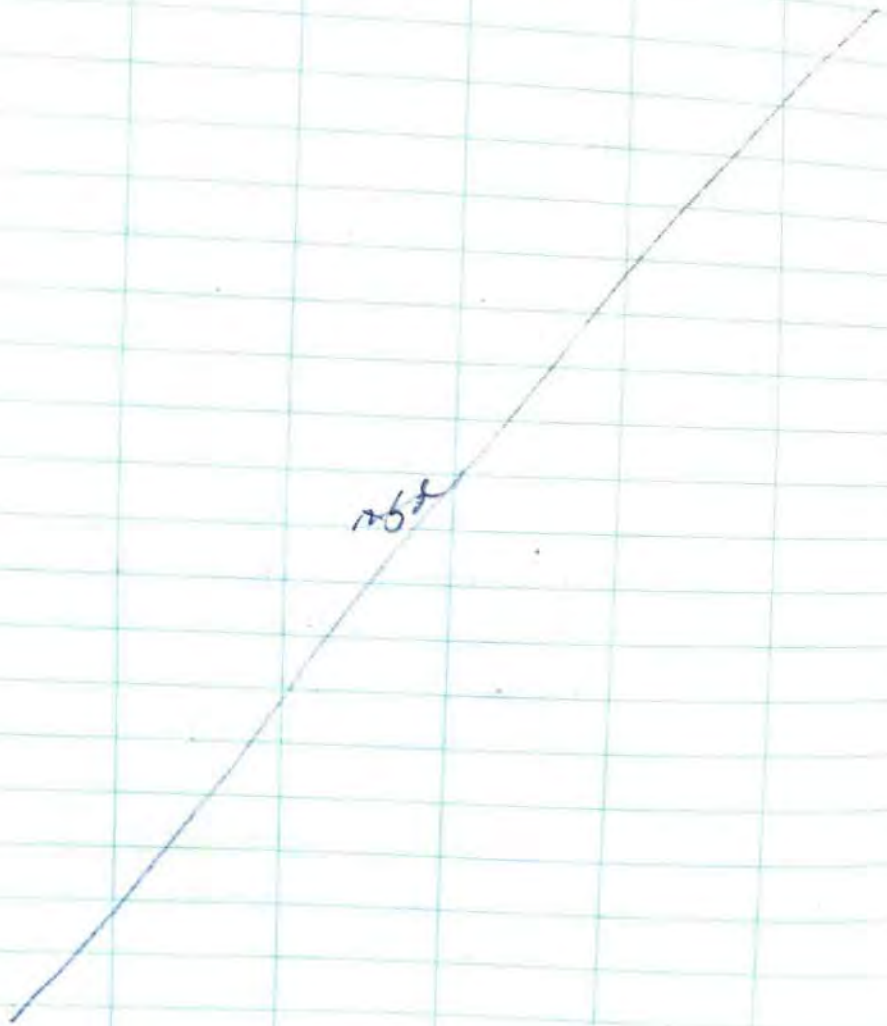
Rite in the Rain

Location SLC VA

Project / Client VA 700 S 1600 E PCE Plume

Date 10/1

shipped samples.
Disposed of empty used core boxes at landfill
organized conex buildings
1930 COM offsite.



Location SLC VA

Project / Client VA 700S 1600E PCE Plume

Date 11/10/20

Weather: Cloudy, 30°F
Task: GW well development
PPE: Level D
Personell: E. Rott (Author), A. Forni (Wasatch)

0700 E. Rott onsite. Calibrate PID.
Begin loading equiptment
0900 A. Forni onsite. Calibrate YSI.
H&S meeting.
0900 Team to MW-26. Plan to develop all 4- intervals.
1000
1040 Begin Development at MW-26D by airlift. Set stinger @ 289 ft btoc
1115 E. Rott to connex for airgas dropoff
1130 E. Rott back to MW-26D.
1220 End development at MW-26D. Did not reach parameter stability. Saw visible decrease in turbidity. Purged a total of approx. 70 gal
1230 To connex to empty purge water and switch nitrogen tanks.
1245 Return to MW-26. Begin development at MW-26C. Set stinger at 268 ft btoc.

Location SLC VA

Project / Client 700S 1600E PCE Plume

Date 11/10/20

1400 Attempt development at MW-26A with 3/4" stainless steel bailer.

1415 Evident bailer is getting stuck in casing. Pulled up bailer and no water, hadn't dropped far enough

1430 Attempt bailer in MW-26A again able to get it slightly further than previously. Stuck on way up.

1500 Able to get bailer out of MW-26A Called Joe Miller (CDM Smith) to discuss issues. Assumes casing is slightly crooked and won't be able to get to water column. Decision to not develop at MW-26A.

1700 End development at MW-26C for the day. Purged approx. 38 gallons. Water still very turbid, but decreasing. Will return tomorrow to continue.

1800 Field team offsite.

Emma Rott
11/10/20

Location SLC VA

Project / Client 700S 1600E PCE Plume

Date 11/11/20

Weather: Snow/Rain, 30-40°F
Task: Well Development
PPE: Level D
Personell: E. Rott (Author), A. Forni (Wasatch)

0715 Field team onsite.
0730 H+S meeting
0735 Calibrate PID. YSI was dropped. No longer calibrating correctly.
0750 Anna to Wasatch to get functional water quality meter.
0830 E. Rott to MW-34A to see if bailer will work for development.
0840 Bailer getting stuck at around 130' btoc at MW-34A.
0850 E. Rott back to connexs. Meets A. Forni and loads equipment.
0930 Team to MW-26. Setup on MW-26B.
1005 Begin airlift at MW-26B. Set stinger at 222' btoc.
1015 No water present. Lower stinger approx. 8'.
1030 No water. Determine not enough water column to use airlifting for development.

Location VA SLC

Project / Client 700S 1600E PCE Plume

Date 11/11/20

1045 E. Rott called Miles Kheeler (BESST) to discuss using ZIST pump w/o filter for development. He states we can attempt but likely too coarse of material for the pump to function.

1100 Team Continues development at MW-21 looks clear at first.

1115 E. Rott Attempts to use ZIST pump at MW-26B w/o filter.

1130 Slug of water comes out of MW-26B, assumed to be water remaing in tubing from last sampling.

1140 No more water from MW-26B. Team pulls pump and cleans out. No visible sediment within pump.

1150 Re-deploy pump at MW-26B.

1200 No water present. Determined pump will not work for development Team pulls pump and brings it to connex.

1220 Complete development at MW-26C. Purged >60 gallons total. Saw slight increase in turbidity towards the end. Stopped based on volume metrics.

Location VA SLC

Project / Client 700S 1600E PCE Plume

Date 11/11/20

1230 Attempted bailer at MW-26B.

1245 Unable to get bailer past 114' btoc.

1300 Team to connex to prep transducers for deployment at MW-34.

1500 Team to MW-34.

1515 WL = 131.0' @ MW-34B. Install pump + transducer attachment by removing filter and threading on intellipump.

1535 WL = 130.41 @ MW-34D. Install pump + transducer attachment

1557 WL = 130.72' @ MW-34C. Install pump + transducer attachment

1615 Team to Connex. E. Rott spoke with K. Lesue + N. Smith to determine not to install transducer at MW-34A until it can be developed.

1645 E. Rott to MW-6 and MW-17 to make determinations for tamper-proof bolts

1730 Field team offsite.

Emma Rott
11/11/20

Location VA SLC

Project / Client 700S 1600E PCE Plume

Date 11/12/20

Weather: Sunny, 30-50°F
Task: Well development
PPE: Level D
Personnel: E. Rott (author), Anna Fiorni, Joe Miller (COM Smith)

0700 Field team onsite. Calibrate PID. Begin packing vehicles. H+S meeting.
0720 E. Rott to Hose + Rubber to purchase tubing (½" OD) for grundfos pump use.
0730 A. Fiorni calibrates YSI.
0940 E. Rott onsite.
1000 Team to ~~MW-26~~ OR MW-30RA/B.
1005 WL = 229.75' btoc @ MW-30RB
TD = ~~293.0' btoc~~ OR 290.92' btoc
1010 Team to use 2" poly bailer to surge/collect sediment.
1020 Bailer doesn't weigh enough. Team to attempt using stainless bailer (3/4") to see rope depth.
1045 Stainless bailer comes up full of sludge. E. Rott to connex to find weight to add to poly bailer. Stainless is too small to be effective.

Location VA SLC

Project / Client 700S 1600E PCE Plume

Date 11/12/20

1115 Send poly bailer down w/ weight. Comes up partially full with sludgy water.
1145 Continued to bail, but kept pulling up empty bailer. Team assumes the ball can't sit well b/c sediment. Anything that does fill leaks out by the time it's brought to the surface.
1200 Begin setting up Grundfos Rediflo 2.
1220 Deploy @ 250' btoc (max length on pump cord). Using Wasatch's generator (3150 Watt champion)
1230 Begin pumping. Gradually increasing Hz.
1245 Controller faults at approx 300Hz
1300 After restarting, controller faults again at 336 Hz. Spoke with Joe Miller, decided to attempt renting new larger capacity generator.
1315 Team pulls pump.
1400 Team to Sunburst Rentals. Rented Honda EU7000IS, 6500 watt

Location VA SLC

Project / Client 7005 1600E PCE Plume

Date 11/12/20

1430 Field team onsite. To MW-30RB.
1445 Team deploys pump. Error when plugged into new generator. (Fault → under voltage).
1530 Team continues to encounter fault. Pulls pump.
1545 To connex. ~~Cr~~ Plan to try pump in 5-gallon bucket of water to see if the pump was the issue.
1620 Pump not functioning with either generator. E. Root calls Pine Environmental.
1630 Remove bottom of pump. Dirty water comes out. Rinsed multiple times.
1640 Re-run pump, working this time. Likely clogged. Pine representative stated that running pump at max (400 Hz) is risky for very long.
1700 A. Fiorni offsite.
1740 J. Miller, E. Root to MW-30. WL = 227.40 @ MW-30RA.
1745 Team notes water in well vault at MW-30C. Team offsite.

Location VA SLC

Project / Client 7005 1600E PCE Plume

Date 11/13/20

Weather:
Task: Well development
PPE: Level D
Personnel: E. Root (Author), A. Fiorni (Wasatch)
0700 E. Root onsite. A. Fiorni to Sunbelt rentals to drop off rented generator.
0715 Calibrate PID.
0730 E. Root to get ice for drilling crew.
0800 E. Root onsite.
0900 A. Fiorni onsite.
0915 Team to ~~MW-20R~~ MW-30RA. Plan to attempt using Grundfos pump for development. TD = 250.6' btoc.
0925 Deployed Grundfos Redi Flow 2 at approx 240' btoc. Using Wasatchs generator.
0940 Pump faulted at approx. 300 Hz. Team to pull pump.
0950 Pulled pump and saw sludge water leave it when cleaning. Assumed to have clogged with sediment.
1000 Team to drilling crew at MW-37. Packed push ahead sample.
1030 Team to fedex to ship samples

Location VA Plume

Project / Client 700S 1600E PCE Plume

Date 11/13/20

1030 Shipped Sounst controller and YSI back.

1100 Team to Wasatch to pickup tubing for sounst pump install.

1120 Pine shipped 4x 250' rolls, only will be able to install at MW 30RA

1140 Team onsite to connex to load equiptment to use for sounst pump deployment and purging.

1215 Deployed sounst pump in MW 30RA at 240' btoc. Hung on 1/16" wire cable. 1/4" x 1/4" bonded tubing.

1220 Begin purge to attempt development.

1240 Water at surface. Very turbid, filled with sediment.

1245 Water stopped flowing. Team turned off controller. Assume it clogged.

1315 Pulled pump. Ball valves filled with sediment.
Team cleared line and cleaned pump. Brought back to connex.

1400 Pulled MW-30C and took TD
TD = 325.8' btoc.
difficult to guage with skinny dipper. No sign of grout.

Location VA Plume

Project / Client 700S 1600E PCE Plume

Date 11/13/20

1415 Placed pump back in MW 30C.

1430 Team to connex to unload vehicles. Take inventory on sampling bottles

1530 Team to MW-17D to tap well cap. Need larger tap wrench. Team to ACE.

1600 Return to MW-17D. Tap well cap. Tamper proof bolts now sitting properly. Return to connex.

1630 Pack remaining equiptment to ship

1700 Team offsite.

Emma Reed
11/13/20

Location SLC VA Date 12/01/2020

Project / Client 7005 1600 E PCE PLUME

WEATHER: SUNNY, LOW 21°F, HIGH 40°F

TASK: GW WELL DEVELOPMENT

PPE: LEVEL D

PERSONNEL: T. VRTLOK (EDIT SHIFT AUTHOR)

KEVIN MURPHY (WASATCH ENVIRONMENTAL)

0650 TEI ONSITE

0720 KEVIN AND TEI MEETING DRILLING TEAM FOR HEALTH AND SAFETY MEETING AT MW-36

0730 BACK AT CONVEX CALIBRATING YSI AND PID CHECKING BOXES WITH EQUIPMENT. LOOKING FOR CYLINDERS IDENTIFYING MISSING EQUIPMENT.

0815 KEVIN TO MW 36 TO HELP DRILLING CREW WITH GENERATOR ISSUES

0820 RESOLVING ISSUE WITH NO ELECTRICITY AT THE CONVEX

0845 KEVIN TO WASATCH EM OFFICE TO PICK UP THE REST OF THE EQUIPMENT

0915 YSI HAS BEEN RETURNED YET. KEVIN STILL HAS PUMP AT WASATCH

0930 CONDUCTING INVENTORY FOR GW MONITORING TEAM

1000 KEVIN BACK AT CONVEX

1015 CALIBRATING SONDES AND ITE HAVE PROBLEM WITH GOING UNFREEZING THEN TROUBLESHOOTING ISSUES WITH PH CALIBRATION (NOT STABILIZING, NOT ALLOWING ACCEPTANCE OF THE CALIBRATION POINT)

Location SLC UTA Date 12/21/2-

Project / Client 700 S 1600 E ICE PLUME

1300 MOBILIZE TO MW-30RA

1315 TAKING DOWN TO WATER AND TOTAL DEPTH MEASUREMENTS. TOC IS AT -3M FROM THE MONUMENT

1330 DEPLOYED SOLINST PUMP. ADDED EXCESS OF 75 FT OF TUBING. LIFTED PUMP 5 FT FROM THE BOTTOM OF THE WELL

1345 STARTED DEVELOPMENT

1405 WATER PRESENT

1410 WATER FLOW TO DRIVING AIR IN THE DISCHARGE TUBE. TURNED OFF CONTROLLER, PULLED OUT THE PUMP, NO COOLING. PLACED THE PUMP INTO THE WELL AGAIN. TRIED BUILDING UP WATER COLUMN MORE SLOWLY A FEW TIMES.

1730 DEVELOPED 12 GALLONS. TURBIDITY <50. WATER LEVEL IMPROVED (DIRECTLY OF WELL DEVELOPMENT. SETTINGS USED DURING:

125 PSI

.5 Seconds DISCHARGE

4.5 Seconds RECHARGE (MAXIMUM ALLOWED)

1.5 GHS CYLINDERS USED

FLOWRATE 3GPM FLUCTUATING

USED APOA FOR pH MEASUREMENTS

3 POINT CALIBRATED, SEE THE GHS

1830 TEAM OFFSITE. GETTING SUPPLIES AND CHARGING OF EQUIPMENT

Rite in the Rain

Location SLC VA Date 12/2/20

Project / Client 7005 1600 C PCE REMK

WEATHER	SUNNY, HIGH 41°F, LOW 19°F
TASK	GW WELL DEVELOPMENT
PPE	LEVEL D
PERSONNEL	T. VRTAR (CDM SMITH, AUTHOR), KEVIN MURPHY (WASATCH ENVIRONMENTAL
0700	FIELD TEAM ONSITE
0705	FIELD TEAM TO STAGING AREA TO JOIN DRILLING TEAM IN HES MEETING
0715	FIELD TEAM BACK TO CONNEX TO CALIBRATE EQUIPMENT. ELECTRICITY OUT AGAIN. PH MEASUREMENTS ON YSI NOT WITHIN RANGE, CALIBRATED APERA PH MEASURING TOOL TO USE IN SYNC WITH YSI IF THE MEASUREMENTS ARE NOT GOOD.
0850	FIELD TEAM TO MW-30RB TOC TO MEASUREMENT IS -8.51
0935	STARTED DEVELOPMENT AT WELL MW-30RB
0951	GROUNDWATER PARAMETERS PICKUP FROM FLOWTHRU (3.5 mL/min)
1200	BOTH GAS CYLINDERS EMPTY. PAUSED DEVELOPMENT TO GET NEW GAS CYLINDERS
1230	RESUMING WITH NEW GAS CYLINDERS AT REDUCED PRESSURE FLOWRATE NOW IS 450 mL/min
1315	KEVIN TO CONNEX TO GET DEDICATED PUMP FOR MW-30RA AND GET BAGGING DONE
1345	FEDEX RUN FOR DRILLING TEAM (TEA SHIPPED THE SAMPLES)
1430	WATER QUALITY PARAMETERS STABLE, PURGE VOLUME 37 GALLONS

Location SLC VA Date 12/2/12

Project - Client TOC S/GOOC ICE RUNS

TIME OF PURGING WAS 4 hrs. CONTROLLER PARAMETERS ARE 20 DISCHARGE, 20 RECHARGE, 150 PSI, FLOW RATE ~~#4~~ 5 RIG #4 150 mL/min. USED AFCRA FOR PSI MEASUREMENTS.

1445 DELIVERED DEDICATED PUMP TO MW-30RA

1500 ~~Delivered~~ DECONTAMINATED GEOTECH RECLAIMER PUMP, PICKED EVERYTHING TO GO BACK TO CAMP

1600 ORDERED GAS CYLINDER ~~REPLACED~~ TV 12/2 RESUPPLY AND PICK UP OF EMPTY GAS CYLINDERS. PARTS FOR DEDICATED PUMP DEPLOYMENT AT MW-30RB WERE GATHERED MISSING PARTS WERE IDENTIFIED TO BE PURCHASED. NO ELECTRICITY AT THE CORNER.

1700 FIELD TEAM OFFSITE. KEVIN STOPPING BY THE OFFICE TO PICK UP SUPPLIES. TEA TO HARDWARE STORE TO PICK UP MISSING DEDICATED PUMP PART.

Tim Mk
12/4/12

Location SLC VA Date 12/3/20

Project / Client 700 S 160 E PCE PLUME

WEATHER:	SUNNY, LOW 19°F, HIGH 40°F
TASK:	GW WELL DEVELOPMENT
PPE:	LEVEL D
PERSONNEL:	T. VRTAR (CON SMITH, AUTHOR)
	KEVIN MURPHY (WASATCH ENVIRONMENTAL)
0700	FIELD TEAM ONSITE
0710	FIELD TEAM TO STAGING AREA FOR HEALTH AND SAFETY MEETING WITH DRILLING TEAM
0725	FIELD TEAM TO CONNEX TO CALIBRATE EQUIPMENT. ISSUES WITH EVERYTHING FREEZING. NO ELECTRICITY AT CONNEX.
0900	~~AT~~ DTW THIS TEAM IS AT MW-36. TD = 52.05' DTW = [illegible]
0930	TEAM STARTED BAILING MW-36. BAILED ~25 gallons
1200	DEPLOYED SOLINST PUMP @ 51ft IN MW, 48ft SCH. PUMP TO DEPTH
1240	WATER FLOWING AT 400 mL/min, 3 PUMPS HOSE TO DISCHARGE, 2 DISCHARGE AT 50 PSI. SIDENOTE: THERE IS 2.5 GALLONS OF WATER FROM THE TUBING PREVIOUSLY DEPLOYED AT MW-36. DTW AT THE MOMENT IS 44.53 ftBTOC
1300	STARTED TAKING WATER QUALITY PARAMETERS
1350	PURGING STOPPED AT 21 GALLONS. WATER QUALITY PARAMETERS STABLE, TURBIDITY IS 0. TOTAL VOLUME BAILED AND PURGED MOW IS 46 GALLONS. ALL DETAILS ARE ON THE WELL DEVELOPMENT LOG. SETTINGS ARE THE SAME AS ONES RECORDED AT 1240, FLOWRATE STILL 400 mL/min.

Location SLC V

Project / Client 70

1400 BACK TO
FROM THE
WITH C+C
FROM CONN
THE BACK
IDW AREA
BEEN
OFF AND
FIELD
ON BA
AGAIN,
HE WILL
1500 ASSEMBLE
DEMOB
K. LESLIE
FITTIN
FITTING
1530 FIELD
DEDICA
1645 DEDICA
AT
OF C
CASING
LOGS
170

1400 BACK TO CONNER TO TRANSFER PURGED WATER FROM THE DRUM. ATTEMPTED TO RESOLVE ISSUE WITH LACK OF ELECTRICITY BY REQUESTING HELP FROM LARRY (OFFICE NEAR THE GATES). HE CHECKED THE BREAKERS IN THE SHOP ACROSS FROM THE IDW AREA AND SAID BREAKERS HAVE NOT BEEN TRIPPED. HE TRIED TURNING THEM OFF AND ON AGAIN, NO ELECTRICITY AT CONNER. FIELD TEAM ATTEMPTED FLIPPING SWITCHES ON BREAKERS BEHIND CONNER OFF AND ON AGAIN, NO LUCK. REACHED OUT TO NEIL, HE WILL CONTACT SHANNON TO RESOLVE THE ISSUE.

1500 ASSEMBLED NECESSARY EQUIPMENT FOR DEPLOYMENT OF PUMP AT MW-30RB. K. LESLIE CONFIRMED TO USE SWAGELOK FITTINGS ON MW-30RS AND BARB FITTINGS ON MW-36/37/38.

1530 FIELD TEAM TO MW-30RS TO DEPLOY DEDICATED PUMP.

1645 DEDICATED PUMP DEPLOYED AT MW-30RS AT THE DEPTH OF 28S FEET BELOW TOP OF CASING. SOUNST CAP COULDN'T BE ADDED AS CASING FOR MW-30RA IS TOO CLOSE TO MW-30RB. LOCKS WERE ADDED TO MW-36 AND MW-30RA.

1700 FIELD TEAM OFFSITE.

Rite in the Rain.

Location SLC VA Date 12/9/20

Project / Client 700 S 1600 E PCE ACUTE

WEATHER: SUNNY, LOW 21°F, [illegible]

TASK: GW WELL DEVELOPMENT

PPE: LEVEL D

PERSONNEL: TEA VETLAB (COLT SMITH, AUTHOR)
KEVIN MURRAY (WASATCH ENVIRONMENTAL)

0700 EQUIPMENT CALIBRATED AT HOTEL TO AVOID FREEZING ISSUES.

0810 FIELD TEAM MEETING GW DRILLING TEAM ONSITE FOR HEALTH AND SAFETY MEETING. HELD TEAM HUDDLE

0825 FIELD TEAM TO CONTINUE TO LOAD UP EQUIPMENT FOR DRILLING ACTIVITIES

0845 FIELD TEAM TO MW-38S AND MW-38D. MEASURED WATER LEVEL AND DTW AS WELL AS DISTANCE FROM TOP OF CASING TO THE MONUMENT

WELL:	DTW	TD	TOC TO MONUMENT	LOCATION
MW-38S	35 ft 9.77	36.68	0.98 ft	W
MW-38D	18.66	70.34	0.83 ft	E

0930 BAILED 10 GALLONS FROM MW-38S.

1000 CONNECTED DECHED SAMSI PUMP AT 32 FT BTOC

1015 WATER APPEARS AT 450 mL/min RATE, SETTINGS USED ARE 10 SECONDS 5 DISCHARGE 35 Hz

1130 STARTED BAILING MW-38D

1200 OUT OF GAS, AIRGAS HASN'T DELIVERED THEIR GAS CYLINDERS. KEVIN TO AIRGAS TO PICK UP ADDITIONAL

Location SLC VA Date 12/4/20

Project / Client 703 S 1600 E PCE PLANT

COLT FACILITY #5

ARE RUNNING AT OF DAYLIGHT, WILL PAUSE FOR TODAY AND CONTINUE TOMORROW, 12 ISTS TO TOTAL VAULT PUMPED TODAY IS 40 GALLONS WITH BAILING, WE REMOVED 58 GALLONS CONTINUE TOMORROW WITH SETTINGS FROM ISTS NEXT VISIT

1730 FIELD TEAM TO CONNEX

BOS FIELD TEAM OFFSITE TEAM TO STORE TO GRAB FIELD SUPPLIES.

WEATHER: SUNNY, LOW 24°F, HIGH 41°F
TASK: GW WELL DEVELOPMENT
PPE: LEVEL D
PERSONNEL: TEA VARIAN, JOE MILLER (GW SPECIALIST), KEVIN MURPHY (MASTTEC)
0700 EQUIPMENT CALIBRATED AT THE HOTEL
0800 FIELD TEAM ONSITE
0815 HEALTH AND SAFETY MEETING.
0845 TEA AND KEV TO MW-35D, JOE TO MW-37S
0915 AIRLIFT HAS WATER, PUMP RETRIEVED FROM MW-35D AND REDEPLOYED AGAIN (FIRST TIME DEPLOYED AT 0900).
1000 WELLER WITH WITNESSPIC TO MW TO ~~MINIMIZE~~ MAXIMIZE FLOW RATE. SET UP TO GO RECHARGE 2, DISCHARGE, 105 PSI BEFORE BLOWTHROUGH SECURED AT 110 PSI DECIDED TO CUT THE 3/8" TUBE INTO 2ND AND 10 FT INTERVAL. CONTINUE TO USE 10 FT SETTING AT MW-35D. FINAL SETTINGS WE HAVE SETTLED AT ARE 20 RECHARGE, 10 DISCHARGE, 5 PSI FLOWRATE IS 1300 mL/min.
1155 TURBIDITY SUBSTANTIALLY DECREASED. STARTED TO TAKE READINGS RECORDED IN WELL DEVELOPMENT LOG.
1230 JOE COMPLETED PUMPING AT MW-37S (16 GALLONS) AND MW-37D (20 GALLONS) AND JOINS KEVIN AND

COUNTING SUPPLIES

Rite in the Rain

Location SLC VA Date 12/5/12

Project / Client 700 S 1600 E PCE PLUME

CONT. FROM PAGE 117

TEA AT MW-38D. IDE COLLECTED FOLLOWING ~~RECHARGE~~ TO 1405 MEASUREMENTS FOR MW-37S, D

WELL ID	DTW (ft BTOC)	TD (ft BTOC)	TOC TO WATER MEASUREMENT (ft)
MW-37S	18.32	33.55	0.35
MW-37D	42.3	69.29	0.55

1325 WATER QUALITY PARAMETERS AT MW-38D MET, ~~PCE~~ TO 1405 TOTAL VOLUME PURGED DURING DEVELOPMENT IS 116 GALLONS. DEVELOPMENT COMPLETED.

1345 TEAM TO MW-37S

1405 DEVELOPMENT OF MW-37S STARTED PUMP DEPLOYED AT 28.55 ft BTOC. SETTINGS AT THE CONTROLLER ARE 10s RECHARGE, 5s DISCHARGE, 30 PSI. FLOWRATE IS 1400 mL/min.

1410 KEVIN TO WASATCH ENVIRONMENTAL OFFICE TO PICK UP SUPPLIES.

1515 TEA AND KEVIN TO MW-36 TO DEPLOY THE DEDICATED PUMP.

1630 DEDICATED PUMP DEPLOYED AT 49.5 FT BTOC AT MW-36. TEA AND KEVIN BACK TO MW-37S

1645 WATER QUALITY PARAMETERS MET AT MW-37S. TOTAL VOLUME PURGED IS 48 GALLONS.

1730 TEAM TO CONNEX. UNLOADING RECEIVED BOXES.

1805 FIELD TEAM OFFSITE. TEA TO ACE TO GET SUPPLIES FOR DEPLOYING THE REST OF THE DEDICATED PUMPS.

WEATHER SUNNY, LOW 23°F, HIGH 46 F
RISK GW WELL DEVELOPMENT
PPE LEVEL D
PERSONNEL: TEA VATLAR AND JOE MILLER (CGM SMITH)
VAN EQUIPMENT CALIBRATED AT THE HOTEL
0805 FIELD TEAM ONSITE. JM ARRIVED AT 0745
0815 HEALTH AND SAFETY MEETING
0820 PLACING CYLINDERS STRAPS TO TRUCKS. LOADING EQUIPMENT.
0845 PLACING CONES FOR GW MONITORING EVENT ARMS
0900 FIELD TEAM AT MW-370. DTW = 42.25FT BTOC. TD = 63.84FT BTOC. DEPLOYED AT 63.84' BTOC. CONTROLLER SETTINGS AT 20% RECHARGE. 10S DISCHARGE, 40 psi. FLOWRATE APPROXIMATELY 900 mL/min
1040 JOE TO MW-13L TO BAIL IT. WILL COLLECT DTW FOR MW-13S AND 13D PRIOR TO COLLECTING DTW, TD AND TOC TO FT BTS MEASUREMENTS.
1320 JOE RETURNS TO MW-370 HE BAILED APPROXIMATELY 8 GALLONS FROM MW-13L AND TOOK THE FOLLOWING WATER LEVEL MEASUREMENTS PRIOR TO BAILING AND DISTURBING THE SYSTEM.

WELL ID	DTW	UNITS
MW-13S	14.16	FT BTOC
MW-13D	13.56	FT BTOC
MW-13L	22.09	FT BTOC

Cont'd on page 120

Location SLC VA Date

Project / Client 7005 1600 E PCE PLUME

cont from pg 117

J. MILLER ALSO HAS A FIELD NOTEBOOK WHERE ALL MEASUREMENTS ARE RECORDED. DISTANCE FROM TOC TO TOP OF MONITOR IS 0.5'

1330 STARTED RECORDING WATER QUALITY PARAMETERS AFTER THE TURBIDITY HAS DECREASED

1425 WELL ~~APPEARS~~ TO BE WQ PARAMETERS ARE STABLE AFTER AN HOUR OF TAKING MEASUREMENTS. WELL DEVELOPMENT IS COMPLETE AFTER APPROXIMATELY 48 GALLONS OF GROUNDWATER GOT PURGED. SETTINGS AND FLOWRATE WERE THE SAME AS INPUT RECORDED AT 0900

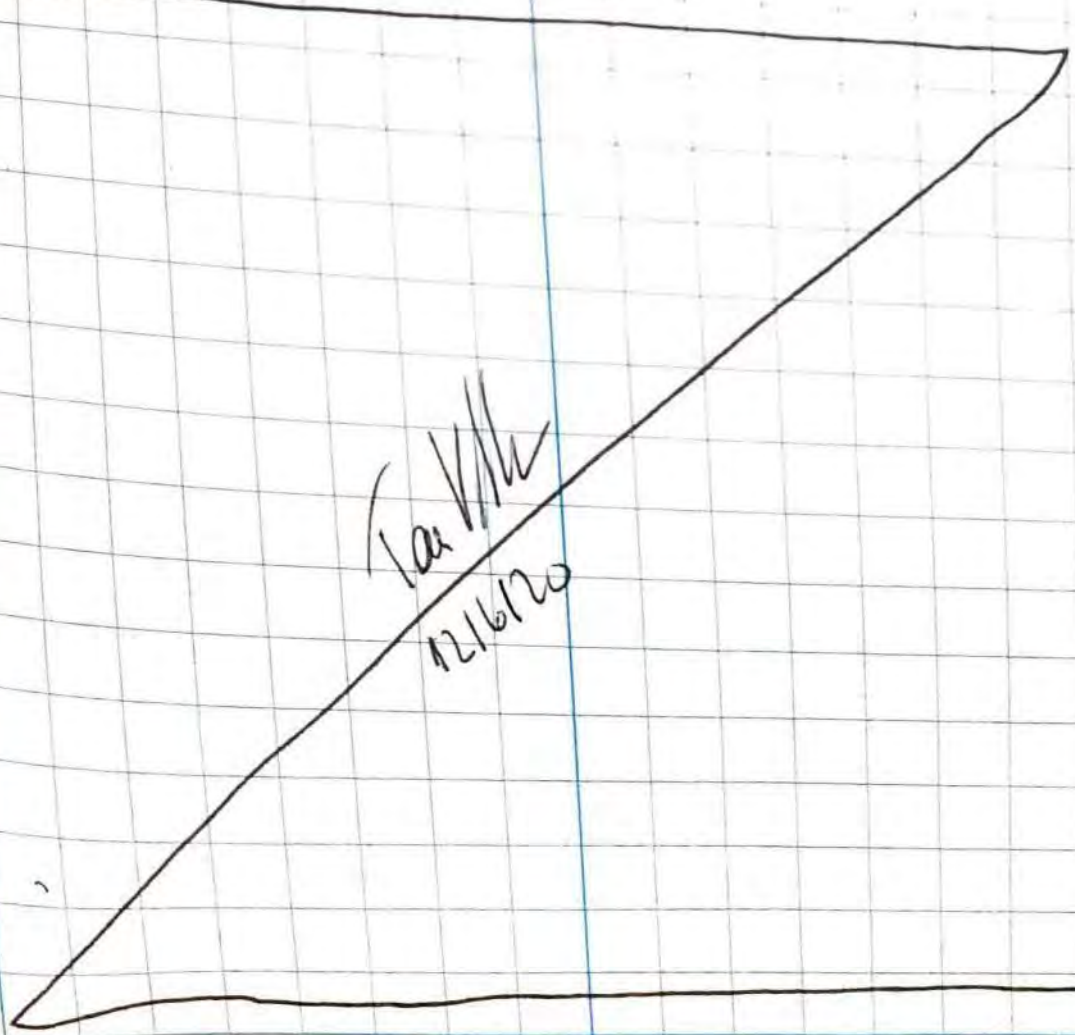
1445 FIELD TEAM TO MW-13L. AFTER BACKING 8 FT TO MEASURED BY WATER LEVEL METER IS 150 WE KNOW THAT THE WELL SHOULD BE AT -160 FT BTOC TO SO PUMP WAS DEPLOYED AT THE BOTTOM AND LIFTED 1 FT. MEASURED PUMP TOC DEPTH WAS 148.7 FT BTOC, INDICATING THAT PURGING STARTED AT 151.2 FT BTOC. NOTE IS THAT WELL DEVELOPMENT WILL ALLOW FOR FURTHER LOWERING OF THE PUMP, UP TO DESIRED DEPTH OF 154 FT. ONCE DEVELOPMENT AT THAT DEPTH IS MET, THE DEDICATED PUMP WOULD BE DEPLOYED AT ~ 155 FT

1530 GROUNDWATER APPEARS. CONTROLLER SETTINGS ARE 11s RECHARGE, 9s DISCHARGE, 85 PSI. FLOWRATE IS 1500 mL/min.

1630 STOPPED DEVELOPMENT DUE TO LACK OF SUNLIGHT. PURGED A TOTAL OF 17 GALLONS. MEASURED TOTAL DEPTH, WHICH IS NOW ~~AT~~ 152 FT BTOC. PUMP APPEARS TO BE WORKING MORE EFFICIENTLY THAN BAILING. DEVELOPMENT WILL BE CONTINUED FIRST THING TOMORROW MORNING.

1645 FIELD TEAM TO CONNEX

1740 FIELD TEAM OFFSITE



Location SLC UT Date 12/7/20

Project / Client 7005 1620 E PCE PLUME

WEATHER: SUNNY, LOW 21°F, HIGH 43°F

TASK: GW WELL DEVELOPMENT

PPE: LEVEL D

PERSONNEL: TEA (CON SMITH, AUTHOR)
KEVIN MURPHY (WASATCH ENVIRONMENTAL)
JOE MILLER, EMMA PUTT (CON SMITH)

0630 EQUIPMENT CALIBRATED AT THE HOTEL

0730 TEA AND JOE ONSITE LOADING EQUIPMENT

0800 MEETING GW SAMPLING TEAM AT OFFICE

0815 HEALTH AND SAFETY MEETING WITH GW SAMPLING TEAM.

0840 TEA, JOE AND KEVIN @ MW-13L CONNECTED UP LINES FROM BOTH TUBINGS FROM TO DEPTH OF PUMP AT 151.7 FT BTOC. JOE ALSO TOOK MEASUREMENTS AND LOGGED THEM IN HIS FIELD NOTEBOOK. DECIDED A PUMP RATE OF BETWEEN 400-500 ML/MIN. SINCE THEY'RE NEW. TRIED SUCKING, VORTEXING SURFACE PARTS OF TUBING. CONTROLLER DON'T RELEASE AIR. KEVIN HAD TO CONNECT TO GET A DIFFERENT CONTROLLER. TUBING AND EXISTING CONTROLLER POWER WENT DOWN TO HEAT UP USING AIR.

1020 KEVIN AND TEA TO PICK UP GAS CYLINDERS (5) FROM AIRGAS.

1100 BACK TO MW-13L. CONTROLLER RELEASING PRESSURE WITH DELAY. TRIED GW MONITORING TEAM'S CONTROLLER. GOT ~300 ML/MIN FLOW.

Location SLC VA Date 12/2/20

Project / Client 7905 1600 E PCE PLUME

1215 KEVIN AND TEA DEPLOYING PUMPS AT MW-37
TOOK DTW MEASUREMENTS: MW-385 AT 19.59 FT BTOC,
0.93' FROM TOC TO TOP OF MONUMENT.
MW-380 18.53 FT BTOC, 0.82' TOC TO TOP OF
MONUMENT.
TD AT MW-385 IS 36.49' BTOC. DEDICATED
PUMP DEPLOYED AT 32 FT BTOC AT MW-385.

1300 TD AT MW-380 IS 70.3' BTOC. DEPLOYED
DEDICATED PUMP AT 65 FEET BTOC

1330 KEVIN AND TEA TO CONNEX, WHILE SKIMMING
DTW MEASUREMENTS AT MW-13C, OBTAINING
WATERRA PUMP AND TUBING FROM CONNEX,
GETTING SKINNY WATER LEVEL METER FROM GW
SAMPLING TEAM

1420 TEA, ENNA AND KEVIN TO MW-34 TO USE
WATERRA PUMP ON MW-34A TAKE DTW MEASU-
REMENTS: MW-34A 130.75 FT BTOC, 0.53' BTW
TO MONUMENT AND MW-34B IS 130.60 FT BTOC *

1504 STARTED PUMPING WITH WATERRA PUMP

* WATER LEVEL AT MW-34C IS 129.87 FT BTOC.
WATER LEVEL AT MW-34D IS 130.0 FT BTOC

1521 WATER EMERGES, USING THE SPEED OF THE PUMP NO WATER
ON THE OTHER END. CUT 200 FT OF 500 FT
TUBING

Rite in the Rain

124 Location SLC UT Date 12/7/20

Project / Client 7003 1600 E PCE PLUME

1545 650 mL/min OF WATER PURGE RATE AT MW-36A. EMMA LEFT 36A TO HELP JOE AT MW-13L CONNECTED PUMP TO TEA'S TRUCK. FLOWRATE 800 mL/MIN

1630 STARTED TAKING WATER QUALITY MEASUREMENTS. TURBIDITY STILL TOO HIGH TO READ, WATER LEVEL METER CANNOT BE DEPLOYED ALONGSIDE WATERRA TUBING.

1645 STOPPED PURGING DUE TO SUNSET AND LACK OF SUNLIGHT. PURGED TOTAL OF 15 gallons. DEVELOPMENT WILL CONTINUE IN THE MORNING

1700 KEVIN AND TEA TO CONNER. JOE HAS APPROVED THE DEVELOPMENT AND KEPT TRACK OF ALL THE CHALLENGES ENCOUNTERED TODAY IN HIS FIELD NOTEBOOK. HE WILL CONTINUE DEVELOPMENT AT MW-13L IN THE MORNING. HE ALSO JOE WITH COLLECTION OF IDW SAMPLES.

1835 FIELD TEAM OFFSITE.

12/7/20

WEATHER: SUNNY, LOW 23°F, HIGH 44°F
TASK: GW WELL DEVELOPMENT
PPE: LEVEL D
PERSONNEL: TEA VIETMAN (CON SMITH, AUTHOR)
KEVIN MURPHY (LANDFATCH ENVIRONMENTAL)
JOE MILLER (CON SMITH)

0700 EQUIPMENT CALIBRATED AT THE MOTEL
0800 FIELD TEAM ONSITE
0815 HEALTH AND SAFETY MEETING WITH GW SAMPLING TEAM.
0845 TEAM TO MW-34A. MW-13L DEVELOPMENT NO LONGER A PRIORITY SO JOE JOINED THE GW SAMPLING TEAM. ~~TD = 130.95 FT BTOC~~ DTW = 13.45, TD = 152.64 FT BTOC. TOC NOTCH OF MEASUREMENT IS 0.55 FT
0920 STARTED WELL DEVELOPMENT, PURGE RATE IS 450 mL/min
1000 NO WATER LEVEL DROPPING. GUESSING IT IS DUE TO DRAWING OUT THE WELL. GETTING THE WELL DISCHARGE FOR 10 MINUTES. NOT WORKING. TRIED PULLING OUT THE TUBING. THERE WERE CRAZY ISSUES WITH CHECK VALVE. CLEANED OUT CHECK VALVE AND TUBING. GOT 600 mL/min, THEN NO FLOW. TRIED STARTING AND GETTING RECHARGE, NO LUCK. TRIED POWERING FROM GENERATOR INSTEAD OF INVERTER

cont'd on page 126

Location SLC VA Date 12/8/20

Project / Client 720 S 162 E PW: PLUME

cont from pg 125

DIDN'T WORK. TRIED RESETTING DTW AGAIN IT'S 130.45 FT BTOC SO NOT A DRAWDOWN ISSUE. TRIED SLOWLY PURGING FOR EXTENDED PERIOD, CHECK VALVE IS 1 FT ABOVE TD. NO FLOW. GOT FLOW WHEN WE CLIPPED OF CHECK VALVE 2 FT ABOVE THE BOTTOM OF THE WELL. NOTICED THAT TUBING IS MOVING. ROPED A VICE GRIP ON TOP OF THE PUMP TO HELP WITH HOLDING TUBING. WORKS FOR NOW

1250 STARTED TAKING WATER QUALITY READINGS TURBIDITY > 7000 NTU FLOW IS ~1000 mL/min

1315 STARTED USING MW2 READINGS UPPED THE FLOW TO MAX ~ 2400 mL/min. WAITING FOR TURBIDITY TO DROP.

1400 SIGNIFICANT DECREASE IN TURBIDITY OBSERVED REDUCED FLOWRATE TO 800 mL/min, TAKING WATER QUALITY MEASUREMENTS AGAIN

1545 TURBIDITY DROPPED BELOW 100 NTU, OK TO STOP. PURGED A TOTAL OF .885 GALLONS (STOPPED AT 1541) FLOWRATE AT THE END WAS 1100 mL/min

1600 TEAM TO MW-26B.

1630 SETUP AT MW-26B. DTW AT MW-26B IS 195.28 FT BTOC, TD IS ~~245.8 FT~~ 246.32 BTOC (MW 12/8/20) TOC TO TOP OF MONUMENT IS 0.6 FT. DECIDED TO SET PUMP AT APPROXIMATELY 245 FT BTOC.

Location SLC VA Date 12/18/20

Project / Client 700 S 600 E PCE PLUME

1640 STARTED DEVELOPMENT OF MW-20B. PUMP ORIENTED FOR 15 MIN; NO WATER WAS PURGED. PULLED THE TUBING OUT, ABOUT 20 FT OF WATER WITH HIGH TURBIDITY WAS IN THE TUBING. STOPPING DEVELOPMENT FOR THE DAY, KEVIN WILL CONTINUE TOMORROW.

1700 BACK TO CONNEX TO UNLOAD THE TRUCK. ELECTRICITY DISAPPEARED AGAIN. USED GENERATOR FOR REMOVING WATER FROM THE BARRELS.

1805 TEAM OFFSITE. TEX AND JOE LEAVING TOMORROW.

Tom Vik 12/18/20

Rite in the Rain

Appendix C

Utility Locate Reports

Utility Locate Report

SITE

VA Plume, Salt Lake City, Utah

11/3/2020

PREPARED FOR

CDM Smith

PREPARED BY

TWS ENVIRONMENTAL, LLC

Denver, CO

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2.2 Equipment On Site 6
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CLIENT NAME:	CDM Smith
CLIENT ADDRESS:	555 17th Street Suite 500 Denver, CO 80202
PROJECT NAME & LOCATION ADDRESS:	VA Plume – Salt Lake City, Utah
TWS PROJECT MANAGER:	Jeff Baker
TWS TEAM REPRESENTATIVE:	Jeff Baker

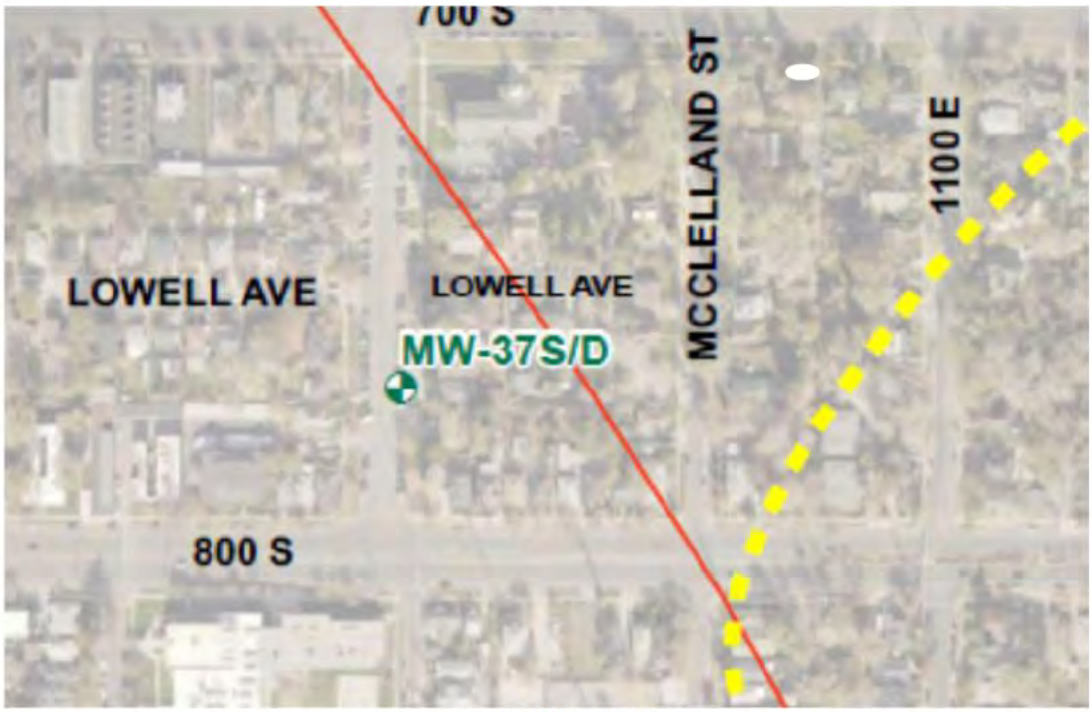


Fig 1. MW-37 S/D

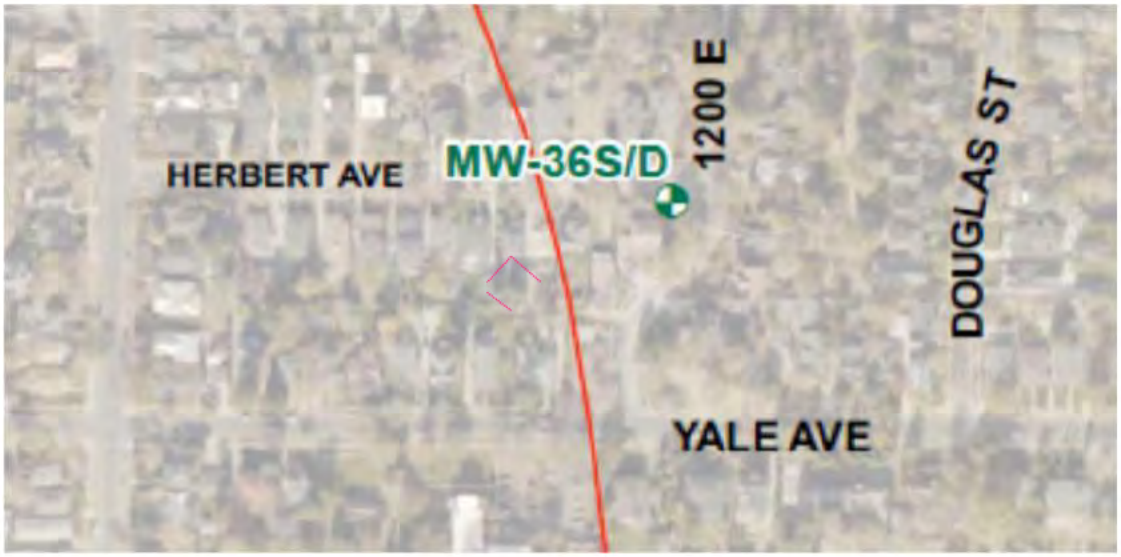


Fig 2. MW-36 S/D

Fig 3. MW-38 S/D

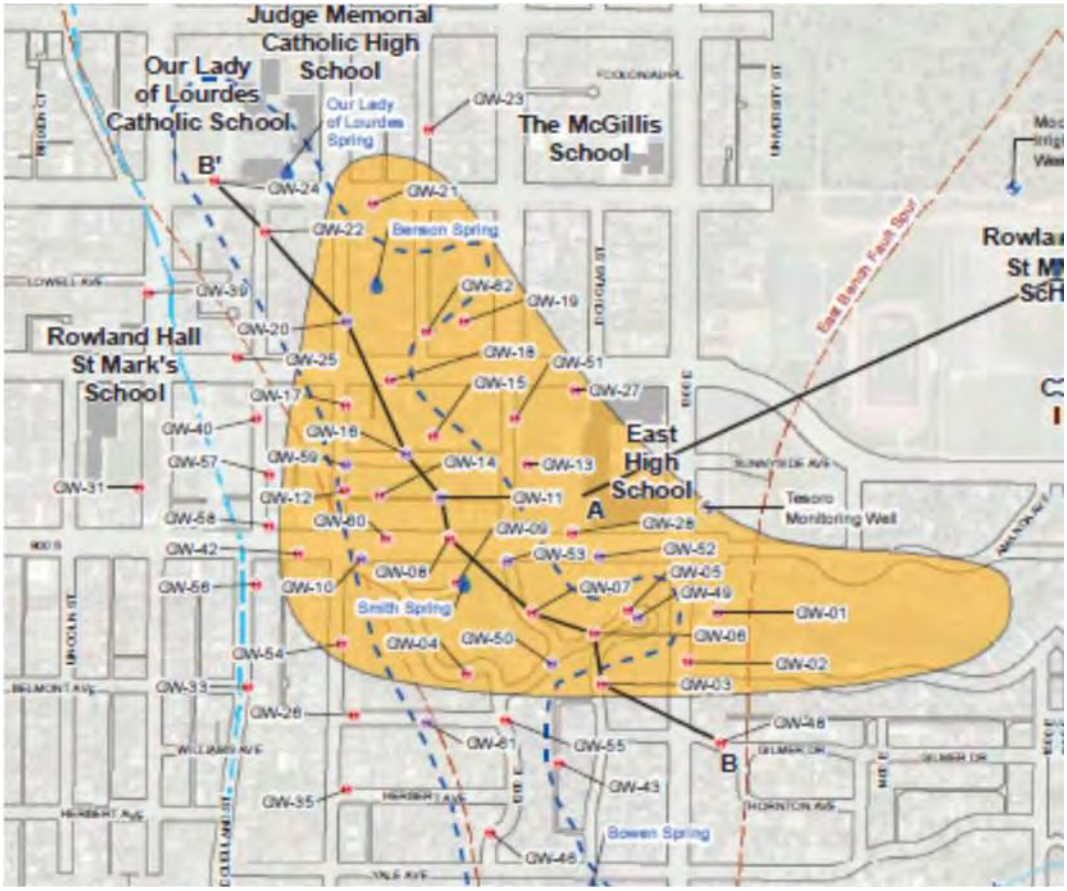


Fig 4. AOU-1

2.1 Site Location

The sites are located across East Side Springs and are part of OU-2 Remedial Investigation 700 South 1600 East PCE Plume Salt Lake City, Utah.

2.2 Equipment on Site:

- **SeekTech SR-20 Line Tracer and Underground Utility Locator**
- **SeekTech ST-305 Line Transmitter**
- **Schonstedt GA-52-Cx Magnetometer**
- **Ground-penetrating radar: GSSI UtilityScan/ rough terrain cart**

2.3 Equipment Capabilities:

Electromagnetic Induction

Electromagnetic Inductions consists of two steps. First, a transmitter is used to transfer an alternating electrical current to the pipe or wire to be located. Next, a receiver is used to analyze the transmitted signal, and localize the position and depth of the facility. The transmitter can transfer the signal to the facility either by a direct connections, or by inducing a signal. The direct connect method introduces a signal into pipes or cables (or the fluids within pipes) that is radiated from the facility to aid its detection and location. The surface-induced method generates a signal a t the ground surface that will induce a response in the cable, pipe or tracer wire underground.

Typical applications:

- Conductive utilities: Steel or copper pipes (water service, gas service) Copper telecom cables.
- Tracer lines on non-conductive utilities

Limitations:

- EM/RF locating requires a conductive object (pipe, cable, conduit, or tracer) into which a radio signal can be introduced. The signal cannot travel through non-conductive (insulating) materials. The signal may be interrupted or lost on a conductive utility that is not continuous (damaged, broken, corroded, repaired with non-conductive materials, or constructed of segments with non-conductive gaskets, i.e. rubber)
- RF locating requires some level of access or prior knowledge to effectively introduce the radio signal. An exposed portion (or end) of a utility is needed for direct connections or to utilize an inductive clamp. A point of well-known location and direction is needed for an inductive drop.
- RF locating signals are susceptible to “bleeding” onto nearby conductive utilities. Due care will be taken to recognize and minimize bleed-off, and to confirm utility locations with alternate methods. All utility marks should be afforded and industry-standard tolerance zone of 24” to either side.

- A known (or visible) point of connection is generally needed to identify the function of a

utility.
- A hand-dug or vacuum-excavated test hole should be used to precisely confirm horizontal or vertical locations of any utility.

Magnetometer

The GA-52Cx magnetic locator detects the magnetic field of ferromagnetic objects. It responds to the difference in the magnetic field between two sensors that are spaced approximately 20 inches apart. This difference is referred to as the "signal strength" and is represented in the instrument by an audio tone.

Typical applications:

- Locating ferrous pipes/utilities: Steel or other ferrous metal objects or pipes can be located with this tool.

Limitations:

- The instrument will not detect non-ferrous metals, such as gold, silver, copper, brass and aluminum.

Ground-Penetrating Radar (GPR)

350 MHz "HyperStacking" GPR Antenna – GPR works by sending a tiny pulse of energy into a material and recording the strength and the time required for the return of any reflected signal. Our GPR system uses state of the art HyperStacking Technology which provides excellent near-surface resolution and increased depth penetration in all soil types. We will be able to quickly search the location and depth of service utilities such as gas, communications, and sewer lines – as well as other metallic and nonmetallic targets including underground storage tanks and PVC pipes. For rough terrain conditions, we are able to place the unit into a rugged utility cart to complete the search.

Principle of operation:

- Ground- penetrating radar (GPR) uses a pair of radio antennas (transmitting and receiving), moved together across the ground surface. The transmitted radar wave penetrates into the ground until it reaches an "interface", or boundary, between materials of differing electrical properties. The wave is then reflected and detected by the receiving antenna.

Typical applications:

- Non- conductive utilities: Plastic pipes, gas and water main/services, etc. Bituminous fiber pipe ("Orangeburg", "Bermico"), asbestos-cement pipes ("Transite"). Cast iron pipe with rubber gaskets, or other insulating materials.

- Subsurface structures: Buried tanks, cisterns, septic tanks, cesspools, dry wells and oil-water separators. Buried vaults, manholes, and utility tunnels. Historical building foundations and other structures.

Limitations:

- For an object to produce a signal that is able to be interpreted by operations, the transmitted radar wave must penetrate to the depth of the object of interest, reflect, and return the receiving antenna.

- Depth of penetration is reduced by soils that are electrically conductive, due to water saturation or otherwise. Depth of penetrating is reduced by especially rocky, mixed, or inconsistent soil. A metallic ground surface (i.e. steel plate), or standing water, interferes with penetration of the transmitted signal into the soil.

- A reflection of the radar signal depends on the "interface", or boundary, of materials of differing electrical properties – such as the encountered at boundaries between soil layers of differing compaction, or at the surface of a hard object embedded in the soil. The reflection is weakened when the boundary has a lower contrast in electrical properties. An object of a give diameter will producte a reflection of decreasing strength with increasing depth to cover. Generally, one inch of diameter is required, per foot of cover, to produce a strong reflection.

- A known (or visible) point of connecting is generally needed to identify the function of a utility.

- Any utility, subsurface structure, or anomaly located with GPR and marked on site should be afforded an industry – standard tolerance zoned of 24'.

- A hand-dug or vacuum-excavated test hole should be used to precisely confirm horizontal or vertical location of any utility.

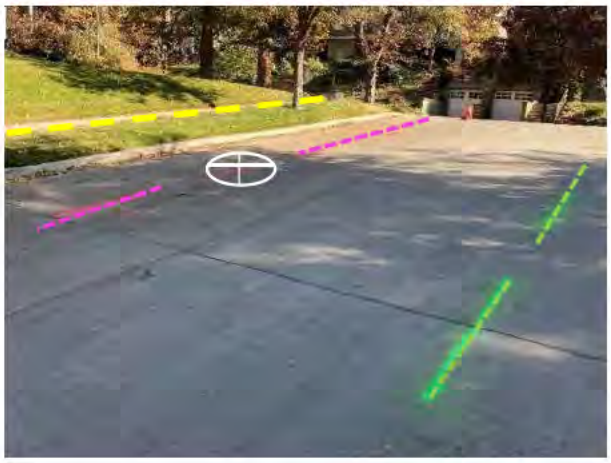
3.1 Physical Setting

The sites are located in Salt Lake City, Utah. These sites are a combination of neighbor hoods that are near the VA hospital campus including residential neighborhoods to the West of the campus. There are a total of three (3) proposed well locations MW 37, MW 36 and MW 38 (MW-38 had two areas scanned as options) and 10 ground water locations that were scanned on this round of work. There were no locations on the VA campus on this round of work. The well locations were all in or near parking lanes on the street. The majority of the ground water locations were located in landscaped/grass areas near residential homes and included GW-20, GW-16, GW-59, GW-11, GW-10, GW-53, GW52, GW-49, GW-50 and GW-61. Once all health and safety discussions and a tailgate meeting with the CDM field staff was completed, the crew proceeded to clear the area around each proposed location. This occurred over the course of one day on Tuesday, November 3rd, 2020. The temperature was in the low to mid 60's during this engagement. Skies were mostly clear.

3.2 Results

TWS personnel worked on site to locate and mark utilities, and to survey the areas of the proposed boring/well locations residential locations on November 3rd, 2020. Methods used include both radio-frequency (EM/RF) locating and ground-penetrating radar (GPR) as well as utilizing a magnetometer/pipe locator. As disclosed at the bidding stage, GPR penetration rates in the Salt Lake area were expected to be between 0-3 feet bgs. Depths beyond that may be impacted by soil conditions and data quality may be affected. Utilities located and marked in the vicinity of the work areas included anomalies/unknowns electrical, gas, water, and communication. There were also storm water drains and sewer networks across the properties. A combination of paint on the ground and paint and pin flags in the grassy areas were utilized to mark out utilities and anomalies in the general areas where there are proposed boring/well locations are planned. It is recommended that the areas for MW-38 (both the location off Elizabeth and 1200 E) as well as all of the ground water (GW) locations be called in to Blue Stake of Utah 811 prior to any drilling activities.

3.3 Project Photos



MW-36, anomaly (pink) located running through the proposed boring location, gas and sewer marked as well..

MW-37, gas and sewer (located in the grass parallel to the roadway) located and marked.

MW 38 (Elizabeth Street option) note proximity of water line markings. Sewer in center of street, recommend engaging Blue Stake before proceeding.

MW 38 (1200 E option) Water located along sidewalk and crossing the street to the North of the proposed location. Recommend engaging Blue Stake before proceeding.

GW-10, multiple communication and sewer lines nearby proposed location.

GW-11, storm water drainage runs down the alley approximately in the middle of the road.

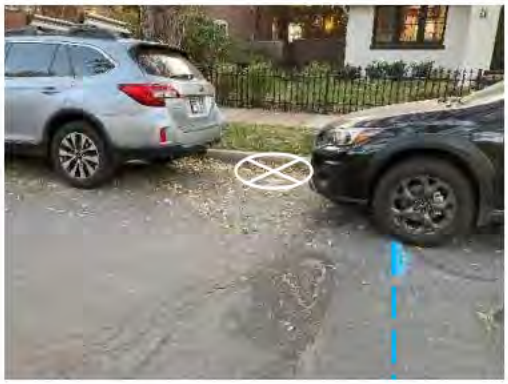
Storm water lines and unknown line located in street adjacent form existing GW-16 location

Water line located running up the street adjacent to planter where GW-20 was located in the planter area.

GW-49, possible storm water line running along the road parallel to the site.

GW-52, Communication running along the road, gas and power between the sidewalk and GW-52.

Water, sewer and power near intersection near proposed work area for GW-53.



Water near proposed work area for GW-53. (Relocated by CDM Staff)

Water and drain lines near proposed work area for GW-59.

Electrical lines in planter near proposed work area for GW-61

Metal landscaping rings potentially interfering with magnetometer readings near. MW-61.

Appendix D

Traffic Control Plan

UTAH BARRICADE
Your Safety Is our Business

Date: 11/4/20 **Author:** ERNESTO

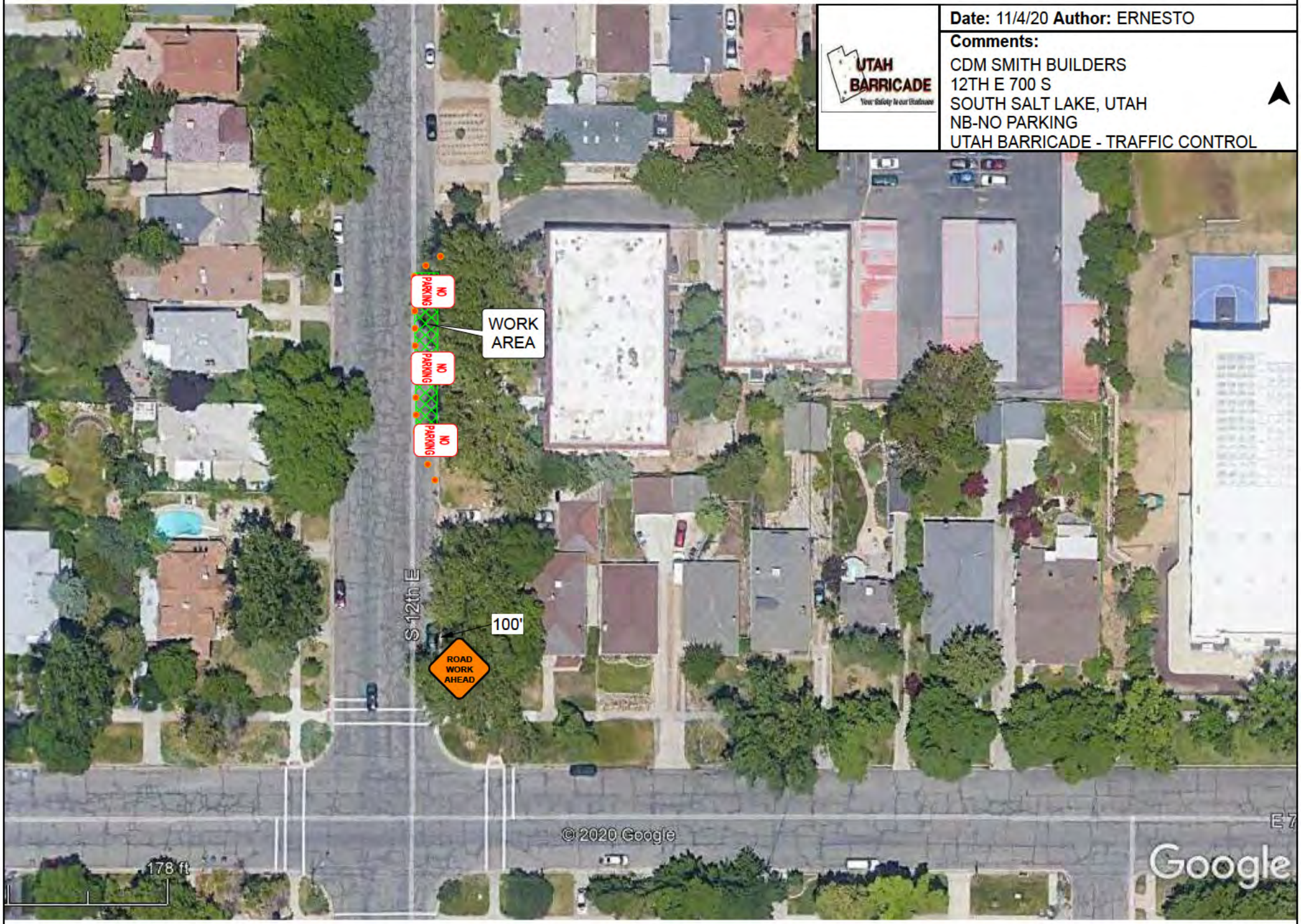
Comments:

CDM SMITH
1000 E LOWELL AVE
SOUTH SALT LAKE, UTAH
SB-SHOULDER WORK & SIDEWALK
UTAH BARRICADE - TRAFFIC CONTROL

Date: 11/4/20 **Author:** ERNESTO

Comments:

CDM SMITH BUILDERS
12TH E 700 S
SOUTH SALT LAKE, UTAH
NB-NO PARKING
UTAH BARRICADE - TRAFFIC CONTROL



www.invarion.com

UTAH BARRICADE
Your Safety Is our Business

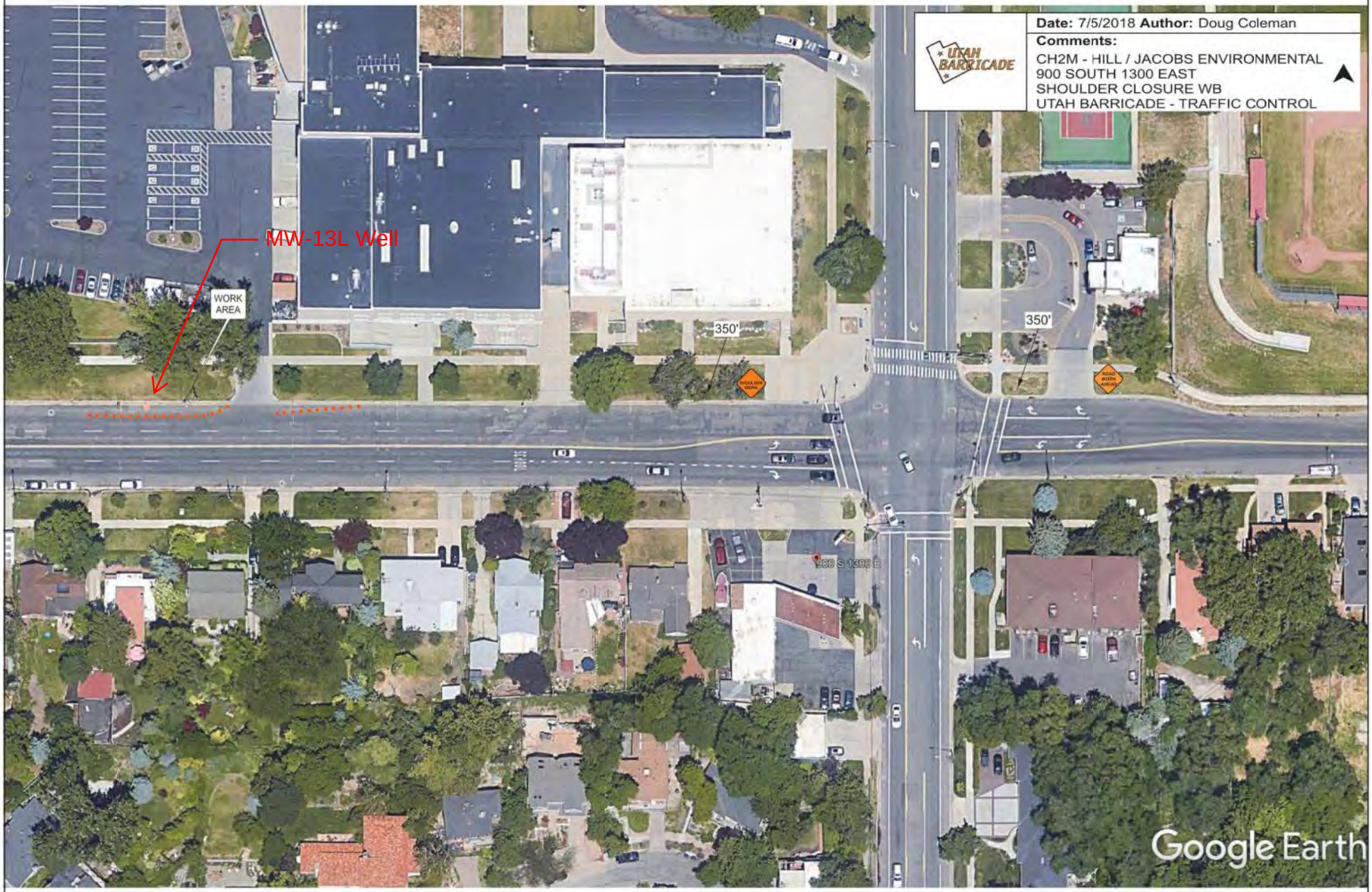
Date: 10/29/20 **Author:** ERNESTO

Comments:

CDM SMITH
HERBERT AVE 12TH E
SOUTH SALT LAKE, UTAH
SHOULDER WORK
UTAH BARRICADE - TRAFFIC CONTROL

MW-13S/D Traffic Control Plan

www.invarion.com



Appendix E

Salt Lake City Traffic Control, Engineering, and Right-of-Way Permits

SALT LAKE CITY CORPORATION
ENGINEERING DIVISION
349 SOUTH 200 EAST, SUITE 100
SALT LAKE CITY, UTAH 84111
PHONE (801) 535-6396
FAX (801) 535-6093
engpermit@slcgov.com

ENG2020-02422

Assigned Inspector: Jack Crockett
Office Phone: 801.703.5964
Cell Phone:

Please contact inspector 24 hours before beginning work

PERMIT TO WORK IN THE PUBLIC WAY

Job Address:	**Contractor Phone**
[redacted]	Phone1: Phone2: FAX:

Applicant Name:	Business Name: CDM FEDERAL PROGRAMS	Mailing Address: SALT LAKE CITY, UT

Traffic Control Plan		**Starting and Ending Dates**		**Fee**	
Barricade Manual Figure	**TA6**	Begin Date:	**11/09/2020**	Total Fee:	**$123.75**
Traffic Permit Number:	**TRN2020-02820, 2821, 2822**	Expiration Date:	**12/07/2020**		

Certificate of Insurance as Per City Ordinance – Chapter 14.32.065	Number: TB7611B8T8Z6040T
Bonds As Per City Ordinance – Chapter 14.32.070	Number: 9340850
State Contractors License As Per City Ordinance – Chapter 14.32.025	Number:

Work Type: **Test Bore**
Drawing Included: **Yes**
APWA Standard:

Field Contact: Joe **Phone:** 513.602.1619

Comments or Additional Requirements:
Installation of 3 monitoring wells. [redacted] Work will only take 3-4 days. Project manager will call Jack when complete. Joe 513.602.1619 additional monitoring well is being added to the project. A week fee and well fee has been added. -Jack Crockett 11/24/2020 Added approximately 2 week(s) to the permit The old completion date was 11/27/2020 The new completion date is 12/07/2020 Changes performed by Jack Crockett on 11/24/2020 Extension fees not charged because: A fee was already applied. The amount of time occupying the public way is reflected in that fee. The drilling schedule is tentative so a wide range was provided.

Notice: CALL 24 HOURS BEFORE COMMENCING WORK (535-6727) for Public Utility inspections or assigned inspector for all other inspections or 48 hours if work is scheduled on holidays and weekends. **Digging within ten feet (10') of any parkstrip street tree requires written authorization from Salt Lake City Urban Forestry. Contact Urban Forestry at (801) 535-7818, before any excavation with in ten feet of a street tree, for inspection and authorization.**
BEFORE EXCAVATION CONTACT BLUE STAKES – 811 or 1-800-662-4111

PERMIT APPLICATION: Application is hereby made for a permit to work in the public way as specified above. Applicant agrees to the terms on the reverse side and to any increase in fees should they be required by Engineering.
Print name of Applicant:

Signature of Applicant: Joe Miller Date: 11/24/2020

Permit Issued By: Jack Crockett

**** WORK GUARANTEED - 3 YEARS FROM ACCEPTANCE DATE ****

GENERAL CONDITIONS

ACCEPTANCE OF CONDITIONS. It is understood and agreed by the Permittee that performing any work under this permit constitutes acceptance of Title 14 Chapter 32 of the Revised Ordinances of Salt Lake City and the City's Regulations for controlling construction, excavation and obstructions in the Public Right ¬of ¬Way, latest revision.
PROXIMATE WORK. Applicant agrees that no other work shall be done under this permit except that specifically set forth herein. It is the applicants responsibility to verify the exact location of city and private facilities prior to commencing excavation operations.
PERMIT AND DRAWINGS AT JOB SITE. The permittee shall have at the work site a copy of the permit, the traffic control plan, and the City approved drawings. NOTIFICATION. Notify the assigned inspector 24 hours before commencing work. Provide the following information: permit number, name and telephone number of permittee, date/time work is to commence, location of work and any other information which may be relevant to the work.
CONFORMANCE TO EXISTING LAWS AND CITY SPECIFICATIONS. Permittee agrees to be fully informed of all federal, state and local laws, ordinances, rules, regulations, and City Construction Specifications which, in any manner, affect the work, and at all times shall observe and comply with such laws, ordinances, rules, regulations and specifications. The City Engineer reserves the right to shut down and/or issue a citation for violation of these provisions.
ENVIRONMENTAL LIABILITY. Permittee agrees to indemnify, defend and hold harmless Salt Lake City, its officers, agents and employees against any claims, losses, damages, or expenses, including, without limitation, any fees or penalties imposed by the United States Environmental Protection Agency, the Utah State Department of Environmental Protection Agency, the Utah State Department of Environmental Quality or any other government or regulatory agency and any attorney's fees or costs sustained on account of, or related to, the presence, release, discovery or creation of hazardous wastes or similar materials as those materials are defined under applicable federal or state statutes or regulations, including, without limitation, the Resource Conservation and Recovery Act of 1976.
STANDARD SPECIFICATIONS AND STANDARD DRAWINGS. Comply with all Salt Lake City Standard Specifications and Standard Drawings for cutting surface, traffic control, backfill, compaction, selection of subgrade materials, asphalt and concrete surfacing requirements. Printed copies of the Regulations and Specifications can be obtained through the City Engineer's Office.
WARRANTY. Permittee shall guarantee the worksite restoration for a period of three years from completion and acceptance of the work, reasonable wear and tear excepted.

SPECIAL CONDITIONS

EXCAVATION OPERATIONS BLUE STAKES. Before commencing excavation operations, Permittee shall call "Blue Stakes" at 811
TRAFFIC CONTROL DEVICES. Traffic control devices must be in place before excavation begins.
ENVIRONMENTAL CONTROL DUST AND DEBRIS. Keep dust and debris controlled at the work site at all times. If necessary, wet down dusty areas with water and provide containers for debris.
WHEEL CLEANING ORDINANCE. Conform to Section 18.20.210 of the Revised Ordinances of Salt Lake City, 1987. The ordinance describes the City's requirements for keeping the public way clean.
NOISE. Permittee shall control noise in accordance with the Salt Lake County Health Department Noise Ordinance.
CLEANUP. Remove all equipment, material, barricades and similar items from the right of way. Areas used for storage of excavated material will be smoothed and returned to their original contour. Vacuum sweeping or hand sweeping is required when Engineer determines cleaning equipment is ineffective.
CONFORMANCE TO ENGINEERING REGULATIONS. All provisions of Salt Lake City Engineering Regulation 5¬R¬4, "Regulations for Controlling Construction in the City's Public Way", and other pertinent Engineering Regulations, will be adhered to. Engineering Regulations can be obtained in the office of the City Engineer, 349 South 200 East, Suite 100, Salt Lake City, Utah 84111.
TRAFFIC INTERRUPTION. Construction operations will be conducted in a manner to minimize the amount of interference or interruption of roadway traffic. Except during emergency conditions or unless authorized by the Engineer, construction operations such as excavation, backfill and pavement restoration on major/collector and CBD streets are prohibited during peak traffic hours of 7:00 to 9:00 a.m. and 4:00 to 6:00 p.m.
TRAFFIC CONTROL MANUAL. All provisions of the current "Traffic Control Manual" shall be adhered to. This manual provides regulations concerning traffic control construction barricades, road closures, public and private access, traffic control signing, traffic control in Central Business Area and traffic control devices.
EMERGENCY INFORMATION. Permittee shall clearly post on barricades in letters not less than two inches (2 in.) high emergency information consisting of the name and emergency telephone number of the permittee, and the permittee shall cause at least one such barricade per block to be erected at every job site until the work is complete and formally accepted by the City.
STREET EXCAVATION IN WINTER. Excavation of City Streets during the winter months (herein defined as November 15 to April 1) will be allowed only if the work is a new service connection, required maintenance or emergency, or otherwise approved by the Engineer. Permanent patching of City streets excavated in the winter may be delayed until April 1, provided the permittee provides and maintains a temporary asphalt surface until such time as the permanent surfacing is accomplished.
PRECONSTRUCTION PICTURES OF EXISTING PUBLIC WAY IMPROVEMENTS. Prior to commencing the permit work, the permittee is encouraged to secure pictures of the conditions of the existing public way improvements such as curbing, sidewalk, landscaping, asphalt surfaces, etc.
TIME LIMIT. Unless authorized otherwise by the Engineer on the permit, all paving and replacement of street facilities shall be done within seven (7) calendar days from the time the excavation commences, or within three (3) calendar days on major or collector streets from the time excavation commences, except as provided for during excavation in winter or during weather conditions that do not allow paving according to applicable standards and specifications. If work is expected to exceed the above duration, the permittee shall submit a detailed construction schedule for approval. The schedule will address means and methods to minimize traffic disruption and complete the construction as soon as possible.
EXCAVATION WITHIN 10 FEET OF STREET TREES. Before commencing excavation activities, Permittee shall contact Salt Lake City Urban Forestry (801) 535-7818 for an inspection.

SALT LAKE CITY CORPORATION
ENGINEERING DIVISION
349 SOUTH 200 EAST, SUITE 100
SALT LAKE CITY, UTAH 84111
PHONE (801) 535-6248
FAX (801) 535-6093
engpermit@slcgov.com

PERMIT NUMBER: ENG2020-02422

Assigned Inspector: Jack Crockett
Office Phone: 801.703.5964
Cell Phone:

PERMIT TO WORK IN THE PUBLIC WAY

Job Address: [redacted]	**Contractor Phone**
	Phone1: Phone2: FAX:

Applicant Name:	Business Name: CDM FEDERAL PROGRAMS	Mailing Address: SALT LAKE CITY, UT

Traffic Control Plan		**Starting and Ending Dates**		**Fee**	
Barricade Manual Figure	**TA6**	Begin Date:	**11/09/2020**	Total Fee:	**$123.75**
Traffic Permit Number:	**TRN2020-02820,**	Expiration	**11/27/2020**		

Certificate of Insurance as Per City Ordinance – Chapter 14.32.065	Number: TB7611B8T8Z6040T
Bonds As Per City Ordinance – Chapter 14.32.070	Number: 9340850
State Contractors License As Per City Ordinance – Chapter 14.32.025	Number:

Work Type: **Test Bore**
Drawing Included: **Yes**
APWA Standard:

Comments or Additional Requirements:
Installation of 3 monitoring wells.

[redacted]

Notice: Work shall be completed within 30 days from the date the permit is granted unless extended by the City Engineer. CALL 24 HOURS BEFORE COMMENCING WORK (535-6727) for Public Utility inspections or assigned inspector for all other inspections) or 48 hours if work is scheduled on holidays and weekends. Contact Urban Forestry 972-7818, 48 hours prior of work to be done if work impacts a city tree.

BEFORE EXCAVATION CONTACT BLUE STAKES – 811 or 1-800-662-4111

PERMIT APPLICATION: Application is hereby made for a permit to work in the public way as specified above. Applicant agrees to the terms on the reverse side and to any increase in fees should they be required by Engineering.

Print name of Applicant:

Signature of Applicant: Date: 11/10/2020

Joe Miller

Permit Issued By: CJ9250

**** WORK GUARANTEED - 3 YEARS FROM ACCEPTANCE DATE ****

GENERAL CONDITIONS

ACCEPTANCE OF CONDITIONS. It is understood and agreed by the Permittee that performing any work under this permit constitutes acceptance of Title 14 Chapter 32 of the Revised Ordinances of Salt Lake City and the City's Regulations for controlling construction, excavation and obstructions in the Public Right ¬of ¬Way, latest revision.
PROXIMATE WORK. Applicant agrees that no other work shall be done under this permit except that specifically set forth herein. It is the applicants responsibility to verify the exact location of city and private facilities prior to commencing excavation operations.
PERMIT AND DRAWINGS AT JOB SITE. The permittee shall have at the work site a copy of the permit, the traffic control plan, and the City approved drawings. NOTIFICATION. Notify the assigned inspector 24 hours before commencing work. Provide the following information: permit number, name and telephone number of permittee, date/time work is to commence, location of work and any other information which may be relevant to the work.
CONFORMANCE TO EXISTING LAWS AND CITY SPECIFICATIONS. Permittee agrees to be fully informed of all federal, state and local laws, ordinances, rules, regulations, and City Construction Specifications which, in any manner, affect the work, and at all times shall observe and comply with such laws, ordinances, rules, regulations and specifications. The City Engineer reserves the right to shut down and/or issue a citation for violation of these provisions.
ENVIRONMENTAL LIABILITY. Permittee agrees to indemnify, defend and hold harmless Salt Lake City, its officers, agents and employees against any claims, losses, damages, or expenses, including, without limitation, any fees or penalties imposed by the United States Environmental Protection Agency, the Utah State Department of Environmental Protection Agency, the Utah State Department of Environmental Quality or any other government or regulatory agency and any attorney's fees or costs sustained on account of, or related to, the presence, release, discovery or creation of hazardous wastes or similar materials as those materials are defined under applicable federal or state statutes or regulations, including, without limitation, the Resource Conservation and Recovery Act of 1976.
STANDARD SPECIFICATIONS AND STANDARD DRAWINGS. Comply with all Salt Lake City Standard Specifications and Standard Drawings for cutting surface, traffic control, backfill, compaction, selection of subgrade materials, asphalt and concrete surfacing requirements. Printed copies of the Regulations and Specifications can be obtained through the City Engineer's Office.
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SPECIAL CONDITIONS

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TRAFFIC CONTROL DEVICES. Traffic control devices must be in place before excavation begins.
ENVIRONMENTAL CONTROL DUST AND DEBRIS. Keep dust and debris controlled at the work site at all times. If necessary, wet down dusty areas with water and provide containers for debris.
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NOISE. Permittee shall control noise in accordance with the Salt Lake County Health Department Noise Ordinance.
CLEANUP. Remove all equipment, material, barricades and similar items from the right of way. Areas used for storage of excavated material will be smoothed and returned to their original contour. Vacuum sweeping or hand sweeping is required when Engineer determines cleaning equipment is ineffective.
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PRECONSTRUCTION PICTURES OF EXISTING PUBLIC WAY IMPROVEMENTS. Prior to commencing the permit work, the permittee is encouraged to secure pictures of the conditions of the existing public way improvements such as curbing, sidewalk, landscaping, asphalt surfaces, etc.
TIME LIMIT. Unless authorized otherwise by the Engineer on the permit, all paving and replacement of street facilities shall be done within seven (7) calendar days from the time the excavation commences, or within three (3) calendar days on major or collector streets from the time excavation commences, except as provided for during excavation in winter or during weather conditions that do not allow paving according to applicable standards and specifications. If work is expected to exceed the above duration, the permittee shall submit a detailed construction schedule for approval. The schedule will address means and methods to minimize traffic disruption and complete the construction as soon as possible.

Traffic Control Permit

Salt Lake City Community and Neighborhoods
Division of Transportation
349 South 200 East #150
Salt Lake City, Utah 84111
Telephone (801) 535-6630
E-Mail TechPermit@slcgov.com

Permit # TRN2020-02820

Organization Name: CDM Federal Programs Corp
Address: 10560 Arrowhead Drive Suite 500 Fairfax, 22030
Contact Person: Joseph Miller Phone: 3033832328 Cell: 5136021619
Barricade Company: Barricade Phone:

WORK SHALL COMPLY WITH PART 6 OF THE 2009 MUTCD.
PERMITS MUST BE EXTENDED 24 HOURS IN ADVANCE OF EXPIRATION.
IF THE TRAFFIC CONTROL PERMIT IS ALLOWED TO EXPIRE, A NEW PERMIT, AND AN ADDITIONAL FEE WILL BE REQUIRED.
CLOSURES ON A DIFFERENT STREET THAN LISTED WILL REQUIRE AN ADDITIONAL TRAFFIC CONTROL, AND ENGINEERING PERMIT.
THE ORGANIZATION ISSUED THE TRAFFIC CONTROL PERMIT SHALL BE RESPONSIBLE FOR ALL BARRICADE PLACEMENT AND MAINTENENCE.
AN ADDITIONAL PERMIT FROM SLC ENGINEERING MAY ALSO BE REQUIRED.
SHALL MAINTAIN ACCESS TO ALL PROPERTIES.
SHALL INFORM BUSINESSES & RESIDENTS OF PROJECT & DURATION.
SHALL COORDINATE WITH BUSINESSES & RESIDENTS AFFECTED.
SHALL OBTAIN A PERMIT FOR ALL PARKING METERS OR OTHER RESTRICTED PARKING MADE UNAVAILBABLE TO THE PUBLIC.
TRAFFIC CONTROL PERMITS ARE NOT VALID UNTIL PAID IN FULL.
CHANGES TO PERMIT MAY BE REQUIRED AND MADE UPON REVIEW and/or COMPLAINT.

Project Name / Description: Monitoring well installation for 700 S 1600 E PCE Plume site. Parking lane closure with minor encroachment
General Work Type: Staging Specific Work Type: Excavation
City Project # Public Way Permit #
Special Event Permit # Block Party Permit #

Closure Type	*On Street Name*	*From Number*	*To Number*	*Side of Street*
Street	**Herbert**	**1177**	**1183**	**N**

Start Date	*End Date*	*Full Road Closure?*	*Barricade Manual Fig #*	*Description*
11/09/2020	11/27/2020	No	TA-6	Closure of parking lane with minor encroachment.

Approved By: Joseph Jacobsen Issue Date: 11/4/2020

Traffic Control Permit

Salt Lake City Community and Neighborhoods
Division of Transportation
349 South 200 East #150
Salt Lake City, Utah 84111
Telephone (801) 535-6630
E-Mail TechPermit@slcgov.com

Permit # TRN2020-02821

Organization Name: CDM Federal Programs Corp
Address: 10560 Arrowhead Drive Suite 500 Fairfax, 22030
Contact Person: Joseph Miller Phone: 3033832328 Cell: 5136021619
Barricade Company: Barricade Phone:

WORK SHALL COMPLY WITH PART 6 OF THE 2009 MUTCD.
PERMITS MUST BE EXTENDED 24 HOURS IN ADVANCE OF EXPIRATION.
IF THE TRAFFIC CONTROL PERMIT IS ALLOWED TO EXPIRE, A NEW PERMIT, AND AN ADDITIONAL FEE WILL BE REQUIRED.
CLOSURES ON A DIFFERENT STREET THAN LISTED WILL REQUIRE AN ADDITIONAL TRAFFIC CONTROL, AND ENGINEERING PERMIT.
THE ORGANIZATION ISSUED THE TRAFFIC CONTROL PERMIT SHALL BE RESPONSIBLE FOR ALL BARRICADE PLACEMENT AND MAINTENENCE.
AN ADDITIONAL PERMIT FROM SLC ENGINEERING MAY ALSO BE REQUIRED.
SHALL MAINTAIN ACCESS TO ALL PROPERTIES.
SHALL INFORM BUSINESSES & RESIDENTS OF PROJECT & DURATION.
SHALL COORDINATE WITH BUSINESSES & RESIDENTS AFFECTED.
SHALL OBTAIN A PERMIT FOR ALL PARKING METERS OR OTHER RESTRICTED PARKING MADE UNAVAILBABLE TO THE PUBLIC.
TRAFFIC CONTROL PERMITS ARE NOT VALID UNTIL PAID IN FULL.
CHANGES TO PERMIT MAY BE REQUIRED AND MADE UPON REVIEW and/or COMPLAINT.

Project Name / Description: Work area will be sidewalk and planting strip on west side 1000 E south of Lowell.
General Work Type: Staging Specific Work Type: Excavation
City Project # Public Way Permit #
Special Event Permit # Block Party Permit #

Closure Type	*On Street Name*	*From Number*	*To Number*	*Side of Street*
Street	**S 1000 E**	**746**	**752**	**W**

Start Date	*End Date*	*Full Road Closure?*	*Barricade Manual Fig #*	*Description*	*Special Requirements*
11/09/2020	11/20/2020	No	TA-6	Closure of parking lane on west side of 1000 E.	Sidewalk Closure for 70'.

Approved By: Joseph Jacobsen Issue Date: 11/4/2020

Traffic Control Permit

Salt Lake City Community and Neighborhoods
Division of Transportation
349 South 200 East #150
Salt Lake City, Utah 84111
Telephone (801) 535-6630
E-Mail TechPermit@slcgov.com

Permit # TRN2020-02822

Organization Name: CDM Federal Programs Corp
Address: 10560 Arrowhead Drive Suite 500 Fairfax, 22030
Contact Person: Joseph Miller Phone: 3033832328 Cell: 5136021619
Barricade Company: Barricade Phone:

WORK SHALL COMPLY WITH PART 6 OF THE 2009 MUTCD.
PERMITS MUST BE EXTENDED 24 HOURS IN ADVANCE OF EXPIRATION.
IF THE TRAFFIC CONTROL PERMIT IS ALLOWED TO EXPIRE, A NEW PERMIT, AND AN ADDITIONAL FEE WILL BE REQUIRED.
CLOSURES ON A DIFFERENT STREET THAN LISTED WILL REQUIRE AN ADDITIONAL TRAFFIC CONTROL, AND ENGINEERING PERMIT.
THE ORGANIZATION ISSUED THE TRAFFIC CONTROL PERMIT SHALL BE RESPONSIBLE FOR ALL BARRICADE PLACEMENT AND MAINTENENCE.
AN ADDITIONAL PERMIT FROM SLC ENGINEERING MAY ALSO BE REQUIRED.
SHALL MAINTAIN ACCESS TO ALL PROPERTIES.
SHALL INFORM BUSINESSES & RESIDENTS OF PROJECT & DURATION.
SHALL COORDINATE WITH BUSINESSES & RESIDENTS AFFECTED.
SHALL OBTAIN A PERMIT FOR ALL PARKING METERS OR OTHER RESTRICTED PARKING MADE UNAVAILBABLE TO THE PUBLIC.
TRAFFIC CONTROL PERMITS ARE NOT VALID UNTIL PAID IN FULL.
CHANGES TO PERMIT MAY BE REQUIRED AND MADE UPON REVIEW and/or COMPLAINT.

Project Name / Description: Work area for monitoring well installation on east side of S 1200 E, north of 700 S.
General Work Type: Staging Specific Work Type: Excavation
City Project # Public Way Permit #
Special Event Permit # Block Party Permit #

Closure Type	*On Street Name*	*From Number*	*To Number*	*Side of Street*
Street	**S 1200 E**	**647**	**659**	**E**

Start Date	*End Date*	*Full Road Closure?*	*Barricade Manual Fig #*	*Description*
11/09/2020	11/20/2020	No	TA-6	Parking lane closure with minor encroachment.

Approved By: Joseph Jacobsen Issue Date: 11/4/2020

Traffic Control Permit

Salt Lake City Community and Neighborhoods
Division of Transportation
349 South 200 East #150
Salt Lake City, Utah 84111
Telephone (801) 535-6630
E-Mail TechPermit@slcgov.com

Permit # TRN2020-02973

Organization Name: CDM Federal Programs Corp
Address: 10560 Arrowhead Drive Suite 500 Fairfax, 22030
Contact Person: Joseph Miller Phone: 3033832328 Cell: 5136021619
Barricade Company: Barricade Phone:

WORK SHALL COMPLY WITH PART 6 OF THE 2009 MUTCD.
PERMITS MUST BE EXTENDED 24 HOURS IN ADVANCE OF EXPIRATION.
IF THE TRAFFIC CONTROL PERMIT IS ALLOWED TO EXPIRE, A NEW PERMIT, AND AN ADDITIONAL FEE WILL BE REQUIRED.
CLOSURES ON A DIFFERENT STREET THAN LISTED WILL REQUIRE AN ADDITIONAL TRAFFIC CONTROL, AND ENGINEERING PERMIT.
THE ORGANIZATION ISSUED THE TRAFFIC CONTROL PERMIT SHALL BE RESPONSIBLE FOR ALL BARRICADE PLACEMENT AND MAINTENENCE.
AN ADDITIONAL PERMIT FROM SLC ENGINEERING MAY ALSO BE REQUIRED.
SHALL MAINTAIN ACCESS TO ALL PROPERTIES.
SHALL INFORM BUSINESSES & RESIDENTS OF PROJECT & DURATION.
SHALL COORDINATE WITH BUSINESSES & RESIDENTS AFFECTED.
SHALL OBTAIN A PERMIT FOR ALL PARKING METERS OR OTHER RESTRICTED PARKING MADE UNAVAILBABLE TO THE PUBLIC.
TRAFFIC CONTROL PERMITS ARE NOT VALID UNTIL PAID IN FULL.
CHANGES TO PERMIT MAY BE REQUIRED AND MADE UPON REVIEW and/or COMPLAINT.

Project Name / Description: Equipment staging for monitoring well installation in planting strip near the curb.
General Work Type: Staging Specific Work Type: Excavation
City Project # Public Way Permit #
Special Event Permit # Block Party Permit #

Closure Type	*On Street Name*	*From Number*	*To Number*	*Side of Street*
Street	**E 900 S**	**1217**	**1235**	**N**

Start Date	*End Date*	*Full Road Closure?*	*Barricade Manual Fig #*	*Description*
12/01/2020	12/08/2020	No	TA-6	Parking lane closure for equipment staging for monitoring well installation in planting strip north of the curb

Approved By: Joseph Jacobsen Issue Date: 11/23/2020

Appendix F

Salt Lake City VHA Daily Excavation Checklists

Attachment C

TRENCHING AND EXCAVATION PERMIT

Permit Issued to: CDM Smith (Service/Contractor Printed name) 11/03/2020 (Signature/Date)

Permit Issued by: Linda Gallegos (Printed name) Gallegos 11/03/20 (Signature/Date)

Date: 11/03/20 Job Location: West side garage

Inspection Item	Yes/No	Comment
Competent Person Identified?	Y	Whitney Treadway
Surface encumbrances protected?	Y	
Spoils pile set back 2 feet?	Y	
Access/egress to trench to limit travel 25 feet?	N	If no, ladders are required.
Area barricaded or protected?	Y	
Soils Analysis Completed?		Type B Type C ✓
Protective System: if 5' or deeper Shoring ___ Benching ___ Sloping ___ Shielding ✓ sonic casing		Type B Soil: 1H:1V ___ Type C Soil: 1½H:1V ___
Utilities Located and marked?	Y	
Potential for hazardous atmosphere?	?	If yes, Confined Space evaluation needed.
Potential for engulfment?	N	If yes, Confined Space evaluation needed.

Note: Daily checklist required when excavation activities in the same location exceed 24 hrs.

Date received: 11/03/20 Safety Office signature: Gallegos

ATTACHMENT A

Daily Excavation Checklist
(To be completed by the CP)

Site Location: MW-30R A/B VA Campus PCE Plume 7005 1605		
Date: 11/3/20 Time:	CP:	
Soil Type: NA		
Soil Classification: NA	Excavation Depth: 9'	Excavation Width: 18"
Type Of Protective System Used: none, boring		

Indicate for each item: YES - NO - or N/A for not applicable.
Provide date item last inspected if not required daily

1. General Inspection of Jobsite:	
A. Excavations, adjacent areas, and protective systems inspected by a CP daily before the start of work.	✓
B. CP has the authority to remove employees from the excavation immediately.	✓
C. Surface encumbrances removed or supported.	✓
D. Employees protected from loose rock or soil that could pose a hazard by falling or rolling into the excavation.	✓
E. Hard hats worn by all employees	✓
F. Spoils, materials, and equipment set back at least two feet from the edge of the excavation. → removed by vac truck	✓
G. Barriers provided at all remotely located excavations, wells, pits, shafts, etc.	✓
H. Walkways and bridges over excavations six feet or more in depth are equipped with standard guardrails and toe boards (fall protection).	NA
I. Warning vests or other highly visible clothing provided and worn by all employees exposed to public vehicular traffic.	✓
J. Warning system established and utilized when mobile equipment is operating near the edge of the excavation.	NA
K. Employees are required to stand away from any vehicle being loaded or unloaded.	✓
L. Employees are not permitted underneath loads handled by lifting or digging equipment.	✓
M. Employees prohibited from working on the faces of slopes or benched excavations above other employees.	✓
2. Utilities:	
A. Utility companies contacted and/or utilities located.	✓
B. Exact location of utilities marked.	✓
C. Underground installations protected, supported, or removed when excavation is open.	NA

A. 29 CFR 1926.650; Scope, application, and definitions applicable to this subpart

B. 29 CFR 1926.651; Specific excavation requirements

C. 29 CFR 1926.652; Requirements for protective systems

D. OSHA Technical Manual (OTM) Section V: Chapter 2, Excavations: Hazard Recognition in Trenching and Shoring.

7. ATTACHMENTS:

Attachment A: Daily Excavation Checklist
Attachment B: Maximum Allowable Slopes and Slope Configurations
Attachment C: Trenching and Excavation Permit

8. RESCISSION:

Memorandum 00Q.44, "Excavation Safety Program", dated June 23, 2017.

9. RECERTIFICATION:

This MCP is scheduled for recertification on or before the last working day of September 2025. This MCP will continue to serve as local policy until it is recertified or rescinded. In the event of contradiction with national policy, the national policy supersedes and controls.

10. SIGNATORY AUTHORITY

/s//

Shella Stovall, MNA, RN
George E. Wahlen VA Medical Center Director
Date Approved: September 23, 2020

NOTE: *The signature remains valid until rescinded by an appropriate administrative action.*

3. Means of Access and Egress:	
A. Lateral travel to means of egress no greater than 25 feet in excavations four feet or more in depth.	NA
B. Ladders used in excavations secured and extended three feet above the edge trench.	NA
C. Structural ramps used by employees designed by a CP.	NA
D. Structural ramps used for equipment designed by a registered professional Engineer (RPE).	NA
E. Ramps constructed of materials of uniform thickness, cleated together on the bottom, equipped with no-slip surface.	NA
F. Employees protected from cave-ins when entering or exiting the excavation.	NA
4. Wet Conditions:	
A. Precautions take to protect employees from the accumulation of water.	✓
B. Water removal equipment monitored by a CP.	✓
C. Surface water or runoff diverted or controlled to prevent accumulation in the excavation.	✓
D. Inspections made after every rainstorm or other hazard-increasing occurrence.	✓
5. Hazardous Atmosphere:	
A. Atmosphere within the excavation tested where there is a reasonable possibility of an oxygen deficiency, combustible or other harmful contaminant exposing employees to a hazard. PID for air monitoring	✓
B. Adequate precautions taken to protect employees from exposure to an atmosphere containing less than 19.5% oxygen and/or to other hazardous atmospheres.	✓
C. Ventilation provided to prevent employee exposure to an atmosphere containing flammable gas in excess of 10% of the lower explosive limit of the gas.	✓
D. Testing conducted often to ensure that the atmosphere remains safe.	✓
E. Emergency equipment, such as breathing apparatus, safety harness and lifeline, and/or basket stretcher readily available where hazardous atmospheres could or do exist.	✓
F. Employees trained to use personal protective and other rescue equipment.	✓
G. Safety harness and lifeline used and individually attended when entering bell bottom or other deep confined excavations.	NA
6. Support Systems:	
A. Materials and/or equipment for support systems selected based on soil analysis, trench depth, and expected loads.	NA
B. Materials and equipment used for protective systems inspected and in good condition.	✓
C. Materials and equipment not in good condition have been removed from service.	✓
D. Damaged materials and equipment used for protective systems inspected by a registered professional engineer (RPE) after repairs and before being placed back into service.	✓

E. Protective systems installed without exposing employees to the hazards of cave-ins, collapses, or threat of being struck by materials or equipment.	✓
F. Members of support system securely fastened to prevent failure.	✓
G. Support systems provided in ensure stability of adjacent structures, buildings, roadways, sidewalks, walls, etc.	NA
H. Excavations below the level of the base or footing supported, approved by an RPE.	NA
I. Removal of support systems progresses from the bottom and members are released slowly as to note any indication of possible failure.	NA
J. Backfilling progresses with removal of support system.	✓
K. Excavation of material to a level no greater than two feet below the bottom of the support system and only if the system is designed to support the loads calculated for the full depth.	NA
L. Shield system placed to prevent lateral movement. Sonic casing	✓
M. Employees are prohibited from remaining in shield system during vertical movement.	✓
Corrective Action and Comments	

Signature of CP/COR

9/3/20
Date

Whitney Treadway
Printed name of CP/COR

ATTACHMENT A

Daily Excavation Checklist
(To be completed by the CP)

Site Location: VA Campus MW-30R		
Date: 11/6/20 Time: 0745	CP: W. Treadway	
Soil Type:		
Soil Classification:	Excavation Depth: 10 ft typ	Excavation Width: 8"
Type Of Protective System Used: casing		

Indicate for each item: YES - NO - or N/A for not applicable.
Provide date item last inspected if not required daily

1. General Inspection of Jobsite:	
A. Excavations, adjacent areas, and protective systems inspected by a CP daily before the start of work.	✓
B. CP has the authority to remove employees from the excavation immediately.	✓
C. Surface encumbrances removed or supported.	✓
D. Employees protected from loose rock or soil that could pose a hazard by falling or rolling into the excavation.	✓
E. Hard hats worn by all employees	✓
F. Spoils, materials, and equipment set back at least two feet from the edge of the excavation.	NA
G. Barriers provided at all remotely located excavations, wells, pits, shafts, etc.	NA
H. Walkways and bridges over excavations six feet or more in depth are equipped with standard guardrails and toe boards (fall protection).	NA
I. Warning vests or other highly visible clothing provided and worn by all employees exposed to public vehicular traffic.	✓
J. Warning system established and utilized when mobile equipment is operating near the edge of the excavation.	✓
K. Employees are required to stand away from any vehicle being loaded or unloaded.	✓
L. Employees are not permitted underneath loads handled by lifting or digging equipment.	✓
M. Employees prohibited from working on the faces of slopes or benched excavations above other employees.	NA
2. Utilities:	
A. Utility companies contacted and/or utilities located.	✓
B. Exact location of utilities marked.	✓
C. Underground installations protected, supported, or removed when excavation is open.	✓
3. Means of Access and Egress:	
A. Lateral travel to means of egress no greater than 25 feet in excavations four	NA

feet or more in depth.	
B. Ladders used in excavations secured and extended three feet above the edge trench.	NA
C. Structural ramps used by employees designed by a CP.	NA
D. Structural ramps used for equipment designed by a registered professional Engineer (RPE).	NA
E. Ramps constructed of materials of uniform thickness, cleated together on the bottom, equipped with no-slip surface.	NA
F. Employees protected from cave-ins when entering or exiting the excavation.	NA
4. Wet Conditions:	
A. Precautions take to protect employees from the accumulation of water.	NA
B. Water removal equipment monitored by a CP.	NA
C. Surface water or runoff diverted or controlled to prevent accumulation in the excavation.	NA
D. Inspections made after every rainstorm or other hazard-increasing occurrence.	✓
5. Hazardous Atmosphere:	
A. Atmosphere within the excavation tested where there is a reasonable possibility of an oxygen deficiency, combustible or other harmful contaminant exposing employees to a hazard.	✓
B. Adequate precautions taken to protect employees from exposure to an atmosphere containing less than 19.5% oxygen and/or to other hazardous atmospheres.	✓
C. Ventilation provided to prevent employee exposure to an atmosphere containing flammable gas in excess of 10% of the lower explosive limit of the gas.	✓
D. Testing conducted often to ensure that the atmosphere remains safe.	✓
E. Emergency equipment, such as breathing apparatus, safety harness and lifeline, and/or basket stretcher readily available where hazardous atmospheres could or do exist.	✓
F. Employees trained to use personal protective and other rescue equipment.	✓
G. Safety harness and lifeline used and individually attended when entering bell bottom or other deep confined excavations.	NA
6. Support Systems:	
A. Materials and/or equipment for support systems selected based on soil analysis, trench depth, and expected loads.	NA
B. Materials and equipment used for protective systems inspected and in good condition.	✓
C. Materials and equipment not in good condition have been removed from service.	✓
D. Damaged materials and equipment used for protective systems inspected by a registered professional engineer (RPE) after repairs and before being placed back into service.	✓
E. Protective systems installed without exposing employees to the hazards of cave-ins, collapses, or threat of being struck by materials or equipment.	NA

F. Members of support system securely fastened to prevent failure.	NA
G. Support systems provided in ensure stability of adjacent structures, buildings, roadways, sidewalks, walls, etc.	NA
H. Excavations below the level of the base or footing supported, approved by an RPE.	NA
I. Removal of support systems progresses from the bottom and members are released slowly as to note any indication of possible failure.	NA
J. Backfilling progresses with removal of support system.	NA
K. Excavation of material to a level no greater than two feet below the bottom of the support system and only if the system is designed to support the loads calculated for the full depth.	NA
L. Shield system placed to prevent lateral movement. caving	~~NA~~ ✓
M. Employees are prohibited from remaining in shield system during vertical movement.	NA
Corrective Action and Comments	

WMA
Signature of CP/COR

11/16/20
Date

Whitney Treadway
Printed name of CP/COR

One copy shall be provided for both the contractor conducting the work and COR (VASLCHCS)

ATTACHMENT A

Daily Excavation Checklist
(To be completed by the CP)

Site Location: VA Campus MW-30R		
Date: 11/7/20	Time: 0745	CP: Whitney Treadway
Soil Type: NA		
Soil Classification: NA	Excavation Depth: 183-ft	Excavation Width: 8"
Type Of Protective System Used: Sonic casing		

Indicate for each item: YES - NO - or N/A for not applicable.
Provide date item last inspected if not required daily

1. General Inspection of Jobsite:	
A. Excavations, adjacent areas, and protective systems inspected by a CP daily before the start of work.	✓
B. CP has the authority to remove employees from the excavation immediately.	✓
C. Surface encumbrances removed or supported.	✓
D. Employees protected from loose rock or soil that could pose a hazard by falling or rolling into the excavation.	✓
E. Hard hats worn by all employees	✓
F. Spoils, materials, and equipment set back at least two feet from the edge of the excavation.	NA
G. Barriers provided at all remotely located excavations, wells, pits, shafts, etc.	✓
H. Walkways and bridges over excavations six feet or more in depth are equipped with standard guardrails and toe boards (fall protection).	NA
I. Warning vests or other highly visible clothing provided and worn by all employees exposed to public vehicular traffic.	✓
J. Warning system established and utilized when mobile equipment is operating near the edge of the excavation.	✓
K. Employees are required to stand away from any vehicle being loaded or unloaded.	✓
L. Employees are not permitted underneath loads handled by lifting or digging equipment.	✓
M. Employees prohibited from working on the faces of slopes or benched excavations above other employees.	NA
2. Utilities:	
A. Utility companies contacted and/or utilities located.	✓
B. Exact location of utilities marked.	✓
C. Underground installations protected, supported, or removed when excavation is open.	✓
3. Means of Access and Egress:	
A. Lateral travel to means of egress no greater than 25 feet in excavations four	NA

feet or more in depth.	
B. Ladders used in excavations secured and extended three feet above the edge trench.	NA
C. Structural ramps used by employees designed by a CP.	NA
D. Structural ramps used for equipment designed by a registered professional Engineer (RPE).	NA
E. Ramps constructed of materials of uniform thickness, cleated together on the bottom, equipped with no-slip surface.	NA
F. Employees protected from cave-ins when entering or exiting the excavation.	NA
4. Wet Conditions:	
A. Precautions take to protect employees from the accumulation of water.	NA
B. Water removal equipment monitored by a CP.	NA
C. Surface water or runoff diverted or controlled to prevent accumulation in the excavation.	NA
D. Inspections made after every rainstorm or other hazard-increasing occurrence.	✓
5. Hazardous Atmosphere:	
A. Atmosphere within the excavation tested where there is a reasonable possibility of an oxygen deficiency, combustible or other harmful contaminant exposing employees to a hazard.	✓
B. Adequate precautions taken to protect employees from exposure to an atmosphere containing less than 19.5% oxygen and/or to other hazardous atmospheres.	✓
C. Ventilation provided to prevent employee exposure to an atmosphere containing flammable gas in excess of 10% of the lower explosive limit of the gas.	✓
D. Testing conducted often to ensure that the atmosphere remains safe.	✓
E. Emergency equipment, such as breathing apparatus, safety harness and lifeline, and/or basket stretcher readily available where hazardous atmospheres could or do exist.	✓
F. Employees trained to use personal protective and other rescue equipment.	✓
G. Safety harness and lifeline used and individually attended when entering bell bottom or other deep confined excavations.	✓
6. Support Systems:	
A. Materials and/or equipment for support systems selected based on soil analysis, trench depth, and expected loads.	✓
B. Materials and equipment used for protective systems inspected and in good condition.	✓
C. Materials and equipment not in good condition have been removed from service.	✓
D. Damaged materials and equipment used for protective systems inspected by a registered professional engineer (RPE) after repairs and before being placed back into service.	✓
E. Protective systems installed without exposing employees to the hazards of cave-ins, collapses, or threat of being struck by materials or equipment.	✓

F. Members of support system securely fastened to prevent failure.	NA
G. Support systems provided in ensure stability of adjacent structures, buildings, roadways, sidewalks, walls, etc.	NA
H. Excavations below the level of the base or footing supported, approved by an RPE.	NA
I. Removal of support systems progresses from the bottom and members are released slowly as to note any indication of possible failure.	NA
J. Backfilling progresses with removal of support system.	NA
K. Excavation of material to a level no greater than two feet below the bottom of the support system and only if the system is designed to support the loads calculated for the full depth.	NA
L. Shield system placed to prevent lateral movement. sonic casing	✓
M. Employees are prohibited from remaining in shield system during vertical movement.	NA
Corrective Action and Comments	

W/A
Signature of CP/COR

11/7/20
Date

Whitney Treadway
Printed name of CP/COR

One copy shall be provided for both the contractor conducting the work and COR (VASLCHCS)

ATTACHMENT A

Daily Excavation Checklist
(To be completed by the CP)

Site Location: VA campus MW-30R			
Date: 11/9/20	Time: 0730	CP: Whitney Treadway	
Soil Type: NA			
Soil Classification: NA	Excavation Depth: 295 ft	Excavation Width: 8", 6"	
Type Of Protective System Used: Sonic casing			

Indicate for each item: YES - NO - or N/A for not applicable.
Provide date item last inspected if not required daily

1. General Inspection of Jobsite:	
A. Excavations, adjacent areas, and protective systems inspected by a CP daily before the start of work.	✓
B. CP has the authority to remove employees from the excavation immediately.	✓
C. Surface encumbrances removed or supported.	NA
D. Employees protected from loose rock or soil that could pose a hazard by falling or rolling into the excavation.	NA
E. Hard hats worn by all employees	✓
F. Spoils, materials, and equipment set back at least two feet from the edge of the excavation.	NA
G. Barriers provided at all remotely located excavations, wells, pits, shafts, etc.	NA
H. Walkways and bridges over excavations six feet or more in depth are equipped with standard guardrails and toe boards (fall protection).	NA
I. Warning vests or other highly visible clothing provided and worn by all employees exposed to public vehicular traffic.	✓
J. Warning system established and utilized when mobile equipment is operating near the edge of the excavation.	✓
K. Employees are required to stand away from any vehicle being loaded or unloaded.	✓
L. Employees are not permitted underneath loads handled by lifting or digging equipment.	✓
M. Employees prohibited from working on the faces of slopes or benched excavations above other employees.	NA
2. Utilities:	
A. Utility companies contacted and/or utilities located.	✓
B. Exact location of utilities marked.	✓
C. Underground installations protected, supported, or removed when excavation is open.	✓
3. Means of Access and Egress:	
A. Lateral travel to means of egress no greater than 25 feet in excavations four	NA

feet or more in depth.	
B. Ladders used in excavations secured and extended three feet above the edge trench.	NA
C. Structural ramps used by employees designed by a CP.	NA
D. Structural ramps used for equipment designed by a registered professional Engineer (RPE).	NA
E. Ramps constructed of materials of uniform thickness, cleated together on the bottom, equipped with no-slip surface.	NA
F. Employees protected from cave-ins when entering or exiting the excavation.	NA
4. Wet Conditions:	
A. Precautions take to protect employees from the accumulation of water.	NA
B. Water removal equipment monitored by a CP.	NA
C. Surface water or runoff diverted or controlled to prevent accumulation in the excavation.	NA
D. Inspections made after every rainstorm or other hazard-increasing occurrence.	✓
5. Hazardous Atmosphere:	
A. Atmosphere within the excavation tested where there is a reasonable possibility of an oxygen deficiency, combustible or other harmful contaminant exposing employees to a hazard.	✓
B. Adequate precautions taken to protect employees from exposure to an atmosphere containing less than 19.5% oxygen and/or to other hazardous atmospheres.	✓
C. Ventilation provided to prevent employee exposure to an atmosphere containing flammable gas in excess of 10% of the lower explosive limit of the gas.	✓
D. Testing conducted often to ensure that the atmosphere remains safe.	✓
E. Emergency equipment, such as breathing apparatus, safety harness and lifeline, and/or basket stretcher readily available where hazardous atmospheres could or do exist.	✓
F. Employees trained to use personal protective and other rescue equipment.	✓
G. Safety harness and lifeline used and individually attended when entering bell bottom or other deep confined excavations.	✓
6. Support Systems:	
A. Materials and/or equipment for support systems selected based on soil analysis, trench depth, and expected loads. casing	✓
B. Materials and equipment used for protective systems inspected and in good condition.	✓
C. Materials and equipment not in good condition have been removed from service.	✓
D. Damaged materials and equipment used for protective systems inspected by a registered professional engineer (RPE) after repairs and before being placed back into service.	✓
E. Protective systems installed without exposing employees to the hazards of cave-ins, collapses, or threat of being struck by materials or equipment.	✓

F. Members of support system securely fastened to prevent failure.	✓
G. Support systems provided in ensure stability of adjacent structures, buildings, roadways, sidewalks, walls, etc.	NA
H. Excavations below the level of the base or footing supported, approved by an RPE.	NA
I. Removal of support systems progresses from the bottom and members are released slowly as to note any indication of possible failure.	NA
J. Backfilling progresses with removal of support system.	NA
K. Excavation of material to a level no greater than two feet below the bottom of the support system and only if the system is designed to support the loads calculated for the full depth.	NA
L. Shield system placed to prevent lateral movement. casing	✓
M. Employees are prohibited from remaining in shield system during vertical movement.	NA
Corrective Action and Comments	

Signature of CP/COR

Date 11/9/20

Whitney Treadway

Printed name of CP/COR

One copy shall be provided for both the contractor conducting the work and COR (VASLCHCS)

ATTACHMENT A

Daily Excavation Checklist
(To be completed by the CP)

Site Location: MW-30R VA Campus		
Date: 11/10/20 Time: 0730	CP: Whitney Treadway	
Soil Type: NA		
Soil Classification: NA	Excavation Depth: 295ft	Excavation Width: 8-6"
Type Of Protective System Used: Sonic casing		

Indicate for each item: YES - NO - or N/A for not applicable.
Provide date item last inspected if not required daily

1. General Inspection of Jobsite:	
A. Excavations, adjacent areas, and protective systems inspected by a CP daily before the start of work.	✓
B. CP has the authority to remove employees from the excavation immediately.	✓
C. Surface encumbrances removed or supported.	NA
D. Employees protected from loose rock or soil that could pose a hazard by falling or rolling into the excavation.	NA
E. Hard hats worn by all employees	✓
F. Spoils, materials, and equipment set back at least two feet from the edge of the excavation.	NA
G. Barriers provided at all remotely located excavations, wells, pits, shafts, etc.	NA
H. Walkways and bridges over excavations six feet or more in depth are equipped with standard guardrails and toe boards (fall protection).	NA
I. Warning vests or other highly visible clothing provided and worn by all employees exposed to public vehicular traffic.	✓
J. Warning system established and utilized when mobile equipment is operating near the edge of the excavation.	✓
K. Employees are required to stand away from any vehicle being loaded or unloaded.	✓
L. Employees are not permitted underneath loads handled by lifting or digging equipment.	✓
M. Employees prohibited from working on the faces of slopes or benched excavations above other employees.	NA
2. Utilities:	
A. Utility companies contacted and/or utilities located.	✓
B. Exact location of utilities marked.	✓
C. Underground installations protected, supported, or removed when excavation is open.	✓
3. Means of Access and Egress:	
A. Lateral travel to means of egress no greater than 25 feet in excavations four	NA

feet or more in depth.	
B. Ladders used in excavations secured and extended three feet above the edge trench.	NA
C. Structural ramps used by employees designed by a CP.	NA
D. Structural ramps used for equipment designed by a registered professional Engineer (RPE).	NA
E. Ramps constructed of materials of uniform thickness, cleated together on the bottom, equipped with no-slip surface.	NA
F. Employees protected from cave-ins when entering or exiting the excavation.	NA
4. Wet Conditions:	
A. Precautions take to protect employees from the accumulation of water.	NA
B. Water removal equipment monitored by a CP.	NA
C. Surface water or runoff diverted or controlled to prevent accumulation in the excavation.	NA
D. Inspections made after every rainstorm or other hazard-increasing occurrence.	NA
5. Hazardous Atmosphere:	
A. Atmosphere within the excavation tested where there is a reasonable possibility of an oxygen deficiency, combustible or other harmful contaminant exposing employees to a hazard.	✓
B. Adequate precautions taken to protect employees from exposure to an atmosphere containing less than 19.5% oxygen and/or to other hazardous atmospheres.	✓
C. Ventilation provided to prevent employee exposure to an atmosphere containing flammable gas in excess of 10% of the lower explosive limit of the gas.	✓
D. Testing conducted often to ensure that the atmosphere remains safe.	✓
E. Emergency equipment, such as breathing apparatus, safety harness and lifeline, and/or basket stretcher readily available where hazardous atmospheres could or do exist.	✓
F. Employees trained to use personal protective and other rescue equipment.	✓
G. Safety harness and lifeline used and individually attended when entering bell bottom or other deep confined excavations.	✓
6. Support Systems:	
A. Materials and/or equipment for support systems selected based on soil analysis, trench depth, and expected loads. casing	✓
B. Materials and equipment used for protective systems inspected and in good condition.	✓
C. Materials and equipment not in good condition have been removed from service.	✓
D. Damaged materials and equipment used for protective systems inspected by a registered professional engineer (RPE) after repairs and before being placed back into service.	✓
E. Protective systems installed without exposing employees to the hazards of cave-ins, collapses, or threat of being struck by materials or equipment.	V

F. Members of support system securely fastened to prevent failure.	✓
G. Support systems provided in ensure stability of adjacent structures, buildings, roadways, sidewalks, walls, etc.	NA
H. Excavations below the level of the base or footing supported, approved by an RPE.	NA
I. Removal of support systems progresses from the bottom and members are released slowly as to note any indication of possible failure.	NA
J. Backfilling progresses with removal of support system.	✓
K. Excavation of material to a level no greater than two feet below the bottom of the support system and only if the system is designed to support the loads calculated for the full depth.	NA
L. Shield system placed to prevent lateral movement. casing	✓
M. Employees are prohibited from remaining in shield system during vertical movement.	
Corrective Action and Comments	

Signature of CP/COR

11/10/20
Date

Whitney Treadway
Printed name of CP/COR

One copy shall be provided for both the contractor conducting the work and COR (VASLCHCS)

ATTACHMENT A

Daily Excavation Checklist
(To be completed by the CP)

Site Location: VA Campus MW-30R			
Date: 11/5/20	Time: 0800	CP: W. Treadway	
Soil Type:			
Soil Classification:	Excavation Depth: 9 ft bgs	Excavation Width: 8"	
Type Of Protective System Used: casing			

Indicate for each item: YES - NO - or N/A for not applicable.
Provide date item last inspected if not required daily

1. General Inspection of Jobsite:	
A. Excavations, adjacent areas, and protective systems inspected by a CP daily before the start of work.	✓
B. CP has the authority to remove employees from the excavation immediately.	✓
C. Surface encumbrances removed or supported.	✓
D. Employees protected from loose rock or soil that could pose a hazard by falling or rolling into the excavation.	✓
E. Hard hats worn by all employees	✓
F. Spoils, materials, and equipment set back at least two feet from the edge of the excavation.	✓
G. Barriers provided at all remotely located excavations, wells, pits, shafts, etc.	✓
H. Walkways and bridges over excavations six feet or more in depth are equipped with standard guardrails and toe boards (fall protection).	NA
I. Warning vests or other highly visible clothing provided and worn by all employees exposed to public vehicular traffic.	✓
J. Warning system established and utilized when mobile equipment is operating near the edge of the excavation.	✓
K. Employees are required to stand away from any vehicle being loaded or unloaded.	✓
L. Employees are not permitted underneath loads handled by lifting or digging equipment.	✓
M. Employees prohibited from working on the faces of slopes or benched excavations above other employees.	NA
2. Utilities:	
A. Utility companies contacted and/or utilities located.	✓
B. Exact location of utilities marked.	✓
C. Underground installations protected, supported, or removed when excavation is open.	✓
3. Means of Access and Egress:	
A. Lateral travel to means of egress no greater than 25 feet in excavations four	NA

feet or more in depth.	
B. Ladders used in excavations secured and extended three feet above the edge trench.	NA
C. Structural ramps used by employees designed by a CP.	NA
D. Structural ramps used for equipment designed by a registered professional Engineer (RPE).	NA
E. Ramps constructed of materials of uniform thickness, cleated together on the bottom, equipped with no-slip surface.	NA
F. Employees protected from cave-ins when entering or exiting the excavation.	NA
4. Wet Conditions:	
A. Precautions take to protect employees from the accumulation of water.	NA
B. Water removal equipment monitored by a CP.	NA
C. Surface water or runoff diverted or controlled to prevent accumulation in the excavation.	NA
D. Inspections made after every rainstorm or other hazard-increasing occurrence.	✓
5. Hazardous Atmosphere:	
A. Atmosphere within the excavation tested where there is a reasonable possibility of an oxygen deficiency, combustible or other harmful contaminant exposing employees to a hazard.	✓
B. Adequate precautions taken to protect employees from exposure to an atmosphere containing less than 19.5% oxygen and/or to other hazardous atmospheres.	✓
C. Ventilation provided to prevent employee exposure to an atmosphere containing flammable gas in excess of 10% of the lower explosive limit of the gas.	✓
D. Testing conducted often to ensure that the atmosphere remains safe.	✓
E. Emergency equipment, such as breathing apparatus, safety harness and lifeline, and/or basket stretcher readily available where hazardous atmospheres could or do exist.	✓
F. Employees trained to use personal protective and other rescue equipment.	✓
G. Safety harness and lifeline used and individually attended when entering bell bottom or other deep confined excavations.	✓
6. Support Systems:	
A. Materials and/or equipment for support systems selected based on soil analysis, trench depth, and expected loads.	NA
B. Materials and equipment used for protective systems inspected and in good condition.	NA
C. Materials and equipment not in good condition have been removed from service.	NA
D. Damaged materials and equipment used for protective systems inspected by a registered professional engineer (RPE) after repairs and before being placed back into service.	✓
E. Protective systems installed without exposing employees to the hazards of cave-ins, collapses, or threat of being struck by materials or equipment.	NA

F. Members of support system securely fastened to prevent failure.	NA
G. Support systems provided in ensure stability of adjacent structures, buildings, roadways, sidewalks, walls, etc.	NA
H. Excavations below the level of the base or footing supported, approved by an RPE.	NA
I. Removal of support systems progresses from the bottom and members are released slowly as to note any indication of possible failure.	NA
J. Backfilling progresses with removal of support system.	NA
K. Excavation of material to a level no greater than two feet below the bottom of the support system and only if the system is designed to support the loads calculated for the full depth.	NA
L. Shield system placed to prevent lateral movement. casing	✓
M. Employees are prohibited from remaining in shield system during vertical movement.	NA
Corrective Action and Comments	

Signature of CP/COR

11/5/20
Date

Whitney Treadway
Printed name of CP/COR

One copy shall be provided for both the contractor conducting the work and COR (VASLCHCS)

Appendix G

Borehole Logs with Well Construction Diagrams

CDM Smith
555 17th Street, Suite 500
Denver, CO 80202
(303) 383-2300

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER	238824.6495-F3048-005.DRILL	**BORING/WELL NUMBER**	MW-13L
PROJECT NAME	700 S 1600 E PCE Plume	**DATE DRILLED**	12/2/2020 - 12/3/2020
LOCATION	Salt Lake City, UT	**CASING TYPE/DIAMETER**	2-inch Schedule 40 PVC
DRILLING METHOD	Sonic	**SCREEN TYPE/SLOT**	2-inch Schedule 40 0.020-slot
SAMPLING METHOD	Sonic Grab	**GRAVEL PACK TYPE**	#10/20 sand
GROUND ELEVATION (FT MSL)	4483.67	**GROUT TYPE/QUANTITY**	Hydrated Bentonite Chips
TOP OF CASING (FT MSL)	4483.23	**DEPTH TO WATER (FT BGS)**	19.83
LOGGED BY	Joe Miller	**GROUND WATER ELEVATION (FT MSL)**	4463.84
REMARKS	Groundwater measured while drilling		

PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
							No recovery. Hand augered to 5 ft bgs.	
				5				5.0
					SM		Silty SAND: brown (10YR 5/4); 70% fine sand, poorly graded; 30% silt; loose; moist.	6.0
0	0.528				ML		Sandy SILT: yellowish brown (10YR 5/4); 60% silt; 40% sand; soft; moist.	7.0
0.1	0.371						Sandy CLAY: mottled gray and light yellowish brown (2.5Y 6/3); 80% clay; 20% fine sand; stiff; cohesive; moist.	
0.1				10	CL			
0.6	0.138							12.0
					SM		Silty SAND: yellowish brown (10YR 5/4); 70% sand, poorly graded, fine to coarse; 30% silt; loose; wet.	12.7
	0.182						SAND: yellowish brown (10YR 5/4); fine to coarse, poorly graded; loose; wet.	
0.6					SP			
	0.135			15				
								16.5
0.4	0.254				GM		Silty GRAVEL with Sand: reddish brown (5YR 4/3); 60% gravel, fine to coarse, subangular to subrounded; 20% silt; 20% sand, fine to coarse; medium dense; cohesive in places; wet.	
0.1								
				20				20.0

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WELL DIAGRAM

- Flush-mounted vault (10-inch).
- Hydrated bentonite chips (2 to 147 ft bgs).
- 2-inch SCH 40 PVC blank.

WHITNEY'S BORING LOG SLC VA PLUME DRAFT DEC2020_WTJM.GPJ LAEWNN01.GDT 3/10/21

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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 238824.6495-F3048-005.DRILL
BORING/WELL NUMBER MW-13L
PROJECT NAME 700 S 1600 E PCE Plume
DATE DRILLED 12/2/2020 - 12/3/2020

Continued from Previous Page

PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
0.7	0.085				GM				
							Silty SAND: reddish brown (5YR 4/3); 60% sand, poorly graded, fine to coarse; 40% silt; cohesive; compact; wet.	21.5	
0.4	0.112				SM		At 24.5 feet bgs, trace gravel.		
				25			Silty GRAVEL with Sand: reddish brown (5YR 4/3); 70% gravel, fine to coarse; 20% silt; 10% sand; compact; cohesive; wet.	25.0	Hydrated bentonite chips (2 to 147 ft bgs).
1.1	0.103				GM				
							SAND: reddish brown (5YR 4/3); 60% sand, well graded, fine to coarse, subangular to subrounded; 40% gravel, fine to coarse, loose; wet.	28.0	
0.7	0.062				SW				
				30			Silty GRAVEL with Sand: reddish brown (5YR 4/3); 50% gravel, fine to coarse, subangular to subrounded; 30% silt; 20% sand; compact; cohesive in places; wet.	30.0	2-inch SCH 40 PVC blank.
0.5	0.58								
0.7	0.78				GM		At 33.3 feet bgs, increase in sand content, decrease in silt content.		
				35			At 34.5 feet bgs, decrease in sand content, increase in silt content.		
0.6	0.123								
							Clayey SILT: reddish brown (7.5YR 5/4); 100% fines, low to medium plasticity; firm to stiff; cohesive; moist to wet.	37.0	
0.4	0.998				ML		At 39 feet bgs, trace sand, wet.		
				40			Sandy SILT: reddish brown (7.5YR 5/4); 80% silt, low plasticity; 20% sand; stiff; moist to wet.	40.0	
0.5	0.962				ML				

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BORING/WELL CONSTRUCTION LOG

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BORING/WELL NUMBER MW-13L
PROJECT NAME 700 S 1600 E PCE Plume
DATE DRILLED 12/2/2020 - 12/3/2020

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PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
0.4	0.335				ML		At 44 feet bgs, trace fine gravel.	43.0	
0.4	0.128			45	GM		Silty GRAVEL: reddish brown (5YR 5/4); 60% gravel, fine to coarse, subangular to subrounded; 30% silt; 10% sand, fine to coarse; cohesive in places; compact; wet.	45.0	
1	0.334						At 48 feet bgs, large clasts.		
1							At 49.5 feet bgs, less moisture.	50.0	Hydrated bentonite chips (2 to 147 ft bgs).
0.5	0.543			50	SP		SAND: brown (7.5YR 4/4); 90% sand, poorly graded, fine to coarse; 10% fine gravel; loose; wet.	52.0	
					GC		Clayey GRAVEL: brown (7.5YR 4/4); 70% coarse gravel; 30% clay; dense; moist.	52.8	
	0.351				SP		SAND with Gravel: light reddish brown (5YR 6/4); 85% fine sand, poorly graded; 15% fine gravel; loose; moist.	54.0	
2.1				55	GC		Clayey GRAVEL: brown (7.5YR 4/4); 70% gravel, fine to coarse; 30% clay; dense; moist to wet.		2-inch SCH 40 PVC blank.
0.6	0.478						At 57.5 feet bgs, increase in moisture.	58.5	
0.8	0.682				CL		CLAY: brown (7.5YR 4/4); low to medium plasticity clay; stiff; cohesive; dry to moist.	60.0	
0.8	0.262			60	ML		Clayey SILT: brown (7.5YR 5/4); low to medium plasticity; stiff; cohesive; moist.	63.0	
0.7					CL		CLAY: brown (7.5YR 5/4); lean clay; very stiff; cohesive; cemented in places; dry to moist.		
	0.274			65					

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WHITNEY'S BORING LOG SLC VA PLUME DRAFT DEC2020_WTJM.GPJ LAEWNN01.GDT 3/10/21

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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 238824.6495-F3048-005.DRILL
BORING/WELL NUMBER MW-13L
PROJECT NAME 700 S 1600 E PCE Plume
DATE DRILLED 12/2/2020 - 12/3/2020

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PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
0.8	0.273				CL			66.0	
					SP		SAND with Gravel: light reddish brown (5YR 6/4); 85% sand, poorly graded, fine to coarse; 15% gravel, fine to coarse; dry.	67.0	
							Clayey SILT: brown (7.5YR 5/4); low to medium plasticity; firm to stiff; cohesive; moist.	68.0	
0.9	0.218			70					
1.2	0.38				ML		At 72 feet bgs, wet sandy lens.		
1	0.582							74.5	
				75			Clayey GRAVEL: brown (7.5YR 5/4); 70% gravel, fine to coarse, subrounded to rounded; 30% clay; dense; cohesive; moist.		Hydrated bentonite chips (2 to 147 ft bgs).
1.2	0.542				GC				
1.1	0.243				ML		Sandy SILT: brown (7.5YR 5/4); 60% silt; 40% sand; trace fine gravel; firm; cohesive; moist; wet in places.	79.0	
				80			Sandy SILT: light brown (7.5YR 6/4); 70% silt, low plasticity; 30% sand; firm; cohesive; moist.	80.0	2-inch SCH 40 PVC blank.
1.2	0.379								
1.3	0.515				ML				
				85					
1.2	0.507								
								87.0	
					ML		Clayey SILT: light brown (7.5YR 6/4); low to medium plasticity; 10% sand; firm; cohesive; moist.		

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WHITNEY'S BORING LOG SLC VA PLUME DRAFT DEC2020_WTJM.GPJ LAEWNN01.GDT 3/10/21

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BORING/WELL CONSTRUCTION LOG

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BORING/WELL NUMBER MW-13L
PROJECT NAME 700 S 1600 E PCE Plume
DATE DRILLED 12/2/2020 - 12/3/2020

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PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
1	0.604				ML			89.0	
				90				90.0	
					ML		SILT with Sand and Gravel: light brown (7.5YR 6/4); 60% silt; 20% sand; 20% gravel; firm; cohesive; moist to wet.		
1.8	0.395							91.5	
					CL		Gravelly CLAY: light brown (7.5YR 6/4); low to medium plasticity; moist.		
1.6	0.282								
							At 94.25 feet bgs, large clast.	94.8	
				95			CLAY: light brown (7.5YR 6/4); 80% clay, low to medium plasticity; 10% sand, fine to coarse; 10% gravel, fine to coarse; firm to stiff; cohesive; moist.		Hydrated bentonite chips (2 to 147 ft bgs).
1.5	0.61								
1.5	0.226				CL				
				100					2-inch SCH 40 PVC blank.
1.8	0.448								
2.1	0.222								
								104.0	
							CLAY: light olive brown (2.5Y 5/3); lean clay; trace fine gravel; hard; cohesive; dry.		
				105					
1	0.118								
					CL				
0.6	0.131								
				110					
								111.0	
1.7	0.093								

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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 238824.6495-F3048-005.DRILL
BORING/WELL NUMBER MW-13L
PROJECT NAME 700 S 1600 E PCE Plume
DATE DRILLED 12/2/2020 - 12/3/2020

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PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
					CL			113.0	
1.8	0.092			115	CL		CLAY with Sand: light olive brown (2.5Y 5/3) with brown mottling; 85% lean clay, low to medium plasticity; 15% sand; trace silt; laminated; firm to stiff; cohesive; moist.		
2.1								116.5	
	0.082						CLAY: light olive brown (2.5Y 5/3) with brown mottling; lean clay, low to medium plasticity; hard; cohesive; dry.		
1.7	0.126			120	CL				Hydrated bentonite chips (2 to 147 ft bgs).
1.2	0.171						At 122.25 feet bgs, increase in silt.		
1.5								124.0	
	0.343				SM		Silty SAND: pale brown (10YR 6/3); 70% fine sand, poorly graded; 30% silt; loose; moist to wet. Sample is closer to wet than moist, but not saturated.	124.5	
					ML			125.0	
				125	SM		Sandy SILT: light olive brown with brown mottling; low plasticity; moist to wet.		2-inch SCH 40 PVC blank.
1.5	0.508						Silty SAND: pale brown (10YR 6/3); 70% fine sand, poorly graded; 30% silt; loose; moist to wet. Sample is closer to wet than moist, but not saturated.	126.0	
							Sandy SILT: pale brown (10YR 6/3) with trace iron oxide staining in places; 70% silt, low plasticity; 30% sand; laminated; firm to stiff; cohesive; moist.		
					ML				
1.3	0.141			130			At 130.3 feet bgs, increase in clay.		
1.8	0.118							131.5	
	0.802						Sandy SILT: brown (7.5YR 4/4); 70% silt; 30% sand; laminated; firm to stiff; cohesive; moist to wet.		
					ML				

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WHITNEY'S BORING LOG SLC VA PLUME DRAFT DEC2020_WTJM.GPJ LAEWNN01.GDT 3/10/21

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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 238824.6495-F3048-005.DRILL
BORING/WELL NUMBER MW-13L
PROJECT NAME 700 S 1600 E PCE Plume
DATE DRILLED 12/2/2020 - 12/3/2020

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PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
1.6				135	ML		Sandy SILT: brown (7.5YR 4/4); 60% silt; 30% sand; 10% fine gravel; moist to wet.	134.5	
								135.5	
1.9	0.273				SM		Silty SAND: brown (7.5YR 4/4); 60% sand, fine to coarse; 30% silt; 10% fine gravel; dense; wet.	137.0	
							SILT with SAND: brown (7.5YR 4/4); 70% silt; 20% sand; 10% gravel; moist.		
1.6	0.446			140			At 140 feet bgs, less gravel.		Hydrated bentonite chips (2 to 147 ft bgs).
2.5					ML				
1.9				145					2-inch SCH 40 PVC blank.
1.8								146.5	
					ML		Gravelly SILT: brown (7.5YR 5/5); 60% silt; 40% gravel, fine to coarse; stiff; cohesive; moist to wet. At 147.5 feet bgs, less stiff and wetter.	148.0	
							SILT with Gravel: brown (7.5YR 5/5); 85% silt; 15% gravel; stiff; cohesive; moist.		#10/20 sand filter pack (147 to 160 ft bgs).
2.9					ML				
2.1	0.265			150				150.0	
					ML		Sandy SILT: brown (7.5YR 5/4); 60% silt, low plasticity; 40% sand, fine to coarse; trace fine gravel; firm; cohesive; moist to wet. At 152.5 feet bgs, increase in gravel.	153.0	
2.2	0.416						SILT with Sand: brown (7.5YR 5/5); 85% silt; 15% sand; firm to stiff; cohesive; moist to wet.		
					ML				
2.4	0.612			155					2-inch SCH 40 PVC 0.020-slot screen (150 to 160 ft bgs).
								156.0	
					GM		GRAVEL with Sand and Silt: brown (7.5YR 5/4); 50% gravel; poorly graded, fine to coarse, subangular to subrounded; 35% sand, fine to coarse; 15% silt; saturated; wet.	157.0	

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BORING/WELL CONSTRUCTION LOG

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BORING/WELL NUMBER MW-13L
PROJECT NAME 700 S 1600 E PCE Plume
DATE DRILLED 12/2/2020 - 12/3/2020

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PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
2.7	0.105				GM		At 158 feet bgs, decrease in silt.		
				160			End of boring at 160 feet bgs.	160.0	

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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER	238824.6495-F3048-005.DRILL	**BORING/WELL NUMBER**	MW-30R
PROJECT NAME	700 S 1600 E PCE Plume	**DATE DRILLED**	11/5/2020 - 11/10/2020
LOCATION	Salt Lake City, UT	**CASING TYPE/DIAMETER**	2-inch Schedule 40 PVC
DRILLING METHOD	Sonic	**SCREEN TYPE/SLOT**	2-inch Schedule 40 0.020-slot
SAMPLING METHOD	Sonic Grab	**GRAVEL PACK TYPE**	#10/20 sand
GROUND ELEVATION (FT MSL)	4722.89	**GROUT TYPE/QUANTITY**	Hydrated Bentonite Chips
TOP OF CASING (FT MSL)	A: 4722.60 B: 4722.36	**DEPTH TO WATER (FT BGS)**	A: 227.57 B: 229.56
LOGGED BY	Whitney Treadway	**GROUND WATER ELEVATION (FT MSL)**	A: 4495.03 B: 4492.8
REMARKS	Groundwater measured after installation.		

PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
				5			No recovery. Hydrovac to 9 ft bgs.		Flush-mounted vault (10-inch).
0			B	10			Silty SAND: dark yellowish brown (10YR 4/6); 50% sand, well graded, fine to coarse, subangular to subrounded; 30% silt, non-plastic; 20% gravel and cobbles, well graded, fine to coarse, subrounded, maximum diameter is 4 inches; dry. At 10 feet bgs, cobbles are up to 6 inches.	9.0	Pea gravel (2 to 8 ft bgs)
0	0.009								Hydrated bentonite chips (8 to 237 ft bgs).
0							At 12 feet bgs, color changes to yellowish red (5YR 5/6).		
							At 13 feet bgs, color changes to brown (7.5YR 4/4).		
0					SM				
	0.236		B	15					2-inch SCH 40 PVC blank.
0							At 16 feet bgs, cobbles are up to 7 inches.		
0								18.5	
					SM		Silty SAND: brown (7.5YR 5/4); 45% sand, poorly graded, fine to coarse, mostly fine, subangular to subrounded; 40% silt, non-plastic; 15% gravel, poorly graded, fine to coarse, mostly fine, subrounded to subangular, maximum diameter is 4	20.0	
				20			*Continued Next Page*		

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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 238824.6495-F3048-005.DRILL
BORING/WELL NUMBER MW-30R
PROJECT NAME 700 S 1600 E PCE Plume
DATE DRILLED 11/5/2020 - 11/10/2020

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PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
0	0.08				CH		inches; moist.	20.3	
0					SC		CLAY: light brown (7.5YR 6/4); high plasticity clay with dark red and light green stained nodules.		
							Clayey SAND with Gravel: brown (7.5YR 4/4); 55% sand, poorly graded, fine to coarse, mostly fine to medium, subangular to subrounded; 30% high plasticity clay; 15% gravel, poorly graded, fine to coarse, mostly fine; moist.	22.0	
					SM		Silty SAND: brown (7.5YR 4/4); 85% sand, poorly graded, fine, subangular to subrounded; 15% silt, non-plastic; moist.	23.0	
0					CH		Gravelly CLAY: brown (7.5YR 5/4); 60% high plasticity clay; 40% gravel, well graded, fine to coarse, subangular to subrounded, maximum diameter is 5 inches; moist.	24.0	
0	0.122		B	25	GC		Clayey GRAVEL with Sand: brown (7.5YR 5/4); 50% gravel, well graded, fine to coarse, subangular to subrounded; 30% sand, well graded, fine to coarse, subangular to subrounded; 20% high plasticity clay with light green staining. Gradual transition from gravelly clay above.	26.0	Hydrated bentonite chips (8 to 237 ft bgs).
0					SC SM		Silty Clayey SAND: brown (7.5YR 4/4); 60% sand, poorly graded, fine to coarse, mostly fine, subangular to subrounded; 20% clay, medium to high plasticity (in nodules and layers); 20% silt, non-plastic; trace fine gravel; moist.		
0								30.0	2-inch SCH 40 PVC blank.
	0.069			30			Silty SAND with Gravel: brown (7.5YR 4/4); 60% sand, well graded, fine to coarse, subangular to subrounded; 20% silt, non-plastic; 20% gravel, well graded, fine to coarse, subangular to subrounded, maximum diameter is 6 inches; moist.		
0					SM		At 32 feet bgs, sandy gravelly CLAY lens; 32 to 33 feet bgs.		
0	0.065		B	35					
								36.0	
0					CH		Gravelly CLAY: reddish brown (5YR 4/4); 70% high plasticity clay; 40% gravel, well graded, fine to coarse, subangular to subrounded; moist.		
								38.0	
					SM		Silty SAND with Gravel: brown (7.5Y 5/4); 40% sand, well graded, fine to coarse; 20% silt, non-plastic; 20% gravel, well graded; 10% clay.	39.0	
0					SM		Silty SAND with Gravel: light brownish gray (2.5Y 6/2); 60% sand, poorly graded, mostly fine, angular to subangular; 30% silt, non-plastic; 10% gravel, poorly graded, mostly fine, angular to subangular; dry. Crushed rock.	40.0	
	0			40			Clayey GRAVEL: brown (7.5YR 4/3); 70% gravel, well graded, fine to coarse, angular to suangular, maximum diameter is 4 inches; 30% medium plasticity clay matrix; moist.		
0.7			B		GC		At 42 feet bgs, large tan to light gray boulder, approximately 1 foot in diameter.		

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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 238824.6495-F3048-005.DRILL
BORING/WELL NUMBER MW-30R
PROJECT NAME 700 S 1600 E PCE Plume
DATE DRILLED 11/5/2020 - 11/10/2020

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PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
0.7					GC			43.0	
								44.5	
0.5	0			45	SM		Silty SAND with Gravel: light brownish gray (2.5Y 6/2); 40% sand, well graded, fine to coarse, angular to subrounded; 30% gravel, well graded, fine to coarse, angular to subrounded, maximum diameter is 5 inches; 30% silt, non-plastic; moist.		
								47.0	
0.3					SC		Clayey SAND with Gravel: red boulders, gravel, and sand with clay matrix. Maximum diameter is 6 inches.		
								48.0	
0.2					SM		Silty SAND with Gravel: light brownish gray (2.5Y 6/2); 40% sand, well graded, fine to coarse, angular to subrounded; 30% gravel, well graded, fine to coarse, angular to subrounded, maximum diameter is 5 inches; 30% silt, non-plastic; moist.		
								50.0	Hydrated bentonite chips (8 to 237 ft bgs).
	0.098			50			CLAY: light brown (7.5YR 6/3); 95% high plasticity clay, slightly mottled; 5% gravel, well graded, fine to coarse, subangular to subrounded, maximum diameter is 4 inches.		
0.7					CH		At 52 feet bgs, small, olive silt nodules.		
0.4							At 53.5 feet bgs, clay is mottled with red.		
								54.5	
					SC		Clayey SAND with Gravel: brown (7.5YR 5/4); 40% sand, well graded, fine to coarse, sunangular to subrounded; 35% gravel, well graded, fine to coarse, angular to subangular, maximum diamter is 4 inches; 15% medium plasticity clay; 10% silt, non-plastic; moist.	55.0	2-inch SCH 40 PVC blank.
0.2	0.029			55			SAND with Gravel: brown (7.5YR 4/4); 60% sand, poorly graded, fine to coarse, mostly fine to medium; 40% gravel, well graded, fine to coarse, subangular to subrounded, maximum diameter is 6 inches; trace silt; moist.		
0.2					SP		At 58 feet bgs, trace clay.		
0.1									
								60.0	
	0.048			60			At 60 feet bgs, light gray pulverized rock; limestone.		
0							Silty SAND with Gravel: brown (7.5YR 5/4); 50% sand, poorly graded, fine to coarse, mostly fine, subangular to subrounded; 30% gravel, well graded, fine to coarse, subangular to subrounded, maximum diameter is 5 inches; 20% silt, non-plastic; moist.		
0					SM		At 63 feet bgs, lithified fragment with clay.		
0	0.02			65					

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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 238824.6495-F3048-005.DRILL
BORING/WELL NUMBER MW-30R
PROJECT NAME 700 S 1600 E PCE Plume
DATE DRILLED 11/5/2020 - 11/10/2020

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PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
0					SM		At 66 feet bgs, clay content increases to 15%, silt content decreases to 5%.	66.0	
							At 68 feet bgs, 8 inches cobble.		
								69.0	
	0.058			70	CH		Sandy CLAY: brown (7.5YR 4/4); 75% high plasticity clay; 20% sand, poorly graded, fine; 5% gravel, well graded; small nodules of red sand in clay. Mostly lithified. At 70 feet bgs, white to light gray crushed rock; gray limestone.	70.5	
0					GC		Clayey GRAVEL with Sand: brown (7.5YR 4/4); 40% gravel, well graded, fine to coarse, subangular to subrounded, maximum diameter is 7 inches; 30% medium plasticity clay; 30% sand, poorly graded, fine to medium, subangular to subrounded; moist.		
0								75.0	Hydrated bentonite chips (8 to 237 ft bgs).
0	0.016			75			Silty SAND with Gravel: brown (7.5YR 4/4); 45% sand, well graded, fine to coarse, subangular to subrounded; 35% gravel, well graded, fine to coarse, subangular to subrounded, maximum diameter is 4 inches; 20% silt, non-plastic; moist.		
0					SM				
0							At 79 feet bgs, cobble of crystalline rock.		
	0			80			Silty Clayey SAND with Gravel: brown (7.5YR 4/4); 55% sand, well graded, fine to coarse, subangular to subrounded; 30% gravel, well graded, fine to coarse, subangular to subrounde, maximum diameter is 6 inches; 15% clay and silt (varies by depth), low plasticity; moist.	80.0	2-inch SCH 40 PVC blank.
0									
0									
0					SC SM				
0	0.056			85					
0									

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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 238824.6495-F3048-005.DRILL **BORING/WELL NUMBER** MW-30R
PROJECT NAME 700 S 1600 E PCE Plume **DATE DRILLED** 11/5/2020 - 11/10/2020

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PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
0	0.069		B	90	SC SM		Silty Clayey SAND with Gravel: brown (7.5YR 4/4); 55% sand, well graded, fine to coarse, subangular to subrounded; 30% gravel, well graded, fine to coarse, subangular to subrounde, maximum diameter is 6 inches; 15% clay and silt (varies by depth), low plasticity; moist.	89.0	
0					CH		Gravelly CLAY: brown (7.5YR 4/4); 60% high plasticity clay; 25% gravel, well graded, fine to coarse, subangular to subrounded; 15% sand, poorly graded, fine to medium, subangular to subrounded; moist. Lenses of light yellow sand.	91.0	
0					GC		Clayey GRAVEL: reddish brown (5YR 4/4); 60% gravel, well graded, fine to coarse, subangular to subrounded; 20% medium plasticity clay; 20% sand, poorly graded, mostly fine to medium, subangular to subrounded; moist.	92.5	
0	0.074		B	95	SM		Silty SAND with Gravel: reddish brown (5YR 5/3); 50% sand, poorly graded, fine to coarse, mostly fine to medium; 30% gravel, well graded, fine to coarse, subangular to subrounded; 20% silt, non-plastic; moist. Some large, 6-inch cobbles.	94.0	Hydrated bentonite chips (8 to 237 ft bgs).
0								99.0	
0					SM		Silty SAND: brown (7.5YR 4/4); 60% sand, poorly graded, fine to medium; 30% silt, non-plastic; 10% gravel, poorly graded, fine, subrounded; moist.	100.0	
0	0.013			100	GC		Clayey Silty GRAVEL with Sand: yellowish red (5YR 5/6); 50% gravel and cobbles, poorly graded, mostly coarse, maximum diameter is 7 inches, subangular to subrounded; 30% sand, poorly graded, mostly fine to medium, subangular to subrounded; 20% silt and clay, low plasticity; moist. At 102 feet bgs, broken, light pink boulder.		2-inch SCH 40 PVC blank.
0								103.5	
0	0.052		B	105	SC SM		Clayey Silty SAND with Gravel: yellowish red (5YR 5/6); 50% sand, well graded, fine to coarse, subangular to subrounded; 30% gravel, poorly graded, mostly fine; 10% silt and clay, low plasticity; moist.		
0								110.0	
0	0.012		B	110	GC		Clayey GRAVEL with Sand: reddish brown (5YR 4/4); 45% gravel and cobbles, well graded, fine to coarse, subangular to subrounded, maximum diameter is 6 inches; 35% sand, well graded, fine to coarse, subangular to subrounded; 20%	111.0	

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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 238824.6495-F3048-005.DRILL
BORING/WELL NUMBER MW-30R
PROJECT NAME 700 S 1600 E PCE Plume
DATE DRILLED 11/5/2020 - 11/10/2020

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PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
0							medium plasticity clay with some non-plastic silt; moist. Samples look like clay matrix around gravel that was more lithified before it was drilled.		
0	0.03			115	GC		At 114 feet bgs, largest cobbles.	117.0	
	0.041			120			Clayey SAND with Gravel: reddish brown (5YR 4/4); 45% sand, well graded, fine to coarse, subangular to subrounded; 35% gravel and cobbles, well graded, fine to coarse, subangular to subrounded, maximum diameter is 7 inches; 20% medium plasticity clay with some non-plastic silt; moist. Gradual transition from above. Similar to sample above, looks like clay matrix around sand and gravel that was once more lithified. More clay from 120 to 122 feet bgs.		Hydrated bentonite chips (8 to 237 ft bgs).
0									
0	0.158			125	SC				2-inch SCH 40 PVC blank.
0									
0				130			More clay from 130 to 131 feet bgs.		
0	0.052								
0							At 133 feet bgs, 6-inch lens of reddish yellow (5YR 7/8) medium sand.		

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WHITNEY'S BORING LOG SLC VA PLUME DRAFT DEC2020_WTJM.GPJ LAEWNN01.GDT 3/10/21

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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 238824.6495-F3048-005.DRILL **BORING/WELL NUMBER** MW-30R
PROJECT NAME 700 S 1600 E PCE Plume **DATE DRILLED** 11/5/2020 - 11/10/2020

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PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
				135				135.0	
0	0.035				GC		Clayey GRAVEL with Sand: reddish brown (5YR 4/4); 40% gravel and cobbles, well graded, fine to coarse, subangular to subrounded, maximum diameter is 6 inches; 30% sand, well graded, fine to coarse, subangular to subrounded; 30% medium to high plasticity clay matrix around sand and gravel; moist.	137.0	
0							Clayey SAND with Gravel: reddish brown (5YR 4/4); 50% sand, well graded, fine to coarse, subangular to subrounded; 35% gravel and cobbles, well graded, fine to coarse, subangular to subrounded, maximum diameter is 6 inches; 15% medium plasticity clay matrix with non-plastic silt; moist.		
0					SC				
	0.076			140					Hydrated bentonite chips (8 to 237 ft bgs).
0								142.0	
0							Clayey SAND with Gravel: reddish brown (5YR 4/4); 60% sand, poorly graded, fine to coarse, mostly fine to medium, subangular to subrounded; 20% medium plasticity clay matrix; 20% gravel, well graded, fine to coarse, subangular to subrounded, maximum diameter is 3 inches; moist.		
					SC		Sand becomes well graded, fine to coarse.		
0	0.078			145					2-inch SCH 40 PVC blank.
0								147.5	
							Silty SAND with Gravel: brown (7.5YR 4/4); 60% sand, poorly graded, fine to coarse, mostly fine; 20% silt, non-plastic; 20% gravel, well graded, fine to ccoarse; trace clay; moist.		
0					SM				
	0.049			150				150.0	
							SAND with Gravel and Clay: reddish brown (5YR 4/4); 50% sand, well graded, fine to coarse, subangular to subrounded; 40% gravel, well graded, fine to coarse, maximum diameter is 7 inches; 10% medium plasticity clay; moist.		
					SW SC		At 153 feet bgs, lighter 6-inch layer with silt (not clay); brown (5YR 6/4).		
0	0.122			155					
								157.0	

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PROJECT NUMBER 238824.6495-F3048-005.DRILL
BORING/WELL NUMBER MW-30R
PROJECT NAME 700 S 1600 E PCE Plume
DATE DRILLED 11/5/2020 - 11/10/2020

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PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
0					GC		Clayey GRAVEL with Sand: reddish brown (5YR 4/4); 50% gravel, well graded, fine to coarse, subangular to subrounded, maximum diameter is 7 inches; 35% sand, well graded, fine to coarse, subangular to subrounded; 15% low to medium plasticity clay matris; moist.	159.0	
0				160	SC SM		Clayey Silty SAND with Gravel: reddish brown (5YR 4/4); 55% sand, well graded, fine to coarse, mostly fine, subangular to subrounded; 25% clay and silt intermixed; 20% gravel, poorly graded, fine to coarse, mostly fine, subangular to subrounded, maximum diameter is 4 inches; moist.	164.0	
0	0.099			165	CH		Gravelly CLAY: reddish brown (5YR 4/4); 75% medium plasticity clay; 25% gravel, well graded, fine to coarse, subangular to subrounded, maximum diameter is 4 inches; moist; slightly lithified.	166.0	← Hydrated bentonite chips (8 to 237 ft bgs).
					ML		Gravelly SILT: reddish brown (5YR 4/4); 75% silt, non-plastic; 25% gravel, poorly graded, coarse, subangular to subrounded, maximum diameter is 4 inches; moist; lithified.	166.5	
0							Large, white to light pink cobble/boulder, cut by core barrel, including silt and fine sand from cutting and grinding.	167.5	
					SM		Silty SAND with Gravel: reddish brown (5YR 4/4); 40% sand, poorly graded, fine to coarse, mostly fine, subangular to subrounded; 30% gravel, well graded, fine to coarse, subangular to subrounded; 30% silt; moist.	168.5	
0					SC		Clayey SAND and GRAVEL: reddish brown (5YR 4/4); 40% sand, poorly graded, fine to coarse, subangular to subrounded; 40% gravel, well graded, fine to coarse, subangular to subrounded; 20% low plasticity clay; moist; with lenses of light-colored, fine sand.	170.0	← 2-inch SCH 40 PVC blank.
0				170	SC		Clayey SAND with Gravel: reddish brown (5YR 4/4); 45% sand, well graded, fine to coarse, subangular to subrounded; 35% gravel, well graded, fine to coarse, subangular to subrounded, maximum diameter is 6 inches; 20% medium plasticity clay; moist.	172.0	
0					GC		Clayey GRAVEL with Sand: reddish brown (5YR 4/4); 40% gravel, well graded, fine to coarse, subangular to subrounded; 30% medium plasticity clay; 30% sand, well graded, fine to coarse, subangular to subrounded; moist.	174.0	
2.5	0.067			175	SM		Silty SAND and GRAVEL: reddish brown (5YR 5/4); 40% sand, poorly graded, fine to coarse, mostly fine, subangular to subrounded; 40% gravel, well graded, fine to coarse, subangular to subrounded, maximum diameter is 6 inches; 20% silt, non-plastic; moist. At 175 feet bgs, large pulverized cobbles, light gray powder with dark gray cobbles. At 176 feet bgs, 6-inch fine sand layer (trace coarse).		
1.1								178.0	
2.1				180	SM		Silty SAND with Gravel: reddish brown (5YR 4/3); 40% sand, well graded, fine to coarse, subangular to subrounded; 35% gravel, well graded, fine to coarse, subangular to subrounded, maximum diameter is 5 inches; 25% clay and silt; moist. Most gravel and cobbles are of dark gray limestone.	180.0	

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WHITNEY'S BORING LOG SLC VA PLUME DRAFT DEC2020_WTJM.GPJ LAEWNN01.GDT 3/10/21

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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 238824.6495-F3048-005.DRILL
BORING/WELL NUMBER MW-30R
PROJECT NAME 700 S 1600 E PCE Plume
DATE DRILLED 11/5/2020 - 11/10/2020

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PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
	0.06								
1.3			B		SM				
								183.0	
					SM		Silty SAND with Gravel: brown (7.5YR 4/4); 65% sand, poorly graded, fine to coarse, mostly fine to medium, subangular to subrounded; 20% gravel, poorly graded, fine to coarse, mostly fine, subangular to subrounded, maximum diameter is 3 inches; 15% silt, slight plasticity; moist.		
0.2	0.058			185					Hydrated bentonite chips (8 to 237 ft bgs).
								186.0	
			B		ML		SILT with Gravel: brown (7.5YR 4/4); 85% silt, non-plastic; 15% gravel, poorly graded, mostly fine, subangular to subrounded; trace sand lenses; moist. Gradual transition to clay below.		
0								187.5	
					CH		CLAY with Sand and Gravel: brown (7.5YR 4/4); 80% medium to high plasticity clay; 10% fine gravel, subangular to subrounded; 10% fine to medium sand; moist. Transition to silty sand below is a thin silt layer.	188.5	
0					SM		Silty SAND: brown (7.5YR 4/4); 70% sand, poorly graded, mostly fine, subangular to subrounded; 20% silt, non-plastic; 10% gravel, well graded, fine to coarse, maximum diameter is 3 inches; moist.	190.0	2-inch SCH 40 PVC blank.
	0.173			190					
0					SM		Silty SAND with Gravel: brown (7.5YR 4/4); 45% sand, well graded, fine to coarse, subangular to subrounded; 35% gravel and cobbles, well graded, fine to coarse, subangular to subrounded, maximum diameter is 7 inches; 20% silt, slightly plastic; moist.		
0								194.0	
					CH		CLAY with Sand and Gravel: brown (7.5YR 4/4); 70% medium to high plasticity clay; 15% gravel, poorly graded, fine, subangular to subrounded; 15% sand, well graded, fine to coarse, subangular to subrounded; moist.	195.0	
0	0.058		B	195					
					SM		Silty SAND with Gravel: brown (7.5YR 4/4); 45% sand, well graded, fine to coarse, subangular to subrounded; 35% gravel, well graded, fine to coarse, subangular to subrounded; 20% silt, slightly plastic; moist.	197.0	
0					SC		Clayey SAND: brown (7.5YR 4/4); 45% sand, well graded, fine to coarse, subangular to subrounded; 35% gravel, well graded, fine to coarse, subangular to subrounded; 20% clay; moist.		
0								199.5	
					SC		Silty Clayey SAND with Gravel: brown (7.5YR 4/4); 40% sand, well graded, fine to coarse, subangular to subrounded; 40% silt and clay; 20% gravel, well graded, fine to coarse, subangular to subrounded; moist.	200.0	
	0.068			200	SM				
0			B		SM		Silty SAND with Gravel: brown (7.5YR 4/4); 45% sand, well graded, fine to coarse, subangular to subrounded; 35% gravel, well graded, fine to coarse, subangular to subrounded, maximum diameter is 6 inches; 20% medium plasticity clay; moist.		

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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 238824.6495-F3048-005.DRILL **BORING/WELL NUMBER** MW-30R
PROJECT NAME 700 S 1600 E PCE Plume **DATE DRILLED** 11/5/2020 - 11/10/2020

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PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
0					CL		CLAY: yellowish brown (10YR 5/4); 100% low to medium plasticity clay; trace coarse gravel and cobbles; moist. Clay is slightly mottled.	203.0	
								204.5	
0				205	SM		Silty SAND with Gravel: brown (7.5YR 5/4); 60% sand, poorly graded, fine to coarse, mostly fine, subangular to subrounded; 20% gravel, well graded, fine to coarse, subangular to subrounded, maximum diameter is 6 inches; 20% silt, non-plastic; moist.		
0								208.5	
0					SC		Clayey SAND with Gravel: brown (7.5YR 4/4); 60% sand, well graded, fine to coarse, subangular to subrounded; 20% gravel, poorly graded, fine to coarse, mostly fine, subangular to subrounded, maximum diameter is 4 inches; 20% clay, medium plasticity clay; moist.		
	0.016			210			At 210 feet bgs, 3-inch clay layer.	210.5	← Hydrated bentonite chips (8 to 237 ft bgs).
0							Silty Clayey SAND with Gravel: brown (7.5YR 4/4); 65% sand, poorly graded, fine to coarse, mostly fine, subangular to subrounded; 20% clay and silt (alternating layers of none to medium plasticity); 15% gravel, poorly graded, fine to coarse, mostly fine, subangular to subrounded; moist.		
0									
0	0.07			215	SC SM				← 2-inch SCH 40 PVC blank.
0							At 218 feet bgs, 3-inch clay later.		
0								220.0	
	0.188			220			Silty Clayey SAND with Gravel: brown (7.5YR 4/3); 60% sand, well graded, fine to coarse, subangular to subrounded; 20% gravel, well graded, fine to coarse, subangular to subrounded; 20% clay and silt (varying degrees of plasticity); moist. Gradual transition to clayey sand below.		
0					SC SM				
0	0.063			225					

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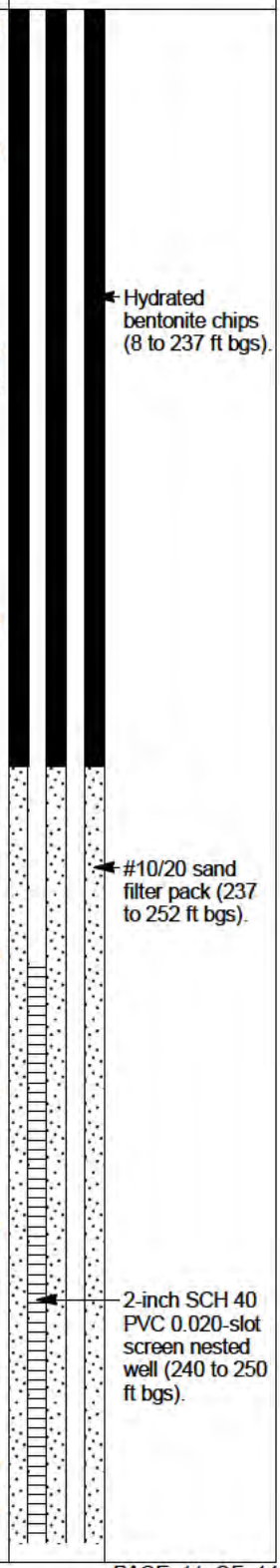
PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
							Clayey SAND and GRAVEL: brown (7.5YR 4/3); 40% sand, well graded, fine to coarse, subangular to subrounded; 40% gravel, well graded, fine to coarse, subangular to subrounded; 20% clay; moist.	226.0
0			B		SC			228.0
0					CH		Sandy CLAY: brown (7.5YR 4/3); 60% medium to high plasticity clay; 30% sand, poorly graded, fine to medium, subangular to subrounded; 10% gravel, poorly graded, fine to coarse, mostly fine, subangular to subrounded; moist.	
				230				231.0
0					CL		CLAY: brown (7.5YR 4/3); 100% low plasticity clay; trace sand and gravel; moist.	231.5
0			B		CH		Gravelly CLAY: brown (7.5YR 5/4); 50% medium to high plasticity clay; 30% gravel, well graded, fine to coarse, subangular to subrounded; 20% sand, well graded, fine to coarse, subangular to subrounded; moist. At 233 feet bgs, large, 7-inch cobble. Gravel is coarse, including cobbles, with lenses of wet sand.	235.0
	0.018			235			Clayey SAND with Gravel: yellowish brown (10YR 5/4); 40% sand, well graded, fine to coarse, subangular to subrounded; 30% gravel, well graded, fine to coarse, subangular to subrounded; 30% high plasticity clay; wet.	
0					SC			
0				240				240.0
0			B		GC		Clayey GRAVEL with Sand: yellowish brown (10YR 5/4); 60% gravel, poorly graded, fine to coarse, mostly fine, subangular to subrounded; 20% sand, poorly graded, coarse, subangular to subrounded; 20% high plasticity clay; wet.	242.0
0					CH		Gravelly CLAY: yellowish brown (10YR 5/4); 50% high plasticity clay; 30% gravel, poorly graded, fine to coarse, mostly fine with some large cobbles, maximum diameter is 5 inches; 20% sand, poorly graded, coarse, subangular to subrounded; wet.	244.0
0	0.008			245	SP SC		SAND with Clay and Gravel: yellowish brown (10YR 5/4); 70% sand, poorly graded, medium to coarse, subangular to subrounded; 20% gravel, poorly graded, mostly fine, subangular to subrounded; 10% medium plasticity clay; wet. From 246 to 246.5 feet bgs, more clay.	
0					ML		SILT: reddish brown (5YR 5/4); 100% silt, slightly mottled; trace coarse groavel and cobbles at lower contact.	247.5 248.3



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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 238824.6495-F3048-005.DRILL
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DATE DRILLED 11/5/2020 - 11/10/2020

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PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
0			B		GC		Clayey GRAVEL: yellowish brown (10YR 5/4); 50% gravel, poorly graded, mostly fine, some coarse and cobbles; 30% sand, poorly graded, medium to coarse, subangular to subrounded; 20% high plasticity clay; wet.	250.0	
0				250	CH		CLAY: reddish brown (5YR 4/4); 95% medium to high plasticity clay; 5% gravel, well graded, fine to coarse, subangular to subrounded, maximum diameter is 3 inches; moist.		#10/20 sand filter pack (237 to 252 ft bgs).
0								255.0	
0	0.062		B	255	SC SM		Silty Clayey SAND with Gravel: reddish brown (5YR 4/4); 40% sand, poorly graded, fine to medium, subangular to subrounded; 30% gravel, well graded, fine to coarse, subangular to subrounded, maximum diameter is 3 inches; 15% clay; 15% silt (in layers of differing plasticity); moist.		
0								259.0	
0					CH		CLAY: reddish brown (5YR 4/4); 90% medium to high plasticity clay; 10% gravel, well graded, fine to coarse, subangular to subrounded, maximum diameter is 3 inches; moist.	260.0	
	0.144			260					2-inch SCH 40 PVC blank.
0					CL		Gravelly CLAY: reddish brown (5YR 4/3); 70% low plasticity clay; 30% gravel, well graded, fine to coarse, subangular to subrounded, maximum diameter is 3 inches; trace sand; moist.		
0								264.0	
					CH		CLAY: reddish brown (5YR 4/4); 100% high plasticity clay; trace sand and gravel; moist.	265.0	Hydrated bentonite chips (252 to 277 ft bgs).
0	0.111			265	CL		Gravelly CLAY: reddish brown (5YR 4/4); 70% low plasticity clay; 30% gravel, poorly graded, mostly fine, maximum diameter is 2 inches; moist.		
0								268.0	
			B		GM		Silty GRAVEL with Sand: reddish brown (5YR 5/4); 45% gravel, poorly graded, mostly fine; 35% sand, poorly graded, mostly fine; 20% silt; moist. Lithified fragments.	269.0	
0					CL		Gravelly CLAY: reddish brown (5YR 4/4); 60% low to medium plasticity clay; 40% gravel, well graded, fine to coarse, maximum diameter is 4 inches; moist. At 270 feet bgs, clay content increases to 70%, gravel content decreases to 30%.		
	0.08			270				271.0	
0									

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WHITNEY'S BORING LOG SLC VA PLUME DRAFT DEC2020_WTJM.GPJ LAEWNN01.GDT 3/10/21

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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 238824.6495-F3048-005.DRILL
BORING/WELL NUMBER MW-30R
PROJECT NAME 700 S 1600 E PCE Plume
DATE DRILLED 11/5/2020 - 11/10/2020

Continued from Previous Page

PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
					CL			273.0
0							Clayey GRAVEL with Sand: reddish brown (5YR 4/4); 40% gravel, well graded, fine to coarse, subangular to subrounded, maximum diameter is 3 inches; 30% sand, well graded, fine to coarse, subangular to subrounded; 30% low plasticity clay; moist. Lithified fragments.	
0	0.018		B	275	GC			
0								278.0
0					SC		Clayey SAND: reddish brown (5YR 4/4); 60% sand, poorly graded, coarse, subangular to subrounded; 40% high plasticity clay; wet.	
	0.175			280			At 280 feet bgs, some gravel.	281.0
0					GC		Clayey GRAVEL: reddish brown (5YR 4/4); 60% gravel, well graded, fine to coarse, subangular to subrounded, maximum diameter is 3 inches; 40% low to medium plasticity clay; moist.	
0			B					284.0
0	0.184			285	GC		Clayey GRAVEL: reddish brown (5YR 4/4); 45% gravel, poorly graded, fine to coarse, mostly fine, some cobbles; 35% sand, well graded, fine to coarse, subangular to subrounded; 20% low to medium plasticity clay; moist.	286.0
0					SM		Silty SAND with Gravel: very pale brown (10YR 7/3); 40% sand, poorly graded, mostly fine, subangular to subrounded; 30% gravel, poorly graded, mostly fine, some coarse and cobbles; 30% silt, non-plastic; moist. Possibly crushed rock.	288.0
0					CL		Thin, reddish yellow (5YR 6/6) sand lens at 288 feet bgs, then Gravelly CLAY: reddish brown (5YR 4/4); 70% low to medium plasticity clay; 30% gravel, well graded, fine to coarse, subangular to subrounded; moist.	
	0.16			290				290.0
			B		SC		Clayey SAND with Gravel: reddish brown (5YR 4/4); 40% sand, well graded, fine to coarse, subangular to subrounded; 40% medium plasticity clay; 20% gravel, poorly graded, mostly fine, subangular to subrounded; wet.	292.5
					CL		Gravelly CLAY: reddish brown (5YR 4/4); 60% low to medium plasticity clay; 30% gravel, well graded, fine to coarse; 10% sand, poorly graded, coarse; moist.	

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WELL DIAGRAM

- Hydrated bentonite chips (252 to 277 ft bgs).
- #10/20 sand filter pack (277 to 291 ft bgs).
- 2-inch SCH 40 PVC 0.020-slot screen nested well (280 to 290 ft bgs).
- Native soil sluff (291 to 295 ft bgs).

WHITNEY'S BORING LOG SLC VA PLUME DRAFT DEC2020_WTJM.GPJ LAEWNN01.GDT 3/10/21

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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 238824.6495-F3048-005.DRILL **BORING/WELL NUMBER** MW-30R
PROJECT NAME 700 S 1600 E PCE Plume **DATE DRILLED** 11/5/2020 - 11/10/2020

Continued from Previous Page

PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
	0.064		D	295			End of boring at 295 feet bgs.	295.0	

WHITNEY'S BORING LOG SLC VA PLUME DRAFT DEC2020_WTJM.GPJ LAEWNN01.GDT 3/10/21

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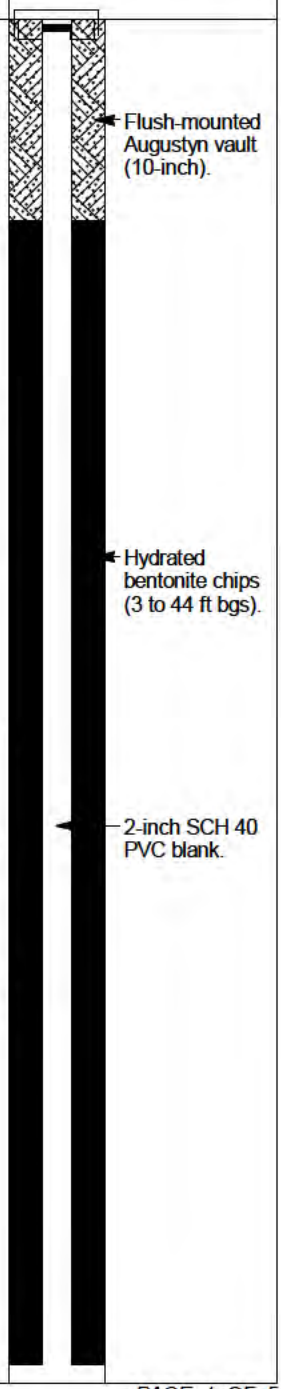
BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER	238824.6495-F3048-005.DRILL	**BORING/WELL NUMBER**	MW-36
PROJECT NAME	700 S 1600 E PCE Plume	**DATE DRILLED**	11/17/2020
LOCATION	Salt Lake City, UT	**CASING TYPE/DIAMETER**	2-inch Schedule 40 PVC
DRILLING METHOD	Sonic	**SCREEN TYPE/SLOT**	2-inch Schedule 40 0.020-slot
SAMPLING METHOD	Sonic Grab	**GRAVEL PACK TYPE**	#10/20 sand
GROUND ELEVATION (FT MSL)	4429.01	**GROUT TYPE/QUANTITY**	Hydrated Bentonite Chips
TOP OF CASING (FT MSL)	4428.49	**DEPTH TO WATER (FT BGS)**	44.72
LOGGED BY	Joe Miller	**GROUND WATER ELEVATION (FT MSL)**	4384.29
REMARKS	Groundwater measured while drilling		

PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
				0			Hydrovac to 6 ft bgs.	
				5				6.0
	0.519				ML		SILT: light yellowish brown (10YR 5/6); 60% silt; 30% clay; 10% fine sand; cohesive; moist to wet.	8.0
0.6			B				SAND: yellowish brown (10YR 5/6); 100% sand, poorly graded, fine to medium; loose; moist.	
1.1	0.185			10	SP			
								11.0
0.5	0.369				SM		Silty SAND: brown (10YR 4/3); 80% sand; 20% silt; cohesive; firm; moist to wet.	12.5
1.7	0.158				SP		SAND: brown (10YR 4/3); 100% sand, poorly graded, fine; loose; moist.	
								14.5
					SM		Silty SAND: light yellowish brown (2.5Y 6/4); 80% sand; 20% silt; cohesive; firm; moist to wet.	15.0
0.7	0.117		B	15			SAND: brown (10YR 4/3); 100% sand, poorly graded, fine; loose; moist.	
0.6	0.061				SP		At 18 feet bgs, silty layer; moist to wet.	
1.6	0.098						At 19.5 feet bgs, silty layer; moist to wet; light yellowish brown	20.0
				20			*Continued Next Page*	

WELL DIAGRAM



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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 238824.6495-F3048-005.DRILL **BORING/WELL NUMBER** MW-36
PROJECT NAME 700 S 1600 E PCE Plume **DATE DRILLED** 11/17/2020

Continued from Previous Page

PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
							(2.5Y light yellowish brown).		
5.7	0.438				SP		SAND: brown (10YR 4/3); 100% sand, poorly graded, fine; loose; moist.		Hydrated bentonite chips (3 to 44 ft bgs).
								24.5	
					SM		Silty SAND: yellowish brown (10YR 5/4); 80% sand; 20% silt; cohesive; firm; moist to wet.	25.0	
2.2	0.442			25			SAND: yellowish brown (10YR 5/4); 100% sand, poorly graded, fine; loose; moist.		
1.7	0.121				SP				
							At 28.5 feet bgs, silty layer; moist to wet.		
1.9	0.251								
				30				30.0	2-inch SCH 40 PVC blank.
							Silty SAND: 70% sand; 30% silt; cohesive in places; loose to firm; moist to wet. NOTE: sample slid out of core barrel.		
7.5	0.348				SM		Depth to water at time of drilling: 30.82 feet bgs.		
								32.0	
							Silty SAND: 60% sand; 40% silt; laminated; loose; saturated wet. NOTE: most of sample lost.		
0	0.127				SM				
								35.0	
0.4	0.631			35			SILT with SAND: dark grayish brown (2.5Y 4/2); 80% silt; 20% sand; laminated; soft to firm; wet but not saturated.		
					ML				
0.1	0.558								
								38.0	
							No recovery; shoe sample was muck.		
								40.0	
				40			Sandy SILT: dark grayish brown (2.5Y 4/2); 80% silt; 40% sand; cohesive; moist to wet.		
0	0.935				ML				
							At 42 feet bgs, color changes to brown (7.5YR 4/2).		

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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 238824.6495-F3048-005.DRILL **BORING/WELL NUMBER** MW-36
PROJECT NAME 700 S 1600 E PCE Plume **DATE DRILLED** 11/17/2020

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PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
0.7	0.435				ML		At 43 feet bgs, wetter zone.	43.0	
							At 44.5 feet bgs, wetter zone, increased sand.	45.0	
0.3	0.432			45			Silty SAND: 70% sand; 30% silt; some iron oxide staining; cohesive; loose.		#10/20 sand filter pack (44 to 54 ft bgs).
0.6	0.17				SM				
								49.0	
0.4	0.36				SP		SAND: brown (7.5YR 5/2); fine to coarse sand; trace fine gravel; loose; saturated wet.	49.8	
				50	SM		Silty SAND: 70% sand; 30% silt; some iron oxide staining; cohesive; loose.	50.0	2-inch SCH 40 PVC 0.020-slot screen nested well (47 to 52 ft bgs).
0.5	0.158				GP		GRAVEL with Sand and Silt: brown (7.5YR 5/2); 70% gravel, poorly graded, fine to coarse, subangular to rounded; 20% sand, coarse; 10% silt; wet.		
								52.2	
0.4							SILT: very dark gray (7.5YR 3/1); laminated; trace iron oxide staining; trace clay; trace fine gravel; stiff; moist, decreasing moisture with depth.		
	0.663			55					
					ML		At 56 ft bgs, dry to moist.		
0.8	0.68								
1.2	0.765								
				60				60.0	Hydrated bentonite chips (54 to 105 ft bgs).
0.8	1.07						SILT: black (10YR 2/1); clayey silt; trace fine to coarse gravel; cohesive; very stiff; dry.		
					ML		At 62 feet bgs, color changes to dark gray (7.5YR 4/1); firm to stiff; trace fine gravel; moist.		
0.3	0.876								
				65				65.0	
0.5	0.555						CLAY: brown (7YR 5/4); 50% clay; 40% silt; 10% gravel, fine to coarse, subangular to surounded; dry to moist.		

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WHITNEY'S BORING LOG SLC VA PLUME DRAFT DEC2020_WTJM.GPJ LAEWNN01.GDT 3/10/21

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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 238824.6495-F3048-005.DRILL **BORING/WELL NUMBER** MW-36
PROJECT NAME 700 S 1600 E PCE Plume **DATE DRILLED** 11/17/2020

Continued from Previous Page

PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
0.7	0.48				CL		CLAY: brown (7YR 5/4); 50% clay; 40% silt; 10% gravel, fine to coarse, subangular to surounded; dry to moist.		
								68.0	
					ML		SILT: trace fine gravel; cohesive; stiff; moist.		
								69.0	
0.8	0.12				GC		Clayey GRAVEL: brown (7.5YR 5/4); 60% gravel, fine to coarse; 40% clay; moist.		
								70.0	
				70			SILT: brown (7.5YR 5/4); 80% silt; 15% clay; 5% fine gravel; cohesive; very stiff; moist.		
1	0.572								
0.4	0.58				ML				
0.6	0.286			75					
								76.0	
					ML		Gravelly SILT: brown (7.5YR 5/4); 60% silt; 40% gravel; moist.	76.5	
1.6	0.421				ML		SILT: brown (7.5YR 5/4); trace gravel; cohesive; stiff; laminated; dry to moist.		
								78.0	
					ML		Gravelly SILT: brown (7.5YR 5/4); 70% silt; 30% fine gravel; cohesive; stiff; moist.		
								79.0	
1.4	0.348				GM		Silty GRAVEL: light yellowish brown (2.5Y 6/3); 60% gravel, fine to coarse, angular to subangular; 30% silt; 10% sand; cohesive; medium dense; moist to wet. At 80 feet bgs, color changes to light yellowish brown (10YR 6/4).		← Hydrated bentonite chips (54 to 105 ft bgs).
				80					
0.9	0.54								
								82.0	
0.6	0.45				GM		Silty GRAVEL: light yellowish brown (10YR 6/4); 60% gravel, fine to coarse, angular to subrounded; 40% silt; cohesive; dense; moist.		
								84.0	
					SM		Silty SAND: light yellowish brown (10YR 6/4); 60% sand, fine to coarse; 30% silt; 10% fine gravel; loose to medium dense; moist to wet.	85.0	
4.6	0.129			85			Silty GRAVEL: light yellowish brown (10YR 6/4); 60% gravel, fine to coarse, subangular to subrounded, cobbles up to 4 inches in diameter; 40% silt; cohesive; dense; moist; socketed matrix.		
6.7	0.103				GM				

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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 238824.6495-F3048-005.DRILL **BORING/WELL NUMBER** MW-36
PROJECT NAME 700 S 1600 E PCE Plume **DATE DRILLED** 11/17/2020

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PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
7	0.237		B	90	GM		Silty GRAVEL: light yellowish brown (10YR 6/4); 60% gravel, fine to coarse, subangular to subrounded, cobbles up to 4 inches in diameter; 40% silt; cohesive; dense; moist; socketed matrix. At 90 feet bgs, moist to wet.	89.0	Hydrated bentonite chips (54 to 105 ft bgs).
3.1	0.176						At 91 feet bgs, moist to wet sandy lens.		
1.8	0.073						At 92.5 feet bgs, wet, sandy lens.		
1.8	0.11		B	95			At 95 feet bgs, 5-inch cobble. At 96 feet bgs, wet, sandy lens.		
2.2	0.057							98.5	
4	0.119				CL		CLAY: pale olive (5Y 6/3); iron oxide staining in places; laminated; very stiff; dry to moist.	100.0	
0.4	0.785			100			SILT: dary gray (5Y 4/1); clayey silt; laminated; cohesive; very stiff; moist; possibly lake bed sediments.		
0.8	1.4								
0.7	2.34		B	105	ML				Native sluff (105 to 110 feet bgs).
0.7	2.89								
1.1	2.25			110			End of boring at 110 feet bgs.	110.0	

WHITNEY'S BORING LOG SLC VA PLUME DRAFT DEC2020_WTJM.GPJ LAEWNN01.GDT 3/10/21

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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER	238824.6495-F3048-005.DRILL	**BORING/WELL NUMBER**	MW-37
PROJECT NAME	700 S 1600 E PCE Plume	**DATE DRILLED**	11/12/2020-11/13/2020
LOCATION	Salt Lake City, UT	**CASING TYPE/DIAMETER**	2-inch Schedule 40 PVC
DRILLING METHOD	Sonic	**SCREEN TYPE/SLOT**	2-inch Schedule 40 0.020-slot
SAMPLING METHOD	Sonic Grab	**GRAVEL PACK TYPE**	#10/20 sand
GROUND ELEVATION (FT MSL)	4348.36	**GROUT TYPE/QUANTITY**	Hydrated Bentonite Chips
TOP OF CASING (FT MSL)	S: 4348.00 D: 4347.97	**DEPTH TO WATER (FT BGS)**	S: 18.45 D: 42.28 BTOC
LOGGED BY	Joe Miller and Whitney Treadway	**GROUND WATER ELEVATION (FT MSL)**	S: 4329.55 D: 4305.69
REMARKS	Groundwater measured after installation.		

PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
							Hydrovac to 7 ft bgs.	
1.7	0.135		B	5	CL		CLAY with Gravel: light olive brown (2.5Y 5/3) with red iron oxide staining; 90% low to medium plasticity clay; 10% gravel, poorly graded, mostly fine, subangular to subrounded; moist.	7.0
1.6	0.089							
1.5	0.01			10	ML		SILT: light olive brown (2.5Y 5/3) with red iron oxide staining; 100% silt with none to low plasticity; moist.	10.0
0.4	0.157						At 11 feet bgs, 3-inch medium sand layer, dark reddish brown (5YR 3/4); wet.	11.3
0.4	0.135				CH		Sandy CLAY: dark brown (7.5YR 3/4); 70% medium to high plasticity; 30% sand, poorly graded, fine, subangular to subrounded; wet.	14.5
0.4	0.168		B	15	CH		CLAY: dark brown (7.5YR 3/4); 100% high plasticity clay; moist.	
0.5	0.067				SC		Sandy CLAY/Clayey SAND: dark brown (7.5YR 3/4); moist.	17.5
					SP		SAND: medium to coarse sand and fine gravel; wet. 4-inch layer.	18.5 / 18.8
0.6	0.037				SC		Sandy CLAY/Clayey SAND: dark brown (7.5YR 3/4); moist.	
				20			*Continued Next Page*	20.0

WELL DIAGRAM

- Flush-mounted vault (10-inch).
- Hydrated bentonite chips (3 to 7 ft bgs).
- 6-inch stainless steel vapor probe at 8 feet bgs with #10/20 sand filter pack (7 to 9 ft bgs).
- 2-inch SCH 40 PVC blank.
- Hydrated bentonite chips (9 to 22 ft bgs).

WHITNEY'S BORING LOG SLC VA PLUME DRAFT DEC2020_WTJM.GPJ LAEWNN01.GDT 3/10/21

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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 238824.6495-F3048-005.DRILL **BORING/WELL NUMBER** MW-37
PROJECT NAME 700 S 1600 E PCE Plume **DATE DRILLED** 11/12/2020-11/13/2020

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PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
0	0.095	Attempted bailer sample; no water.					CLAY: yellowish brown (5YR 4/6); 100% high plasticity clay; wet. NOTE: recovery was not in-situ.		
0.4	0.103				CH				
0.5	0.063		B	25					
0.5	0.1							27.5	
					SC		Clayey SAND: yellowish red (5YR 4/6); 70% sand, poorly graded, fine to medium subangular to subrounded; 30% high plasticity clay; wet. NOTE: recovery was not in-situ, depth may not be exact.		
0.6	0.042							30.0	
		MW37-GW111220-30		30			CLAY with SAND: yellowish red (5YR 4/6); high plasticity clay with orange and black staining; sand content varies, mostly fine to medium; moist. At 31 feet bgs, thin, wet, fine sand lense with red/orange and black staining.		
0.1	0.087				CH				
0.3	0.172						At 32.5 feet bgs, thin, wet, fine sand lense with red/orange and black staining. At 33 feet bgs, thin, wet, fine sand lense with red/orange and black staining.		
							At 34 feet bgs, thin, wet, fine sand lense with red/orange and black staining.	34.5	
0.4	0.062		B	35	CH		CLAY: yellowish red (5YR 4/6) mottled with light greenish gray; hard clay; moist.	35.8	
					CH		Sandy CLAY: yellowish red (5YR 4/6); 50% high plasticity clay with orange and black staining; 30% sand, well graded, fine to coarse, subangular to subrounded; 20% gravel, poorly graded, fine; wet.	36.5	
0.4	0.276						At 36.5 feet bgs, thin, wet, fine sand lense with red/orange and black staining, then CLAY with SAND: yellowish red (5YR 4/6); high plasticity clay with orange and black staining; sand content varies, mostly fine to medium; moist.		
0.5	0.202				CH		At 38.5 feet bgs, thin, wet, fine sand lense with red/orange and black staining.		
				40			At 40 feet bgs, thin, wet, fine sand lense with red/orange and black staining.	40.5	
0.7	0.153		B				Sandy CLAY: yellowish red (5YR 4/6); high plasticity clay; sand content varies; moist.		
					CH		At 42 feet bgs, thin, wet, fine sand lense with red/orange and black staining.		

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#10/20 sand filter pack (22 to 39 ft bgs).
2-inch SCH 40 PVC 0.020-slot screen nested well (25 to 35 ft bgs).
2-inch SCH 40 PVC blank.
Hydrated bentonite chips (39 to 57 ft bgs).

WHITNEY'S BORING LOG SLC VA PLUME DRAFT DEC2020_WTJM.GPJ LAEWNN01.GDT 3/10/21

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BORING/WELL CONSTRUCTION LOG

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BORING/WELL NUMBER MW-37
PROJECT NAME 700 S 1600 E PCE Plume
DATE DRILLED 11/12/2020-11/13/2020

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PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
1	0.124						At 43 feet bgs, large cobble.	43.5	
					CH		Sandy CLAY with Gravel: yellowish red (5YR 4/6); 50% high plasticity clay; 30% sand, well graded; 20% fine gravel; wet.	44.3	
							CLAY: mottled dark reddish brown (5YR 3/4) and pale brown (10YR 6/3); 100% high plasticity clay; hard; moist.		
	0.43			45					
							At 46 feet bgs, color changes to mottled light olive gray (5Y 6/2) and yellowish brown (10YR 4/6) (possible staining); softer than above.		
1.2	0.205				CH				Hydrated bentonite chips (39 to 57 ft bgs).
1.3	0.143							50.0	
				50			No recover from 50 to 60 feet bgs due to rock in drill bit.		
							At 54 feet bgs approximate contact per driller.		2-inch SCH 40 PVC blank.
				55					
									#10/20 sand filter pack (57 to 70 ft bgs).
				60				60.0	
1.2	0.217				CH		CLAY: mottled dark reddish brown (5YR 3/4) with dark yellowish brown (10YR 4/4); 85% high plasticity clay, firm to stiff; 10% fine sand; 5% silt; cohesive in places; moist to wet. Mixed recovery. NOTE: likely soft material pushed down from above.		
1.9	0.237								2-inch SCH 40 PVC 0.020-slot screen nested well (60 to 70 ft bgs).
								64.5	
2	0.351			65	CH		CLAY with Gravel: 70% medium to high plasticity clay; 30% gravel, fine to coarse, angular to subrounded; cohesive in placest; wet. Mixed Recovery.		

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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 238824.6495-F3048-005.DRILL
BORING/WELL NUMBER MW-37
PROJECT NAME 700 S 1600 E PCE Plume
DATE DRILLED 11/12/2020-11/13/2020

Continued from Previous Page

PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
								66.0	#10/20 sand filter pack (57 to 70 ft bgs).
2.3	0.458				CH		CLAY with Gravel: 70% medium to high plasticity clay; 30% gravel, fine to coarse, angular to subrounded; cohesive in placest; wet. Mixed Recovery.	67.5	
							Gravelly CLAY: reddish brown (5YR 4/3); 55% medium to high plasticity clay, soft; 30% fine gravel; 15% fine sand; very wet. Mixed recovery. NOTE: boring open to 68 feet bgs, boring making water.		2-inch SCH 40 PVC 0.020-slot screen nested well (60 to 70 ft bgs).
1.8	0.36	MW37-GW111320-70			CH				
				70			End of boring at 70 feet bgs.	70.0	

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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER	238824.6495-F3048-005.DRILL	**BORING/WELL NUMBER**	MW-38
PROJECT NAME	700 S 1600 E PCE Plume	**DATE DRILLED**	11/14/2020
LOCATION	Salt Lake City, UT	**CASING TYPE/DIAMETER**	2-inch Schedule 40 PVC
DRILLING METHOD	Sonic	**SCREEN TYPE/SLOT**	2-inch Schedule 40 0.020-slot
SAMPLING METHOD	Sonic Grab	**GRAVEL PACK TYPE**	#10/20 sand
GROUND ELEVATION (FT MSL)	4498.56	**GROUT TYPE/QUANTITY**	Hydrated Bentonite Chips
TOP OF CASING (FT MSL)	S: 4497.64 D: 4497.8	**DEPTH TO WATER (FT BGS)**	S: 19.59 D: 18.53 BTOC
LOGGED BY	Joe Miller	**GROUND WATER ELEVATION (FT MSL)**	S: 4478.05 D: 4479.27
REMARKS	Groundwater measured after installation.		

PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
							Hydrovac to 7 ft bgs.	
				5				
0.7			D		SM		Silty SAND: brown (7.5YR 5/4); 75% loose, fine sand; 25% silt; moist.	7.0
	0.385						Sandy CLAY: brown (7.5YR 5/4); 70% cohesive, laminated clay; 30% sand; moist.	9.0
				10				
0.3	0.646				CL		At 10 feet bgs, sample is stiff.	
					CL		Sandy CLAY: brown (7.5YR 5/4); 60% clay, less cohesive, firm; 40% sand; moist.	12.0
0.3	0.305						Sandy CLAY: brown (7.5YR 5/4); 75% clay, cohesive, stiff; 25% sand; trace fine, rounded gravel; moist.	13.0
	0.518		D	15				
					CL		At 16 feet bgs, increase in moisture; firm.	
0.3							At 18 feet bgs, wet, sandy lens.	
0.3	0.442			20			GRAVEL with Sand and Clay: brown (7.5YR 5/4); 60%	19.5

Continued Next Page

WELL DIAGRAM

- Flush-mounted Augustyn vault (10-inch).
- Portland cement seal (3 to 7 ft bgs).
- 6-inch stainless steel vapor probe at 8 feet bgs with #10/20 sand filter pack (7 to 9 ft bgs).
- 2-inch SCH 40 PVC blank.
- Hydrated bentonite chips (9 to 25 ft bgs).

WHITNEY'S BORING LOG SLC VA PLUME DRAFT DEC2020_WTJM.GPJ LAEWNN01.GDT 3/10/21

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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 238824.6495-F3048-005.DRILL
BORING/WELL NUMBER MW-38
PROJECT NAME 700 S 1600 E PCE Plume
DATE DRILLED 11/14/2020

Continued from Previous Page

PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
					GW GC		gravel, fine to coarse, angular to subrounded; 30% fine sand; 10% clay; loose; moist to wet.	20.5	
0.3	0.503						Sandy CLAY: brown (7.5YR 5/4); 80% clay, soft, cohesive; 20% fine sand; moist to wet.		
							At 22 feet bgs, trace coarse gravel. Depth to water at time of drilling: 22.09 feet bgs. At 22.5 feet bgs, wet lens.		Hydrated bentonite chips (9 to 25 ft bgs).
0.2	0.467						At 23.75 feet bgs, 2 to 3 inch clast, less moisture.		
					CL				
0.1	0.355			25			At 25.5 feet bgs, 2 to 3 inch clast, increase in fine sand.		#10/20 sand filter pack (25 to 39 ft bgs).
0.2	0.485						At 27.5 feet bgs, wet, sandy lens with trace gravel.		
								28.5	
0.2	0.507				CL		Sandy CLAY: brown (7.5YR 5/3); 70% clay, cohesive, stiff to firm; 20% fine sand; 10% gravel, fine to coarse, subangular to subrounded; dry to moist.		
				30				30.0	
0.4	0.397				SC		Clayey SAND: brown (7.5YR 5/3); 75% sand, fine to coarse, loose; 25% clay; trace fine gravel; cohesive; wet.		
								32.0	2-inch SCH 40 PVC 0.020-slot screen nested well (27 to 37 ft bgs).
0.4	0.498						Clayey SAND with Gravel: brown (7.5YR 5/3); 60% sand, fine to coarse; 25% clay; 15% gravel, fine to coarse; loose to compact; moist to wet.		
0.4				35	SC		At 35 feet bgs, wet lens, increase in gravel.		
	0.395						At 37 feet bgs, wet lens, increase in gravel.		
								38.0	
					CL		Sandy CLAY: brown (7.5YR 5/4); 70% clay, cohesive; 30% sand; trace fine gravel; wet.		
								39.0	
0.3	0.103						GRAVEL with Sand and Clay: 80% gravel, fine to coarse, subangular to subrounded; 20% sand and clay; sand is poorly graded, fine to coarse; loose; wet (saturated).		
				40	GP GC				
1.1	0.42						At 41 feet bgs, increase in clay (gray layer).		Hydrated bentonite chips (39 to 57 ft bgs).
								42.0	
							At 42 feet bgs, 6 to 8 inch clast, then Sandy CLAY with Gravel: brown (7.5YR 5/4); 60% lean clay, cohesive, firm to		

Continued Next Page

WHITNEY'S BORING LOG SLC VA PLUME DRAFT DEC2020_WTJM.GPJ LAEWNN01.GDT 3/10/21

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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 238824.6495-F3048-005.DRILL **BORING/WELL NUMBER** MW-38
PROJECT NAME 700 S 1600 E PCE Plume **DATE DRILLED** 11/14/2020

Continued from Previous Page

PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
1.1	0.446			45	CL		stiff; 30% fine sand; 10% fine to coarse gravel, subangular to subrounded; moist to wet.	
1	0.394							45.5
1	0.095						CLAY: light gray (5Y 7/2) mottled with brown; lean clay, very stiff to hard; cohesive; dry.	
0.9	0.088			50	CL			
1	0.27							52.5
1.1	0.252				SP		SAND with Gravel: dark reddish brown (5YR 3/4); 60% sand, fine to coarse; 40% gravel, fine to coarse, rounded; loose; wet.	54.0
1.2	0.22			55	GC		Clayey GRAVEL with Sand: yellowish brown (10YR 5/4); 60% gravel, fine to coarse, subangular to subrounded; 20% clay; 20% sand; cohesive; dense; moist to wet.	56.0
1	0.239				ML		SILT: yellowish brown (10YR 5/4); 80% silt; 10% fine sand; 10% fine gravel; very stiff; cohesive; moist.	59.0
1	0.243				GM		Silty GRAVEL with Sand: yellowish brown (10YR 5/4); 60% gravel, poorly graded, fine to coarse, subangular to subrounded; 20% silt; 20% sand; cohesive; medium dense; moist to wet.	60.0
1	0.15			60	SP		SAND: dark brown (10YR 3/3); poorly graded sand; loose; saturated; wet.	62.5
1.1	0.12				GP GC		GRAVEL with Clay: brown (7.5YR 4/4); 80% gravel, fine to coarse, subangular to subrounded; 10% clay; 10% sand, medium to coarse; loose; wet.	63.5
					ML		SILT: brown (7.5YR 4/4); cohesive; stiff; moist to wet.	64.0
1	0.112			65	GP		GRAVEL with Sand: brown (7.5YR 4/4); 70% gravel, poorly graded, fine to coarse, subangular to subrounded; 25% sand, fine to coarse; 5% clay; loose; wet.	

WELL DIAGRAM

- Hydrated bentonite chips (39 to 57 ft bgs).
- 2-inch SCH 40 PVC blank.
- #10/20 sand filter pack (57 to 71 ft bgs).
- 2-inch SCH 40 PVC 0.020-slot screen nested well (60 to 70 ft bgs).

Continued Next Page

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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 238824.6495-F3048-005.DRILL **BORING/WELL NUMBER** MW-38
PROJECT NAME 700 S 1600 E PCE Plume **DATE DRILLED** 11/14/2020

Continued from Previous Page

PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
								66.0	2-inch SCH 40 PVC 0.020-slot screen nested well (60 to 70 ft bgs).
0.9	0.172				GP		GRAVEL with Sand: brown (7.5YR 4/4); 70% gravel, poorly graded, fine to coarse, subangular to subrounded; 25% sand, fine to coarse; 5% clay; loose; wet.	67.5	
					GM		Silty GRAVEL: brown (7.5YR 4/3); fine to coarse gravel, rounded; cohesive; dense; moist.		#10/20 sand filter pack (57 to 71 ft bgs).
1.2	0.344							70.0	
				70	GP GM		GRAVEL with Sand and Silt: brown (7.5YR 4/3); 70% gravel, poorly graded, fine to coarse; 20% sand, fine to coarse; 10% silt; loose; wet.	71.0	
1.2	0.183						Sandy SILT: brown (7.5YR 4/4); 80% silt, 20% sand; cohesive; firm to stiff; moist to wet.		Hydrated bentonite chips (71 to 72 ft bgs).
					ML				
1	0.406							74.0	
					GP GM		GRAVEL with Sand and Silt: brown (7.5YR 4/3); 70% gravel, poorly graded, fine to coarse; 20% sand, fine to coarse; 10% silt; loose; wet.	75.0	
0.9	0.27			75			Sandy SILT: 80% silt; 20% sand; trace gravel, fine to coarse; cohesive; firm; moist.		Native soil sluff (72 to 80 ft bgs).
1.2	0.66				ML				
1.3	0.423						At 79.5 feet bgs, increase in clay; stiff.	80.0	
				80			End of boring at 80 feet bgs.		

WHITNEY'S BORING LOG SLC VA PLUME DRAFT DEC2020_WTJM.GPJ LAEWNN01.GDT 3/10/21

Appendix H

Soil Core Photo Log

CDM Smith **PHOTOGRAPHIC LOG**

Site:	Project No.
700 South 1600 East PCE Plume	238824

Photo No.	Date:
1	11/6/20

Location:

MW-30R

Description:

9-10'

Photo No.	Date:
2	11/6/2020

Location:

MW-30R

Description:

10-12'

Photo No.	Date:
3	11/6/20

Location:

MW-30R

Description:

12-14'

CDM Smith **PHOTOGRAPHIC LOG**

Site:	**Project No.**
700 South 1600 East PCE Plume	238824

Photo No.	**Date:**
4	11/6/20

Location:

MW-30R

Description:

14-16’

Photo No.	**Date:**
5	11/6/20

Location:

MW-30R

Description:

16-18’

Photo No.	**Date:**
6	11/6/20

Location:

MW-30R

Description:

18-20’

CDM Smith **PHOTOGRAPHIC LOG**

Site:	Project No.
700 South 1600 East PCE Plume	238824

Photo No.	Date:
7	11/6/20

Location:

MW-30R

Description:

20-21.5’

Photo No.	Date:
8	11/6/20

Location:

MW-30R

Description:

21.5-24’

Photo No.	Date:
9	11/6/20

Location:

MW-30R

Description:

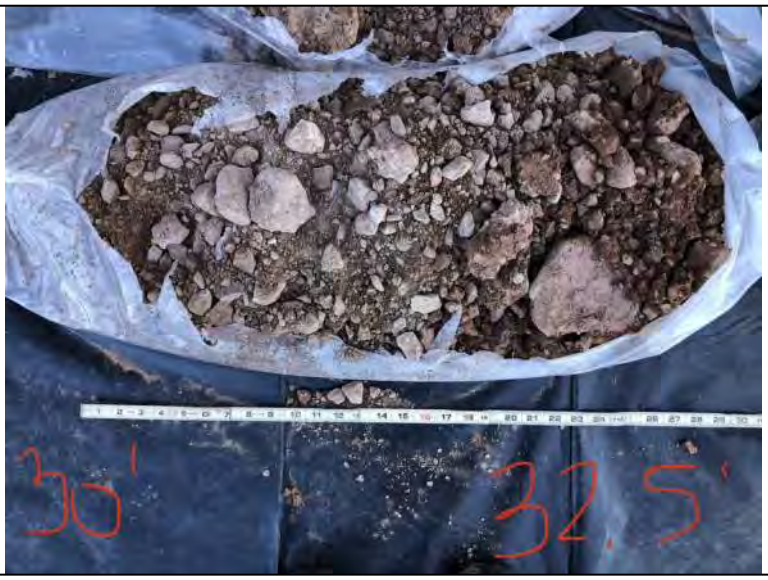
24-26’

CDM Smith PHOTOGRAPHIC LOG	Site: 700 South 1600 East PCE Plume	Project No. 238824

Photo No. 10	Date: 11/6/20
Location: MW-30R	
Description: 26-28’	

Photo No. 11	Date: 11/6/20
Location: MW-30R	
Description: 28-30’	

Photo No. 12	Date: 11/6/20
Location: MW-30R	
Description: 30-32.5’	



CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 13	**Date:** 11/6/20
Location: MW-30R	
Description: 32.5-35’	

Photo No. 14	**Date:** 11/6/20
Location: MW-30R	
Description: 35-37’	

Photo No. 15	**Date:** 11/6/20
Location: MW-30R	
Description: 37-39’	

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 16	**Date:** 11/6/20
Location: MW-30R	
Description: 39-40’	

Photo No. 17	**Date:** 11/6/20
Location: MW-30R	
Description: 40-42’	

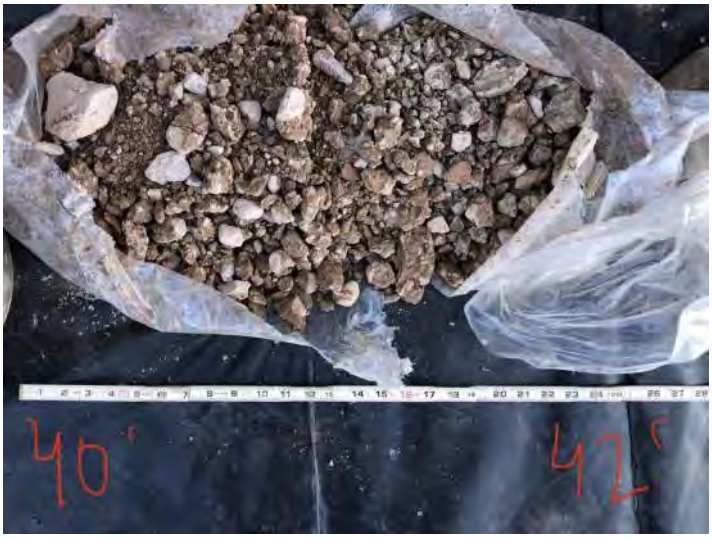


Photo No. 18	**Date:** 11/6/20
Location: MW-30R	
Description: 42-44’	

CDM Smith **PHOTOGRAPHIC LOG**

Site:	Project No.
700 South 1600 East PCE Plume	238824

Photo No.	Date:
19	11/6/20

Location:

MW-30R

Description:

44-46'

Photo No.	Date:
20	11/6/20

Location:

MW-30R

Description:

46-48'

Photo No.	Date:
21	11/6/20

Location:

MW-30R

Description:

48-50'

CDM Smith **PHOTOGRAPHIC LOG**

Site:	Project No.
700 South 1600 East PCE Plume	238824

Photo No.	Date:
22	11/6/20

Location:

MW-30R

Description:

50-52.5’

Photo No.	Date:
23	11/6/20

Location:

MW-30R

Description:

52.5-55’

Photo No.	Date:
24	11/6/20

Location:

MW-30R

Description:

55-57.5’

CDM Smith **PHOTOGRAPHIC LOG**

Site:	**Project No.**
700 South 1600 East PCE Plume	238824

Photo No.	**Date:**
25	11/6/20

Location:

MW-30R

Description:

57.5-60’

Photo No.	**Date:**
26	11/6/20

Location:

MW-30R

Description:

60-62’

Photo No.	**Date:**
27	11/6/20

Location:

MW-30R

Description:

62.5-65’

CDM Smith **PHOTOGRAPHIC LOG**

Site:	Project No.
700 South 1600 East PCE Plume	238824

Photo No.	Date:
28	11/6/20

Location:

MW-30R

Description:

65-67’

Photo No.	Date:
29	11/6/20

Location:

MW-30R

Description:

67-70’

Photo No.	Date:
30	11/6/20

Location:

MW-30R

Description:

70-72’

CDM Smith **PHOTOGRAPHIC LOG**

Site:	**Project No.**
700 South 1600 East PCE Plume	238824

Photo No.	**Date:**
31	11/6/20

Location:

MW-30R

Description:

72-74’

Photo No.	**Date:**
32	11/6/20

Location:

MW-30R

Description:

74-76’

Photo No.	**Date:**
33	11/6/20

Location:

MW-30R

Description:

76-78’

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 34	**Date:** 11/6/20
Location: MW-30R	
Description: 78-80'	

Photo No. 35	**Date:** 11/6/20
Location: MW-30R	
Description: 80-82'	

Photo No. 36	**Date:** 11/6/20
Location: MW-30R	
Description: 82.5-85'	

CDM Smith PHOTOGRAPHIC LOG	Site: 700 South 1600 East PCE Plume	Project No. 238824

Photo No. 37	Date: 11/6/20
Location: MW-30R	
Description: 85-87.5’	

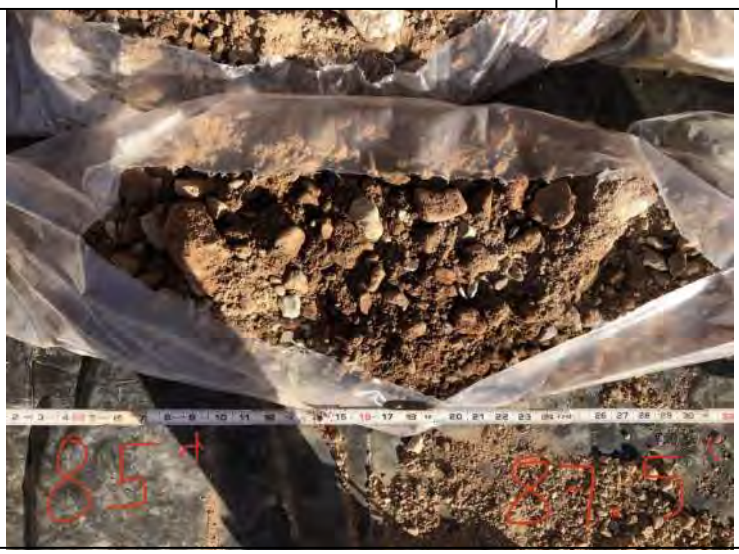


Photo No. 38	Date: 11/6/20
Location: MW-30R	
Description: 87.5-90’	

Photo No. 39	Date: 11/6/20
Location: MW-30R	
Description: 90-92.5’	

CDM Smith **PHOTOGRAPHIC LOG**

Site:	Project No.
700 South 1600 East PCE Plume	238824

Photo No.	Date:
40	11/6/20

Location:

MW-30R

Description:

92.5-95’

Photo No.	Date:
41	11/6/20

Location:

MW-30R

Description:

95-97.5’

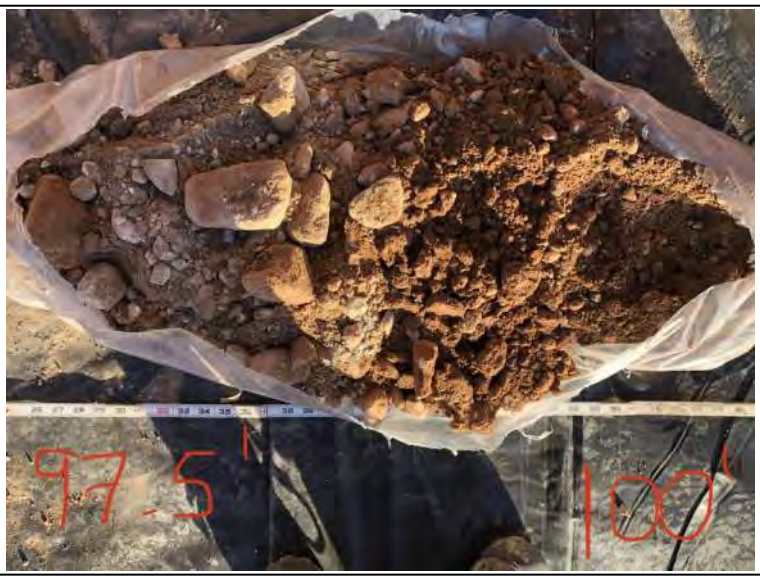
Photo No.	Date:
42	11/6/20

Location:

MW-30R

Description:

97.5-100’



CDM Smith PHOTOGRAPHIC LOG	Site: 700 South 1600 East PCE Plume	Project No. 238824

Photo No. 43	Date: 11/6/20
Location: MW-30R	
Description: 100-102’	

Photo No. 44	Date: 11/6/20
Location: MW-30R	
Description: 102-104’	

Photo No. 45	Date: 11/6/20
Location: MW-30R	
Description: 104-106’	

CDM Smith **PHOTOGRAPHIC LOG**

Site:	Project No.
700 South 1600 East PCE Plume	238824

Photo No. 46	Date: 11/6/20

Location:

MW-30R

Description:

106-108’

Photo No. 47	Date: 11/6/20

Location:

MW-30R

Description:

108-110’

Photo No. 48	Date: 11/6/20

Location:

MW-30R

Description:

110-112’

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No.	Date:
49	11/6/20

Location:

MW-30R

Description:

112-114.5'

Photo No.	Date:
50	11/6/20

Location:

MW-30R

Description:

114.5-117'

Photo No.	Date:
51	11/6/20

Location:

MW-30R

Description:

117-119.5'

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 52	**Date:** 11/6/20
Location: MW-30R	
Description: 119.5-121.5’	

Photo No. 53	**Date:** 11/6/20
Location: MW-30R	
Description: 121.5-123.5’	

Photo No. 54	**Date:** 11/6/20
Location: MW-30R	
Description: 123.5-125’	

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No.	Date:
55	11/6/20

Location:

MW-30R

Description:

125-127'

Photo No.	Date:
56	11/6/20

Location:

MW-30R

Description:

127-129.5'

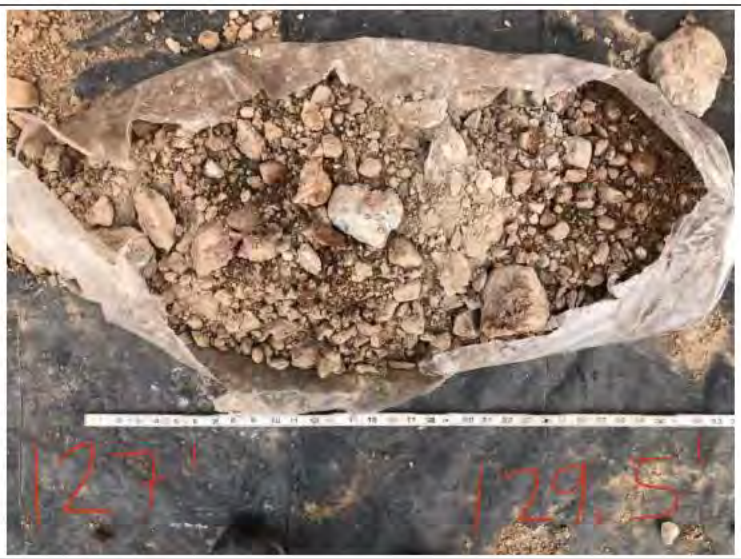


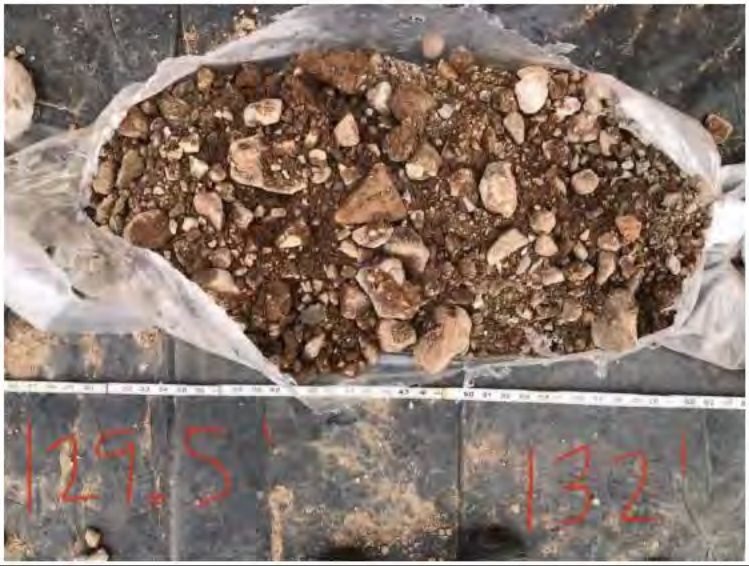
Photo No.	Date:
57	11/6/20

Location:

MW-30R

Description:

129.5-132'



CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 58	**Date:** 11/6/20
Location: MW-30R	
Description: 132-133.5’	

Photo No. 59	**Date:** 11/6/20
Location: MW-30R	
Description: 133.5-135’	

Photo No. 60	**Date:** 11/6/20
Location: MW-30R	
Description: 135-137’	

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No.	Date:
61	11/6/20

Location:

MW-30R

Description:

137-139’

Photo No.	Date:
62	11/6/20

Location:

MW-30R

Description:

139-142’

Photo No.	Date:
63	11/6/20

Location:

MW-30R

Description:

142-144’

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 64

Date: 11/6/20

MW-30R

Description:
144-146’

Photo No. 65

Date: 11/6/20

Location:

MW-30R

Description:

146-148’

Photo No. 66

Location:

MW-30R

Description:

148-150’

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume
Project No.
23882 4

Photo No. 67	**Date:** 11/6/20
Location: MW-30R	
Description: 150-152’	

Photo No. 68	**Date:** 11/6/20
Location: MW-30R	
Description: 152-155’	

Photo No. 69	**Date:** 11/6/20
Location: MW-30R	
Description: 155-157’	

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 70	**Date:** 11/6/20
Location: MW-30R	
Description: 157-159’	

Photo No. 71	**Date:** 11/6/20
Location: MW-30R	
Description: 159-162’	

Photo No. 72	**Date:** 11/6/20
Location: MW-30R	
Description: 162-164’	

CDM Smith **PHOTOGRAPHIC LOG**

Site:	Project No.
700 South 1600 East PCE Plume	238824

Photo No. 73	Date: 11/6/20
Location: MW-30R	
Description: 164-166’	

Photo No. 74	Date: 11/6/20
Location: MW-30R	
Description: 166-168’	

Photo No. 75	Date: 11/6/20
Location: MW-30R	
Description: 168-170’	

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 76	**Date:** 11/6/20
Location: MW-30R	
Description: 170-172.5’	

Photo No. 77	**Date:** 11/6/20
Location: MW-30R	
Description: 172.5-174’	

Photo No. 78	**Date:** 11/6/20
Location: MW-30R	
Description: 174-176’	

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 79	**Date:** 11/6/20
Location: MW-30R	
Description: 176-178’	

Photo No. 80	**Date:** 11/6/20
Location: MW-30R	
Description: 178-180.5’	

Photo No. 81	**Date:** 11/6/20
Location: MW-30R	
Description: 180.5-183’	

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 82	**Date:** 11/7/20
Location: MW-30R	
Description: 183-185’	

Photo No. 83	**Date:** 11/7/20
Location: MW-30R	
Description: 185-187.5’	

Photo No. 84	**Date:** 11/7/20
Location: MW-30R	
Description: 187.5-190’	

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 85	**Date:** 11/7/20
Location: MW-30R	
Description: 190-192’	

Photo No. 86	**Date:** 11/7/20
Location: MW-30R	
Description: 192-194’	

Photo No. 87	**Date:** 11/7/20
Location: MW-30R	
Description: 194-196’	

CDM Smith **PHOTOGRAPHIC LOG**

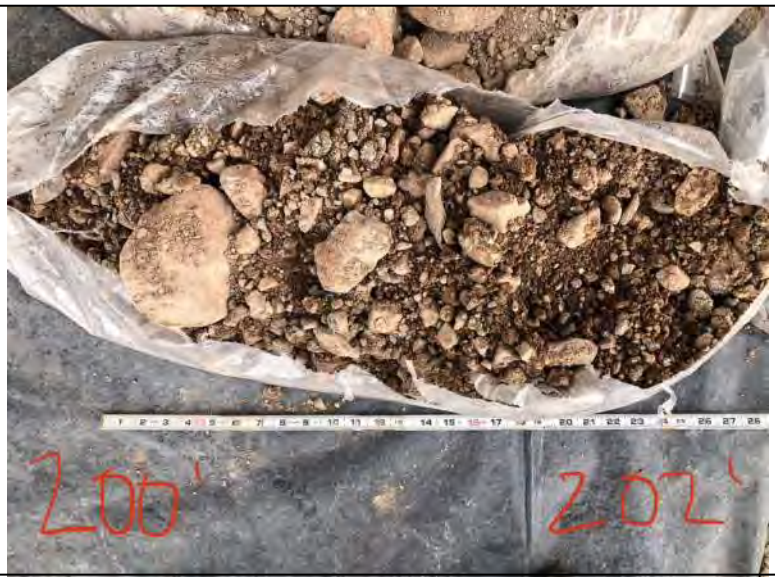
Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 88	**Date:** 11/7/20
Location: MW-30R	
Description: 196-198’	

Photo No. 89	**Date:** 11/7/20
Location: MW-30R	
Description: 198-200’	

Photo No. 90	**Date:** 11/7/20
Location: MW-30R	
Description: 200-202’	



CDM Smith **PHOTOGRAPHIC LOG**

Site:	Project No.
700 South 1600 East PCE Plume	238824

Photo No. 91	Date: 11/7/20

Location:

MW-30R

Description:

202-203.5’

Photo No. 92	Date: 11/7/20

Location:

MW-30R

Description:

203.5-2-5.5’

Photo No. 93	Date: 11/7/20

Location:

MW-30R

Description:

205.5-207.5’

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No.	Date:
94	11/7/20

Location:

MW-30R

Description:

207.5-210’

Photo No.	Date:
95	11/7/20

Location:

MW-30R

Description:

210-212’

Photo No.	Date:
96	11/7/20

Location:

MW-30R

Description:

212-213.5’

CDM Smith **PHOTOGRAPHIC LOG**

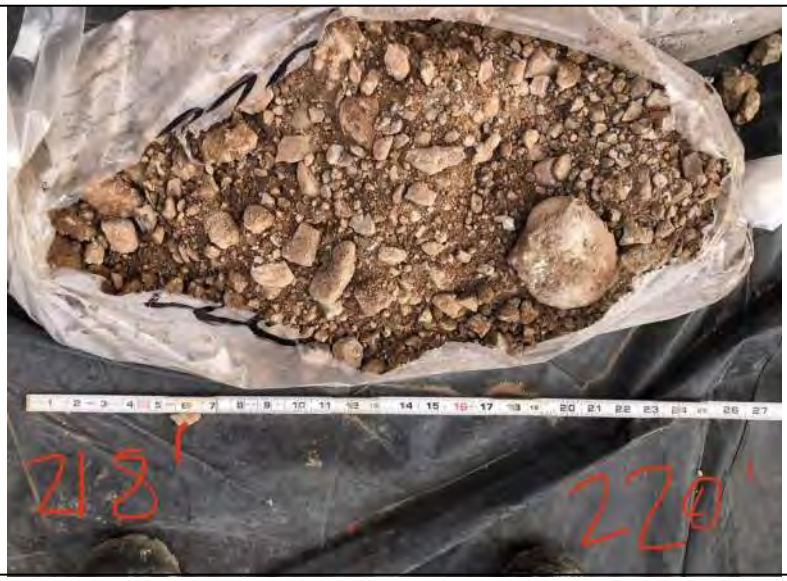
Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 97	**Date:** 11/7/20
Location: MW-30R	
Description: 213.5-216’	

Photo No. 98	**Date:** 11/7/20
Location: MW-30R	
Description: 216-218’	

Photo No. 99	**Date:** 11/7/20
Location: MW-30R	
Description: 218-220’	



CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 100	**Date:** 11/7/20
Location: MW-30R	
Description: 220-221.5’	

Photo No. 101	**Date:** 11/7/20
Location: MW-30R	
Description: 221.5-223’	

Photo No. 102	**Date:** 11/7/20
Location: MW-30R	
Description: 223-225.5’	

CDM Smith PHOTOGRAPHIC LOG	Site: 700 South 1600 East PCE Plume	Project No. 238824

Photo No. 103	Date: 11/7/20
Location: MW-30R	
Description: 225.5-228’	

Photo No. 104	Date: 11/7/20
Location: MW-30R	
Description: 228-229.5’	

Photo No. 105	Date: 11/7/20
Location: MW-30R	
Description: 229.5-231.5’	

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 106	**Date:** 11/7/20
Location: MW-30R	
Description: 231.5-233’	

Photo No. 107	**Date:** 11/7/20
Location: MW-30R	
Description: 233-235’	

Photo No. 108	**Date:** 11/7/20
Location: MW-30R	
Description: 235-237’	

CDM Smith **PHOTOGRAPHIC LOG**	**Site:** 700 South 1600 East PCE Plume	**Project No.** 238824

Photo No. **109**	**Date:** 11/7/20
Location: MW-30R	
Description: 237-240’	

Photo No. **110**	**Date:** 11/7/2020
Location: MW-30R	
Description: 240-242’	

Photo No. **111**	**Date:** 11/7/20
Location: MW-30R	
Description: 242-243.5’	

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 112	**Date:** 11/7/20
Location: MW-30R	
Description: 243.5-246’	

Photo No. 113	**Date:** 11/7/20
Location: MW-30R	
Description: 246-247.5’	

Photo No. 114	**Date:** 11/7/20
Location: MW-30R	
Description: 247.5-250’	

CDM Smith **PHOTOGRAPHIC LOG**

Site:	Project No.
700 South 1600 East PCE Plume	238824

Photo No.	Date:
115	11/9/20

Location:

MW-30R

Description:

250-252.5’

Photo No.	Date:
116	11/9/20

Location:

MW-30R

Description:

252.5-255’

Photo No.	Date:
117	11/9/20

Location:

MW-30R

Description:

255-257’

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 118	**Date:** 11/9/20
Location: MW-30R	
Description: 257-259’	

Photo No. 119	**Date:** 11/9/20
Location: MW-30R	
Description: 259-261’	

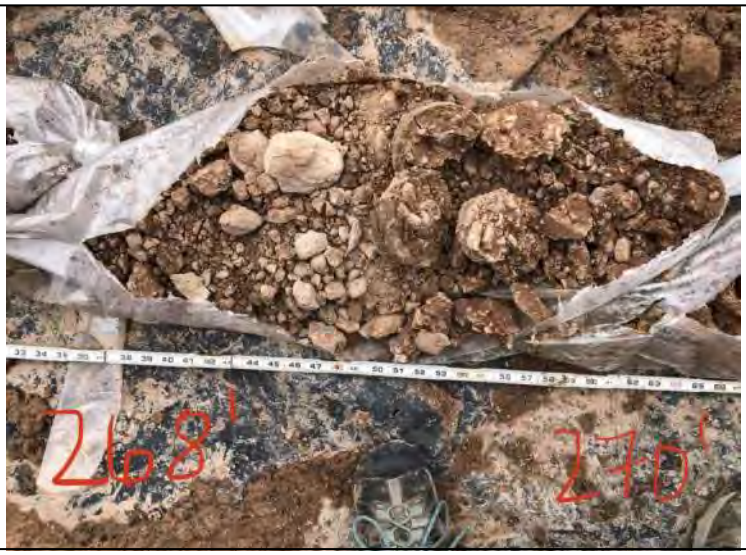
Photo No. 120	**Date:** 11/9/20
Location: MW-30R	
Description: 261-263’	

CDM Smith PHOTOGRAPHIC LOG	Site: 700 South 1600 East PCE Plume	Project No. 238824

Photo No. 121	Date: 11/9/20
Location: MW-30R	
Description: 263-265’	

Photo No. 122	Date: 11/9/20
Location: MW-30R	
Description: 265-268’	

Photo No. 123	Date: 11/9/20
Location: MW-30R	
Description: 268-270’	



CDM Smith PHOTOGRAPHIC LOG	Site: 700 South 1600 East PCE Plume	Project No. 238824

Photo No. 124	Date: 11/9/20
Location: MW-30R	
Description: 270-272’	

Photo No. 125	Date: 11/9/20
Location: MW-30R	
Description: 272-274’	

Photo No. 126	Date: 11/9/20
Location: MW-30R	
Description: 274-276’	

CDM Smith PHOTOGRAPHIC LOG	Site: 700 South 1600 East PCE Plume	Project No. 238824

Photo No. 127	Date: 11/9/20
Location: MW-30R	
Description: 276-278’	

Photo No. 128	Date: 11/9/20
Location: MW-30R	
Description: 280-282’	

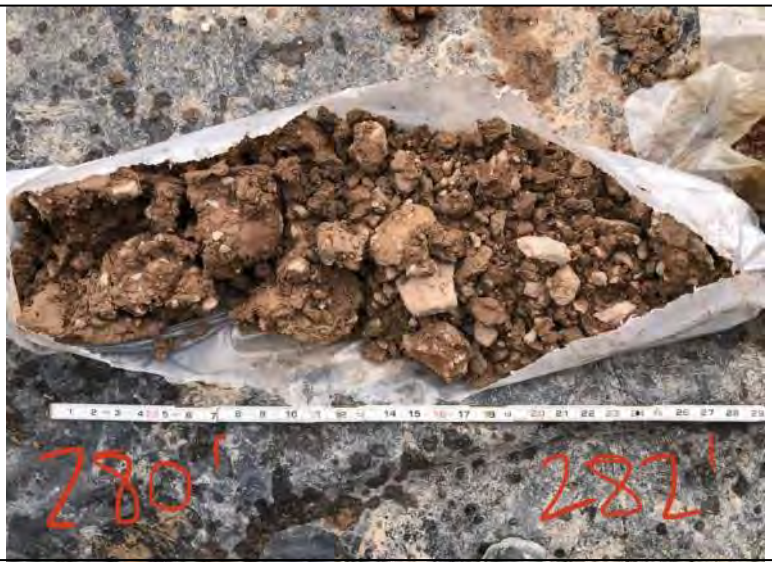


Photo No. 129	Date: 11/9/20
Location: MW-30R	
Description: 282-284’	

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 130	**Date:** 11/9/20
Location: MW-30R	
Description: 284-286'	

Photo No. 131	**Date:** 11/9/20
Location: MW-30R	
Description: 286-288'	

Photo No. 132	**Date:** 11/9/20
Location: MW-30R	
Description: 288-290'	

CDM Smith PHOTOGRAPHIC LOG	Site: 700 South 1600 East PCE Plume	Project No. 238824

Photo No. 133	Date: 11/9/20
Location: MW-30R	
Description: 290-292.5’	

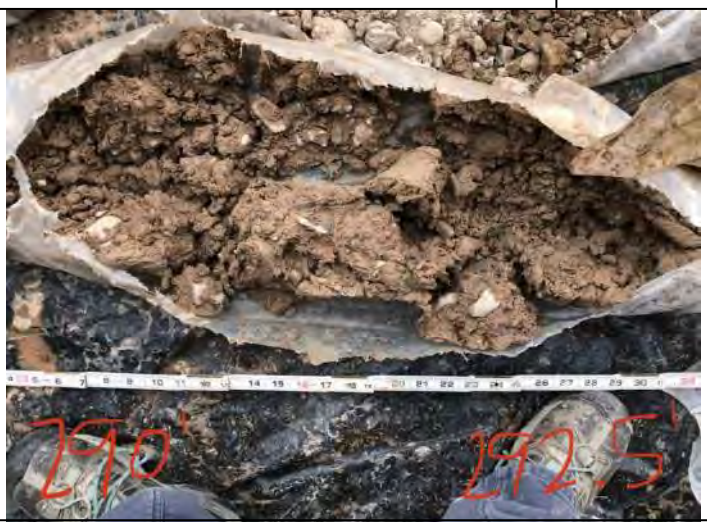
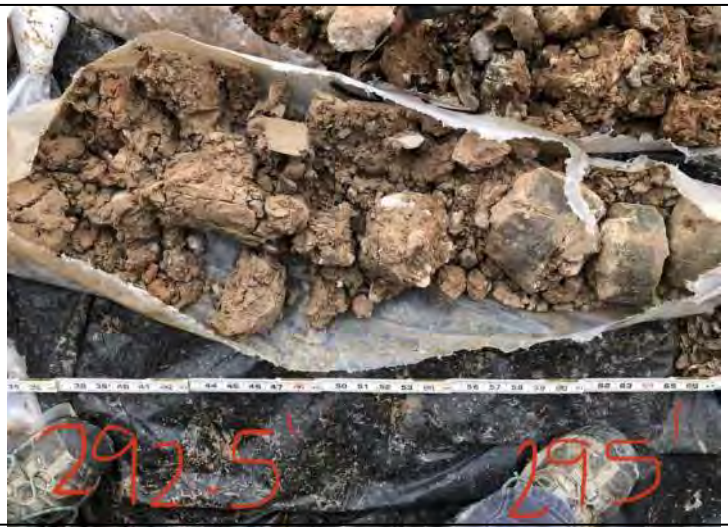


Photo No. 134	Date: 11/9/20
Location: MW-30R	
Description: 292.5-295’	



CDM Smith PHOTOGRAPHIC LOG	Site: 700 South 1600 East PCE Plume	Project No. 238824

Photo No. 1	Date: 12/2/20
Location: MW-13L	
Description: 0-5' No Photo – Pre-cleared with hand auger	

Photo No. 2	Date: 12/2/2020
Location: MW-13L	
Description: 5-6'	

Photo No. 3	Date: 12/2/20
Location: MW-13L	
Description: 6-10'	

CDM Smith **PHOTOGRAPHIC LOG**

Site:	Project No.
700 South 1600 East PCE Plume	238824

Photo No.	Date:
4	12/2/20

Location:

MW-13L

Description:

10-11'

Photo No.	Date:
5	12/2/20

Location:

MW-13L

Description:

11-14'

Photo No.	Date:
6	12/2/20

Location:

MW-13L

Description:

14-17'

CDM Smith **PHOTOGRAPHIC LOG**

Site:	Project No.
700 South 1600 East PCE Plume	238824

Photo No.	Date:
7	12/2/20

Location:

MW-13L

Description:

17-20'

Photo No.	Date:
8	12/2/20

Location:

MW-13L

Description:

20-22.5'

Photo No.	Date:
9	12/2/20

Location:

MW-13L

Description:

22.5-25'

CDM Smith **PHOTOGRAPHIC LOG**

Site:	Project No.
700 South 1600 East PCE Plume	238824

Photo No.	Date:
10	12/2/20

Location:

MW-13L

Description:

25-27.5'

Photo No.	Date:
11	12/2/20

Location:

MW-13L

Description:

27.5-30'

Photo No.	Date:
12	12/2/20

Location:

MW-13L

Description:

30-33'

CDM Smith **PHOTOGRAPHIC LOG**

Site:	Project No.
700 South 1600 East PCE Plume	238824

Photo No.	Date:
13	12/2/20

Location:

MW-13L

Description:

33-36'

Photo No.	Date:
14	12/2/20

Location:

MW-13L

Description:

36-38'

Photo No.	Date:
15	12/2/20

Location:

MW-13L

Description:

38-40'

CDM Smith **PHOTOGRAPHIC LOG**

Site:	Project No.
700 South 1600 East PCE Plume	238824

Photo No.	Date:
16	12/2/20

Location:

MW-13L

Description:

40-44'

Photo No.	Date:
17	12/2/20

Location:

MW-13L

Description:

44-47'

Photo No.	Date:
18	12/2/20

Location:

MW-13L

Description:

47-50'

CDM Smith **PHOTOGRAPHIC LOG**

Site:	Project No.
700 South 1600 East PCE Plume	238824

Photo No.	Date:
19	12/2/20

Location:

MW-13L

Description:

50-53'

Photo No.	Date:
20	12/2/20

Location:

MW-13L

Description:

53-56'

Photo No.	Date:
21	12/2/20

Location:

MW-13L

Description:

56-58'

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 22	**Date:** 12/2/20
Location: MW-13L	
Description: 58-60'	

Photo No. 23	**Date:** 12/2/20
Location: MW-13L	
Description: 60-63.5'	

Photo No. 24	**Date:** 12/2/20
Location: MW-13L	
Description: 63.5-65'	

CDM Smith **PHOTOGRAPHIC LOG**

Site:	Project No.
700 South 1600 East PCE Plume	238824

Photo No.	Date:
25	12/2/20

Location:

MW-13L

Description:

65-68'

Photo No.	Date:
26	12/2/20

Location:

MW-13L

Description:

68-70'

Photo No.	Date:
27	12/2/20

Location:

MW-13L

Description:

70-73'

CDM Smith **PHOTOGRAPHIC LOG**

Site:	Project No.
700 South 1600 East PCE Plume	238824

Photo No.	Date:
28	12/2/20

Location:

MW-13L

Description:

73-75'

Photo No.	Date:
29	12/2/20

Location:

MW-13L

Description:

75-77.5'

Photo No.	Date:
30	12/2/20

Location:

MW-13L

Description:

77.5-80'

CDM Smith **PHOTOGRAPHIC LOG**

Site:	Project No.
700 South 1600 East PCE Plume	238824

Photo No.	Date:
31	12/2/20

Location:

MW-13L

Description:

80-82.5'

Photo No.	Date:
32	12/2/20

Location:

MW-13L

Description:

82.5-85'

Photo No.	Date:
33	12/2/20

Location:

MW-13L

Description:

85-87.5'

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No.	Date:
34	12/2/20

Location:

MW-13L

Description:

87.5-90'

Photo No.	Date:
35	12/2/20

Location:

MW-13L

Description:

90-92.5'

Photo No.	Date:
36	12/2/20

Location:

MW-13L

Description:

92.5-95'

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No.	Date:
37	12/2/20

Location:

MW-13L

Description:

95-97.5'

Photo No.	Date:
38	12/2/20

Location:

MW-13L

Description:

97.5-100'

Photo No.	Date:
39	12/2/20

Location:

MW-13L

Description:

100-102.5'

CDM Smith **PHOTOGRAPHIC LOG**

Site:	Project No.
700 South 1600 East PCE Plume	238824

Photo No.	Date:
40	12/2/20

Location:

MW-13L

Description:

102.5-105'

Photo No.	Date:
41	12/2/20

Location:

MW-13L

Description:

105-107.5'

Photo No.	Date:
42	12/2/20

Location:

MW-13L

Description:

107.5-110'

CDM Smith **PHOTOGRAPHIC LOG**

Site:	Project No.
700 South 1600 East PCE Plume	238824

Photo No.	Date:
43	12/2/20

Location:

MW-13L

Description:

110-112.5'

Photo No.	Date:
44	12/2/20

Location:

MW-13L

Description:

112.5-115'

Photo No.	Date:
45	12/2/20

Location:

MW-13L

Description:

115-117.5'

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 46	**Date:** 12/2/20
Location: MW-13L	
Description: 117.5-120'	

Photo No. 47	**Date:** 12/2/20
Location: MW-13L	
Description: 120-122.5'	

Photo No. 48	**Date:** 12/2/20
Location: MW-13L	
Description: 122.5-125'	

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No.	Date:
49	12/2/20

Location:

MW-13L

Description:

125-127.5'

Photo No.	Date:
50	12/2/20

Location:

MW-13L

Description:

127.5-130'

Photo No.	Date:
51	12/2/20

Location:

MW-13L

Description:

130-132.5'

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No.	Date:
52	12/2/20

Location:

MW-13L

Description:

132.5-135'

Photo No.	Date:
53	12/2/20

Location:

MW-13L

Description:

135-137.5'

Photo No.	Date:
54	12/2/20

Location:

MW-13L

Description:

137.5-140'

CDM Smith **PHOTOGRAPHIC LOG**

Site:	Project No.
700 South 1600 East PCE Plume	238824

Photo No.	Date:
55	12/2/20

Location:

MW-13L

Description:

140-142.5'

Photo No.	Date:
56	12/2/20

Location:

MW-13L

Description:

142.5-145'

Photo No.	Date:
57	12/2/20

Location:

MW-13L

Description:

145-147.5'

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 58	**Date:** 12/2/20
Location: MW-13L	
Description: 147.5-150'	

Photo No. 59	**Date:** 12/3/20
Location: MW-13L	
Description: 150-152.5'	

Photo No. 60	**Date:** 12/3/20
Location: MW-13L	
Description: 152.5-155'	

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 61	**Date:** 12/3/20
Location: MW-13L	
Description: 155-157.5'	

Photo No. 62	**Date:** 12/3/20
Location: MW-13L	
Description: 157.5-160'	

CDM Smith PHOTOGRAPHIC LOG	Site: 700 South 1600 East PCE Plume	Project No. 238824

Photo No. 1	Date: 11/12/20
Location: MW-37	
Description: 0-7' No photo – Vacuum Excavated	

Photo No. 2	Date: 11/12/2020
Location: MW-37	
Description: 7-8'	

Photo No. 3	Date: 11/12/20
Location: MW-37	
Description: 8-9'	

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 4	**Date:** 11/12/20
Location: MW-37	
Description: 9-10'	

Photo No. 5	**Date:** 11/12/20
Location: MW-37	
Description: 10-12'	

Photo No. 6	**Date:** 11/12/20
Location: MW-37	
Description: 12-14'	

CDM Smith **PHOTOGRAPHIC LOG**

Site:	Project No.
700 South 1600 East PCE Plume	238824

Photo No.	Date:
7	11/12/20

Location:

MW-37

Description:

14-16'

Photo No.	Date:
8	11/12/20

Location:

MW-37

Description:

16-18'

Photo No.	Date:
9	11/12/20

Location:

MW-37

Description:

18-20'

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 10	**Date:** 11/12/20
Location: MW-37	
Description: 20-22'	

Photo No. 11	**Date:** 11/12/20
Location: MW-30R	
Description: 22-24'	

Photo No. 12	**Date:** 11/12/20
Location: MW-30R	
Description: 24-26'	

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 13	**Date:** 11/12/20
Location: MW-30R	
Description: 26-28'	

Photo No. 14	**Date:** 11/12/2020
Location: MW-30R	
Description: 28-30'	

Photo No. 15	**Date:** 11/12/20
Location: MW-30R	
Description: 30-32'	

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No.	Date:
16	11/12/20

Location:

MW-30R

Description:

32-34'

Photo No.	Date:
17	11/12/20

Location:

MW-30R

Description:

34-36'

Photo No.	Date:
18	11/12/20

Location:

MW-30R

Description:

36-38'

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No.	Date:
19	11/12/20

Location:

MW-30R

Description:

38-40'

Photo No.	Date:
20	11/12/20

Location:

MW-30R

Description:

40-42.5'

Photo No.	Date:
21	11/12/20

Location:

MW-30R

Description:

42-45'

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 22	**Date:** 11/12/20
Location: MW-30R	
Description: 45-47.5'	

Photo No. 23	**Date:** 11/12/20
Location: MW-30R	
Description: 47.5-50'	

Photo No. 24	**Date:** 11/12/20
Location: MW-30R	
Description: 50-60' No photo due to no recovery	

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 28	**Date:** 11/12/20
Location: MW-30R	
Description: 60-61'	

Photo No. 29	**Date:** 11/12/20
Location: MW-30R	
Description: 61-63'	

Photo No. 30	**Date:** 11/12/20
Location: MW-30R	
Description: 63-65'	

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No.	Date:
31	11/12/20

Location:

MW-30R

Description:

65-66'

Photo No.	Date:
32	11/12/20

Location:

MW-30R

Description:

66-68'

Photo No.	Date:
33	11/12/20

Location:

MW-30R

Description:

CDM Smith PHOTOGRAPHIC LOG	Site: 700 South 1600 East PCE Plume	Project No. 238824

Photo No. 1	Date: 11/14/20
Location: MW-38	
Description: 0-7' No Photo – Vacuum Excavated	

Photo No. 2	Date: 11/14/2020
Location: MW-38	
Description: 7-10'	

Photo No. 3	Date: 11/14/20
Location: MW-38	
Description: 10-12.5'	

CDM Smith **PHOTOGRAPHIC LOG**

Site:	Project No.
700 South 1600 East PCE Plume	238824

Photo No.	Date:
4	11/14/20

Location:

MW-38

Description:

12.5-15'

Photo No.	Date:
5	11/14/20

Location:

MW-38

Description:

15-17.5'

Photo No.	Date:
6	11/14/20

Location:

MW-38

Description:

17.5-20'

CDM Smith **PHOTOGRAPHIC LOG**

Site:	Project No.
700 South 1600 East PCE Plume	238824

Photo No.	Date:
7	11/14/20

Location:

MW-38

Description:

20-22'

Photo No.	Date:
8	11/14/20

Location:

MW-38

Description:

22-24'

Photo No.	Date:
9	11/14/20

Location:

MW-38

Description:

24-26'

CDM Smith **PHOTOGRAPHIC LOG**

Site:	Project No.
700 South 1600 East PCE Plume	238824

Photo No.	Date:
10	11/14/20

Location:

MW-38

Description:

26-28'

Photo No.	Date:
11	11/14/20

Location:

MW-38

Description:

28-30'

Photo No.	Date:
12	11/14/20

Location:

MW-38

Description:

30-32'

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 13	**Date:** 11/14/20
Location: MW-38	
Description: 32-35'	

Photo No. 14	**Date:** 11/14/2020
Location: MW-38	
Description: 35-37.5'	

Photo No. 15	**Date:** 11/14/20
Location: MW-38	
Description: 37.5-40'	

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 16	**Date:** 11/14/20
Location: MW-38	
Description: 40-42'	

Photo No. 17	**Date:** 11/14/20
Location: MW-38	
Description: 42-44'	

Photo No. 18	**Date:** 11/14/20
Location: MW-38	
Description: 44-46'	

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No.	Date:
19	11/14/20

Location:

MW-38

Description:

46-48'

Photo No.	Date:
20	11/14/20

Location:

MW-38

Description:

48-50'

Photo No.	Date:
21	11/14/20

Location:

MW-38

Description:

50-52'

CDM Smith **PHOTOGRAPHIC LOG**

Site:	Project No.
700 South 1600 East PCE Plume	238824

Photo No.	Date:
22	11/14/20

Location:

MW-38

Description:

52-54'

Photo No.	Date:
23	11/14/20

Location:

MW-38

Description:

54-56'

Photo No.	Date:
24	11/14/20

Location:

MW-38

Description:

56-58'

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 25	**Date:** 11/14/20
Location: MW-38	
Description: 58-60'	

Photo No. 26	**Date:** 11/14/2020
Location: MW-38	
Description: 60-62'	

Photo No. 27	**Date:** 11/14/20
Location: MW-38	
Description: 62-64'	

CDM Smith **PHOTOGRAPHIC LOG**

Site:	Project No.
700 South 1600 East PCE Plume	238824

Photo No.	Date:
28	11/14/20

Location:

MW-38

Description:

64-66'

Photo No.	Date:
29	11/14/20

Location:

MW-38

Description:

66-68'

Photo No.	Date:
30	11/14/20

Location:

MW-38

Description:

68-70'

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 31	**Date:** 11/14/20
Location: MW-38	
Description: 70-72'	

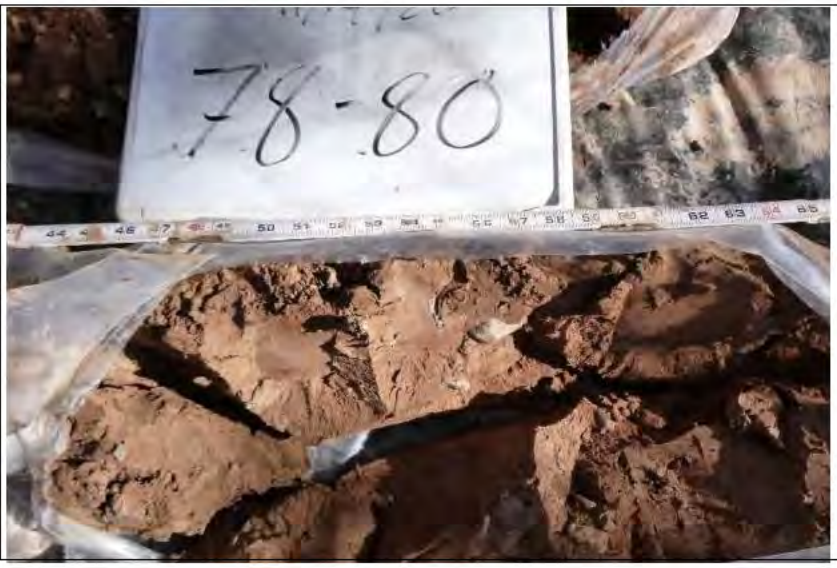
Photo No. 32	**Date:** 11/14/2020
Location: MW-38	
Description: 72-74'	

Photo No. 33	**Date:** 11/6/20
Location: MW-38	
Description: 74-76'	

CDM Smith PHOTOGRAPHIC LOG	Site: 700 South 1600 East PCE Plume	Project No. 238824

Photo No. 34	Date: 11/14/20
Location: MW-38	
Description: 76-78'	

Photo No. 35	Date: 11/14/2020
Location: MW-38	
Description: 78-80'	



CDM Smith PHOTOGRAPHIC LOG	Site: 700 South 1600 East PCE Plume	Project No. 238824

Photo No. 1	Date: 11/17/20
Location: MW-36	
Description: 0-6' No Photo – Vacuum excavated	

Photo No. 2	Date: 11/17/2020
Location: MW-36	
Description: 6-6.5'	

Photo No. 3	Date: 11/17/20
Location: MW-36	
Description: 6.5-8'	

CDM Smith **PHOTOGRAPHIC LOG**

Site:	Project No.
700 South 1600 East PCE Plume	238824

Photo No.	Date:
4	11/17/20

Location:

MW-36

Description:

8-10'

Photo No.	Date:
5	11/17/20

Location:

MW-36

Description:

10-12'

Photo No.	Date:
6	11/17/20

Location:

MW-36

Description:

12-14'

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No.	Date:
7	11/17/20

Location:

MW-36

Description:

14-16'

Photo No.	Date:
8	11/17/20

Location:

MW-36

Description:

16-18'

Photo No.	Date:
9	11/17/20

Location:

MW-36

Description:

18-20'

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No.	Date:
10	11/17/20

Location:

MW-36

Description:

20-22.5'

Photo No.	Date:
11	11/17/20

Location:

MW-36

Description:

22.5-25'

Photo No.	Date:
12	11/17/20

Location:

MW-36

Description:

25-27.5'

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 13	**Date:** 11/17/20
Location: MW-36	
Description: 27.5-30'	

Photo No. 14	**Date:** 11/17/20
Location: MW-36	
Description: 30-32'	

Photo No. 15	**Date:** 11/17/20
Location: MW-36	
Description: 33-35'	

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No.	Date:
16	11/17/20

Location:

MW-36

Description:

35-37'

Photo No.	Date:
17	11/17/20

Location:

MW-36

Description:

37-40'

Photo No.	Date:
18	11/17/20

Location:

MW-36

Description:

40-42'

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No.	Date:
19	11/17/20

Location:

MW-36

Description:

42-44'

Photo No.	Date:
20	11/17/20

Location:

MW-36

Description:

44-45'

Photo No.	Date:
21	11/17/20

Location:

MW-36

Description:

45-47.5'

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 22	**Date:** 11/17/20
Location: MW-36	
Description: 47.5-50'	

Photo No. 23	**Date:** 11/17/20
Location: MW-36	
Description: 50-52.5'	

Photo No. 24	**Date:** 11/17/20
Location: MW-36	
Description: 52.5-55'	

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 25	**Date:** 11/17/20
Location: MW-36	
Description: 55-57.5'	

Photo No. 26	**Date:** 11/17/20
Location: MW-36	
Description: 57.5-60'	

Photo No. 27	**Date:** 11/17/20
Location: MW-36	
Description: 60-61'	

CDM Smith **PHOTOGRAPHIC LOG**

Site:	Project No.
700 South 1600 East PCE Plume	238824

Photo No. 28	Date: 11/17/20
Location: MW-36	
Description: 61-64'	

Photo No. 29	Date: 11/17/20
Location: MW-36	
Description: 64-66'	

Photo No. 30	Date: 11/17/20
Location: MW-36	
Description: 66-68'	

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No.	Date:
31	11/17/20

Location:

MW-36

Description:

68-70'

Photo No.	Date:
32	11/17/20

Location:

MW-36

Description:

70-73'

Photo No.	Date:
33	11/17/20

Location:

MW-36

Description:

73-75'

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 34	**Date:** 11/17/20
Location: MW-36	
Description: 75-76'	

Photo No. 35	**Date:** 11/17/20
Location: MW-36	
Description: 76-78'	

Photo No. 36	**Date:** 11/17/20
Location: MW-36	
Description: 78-80'	

CDM Smith **PHOTOGRAPHIC LOG**

Site:	Project No.
700 South 1600 East PCE Plume	238824

Photo No.	Date:
37	11/17/20

Location:

MW-36

Description:

80-82'

Photo No.	Date:
38	11/17/20

Location:

MW-36

Description:

82-85'

Photo No.	Date:
39	11/17/20

Location:

MW-36

Description:

85-87.5'

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No.	Date:
40	11/17/20

Location:

MW-36

Description:

87.5-90'

Photo No.	Date:
41	11/17/20

Location:

MW-36

Description:

90-92'

Photo No.	Date:
42	11/17/20

Location:

MW-36

Description:

92-94'

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No.	Date:
43	11/17/20

Location:

MW-36

Description:

94-96'

Photo No.	Date:
44	11/17/20

Location:

MW-36

Description:

96-98'

Photo No.	Date:
45	11/17/20

Location:

MW-36

Description:

98-100'

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 46	**Date:** 11/17/20
Location: MW-36	
Description: 100-102'	

Photo No. 48	**Date:** 11/17/2020
Location: MW-36	
Description: 102-104'	

Photo No. 49	**Date:** 11/17/20
Location: MW-36	
Description: 104-106'	

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No. 50	**Date:** 11/17/20
Location: MW-36	
Description: 106-108'	

Photo No. 51	**Date:** 11/17/2020
Location: MW-36	
Description: 108-110'	

Appendix I

Laboratory Data Package and Data Validation Report

Note: Laboratory Data Reports removed from report and provided separately.

VA Salt Lake City
Salt Lake City, Utah
Groundwater Validation Report

Sample Delivery Group (SDG) Number: 20K141
Laboratory: EMAX Laboratories, Inc.

Matrix: Groundwater
Collection date: 11/12/2020, 11/13/2020
Analysis/Methods:

Volatile Organic Compounds SW 846 8260C

Samples in SDG:

Lab ID	Sample Number
JK141-01	MW37-GW111220-30
JK141-02	TB56-GW111220
JK141-03	EB49-GW111220
JK141-04	MW37-GW111320-70

Data validation was performed in accordance with the specific analytical methods and the National Functional Guidelines for Organic Superfund Methods Data Review (EPA January 2017).

Volatile Organic Compounds 8260C

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?			**N/A**
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Laboratory Control Spike Duplicates RPD within limits?	**Yes**		

Comments (note deviations):

Field Duplicates	**8260C**	**Sample**	**Duplicate**	**%RPD**	**Qualifiers**	**Associated Samples**
N/A						

MS/MSD	**8260C**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
N/A					

LCS/LCSD	**8260C**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
LCS1W / LCSD1W		Acceptable			

Accuracy:	**Yes**	**No**	**N/A**
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?	**Yes**		
Were the Laboratory Method Blank results all < RL?	**Yes**		
Were the Field Blanks results all < RL?		**No**	
Was the ICAL criteria met?	**Yes**		
Was the CCV criteria met?	**Yes**		
Was the Tuning criteria met?	**Yes**		
Were the Surrogate % recoveries within laboratory determined control limits?	**Yes**		
Were the Internal Standard areas within ± 50 - 150%?	**Yes**		

Comments (note deviations):

Blanks	**8260C**	**Concentration (ug/L)**	**MDL /RL**	**Qualifiers**	**Associated Samples**
MBLK1W		Nondetect			

Field Blank	**8260C**	**Concentration**	**MDL /RL**	**Qualifiers**	**Associated Samples**
TB56-GW111220	Acetone	3.3 J	2.5 / 20	**U - RL**	**K141-01, K141-04**
	Bromodichloromethane	0.23 J	0.1 / 1.0	None	Sample results nondetect
	Bromoform	0.17 J	0.15 / 1.0	None	Sample results nondetect
	Chloroform	0.1 J	0.1 / 1.0	**U - RL**	**K141-04**
	Dibromochloromethane	0.38 J	0.1 / 1.0	None	Sample results nondetect
EB49-GW111220	Acetone	3.7 J	2.5 / 20	**U - RL**	**K141-01, K141-04**

Surrogates	8260C	%R	Limit	Qualifiers	Associated Samples
		Acceptable			

MS/MSD	8260C	%R	Limit	Qualifiers	Associated Samples
N/A					

LCS/LCSD	8260C	%R	Limits	Qualifiers	Associated Samples
LCS1W / LCSD1W		Acceptable			

ICAL	8260C	RRF	%RSD	Qualifiers	Associated Samples
10/30/2020 11:33		Acceptable	Acceptable		

CCV	8260C	RRF	%D	Limits	Qualifiers	Associated Samples
11/16/20 12:21		Acceptable	Acceptable			

Tune	8260C
	Acceptable

Internal Standards	8260C	Area	Area Lower / Upper Limit	Qualifiers	Associated Samples
		Acceptable			

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	Yes		
Were holding times met?	Yes		
Was preservation criteria met? (0° C - 6° C)	Yes		
Were Chain-of-Custody records complete and provided in data package?	Yes		

Comments (note

The cooler temperature was 3.6 °C

Preservation	Cooler Temperature (Degrees C)	Preservation Criteria	Qualifier	Associated Samples
	Acceptable			

Holding Times	Analyte	Days to Extraction	HT Criteria	Qualifier	Associated Samples
		Acceptable			

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	Yes		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	Yes		

Comments (note deviations):

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	Yes		
Do the reporting limits meet project requirements?	Yes		

Comments (note deviations):

Comment:

Data is usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 11/19/2020

Data Reviewer: Cherie Zakowski Date: 11/20/2020

Appendix J

Survey Data

1/1

VA PLUME

1/21/21

PT #	MH #	CODE	CUT
121600	30R	℄ MW-30R	
121601		NO MW-30R	
121602		MW-30R A	.24
121603		MW-30R B	.44
121604	36	℄ MW-36	
121605		NO MW-36	
121606		MW-36	.54
121607		℄ MW-37	
121608		NO MW-37	
121609		MW-37 S	.36
121610		MW-37 D	.41
121611		℄ MW-38	
121612		NO MW-38	
121613		MW-38 S	.88
121614		MW-38 D	.73
121615		℄ MW-13L	
121616		NO MW-13L	
121617		MW-13L	.61

Point	Northing	Easting	Elevation	ID
121600	7445055.62	1545425.12	4722.89	CL MW-30R
121601	7445056.12	1545425.09	4722.95	NO MW-30R
121602	7445055.90	1545425.16	4722.60	MW-30RA
121603	7445055.64	1545425.20	4722.36	MW-30RB
121604	7440955.06	1541547.17	4429.01	CL MW-36
121605	7440955.57	1541547.14	4428.96	NO MW-36
121606	7440955.13	1541547.30	4428.49	MW-36
121607	7443160.46	1539938.63	4348.36	CL MW-37
121608	7443160.98	1539938.61	4348.36	NO MW-37
121609	7443160.41	1539938.84	4348.00	MW-37 S
121610	7443160.68	1539938.71	4347.97	MW-37 D
121611	7443931.79	1541593.58	4498.56	CL MW-38
121612	7443932.26	1541593.53	4498.55	NO MW-38
121613	7443931.72	1541593.35	4497.64	MW-38 S
121614	7443931.93	1541593.53	4497.80	MW-38 D
121615	7442106.30	1541851.01	4483.67	CL MW-13L
121616	7442106.64	1541851.07	4483.66	NO MW-13L
121617	7442106.40	1541851.05	4483.23	MW-13L

Appendix K

Well Development Purge Logs

BESST INC.
GLOBAL SUBSURFACE TECHNOLOGIES

Airlifting procedure:

***A: Assembling the diverter*:**

1. Measure out length of airlift line (nylon tubing) that will be inside the well. It should be set 3-5 feet above the well screen. BE SURE THE AIRLIFT WEIGHT DOES NOT HANG WITHIN THE WELL SCREEN. MAKE SURE IT IS IN THE BLANK CASING, AS PRESSURIZING INSIDE THE WELL SCREEN CAN DAMAGE THE SCREEN AND COMPROMISE THE INTEGRITY OF THE CASING ALLOWING SEDIMENT OR SAND INVASION AND RUINING THE WELL.
2. Thread the uphole or surface end of the nylon tube through the bored through fitting at the top of the plastic diverter and tighten it down.
3. Attach the airlift weight (stainless steel weight with fitting on top) to the nylon tube with the Swagelok connection.
4. Tighten down the airlift weight connection and diverter gas-line connection (on top of the diverter).
5. Feed airlift weight and nylon tube into well, thread diverter piece onto threads at the top of the well casing.
6. Attach a garden hose to the fitting on the diverter piece. Put the other end of the hose into discharge vessel.
7. Attach the loose nylon tube to nitrogen tank regulator.

***B: Development*:**

1. Calculate needed lift pressure with the following equation:
   depth of the airlift weight/2.31x1.1=airlift pressure (in psi)
   NEVER EXCEED 150 PSI WHICH IS THE WORKING PRESSURE OF 1" SCHED 80 THREADED PVC PIPE OR THE WELL THREADS AND WELL SCREEN COULD BE DAMAGED.
2. In order for this procedure to work about 25% of the casing above the airlift weight needs to be full of water. If static conditions aren't such that there is enough head above the screen and the airlift device then water needs to be added for each slug. 1" Schedule 80 pvc holds about **.35gal/10ft** so you can plan accordingly with the volume that will need to be added.
3. When all connections are tight and discharge tube is securely in discharge vessel, dial in the nitrogen to the pressure calculated above.
4. Let the nitrogen gas flow in until a slug of water comes into the diverter, turn off the pressure, let the water flow out of the diverter.
5. Repeat this process, giving enough time for recharge between cycles, until water either (A)is clear or (B)is no longer changing in its sediment load with each volume purged.
6. For example, at the beginning it may look like mud, ten cycles later it may look like chocolate milk, and five cycles after that it may look like murky water, but ten cycles later it still looks like murky water, then murky water is what the well is going to produce and the well is developed.

Appendix A.3. Well Development Log

Monitoring Point: MW-26A Date: 11/10/20 Sampler: E Pott, A Florini

Weather: Visitors:

Boring Dia. Casing Dia. 1" DTW: 190.98 TD: 217 Pump Intake Depth: Pump Top Depth:

Purge/Sampling Method: Vial pH: Depth to Water @Sampling:

Calculated Purge Volume[1] (Method 1) Water added during construction (gal) x 2 = Purge Volume (gal) (0.0)

[1] = Calculate the purge volume using both methods. Purge the well to whichever volume is greater

Calculated Purge Volume[1] (Method 2) [Casing and Annular Volume: (217 TD (ft) - 190.98 DTW (ft)) x (— CF + — BF)] + [Vol. Above Filter Pack: (— Casing Leng. (ft) x — CF)] = ~~3.71~~ 1.07 gal x 5 + Water added during construction (gal) = 5.33 Purge Volume (gal) (0.0)

Casing Volume Factors (gal/ft): 2"= 0.17; 4"=0.66; 5"=0.95 Borehole Factor Vols. (Cas.Dia/Bor.Dia.)(in): 2/8"= 0.71 gal/ft; 4/10"= 0.98 gal/ft; 4/12"= 1.18 gal/ft; 5"/12"= 1.38 gal/ft

Site Safety: PPE Disposal: Disposition of Purge Water: 90% Recharge Level: ft

Time	Purge Vol specify ml or gal	Temp (C) (0.0)	pH (0.0)	Specific Cond. (mS/cm) (0.000)	Turbidity (NTU) (0.0)	GW Level (ft below MP)	Comments (Color/Odor)
1400	Attempt to start bailing - bailer getting stuck.						
1430	After pulling up and trying again, bailer is stuck while pulling up.						
1500	Able to retrieve bailer. Measured rope from location where bailer was getting stuck. At approx. 206' btoc						206'.

Appendix A.3. Well Development Log

Monitoring Point: MW-30RA Date: 12/1/2020 Sampler: T. Vroom / K. Murphy

Weather: SUNNY LOW 21°F HIGH 40°F Visitors: None

Boring Dia. 8in Casing Dia. 2 inches DTW: 227.34 TD: 252.3 Pump Intake Depth: 247.3 Pump Top Depth: 244.3

Purge/Sampling Method: N/A Vial pH: N/A Depth to Water @Sampling: N/A

Calculated Purge Volume[1] (Method 1) N/A (Water added during construction (gal)) x 2 = N/A (Purge Volume (gal) (0.0))

[1] = Calculate the **purge** volume using both methods. Purge the well to whichever **volume** is greater.

Calculated Purge Volume[1] (Method 2) [Casing and Annular Volume] [(252.3 (TD (ft)) - 227.34 (DTW (ft))) x (0.17 (CF) + 2.71 (BF))] + [Vol. Above Filter Pack] (16 (Casing Leng. (ft)) x 0.17 (CF)) = 24.7 x 5 + 0 (Water added during construction (gal)) = 123.4 (Purge Volume (gal) (0.0))

Casing Volume Factors (gal/ft): 2"= 0.17; 4"=0.66; 5"=0.95 Borehole Factor Vols. (Cas.Dia/Bor.Dia.)(in): 2/8"= 0.71 gal/ft; 4/10"= 0.98 gal/ft; 4/12"= 1.18 gal/ft; 5"/12"= 1.38 gal/ft

Site Safety: _____ PPE Disposal: _____ Disposition of Purge Water: _____ 90% Recharge Level: _____ ft

Time	Purge Vol specify ml or (gal)	Temp (C) (0.0)	pH (0.0)	Specific Cond. (mS/cm) (0.000)	Turbidity (NTU) (0.0)	GW Level (ft below MP) ORP	ORP (mV)	Comments (Color/Odor)
1615	7	9.17	7.70	3.12 ~~3.64~~	232.56	227.23	23 ~~20~~ 107.9	Hmpkn bld rpms
1625	7	6.83	8.25	2.34	189.27	227.23	105.9	
1630	7	7.47	8.11	2.36	150.20	227.23	105.2	
1640	7.5	3.52	8.15	2.36	110.35	227.23	111.2	
1645	8	7.34	8.35	2.36	93.25	227.23	111.2	
1650	8	7.21	8.34	2.35	90.17	227.23	113.5	
1655	8.5	6.13	8.15	2.34	64.50	227.23	120.4	
1705	9.5	~~7.06~~ Tom	8.04	2.36	42.13	227.23	122.0	
1710	10	6.70	8.20	2.36	36.63	227.23	122.5	pH=6.24 apsn reading
1715	10.5	6.42	8.29	2.37	36.49	227.23	122.2	pH: 6.53 apsn reading
1720	11	6.43	8.41	2.31	24.17	227.23	122.5	pH=6.56 apsn reading
1725	11.5	6.41	8.52	2.35	24.89	227.23	122.1	pH=6.97 Apsn read
1730	12	6.55	8.82	2.37	16.55	227.23	120.9	pH=7.06 apsn reading. stopped development //
	~~12.5~~ bld pump	12.5 gallons in	(1 tubing)					

Time	Purge Vol specify ml or gal	Temp (C) (0.0)	pH (0.0)	Specific Cond. (mS/cm) (0.000)	Turbidity (NTU) (0.0)	GW Level (ft below MP)	Comments (Color/Odor)
Field parameters stable?		(Y) N	(Y) N	(Y) N	(Y) N	Total Purge Volume (mL or (gallons)) = 14.5	

Flow-through Cell Calibration ✱ Meter:

Parameter	Calibration	Check	Date	Time	Calibration Standards	Initial Reading	Final Reading	Calibration within Specifications
pH								
Turbidity								
Spec Cond								

General Notes: ✱ RECORDED ON EQUIPMENT CALIBRATION LOG

Appendix A.3. Well Development Log

Monitoring Point: MW-3=LB Date: 12/2/20 Sampler: T. Martin / K. Murray

Weather: Sunny, 41 41°F Lgt 19°F Visitors: None

Boring Dia. 8" Casing Dia. 2 DTW: 229.35 TD: 293.30 Pump Intake Depth: 287.30 Pump Top Depth: 284.30

Purge/Sampling Method: Bail / Pump Vial pH: N/A Depth to Water @Sampling: N/A

Calculated Purge Volume[1] (Method 1) N/A (Water added during construction (gal)) x 2 = N/A (Purge Volume (gal) (0.0))

[1] = Calculate the purge volume using both methods. Purge the well to whichever volume is greater.

Calculated Purge Volume[1] (Method 2) [Casing and Annular Volume: [(293.3 (TD (ft)) - 229.35 (DTW (ft))) x (0.17 (CF) + 0.71 (BF))] + Vol. Above Filter Pack: (16 (Casing Leng. (ft)) x 0.17 (CF))] = 54 x 5 + ~~N/A~~ N/A (Water added during construction (gal)) = 295 (Purge Volume (gal) (0.0))

Casing Volume Factors (gal/ft): 2"= 0.17; 4"=0.66; 5"=0.95 Borehole Factor Vols. (Cas.Dia/Bor.Dia.)(in): 2/8"= 0.71 gal/ft; 4/10"= 0.98 gal/ft; 4/12"= 1.18 gal/ft; 5"/12"= 1.38 gal/ft

Site Safety: _____ PPE Disposal: _____ Disposition of Purge Water: _____ 90% Recharge Level: _____ ft

Time	Purge Vol specify ml or (gal)	Temp (C) (0.0)	pH (0.0)	Specific Cond. (mS/cm) (0.000)	Turbidity (NTU) (0.0)	GW Level (ft below MP)	ORP mV	Aperox pH mg/L	Comments (Color/Odor)
1335	31	11.87	12.16	1.51	126.56	229.35	25.4	6.61	
1345	32	12.34	12.04	1.52	68.44	229.35	22.8	7.11	
1355	33	12.40	12.01	1.51	34.73	229.35	36.3	7.11	
1407	33.5	12.27	12.04	1.51	31.98	229.35	35.4	7.15	
1405	34	12.08	12.12	1.51	24.68	229.35	41.2	7.19	
1410	35	12.17	12.10	1.51	21.83	229.35	36.5	7.25	
1415	35.5	12.13	12.08	1.51	17.06	229.35	36.3	7.17	
1420	36	12.21	12.07	1.51	16.11	229.35	38.4	7.18	
1425	36.5	11.97	12.09	1.51	17.86	229.35	30.1	7.22	
1430	37.0	STOPPING DEVELOPMENT							

Time	Purge Vol specify ml or gal	Temp (C) (0.0)	pH (0.0)	Specific Cond. (mS/cm) (0.000)	Turbidity (NTU) (0.0)	GW Level (ft below MP)	Comments (Color/Odor)
Field parameters stable?		(Y) N	(Y) N	(Y) N	(Y) N	Total Purge Volume (mL or gallons) = 57	

Flow-through Cell Calibration ★ Meter:

Parameter	Calibration	Check	Date	Time	Calibration Standards	Initial Reading	Final Reading	Calibration within Specifications
pH								
Turbidity								
Spec Cond								

General Notes: ★ RECORDED ON EQUIPMENT CALIBRATION LOG

Appendix A.3. Well Development Log

Monitoring Point: MW-36 Date: 12/3/20 Sampler: T. VERTUCI / K. MURPHY

Weather: SUNNY Visitors: None

Boring Dia. 8 Casing Dia. 2 DTW: 44.60 TD: 52.05 Pump Intake Depth: 51 Pump Top Depth: 48

Purge/Sampling Method: Bail / Pump Vial pH: N/A Depth to Water @Sampling: N/A

Calculated Purge Volume[1] (Method 1): N/A (Water added during construction (gal)) x 2 = N/A (Purge Volume (gal) (0.0))

[1] = Calculate the purge volume using both methods. Purge the well to whichever volume is greater.

Calculated Purge Volume[1] (Method 2): [Casing and Annular Volume: [(52.05 TD (ft) - 44.60 DTW (ft)) x (.17 CF + 1.14 BF)] + Vol. Above Filter Pack: (3 Casing Leng. (ft) x 0.17 CF)] = 11.4 x 5 + N/A (Water added during construction (gal)) = 57 (Purge Volume (gal) (0.0))

Casing Volume Factors (gal/ft): 2"= 0.17; 4"=0.66; 5"=0.95 Borehole Factor Vols. (Cas.Dia/Bor.Dia.)(in): 2/8"= 0.71 gal/ft; 4/10"= 0.98 gal/ft; 4/12"= 1.18 gal/ft; 5"/12"= 1.38 gal/ft

Site Safety: _____ PPE Disposal: _____ Disposition of Purge Water: _____ 90% Recharge Level: _____ ft

Time	Purge Vol specify ml or (gal)	Temp (C) (0.0)	pH (0.0)	Specific Cond. (mS/cm) (0.000)	Turbidity (NTU) (0.0)	GW Level (ft below MP)	ORP	Appx pH	Comments (Color/Odor)
1310	12.5	11.10	10.49	1.34	56.48	44.54	52.6	6.86	
1315	13.5	11.01	10.48	1.34	33.33	44.54	44.5	7.10	
1320	14	10.94	10.43	1.34	30.52	44.54	43.6	7.20	
1330	17	11.04	10.43	1.34	7.31	44.54	67.2	7.30	
1340	19.5	11.10	10.12	1.33	0.00	44.54	66.6	7.30	
1350	21	11.07	10.07	1.34	0.00	44.54	62.1	7.31	stopped development

Time	Purge Vol specify ml or gal	Temp (C) (0.0)	pH (0.0)	Specific Cond. (mS/cm) (0.000)	Turbidity (NTU) (0.0)	GW Level (ft below MP)	Comments (Color/Odor)
Field parameters stable?		(Y) N	(Y) N	(Y) N	(Y) N	Total Purge Volume (mL or gallons) = 25	

Flow-through Cell Calibration ✱ Meter:

Parameter	Calibration	Check	Date	Time	Calibration Standards	Initial Reading	Final Reading	Calibration within Specifications
pH								
Turbidity								
Spec Cond								

General Notes: ✱ RECORDED ON EQUIPMENT CALIBRATION LOG

Appendix A.3. Well Development Log

Monitoring Point: MW-37S Date: 12/5/12 Sampler: T. VRTIAK / K. MURRAY / J. MILLER

Weather: SUNNY COLD 24°F, HIGH 41°F Visitors: None

Boring Dia. 8" Casing Dia. 2" DTW: 18.32 TD: 34.55 Pump Intake Depth: 28.55 Pump Top Depth: 25.55

Purge/Sampling Method: Bail / Pump Vial pH: N/A Depth to Water @Sampling: N/A

Calculated Purge Volume[1] (Method 1) N/A (Water added during construction (gal)) x 2 = N/A (Purge Volume (gal) (0.0))

[1] = Calculate the purge volume using both methods. Purge the well to whichever volume is greater.

Calculated Purge Volume[1] (Method 2) [Casing and Annular Volume: (34.55 (TD (ft)) - 18.32 (DTW (ft))) x (0.17 (CF) + 0.71 (BF))] + [Vol. Above Filter Pack: (17 (Casing Leng. (ft)) x 0.17 (CF))] = 17.2 x 5 + N/A (Water added during construction (gal)) = 89.9 (Purge Volume (gal) (0.0))

Casing Volume Factors (gal/ft): 2"= 0.17; 4"=0.66; 5"=0.95 Borehole Factor Vols. (Cas.Dia/Bor.Dia.)(in): 2/8"= 0.71 gal/ft; 4/10"= 0.98 gal/ft; 4/12"= 1.18 gal/ft; 5"/12"= 1.38 gal/ft

Site Safety: _____ PPE Disposal: _____ Disposition of Purge Water: _____ 90% Recharge Level: _____ ft

Time	Purge Vol specify ml or (gal)	Temp (C) (0.0)	pH (0.0)	Specific Cond. (mS/cm) (0.000)	Turbidity (NTU) (0.0)	GW Level (ft below MP)	ORP (mV)	Appox pH	Comments (Color/Odor)
1510	23	16.20	6.19	2.32	92.6	20.47	220.0	7.41	Bailed 16 gal prior to pump-in
1520	25	14.86	5.79	2.36	47.25	20.31	231.3	7.42	
1530	27	13.88	5.49	2.36	43.02	20.43	237.3	7.40	
1540	29	13.73	5.44	2.36	38.54	20.45	245.1	7.37	
1550	31	13.27	6.43	2.36	40.59	20.40	246.7	7.37	
1600	33	13.07	6.71	2.37	46.12	20.46	248.6	7.35	
1610	36	13.50	6.77	2.37	49.04	20.40	248.5	7.38	
1620	39	13.22	6.95	2.36	46.81	20.43	248.5	7.32	
1630	42	12.92	6.91	2.36	47.68	20.44	249.3	7.30	
1640	45	13.09	6.49	2.36	48.15	20.30	249.7	7.29	
1645	48	13.13	6.80	2.36	47.74	20.29	249.6	7.40	Stop purge Kayla says Okay

Time	Purge Vol specify ml or gal	Temp (C) (0.0)	pH (0.0)	Specific Cond. (mS/cm) (0.000)	Turbidity (NTU) (0.0)	GW Level (ft below MP)	Comments (Color/Odor)
Field parameters stable?		(Y) N	(Y) N	(Y) N	(Y) N	Total Purge Volume (mL or (gallons)) = 48	

Flow-through Cell Calibration ★ Meter:

Parameter	Calibration	Check	Date	Time	Calibration Standards	Initial Reading	Final Reading	Calibration within Specifications
pH								
Turbidity								
Spec Cond								

General Notes: ★ RECORDED IN EQUIPMENT CALIBRATION LOG

Appendix A.3. Well Development Log

Monitoring Point: MW-37D Date: 12/6/20 Sampler: EVERETT J MILLER

Weather: SUNNY, LOW 23°F, HIGH 46°F Visitors: N/A

Boring Dia. 8" Casing Dia. 2" DTW: 42.25 TD: 63.84 Pump Intake Depth: 63.84 Pump Top Depth: 60 ~~64~~

Purge/Sampling Method: BAIL/PUMP Vial pH: N/A Depth to Water @Sampling: N/A

Calculated Purge Volume[1] (Method 1) N/A (Water added during construction (gal)) x 2 = N/A (Purge Volume (gal) (0.0))

[1] = Calculate the purge volume using both methods. Purge the well to whichever volume is greater.

Calculated Purge Volume[1] (Method 2) [Casing and Annular Volume] [(63.84 (TD (ft)) - 42.25 (DTW (ft))) x (0.17 (CF) + 0.71 (BF))] + [Vol. Above Filter Pack] (13 (Casing Leng. (ft)) x 4.17 (CF)) = 25 x 5 + N/A (Water added during construction (gal)) = 125 (Purge Volume (gal) (0.0))

Casing Volume Factors (gal/ft): 2"= 0.17; 4"=0.66; 5"=0.95 Borehole Factor Vols. (Cas.Dia/Bor.Dia.)(in): 2/8"= 0.71 gal/ft; 4/10"= 0.98 gal/ft; 4/12"= 1.18 gal/ft; 5"/12"= 1.38 gal/ft

Site Safety: _____ PPE Disposal: _____ Disposition of Purge Water: _____ 90% Recharge Level: _____ ft

Time	Purge Vol specify ml or gal	Temp (C) (0.0)	pH (0.0)	Specific Cond. (mS/cm) (0.000)	Turbidity (NTU) (0.0)	GW Level (ft below MP)	ORP (mV)	Comments (Color/Odor)
1330	35	14.6	7.04	1.702	~~42.5~~ 18.8	42.31	107.1	
1335	37	14.8	7.00	1.700	17.7	42.25	105.1	
1340	38	14.8	6.96	1.699	19.6	42.26	99.4	
1345	39	14.7	6.96	1.693	19.5	42.26	97.2	
1355	42	14.4	6.96	1.694	22.3	42.26	92.1	
1405	44	14.6	6.96	1.696	19.6	42.26	84.5	
1410	45.5	14.4	6.97	1.688	25.3	42.26	87.0	
1415	46.5	14.4	6.96	1.692	25.8	42.26	87.1	
1420	47	14.5	6.96	1.693	22.9	42.26	86.4	
1425	48	14.5	6.96	1.691	21.3	42.28	86.0	Stopping due/ground

Time	Purge Vol specify ml or gal	Temp (C) (0.0)	pH (0.0)	Specific Cond. (mS/cm) (0.000)	Turbidity (NTU) (0.0)	GW Level (ft below MP)	Comments (Color/Odor)
Field parameters stable?		(Y) N	(Y) N	(Y) N	(Y) N	Total Purge Volume (mL or (gallons)) = 4.8	

Flow-through Cell Calibration ✗ Meter:

Parameter	Calibration	Check	Date	Time	Calibration Standards	Initial Reading	Final Reading	Calibration within Specifications
pH								
Turbidity								
Spec Cond								

General Notes: ARE LOGGED ON EQUIPMENT CALIBRATION LOG

Appendix A.3. Well Development Log

Monitoring Point: MW-38S Date: 12/14/20 Sampler: T. Varone / K. Murphy

Weather: SUNNY, LOW 21° HIGH 40°F Visitors: None

Boring Dia. 8" Casing Dia. 2 DTW: 19.70 TD: 36.68 Pump Intake Depth: 32 ft BTOC Pump Top Depth: 24 ft BTOC

Purge/Sampling Method: Bail/Pump Vial pH: N/A Depth to Water @Sampling: N/A

Calculated Purge Volume[1] (Method 1) N/A / Water added during construction (gal) x 2 = N/A / Purge Volume (gal) (0.0)

[1] = Calculate the purge volume using both methods. Purge the well to whichever volume is greater.

Calculated Purge Volume[1] (Method 2) [Casing and Annular Volume] [(36.68 TD (ft) - 19.70 DTW (ft)) x (0.17 CF + 0.21 BF)] + [Vol. Above Filter Pack] (16 Casing Leng. (ft) x 0.17 CF) = 17.7 x 5 + N/A Water added during construction (gal) = 33.3 Purge Volume (gal) (0.0)

Casing Volume Factors (gal/ft): 2"= 0.17; 4"=0.66; 5"=0.95 Borehole Factor Vols. (Cas.Dia/Bor.Dia.)(in): 2/8"= 0.71 gal/ft; 4/10"= 0.98 gal/ft; 4/12"= 1.18 gal/ft; 5"/12"= 1.38 gal/ft

Site Safety: _____ PPE Disposal: _____ Disposition of Purge Water: _____ 90% Recharge Level: _____ ft

Time	Purge Vol specify ml or gal	Temp (C) (0.0)	pH (0.0)	Specific Cond. (mS/cm) (0.000)	Turbidity (NTU) (0.0)	GW Level (ft below MP)	Apx pH	Comments (Color/Odor)
1340	26.5	12.35	4.62	1.46	34.43	19.76	6.82	
1350	28.5	11.85	4.73	1.46	22.90	19.76	7.11	
1400	31	11.45	4.69	1.46	6.45	19.74	7.22	
1405	33	11.20	4.68	1.46	0.84	19.74	7.29	
1410	35	11.12	4.46	1.46	0.00	19.74	7.30	ORP = 216.4mV
1415	Stopped	development	complete	total	of	36 gal		

Time	Purge Vol specify ml or gal	Temp (C) (0.0)	pH (0.0)	Specific Cond. (mS/cm) (0.000)	Turbidity (NTU) (0.0)	GW Level (ft below MP)	Comments (Color/Odor)
Field parameters stable?		(Y) N	(Y) N	(Y) N	(Y) N	Total Purge Volume (mL or gallons) = 36	

Flow-through Cell Calibration ★ Meter:

Parameter	Calibration	Check	Date	Time	Calibration Standards	Initial Reading	Final Reading	Calibration within Specifications
pH								
Turbidity								
Spec Cond								

General Notes: ★ RECORDED ON EQUIPMENT CALIBRATION LOG

Appendix A.3. Well Development Log

Monitoring Point: MW-38D Date: 12/4/20 & 12/5/20 Sampler: T. VRTLIK / K. MURPHY

Weather: SUNNY, LOW 21F, HIGH 40F Visitors: None

Boring Dia. 8 Casing Dia. 2 DTW: 18.66 TD: 70.34 Pump Intake Depth: 65.34 Pump Top Depth: 62.34

Purge/Sampling Method: Bail/Pump Vial pH: N/A Depth to Water @Sampling: N/A

Calculated Purge Volume[1] (Method 1) N/A (Water added during construction (gal)) x 2 = N/A (Purge Volume (gal) (0.0))

[1] = Calculate the purge volume using both methods. Purge the well to whichever volume is greater.

Calculated Purge Volume[1] (Method 2) [(70.34 (TD (ft)) - 18.66 (DTW (ft))) x (0.17 (CF) + 0.71 (BF))] + [(16 (Casing Leng. (ft)) x 0.17 (CF))] = 48.2 x 5 + N/A (Water added during construction (gal)) = 241 (Purge Volume (gal) (0.0))

Casing and Annular Volume | Vol. Above Filter Pack

Casing Volume Factors (gal/ft): 2"= 0.17; 4"=0.66; 5"=0.95 Borehole Factor Vols. (Cas.Dia/Bor.Dia.)(in): 2/8"= 0.71 gal/ft; 4/10"= 0.98 gal/ft; 4/12"= 1.18 gal/ft; 5"/12"= 1.38 gal/ft

Site Safety: _____ PPE Disposal: _____ Disposition of Purge Water: _____ 90% Recharge Level: _____ ft

Time	Purge Vol specify ml or (gal)	Temp (C) (0.0)	pH (0.0)	Specific Cond. (mS/cm) (0.000)	Turbidity (NTU) (0.0)	GW Level (ft below MP)	ORP (mV)	Appx. 1"	Comments (Color/Odor)
1655	38	9.6	5.26	1.28	832.43	19.16	216.7	7.70	12/4/20
1705	39	8.82	5.48	1.27	933.46	19.38	224.7	7.58	
1710	40	8.76	5.45	1.27	1314.8	19.21	230.6	7.34	Will pause for Friday and continue Saturday 12/5/20
1155	76 (total) 81	11.61	7.11	1.17	90.52	18.71	209.3	7.00	12/5/20
1205	835 (total) 83.5	12.17	6.88	1.25	49.01	18.70	216.2	7.38	
1215	87	12.44	6.91	1.25	44.17	18.70	217.6	7.51	
1225	91	12.54	6.96	1.25	28.11	18.70	218.1	7.43	
1235	95.5	12.64	6.71	1.25	18.90	18.70	220.3	7.58	
1245	97.5	12.71	6.68	1.25	17.44	18.70	222.6	7.45	
1255	102.5	12.86	6.53	1.25	12.58	18.70	225.0	7.40	
1305	106	12.74	6.54	1.25	6.52	18.70	221	7.32	
1315	112.5	12.70	6.62	1.25	3.13	18.70	224.9	7.37	
1320	115	12.63	6.64	1.25	2.77	18.70	227.4	7.40	
1325	116	12.33	6.62	1.25	0.00	18.68	225.2	7.43	stopped development

Time	Purge Vol specify ml or gal	Temp (C) (0.0)	pH (0.0)	Specific Cond. (mS/cm) (0.000)	Turbidity (NTU) (0.0)	GW Level (ft below MP)	Comments (Color/Odor)
Field parameters stable?		(Y) N	(Y) N	(Y) N	(Y) N	Total Purge Volume (mL or (gallons)) = 116 gallons	

Flow-through Cell Calibration ★ Meter:

Parameter	Calibration	Check	Date	Time	Calibration Standards	Initial Reading	Final Reading	Calibration within Specifications
pH								
Turbidity								
Spec Cond								

General Notes: ★ RECORDED ON EQUIPMENT CALIBRATION LOG

Appendix A.3. Well Development Log

T. VOTAW / K. MURPHY (12/7)

Monitoring Point: MW-34A Date: 12/7/20 & 12/8/20 Sampler: T. VOTAW / K. MURPHY / E. COTT. (12/7)

Weather: SUNNY, LOW 21°F, HIGH 43°F Visitors: D. CAMERON / C. KELLY

Boring Dia. 6 Casing Dia. 4 DTW: 132.45 TD: 152.64 Pump Intake Depth: 150 Pump Top Depth: 144.6

Purge/Sampling Method: _____ Vial pH: _____ Depth to Water @Sampling: _____

Calculated Purge Volume[1] (Method 1) _____ (Water added during construction (gal)) x 2 = _____ (Purge Volume (gal) (0.0))

[1] = Calculate the purge volume using both methods. Purge the well to whichever volume is greater.

Calculated Purge Volume[1] (Method 2) [Casing and Annular Volume: [(152.64 (TD (ft)) - 132.45 (DTW (ft))) x (____ (CF) + ____ (BF))]] + [Vol. Above Filter Pack: (____ (Casing Leng. (ft)) x ____ (CF))] = ____ x 5 + ____ (Water added during construction (gal)) = ____ (Purge Volume (gal) (0.0))

Casing Volume Factors (gal/ft): 2"= 0.17; 4"=0.66; 5"=0.95 Borehole Factor Vols. (Cas.Dia/Bor.Dia.)(in): 2/8"= 0.71 gal/ft; 4/10"= 0.98 gal/ft; 4/12"= 1.18 gal/ft; 5"/12"= 1.38 gal/ft

Site Safety: _____ PPE Disposal: _____ Disposition of Purge Water: _____ 90% Recharge Level: _____ ft

Time	Purge Vol specify ml or (gal)	Temp (C) (0.0)	pH (0.0)	Specific Cond. (mS/cm) (0.000)	Turbidity (NTU) (0.0)	GW Level (ft below MP)	ORP (mV)	Comments (Color/Odor)
1630	10	9.5	7.30	0.924	N/A	N/A	172.2	turbidity too high, can't get NL meter 12/7/20
1640	12	9.2	7.08	0.906	N/A	N.A	152.8	turbidity too high, can't get NL meter
1645	stopped	pumping	total	of 15 gallons	pumped			
1250	23	7.4	7.26	0.946	76.14	N/A (152.64)	128.7	12/8/20, DTW at 132.45 at the beginning of the day
1255	23.5	7.18 (7.18, 7.18, 7.18)	7.18	0.958	750.2	N/A	129.0	
1300	30	7.16 (7.16, 7.16, 7.16) AVG 7.55	7.16	0.0193	605.4	N/A	125.3	Specific conductivity likely wrong, battery of thermometer
1400	61	12.0	7.30	1.052	324.2	N/A	97.2	
1405	62.5	11.5	7.21	1.022	242.85	N/A	99.4	
1415	64.5	11.4	7.16	1.029	463.41	N/A	103.4	
1535	85	11.2	7.13	1.034	97.63	N/A	97.6	
1540	86.5	10.6	7.12	1.022	92.11	N/A	96.5	
1545	88	10.7	7.12	1.020	53.61	N/A	95.8	Blowing at 1100 ml/min, Carla says 4 gallons
1547	stopped	development	pumped	4 gal/	at	88.5	gallons.	

Time	Purge Vol specify ml or gal	Temp (C) (0.0)	pH (0.0)	Specific Cond. (mS/cm) (0.000)	Turbidity (NTU) (0.0)	GW Level (ft below MP)	Comments (Color/Odor)
Field parameters stable?		(Y) N	(Y) N	(Y) N	Y (N) KLAMATH	Total Purge Volume (mL or (gallons) = 88.5	

Flow-through Cell Calibration ★ Meter:

Parameter	Calibration	Check	Date	Time	Calibration Standards	Initial Reading	Final Reading	Calibration within Specifications
pH								
Turbidity								
Spec Cond								

General Notes: ★ RECORDED IN EQUIPMENT CALIBRATION LOG

Appendix A.3. Well Development Log

Monitoring Point: MW-26D Date: 11/10/20 Sampler: E. RUT

Weather: _____ Visitors: _____

Boring Dia. _____ Casing Dia. 1" DTW: 218.50 TD: 360 Pump Intake Depth: _____ Pump Top Depth: _____

Purge/Sampling Method: _____ Vial pH: _____ Depth to Water @Sampling: _____

Calculated Purge Volume[1] (Method 1) _____ (Water added during construction (gal)) x 2 = _____ (Purge Volume (gal) (0.0))

[1] = Calculate the purge volume using both methods. Purge the well to whichever volume is greater.

Calculated Purge Volume[1] (Method 2) [(Casing and Annular Volume: (360 (TD (ft)) - 218.50 (DTW (ft)) x 0.041 (CF) + ~~BF~~) + (Vol. Above Filter Pack: ~~Casing Leng. (ft) x CF~~)*] = 5.30 x 5 + _____ (Water added during construction (gal)) = 27.6 (Purge Volume (gal) (0.0))

Casing Volume Factors (gal/ft): 2"= 0.17; 4"=0.66; 5"=0.95 Borehole Factor Vols. (Cas.Dia/Bor.Dia.)(in): 2/8"= 0.71 gal/ft; 4/10"= 0.98 gal/ft; 4/12"= 1.18 gal/ft; 5"/12"= 1.38 gal/ft

Site Safety: _____ PPE Disposal: _____ Disposition of Purge Water: _____ 90% Recharge Level: _____ ft

Time	Purge Vol specify ml or gal	Temp (C) (0.0)	pH (0.0)	Specific Cond. (mS/cm) (0.000)	Turbidity (NTU) (0.0)	ORP ~~GW Level (ft below MP)~~ (mV)	Comments (Color/Odor)
1049		12.32	8.06	1.035	32.5	-31.7	Sulfur smell
1056		12.50	8.26	0.995	107.7	-98.2	
1111		12.45	8.32	1.012	698.7	-93.2	
1133	~30 gal	12.48	8.30	0.987	174.9	84	Minimum purge met
1137							Switch gas
1148	40 gal	12.61	8.37	0.998	124.2	-0.1	
1153		12.43	8.36	0.997	832.7	-45.5	
1202	50 gal	12.45	8.32	0.998	232.7	-61.3	
1207	55 gal	12.16	8.35	0.988	254.1	-80.1	Visibly more clear
1212	60 gal	12.04	8.33	0.990	167.1	-76.7	Purged 10x well volume
1220	70 gal	end	purge				

* ZIST computation, not applicable

Appendix A.3. Well Development Log

Monitoring Point: MW-26C Date: ~~11/10/20~~ 11/10/20 ER Sampler: E. ROTT A. Forni

Weather: Visitors:

Boring Dia. Casing Dia. 1" DTW: 219.67' TD: 315 Pump Intake Depth: Pump Top Depth:

Purge/Sampling Method: Vial pH: Depth to Water @Sampling:

Calculated Purge Volume[1] (Method 1) ____ (Water added during construction (gal)) x 2 = ____ (Purge Volume (gal) (0.0))

[1] = Calculate the purge volume using both methods. Purge the well to whichever volume is greater.

Calculated Purge Volume[1] (Method 2) [Casing and Annular Volume: [(315 (TD (ft)) - 219.67 (DTW (ft)) x 0.041 (CF) + ____ (BF))] + Vol. Above Filter Pack: (____ (Casing Leng. (ft)) x ____ (CF))] = 4.4 x 5 + ____ (Water added during construction (gal)) = 22 (Purge Volume (gal) (0.0))

Casing Volume Factors (gal/ft): 2"= 0.17; 4"=0.66; 5"=0.95 Borehole Factor Vols. (Cas.Dia/Bor.Dia.)(in): 2/8"= 0.71 gal/ft; 4/10"= 0.98 gal/ft; 4/12"= 1.18 gal/ft; 5"/12"= 1.38 gal/ft

Site Safety: PPE Disposal: Disposition of Purge Water: 90% Recharge Level: ft

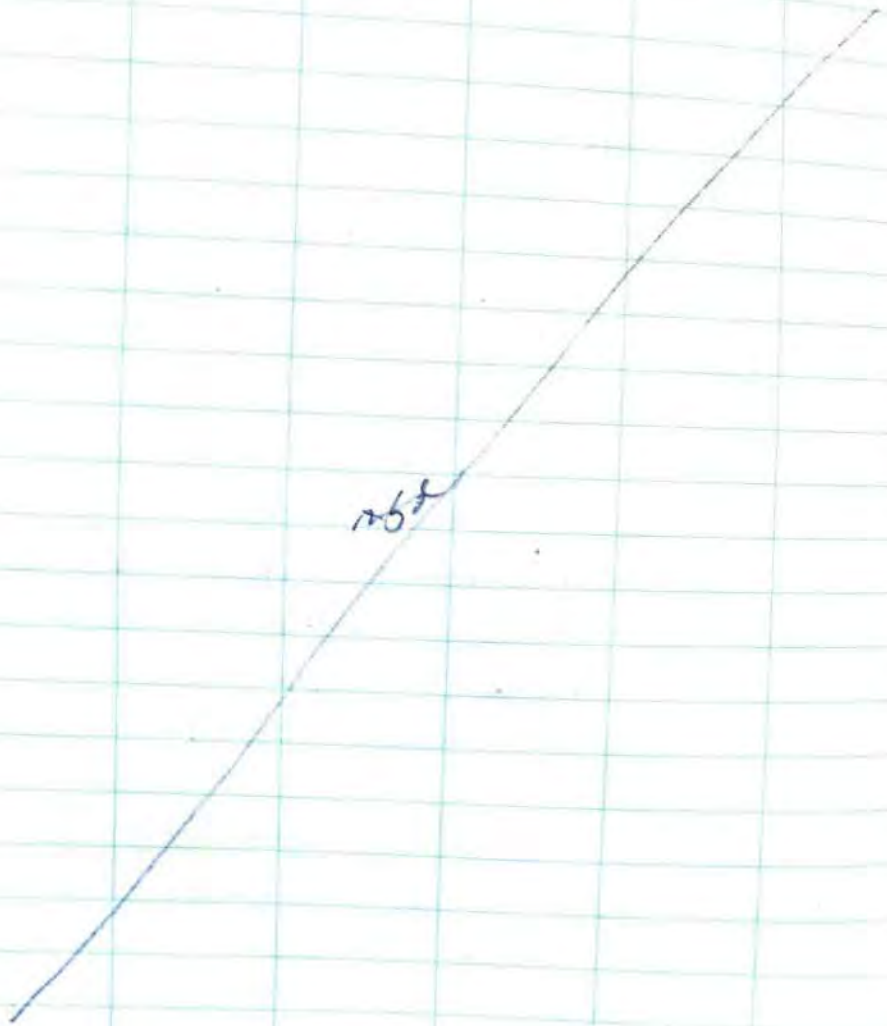
Time	Purge Vol specify ml or gal	Temp (C) (0.0)	pH (0.0)	Specific Cond. (mS/cm) (0.000)	Turbidity (NTU) (0.0)	~~GW Level (ft below MP)~~ ORP (mV)	Comments (Color/Odor)
1316	2gal in	DRY		at stinger at		268' btoc, 80 psi	
1332		13.10	8.30	1.043	604.7	-191.2	
1344		12.95	7.11	1.021	74.2	-236.0	
1359		13.90	8.67	0.967		-156.9	turb. out of range extreme cum. of sediment
1409		13.37	8.57	0.874		-145.5	~10g. purged, turb. out of range
1430							switch gas
1437		13.05	8.51	0.826		-120.4	turb. out of range
1505		12.93	8.35	0.900	1761.1	-37.6	visibly less turbid
1514		12.99	8.41	0.895	1640.6	-27.9	
1525		13.17	8.33	0.873	1722.4	-26.5	switch gas
1555	~30 gal	13.09	8.32	0.893	1766.0	-29.5	switch gas
1615	→	12.97	8.28	0.832	1633.6	-26.2	↓
1630							
1645		12.94	8.38	0.900	1545.7	-34.8	
1657	~40 gal	12.32	8.25	0.903	944.0	-17.5	
11/11/2020 DTW: 218.42							Started at 1100, very turbid
1121		11.54	7.53	973.67	734.02	89.0	
1138		12.73	7.63	934.99	433.05	0.1	visible decrease in turbidity, met 10x well volume
1154		12.43	7.75	958.04	1335.21	6.0	
1208		12.95	7.80	953.76	1078.1	24.7	
1230	~20 gal	12.82	7.77	922.52	1231.6	32.6	Total purged between days (11/10 + 11/11) is 60 gallons

Location SLC VA

Project / Client VA 700 S 1600 E PCE Plume

Date 10/1

shipped samples.
Disposed of empty used core boxes at landfill
organized conex buildings
1930 COM offsite.



Location SLC VA

Project / Client VA 700S 1600E PCE Plume

Date 11/10/20

Weather: Cloudy, 30°F
Task: GW well development
PPE: Level D
Personell: E. Rott (Author), A. Forni (Wasatch)

0700 E. Rott onsite. Calibrate PID.
Begin loading equiptment
0900 A. Forni onsite. Calibrate YSI.
H&S meeting.
0900 Team to MW-26. Plan to develop all 4- intervals.
1000
1040 Begin Development at MW-26D by airlift. Set stinger @ 289 ft btoc
1115 E. Rott to connex for airgas dropoff
1130 E. Rott back to MW-26D.
1220 End development at MW-26D. Did not reach parameter stability. Saw visible decrease in turbidity. Purged a total of approx. 70 gal
1230 To connex to empty purge water and switch nitrogen tanks.
1245 Return to MW-26. Begin development at MW-26C. Set stinger at 268 ft btoc.

Location SLC VA

Project / Client 700S 1600E PCE Plume

Date 11/10/20

1400 Attempt development at MW-26A with 3/4" stainless steel bailer.

1415 Evident bailer is getting stuck in casing. Pulled up bailer and no water, hadn't dropped far enough

1430 Attempt bailer in MW-26A again able to get it slightly further than previously. Stuck on way up.

1500 Able to get bailer out of MW-26A Called Joe Miller (CDM Smith) to discuss issues. Assumes casing is slightly crooked and won't be able to get to water column. Decision to not develop at MW-26A.

1700 End development at MW-26C for the day. Purged approx. 38 gallons. Water still very turbid, but decreasing. Will return tomorrow to continue.

1800 Field team offsite.

Emma Rott
11/10/20

Location SLC VA

Project / Client 700S 1600E PCE Plume

Date 11/11/20

Weather: Snow/Rain, 30-40°F
Task: Well Development
PPE: Level D
Personell: E. Rott (Author), A. Forni (Wasatch)

0715 Field team onsite.
0730 H+S meeting
0735 Calibrate PID. YSI was dropped. No longer calibrating correctly.
0750 Anna to Wasatch to get functional water quality meter.
0830 E. Rott to MW-34A to see if bailer will work for development.
0840 Bailer getting stuck at around 130' btoc at MW-34A.
0850 E. Rott back to connexs. Meets A. Forni and loads equipment.
0930 Team to MW-26. Setup on MW-26B.
1005 Begin airlift at MW-26B. Set stinger at 222' btoc.
1015 No water present. Lower stinger approx. 8'.
1030 No water. Determine not enough water column to use airlifting for development.

Location VA SLC

Project / Client 700S 1600E PCE Plume

Date 11/11/20

1045 E. Rott called Miles Kheeler (BESST) to discuss using ZIST pump w/o filter for development. He states we can attempt but likely too coarse of material for the pump to function.

1100 Team Continues development at MW-21 looks clear at first.

1115 E. Rott Attempts to use ZIST pump at MW-26B w/o filter.

1130 Slug of water comes out of MW-26B, assumed to be water remaing in tubing from last sampling.

1140 No more water from MW-26B. Team pulls pump and cleans out. No visible sediment within pump.

1150 Re-deploy pump at MW-26B.

1200 No water present. Determined pump will not work for development Team pulls pump and brings it to connex.

1220 Complete development at MW-26C. Purged >60 gallons total. Saw slight increase in turbidity towards the end. Stopped based on volume metrics.

Location VA SLC

Project / Client 700S 1600E PCE Plume

Date 11/11/20

1230 Attempted bailer at MW-26B.

1245 Unable to get bailer past 114' btoc.

1300 Team to connex to prep transducers for deployment at MW-34.

1500 Team to MW-34.

1515 WL = 131.0' @ MW-34B. Install pump + transducer attachment by removing filter and threading on intellipump.

1535 WL = 130.41 @ MW-34D. Install pump + transducer attachment

1557 WL = 130.72' @ MW-34C. Install pump + transducer attachment

1615 Team to Connex. E. Rott spoke with K. Lesue + N. Smith to determine not to install transducer at MW-34A until it can be developed.

1645 E. Rott to MW-6 and MW-17 to make determinations for tamper-proof bolts

1730 Field team offsite.

Emma Rott
11/11/20

Location VA SLC

Project / Client 700S 1600E PCE Plume

Date 11/12/20

Weather: Sunny, 30-50°F
Task: Well development
PPE: Level D
Personnel: E. Rott (author), Anna Fiorni, Joe Miller (COM Smith)

0700 Field team onsite. Calibrate PID. Begin packing vehicles. H+S meeting.
0720 E. Rott to Hose + Rubber to purchase tubing (½" OD) for grundfos pump use.
0730 A. Fiorni calibrates YSI.
0940 E. Rott onsite.
1000 Team to ~~MW-26~~ OR MW-30RA/B.
1005 WL = 229.75' btoc @ MW-30RB
TD = ~~293.0' btoc~~ OR 290.92' btoc
1010 Team to use 2" poly bailer to surge/collect sediment.
1020 Bailer doesn't weigh enough. Team to attempt using stainless bailer (3/4") to see rope depth.
1045 Stainless bailer comes up full of sludge. E. Rott to connex to find weight to add to poly bailer. Stainless is too small to be effective.

Location VA SLC

Project / Client 700S 1600E PCE Plume

Date 11/12/20

1115 Send poly bailer down w/ weight. Comes up partially full with sludgy water.
1145 Continued to bail, but kept pulling up empty bailer. Team assumes the ball can't sit well b/c sediment. Anything that does fill leaks out by the time it's brought to the surface.
1200 Begin setting up Grundfos Rediflo 2.
1220 Deploy @ 250' btoc (max length on pump cord). Using Wasatch's generator (3150 Watt champion)
1230 Begin pumping. Gradually increasing Hz.
1245 Controller faults at approx 300Hz
1300 After restarting, controller faults again at 336 Hz. Spoke with Joe Miller, decided to attempt renting new larger capacity generator.
1315 Team pulls pump.
1400 Team to Sunburst Rentals. Rented Honda EU7000IS, 6500 watt

Location VA SLC

Project / Client 7005 1600E PCE Plume

Date 11/12/20

1430 Field team onsite. To MW-30RB.
1445 Team deploys pump. Error when plugged into new generator. (Fault → under voltage).
1530 Team continues to encounter fault. Pulls pump.
1545 To connex. ~~Cr~~ Plan to try pump in 5-gallon bucket of water to see if the pump was the issue.
1620 Pump not functioning with either generator. E. Root calls Pine Environmental.
1630 Remove bottom of pump. Dirty water comes out. Rinsed multiple times.
1640 Re-run pump, working this time. Likely clogged. Pine representative stated that running pump at max (400 Hz) is risky for very long.
1700 A. Fiorni offsite.
1740 J. Miller, E. Root to MW-30. WL = 227.40 @ MW-30RA.
1745 Team notes water in well vault at MW-30C. Team offsite.

Location VA SLC

Project / Client 7005 1600E PCE Plume

Date 11/13/20

Weather:
Task: Well development
PPE: Level D
Personnel: E. Root (Author), A. Fiorni (Wasatch)
0700 E. Root onsite. A. Fiorni to Sunbelt rentals to drop off rented generator.
0715 Calibrate PID.
0730 E. Root to get ice for drilling crew.
0800 E. Root onsite.
0900 A. Fiorni onsite.
0915 Team to ~~MW-20R~~ MW-30RA. Plan to attempt using Grundfos pump for development. TD = 250.6' btoc.
0925 Deployed Grundfos Redi Flow 2 at approx 240' btoc. Using Wasatchs generator.
0940 Pump faulted at approx. 300 Hz. Team to pull pump.
0950 Pulled pump and saw sludge water leave it when cleaning. Assumed to have clogged with sediment.
1000 Team to drilling crew at MW-37. Packed push ahead sample.
1030 Team to fedex to ship samples

Location VA Plume

Project / Client 700S 1600E PCE Plume

Date 11/13/20

1030 Shipped Sounst controller and YSI back.

1100 Team to Wasatch to pickup tubing for sounst pump install.

1120 Pine shipped 4x 250' rolls, only will be able to install at MW 30RA

1140 Team onsite to connex to load equiptment to use for sounst pump deployment and purging.

1215 Deployed sounst pump in MW 30RA at 240' btoc. Hung on 1/16" wire cable. 1/4" x 1/4" bonded tubing.

1220 Begin purge to attempt development.

1240 Water at surface. Very turbid, filled with sediment.

1245 Water stopped flowing. Team turned off controller. Assume it clogged.

1315 Pulled pump. Ball valves filled with sediment.
Team cleared line and cleaned pump. Brought back to connex.

1400 Pulled MW-30C and took TD
TD = 325.8' btoc.
difficult to guage with skinny dipper. No sign of grout.

Location VA Plume

Project / Client 700S 1600E PCE Plume

Date 11/13/20

1415 Placed pump back in MW 30C.

1430 Team to connex to unload vehicles. Take inventory on sampling bottles

1530 Team to MW-17D to tap well cap. Need larger tap wrench. Team to ACE.

1600 Return to MW-17D. Tap well cap. Tamper proof bolts now sitting properly. Return to connex.

1630 Pack remaining equiptment to ship

1700 Team offsite.

Emma Reed
11/13/20

Location SLC VA Date 12/01/2020

Project / Client 7005 1600 E PCE PLUME

WEATHER: SUNNY, LOW 21°F, HIGH 40°F

TASK: GW WELL DEVELOPMENT

PPE: LEVEL D

PERSONNEL: T. VRTLOK (EDIT SHIFT AUTHOR)

KEVIN MURPHY (WASATCH ENVIRONMENTAL)

0650 TEI ONSITE

0720 KEVIN AND TEI MEETING DRILLING TEAM FOR HEALTH AND SAFETY MEETING AT MW-36

0730 BACK AT CONVEX CALIBRATING YSI AND PID CHECKING BOXES WITH EQUIPMENT. LOOKING FOR CYLINDERS IDENTIFYING MISSING EQUIPMENT.

0815 KEVIN TO MW 36 TO HELP DRILLING CREW WITH GENERATOR ISSUES

0820 RESOLVING ISSUE WITH NO ELECTRICITY AT THE CONVEX

0845 KEVIN TO WASATCH EM OFFICE TO PICK UP THE REST OF THE EQUIPMENT

0915 YSI HAS BEEN RETURNED YET. KEVIN STILL HAS PUMP AT WASATCH

0930 CONDUCTING INVENTORY FOR GW MONITORING TEAM

1000 KEVIN BACK AT CONVEX

1015 CALIBRATING SONDES AND ITE HAVE PROBLEM WITH GOING UNFREEZING THEN TROUBLESHOOTING ISSUES WITH PH CALIBRATION (NOT STABILIZING, NOT ALLOWING ACCEPTANCE OF THE CALIBRATION POINT)

Location SLC UTA Date 12/21/2-

Project / Client 700 S 1600 E ICE PLUME

1300 MOBILIZE TO MW-30RA

1315 TAKING DOWN TO WATER AND TOTAL DEPTH MEASUREMENTS. TOC IS AT -3M FROM THE MONUMENT

1330 DEPLOYED SOLINST PUMP. ADDED EXCESS OF 75 FT OF TUBING. LIFTED PUMP 5 FT FROM THE BOTTOM OF THE WELL

1345 STARTED DEVELOPMENT

1405 WATER PRESENT

1410 WATER FLOW TO DRIVING AIR IN THE DISCHARGE TUBE. TURNED OFF CONTROLLER, PULLED OUT THE PUMP, NO COOLING. PLACED THE PUMP INTO THE WELL AGAIN. TRIED BUILDING UP WATER COLUMN MORE SLOWLY A FEW TIMES.

1730 DEVELOPED 12 GALLONS. TURBIDITY <50. WATER LEVEL IMPROVED (DIRECTLY OF WELL DEVELOPMENT. SETTINGS USED DURING:

125 PSI

.5 Seconds DISCHARGE

4.5 Seconds RECHARGE (MAXIMUM ALLOWED)

1.5 GHS CYLINDERS USED

FLOWRATE 3GPM FLUCTUATING

USED APOA FOR pH MEASUREMENTS

3 POINT CALIBRATED, SEE THE GHS

1830 TEAM OFFSITE. GETTING SUPPLIES AND CHARGING OF EQUIPMENT

Rite in the Rain

Location SLC VA Date 12/2/20

Project / Client 7005 1600 C PCE REMK

WEATHER	SUNNY, HIGH 41°F, LOW 19°F
TASK	GW WELL DEVELOPMENT
PPE	LEVEL D
PERSONNEL	T. VRTAR (CDM SMITH, AUTHOR), KEVIN MURPHY (WASATCH ENVIRONMENTAL
0700	FIELD TEAM ONSITE
0705	FIELD TEAM TO STAGING AREA TO JOIN DRILLING TEAM IN HES MEETING
0715	FIELD TEAM BACK TO CONNEX TO CALIBRATE EQUIPMENT. ELECTRICITY OUT AGAIN. PH MEASUREMENTS ON YSI NOT WITHIN RANGE, CALIBRATED APERA PH MEASURING TOOL TO USE IN SYNC WITH YSI IF THE MEASUREMENTS ARE NOT GOOD.
0850	FIELD TEAM TO MW-30RB TOC TO MEASUREMENT IS -8.51
0935	STARTED DEVELOPMENT AT WELL MW-30RB
0951	GROUNDWATER PARAMETERS PICKUP FROM FLOWTHRU (3.5 mL/min)
1200	BOTH GAS CYLINDERS EMPTY. PAUSED DEVELOPMENT TO GET NEW GAS CYLINDERS
1230	RESUMING WITH NEW GAS CYLINDERS AT REDUCED PRESSURE FLOWRATE NOW IS 450 mL/min
1315	KEVIN TO CONNEX TO GET DEDICATED PUMP FOR MW-30RA AND GET BAGGING DONE
1345	FEDEX RUN FOR DRILLING TEAM (TEA SHIPPED THE SAMPLES)
1430	WATER QUALITY PARAMETERS STABLE, PURGE VOLUME 37 GALLONS

Location SLC VA Date 12/2/12

Project - Client TOC S/GOOC ICE RUNS

TIME OF PURGING WAS 4 hrs. CONTROLLER PARAMETERS ARE 20 DISCHARGE, 20 RECHARGE, 150 PSI, FLOW RATE ~~#4~~ 5 RIG #4 150 mL/min. USED AFCRA FOR PSI MEASUREMENTS.

1445 DELIVERED DEDICATED PUMP TO MW-30RA

1500 ~~Delivered~~ DECONTAMINATED GEOTECH RECLAIMER PUMP, PICKED EVERYTHING TO GO BACK TO CAMP

1600 ORDERED GAS CYLINDER ~~REPLACED~~ TV 12/2 RESUPPLY AND PICK UP OF EMPTY GAS CYLINDERS. PARTS FOR DEDICATED PUMP DEPLOYMENT AT MW-30RB WERE GATHERED MISSING PARTS WERE IDENTIFIED TO BE PURCHASED. NO ELECTRICITY AT THE CORNER.

1700 FIELD TEAM OFFSITE. KEVIN STOPPING BY THE OFFICE TO PICK UP SUPPLIES. TEA TO HARDWARE STORE TO PICK UP MISSING DEDICATED PUMP PART.

Tim Mk
12/4/12

Location SLC VA Date 12/3/20

Project / Client 700 S 160 E PCE PLUME

WEATHER:	SUNNY, LOW 19°F, HIGH 40°F
TASK:	GW WELL DEVELOPMENT
PPE:	LEVEL D
PERSONNEL:	T. VRTAR (CON SMITH, AUTHOR)
	KEVIN MURPHY (WASATCH ENVIRONMENTAL)
0700	FIELD TEAM ONSITE
0710	FIELD TEAM TO STAGING AREA FOR HEALTH AND SAFETY MEETING WITH DRILLING TEAM
0725	FIELD TEAM TO CONNEX TO CALIBRATE EQUIPMENT. ISSUES WITH EVERYTHING FREEZING. NO ELECTRICITY AT CONNEX.
0900	~~AT~~ DTW THIS TEAM IS AT MW-36. TD = 52.05' DTW = [illegible]
0930	TEAM STARTED BAILING MW-36. BAILED ~25 gallons
1200	DEPLOYED SOLINST PUMP @ 51ft IN MW, 48ft SCH. PUMP TO DEPTH
1240	WATER FLOWING AT 400 mL/min, 3 PUMPS HOSE TO DISCHARGE, 2 DISCHARGE AT 50 PSI. SIDENOTE: THERE IS 2.5 GALLONS OF WATER FROM THE TUBING PREVIOUSLY DEPLOYED AT MW-36. DTW AT THE MOMENT IS 44.53 ftBTOC
1300	STARTED TAKING WATER QUALITY PARAMETERS
1350	PURGING STOPPED AT 21 GALLONS. WATER QUALITY PARAMETERS STABLE, TURBIDITY IS 0. TOTAL VOLUME BAILED AND PURGED MOW IS 46 GALLONS. ALL DETAILS ARE ON THE WELL DEVELOPMENT LOG. SETTINGS ARE THE SAME AS ONES RECORDED AT 1240, FLOWRATE STILL 400 mL/min.

Location SLC V

Project / Client 70

1400 BACK TO
FROM THE
WITH C+C
FROM CONN
THE BACK
IDW AREA
BEEN
OFF AND
FIELD
ON BA
AGAIN,
HE WILL
1500 ASSEMBLE
DEMOB
K. LESLIE
FITTIN
FITTING
1530 FIELD
DEDICA
1645 DEDICA
AT
OF C
CASING
LOGS
170

1400 BACK TO CONNER TO TRANSFER PURGED WATER FROM THE DRUM. ATTEMPTED TO RESOLVE ISSUE WITH LACK OF ELECTRICITY BY REQUESTING HELP FROM LARRY (OFFICE NEAR THE GATES). HE CHECKED THE BREAKERS IN THE SHOP ACROSS FROM THE IDW AREA AND SAID BREAKERS HAVE NOT BEEN TRIPPED. HE TRIED TURNING THEM OFF AND ON AGAIN, NO ELECTRICITY AT CONNER. FIELD TEAM ATTEMPTED FLIPPING SWITCHES ON BREAKERS BEHIND CONNER OFF AND ON AGAIN, NO LUCK. REACHED OUT TO NEIL, HE WILL CONTACT SHANNON TO RESOLVE THE ISSUE.

1500 ASSEMBLED NECESSARY EQUIPMENT FOR DEPLOYMENT OF PUMP AT MW-30RB. K. LESLIE CONFIRMED TO USE SWAGELOK FITTINGS ON MW-30RS AND BARB FITTINGS ON MW-36/37/38.

1530 FIELD TEAM TO MW-30RS TO DEPLOY DEDICATED PUMP.

1645 DEDICATED PUMP DEPLOYED AT MW-30RS AT THE DEPTH OF 28S FEET BELOW TOP OF CASING. SOUNST CAP COULDN'T BE ADDED AS CASING FOR MW-30RA IS TOO CLOSE TO MW-30RB. LOCKS WERE ADDED TO MW-36 AND MW-30RA.

1700 FIELD TEAM OFFSITE.

Rite in the Rain.

Location SLC VA Date 12/9/20

Project / Client 700 S 1600 E PCE ACUTE

WEATHER: SUNNY, LOW 21°F, [illegible]

TASK: GW WELL DEVELOPMENT

PPE: LEVEL D

PERSONNEL: TEA VETLAB (COLT SMITH, AUTHOR)
KEVIN MURRAY (WASATCH ENVIRONMENTAL)

0700 EQUIPMENT CALIBRATED AT HOTEL TO AVOID FREEZING ISSUES.

0810 FIELD TEAM MEETING GW DRILLING TEAM ONSITE FOR HEALTH AND SAFETY MEETING. HELD TEAM HUDDLE

0825 FIELD TEAM TO CONTINUE TO LOAD UP EQUIPMENT FOR DRILLING ACTIVITIES

0845 FIELD TEAM TO MW-38S AND MW-38D. MEASURED WATER LEVEL AND DTW AS WELL AS DISTANCE FROM TOP OF CASING TO THE MONUMENT

WELL:	DTW	TD	TOC TO MONUMENT	LOCATION
MW-38S	35 ft 9.77	36.68	0.98 ft	W
MW-38D	18.66	70.34	0.83 ft	E

0930 BAILED 10 GALLONS FROM MW-38S.

1000 CONNECTED DECHED SAMSI PUMP AT 32 FT BTOC

1015 WATER APPEARS AT 450 mL/min RATE, SETTINGS USED ARE 10 SECONDS 5 DISCHARGE 35 Hz

1130 STARTED BAILING MW-38D

1200 OUT OF GAS, AIRGAS HASN'T DELIVERED THEIR GAS CYLINDERS. KEVIN TO AIRGAS TO PICK UP ADDITIONAL

Location SLC VA Date 12/4/20

Project / Client 703 S 1600 E PCE PLANT

COLT FACILITY #5

ARE RUNNING AT OF DAYLIGHT, WILL PAUSE FOR TODAY AND CONTINUE TOMORROW, 12 ISTS TO TOTAL VAULT PUMPED TODAY IS 40 GALLONS WITH BAILING, WE REMOVED 58 GALLONS CONTINUE TOMORROW WITH SETTINGS FROM ISTS NEXT VISIT

1730 FIELD TEAM TO CONNEX

BOS FIELD TEAM OFFSITE TEAM TO STORE TO GRAB FIELD SUPPLIES.

WEATHER: SUNNY, LOW 24°F, HIGH 41°F
TASK: GW WELL DEVELOPMENT
PPE: LEVEL D
PERSONNEL: TEA VARIAN, JOE MILLER (GW SPECIALIST), KEVIN MURPHY (MASTTEC)
0700 EQUIPMENT CALIBRATED AT THE HOTEL
0800 FIELD TEAM ONSITE
0815 HEALTH AND SAFETY MEETING.
0845 TEA AND KEV TO MW-35D, JOE TO MW-37S
0915 AIRLIFT HAS WATER, PUMP RETRIEVED FROM MW-35D AND REDEPLOYED AGAIN (FIRST TIME DEPLOYED AT 0900).
1000 WELLER WITH WITNESSPIC TO MW TO ~~MINIMIZE~~ MAXIMIZE FLOW RATE. SET UP TO GO RECHARGE 2, DISCHARGE, 105 PSI BEFORE BLOWTHROUGH SECURED AT 110 PSI DECIDED TO CUT THE 3/8" TUBE INTO 2ND AND 10 FT INTERVAL. CONTINUE TO USE 10 FT SETTING AT MW-35D. FINAL SETTINGS WE HAVE SETTLED AT ARE 20 RECHARGE, 10 DISCHARGE, 5 PSI FLOWRATE IS 1300 mL/min.
1155 TURBIDITY SUBSTANTIALLY DECREASED. STARTED TO TAKE READINGS RECORDED IN WELL DEVELOPMENT LOG.
1230 JOE COMPLETED PUMPING AT MW-37S (16 GALLONS) AND MW-37D (20 GALLONS) AND JOINS KEVIN AND

COUNTING SUPPLIES

Rite in the Rain

Location SLC VA Date 12/5/12

Project / Client 700 S 1600 E PCE PLUME

CONT. FROM PAGE 117

TEA AT MW-38D. IDE COLLECTED FOLLOWING ~~RECHARGE~~ TO 1405 MEASUREMENTS FOR MW-37S, D

WELL ID	DTW (ft BTOC)	TD (ft BTOC)	TOC TO WATER MEASUREMENT (ft)
MW-37S	18.32	33.55	0.35
MW-37D	42.3	69.29	0.55

1325 WATER QUALITY PARAMETERS AT MW-38D MET, ~~PCE~~ TO 1405 TOTAL VOLUME PURGED DURING DEVELOPMENT IS 116 GALLONS. DEVELOPMENT COMPLETED.

1345 TEAM TO MW-37S

1405 DEVELOPMENT OF MW-37S STARTED PUMP DEPLOYED AT 28.55 ft BTOC. SETTINGS AT THE CONTROLLER ARE 10s RECHARGE, 5s DISCHARGE, 30 PSI. FLOWRATE IS 1400 mL/min.

1410 KEVIN TO WASATCH ENVIRONMENTAL OFFICE TO PICK UP SUPPLIES.

1515 TEA AND KEVIN TO MW-36 TO DEPLOY THE DEDICATED PUMP.

1630 DEDICATED PUMP DEPLOYED AT 49.5 FT BTOC AT MW-36. TEA AND KEVIN BACK TO MW-37S

1645 WATER QUALITY PARAMETERS MET AT MW-37S. TOTAL VOLUME PURGED IS 48 GALLONS.

1730 TEAM TO CONNEX. UNLOADING RECEIVED BOXES.

1805 FIELD TEAM OFFSITE. TEA TO ACE TO GET SUPPLIES FOR DEPLOYING THE REST OF THE DEDICATED PUMPS.

WEATHER SUNNY, LOW 23°F, HIGH 46 F
RISK GW WELL DEVELOPMENT
PPE LEVEL D
PERSONNEL: TEA VATLAR AND JOE MILLER (CGM SMITH)
VAN EQUIPMENT CALIBRATED AT THE HOTEL
0805 FIELD TEAM ONSITE. JM ARRIVED AT 0745
0815 HEALTH AND SAFETY MEETING
0820 PLACING CYLINDERS STRAPS TO TRUCKS. LOADING EQUIPMENT.
0845 PLACING CONES FOR GW MONITORING EVENT ARMS
0900 FIELD TEAM AT MW-370. DTW = 42.25FT BTOC. TD = 63.84FT BTOC. DEPLOYED AT 63.84' BTOC. CONTROLLER SETTINGS AT 20% RECHARGE. 10S DISCHARGE, 40 psi. FLOWRATE APPROXIMATELY 900 mL/min
1040 JOE TO MW-13L TO BAIL IT. WILL COLLECT DTW FOR MW-13S AND 13D PRIOR TO COLLECTING DTW, TD AND TOC TO FT BTS MEASUREMENTS.
1320 JOE RETURNS TO MW-370 HE BAILED APPROXIMATELY 8 GALLONS FROM MW-13L AND TOOK THE FOLLOWING WATER LEVEL MEASUREMENTS PRIOR TO BAILING AND DISTURBING THE SYSTEM.

WELL ID	DTW	UNITS
MW-13S	14.16	FT BTOC
MW-13D	13.56	FT BTOC
MW-13L	22.09	FT BTOC

Cont'd on page 120

Location SLC VA Date

Project / Client 7005 1600 E PCE PLUME

cont from pg 117

J. MILLER ALSO HAS A FIELD NOTEBOOK WHERE ALL MEASUREMENTS ARE RECORDED. DISTANCE FROM TOC TO TOP OF MONITOR IS 0.5'

1330 STARTED RECORDING WATER QUALITY PARAMETERS AFTER THE TURBIDITY HAS DECREASED

1425 WELL ~~APPEARS~~ TO BE WQ PARAMETERS ARE STABLE AFTER AN HOUR OF TAKING MEASUREMENTS. WELL DEVELOPMENT IS COMPLETE AFTER APPROXIMATELY 48 GALLONS OF GROUNDWATER GOT PURGED. SETTINGS AND FLOWRATE WERE THE SAME AS INPUT RECORDED AT 0900

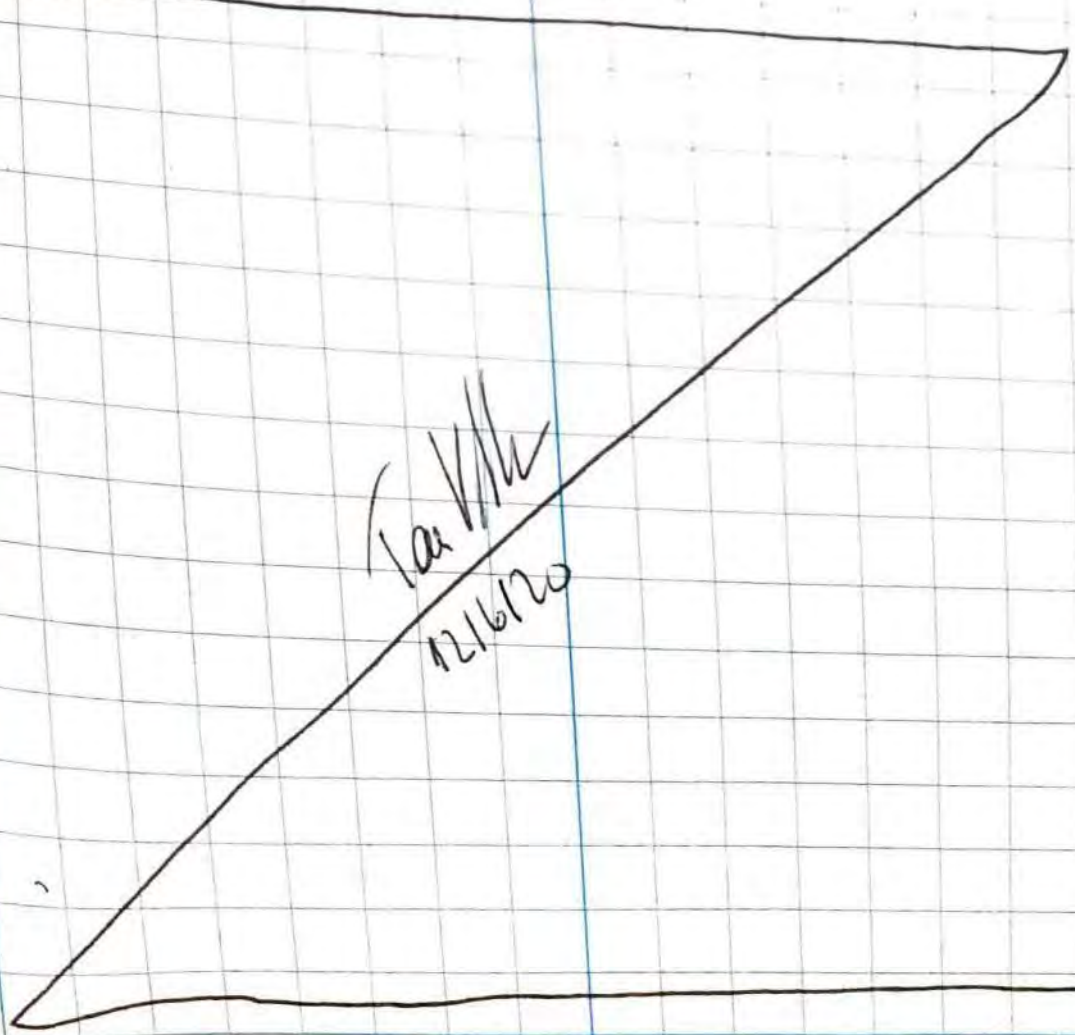
1445 FIELD TEAM TO MW-13L. AFTER BACKING 8 FT TO MEASURED BY WATER LEVEL METER IS 150 WE KNOW THAT THE WELL SHOULD BE AT -160 FT BTOC TO SO PUMP WAS DEPLOYED AT THE BOTTOM AND LIFTED 1 FT. MEASURED PUMP TOC DEPTH WAS 148.7 FT BTOC, INDICATING THAT PURGING STARTED AT 151.2 FT BTOC. NOTE IS THAT WELL DEVELOPMENT WILL ALLOW FOR FURTHER LOWERING OF THE PUMP, UP TO DESIRED DEPTH OF 154 FT. ONCE DEVELOPMENT AT THAT DEPTH IS MET, THE DEDICATED PUMP WOULD BE DEPLOYED AT ~ 155 FT

1530 GROUNDWATER APPEARS. CONTROLLER SETTINGS ARE 11s RECHARGE, 9s DISCHARGE, 85 PSI. FLOWRATE IS 1500 mL/min.

1630 STOPPED DEVELOPMENT DUE TO LACK OF SUNLIGHT. PURGED A TOTAL OF 17 GALLONS. MEASURED TOTAL DEPTH, WHICH IS NOW ~~AT~~ 152 FT BTOC. PUMP APPEARS TO BE WORKING MORE EFFICIENTLY THAN BAILING. DEVELOPMENT WILL BE CONTINUED FIRST THING TOMORROW MORNING.

1645 FIELD TEAM TO CONNEX

1740 FIELD TEAM OFFSITE



Location SLC UT Date 12/7/20

Project / Client 7005 1620 E PCE PLUME

WEATHER: SUNNY, LOW 21°F, HIGH 43°F

TASK: GW WELL DEVELOPMENT

PPE: LEVEL D

PERSONNEL: TEA (CON SMITH, AUTHOR)
KEVIN MURPHY (WASATCH ENVIRONMENTAL)
JOE MILLER, EMMA PUTT (CON SMITH)

0630 EQUIPMENT CALIBRATED AT THE HOTEL

0730 TEA AND JOE ONSITE LOADING EQUIPMENT

0800 MEETING GW SAMPLING TEAM AT OFFICE

0815 HEALTH AND SAFETY MEETING WITH GW SAMPLING TEAM.

0840 TEA, JOE AND KEVIN @ MW-13L CONNECTED UP LINES FROM BOTH TUBINGS FROM TO DEPTH OF PUMP AT 151.7 FT BTOC. JOE ALSO TOOK MEASUREMENTS AND LOGGED THEM IN HIS FIELD NOTEBOOK. DECIDED A PUMP RATE OF BETWEEN 400-500 ML/MIN. SINCE THEY'RE NEW. TRIED SUCKING, VORTEXING SURFACE PARTS OF TUBING. CONTROLLER DON'T RELEASE AIR. KEVIN HAD TO CONNECT TO GET A DIFFERENT CONTROLLER. TUBING AND EXISTING CONTROLLER POWER WENT DOWN TO HEAT UP USING AIR.

1020 KEVIN AND TEA TO PICK UP GAS CYLINDERS (5) FROM AIRGAS.

1100 BACK TO MW-13L. CONTROLLER RELEASING PRESSURE WITH DELAY. TRIED GW MONITORING TEAM'S CONTROLLER. GOT ~300 ML/MIN FLOW.

Location SLC VA Date 12/2/20

Project / Client 7905 1600 E PCE PLUME

1215 KEVIN AND TEA DEPLOYING PUMPS AT MW-37
TOOK DTW MEASUREMENTS: MW-385 AT 19.59 FT BTOC,
0.93' FROM TOC TO TOP OF MONUMENT.
MW-380 18.53 FT BTOC, 0.82' TOC TO TOP OF
MONUMENT.
TD AT MW-385 IS 36.49' BTOC. DEDICATED
PUMP DEPLOYED AT 32 FT BTOC AT MW-385.

1300 TD AT MW-380 IS 70.3' BTOC. DEPLOYED
DEDICATED PUMP AT 65 FEET BTOC

1330 KEVIN AND TEA TO CONNEX, WHILE SKIMMING
DTW MEASUREMENTS AT MW-13C, OBTAINING
WATERRA PUMP AND TUBING FROM CONNEX,
GETTING SKINNY WATER LEVEL METER FROM GW
SAMPLING TEAM

1420 TEA, ENNA AND KEVIN TO MW-34 TO USE
WATERRA PUMP ON MW-34A TAKE DTW MEASU-
REMENTS: MW-34A 130.75 FT BTOC, 0.53' BTW
TO MONUMENT AND MW-34B IS 130.60 FT BTOC *

1504 STARTED PUMPING WITH WATERRA PUMP

* WATER LEVEL AT MW-34C IS 129.87 FT BTOC.
WATER LEVEL AT MW-34D IS 130.0 FT BTOC

1521 WATER EMERGES, USING THE SPEED OF THE PUMP NO WATER
ON THE OTHER END. CUT 200 FT OF 500 FT
TUBING

Rite in the Rain

124 Location SLC UT Date 12/7/20

Project / Client 7003 1600 E PCE PLUME

1545 650 mL/min OF WATER PURGE RATE AT MW-36A. EMMA LEFT 36A TO HELP JOE AT MW-13L CONNECTED PUMP TO TEA'S TRUCK. FLOWRATE 800 mL/MIN

1630 STARTED TAKING WATER QUALITY MEASUREMENTS. TURBIDITY STILL TOO HIGH TO READ, WATER LEVEL METER CANNOT BE DEPLOYED ALONGSIDE WATERRA TUBING.

1645 STOPPED PURGING DUE TO SUNSET AND LACK OF SUNLIGHT. PURGED TOTAL OF 15 gallons. DEVELOPMENT WILL CONTINUE IN THE MORNING

1700 KEVIN AND TEA TO CONNER. JOE HAS APPROVED THE DEVELOPMENT AND KEPT TRACK OF ALL THE CHALLENGES ENCOUNTERED TODAY IN HIS FIELD NOTEBOOK. HE WILL CONTINUE DEVELOPMENT AT MW-13L IN THE MORNING. HE ALSO JOE WITH COLLECTION OF IDW SAMPLES.

1835 FIELD TEAM OFFSITE.

12/7/20

WEATHER: SUNNY, LOW 23°F, HIGH 44°F
TASK: GW WELL DEVELOPMENT
PPE: LEVEL D
PERSONNEL: TEA VIETMAN (CON SMITH, AUTHOR)
KEVIN MURPHY (LANDFATCH ENVIRONMENTAL)
JOE MILLER (CON SMITH)

0700 EQUIPMENT CALIBRATED AT THE MOTEL
0800 FIELD TEAM ONSITE
0815 HEALTH AND SAFETY MEETING WITH GW SAMPLING TEAM.
0845 TEAM TO MW-34A. MW-13L DEVELOPMENT NO LONGER A PRIORITY SO JOE JOINED THE GW SAMPLING TEAM. ~~TD = 130.95 FT BTOC~~ DTW = 13.45, TD = 152.64 FT BTOC. TOC NOTCH OF MEASUREMENT IS 0.55 FT
0920 STARTED WELL DEVELOPMENT, PURGE RATE IS 450 mL/min
1000 NO WATER LEVEL DROPPING. GUESSING IT IS DUE TO DRAWING OUT THE WELL. GETTING THE WELL DISCHARGE FOR 10 MINUTES. NOT WORKING. TRIED PULLING OUT THE TUBING. THERE WERE CRAZY ISSUES WITH CHECK VALVE. CLEANED OUT CHECK VALVE AND TUBING. GOT 600 mL/min, THEN NO FLOW. TRIED STARTING AND GETTING RECHARGE, NO LUCK. TRIED POWERING FROM GENERATOR INSTEAD OF INVERTER

cont'd on page 126

Location SLC VA Date 12/8/20

Project / Client 720 S 162 E PW: PLUME

cont from pg 125

DIDN'T WORK. TRIED RESETTING DTW AGAIN IT'S 130.45 FT BTOC SO NOT A DRAWDOWN ISSUE. TRIED SLOWLY PURGING FOR EXTENDED PERIOD, CHECK VALVE IS 1 FT ABOVE TD. NO FLOW. GOT FLOW WHEN WE CLIPPED OF CHECK VALVE 2 FT ABOVE THE BOTTOM OF THE WELL. NOTICED THAT TUBING IS MOVING. ROPED A VICE GRIP ON TOP OF THE PUMP TO HELP WITH HOLDING TUBING. WORKS FOR NOW

1250 STARTED TAKING WATER QUALITY READINGS TURBIDITY > 7000 NTU FLOW IS ~1000 mL/min

1315 STARTED USING MW2 READINGS UPPED THE FLOW TO MAX ~ 2400 mL/min. WAITING FOR TURBIDITY TO DROP.

1400 SIGNIFICANT DECREASE IN TURBIDITY OBSERVED REDUCED FLOWRATE TO 800 mL/min, TAKING WATER QUALITY MEASUREMENTS AGAIN

1545 TURBIDITY DROPPED BELOW 100 NTU, OK TO STOP. PURGED A TOTAL OF .885 GALLONS (STOPPED AT 1541) FLOWRATE AT THE END WAS 1100 mL/min

1600 TEAM TO MW-26B.

1630 SETUP AT MW-26B. DTW AT MW-26B IS 195.28 FT BTOC, TD IS ~~245.8 FT~~ 246.32 BTOC (MW 12/8/20) TOC TO TOP OF MONUMENT IS 0.6 FT. DECIDED TO SET PUMP AT APPROXIMATELY 245 FT BTOC.

Location SLC VA Date 12/18/20

Project / Client 700 S 600 E PCE PLUME

1640 STARTED DEVELOPMENT OF MW-20B. PUMP ORIENTED FOR 15 MIN; NO WATER WAS PURGED. PULLED THE TUBING OUT, ABOUT 20 FT OF WATER WITH HIGH TURBIDITY WAS IN THE TUBING. STOPPING DEVELOPMENT FOR THE DAY, KEVIN WILL CONTINUE TOMORROW.

1700 BACK TO CONNEX TO UNLOAD THE TRUCK. ELECTRICITY DISAPPEARED AGAIN. USED GENERATOR FOR REMOVING WATER FROM THE BARRELS.

1805 TEAM OFFSITE. TEX AND JOE LEAVING TOMORROW.

Tom Vik 12/18/20

Rite in the Rain

Location SLC VA Plume Date 1/18/21

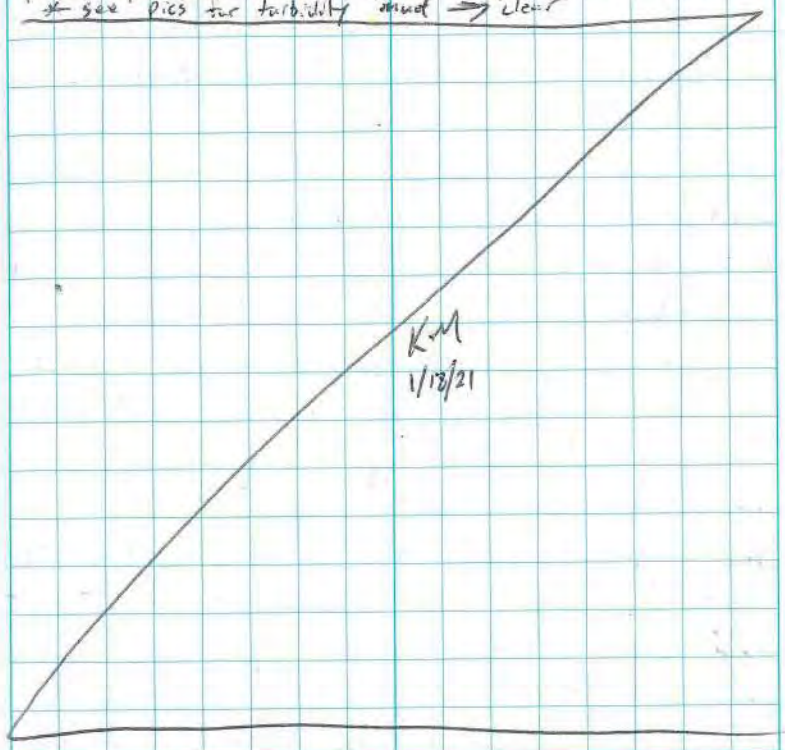
Project / Client

Weather: 30s, some clouds
PPE: modified level 1
Personel onsite: Kevin Murphy (Wasatch)
Planned activities: Well development (~~MW-34C~~) MW-28D
* pickup N tanks prior to arriving @ IDW yard, load equipment & drums, drive to MW-34, one gate open but school is closed for holiday, do not want to risk getting locked in, drive to MW-28D instead
1000 arrive @ MW-28D, deploy ½" airline & airlift setup, air line set 20' above refusal due to not being able to confirm if I'm hitting TD or receiver, IDTW = 217.99' ~~TOC~~, ITD = 353.40' TOC
1032 - begin pressure ramp to 70psi
1048 - Tank 1 empty (N 125), 9.35gal purged
1056 - begin pressure ramp to 70psi
1112 - Tank 2 empty (N 125), 18.7gal purged (total)
1118 - begin pressure ramp to 70psi
1130 - Tank 3 empty (N 125), 28.9gal purged (total)
1134 - begin pressure ramp to 70psi
1149 - Tank 4 empty (N 125), 38.25gal purged (total)
* pull tubing, DTW = 218.36', TD = 358.23'
head to Airgas to swap tanks, 1320 back on site with 5 of N 200s
1335 - Begin pressure ramp to 70psi
1356 - Tank 5 empty (N 200), 50gal purged (total)

Location SLC VA Plume Date 1/18/21

Project / Client

1402 - begin pressure ramp to 70 psi
1421 - Tank 6 empty (N 200), 61.05gal purged (total)
1424 - begin pressure ramp to 70psi
1450 - Tank 7 empty (N 200), 78.43gal purged (total)
1453 - begin pressure ramp to 70psi
1517 - Tank 8 empty (N 200), 94.2gal purged (total)
1520 - pull tubing, DTW = 217.56', TD = 358.28',
pack up, unload @ IDW yard, dump water, leave site
* see pics for turbidity mud → clear



Rite in the Rain

Location SLC VA Plume Date 1/19/21

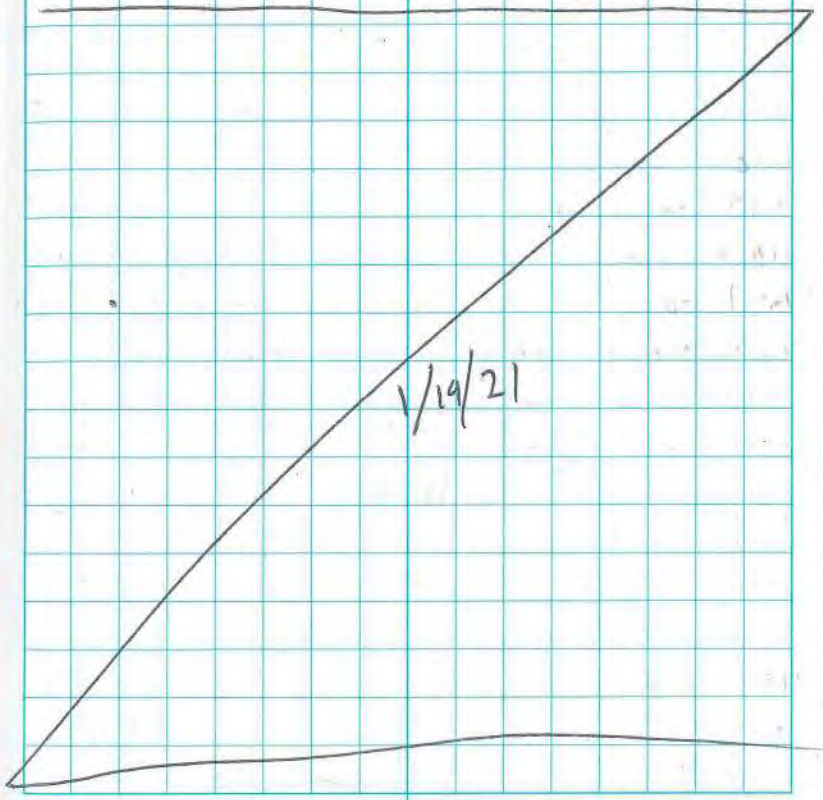
Project / Client

Weather: 40s, clear skies
PPE: modified level 1
Personal onsite: Kevin Murphy (Wasatch)
Planned activities: Well development @ MW-34
* pickup Nitrogen tanks prior to arriving @ IDW yard, load up equipment & drums, drove to MW-34
0930- on site @ MW-34
0940- remove MW-34C ZIST & transducer, measure TD, DTW
MW-34C IDTW = 130.02' ITD = 262.56'
deploy air lift setup, air line set 10' above screen
1012- begin pressure ramp to 50 psi
1033- well developed, initial turbidity was mud cleaned up to clear, 1/2 tank (N 200) used, purged 20 gal total, DTW = 130.20', final TD = 263.05'
1047- Wyatt (VA) on site, discussed development of MW-34C and MW-26D, prep to develop MW-34B
* start removing ZIST & transducer from MW-34B, ZIST gets stuck in well after removing ~10 ft, was able to remove ZIST after 15 min of slight pulling, MW-34B IDTW = 130.90' FTD = 186.92', set air line 10' above screen
1225 check TD = 188.80'
1338- 22.1 gal purged w/ 3.5 tanks, water still turbid, head to Airgas to swap tanks
1500- back on site, continue purging

Location SLC VA Plume Date 1/19/21

Project / Client

1540- redeploy MW-34C ZIST, inspected filter and cleaned water line prior to redeployment
1630- quit purging MW-34B for the day, 30.6 gal (total) removed, very slight improvement in turbidity, five tanks (N 200s) used measured TD @ end of day = 188.80', pack up, unload @ IDW yard, dump water, leave site



Rite in the Rain

Location SLC VA Plume Date 1/20/21

Project / Client

Weather: high 30s, slightly cloudy
PPE: modified level 1
Personnel onsite: Kevin Murphy (Wasatch)
Planned activities: Well Development (MW-26C)
* load up equipment, drums, & tanks, drive to MW-26C
measure IOTW= 218.06', ITD = 320.05', deploy
air lift setup to 20' above screen
1000 - begin pressure ramp to 50psi
1030 - Tank 1 empty (N 200), 15.3 gal purged
1035 - begin pressure ramp to 50psi
1108 - Tank 2 empty (N 200), 29.75 gal purged (total)
1110 - begin pressure ramp to 50psi
1150 - Tank 3 empty (N 200), 46.75 gal purged (total)
* head to Arroyos, swap N tanks
1330 - begin pressure ramp to 50psi
1400 - Tank 4 empty (N 200), 62.9 gal purged (total)
1405 - begin pressure ramp to 50psi
1445 - Tank 5 empty (N 200), 82.5 gal purged (total)
1450 - begin pressure ramp to 50psi
1540 - Tank 6 empty (N 200), 105 gal purged (total)
* walk to IDW yard, carry over 3rd 55 gal drum
1550 - begin pressure ramp to 50psi
1630 - Tank 7 empty (N 200), 123 gal purged (total),
water cleared from mud to slightly cloudy, Final
OTW = 217.56', Final TD = 327.57', pack up, unload truck, dump water, leave site

Location SLC VA Plume Date 1/21/21

Project / Client

Weather: high 30s, overcast
PPE: modified level 1
Personnel onsite: Kevin Murphy (Wasatch), Tony (Redox), Jack (Redox)
Planned Activities: Surveying, Well Development
* load up equipment & drums, meet Redox @ 9am
survey MW-30R (MW-30RA & MW-30RB),
MW-13L, MW-36, MW-37 (MW-37S & MW-37D),
and MW-38 (MW-38S & MW-38D), survey
complete ~1030, head to Arroyos
1130 - back onsite w/ Redox ~ 300s
MW-34B IOTW = 130.30, ITD = 188.80
set airline 20' off bottom
1210 - begin pressure ramp to 30psi
1300 - Tank 1 (N 300) empty, 16.15 gal purged (total)
1305 - begin pressure ramp to 30psi
1405 - Tank 2 empty (N 300), 39.1 gal purged (total)
1407 - begin pressure ramp to 30psi
1510 - Tank 3 empty (N 300), 68 gal purged (total)
1515 - begin pressure ramp to 30psi
1622 - Tank 4 empty (N 300), 94.35 gal purged (total)
Final measured TD = 188.80, pack up truck,
redeploy MW-34B 2IST & Transducer, pump & Tank,
stuck ~10 above screen, try to redeploy
just pump & pump makes it down w/o
* water cleaned up from turbid to cloudy

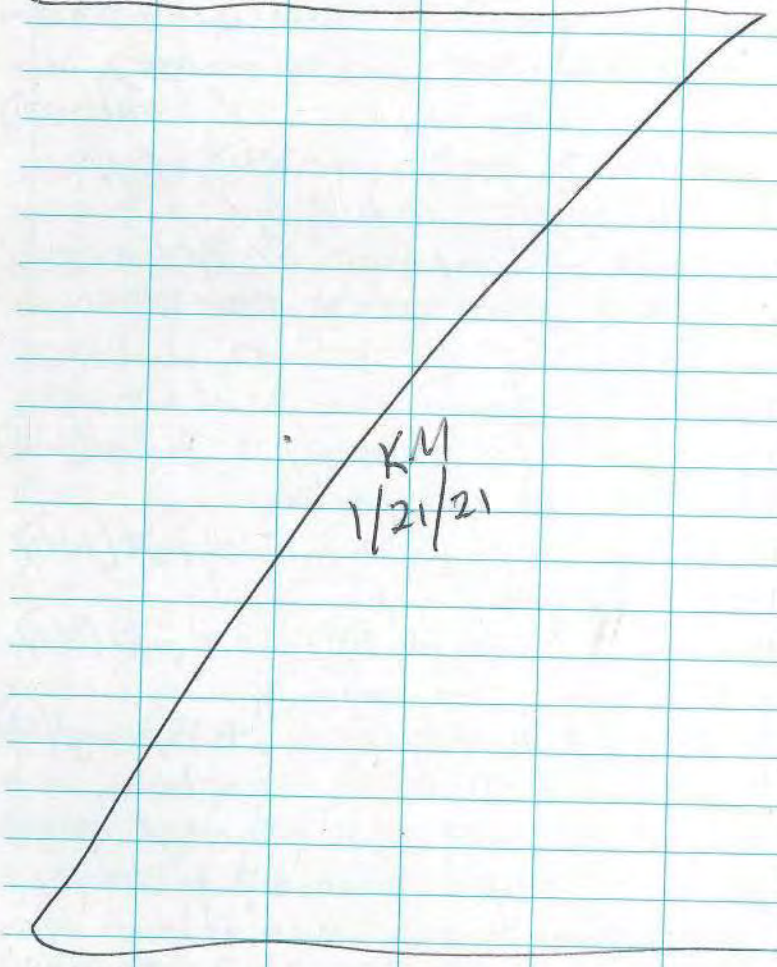
Rite in the Rain

28

Location SLC VA Plume Date 1/21/21

Project / Client

getting stuck, put MW-34B transducer in cover, dump water, will put away equipment & clean yard, return tanks tomorrow, leave site



Location

Project / Client

Location SLC VA Plume Date 12/9/20

Project / Client

Weather: 30s, overcast

PPE: modified level 1

Personel onsite: Kevin Murphy (Wasatch)

Planned activies: Well development (MW-26B)

* A.M. - build modified "barcad" setup, will attempt to use to develop MW-26B, use stinger as seal @ reciever, use ~~air~~ line from air lift setup on water return line, install ball valve on well head assembly to be able to release pressure from well

0930 - deploy barcad setup @ MW-26B, stinger on reciever @ ~235'

* experiment with PSI, remove 18 gal from 1000-1300 using 2 125 N tanks, turbidity decreased from mud to ~3000 NTU

* from 1300 to 1600 use 2 more 125 N tanks @ 130 PSI remove total of 27 gal from MW-26B cleared up from ~3000 NTU to ~900 NTU, however, water looks cleaner than 900 NTU. Pack up equipment and dump water @ ~~Kaydon~~ IDW yard

KM 12/9/20

Location SLC VA Plume Date 12/17/20

Project / Client

Weather: 30s, overcast, light snow

PPE: modified level 1

Personel onsite: Kevin Murphy (Wasatch), Connor Kelly (CDM)

Planned activities: Well Development (MW-26C & MW-26D)

0900 - setup on MW-26C, see Connors notes for additional details, grab sample details

Cycle	Trunk	PSI	Pressure Pump Start	Water @ Surface	Breakthrough	Recharge Stop	Vol (gal)	Total Vol (gal)	Turbidity
1	1	150	0922	0925	NA - stopped to fix leaks	NA - stopped to fix leaks	3	3	out of range
2	1	170	1005	1007	1025	1030	3.8	6.8	"
3	1	170	1036	1038	1055	1058	2.5	9.3	"
4	1	170	1102	1104	1124	1130	3.45	12.75	"
5	2	170	1136	1138	1156	1202	2.55	15.3	"

* stop purging, collect grab sample, switch over to MW-26D see Connors notes for additional details

Cycle	Trunk	PSI	Pressure Pump Start	Water @ Surface	Breakthrough	Recharge Stop	Vol (gal)	Total Vol (gal)	Turbidity
1	2	170	1227	1230	1253	1300	4.25	4.25	out of range
2	2	170	1312	1314	1334	1340	4	8.25	"
3	3	170	1435	NA* see notes					

* during 3rd cycle become concerned w/ amount of sand settling out of purge water and the potential for packing sand around stinger, also experience issues w/ regulator freezing, pull tubing, ~~dump~~ dump water @ IDW yard

KM

Rite in the Rain

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 11/11/2020	**Prepared by:** Whitney Treadway

Personnel on site, including Contractors:	CDM Smith – Whitney Treadway CDM Smith – Emma Rott Holt Services – Jeff Jones (Driller) Holt Services – Andrew Mengle Holt Services – Alex Langdon Wasatch Env. – Anna Fiorni Wasatch Env. – Kiel Keller Badger – Trevor Kindschy
Visitors/Others:	

Weather	Sunny	Partly Cloudy	Overcast	Rain	**Snow**
Temperature	85+ º F	70 to 85º F	50 to 70 º F	32 to 50 º F	**To 32 º F**
Wind	**Still**	Moderate	High		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Terrasonic 150 mini-sonic drill rig • Skid Steer (Bobcat) • JCB 550-170 forklift • Rig Hauler • HNu PID • Water level meter • Compressed gas for development

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

H&S tailgate was conducted at MW-30R well site and MW-37 with Badger.

Drilling: (Whitney Treadway, Kiel Keller, and Holt crew)

MW-30R:
Add pea gravel from 8 ft bgs to 2 ft bgs
Completed 12-inch traffic-rated flush-mount well box with concrete from 2 ft bgs.
8-inch casing, core barrels, and drill pipe decontaminated on decontamination pad.

MW-36:
Cleared to 7 ft bgs by vac truck (Kiel oversaw).
Steel plate placed on top of open hole.
Soil offloaded to containment area on VA campus.

MW-37:
Cleared to 7 ft bgs by vac truck (Kiel oversaw).
Mobilized rig, Bobcat, and fencing to site.
Soil offloaded to containment area on VA campus.

MW-38:
Cleared to 5.5 ft bgs by vac truck (Kiel oversaw).
Steel plate placed on top of open hole.
Soil offloaded to containment area on VA campus.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Development: (Emma Rott and Anna Fiorni)

MW-26C:
Air lifting was used to remove sediment and water. Approximately 60 gallons total of water was removed. Decreasing turbidity values were observed.

MW-26B:
Development using air lifting was attempted, however, there was not enough water column available to produce the lift needed for water to surface. The team then attempted to develop using the ZIST pump (with the filter removed); but they were unable to produce water through this method. Lastly, the team attempted to use a stainless-steel bailer, but was unable to get the bailer past approximately 114 ft below top of casing.

MW-34A:
Attempted development using a stainless-steel bailer but was unable to get the bailer past approximately 130' below top of casing.

MW-34B, MW-34C, and MW-34D:
Transducers were installed at all three zones.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):
See issues with development above.

Second forklift was delivered onsite for Holt crew.

There were three VA vehicles blocking the entrance to the containment area onsite for the Badger pre-clearing crew. We were able to find someone who found the keys and was able move the three vehicles.

Projected Work – Near Term:

11/12/2020 – begin drilling at MW-37, begin development at MW-30RA and MW-30RB

Other Activities/Remarks:

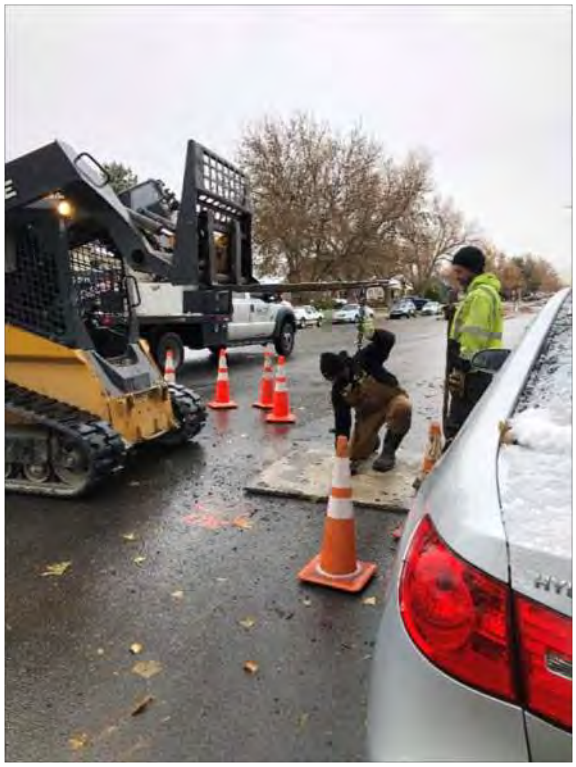
Photos:

Date: 11/11/2020

Location: MW-37

Description: Rig, bobcat, and drill rods mobilized at MW-37 with fencing.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 11/11/2020 **Location:** MW-30R/laydown area **Description:** Decontamination of sonic casing and drill rods.
	**Date: 11/11/2020** **Location:** MW-38 **Description:** Installation of steel plate at MW-38 after pre-clearing.

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Date: 11/10/2020

Location: MW-30R

Description: Installation of concrete at well box.

Date: 11/10/2020

Location: MW-34B

Description: IntelliPump attachment added on to the ZIST pump to house transducer.

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Salt Lake City, Utah

DATE: 11/30/2020	**Prepared by:** Joe Miller

Personnel on site, including Contractors:	Wasatch Environmental – Kevin Murphy Holt Services – Jeff Jones (Driller) Holt Services – Andrew Mengle Holt Services – Alex Langdon
Visitors/Others:	Ready Made Concrete

Weather	Sunny	**Partly Cloudy**	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	To 32 º F
Wind	Still	Moderate	**High**		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Terrasonic 150 mini-sonic drill rig • Skid Steer (Bobcat) • JCB 550-170 forklift • Rig Hauler • HNu PID • Water level meter

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

H&S tailgate was conducted at laydown area on VA campus.

Ready Made Concrete arrived and Holt installed the Augustyn flush mount vaults at MW-36 and MW-38 boring locations.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

Projected Work – Near Term:

12/1/2020 – Develop MW-30RB with a bailer, develop MW-30RA with a development pump, complete geophysical survey at MW-13L, and mobilize drilling equipment to MW-13L.

Other Activities/Remarks:

Photos:

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	Date: 11/30/2020 **Location:** MW-36 **Description:** Augustyn vault installed at MW-36
	Date: 11/30/2020 **Location:** MW-38 **Description:** Augustyn Vault installed at MW-38 location.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 12/1/2020	**Prepared by:** Joe Miller

Personnel on site, including Contractors:	CDM Smith – Joe Miller CDM Smith – Tea Vrtlar Wasatch Environmental – Kevin Murphy Holt Services – Jeff Jones (Driller) Holt Services – Andrew Mengle Holt Services – Alex Langdon
Visitors/Others:	MP Environmental GPRS – Geophysical survey

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	To 32 º F
Wind	**Still**	Moderate	High		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Terrasonic 150 mini-sonic drill rig • Skid Steer (Bobcat) • JCB 550-170 forklift • Rig Hauler • HNu PID (x2) • Water level meter

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

H&S tailgate was conducted at laydown area on VA campus.

Development:
The Holt crew used a bailer to develop MW-30RB. Approximately 25 gallons of water was bailed from MW-30RB.
CDM Smith and Wasatch developed MW-30RA with a Geotech double valve pump. Approximately 12 gallons was purged.

Drilling at MW-13L:
GPRS performed a geophysical locate at MW-13L. They identified a potential irrigation line south of the proposed boring area. MP Environmental relocated one of the roll-off bins from the VA to the boring location. Holt set up the drill rig, fencing and traffic control at the MW-13L drill location.

The MW-13L boring was hand augured to 5 feet bgs.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

Upon arrival at the IDW area connex there was no electricity. The breakers were checked and had not been tripped. Maintenance shop personnel were contacted, and they had flipped the breaker in the shop across from the IDW area.

Projected Work – Near Term:

12/2/2020 – Develop MW-30RB zone with Geotech double valve pump and install dedicated pumps at MW-30RA/B

12/2/2020 – Drill MW-13L

Other Activities/Remarks:

None.

Photos:

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	Date: 12/1/2020 **Location:** MW-13L **Description:** GPRS identified potential irrigation lines and estimated less than 1 foot bgs.
	Date: 12/1/2020 **Location:** MW-30RB **Description:** Silty water from bailer development at MW-30RB.

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Date: 12/1/2020

Location: MW-13L

Description: Holt hand digging MW-13L to 5 feet bgs.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 12/2/2020	**Prepared by:** Joe Miller

Personnel on site, including Contractors:	CDM Smith – Joe Miller CDM Smith – Tea Vrtlar Wasatch Environmental – Kevin Murphy Holt Services – Jeff Jones (Driller) Holt Services – Andrew Mengle Holt Services – Alex Langdon
Visitors/Others:	

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	**To 32 º F**
Wind	Still	**Moderate**	High		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Terrasonic 150 mini-sonic drill rig • Skid Steer (Bobcat) • JCB 550-170 forklift • Rig Hauler • HNu PID (x2) • Water level meter • YSI Multiparameter meter • Apera instruments pH60 pH meter • Geotech Reclaimer pump • QED Model 3020 Driver Compressor • Solinst bladder pump

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

H&S tailgate was conducted at laydown area on VA campus.

Development:
CDM Smith and Wasatch developed MW-30RB with the Geotech Reclaimer double valve pump and removed approximately 37 gallons of water. The dedicated Solinst bladder pump was deployed at MW-30RA.

Drilling at MW-13L:
The MW-13L boring was advanced to 150 feet bgs. The 6-inch sonic casing has also been advanced to the bottom of the borehole. The soil cores were screened and logged no samples were collected. Groundwater was first encountered about 23 feet bgs. A clay confining unit was encountered about 104 feet bgs. There were wet sand stringers below the confining unit, but no distinct layer. All PID readings were less than 5 ppm.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

No electricity at connex after attempting to plug in a single heater. The breakers were checked and had not been tripped. Maintenance shop personnel will be attempted to be contacted again tomorrow, they need to flip the breaker again in the shop across from the IDW area.

Projected Work – Near Term:

12/3/2020 – Develop MW-36, MW-38S and potentially MW-38D zone by bailing and pumping with Geotech Reclaimer pump.

12/3/2020 – Drill MW-13L to 160 feet. Discuss well design and begin installation at MW-13L.

Other Activities/Remarks:

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None.

Photos:

	Date: 12/2/2020 **Location:** MW-13L **Description:** Holt work zone setup at MW-13L. Preparing to resume drilling.
	Date: 12/2/2020 **Location:** MW-13L **Description:** Soil cuttings from 102.5-105 feet bgs. Encountered clay confining layer.

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Date: 12/2/2020

Location: MW-13L

Description: Soil cuttings from 135-137 feet bgs. Moist to we gravelly sand stringer at ~136 feet bgs.

Date: 12/2/2020

Location: MW-30RB

Description: Pump development discharge water prior to development (final turbidity reading after purging additional 37 gallons was <20NTU).

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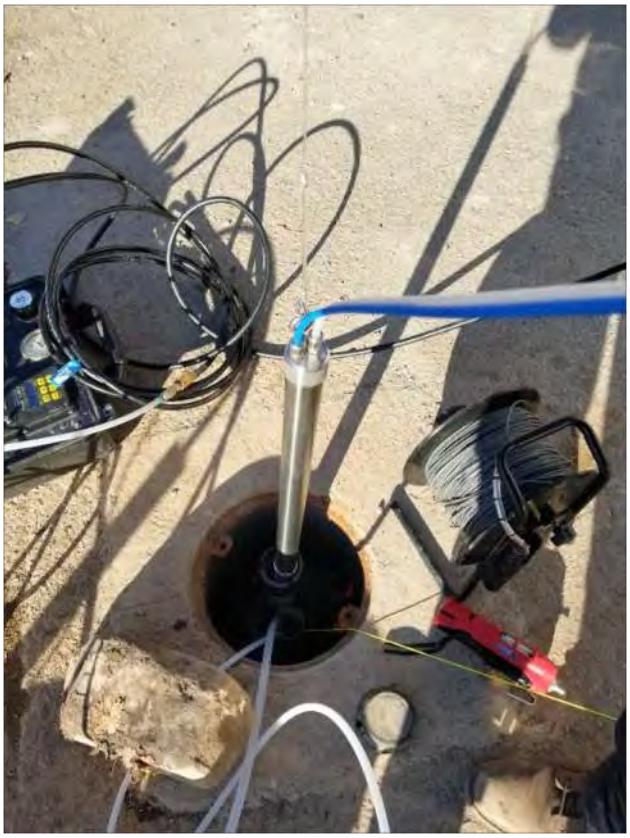	**Date: 12/2/2020** **Location:** MW-30RA **Description:** Deployment of dedicated bladder pump at MW-30RA.
	Date: 12/2/2020 **Location:** MW-30RA **Description:** Completed deployment of dedicated bladder pump at MW-30RA.

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Salt Lake City, Utah

DATE: 12/3/2020	**Prepared by:** Joe Miller and Tea Vrtlar

Personnel on site, including Contractors:	CDM Smith – Joe Miller CDM Smith – Tea Vrtlar Wasatch Environmental – Kevin Murphy Holt Services – Jeff Jones (Driller) Holt Services – Andrew Mengle Holt Services – Alex Langdon
Visitors/Others:	

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	**To 32 º F**
Wind	Still	**Moderate**	High		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Terrasonic 150 mini-sonic drill rig • Skid Steer (Bobcat) • JCB 550-170 forklift • Rig Hauler • HNu PID (x2) • Water level meter • YSI Multiparameter meter • Apera instruments pH60 pH meter • Geotech Reclaimer pump • QED Model 3020 Driver Compressor • Solinst bladder pump

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

H&S tailgate was conducted at laydown area on VA campus.

Development:
CDM Smith and Wasatch developed MW-36: they surged with the bailer, removed approximately 25 gallons by bailing, and removed approximately 21 gallons by pumping. The dedicated Solinst bladder pump was deployed at MW-30RB. Locks were added to MW-30RA and MW-36.

MW-13L:
The MW-13L boring was advanced to 160 feet bgs. The zone from 156-160 feet bgs was a saturated sandy gravel. Following discussion with the VA, the 2-inch PVC well was set with 10 feet of 0.020 slot screen from 150-160 feet bgs. The sand pack was installed from 147-160 feet bgs. Holt completed backfilling and the surface completion at MW-13L. The drill rig and drilling equipment was mobilized back to the VA laydown area. Holt decontaminated the drill steel used for MW-13L.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

No electricity at connex. The breakers behind the connex were checked and had not been tripped. Maintenance shop personnel were contacted. The connex breaker in the shop across from the IDW area was checked and had not been tripped, but the breaker was flipped off and on again to try to resolve the issue. The same procedure was repeated at the breakers behind the connex. Still unable to get electricity to connex.

Casings for MW-30RA and MW-30RB are too close to each other where Solinst well cap assembly couldn't be placed on MW-30RB. No lock was placed on MW-30RB since the lid couldn't be closed.

Projected Work – Near Term:

12/4/2020 – Develop MW-38S/D. Deploy dedicated Solinst bladder pump at MW-36 and potentially MW-38S and D.

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12/4/2020 – Move fencing from MW-13L location back to VA; load equipment and mobilize home.

Other Activities/Remarks:

None.

Photos:

	Date: 12/3/2020 **Location:** MW-13L **Description:** Soil core from MW-13L from 157-160 feet bgs. Saturated sandy gravel layer.
	Date: 12/3/2020 **Location:** MW-13L **Description:** Holt preparing to install 2" PVC at MW-13L.

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	Date: 12/3/2020 **Location:** MW-36 **Description:** Pump discharge water during development.
	Date: 12/3/2020 **Location:** MW-36 **Description:** Pump discharge water after development.

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Date: 12/3/2020

Location: MW-30RB

Description: Dedicated pump deployment at MW-30RB complete.

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DATE: 12/4/2020	**Prepared by:** Joe Miller and Tea Vrtlar

Personnel on site, including Contractors:	CDM Smith – Joe Miller CDM Smith – Tea Vrtlar Wasatch Environmental – Kevin Murphy Holt Services – Jeff Jones (Driller) Holt Services – Andrew Mengle Holt Services – Alex Langdon
Visitors/Others:	

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	**To 32 º F**
Wind	Still	**Moderate**	High		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Terrasonic 150 mini-sonic drill rig • Skid Steer (Bobcat) • JCB 550-170 forklift • Rig Hauler • HNu PID (x2) • Water level meter • YSI Multiparameter meter • Apera instruments pH60 pH meter • Geotech Reclaimer pump • QED Model 3020 Driver Compressor • Solinst bladder pump

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

H&S tailgate was conducted at laydown area on VA campus.

Development:
CDM Smith and Wasatch developed MW-38S by bailing approximately 10 gallons and pumping (with the Geotech Reclaimer pump) approximately 36 gallons. At MW-38D, 18 gallons were bailed, and 40 gallons were pumped, however, well development was not complete and will continue tomorrow. The dedicated Solinst bladder pump was installed at MW-38S

Drilling Demob:
Holt picked up fencing and remaining equipment from MW-13L. They loaded all their equipment and mobilized from site.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

VA Electricians informed us that the connex boxes have been tripping the breaker at the main circuit. They reset the breaker and asked us to reduce our load on the circuits. All equipment has been unplugged and only minimal equipment will be allowed to be plugged in at the connex boxes (eg printer/copier, battery chargers).

Projected Work – Near Term:

12/5/2020 – Complete development at MW-38D. Develop MW-37S and, if time permits develop MW-37D and deploy dedicated Solinst bladder pumps at MW-36, MW-38S and MW-38D.

Other Activities/Remarks:

None.

Photos:

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	Date: 12/4/2020 **Location:** MW-13L **Description:** SMW-13L pad near the MW-13 S/D pads. The well was offset due to underground utilities identified during the geophysical survey.
	Date: 12/4/2020 **Location:** VA laydown area **Description:** Holt has loaded casing, the drill rig and bobcat for demobilization.

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	Date: 12/4/2020 **Location:** MW-38S **Description:** Pump discharge water during development.
	Date: 12/4/2020 **Location:** MW-38S **Description:** Pump discharge water after development.

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700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 12/5/2020	**Prepared by:** Joe Miller and Tea Vrtlar

Personnel on site, including Contractors:	CDM Smith – Joe Miller CDM Smith – Tea Vrtlar Wasatch Environmental – Kevin Murphy
Visitors/Others:	

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	**To 32 º F**
Wind	Still	**Moderate**	High		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• HNu PID (x2) • Water level meter • YSI Multiparameter meter • Apera instruments pH60 pH meter • Geotech Reclaimer pump • QED Model 3020 Driver Compressor • Solinst bladder pump

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

H&S tailgate was conducted at connex.

Development:
The development at MW-38D was completed; approximately 116 gallons were pumped from the well. CDM Smith and Wasatch developed MW-37S by bailing approximately 16 gallons and pumping approximately 48 gallons. Development was initiated at MW-37D; 20 gallons were bailed. The dedicated Solinst bladder pump was deployed at MW-36. Locks were placed on MW-36 and MW-38S/D.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

None.

Projected Work – Near Term:

12/6/2020 –Complete development at MW-37D, and initiate development at MW-13L. If time permits, deploy dedicated Solinst bladder pumps at MW-38S/D.

Other Activities/Remarks:

None.

Photos:

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	Date: 12/5/2020 **Location:** MW-37S and MW-37D **Description**: MW-37S (right) and MW-37D (left) wells.
	Date: 12/5/2020 **Location:** MW-37S **Description:** Pump discharge water prior to development.

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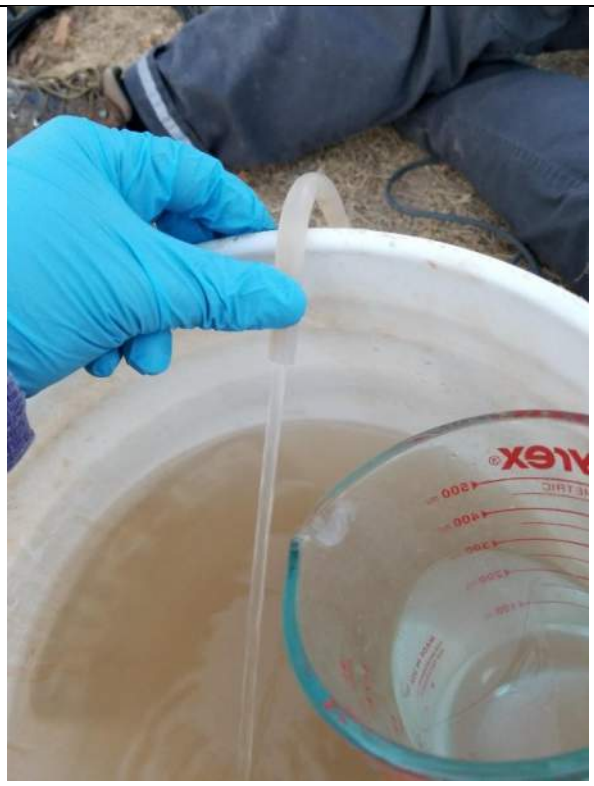	**Date: 12/5/2020** **Location:** MW-37S **Description:** Pump discharge water after development.
	Date: 12/5/2020 **Location:** MW-36 **Description:** Dedicated pump deployment

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DATE: 12/6/2020	**Prepared by:** Joe Miller and Tea Vrtlar

Personnel on site, including Contractors:	CDM Smith – Joe Miller CDM Smith – Tea Vrtlar
Visitors/Others:	

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	**To 32 º F**
Wind	Still	**Moderate**	High		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• HNu PID • Water level meter • YSI Multiparameter meter • Hach 2100Q turbiditimeter • Geotech Reclaimer pump • QED Model 3020 Driver Compressor

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

H&S tailgate was conducted at connex.

Development:
CDM Smith completed development of MW-37D by pumping approximately 48 gallons. Development was initiated at MW-13L by bailing approximately 8 gallons and pumping approximately 17 gallons. The development was paused due to lack of sunlight and will be continued tomorrow.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):
None

Projected Work – Near Term:

Development:
12/7/2020 – Complete development at MW-13L. Initiate development of MW-34A or MW-26B with Waterra pump. If time permits, deploy dedicated Solinst bladder pumps at MW-37S/D and MW-38S/D.

Groundwater Sampling:
12/7/2020 – Complete synoptic water level measurements. Obtain/renew all badges for groundwater sampling team. Confirm receipt of all groundwater sampling equipment.

Other Activities/Remarks:

None.

Photos:

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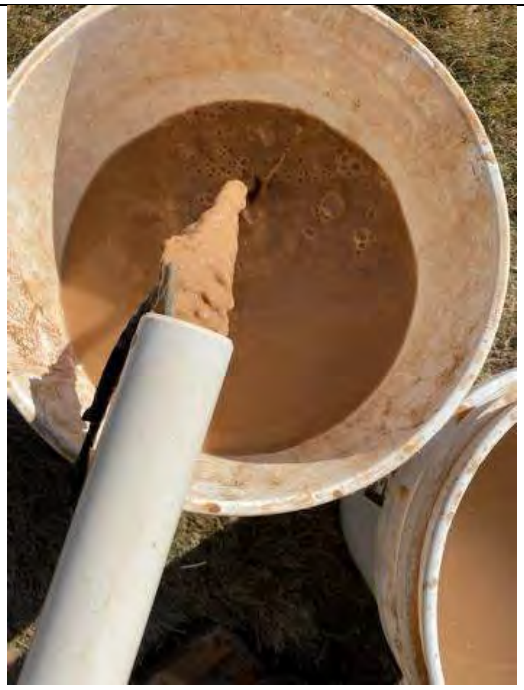
	Date: 12/6/2020 **Location:** MW-37D **Description**: Development of MW-37D.
	**Date: 12/6/2020** **Location:** MW-13L **Description:** Bailing of MW-13L.

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Date: 12/6/2020

Location: MW-13L

Description: Development of MW-13L.

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DATE: 12/7/2020	**Prepared by:** Ben Carreon

Personnel on site, including Contractors:	CDM Smith – Ben Carreon, Maria Day, Tea Vrtlar, Emma Rott, Joe Miller, Iona Campbell, Connor Kelley Wasatch – Kevin Murphy
Visitors/Others:	None

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	**0 To 32 º F**
Wind	**Still**	Moderate	High		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Development equipment • Water level and low-flow groundwater sampling equipment

Description of Field Activities – including samples/data collected, etc:

- A H&S tailgate was conducted at the IDW yard area.
- Equipment was calibrated.
- Synoptic Water Level Event
    - All water levels were completed except at monitoring wells: MW-08A/B/C, MW-14D, MW-17S, MW-28, MW-29 A/B/C, and MW-32A/B/C. These locations will be completed 12/8/20.
- Groundwater Sampling
    - No groundwater samples were collected.
- Development
    - MW-13L
        - Prior to development, the total depth at MW-13L was 151.06' below top of casing; anticipated depth should be 160' below top of casing. Eight gallons bailed and 17 gallons were pumped on 12/6/20. Depth to bottom was measured at 152.1' below top of casing. Today (12/7/20), surging and pumping with the Geotech reclaimer pump removed approximately 100 gallons and depth to water at the end of the day was 154.15' below top of casing. Depth to bottom will be measured tomorrow (12/8/20), at that time we will assess how to move forward with further development and sampling during this event.
    - MW-34A
        - Development was initiated at MW-34A using the Waterra pump, and 15 gallons were removed. At the end of the day turbidity was still high; development will continue tomorrow.
    - MW-38S/D
        - Dedicated pumps were deployed.
- Samples collected:
    - IDW15-GW120720 – Poly water tank
    - IDW16-GW120720 – Drum with sediment water and hydraulic fluid from phase I of investigation
- Samples to be collected tomorrow:
    - 2x IDW soil samples from remaining roll off bins.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

- MP10H controller solenoid was sticking until the temperature was above 35F. All controllers will be kept in the hotel rooms to prevent any moisture build up and reduce sticking at low temperatures.
- Development at MW-13L (see above).
- The teams were short one water level meter due to a shipping issue with Field Environmental. Everything else shipped for the groundwater sampling event was accounted for except 50' of silicone and a regulator. The missing equipment and supplies are expected to arrive 12/7/20.

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- Salt Lake County has a mandatory mask mandate in effect since Saturday, June 27. Masks are required in public.

Projected Work – Near Term:

- One team will continue development of MW-34A and will begin development of MW-26B. Following development, pumps will be deployed at MW-37S/D (time permitting).
- One team will complete the synoptic water level event and then begin sampling.
- Two teams will begin groundwater sampling.

Other Activities/Remarks:

Photos:

	Date: 12/7/2020 **Location:** MW-06 **Description:** Measuring water level
	Date: 12/7/2020 **Location:** MW-02 **Description:** Stockpile of salt/gravel near well

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DATE: 12/8/2020	**Prepared by:** Ben Carreon

Personnel on site, including Contractors:	CDM Smith – Ben Carreon, Maria Day, Tea Vrtlar, Emma Rott, Joe Miller, Iona Campbell, Connor Kelley Wasatch – Kevin Murphy
Visitors/Others:	None

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	**0 To 32 º F**
Wind	**Still**	Moderate	High		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Development equipment • Water level and low-flow groundwater sampling equipment

Description of Field Activities – including samples/data collected, etc:

- A H&S tailgate was conducted at the IDW yard area.
- Equipment was calibrated.
- Synoptic Water Level Event
    - The remaining water levels were measured.
- Groundwater Sampling
    - Groundwater samples collected:
        - MW-05R (MW05R-GW120820 and FD05-GW120820)
            - For the following parameters:
                - VOCs
                - Geochemistry
                    - Metals
                    - Dissolved gases
                    - Sulfate, chloride
                    - Nitrate + nitrite (total N)
                    - TOC
                    - Alkalinity
        - MW-24 (MW24-GW120820)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-27 (MW27-GW120820)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-28 (MW28-GW120820)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-30RA (MW30RA-GW120820)
            - For the following parameters:
                - VOCs
                - 1,4-Dioxane

        - Geochemistry
    - MW-30RB (MW30RB-GW120820)
        - For the following parameters:
            - VOCs
            - 1,4-Dioxane
            - Geochemistry
  - No samples were shipped to EMAX Labs.
- Development
  - MW-13L
    - DTB was measured at 153.91' BTOC.
  - MW-34A
    - Development was completed. A total of 88.5 gallons were purged with the Waterra pump.
  - MW-26B
    - Began development however not much progress was made with the limited daylight available.
- Drilling IDW
  - Samples collected:
    - Roll off bin #5843
    - Roll off bin #6030
  - IDW samples collected 12/7 and 12/8 were shipped to the lab.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

- At the beginning of purging MW-30RB, water did not surface at expected pressures. The pump was pulled and rinsed to remove sediment which corrected the issue and the well was sampled.
- MW-12S was dry. Water level was not measured, and samples will not be collected.
- The water level at MW-31A was below the top of the volume booster. As the installation of the volume booster was difficult at this location, the pump was not pulled, and a water level was not measured.
- The water level at MW-29A was below the top of the volume booster. After pulling the pump, the airline was noted to be twisted. Spare swagelok fittings will be purchased should any issues be encountered while sampling. The tubing was straightened however the tubing should be trimmed as preventative maintenance in the near future.
- MP10H controller solenoids were again sticking despite keeping the controllers in hotel rooms overnight.
- One YSI had a pH sensor in need of replacement. A replacement YSI was requested and will arrive 12/9/20.
- Salt Lake County has a mandatory mask mandate in effect since Saturday, June 27. Masks are required in public.

Projected Work – Near Term:

- Continue development of MW-26B. Following development, pumps will be deployed at MW-37S/D.
- Continue groundwater sampling.

Other Activities/Remarks:

- United services picked up the fencing and jobsite toilet.
- Drilling PIDs and Mag Sep meters were packed for shipment.

Photos:

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	Date: 12/8/2020 **Location:** MW-29A **Description:** Twisted tubing
	Date: 12/8/2020 **Location:** MW-26B **Description:** Waterra foot valve

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Date: 12/8/2020

Location: MW-26B

Description: Development setup

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 12/9/2020	**Prepared by:** Ben Carreon

Personnel on site, including Contractors:	CDM Smith – Ben Carreon, Maria Day, Emma Rott, Iona Campbell, Connor Kelley Wasatch – Kevin Murphy
Visitors/Others:	None

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	**0 To 32 º F**
Wind	**Still**	Moderate	High		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Development equipment • Water level and low-flow groundwater sampling equipment

Description of Field Activities – including samples/data collected, etc:

- A H&S tailgate was conducted at the IDW yard area.
- Equipment was calibrated.
- Groundwater Sampling
    - Groundwater samples collected:
        - MW-08A (MW08A-GW120920 and FD03-GW120920)
            - For the following parameters:
                - VOCs
                - Geochemistry
                    - Metals
                    - Dissolved gases
                    - Sulfate, chloride
                    - Nitrate + nitrite (total N)
                    - TOC
                    - Alkalinity
        - MW-08B (MW08B-GW120920)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-08C (MW08C-GW120920)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-12D (MW12D-GW120920)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-15S (MW15S-GW120920)
            - For the following parameters:
                - VOCs
                - Geochemistry
        - MW-15D (MW15D-GW120920)
            - For the following parameters:
                - VOCs

        - Geochemistry
    - MW-23A (MW23A-GW120920)
        - For the following parameters:
            - VOCs
            - Geochemistry
    - MW-23C (MW23C-GW120920)
        - For the following parameters:
            - VOCs
            - Geochemistry
    - MW-25A (MW25A-GW120920)
        - For the following parameters:
            - VOCs
            - Geochemistry
    - MW-30C (MW30C-GW120920)
        - For the following parameters:
            - VOCs
            - Geochemistry
- Difficulties were encountered while purging MW-25B. Breakthrough was experienced despite staying under the maximum allowable volume per discharge cycle. When rebuilding the water column, breakthrough was again experienced. The pump filter will be replaced 12/10/20 in an effort to resolve breakthrough issues.
- The following samples were shipped to EMAX Labs:
    - MW05R-GW120820
    - FD05-GW120820
    - MW08A-GW120920
    - FD03-GW120920
    - MW08B-GW120920
    - MW08C-GW120920
    - MW12D-GW120920
    - MW15S-GW120920
    - MW15D-GW120920
    - MW24-GW120820
    - MW27-GW120820
    - MW28-GW120820
    - MW30RA-GW120820
    - MW30RB-GW120820
    - MW30C-GW120920

- Development
    - MW-26B
        - Development with the Waterra pump was not successful. Instead, development was completed using the air lifting apparatus, but by slightly pressurizing the well casing during air lift. A total of 27 gallons were purged using this method for development, until the water had significantly cleared.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

- Breakthrough during purging and during water column building at MW-25B.
- One additional YSI was also displaying erroneous pH measurements. The readings had later normalized however a second replacement YSI was still requested.
- Salt Lake County has a mandatory mask mandate in effect since Saturday, June 27. Masks are required in public.

Projected Work – Near Term:

- Continue groundwater sampling.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Other Activities/Remarks:

- None.

Photos:

	Date: 12/9/2020 **Location:** MW-23 **Description:** Equipment setup
	Date: 12/9/2020 **Location:** MW-26B **Description:** Development setup

Appendix L

Investigation-Derived Waste Manifest

NON-HAZARDOUS WASTE MANIFEST

Please print or type (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.: UTD 981 548 985

Manifest Document No.: 20112

2. Page 1 of 1

3. Generator's Name and Mailing Address: VETERANS HEALTH ADMINISTRATION
CERCLA PROGRAM, 500 FOOTHILL DR, MAIL CODE 138
BUILDING6, CERCLA PROGRAM, ATTN: S. FAIRCLOUGH
SALT LAKE CITY, UT 84148

4. Generator's Phone: (385) 777-4672

5. Transporter 1 Company Name: NP ENVIRONMENTAL SERVICES

6. US EPA ID Number: CAT 000 624 747

7. Transporter 2 Company Name:

8. US EPA ID Number:

9. Designated Facility Name and Site Address:
VASATCH REGIONAL LANDFILL
6951 NORTH BAYLEY RD
EAGLE VALLEY, UT 84029

10. US EPA ID Number:

A. State Transporter's ID:

B. Transporter 1 Phone: 435-884-0808

C. State Transporter's ID:

D. Transporter 2 Phone:

E. State Facility's ID:

F. Facility's Phone: 801-924-8430

11. WASTE DESCRIPTION	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt./Vol.
a. NONHAZARDOUS, NOT REGULATED (SOIL CUTTINGS FROM DRILLING MONITORING WELLS)	1	CM	10	T
b.				
c.				
d.				

G. Additional Descriptions for Materials Listed Above:
APPROVAL NUMBER A186205538
CONTAINER NUMBER 6 TON

H. Handling Codes for Wastes Listed Above:

15. Special Handling Instructions and Additional Information:

GENERATOR

16. GENERATOR'S CERTIFICATION: I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name: [illegible] | Signature: [signature] | Date: Month 12 Day 15 Year 21

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: [illegible] | Signature: [signature] | Date: Month 12 Day 15 Year 21

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name: | Signature: | Date: Month Day Year

FACILITY

19. Discrepancy Indication Space:

20. Facility Owner or Operator: Certification of receipt of the waste materials covered by this manifest, except as noted in item 19.

Printed/Typed Name: | Signature: | Date: Month Day Year

NON-HAZARDOUS WASTE

HAZARDOUS WASTE MANIFEST

Please print or type (Form designed for use on elite (12-pitch) typewriter)

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.: NTD 981 548 985

Manifest Document No.: 20119

2. Page 1 of 1

3. Generator's Name and Mailing Address: VETERANS HEALTH ADMINISTRATION
CERCLA PROGRAM, 500 FOOTHILL DR, MAIL CODE 138
BUILDING 6, CERCLA PROGRAM, ATTN: S. PIASCIONCH

4. Generator's Phone (385)272-4672

5. Transporter 1 Company Name: WP ENVIRONMENTAL SERVICES

6. US EPA ID Number: CAT 000 624 347

A. State Transporter's ID:

B. Transporter 1 Phone: 435-884-0805

7. Transporter 2 Company Name:

8. US EPA ID Number:

C. State Transporter's ID:

D. Transporter 2 Phone:

9. Designated Facility Name and Site Address:
WASATCH REGIONAL LANDFILL
8815 NORTH RAVLEY RD
SKULL VALLEY, UT 84029

10. US EPA ID Number:

E. State Facility's ID:

F. Facility's Phone: 801-424-8540

11. WASTE DESCRIPTION	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt./Vol.
a. NONHAZARDOUS, NON REGULATED (GROUNDWATER FROM DRILLING MONITORING WELLS)	1	TT	1,500	G
b.				
c.				
d.				

G. Additional Descriptions for Materials Listed Above

APPROVAL NUMBER 4186205536

H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

Tue 3-24

GENERATOR

16. **GENERATOR'S CERTIFICATION:** I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name: Shannon Smith

Signature

Date: Month Day Year

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: GARY Hill

Signature

Date: Month Day Year

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name

Signature

Date: Month Day Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of the waste materials covered by this manifest, except as noted in Item 19.

Printed/Typed Name

Signature

Date: Month Day Year

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NON-HAZARDOUS WASTE MANIFEST

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.: UTD 981 548 985

Manifest Document No.: 20111

2. Page 1 of 1

3. Generator's Name and Mailing Address: VETERANS HEALTH ADMINISTRATION
CERCLA PROGRAM, 500 FOOTHILL DR. MAIL CODE 138
BUILDING 6, CERCLA PROGRAM, ATTN: S. FAIRCLOUGH
SALT LAKE CITY, UT 84148

4. Generator's Phone: 385 272-4672

5. Transporter 1 Company Name: MP ENVIRONMENTAL SERVICES

6. US EPA ID Number: CAT 000 624 247

7. Transporter 2 Company Name:

8. US EPA ID Number:

9. Designated Facility Name and Site Address:
WASATCH REGIONAL LANDFILL
8833 NORTH RAWLEY RD
SKULL VALLEY, UT 84029

10. US EPA ID Number:

A. State Transporter's ID:

B. Transporter 1 Phone: 435-884-0808

C. State Transporter's ID:

D. Transporter 2 Phone:

E. State Facility's ID:

F. Facility's Phone: 801-924-8450

11. WASTE DESCRIPTION	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt./Vol.
a. NONHAZARDOUS, NON REGULATED (SOIL CUTTINGS FROM DRILLING MONITORING WELLS)	1	CM	11	T
b.				
c.				
d.				

GENERATOR

G. Additional Descriptions for Materials Listed Above

APPROVAL NUMBER 4186205538

CONTAINER NUMBER 5919

H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

16. **GENERATOR'S CERTIFICATION:** I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name: shannon Smith

Signature: Shannon Smith

Date: Month 01 Day 12 Year 21

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: Richard Orr

Signature: Richard Orr

Date: Month 01 Day 12 Year 21

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name:

Signature:

Date: Month Day Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of the waste materials covered by this manifest, except as noted in item 19.

Printed/Typed Name:

Signature:

Date: Month Day Year

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NON-HAZARDOUS WASTE MANIFEST

NON-HAZARDOUS WASTE MANIFEST

UID 981 548 985

20110

Page 1 of 1

2. Generator's Name and Mailing Address: VETERANS HEALTH ADMINISTRATION
CERCLA PROGRAM, 500 FOOTHILL DR., MAIL CODE 138
BUILDING 6, CERCLA PROGRAM, ATTN: S. FAIRCLOUGH
Generator's Phone: (385) 272-4672 SALT LAKE CITY UT 84148

3. Transporter 1 Company Name: MP ENVIRONMENTAL SERVICES
6. US EPA ID Number: CAT 000 624 247
A. State Transporter's ID: 425-884-0808
B. Transporter 1 Phone: [redacted]

7. Transporter 2 Company Name:
8. US EPA ID Number:
C. State Transporter's ID:
D. Transporter 2 Phone:

4. Designated Facility Name and Site Address:
WASATCH REGIONAL LANDFILL
8833 NORTH RAWLEY RD
SKULL VALLEY, UT 84029
10. US EPA ID Number:
E. State Facility's ID:
F. Facility's Phone: 801-924-8540

11. Waste Description	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt./Vol.
a. NONHAZARDOUS, NON REGULATED (SOIL CUTTINGS FROM DRILLING MONITORING WELLS)	1	CM	8	T
b.				
c.				
d.				

GENERATOR

NON-HAZARDOUS WASTE

G. Additional Descriptions for Materials Listed Above:
APPROVAL NUMBER 4186205538
CONTAINER NUMBER 5483

H. Handling Codes for Wastes Listed Above:

15. Special Handling Instructions and Additional Information:

16. GENERATOR'S CERTIFICATION: I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name: Shannon Smith
Signature:
Date: Month 01 Day 12 Year 21

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: Richard Orr
Signature: Richard Orr
Date: Month 01 Day 12 Year 21

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name:
Signature:
Date: Month Day Year

FACILITY

19. Discrepancy Indication Space:

20. Facility Owner or Operator: Certification of receipt of the waste materials covered by this manifest, except as noted in Item 19:
Printed/Typed Name:
Signature:
Date: Month Day Year

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Special Waste Profile

REPUBLIC SERVICES

Disposal Facility: 1186 Wasatch Regional Landfill Inc, UT | Waste Profile #: | Sales Rep #:

I. Generator Information

Generator Name: VETERANS HEALTH ADMINISTRATION CERCLA Program

Generator Site Address: 500 FOOTHILL DRIVE Mail Code 138 Building 6 CERCLA Program

City: SALT LAKE CITY | County: SALT LAKE | State: Utah | Zip: 84148

State ID/Reg No: | State Approval/Waste Code: | NAICS #:

Generator Mailing Address: ☐ (if different) SAME

City: | County: | State: Select State | Zip:

Generator Contact Name: SUSANNE FAIRCLOUGH | Email: Susanne.fairclough@va.gov

Phone Number: 385-272-4672 | Ext: | Fax Number:

II. Billing Information

Bill To: SEACOAST ENVIRONMENTAL SVCS, | Contact Name: EUGENE R. STREITER

Billing Address: 37 LONDONBERRY DRIVE | Email: streiterseacoast@gmail.com

City: HOLMDEL | State: Select State | Zip: 07733 | Phone: 732-275-1616

III. Waste Stream Information

Name of Waste: SOIL CUTTINGS from drilling Monitoring Wells

Process Generating Waste: Waste soil generated from installation of boring and monitoring wells at area contaminated with chlorinated solvents. Waste is not a listed waste. Source is undetermined.

Type of Waste: Select Waste Type | Physical State: Select Physical | Method of Shipment: Select Shipment M

Estimated Volume: 120 | Volume Type: Cubic Yards

Frequency: On-going Waste Stream | Disposal Consideration: Landfill

IV. Representative Sample Certification

☐ **No Sample Taken**

☑ **Sample Taken** **Type of Sample** Composite Sample

Is the representative sample collected to prepare this profile and laboratory analysis, collected in accordance with U.S. EPA 40 CFR 261.20(c) guidelines or equivalent? ☑ **Yes** ☐ **No**

Sample Date: 3/26/20 | Sample ID Number(s) of SDS: IDW02-SB032620

Remember to attach Laboratory Analytical Report (and/or Material Safety Data Sheet) including Chain of Custody and required parameters provided for this profile.

Special Waste Profile

REPUBLIC SERVICES

V. Physical Characteristics of Waste

Characteristic Components (must equal 100%.)	% By Weight (out of 100% - ranges acceptable):
1. SOIL	95% - 100
2. Debris (plastic, concrete, asphalt)	0% - 5%
3.	
4.	
5.	

Color:	Odor (describe):	Does Waste Contain Free Liquids?	% Solids:	pH:	Flash Point:
BROWN	NONE	☐ Yes ☑ No	100	NA	>200 °F

Attach Laboratory Analytical Report (and/or Material Safety Data Sheet) including Chain of Custody and required parameters provided for this profile.

RCRA Regulatory Questions

1. Does this waste or generating process contain regulated concentrations of the following Pesticides and/ or Herbicides: Chlordane, Endrin, Heptachlor (and its epoxides), Lindane, Methoxychlor, Toxaphene, 2,4-D, or 2,4,5-TP Silvex as defined in 40 CFR 261.33?	☐ Yes ☑ No
2. Does this waste contain reactive sulfides (greater than 500 ppm) or reactive cyanide (greater than 250 ppm) (reference 40 CFR 261.23(a)(5))?	☐ Yes ☑ No
3. Does this waste contain regulated concentrations of Polychlorinated Biphenyls (PCBs) as defined in 40 CFR Part 761?	☐ Yes ☑ No
4. Does this waste contain concentrations of listed hazardous wastes defined in 40 CFR 261.31, 261.32, 261.33, including RCRA F-Listed Solvents?	☐ Yes ☑ No
5. Has this waste been delisted under 40 CFR 260.20 and 260.22? If yes, attach the final decision to delist the waste as published in the Federal Register.	☐ Yes ☑ No
6. Does this waste exhibit a Hazardous Characteristic as defined by Federal and/or State regulations? If Yes, identify the applicable waste code and specify if the waste is hazardous as defined by Federal, State or both?	☐ Yes ☑ No
7. Does this waste contain regulated concentrations of 2,3,7,8-Tetrachlorodibenzodioxin (2,3,7,8-TCDD), or any other dioxin as defined in 40 CFR 261.31?	☐ Yes ☑ No
8. Is this a regulated Medical or Infectious Waste as defined by Federal and/or State regulations?	☐ Yes ☑ No
9. Is this a regulated Radioactive Waste as defined by Federal and/or State regulations?	☐ Yes ☑ No
10. Is this a solid waste that is not a hazardous waste in accordance with 40 CFR 261.4(b)? If yes, please provide the corresponding regulatory citation.	☐ Yes ☑ No

Republic Services Waste Handling Questions

1. Does this waste generate heat or react when contacted with water/moisture?	☐ Yes ☑ No
2. Does the waste contain sulfur or sulfur by-products?	☐ Yes ☑ No
3. Is this waste generated at a State or Federal Superfund cleanup site subject to regulation under CERCLA?	☑ Yes ☐ No
4a. Is this waste from a TSD facility, TSD like facility or consolidator (i.e. multiple wastes/multiple generators)?	☐ Yes ☑ No

4b. If yes to the above question, please provide clarification.

Special Waste Profile

REPUBLIC SERVICES

VI. Certification

I hereby certify that to the best of my knowledge and belief, the information contained herein is a true, complete and accurate description of the waste material being offered for disposal and all known or suspected hazards have been disclosed. All Analytical Results/Material Safety Data Sheets submitted are truthful and complete and are representative of the waste.

I further certify that by utilizing this profile, neither myself nor any other employee of the company will deliver for disposal or attempt to deliver for disposal any waste which is classified as toxic waste, hazardous waste or infectious waste, or any other waste material this facility is prohibited from accepting by law. I shall immediately give written notice of any change or condition pertaining to the waste not provided herein. Our company hereby agrees to fully indemnify this disposal facility against any damages resulting from this certification being inaccurate or untrue.

I understand that attaching an electronic signature, I am signing this document, consent to complete this transaction and receive all related communication electronically, and agree this document will be binding as though I had physically signed it. A printout of this document may be accepted with the same authority as the original.

If electronic signature is preferred, please submit completed (unsigned) form to your Special Waste Coordinator or Special Waste Sales Executive to initiate signature process.

I further certify that the company has not altered the form or content of this profile sheet as provided by Republic Services.

Susanne M Fairclough	VA CERCLA Contracts Manager	Veterans Health Administration CERCLA Program
Authorized Representative Name (Printed)	Title (Printed)	Company Name
Susanne M Fairclough	04/06/20	
Representative Signature	Date	

Special Waste Profile

REPUBLIC SERVICES

Disposal Facility: 4166 Wasatch Regional Landfill, Inc, UT

Waste Profile #:

Sales Rep #:

I. Generator Information

Generator Name: VETERANS HEALTH ADMINISTRATION CERCLA Program

Generator Site Address: 500 FOOTHILL DRIVE Mail Code 138 Buidling 6 CERCLA Program

City: SALT LAKE CITY | County: SALT LAKE | State: --Select State-- | Zip: 84148

State ID/Reg No: | State Approval/Waste Code: | NAICS #:

Generator Mailing Address: ☐ (if different) SAME

City: | County: | State: Select State | Zip:

Generator Contact Name: SUSANNE FAIRCLOUGH | Email: Susanne.fairclough@va.gov

Phone Number: 385-272-4672 | Ext: | Fax Number:

II. Billing Information

Bill To: SEACOAST ENVIRONMENTAL SVCS, | Contact Name: EUGENE R. STREITER

Billing Address: 37 LONDONBERRY DRIVE | Email: streiterseacoast@gmail.com

City: HOLMDEL | State: New Jersey | Zip: 07733 | Phone: 732-275-1616

III. Waste Stream Information

Name of Waste: GROUNDWATER from drilling Monitoring Well

Process Generating Waste: Waste water generated from installation of boring and monitoring wells at area contaminated with chlorinated solvents. Waste is not a listed waste. Source is undetermined.

Type of Waste: Select Waste Type | Physical State: --Select Physical | Method of Shipment: Select Shipment M

Estimated Volume: 15000-20000 | Volume Type: Gallons

Frequency: On-going Waste Stream | Disposal Consideration: Landfill

IV. Representative Sample Certification

☐ **No Sample Taken**

☑ **Sample Taken** **Type of Sample** Grab Sample

Is the representative sample collected to prepare this profile and laboratory analysis, collected in accordance with U.S. EPA 40 CFR 261.20(c) guidelines or equivalent? ☑ **Yes** ☐ **No**

Sample Date: 3/24/2020

Sample ID Numbers or SDS: IDW01-GW032420

Remember to attach Laboratory Analytical Report (and/or Material Safety Data Sheet) including Chain of Custody and required parameters provided for this profile.

Special Waste Profile

REPUBLIC SERVICES

V. Physical Characteristics of Waste

Characteristic Components (must equal 100%):	% By Weight (out of 100% - ranges acceptable):
1. water	95% - 100%
2. sediment (silt)	0% - 5%
3.	
4.	
5.	

Color:	Odor (describe):	Does Waste Contain Free Liquids?	% Solids:	pH:	Flash Point:
Clear/Brown	none	☑ Yes ☐ No	<5%	~7	>200 °F

Attach Laboratory Analytical Report (and/or Material Safety Data Sheet) including Chain of Custody and required parameters provided for this profile.

RCRA Regulatory Questions

1.	Does this waste or generating process contain regulated concentrations of the following Pesticides and/ or Herbicides: Chlordane, Endrin, Heptachlor (and its epoxides), Lindane, Methoxychlor, Toxaphene, 2,4-D, or 2,4,5-TP Silvex as defined in 40 CFR 261.33?	☐ Yes ☑ No
2.	Does this waste contain reactive sulfides (greater than 500 ppm) or reactive cyanide (greater than 250 ppm) (reference 40 CFR 261.23(a)(5))?	☐ Yes ☑ No
3.	Does this waste contain regulated concentrations of Polychlorinated Biphenyls (PCBs) as defined in 40 CFR Part 761?	☐ Yes ☑ No
4.	Does this waste contain concentrations of listed hazardous wastes defined in 40 CFR 261.31, 261.32, 261.33, including RCRA F- Listed Solvents?	☐ Yes ☑ No
5.	Has this waste been delisted under 40 CFR 260.20 and 260.22? If yes, attach the final decision to delist the waste as published in the Federal Register.	☐ Yes ☑ No
6.	Does this waste exhibit a Hazardous Characteristic as defined by Federal and/or State regulations? If Yes, identify the applicable waste code and specify if the waste is hazardous as defined by Federal, State or both?	☐ Yes ☑ No
7.	Does this waste contain regulated concentrations of 2,3,7,8 Tetrachlorodibenzodioxin (2,3,7,8-TCDD), or any other dioxin as defined in 40 CFR 261.31?	☐ Yes ☑ No
8.	Is this a regulated Medical or Infectious Waste as defined by Federal and/or State regulations?	☐ Yes ☑ No
9.	Is this a regulated Radioactive Waste as defined by Federal and/or State regulations?	☐ Yes ☑ No
10.	Is this a solid waste that is not a hazardous waste in accordance with 40 CFR 261.4(b)? If yes, please provide the corresponding regulatory citation.	☐ Yes ☑ No

Republic Services Waste Handling Questions

1.	Does this waste generate heat or react when contacted with water/moisture?	☐ Yes ☑ No
2.	Does the waste contain sulfur or sulfur by-products?	☐ Yes ☑ No
3.	Is this waste generated at a State or Federal Superfund cleanup site subject to regulation under CERCLA?	☑ Yes ☐ No
4a.	Is this waste from a TSD facility, TSD-like facility or consolidator (i.e. multiple wastes/multiple generators)?	☐ Yes ☑ No

4b. If yes to the above question, please provide clarification:

Special Waste Profile

REPUBLIC SERVICES

VI. Certification

I hereby certify that to the best of my knowledge and belief, the information contained herein is a true, complete and accurate description of the waste material being offered for disposal and all known or suspected hazards have been disclosed. All Analytical Results/Material Safety Data Sheets submitted are truthful and complete and are representative of the waste.

I further certify that by utilizing this profile, neither myself nor any other employee of the company will deliver for disposal or attempt to deliver for disposal any waste which is classified as toxic waste, hazardous waste or infectious waste, or any other waste material this facility is prohibited from accepting by law. I shall immediately give written notice of any change or condition pertaining to the waste not provided herein. Our company hereby agrees to fully indemnify this disposal facility against any damages resulting from this certification being inaccurate or untrue.

I understand that attaching an electronic signature, I am signing this document, consent to complete this transaction and receive all related communication electronically, and agree this document will be binding as though I had physically signed it. A printout of this document may be accepted with the same authority as the original.

If electronic signature is preferred, please submit completed (unsigned) form to your Special Waste Coordinator or Special Waste Sales Executive to initiate signature process.

I further certify that the company has not altered the form or content of this profile sheet as provided by Republic Services.

Susanne M Fairclough	VA CERCLA Contracts Manager	Veterans Administration CERCLA Program
Authorized Representative Name (Printed)	Title (Printed)	Company Name
Susanne M Fairclough	04/08/2020	
Representative Signature		Date

Memorandum

To: *Josephine Newton-Lund, PMP, Senior Project Manager, Environmental Branch, U.S. Army Corps of Engineers*
Shannon Smith, PE, Program Manager, Veterans Health Administration

From: *Nathan Smith, PMP, Senior Project Manager, CDM Federal Programs Corporation*
Neil Smith, Project Technical Leader, CDM Federal Programs Corporation

Date: *July 21, 2021*

Subject: ***Plan for Surface Water Sampling and Flow Measurement***
700 South 1600 East Tetrachloroethene Plume Superfund Site, Salt Lake City, Utah

On behalf of the U.S. Army Corps of Engineers (USACE), CDM Federal Programs Corporation (CDM Smith) prepared this plan for surface water sampling at select locations within the East Side Springs (ESS) area of the 700 South 1600 East Tetrachloroethene (PCE) Plume Site, located near the George E. Wahlen Veterans Affairs Medical Center (VAMC) in Salt Lake City, Utah. This plan adds details for the surface water sampling described in the Phase 2 Field Sampling Plan (FSP) and describes surface water flow measurement techniques. The Phase 2 FSP is an appendix to the Operable Unit 1 Remedial Investigation Work Plan (CDM Smith 2020).

The data addressed in this plan are necessary to aid in delineation of the PCE plume extent, evaluate temporal variation in surface water volatile organic compound concentrations, and to support the risk assessment. These data support data quality objectives E1 (Hydrogeologic Features), E2 (Plume Characterization), D3 (Groundwater Risk), and D4 (Surface Water Risk) presented in Table 4-1 of the RIWP (CDM Smith 2020). The data will be used as follows:

- Flow rate measurements will assist with hydrogeologic model refinement and fate and transport evaluation.
- Collection of VOC concentration data will support evaluation of risk to human and ecological exposures.

1.0 Scope of Work

This plan includes the rationale and description of work for surface water sampling in the ESS area. During the Accelerated Operable Unit 1 Remedial Investigation, 33 samples from seeps, springs and sumps in the ESS area were collected. Several springs have been diverted into the municipal storm water system; therefore, an additional18 samples from the stormwater system were collected (EA 2019). These locations and the data results are included in **Attachments 1** and **2.** In 2018, two

rounds of samples from nine locations were collected as part of the Operable Unit 2 (OU2) Remedial Investigation (Jacobs 2019). The OU2 surface water sampling was conducted to potentially better correlate PCE groundwater and surface water concentrations, assess human and ecological exposures, refine the groundwater flow paths, and evaluate lateral and down gradient extent of the PCE plume (CH2M Hill 2018). PCE concentrations in samples ranged from less than 0.15 µg/L to 82 µg/L (**Attachment 3)**.

As part of the OU1 remedial investigation eight to ten locations may be sampled, pending property access. The sample locations are presented in **Table 1** and on **Figure 1**. If access is not granted or the seep/spring is not currently flowing, alternative locations will be selected which are accessible and in close proximity to the previously-identified locations. The surface water sampling will consist of flow rate and groundwater quality parameters measurements, and collection and shipment of samples for analytical testing.

Flow measurements will be completed for all sampling locations using a variety of methods. These may include area velocity measurements for flow in pipes or channels, bucket and stopwatch, or estimated visually if no other measurement is possible. The area velocity method includes measurement of a single water velocity reading and water depth at the pipe centerline. Estimation of the velocity and cross-sectional area will be used to calculate a flow rate. Select locations may only include flow measurements and not be sampled for laboratory analyses or field parameters.

In low-flow conditions or where velocity measurements are impractical, flow will be channeled and collected in a container with a known volume, if feasible. A piece of rain gutter will be keyed into the spring to route the water downstream to where volume per time measurements can be collected. The time taken to fill the known volume container will be used to calculate the flow rate. For estimating low flows at seep locations, a small hole may be dug and a syringe used to remove a known volume of water, followed by measuring the time for the hole to re-fill. All volume and time measurements will be collected in triplicate. If none of the above methods can be used, such as for low-flow springs less than 0.1 to 0.5 gallon per minute, flow rates will be estimated visually.

Water quality parameters will include pH, specific conductivity, temperature, oxidation-reduction potential, dissolved oxygen, and turbidity. Analytical samples will be collected for volatile organic compounds, total metals, dissolved gases, anions, nitrate/nitrite, total organic carbon, and alkalinity. Ferrous iron will be measured in the field. Analytical methods are included in **Table 1.** These geochemical analyses will aid the evaluation of attenuation of the PCE plume and interactions of the groundwater and surface water (e.g., rainwater and snowmelt).

2.0 References

CDM Smith. 2020. *Phase 2 Remedial Investigation Work Plan, Operable Unit 1, 700 South 1600 East PCE Plume, Salt Lake City, Utah*. Prepared for U.S. Army Corps of Engineers. November.

CH2M Hill Inc. 2018. *Remedial Investigation Work Plan, OU-2 Remedial Investigation, 700 South 1600 East PCE Plume, Salt Lake City, Utah.* Prepared for the U.S. Army Corps of Engineers. February.

EA Engineering, Science, and Technology, Inc. 2019. 7*00 South 1600 East PCE Plume AOU-1: East Side Springs Remedial Investigation Report*. Prepared for the U.S. Department of Veterans Affairs. February. https://semspub.epa.gov/work/08/1769131.pdf. January.

Jacobs. 2019. 2018 *OU-2 Data Summary Report, Operable Unit 2 Remedial Investigation 700 South 1600 East PCE Plume, Salt Lake City, Utah*. Prepared for the U.S. Army Corps of Engineers. June.

Figures

Figure 1 Proposed Surface Water Sample Locations

Tables

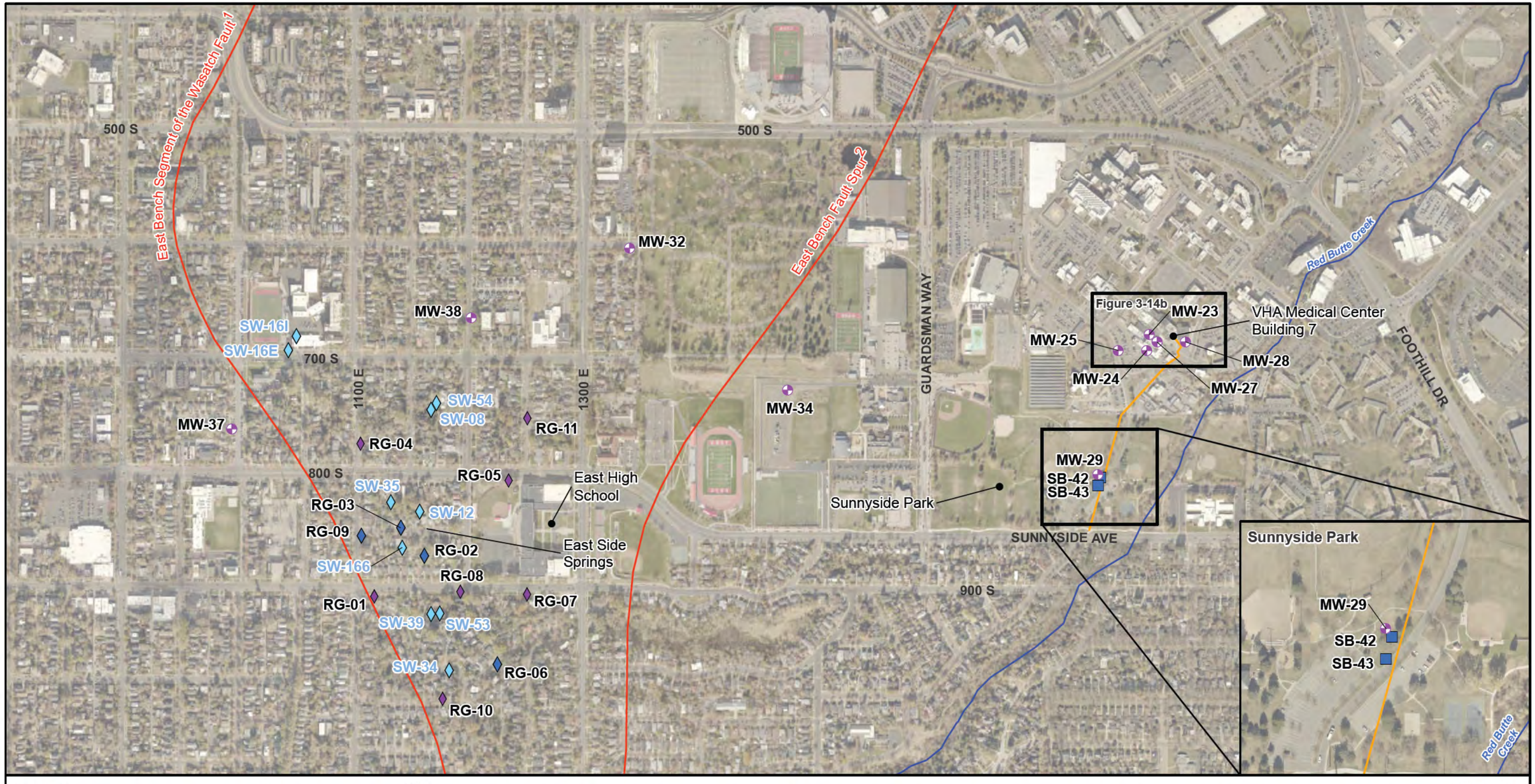
Table 1 Proposed Surface Water Sampling Summary

Attachments

Attachment 1 Figure 6-2, Surface Water Sampling and Soil Sampling Results;
Table 5-5, Surface Water Sampling Locations, 700 South 1600 East PCE Plume AOU-1: East Side Springs Remedial Investigation Report. Salt Lake City, Utah;
Table 17, Surface Water Sampling Locations, 2018 OU-2 Data Summary Report.

Attachment 2 Table 6-3, Surface Water and Stormwater Data, 700 South 1600 East PCE Plume AOU-1: East Side Springs Remedial Investigation Report. Salt Lake City, Utah.

Attachment 3 Figure 4, Q3 and Q4 Surface Water PCE and TCE Data, 2018 OU-2 Data Summary Report 700 South 1600 East PCE Plume. Salt Lake City, Utah.



Legend

- Monitoring Well with Soil Vapor Probe
- Residential Groundwater Sampling Location
- Residential Groundwater Sampling Location with Soil Vapor Probe
- Surface Water Sampling Location
- Multi-Depth Soil Vapor Probe
- Landmark
- Red Butte Creek
- Sewer Line
- Fault Line

Notes:
OU = operable unit
PCE = tetrachloroethene
VHA = Veterans Health Administration
RG = Residential Groundwater Sampling Location

[1] Davis, F.D. 1983. Geologic Map of the Central Wasatch Front, Utah. Utah Geological and Mineral Survey. Map 54-A – Wasatch Front Series. May.

[2] Personius, S.F. and Scott, W.E. 2009. Surficial Geologic Map of the Salt Lake City Segment and Parts of Adjacent Segments of the Wasatch Fault Zone, Davis, Salt Lake, and Utah Counties, Utah

N

0 500 1,000 Feet

CDM Smith

Figure 1
Residential Groundwater, Surface Water, and OU1 Soil Gas Sampling Locations

Remedial Investigation Report
OU1 700 South 1600 East PCE Plume
Salt Lake City, Utah

File Path: J:\238824_VA_Medical_Salt_Lake\MXD\Sampling_2021\RI_2021\Fig3-XX_SW_GW_and_SoilGas.mxd WAGNERA 4/21/2021

Table 1 Proposed Surface Water Sampling Summary

Location	Description	Longitude (deg)[1]	Latitude (deg)[1]	Rationale	Analyses and Methods
SW-06	Spring-fed Sump	-111.857629	40.7495	Evaluate VOC concentration trends over time, and evaluate groundwater discharge rates in the area of Alpine Place. SW-06 was sampled in 2018. Note that water from this sump appears to discharge to location SW-39.	VOCs - EPA SW-846, 8260C to assess risk from chlorinated solvent plume, provide mass discharge estimates and evalute trends
SW-08	Seep	-111.857528	40.75326	Verify VOC concentrations and groundwater discharge near northern estimated plume boundary (Benson Spring area). Consider also sampling SW-48 (described as "Pond Inlet" at Benson Spring and sampled in 2018)	Dissolved Gases - RSK175
SW-16	Our Lady of Lourdes Spring	-111.860455	40.754333	Evaluate groundwater discharge rates in northern portion of ESS area, and verify previous VOC results from the AOU-1 RI (previously ND for PCE)	Nitrate/Nitrite - SM4500-N03E
SW-34	Spring	-111.857193	40.748231	Evalaute VOC concentration trends over time, and evaluate groundwater discharge rates near Gilmer Drive (Gilmer Pipeline area). SW-34 was sampled in 2018.	Alkalinity - SM2320B; Anions - EPA E300.0
SW-35	Seep	-111.858565	40.751494	Evaluate VOC concentration trends over time near Sunnyside Avenue (former high-concentration location). Evaluate groundwater discharge rates in springs near Sunnyside Avenue. SW-35 was sampled in 2018.	Ferrous Iron - Field measurement, HACH 8146
SW-39	Storm Drain - Mitigated Spring Water	-111.857669	40.749314	Evalaute VOC concentration trends over time, and evaluate groundwater discharge rates at Alpine Place. SW-39 was sampled in 2018.	Total Metals (unfiltered) - EPA SW-846, 6020A/7470A
SW-43	Spring	-111.857909	40.747961	Evaluate VOC concentrations in surface water near southern/southwestern extent of plume, evaluate groundwater discharge rates south of the Gilmer Drive area.	All parameters assess aquifer geochemistry and potential for natural attenuation to be occurring, and allow for discerning potential for surface runoff to influence spring sample results
SW-53	Pond Inlet	-111.857435	40.749308	Evaluate VOC concentration trends over time, and evaluate groundwater discharge rates in the area of Alpine Place. SW-53 was sampled in 2018.	

[1] Latitude/Longitude measured using NAD 83

Notes:

deg - degrees

VOC - volatile organic compound

EPA - U.S. Environmental Protection Agency

SM - Standard Methods

TABLE 6-3

Surface Water and Stormwater Data

700 South 1600 East PCE Plume AOU-1: East Side Springs Remedial Investigation Report

Department of Veterans Affairs Salt Lake City Health Care System

Sample Location	Sample ID	Sample Date	Analytes				
			PCE (µg/L)	TCE (µg/L)	cis-1,2-DCE (µg/L)	VC (µg/L)	1,4-dioxane (µg/L)
Residential Surface Water SL for Protection of Soil (µg/L) [1]			130,000	7,700	2,000,000	1,400	1,000,000
Industrial Surface Water for Protection of Soil (µg/L) [1]			530,000	49,000	29,000,000	39,000	4,600,000
SL for Direct Contact with Surface Water (Ing/Derm) (µg/L) [1]			1,500	110	3,000	1	160
Surface Water Samples							
SW-01	A-SW-001	5/4/2016	0.13 J	< 0.50 U	< 0.50 U	< 0.50 U	Not Analyzed
SW-04	A-SW-004	5/2/2016	27	0.34 J	0.19 J	< 0.50 U	Not Analyzed
SW-06	A-SW-006	5/4/2016	74	0.96	0.58	< 0.50 U	Not Analyzed
SW-07	A-SW-007	5/4/2016	2.9	< 0.50 U	< 0.50 U	< 0.50 U	< 2.0 UJ
SW-08	A-SW-008	5/4/2016	7.5	0.13 J	< 0.50 U	< 0.50 U	Not Analyzed
SW-09	A-SW-009	5/3/2016	19	0.88	0.11 J	< 0.50 U	Not Analyzed
SW-11	A-SW-011	5/3/2016	20	0.61	0.60	< 0.50 U	Not Analyzed
SW-12	A-SW-012	5/3/2016	23	0.39 J	0.12 J	< 0.50 U	< 2.0 UJ
SW-12	A-SW-012	5/3/2016	17	0.36 J	< 0.50 U	< 0.50 U	Not Analyzed
SW-13	A-SW-013	5/3/2016	1.8	0.37 J	< 0.50 U	< 0.50 U	Not Analyzed
SW-14	A-SW-014	5/4/2016	18	0.53	< 0.50 U	< 0.50 U	Not Analyzed
SW-15	A-SW-015	5/4/2016	14	0.32 J	< 0.50 U	< 0.50 U	< 2.0 UJ
SW-16	A-SW-016	5/4/2016	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 2.0 UJ
SW-19	A-SW-019	5/4/2016	0.18 J	< 0.50 U	< 0.50 U	< 0.50 U	Not Analyzed
SW-21	A-SW-021	5/3/2016	6.5	0.62	0.44 J	< 0.50 U	Not Analyzed
SW-21	A-SW-021	5/3/2016	5.2	0.49 J	0.41 J	< 0.50 U	< 2.0 UJ
SW-22	A-SW-022	5/3/2016	2.9	0.47 J	0.13 J	< 0.50 U	Not Analyzed
SW-23	A-SW-023	5/3/2016	25	0.46 J	0.15 J	< 0.50 U	< 2.0 UJ
SW-23	A-SW-023	5/3/2016	22	0.47 J	< 0.50 U	< 0.50 U	< 1.9 U
SW-26	A-SW-026	5/3/2016	23	0.30 J	< 0.50 U	< 0.50 U	< 2.0 UJ
SW-27	A-SW-027	5/3/2016	19	0.61	0.57	< 0.50 U	< 2.0 UJ
SW-27	A-SW-027	5/3/2016	13	0.46 J	0.46 J	< 0.50 U	Not Analyzed
SW-29	A-SW-029	5/11/2016	26	0.28 J	< 0.50 U	< 0.50 U	Not Analyzed
SW-30	A-SW-030	5/3/2016	0.50	0.090 J	< 0.50 U	< 0.50 U	Not Analyzed
SW-31	A-SW-031	5/2/2016	20	0.48 J	0.27 J	< 0.50 U	Not Analyzed
SW-33	A-SW-033	5/2/2016	35	0.78	0.15 J	< 0.50 U	Not Analyzed

TABLE 6-3

Surface Water and Stormwater Data

700 South 1600 East PCE Plume AOU-1: East Side Springs Remedial Investigation Report

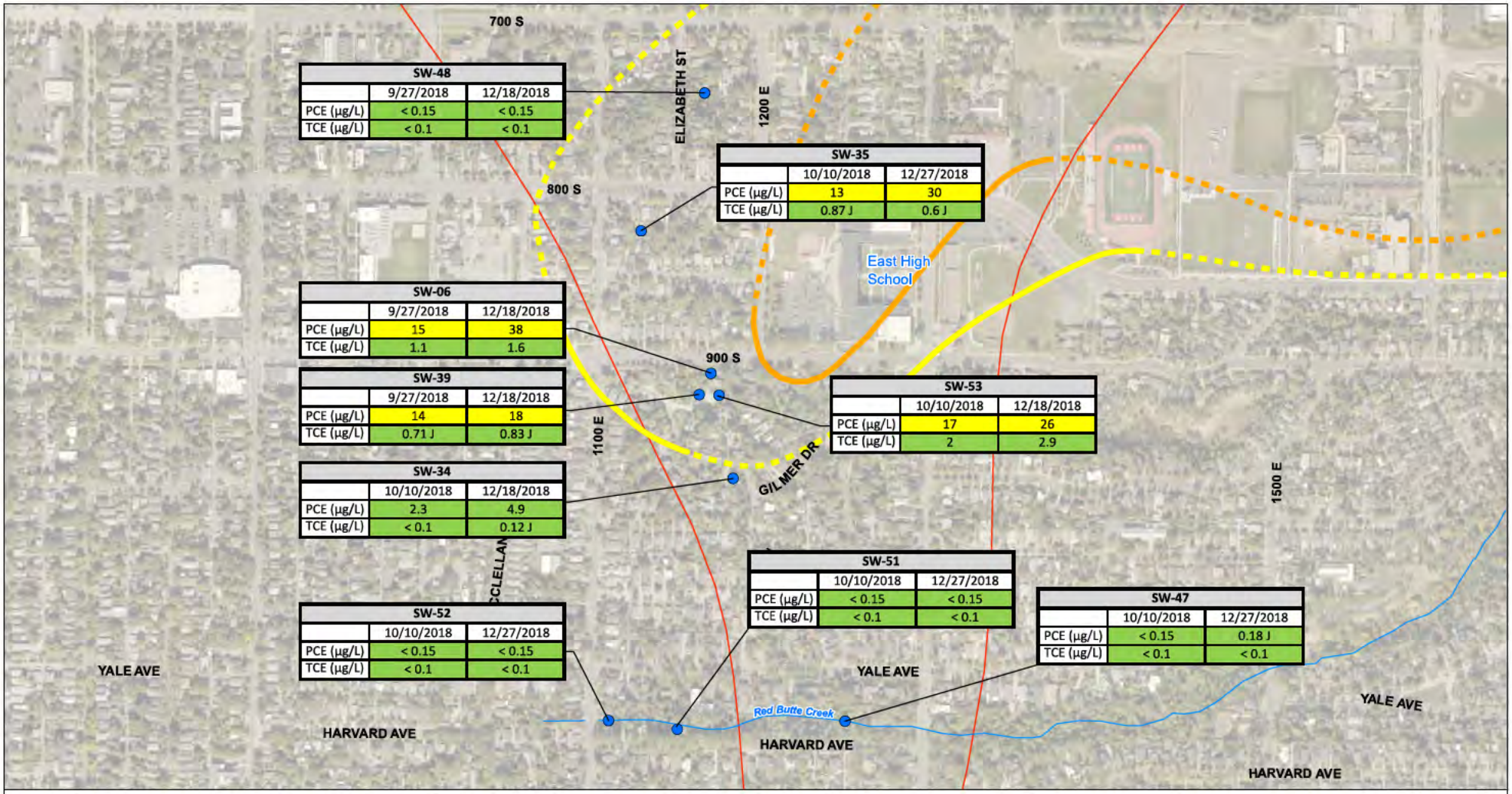
Department of Veterans Affairs Salt Lake City Health Care System

Sample Location	Sample ID	Sample Date	Analytes									
			PCE (µg/L)		TCE (µg/L)		cis-1,2-DCE (µg/L)		VC (µg/L)		1,4-dioxane (µg/L)	
SW-34	A-SW-034	5/2/2016	13		0.27	J	0.13	J	< 0.50	U	Not Analyzed	
SW-35	A-SW-035	5/4/2016	82		0.67		0.54		< 0.50	U	Not Analyzed	
SW-36	A-SW-036	5/3/2016	1.2		2.3		0.69		< 0.50	U	Not Analyzed	
SW-40	A-SW-040	5/5/2016	28		0.38	J	0.18	J	< 0.50	U	Not Analyzed	
SW-42	A-SW-042	5/2/2016	16		0.19	J	< 0.50	U	< 0.50	U	Not Analyzed	
SW-43	A-SW-043	5/2/2016	4.1		0.10	J	< 0.50	U	< 0.50	U	Not Analyzed	
SW-44	A-SW-044	5/4/2016	2.2		< 0.50	U	< 0.50	U	< 0.50	U	Not Analyzed	
SW-46	A-SW-046	5/5/2016	2.4		< 0.50	U	< 0.50	U	< 0.50	U	Not Analyzed	
SW-47	A-SW-047	5/4/2016	< 0.50	U	< 0.50	U	< 0.50	U	< 0.50	U	< 2.0	UJ
SW-48	A-SW-048	5/4/2016	< 0.50	U	< 0.50	U	< 0.50	U	< 0.50	U	Not Analyzed	
SW-50	A-SW-001	2/26/2016	6.3		0.13	J	< 0.50	UJ	< 0.50	U	Not Analyzed	
Storm Sewer Water Samples												
SW-02	A-SW-002	5/11/2016	< 0.50	U	< 0.50	U	< 0.50	U	< 0.50	U	Not Analyzed	
SW-03	A-SW-003	5/11/2016	< 0.50	U	< 0.50	U	< 0.50	U	< 0.50	U	Not Analyzed	
SW-05	A-SW-005	5/11/2016	0.38	J	< 0.50	U	< 0.50	U	< 0.50	U	Not Analyzed	
SW-10	A-SW-010	5/11/2016	< 0.50	U	< 0.50	U	< 0.50	U	< 0.50	U	Not Analyzed	
SW-17	A-SW-017	5/11/2016	< 0.50	U	< 0.50	U	< 0.50	U	< 0.50	U	Not Analyzed	
SW-18	A-SW-018	5/5/2016	17		0.43	J	0.35	J	< 0.50	U	Not Analyzed	
SW-20	A-SW-020	5/5/2016	0.23	J	< 0.50	U	< 0.50	U	< 0.50	U	Not Analyzed	
SW-24	A-SW-024	5/11/2016	< 0.50	U	< 0.50	U	< 0.50	U	< 0.50	U	Not Analyzed	
SW-25	A-SW-025	5/5/2016	1.4		< 0.50	U	< 0.50	U	< 0.50	U	Not Analyzed	
SW-28	A-SW-028	5/3/2016	16		0.66		0.56		< 0.50	U	Not Analyzed	
SW-28	A-SW-028	5/3/2016	12		0.56		0.50		< 0.50	U	< 2.0	UJ
SW-32	A-SW-032	5/5/2016	0.46	J	< 0.50	U	< 0.50	U	< 0.50	U	Not Analyzed	
SW-37	A-SW-037	5/5/2016	15		0.39	J	0.24	J	< 0.50	U	Not Analyzed	
SW-38	A-SW-038	5/11/2016	6.0		0.22	J	< 0.50	U	< 0.50	U	Not Analyzed	
SW-39	A-SW-039	5/3/2016	31		0.50		0.31	J	< 0.50	U	Not Analyzed	
SW-41	A-SW-041	5/5/2016	0.49	J	< 0.50	U	< 0.50	U	< 0.50	U	Not Analyzed	
SW-45	A-SW-045	5/5/2016	3.1		0.11	J	0.11	J	< 0.50	U	Not Analyzed	
SW-49	A-SW-049	5/5/2016	0.21	J	< 0.50	U	< 0.50	U	< 0.50	U	Not Analyzed	

TABLE 6-3
Surface Water and Stormwater Data
700 South 1600 East PCE Plume AOU-1: East Side Springs Remedial Investigation Report
Department of Veterans Affairs Salt Lake City Health Care System

NOTES:
1. Screening levels are from Table 3-7.

µg/L	=	Micrograms per liter.
DCE	=	cis-1,2-dichloroethene
ID	=	Identification.
J	=	Estimated value below the contract-required quantitation limit or based on data validation.
PCE	=	Tetrachloroethene.
SL	=	Screening level.
TCE	=	Trichloroethene.
U	=	Non-detect value.
UJ	=	Estimated non-detect value.
VC	=	Vinyl chloride.



Legend
- Surface Water Sampling Location
- Red Butte Creek
- Fault Line

PCE and TCE Concentrations in Surface Water(µg/L)
- = < 5 µg/L
- = 5 - 50 µg/L
- = > 50 µg/L

PCE Contours in Groundwater
- 5 µg/L
- 50 µg/L

Dashed Line - Inferred Extent
? - Extent not Defined

Notes
1) Sample locations SW-51, SW-52, and SW-53 have not yet been surveyed and are approximate.
(2) Tetrachloroethene (PCE) extent derived from November - December 2018 analytical results. For wells with multiple depth intervals the highest concentration was selected.
(3) µg/L = micrograms per liter
(4) TCE - trichloroethene

N W E S
0 225 450
Feet
1 inch = 450 feet

FIGURE 4
Q3 AND Q4 2018 SURFACE WATER PCE AND TCE DATA
2018 OU-2 DATA SUMMARY REPORT
700 SOUTH 1600 EAST PCE PLUME
SALT LAKE CITY, UTAH

JACOBS

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Legend

- Monitoring Wells
- Production/Irrigation Wells
- Abandoned Monitoring Wells
- Surface Water Sample Location
- Soil Sample Location
- Spring Location
- Infered PCE Contour Near Surface Groundwater
- PCE Contour Near Surface Groundwater
- Wasatch Fault Line
- Stormwater System Structure (drain, manhole, culvert)
- Stormwater Line
- Jordan River Canal (subterranean)
- Streams
- Approximate Occurrence of Springs (East Side Springs Area)

Note(s) :
1. Surface water and stormwater samples were collected between 26 February to 11 May 2016.
2. Table 6-3 lists surface water and stormwater analytical results for the PCOPCs.
3. Surface water results are in ug/l; soil results are in mg/kg.
4. PCE contour concentrations are in µg/L.
5. PCE contours are in shallow groundwater less than 45 ft.
6. Vinyl chloride results were all <0.5 µg/L.
7. 1,4-dioxane results were <2.0 µg/L.
8. There were no surface water or stormwater results that exceeded the surface water-related SLs in Table 3-7.

Source(s) :
Utah Automated Geographic Reference Center (AGRC)
AOU-1 Source = Figure 2 of the RI Work Plan (First Environment 2015a)

Acronym(s) and Abbreviation(s):
µg/L = micrograms per liter
AOU = Accelerated Operable Unit
DCE = cis-1,2-dichloroethene
EPA = U.S. Environmental Protection Agency
ft = feet
J = estimated value
mg/kg = milligrams per kilogram
MW = Monitoring Well
PCE = tetrachloroethene
PCOPC = Preliminary Contaminant of Potential Concern
RI = Remedial Investigation
SL = Screening Level
TCE = trichloroethene
U = non detect value
UJ = estimated non detect value

SW-01		
PCE	TCE	DCE
0.13 J	<0.50 U	<0.50 U
A-SS-01		
PCE	TCE	DCE
<0.011 U	<0.011 U	< 0.011 U

SW-16		
PCE	TCE	DCE
<0.50 U	<0.50 U	<0.50 U

SW-07		
PCE	TCE	DCE
2.9	<0.50 U	<0.50 U

SW-15		
PCE	TCE	DCE
14	0.32 J	<0.50 U

SW-22		
PCE	TCE	DCE
2.9	0.47 J	0.13 J

SW-14		
PCE	TCE	DCE
18	0.53	<0.50 U

SW-13		
PCE	TCE	DCE
1.8	0.37 J	<0.50 U

SW-21		
PCE	TCE	DCE
6.5	0.62	0.44 J
5.2	0.49 J	0.41 J

SW-11		
PCE	TCE	DCE
20	0.61	0.60

SW-27		
PCE	TCE	DCE
19	0.61	0.57
13	0.46 J	0.46 J

SW-31		
PCE	TCE	DCE
20	0.48 J	0.27 J

SW-06		
PCE	TCE	DCE
74	0.96	0.58

SW-30		
PCE	TCE	DCE
0.50	0.090 J	<0.50 U

SW-36		
PCE	TCE	DCE
1.2	2.3	0.69

SW-46		
PCE	TCE	DCE
2.4	<0.50 U	<0.50 U

SW-44		
PCE	TCE	DCE
2.2	<0.50 U	<0.50 U

SW-43		
PCE	TCE	DCE
4.1	0.10 J	<0.50 U

SW-48		
PCE	TCE	DCE
<0.50 U	<0.50 U	<0.50 U

SW-08		
PCE	TCE	DCE
7.5	0.13 J	<0.50 U

SW-35		
PCE	TCE	DCE
82	0.67	0.54

SW-12		
PCE	TCE	DCE
23	0.39 J	0.12 J
17	0.36 J	<0.50 U

SW-29		
PCE	TCE	DCE
26	0.28 J	<0.50 U

SW-23		
PCE	TCE	DCE
25	0.46 J	0.15 J
22	0.47 J	<0.50 U

SW-26		
PCE	TCE	DCE
23	0.30 J	<0.50 U
A-SS-26		
PCE	TCE	DCE
0.022	<0.01 U	<0.01 U

SW-09		
PCE	TCE	DCE
19	0.88	0.11 J
A-SS-09		
PCE	TCE	DCE
<0.01 U	<0.01 U	<0.01 U

SW-19		
PCE	TCE	DCE
0.18 J	<0.50 U	<0.50 U

SW-47		
PCE	TCE	DCE
<0.50 U	<0.50 U	<0.50 U

SW-04		
PCE	TCE	DCE
27	0.34 J	0.19 J

SW-40		
PCE	TCE	DCE
28	0.38 J	0.18 J

SW-42		
PCE	TCE	DCE
16	0.19 J	<0.50 U

SW-33		
PCE	TCE	DCE
35	0.78	0.15 J

SW-34		
PCE	TCE	DCE
13	0.27 J	0.13 J

SW-50		
PCE	TCE	DCE
6.3	0.13 J	<0.50 UJ

Our Lady of Lourdes Catholic School
Judge Memorial Catholic High School
Our Lady of Lourdes Spring
Benson Spring
The McGillis School
Mount Olivet Cemetery
Utah Army National Guard
Salt Lake City Sports Complex
Mount Olivet Irrigation Well
EPA-MW-03
EPA-MW-01S
EPA-MW-01D
EPA-MW-02
Former USFS Helicopter Pad
Rowland Hall St Mark's School
EPA-MW-04
Carmen B Pingree Center
Sunnyside Park
East High School
Smith Spring
Dry Gulch
Bowen Spring
Red Butte Creek
East Bench Fault
East Bench Fault Spur
HAWTHORNE AVE
600 S
PARK ST
ELY PL
HARMONY CT
SEGO AVE
GRAND ST
1000 E
1100 E
BRIXEN CT
700 S
LOWELL AVE
ELIZABETH ST
1200 E
DOUGLAS ST
UNIVERSITY ST
1300 E
900 S
900 E
LINCOLN ST
ALPINE PL
20
40
50
30
10
SUNNYSIDE AVE
AMANDA AVE
HARVIEW AVE
GREENWOOD TER
PARK ROW ST
VALDEZ DR
GUARDSMAN WAY
HUBBARD AVE
DIESTEL RD
GILMER DR
1400 E
THORNTON AVE
BELMONT AVE
WILLIAMS AVE
MICHIGAN AVE
HERBERT AVE
YALE AVE
INGLEWOOD CT
PRINCETON AVE
LAIRD AVE
800 E
WINDSOR ST
NAYLOR CT
LYMAN CT
MCCLELLAND ST
NORMANDIE CIR
1500 E
HARVARD AVE
YALECREST AVE
MILITARY DR

0 150 300 600
Feet

FIGURE 6-2 SURFACE WATER SAMPLING AND SOIL SAMPLING RESULTS (2016)
700 South 1600 East PCE Plume, AOU-1: East Side Springs
Remedial Investigation Report
Salt Lake City, Utah

US Department of Veterans Affairs

DATUM:	DATE 6-15-18	SHEET
NAD83	DWN. BP	1
PROJECTION:	SCALE 1" = 600'	of
Transverse Mercator	APPRVD.	1

File: Albuquerque EA \\lovetongis\GISdata\Federal\West\Utah\SaltLakeCity_VeteransAffairs\MXD\RI Report\Fig 6-2 SW Sampling Results.mxd bpawling 6/8/2018 9:44:37 AM

TABLE 5-5
Surface Water Sampling Locations
700 South 1600 East PCE Plume AOU-1: East Side Springs Remedial Investigation Report
Department of Veterans Affairs Salt Lake City Health Care System

Location ID	Type of Surface Water Sampled	Sample Location Specified in RI Work Plan [1]	Sample Location Deviates From RI Work Plan [1]?	Reason for Moving Sample Location
SW-01	Seep	Spring SL33	Yes	Homeowner indicated there were no seeps or springs on property, therefore the location was moved to a property with an active seep or spring
SW-04	Spring-fed ponds	Spring SL30	No	NA
SW-06	Spring-fed sump	Spring SL28	No	NA
SW-07	Spring box	Spring SL85	Yes	Homeowner indicated there were no seeps or springs on property, therefore the location was moved to a property with an active seep or spring
SW-08	Seep	Spring SL25	Yes	Homeowner indicated there were no seeps or springs on property, therefore the location was moved to a property with an active seep or spring
SW-09	Seep	Spring SL28, near residential sampling location IA-13/SG-13	Yes	Based on the RIWP figure, this location should be collocated with SL23 or SL24
SW-11	Seep	Spring SL82, near residential sampling location IA-15/SG-15	No	NA
SW-12	Spring	Spring SL18, near residential sampling location IA-14/SG-14	No	NA
SW-13	Seep	Spring SL88, near residential sampling location IA-16/SG-16	Yes	Moved sample near SL27 because it was closer to indoor air sampling location 0001H on parcel to the north
SW-14	Spring-fed sump	Spring SL100	No	NA
SW-15	Seep	Benson Spring	No	NA
SW-16	Spring (Our Lady of Lourdes)	Our Lady of Lourdes Spring	No	NA
SW-19	Spring (Bowen)	Spring SL35	Yes	Homeowner indicated there were no seeps or springs on property, therefore the location was moved to a property with an active seep or spring that was confirmed as Bowen Spring
SW-21	Spring-fed sump	NA	NA	NA
SW-22	Spring-fed sump	NA	NA	NA
SW-23	Spring-fed sump	NA	NA	NA

TABLE 5-5
Surface Water Sampling Locations
700 South 1600 East PCE Plume AOU-1: East Side Springs Remedial Investigation Report
Department of Veterans Affairs Salt Lake City Health Care System

Location ID	Type of Surface Water Sampled	Sample Location Specified in RI Work Plan [1]	Sample Location Deviates From RI Work Plan [1]?	Reason for Moving Sample Location
SW-26	Seep	NA	NA	NA
SW-27	Seep	NA	NA	NA
SW-29	Spring	NA	NA	NA
SW-30	Spring (Smith)	NA	NA	NA
SW-31	Seep	NA	NA	NA
SW-33	Seep	NA	NA	NA
SW-34	Spring	NA	NA	NA
SW-35	Seep	NA	NA	NA
SW-36	Seep	NA	NA	NA
SW-40	Spring-fed sump	NA	NA	NA
SW-42	Spring	NA	NA	NA
SW-43	Spring	NA	NA	NA
SW-44	Spring	NA	NA	NA
SW-46	Spring	NA	NA	NA
SW-47	Creek (Red Butte)	NA	NA	NA
SW-48	Spring (Benson)	NA	NA	NA
SW-50	Spring	NA	NA	NA

NOTES:
1. First Environment. 2015a. Final Remedial Investigation Work Plan, AOU-1: East Side Springs, 700 South 1600 East PCE Plume, Salt Lake City, Utah. July.
ID = Identification.
NA = Not applicable. Sample locations were not defined within the RI Work Plan.
RIWP = Remedial Investigation.

Table 17. Surface Water Sampling Locations

2018 OU-2 Data Summary Report

Location ID	Location Type	Approximate Address	Sample Method	Northing (feet)	Easting (feet)	Comment
Seep/Spring Locations						
SW-06	Decorative Well	[redacted]	Peristaltic Pump	7441992.663	1541334.318	
SW-34	Spring	[redacted]	Peristaltic Pump	7441495.553	1541442.897	
SW-35	Seep	[redacted]	Peristaltic Pump	7442664.485	1541000.308	
SW-39	Storm Water Drain	[redacted]	Peristaltic Pump	7441891.751	1541279.016	
SW-48	Pond Inlet (Benson Spring)	[redacted]	Grab	7443316.646	1541297.116	
SW-53	Pond Inlet	[redacted]	Grab	7441888.372	1541374.951	New Location added in 2018
Red Butte Creek Locations						
SW-47	Red Butte Creek	[redacted]	Grab	7440350.580	1541979.127	
SW-51	Red Butte Creek	[redacted]	Grab	7440309.741	1541185.251	New Location added in 2018
SW-52	Red Butte Creek	[redacted]	Grab	7440347.941	1540859.677	New Location added in 2018

Notes

Northing / Easting measured using the NAD 83 State Plain Coordinate System; UT Central Zone

ID = Identification

Memorandum

To: *Josephine Newton-Lund, PMP, Senior Project Manager, Environmental Branch, U.S. Army Corps of Engineers*
Shannon Smith, PE, Program Manager, Veterans Health Administration

From: *Nathan Smith, PMP, Senior Project Manager, CDM Federal Programs Corporation*
Neil Smith, Project Technical Leader, CDM Federal Programs Corporation

Date: *March 19, 2021*

Subject: ***Plan for Soil Vapor Probe Sampling and Indoor Air Sampling at Buildings 6 and 7***
700 South 1600 East Tetrachloroethene Plume Superfund Site,
Salt Lake City, Utah

On behalf of the U.S. Army Corps of Engineers (USACE), CDM Federal Programs Corporation (CDM Smith) prepared this plan for soil vapor sampling of previous and recently installed soil vapor probes and indoor air sampling at Buildings 6 and 7 at the 700 South 1600 East Tetrachloroethene (PCE) Plume Site located near the George E. Wahlen Veterans Affairs Medical Center (VAMC) in Salt Lake City, Utah. This plan adds details for sampling of soil vapor and indoor air, as presented in the Phase 2 Field Sampling Plan (FSP). The Phase 2 FSP is an appendix to the OU1 Remedial Investigation Work Plan (RIWP) (CDM Smith 2020).

1.0 Scope of Work

This plan details the collection of samples from soil vapor probes and indoor air within Buildings 6 and 7. The objective for the collection of soil vapor volatile organic compound (VOC) data is the delineation of the VOC soil vapor plume to support the data quality objectives D1 (source mass) and D2 (source area vapor intrusion risk), as presented in Table 4-1 of the RIWP (CDM Smith 2020). The soil vapor data will be evaluated for the following:

- Assess whether there is evidence of sufficient source mass in the vadose zone to further consider it as an ongoing source of PCE to groundwater.
- Delineate the extent of the soil vapor plume to assess the potential for vapor intrusion in nearby structures.

The objective for the collection of indoor air within Buildings 6 and 7 is to evaluate the potential for vapor intrusion and thereby support the data quality objective D2 (source area vapor intrusion risk). The indoor air data will be evaluated for the following:

- Further assess the potential for vapor intrusion occurring at Buildings 6 and 7 and determine if an unacceptable risk is present.

2.0 Soil Vapor Sampling

This plan includes the rationale and description of work for soil vapor probe sampling. As part of the 2018 OU-2 investigation, the Veterans Health Administration (VHA) installed and sampled 47 soil vapor probes at 43 locations around the VAMC and along the sewer line from the VAMC through Sunnyside Park (Jacobs 2019a). Location and depth information for the soil vapor probes are presented in **Table 1** and shown in **Figures 1** and **2**. The soil VOC sample results are provided in **Table 2** (Jacobs 2019). The VHA sampled these locations using a combination of HAPSITE® gas chromatograph/mass spectrometer (GC/MS) and EPA method TO-15 using SUMMA canisters. The soil gas samples between Buildings 6 and 7 (SG-03, SG-04, SG-05, and SG-06) had the highest concentrations of PCE during the December 2018 sampling. The soil gas samples taken at manhole MH-22658 (along the sewer line in Sunnyside Park) also had elevated PCE concentrations.

In June and July 2019, the VHA installed an additional 11 soil vapor probes and 22 sub-slab vapor pins near Buildings 6 and 7. In July 2019, these 33 new locations (along with 28 of the locations installed in 2018) were sampled and screened using the HAPSITE. Ten of the samples were also analyzed using EPA method TO-15. This event identified elevated PCE concentrations in the sub-slab samples below the basements of Buildings 6 and 7 (**Table 2**).

Between March and December 2020, CDM Smith installed 23 additional soil vapor probes at 12 monitoring well locations during the 2020 Phase 1 and Phase 2 drilling field investigations. The locations installed in 2020 have not yet been sampled. Location and depth information for the soil vapor probes is presented in **Table 1**.

A total of 54 locations including the 23 recently installed locations, will be sampled to evaluate potential source area mass based on lateral and vertical distribution of VOCs in soil vapor and identify potential areas of vapor intrusion risk. The soil vapor samples will be collected following the CDM Smith SOP 1-8 – Vapor Sampling Using a SUMMA Canister (CDM Smith 2020) and analyzed by EPA method TO-15 for VOCs. If any existing soil vapor probes cannot be located or are found damaged, these locations will not be sampled.

3.0 Buildings 6 and 7 Indoor Air Sampling

In January 2019, the VHA collected indoor air samples at Buildings 6, 7, 13, and 20 for PCE, TCE, and DCE analysis by HAPSITE (Jacobs 2019b). Sampling results from this investigation are included in **Attachment 1**. Eighteen sample locations were selected in Building 6; seven locations had detectable PCE and six locations had detectable TCE. The highest PCE concentration detected was 915 µg/m^3, and the highest TCE concentration was 7.13 µg/m^3. Prior to the collection of further indoor air samples, the building was screened for potential indoor air sources and all identified sources were removed. These locations had significantly reduced PCE concentrations when sampled after removal of suspected indoor PCE sources. After the identified sources were removed, the highest PCE concentration was 25.46 µg/m^3 and the highest TCE concentration was 2.54 µg/m^3. Sixteen sample locations were selected in Building 7, and nine of the locations had detectable PCE below the commercial/industrial indoor air risk-based screening level (RBSL) of 47 µg/m^3. None of

the locations sampled at Buildings 13 or 20 had detectable PCE during this screening event (Jacobs 2019b).

In September 2019, the VHA conducted follow-up sampling at nine locations in Building 6 and seven locations in Building 7 (**Table 3**). These locations are shown in **Attachment 2** and **Attachment 3**. This round of sampling used 24-hour SUMMA canister sampling and analysis by EPA method TO-15. Eight of the sample locations in Building 6 had detectable PCE, but all sample results were less than the RBSL of 47 $\mu g/m^3$. Six of the sampling locations in Building 7 had detectable PCE at concentrations less than 1 $\mu g/m^3$. Six samples also had detectable TCE, but only location B7-IA05 (8 $\mu g/m^3$) exceeded the RBSL of 3 $\mu g/m^3$.

A subset of locations will be selected from the September 2019 sampling event. In Building 6, one basement location (B6-IA08) and one ground floor location in occupied office space (B6-IA03) will be sampled. Building 6 sampling location are shown on **Figure 3**. In Building 7, the one basement location (B7-IA05) and one occupied space location (B7-IA02) will be sampled. Building 7 locations are shown on **Figure 4**. This round of sampling will use 24-hour SUMMA canister sampling analyzed by EPA method TO-15. An indoor source assessment will be conducted prior to collecting the indoor air samples, and suspected indoor sources will be removed prior to sampling.

4.0 References

CDM Smith. 2020. *Phase 2 Remedial Investigation Work Plan, Operable Unit 1, 700 South 1600 East PCE Plume, Salt Lake City, Utah*. Prepared for U.S. Army Corps of Engineers.

Jacobs. 2019a. 2018 *OU-2 Data Summary Report, Operable Unit 2 Remedial Investigation 700 South 1600 East PCE Plume, Salt Lake City, Utah*. Prepared for the U.S. Army Corps of Engineers.

Jacobs. 2019b. 2019 *Indoor Air Data Summary Report, Operable Unit 2 Remedial Investigation 700 South 1600 East PCE Plume, Salt Lake City, Utah*. Prepared for the U.S. Army Corps of Engineers.

Figures

Figure 1 Site Map

Figure 2 Buildings 6 and 7 area soil vapor sampling locations

Figure 3 Building 6 indoor air sampling locations

Figure 4 Building 7 indoor air sampling locations

Tables

Table 1 Soil vapor monitoring probe locations

Table 2 Results from soil vapor sampling

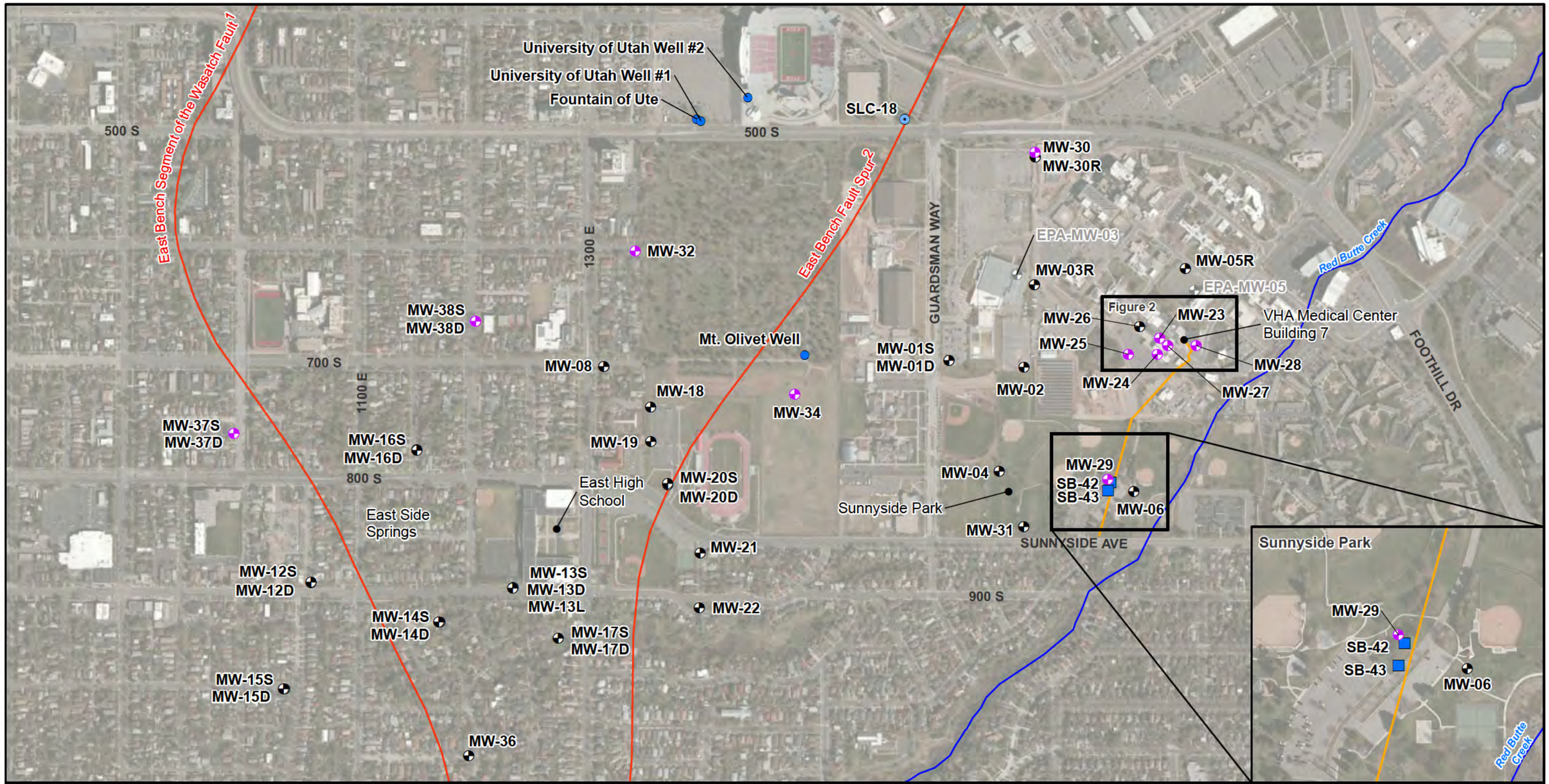
Table 3 Indoor air sampling results September 2019

Attachments

Attachment 1 HAPSITE indoor air sampling results tables January 2019

Attachment 2 Building 6 24-Hour Indoor Air TO-15 Sample Locations

Attachment 3 Building 7 24-Hour Indoor Air TO-15 Sample Locations



Legend

- Monitoring Well
- Monitoring Well with Soil Vapor
- Sampling Location
- Decommissioned Monitoring Well
- Drinking Water Supply Well
- Irrigation Well
- Landmark
- Red Butte Creek
- Sewer Line
- Fault Line

Notes:
(1) Location of University of Utah Well #1 is approximate; well is located less than 100 feet east of Fountain of Ute.

OU = operable unit
PCE = tetrachloroethene
VHA = Veterans Health Administration

[1] Davis, F.D. 1983. Geologic Map of the Central Wasatch Front, Utah. Utah Geological and Mineral Survey. Map 54-A – Wasatch Front Series. May.

[2] Personius, S.F. and Scott, W.E. 2009. Surficial Geologic Map of the Salt Lake City Segment and Parts of Adjacent Segments of the Wasatch Fault Zone, Davis, Salt Lake, and Utah Counties, Utah

N

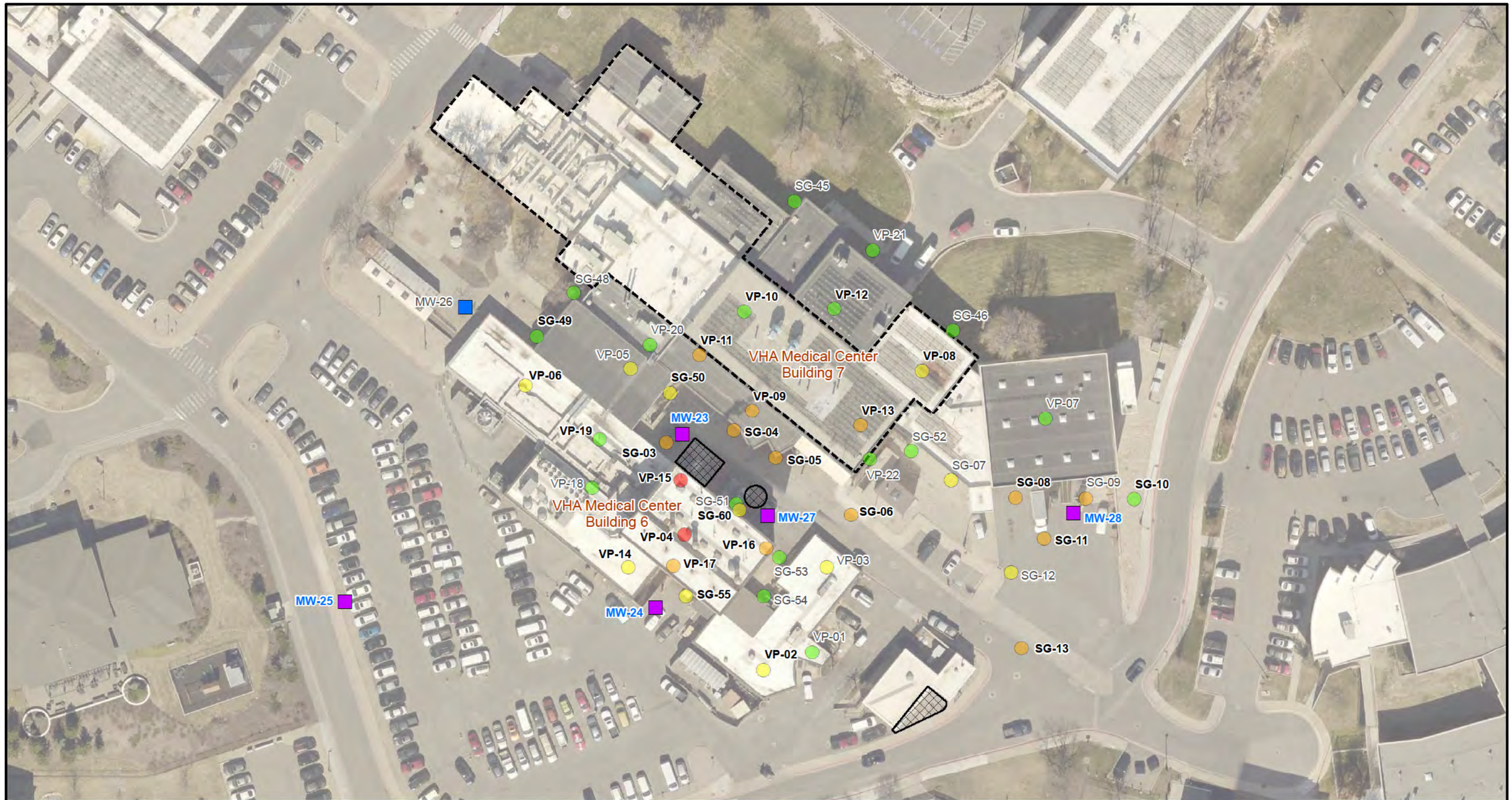
0 500 1,000 Feet

CDM Smith

Figure 1
Site Map

Field Modification
700 South 1600 East PCE Plume
Salt Lake City, Utah

File Path: J:\238824_VA_Medical_Salt_Lake\MXD\Sampling_2021\MFM_2021\Fig1_SewerLineSamples.mxd WAGNERA 3/9/2021



- Boring Location - Phase 1
- Monitoring Well with Soil Vapor
- PCE Soil Vapor Concentrations < 10% Screening Level
- PCE Soil Vapor Concentrations between 10% of Screening Level and Screening Level
- PCE Soil Vapor Concentrations > Screening Level
- PCE Soil Vapor Concentrations > 10 times Screening Level
- Perimeter of Building 7 in 1981
- Underground Storage Tank or Foundation

Notes:
SG = soil gas probe
VP = vapor pin. Locations for vapor pins are approximate.
-Color coding based on the maximum of the December 2018 or March 2019 TO-15 / HAPSITE data and July 2019 HAPSITE data for each location.
The screening level for PCE in soil gas is 600 µg/m³.
-Locations labeled in gray are not planned for further sampling at this time.

N

0 25 50 Feet

CDM Smith

Figure 2
Soil Vapor Samples
Building 6/7 Area

Field Modification
700 South 1600 East PCE Plume
Salt Lake City, Utah

J:\238824_VA_Medical_Salt_Lake\MXD\Sampling_2021\MFM_2021\Fig2_SewerLineSamples_Bldg6_7.mxd WAGNERA 3/19/2021 4:31:20 PM

Potential indoor air samples locations (ground level)
Potential indoor air samples locations (basement)
Basement

Figure 3
Building 6 Indoor Air Sampling

N
0 25 Feet
1 inch = 25 feet

CDM Smith

Field Modification
700 South 1600 East PCE Plume
Salt Lake City, Utah

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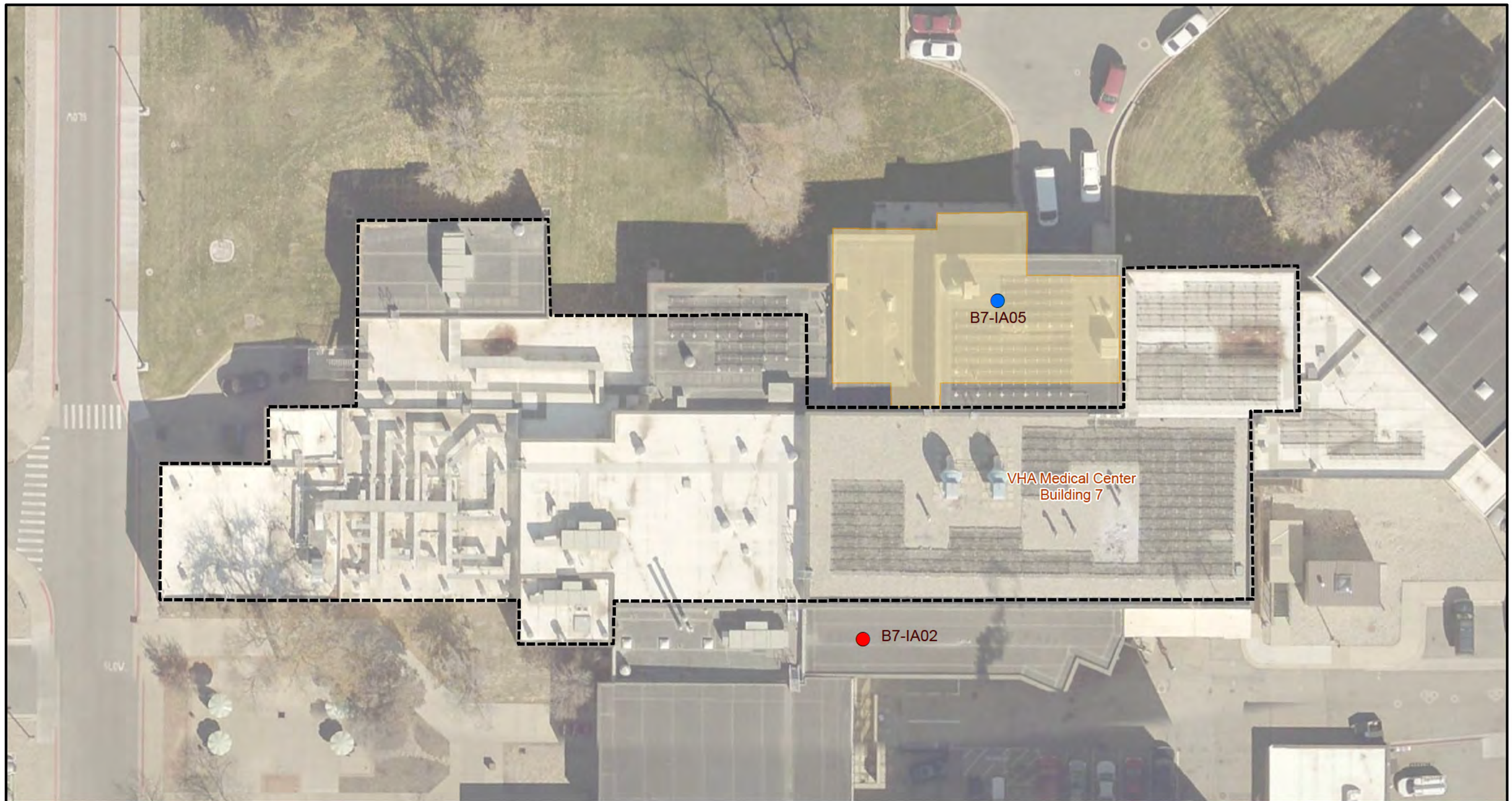


Potential indoor air samples locations (ground level)
Potential indoor air samples locations (basement)
Basement
Perimeter of Building 7 in 1981

Figure 4
Building 7 Indoor Air Sampling

N
0 30 Feet
1 inch = 30 feet

CDM Smith

Field Modification
700 South 1600 East PCE Plume
Salt Lake City, Utah

Table 1. Soil Vapor Probe Locations and Sample Depths

Location ID	Sample Area	Installation Date	Northing (feet)	Easting (feet)	Surface Elevation (ft amsl)	Sample Depth (ft bgs)
MW-30	VA North Area	6/15/2020	7445073.45	1545424.98	4723.07	30
SG-03	VA Building 7 Area	12/10/2018	7443809.00	1546268.75	4712.59	7.8 - 8.1
SG-04		12/11/2018	7443816.69	1546312.02	4712.07	5.5 - 5.8
SG-05		12/11/2018	7443799.27	1546338.69	4712.11	5.9 - 6.3
SG-06		12/10/2018	7443762.75	1546386.92	4712.83	5.8 - 6.1
SG-07		12/4/2018	7443784.75	1546450.84	4714.08	5.2 - 5.5
SG-08		12/13/2018	7443773.66	1546492.04	4712.58	3.0 - 3.3
SG-09		12/13/2018	7443773.33	1546536.79	4712.53	2.3 - 2.7
SG-10		12/14/2018	7443772.95	1546567.85	4717.55	6.3 - 6.8
SG-11		12/12/2018	7443747.47	1546510.21	4713.06	4.7 - 5.0
SG-12		12/12/2018	7443725.84	1546489.30	4713.04	4.8 - 5.2
SG-13		12/11/2018	7443677.39	1546495.82	4711.88	5.3 - 6.0
SG-14		12/14/2018	7443627.33	1546384.14	4709.79	7.4 - 7.8
SG-15		12/4/2018	7443603.43	1546481.25	4711.53	8.0 - 8.3
SG-45		6/26/2019	7443963.21	1546350.55	*	7 - 7.5
SG-46		6/26/2019	7443880.46	1546451.98	*	4.8 - 5.2
SG-48		6/26/2019	7443904.46	1546209.77	*	5.0 - 5.5
SG-50		6/27/2019	7443840.69	1546271.18	*	6.7 - 7.3
SG-52		6/27/2019	7443803.46	1546425.45	*	4.6 - 5.1
VP-07	VHA Building 7 Interior - Ground Level		7443824.09	1546511.16	*	Sub-Slab
VP-08			7443854.91	1546432.21	*	Sub-Slab
VP-09			7443829.16	1546323.72	*	Sub-Slab
VP-10			7443892.50	1546318.66	*	Sub-Slab
VP-11			7443865.08	1546289.95	*	Sub-Slab
VP-20		6/18/2019	7443871.29	1546258.19	*	Sub-Slab
VP-12	VHA Building 7 Interior - Basement		7443894.26	1546376.10	*	Sub-Slab
VP-13			7443820.00	1546392.95	*	Sub-Slab
VP-21	VHA Building 7 Exterior	6/18/2019	7443931.96	1546400.75	*	Sub-Slab
VP-22			7443798.36	1546398.78	*	Sub-Slab
SG-49	Building 6 Area	6/27/2019	7443876.64	1546186.02	*	6.1 - 6.7
SG-51		6/28/2019	7443769.87	1546313.33	*	8.8 - 9.3
SG-53		7/1/2019	7443735.42	1546341.14	*	4.5 - 5.0
SG-54		7/2/2019	7443710.81	1546331.09	*	4.5 - 5.1
SG-55		7/2/2019	7443710.81	1546281.23	*	4.5 - 5.0
SG-60			7443765.87	1546315.60	*	3.8 - 4.3
VP-01	VHA Building 6 Interior - Ground Level		7443674.65	1546362.13	*	Sub-Slab
VP-02			7443663.25	1546330.89	*	Sub-Slab
VP-03			7443729.11	1546371.42	*	Sub-Slab
VP-05			7443856.18	1546245.83	*	Sub-Slab
VP-06			7443845.41	1546178.70	*	Sub-Slab
VP-18			7443780.01	1546221.38	*	Sub-Slab
VP-19			7443810.95	1546225.98	*	Sub-Slab
VP-04	VHA Building 6 Interior - Basement		7443750.08	1546280.28	*	Sub-Slab
VP-14			7443729.23	1546244.48	*	Sub-Slab
VP-15		6/18/019	7443784.84	1546278.00	*	Sub-Slab
VP-16		6/20/2019	7443740.98	1546332.69	*	Sub-Slab
VP-17		6/20/2019	7443730.05	1546273.15	*	Sub-Slab
MW-23	Building 6/7 Area	4/20/2020	7443809.38	1546280.59	4712.47	130-140
MW-24		5/20/2020	7443698.74	1546266.48	4709.77	32
						60
						104
						130
MW-25		5/10/2020	7443676.94	1546071.97	4703.04	28
						100
MW-27		3/26/2020	7443766.76	1546337.14	4712.61	28
						48
						75
						113
						155

Table 1. Soil Vapor Probe Locations and Sample Depths

Location ID	Sample Area	Installation Date	Northing (feet)	Easting (feet)	Surface Elevation (ft amsl)	Sample Depth (ft bgs)
MW-28	Building 6/7 Area	3/20/2020	7443764.76	1546532.92	4712.80	24
						48
						118
SB-42	Sunnyside Park	12/7/2018	7442828.84	1545936.88	4679.06	6 - 7
						12 - 13
						16 - 17
						24.8 - 26
SB-43		12/7/2018	7442771.79	1545921.39	4676.97	7 - 8
						14.7 - 15.7
MW-29		6/7/2020	7442845.95	1545935.59	4679.35	42
						66
						98
MW-34	Rowland Hall School	7/14/2020	7443498.84	1543745.66	4623.61	20
MW-32	East Side Springs	7/1/2020	7444416.40	1542692.62	4566.22	18
MW-37		11/13/2020	7443160.46	1539938.63	4348.36	8
MW-38		11/16/2020	7443931.79	1541593.58	4498.56	8

Notes

Shaded cells are planned for sampling in March 2021.

(1) Point not installed as utilities could not be located in proposed sample location due to surface obstacles

Northing / Easting measured using the NAD 83 State Plane Coordinate Sytem; UT Central Zone

Surface and top of casing elevations measured using the NAVD 88 vertical datum

amsl = above mean sea level

bgs = below ground surface

ft = feet

* = Elevation information not provided

Table 2. Soil Gas and Soil PCE and TCE Concentrations

Sample Area	Location ID	Sample Depth (ft bgs)	HAPSITE Run Date	HAPSITE (µg/m³)		TO-15 (µg/m³)	
				PCE	TCE	PCE	TCE
VA North Area	SG-01	5.9 - 6.25	12/20/2018	7.3	< 2.7	-	-
	SG-01	5.9 - 6.3	7/12/2019	19	< 2.7	-	-
	SG-02	5.5 - 5.8	12/20/2018	21.8	< 2.7	-	-
	SG-02	5.5 - 5.8	7/12/2019	41	< 2.7	-	-
VA Building 6 and 7 Area	SG-03	7.8 - 8.1	12/17/2018	**2,887**	< 27	-	-
	SG-03	7.8 - 8.1	7/10/2019	**3,800**	< 27	-	-
	SG-04	5.5 - 5.8	12/17/2018	**1,045**	6.3	-	-
	SG-04	5.5 - 5.8	7/10/2019	**2,400**	24	-	-
	SG-05	5.9 - 6.3	12/17/2018	**3,039**	< 27	**2,900**	11 J
	SG-05	5.9 - 6.3	7/10/2019	**5,300**	< 27	**4,700**	19
	SG-05 (dup)			-	-	**4,400**	18
	SG-06	5.8 - 6.1	12/17/2018	**3,129**	31.3	-	-
	SG-06	5.8 - 6.1	7/16/2019	**2,000**	30	-	-
	SG-07	5.2 - 5.5	12/10/2018	212.2	< 2.7	-	-
	SG-07	5.2 - 5.5	7/9/2019	240	< 2.7	-	-
	SG-08	3.0 - 3.3	12/17/2018	331.2	< 2.7	180	0.37 J
	SG-08	3.0 - 3.3	7/9/2019	**1,300**	< 5.4	-	-
	SG-09	2.3 - 2.7	12/17/2018	114	< 2.7	-	-
	SG-09	2.3 - 2.7	7/9/2019	**1,100**	< 5.4	-	-
	SG-10	6.3 - 6.8	12/17/2018	14.8	< 2.7	-	-
	SG-10	6.3 - 6.8	7/9/2019	9.5	< 2.7	-	-
	SG-11	4.7 - 5.0	12/17/2018	344.7	< 2.7	240	0.43 J
	SG-11	4.7 - 5.0	7/9/2019	**1,200**	< 5.4	-	-
	SG-12	4.8 - 5.2	12/17/2018	123.8	< 2.7	-	-
	SG-12	4.8 - 5.2	7/12/2019	380	< 2.7	-	-
	SG-13	5.3 - 6.0	12/17/2018	546.8	< 2.7	360	0.86 J
	SG-13	5.3 - 6.0	7/12/2019	**1,600**	< 11	-	-
	SG-14	7.4 - 7.8	12/17/2018	338.5	< 2.7	-	-
	SG-14	7.4 - 7.8	7/12/2019	290	< 2.7	-	-
	SG-15	8.0 - 8.3	12/10/2018	41.8	< 2.7	-	-
	SG-15	8.0 - 8.3	7/12/2019	52	< 2.7	-	-
	SG-45	7 - 7.5	7/9/2019	23	< 2.7	-	-
	SG-46	4.8 - 5.2	7/9/2019	12	< 2.7	-	-
	SG-48	5.0 - 5.5	7/9/2019	10	< 2.7	-	-
	SG-49	6.1 - 6.7	7/9/2019	13	< 2.7	-	-
	SG-50	6.7 - 7.3	7/10/2019	420	2.9	-	-
	SG-51	8.8 - 9.3	7/10/2019	45	< 2.7	33	1.4 J
	SG-52	4.6 - 5.1	7/9/2019	26	< 2.7	11	< 0.34
	SG-53	4.5 - 5.0	7/10/2019	49	< 2.7	-	-
	SG-54	4.5 - 5.1	7/10/2019	26	< 2.7	25	< 0.35
	SG-55	4.5 - 5.0	7/9/2019	62	< 2.7	-	-
	SG-60	3.8 - 4.3	7/16/2019	450	20	-	-

Table 2. Soil Gas and Soil PCE and TCE Concentrations

Sample Area	Location ID	Sample Depth (ft bgs)	HAPSITE Run Date	HAPSITE (µg/m^3)		TO-15 (µg/m^3)	
				PCE	TCE	PCE	TCE
Building 6 Subslab	VP-01	Sub-Slab	7/16/2019	39	< 2.7	-	-
	VP-02	Sub-Slab	7/16/2019	520	< 2.7	-	-
	VP-03	Sub-Slab	7/16/2019	330	< 2.7	-	-
	VP-05	Sub-Slab	7/11/2019	77	< 2.7	-	-
	VP-06	Sub-Slab	7/11/2019	28	< 2.7	-	-
	VP-18	Sub-Slab	7/16/2019	46	< 27	-	-
	VP-19	Sub-Slab	7/11/2019	< 3.4	< 2.7	-	-
	VP-04	Sub-Slab	7/16/2019	**46,000**	54	**20,000**	**35 J**
	VP-14	Sub-Slab	7/16/2019	110	< 2.7	-	-
	VP-15	Sub-Slab	7/16/2019	**11,000**	180	**21,000**	**160**
	VP-16	Sub-Slab	7/16/2019	**5,200**	< 27	**3,600**	5.7 J
	VP-17	Sub-Slab	7/16/2019	**1,800**	< 11	**1,400**	2 J
Building 7 Subslab	VP-07	Sub-Slab	7/11/2019	47	< 2.7	-	-
	VP-08	Sub-Slab	7/11/2019	190	< 2.7	-	-
	VP-09	Sub-Slab	7/11/2019	**840**	< 5.4	-	-
	VP-10	Sub-Slab	7/11/2019	29	< 2.7	-	-
	VP-11	Sub-Slab	7/11/2019	580	< 2.7	440	3.4
	VP-20	Sub-Slab	7/11/2019	22	< 2.7	17	0.33 J
	VP-12	Sub-Slab	7/11/2019	35	< 2.7	-	-
	VP-13	Sub-Slab	7/11/2019	640	< 2.7	-	-
	VP-21	Sub-Slab	7/9/2019	< 3.4	< 2.7	-	-
	VP-22	Sub-Slab	7/11/2019	22	< 2.7	-	-
VA Sewer Line Area	SG-16[a]	-	Not Sampled			-	-
	SG-17	6.3 - 6.7	12/10/2018	75.5	< 2.7	-	-
	SG-17	6.3 - 6.7	7/10/2019	190	< 2.7	-	-
	SG-18	4.7 - 5.2	12/10/2018	18.0	< 2.7	-	-
	SG-18	4.7 - 5.2	7/10/2019	49	< 2.7	-	-
	SG-19	3.8 - 4.1	12/10/2018	15.1	< 2.7	-	-
	SG-19	3.8 - 4.1	7/10/2019	110	< 2.7	-	-
	SG-20	6.1 - 6.5	12/10/2018	21.2	< 2.7	-	-
	SG-20	6.1 - 6.5	7/10/2019	42	< 2.7	-	-
	SG-21	7.8 - 8.1	12/20/2018	56.3	< 2.7	-	-
	SG-21	7.8 - 8.1	7/10/2019	30	< 2.7	-	-
	SG-22	5.3 - 5.6	12/10/2018	14.0	< 2.7	-	-
	SG-22	5.3 - 5.6	7/10/2019	14	< 2.7	-	-
	SG-23	5.8 - 6.1	12/20/2018	14.1	< 2.7	-	-
	SG-23	5.8 - 6.1	7/10/2019	10	< 2.7	-	-
Sunnyside Park	SG-24[b]	14 - 14.5	12/3/2018	19.0	< 2.7	-	-
	SG-25[b]	13.5 - 14.5	12/3/2018	187.1	< 2.7	-	-
	SG-26[b]	14 - 15	12/3/2018	212.5	< 2.7	-	-
	SG-27[b]	14 - 15	12/3/2018	181.0	< 2.7	-	-
	SG-28[b]	14 - 15	12/3/2018	133.6	< 2.7	9	< 0.31
	SG-29[b]	14 - 15	12/4/2018	49.2	< 2.7	-	-
	SG-30[b]	14 - 15	12/4/2018	159.8	< 2.7	-	-
	SG-31[b]	14 - 15	12/4/2018	115.2	< 2.7	-	-
	SG-32	14 - 15	12/4/2018	310.2	< 2.7	-	-
	SG-33	14 - 15	12/4/2018	**1,281**	< 2.7	-	-
	SG-34	14 - 15	12/4/2018	**819.0**	< 8.1	550	1.1 J
	SG-35	14 - 15	12/5/2018	554.7	< 5.4	330	1.3 J
	SG-36	13 - 15	12/6/2018	462.3	< 2.7	-	-
	SG-37	14 - 15	12/5/2018	170.4	< 2.7	91	< 0.31
	SG-38	14 - 15	12/6/2018	10.4	< 2.7	-	-
	SG-39	14 - 15	12/6/2018	< 34	< 2.7	-	-
	SG-40	14 - 15	12/6/2018	305.8	< 2.7	-	-
	SG-41	14 - 15	12/6/2018	**1,387**	< 8.1	-	-
	SB-42	6 - 7	12/10/2018	144.5	< 2.7	-	-
		12 - 13	12/10/2018	513.6	5.4	-	-
		16 - 17	12/10/2018	**819.4**	9.5	-	-
		24.8 - 26	12/10/2018	**1201**	18.8	-	-

Table 2. Soil Gas and Soil PCE and TCE Concentrations

Sample Area	Location ID	Sample Depth (ft bgs)	HAPSITE Run Date	HAPSITE (µg/m^3)		TO-15 (µg/m^3)	
				PCE	TCE	PCE	TCE
Sunnyside Park	SB-42A	6 - 7	7/15/2019	330	< 2.7	-	-
	SB-42B	12 - 13	7/15/2019	**1,100**	< 27	-	-
	SB-42C	16 - 17	7/15/2019	210	< 2.7	-	-
	SB-42D	24.8 - 26	7/15/2019	370	< 2.7	-	-
	SB-43	7 - 8	12/10/2018	95.0	< 2.7	-	-
		14.7 - 15.7		376.0	< 2.7	330	3.7
		7 - 8	7/15/2019	150	< 2.7	-	-
		14.7 - 15.7	7/15/2019	330	< 2.7	-	-
	SG-44	14 - 15	12/6/2018	11.9	< 2.7	8.9	< 0.3

Notes

[a] Point not installed as utilities could not be located in proposed sample location due to surface obstacles
[b]HAPSITE PCE concentrations biased high due to PCE build-up in purge pump. All other locations were sampled via lung box.
Bolded values exceed the Industrial Vapor Instrusion Soil Gas Screening Level of 600 µg/m^3 (PCE) and 29.3 µg/m^3 (TCE)

µg/m^3 = micrograms per cubic meter
bgs = below ground surface
ID = identification
ft = feet
mg/kg = milligrams per kilogram
PCE = tetrachloroethylene
TCE = trichloroethylene

Table 3. Indoor Air Sampling Results - September 2019

Buildings 6 and 7	Analyte				Tetrachloroethene			Trichloroethene			cis-1,2-Dichloroethene		
	CAS				127-18-4			79-01-6			156-59-2		
	Risk-Based Screening Level[a] ($\mu g/m^3$)				47			3			No Toxicity Information		
	Tier 1 Removal Action Level[b] ($\mu g/m^3$)				180			8.8					
	Tier 2 Removal Action Level[c] ($\mu g/m^3$)				540			26					
Sample Type	Location ID	Floor	Sample Location Description	Date of Canister Collection	LOQ ($\mu g/m^3$)	Results ($\mu g/m^3$)	Lab Qualifier	LOQ ($\mu g/m^3$)	Results ($\mu g/m^3$)	Lab Qualifier	LOQ ($\mu g/m^3$)	Results ($\mu g/m^3$)	Lab Qualifier
Indoor Air	B6-IA01	Main	RPM's office	9/6/2019	0.9	**0.26**	**J**	0.9	**0.15**	**J**	0.9	0.13	U
Indoor Air	B6-IA02	Main	Adjacent to receptionist cubicle	9/6/2019	0.91	**0.3**	**J**	0.91	0.12	U	0.91	0.13	U
Indoor Air	B6-IA03	Main	???	9/6/2019	0.92	**0.39**	**J**	0.92	0.12	U	0.92	0.13	U
Indoor Air	B6-IA04	Main	???	9/17/2019	0.85	0.11	U	0.85	0.12	U	0.85	0.12	U
Indoor Air	B6-IA05	Main	South side of annex	9/6/2019	0.98	**0.24**	**J**	0.98	0.13	U	0.98	0.14	U
Indoor Air	B6-IA06	Main	Control room for boiler	9/6/2019	1	**0.32**	**J**	1	0.14	U	1	0.14	U
Indoor Air	B6-IA08	Basement	South end of basement boiler room	9/6/2019	0.82	**4.4**		0.82	0.11	U	0.82	0.12	U
Indoor Air	B6-IA09	Main	Room outside of maintenance supervisor's office	9/7/2019	1.2	**1.2**		1.2	0.16	U	1.2	0.16	U
Indoor Air	B6-IA90	Basement	North end of basement boiler room	9/8/2019	0.91	**5**		0.91	0.12	U	0.91	0.13	U
Outdoor Air	B6-OA02	Outdoor	South of annex	9/9/2019	1	**1.5**		1	0.14	U	1	0.15	U
Indoor Air	B7-IA01	Main	Hallway near east exit in animal lab	9/6/2019	0.8	**0.35**	**J**	0.8	0.11	U	0.8	0.11	U
Indoor Air	B7-IA02	Main	Laundry manager's office	9/6/2019	0.95	**0.33**	**J**	0.95	**0.96**		0.95	0.14	U
Indoor Air	B7-IA03	Main	East corner of loading dock area	9/17/2019	0.9	**0.15**	**J**	0.9	**0.47**	**J**	0.9	0.13	U
Indoor Air	B7-IA04	Main	Break Room?	9/6/2019	1.8	0.23	U	1.8	**0.83**	**J**	1.8	0.26	U
Indoor Air	B7-IA04	Main	East corner of loading dock area	9/17/2019	0.9	0.12	U	0.9	**0.44**	**J**	0.9	0.13	U
Indoor Air	B7-IA05	Basement	Basement	9/6/2019	1.2	**0.5**	**J**	1.2	**8**		1.2	**1**	**J**
Indoor Air	B7-IA06	Main	Corner of ??	9/6/2019	0.79	**0.47**	**J**	0.79	**0.21**	**J**	0.79	0.11	U
Indoor Air	B7-IA07	Main	East corner of loading dock area	9/6/2019	1.7	**0.38**	**J**	1.7	**0.26**	**J**	1.7	0.23	U
Indoor Air	B7-IA07	Main	East corner of loading dock area	9/17/2019	0.92	**0.19**	**J**	0.92	0.13	U	0.92	0.13	U
Indoor Air	B7-IA92 (FD)	Main	East corner of loading dock area	9/17/2019	0.88	**0.63**	**J**	0.88	**0.62**	**J**	0.88	0.12	U
Indoor Air	B7-IA93 (FD)	Main	East corner of loading dock area	9/17/2019	0.92	**0.13**	**J**	0.92	**0.5**	**J**	0.92	0.13	U
Outdoor Air	B7-OA01	Outdoor	East corner of loading dock area	9/17/2019	0.9	0.12	U	0.9	0.12	U	0.9	0.13	U

Notes:

[a] The Indoor Air RBSLs are the indoor air RSLs from the EPA RSL table (EPA, 2018b). The Indoor Air RBSLs are based on either a target cancer risk of 1 x 10-6 or a non-cancer hazard quotient of 1, whichever results in the lower SL.

[b] The Indoor Air Tier 1 RALs are based on the indoor air RSLs from the EPA RSL table (EPA, 2018a) using either a target cancer risk of 1 x 10-5 or a non-cancer hazard quotient of 1, whichever results in the lower RAL.

[c] The Indoor Air Tier 2 RALs are based on the indoor air RSLs from the EPA RSL table (EPA, 2018a) using either a target cancer risk of 1 x 10-4 or a non-cancer hazard quotient of 3, whichever results in the lower RAL.

Bold indicates detection

Yellow highlight indicates detection above screening level, but below the Tier 1 RAL.

All results are unvalidated and subject to change during data validation.

$\mu g/m^3$ = microgram(s) per cubic meter

CAS = Chemical Abstracts Service

EPA = U.S. Environmental Protection Agency

FD = field duplicate

HAPSITE = Inficon HAPSITE

IA = indoor air

J = approximate result below the reporting limit and above the method detection limit

LOQ = limit of quantification; value that is reported for a non-detect sample

OA = outdoor air

PCE = tetrachloroethene

RAL = removal action level

RBSL = risk-based screening level

RSL = regional screening level

SL = screening level

U = not detected

Attachment 1

Table 2. Veterans Health Administration Building 6 Indoor Air Results

2019 Indoor Air Data Summary Report, Operable Unit 2 Remedial Investigation, 700 South 1600 East PCE Plume, Salt Lake City, Utah

Building 6	Analyte				Tetrachloroethene			Trichloroethene			cis-1,2-Dichloroethene		
	CAS				127-18-4			79-01-6			156-59-2		
	Risk-Based Screening Level[a] (µg/m³)				47			3			No Toxicity Information		
	Tier 1 Removal Action Level[b] (µg/m³)				180			8.8					
	Tier 2 Removal Action Level[c] (µg/m³)				540			26					
Sample Type	Location ID	Sample ID	Sample Location Description	Date & Time	LOQ (µg/m³)	Results (µg/m³)	Q	LOQ (µg/m³)	Results (µg/m³)	Q	LOQ (µg/m³)	Results (µg/m³)	Q
Indoor Air	B6-IA-001	B6-IA-001-01	Hallway near room 1A07	1/24/2019 11:14	0.68	0.68	U	0.54	0.54	U	0.40	0.40	U
Indoor Air	B6-IA-001	B6-IA-001-01	Hallway near room 1A07	1/24/2019 11:40	0.68	0.68	U	0.54	0.54	U	0.40	0.40	U
Indoor Air	B6-IA-002	B6-IA-002-01	Hallway near room 1A13	1/24/2019 11:29	0.68	0.68	U	0.54	0.54	U	0.40	0.40	U
Indoor Air	B6-IA-003	B6-IA-003-01	Document storage room	1/24/2019 11:50	0.68	0.68	U	0.54	0.54	U	0.40	0.40	U
Indoor Air	B6-IA-004	B6-IA-004-01	Room 1A19	1/24/2019 12:00	0.68	0.68	U	0.54	0.54	U	0.40	0.40	U
Indoor Air	B6-IA-005	B6-IA-005-01	Break room near boiler control room	1/24/2019 12:11	0.68	0.68	U	0.54	0.54	U	0.40	0.40	U
Indoor Air	B6-IA-006	B6-IA-006-01	Boiler control room	1/24/2019 12:19	0.68	0.68	U	0.54	0.54	U	0.40	0.40	U
Indoor Air	B6-IA-007	B6-IA-007-01	Bldg 6 Office Annex (NW corner)	1/24/2019 12:29	0.68	0.68	U	0.54	0.54	U	0.40	0.40	U
Indoor Air	B6-IA-008	B6-IA-008-01	Bldg 6 Office Annex (NE corner)	1/24/2019 12:37	0.68	0.68	U	0.54	0.54	U	0.40	0.40	U
Indoor Air	B6-IA-009	B6-IA-009-01	Bldg 6 Office Annex (SE corner)	1/24/2019 12:48	0.68	0.68	U	0.54	0.54	U	0.40	0.40	U
Indoor Air	B6-IA-010	B6-IA-010-01	Bldg 6 Office Annex (SW corner)	1/24/2019 12:54	0.68	0.68	U	0.54	0.54	U	0.40	0.40	U
Indoor Air	B6-IA-011	B6-IA-011-01	Operations Supervisor Office (S end of Bldg 6)	1/24/2019 13:37	0.68	**74.65**		0.54	0.54	U	0.40	0.40	U
Indoor Air	B6-IA-011	B6-IA-011-02	Operations Supervisor Office(S end of Bldg 6)	1/24/2019 15:06	0.68	**129.22**		0.54	**1.88**		0.40	0.40	U
Indoor Air	B6-IA-011	B6-IA-011-03	Operations Supervisor Office (S end of Bldg 6)	1/24/2019 15:34	0.68	**74.23**		0.54	**0.73**		0.40	0.40	U
Indoor Air	B6-IA-011	B6-IA-011-04	Operations Supervisor Office (S end of Bldg 6)	1/30/2019 9:37	0.68	**2.50**		0.54	0.54	U	0.40	0.40	U
Indoor Air	B6-IA-012	B6-IA-012-01	Break room (S end of Bldg 6)	1/24/2019 13:46	0.68	**22.39**		0.54	0.54	U	0.40	0.40	U
Indoor Air	B6-IA-012	B6-IA-012-02	Break room (S end of Bldg 6)	1/30/2019 9:20	0.68	**3.28**		0.54	0.54	U	0.40	0.40	U
Indoor Air	B6-IA-013	B6-IA-013-01	Wood shop (S end of Bldg 6)	1/24/2019 13:56	0.68	**41.53**		0.54	0.54	U	0.40	0.40	U
Indoor Air	B6-IA-013	B6-IA-013-02	Wood shop (S end of Bldg 6)	1/30/2019 9:57	0.68	**2.61**		0.54	0.54	U	0.40	0.40	U
Indoor Air	B6-IA-014	B6-IA-014-01	Plumbing Shop (S end of Bldg 6)	1/24/2019 14:02	0.68	**17.40**		0.54	0.54	U	0.40	0.40	U
Indoor Air	B6-IA-014	B6-IA-014-02	Plumbing Shop (S end of Bldg 6)	1/30/2019 9:28	0.68	**2.76**		0.54	0.54	U	0.40	0.40	U
Indoor Air	B6-IA-015	B6-IA-015-01	Electrician Shop (S end of Bldg 6)	1/24/2019 14:21	0.68	**915.69**		0.54	**7.13**		0.40	0.40	U
Indoor Air	B6-IA-015	B6-IA-015-02	Electrician Shop (S end of Bldg 6)	1/30/2019 9:46	0.68	**25.46**		0.54	**2.54**		0.40	0.40	U
Indoor Air	B6-IA-016	B6-IA-016-01	Basement Boiler Parts Room	1/24/2019 16:21	0.68	**4.88**		0.54	0.54	U	0.40	0.40	U
Indoor Air	B6-IA017	B6-IA-017-01	Bldg 6 basement main room	1/24/2019 16:40	0.68	**4.67**		0.54	0.54	U	0.40	0.40	U
Indoor Air	B6-IA-018	B6-IA-018-01	HVAC Shop	1/25/2019 10:33	0.68	**1.02**		0.54	0.54	U	0.40	0.40	U
Indoor Air	B6-NB-002	B6-NB-002-01	Floor drain in basement boiler parts room	1/24/2019 16:31	0.68	**3.52**		0.54	0.54	U	0.40	0.40	U
Outdoor Air	B6-OA-001	B6-OA-001-01	Outdoor air near south end of Bldg 6	1/24/2019 15:46	0.68	**8.31**		0.54	0.54	U	0.40	0.40	U
Outdoor Air	B6-OA-001	B6-OA-001-02	Outdoor air near south end of Bldg 6	1/30/2019 9:11	0.68	0.68	U	0.54	0.54	U	0.40	0.40	U
Outdoor Air	B6-OA-002	B6-OA-002-01	Outdoor air near south end of Bldg 6	1/24/2019 15:53	0.68	**5.46**		0.54	0.54	U	0.40	0.40	U
Outdoor Air	B6-OA-003	B6-OA-003-01	Outdoor air between Bldg 6 and 7	1/25/2019 16:00	0.68	0.68	U	0.54	0.54	U	0.40	0.40	U
Indoor Source[d]	B6-NB-001	B6-NB-001-01	Multiple purpose grease in Operation Supervisor Office (S end of Bldg 6)	1/24/2019 15:30	0.68	**72.78**		0.54	**1.51**		0.40	0.40	U
Indoor Source[d]	B6-NB-003	B6-NB-003-01	Flammables cabinet in wood shop Bldg 6	1/25/2019 10:17	0.68	**6.78**		0.54	**0.96**		0.40	0.40	U
Indoor Source[d]	B6-NB-004	B6-NB-004-01	LPS Greaseless Lubricant (Wood Shop)	1/30/2019 10:24	0.68	**2.00**		0.54	0.54	U	0.40	0.40	U
Indoor Source[d]	B6-NB-005	B6-NB-005-01	Moisture Displacer For Electrical Equipment (Electricians Shop)	1/30/2019 10:46	0.68	**2238.35**		0.54	**19.85**		0.40	0.40	U
Indoor Source[d]	B6-NB-006	B6-NB-006-01	Lektrikleen can (Electricians Shop)	1/30/2019 11:02	0.68	**101.83**		0.54	**2.16**		0.40	0.40	U
Indoor Source[d]	B6-NB-007	B6-NB-007-01	Brake & Wheel Bearing Cleaner (Electricians Shop)	1/30/2019 11:13	0.68	**9357.69**		0.54	**1024.53**		0.40	0.40	U
Indoor Source[d]	B6-NB-008	B6-NB-008-01	Graf-Coat Dry Graphite Lubricant (Electrician Shop)	1/30/2019 11:20	0.68	**215.96**		0.54	**275.92**		0.40	0.40	U
Indoor Source[d]	B6-NB-009	B6-NB-009-01	CAP Battery Cleaner and Protector (Electrician Shop)	1/30/2019 11:29	0.68	**181.08**		0.54	**1441.25**		0.40	0.40	U
Sewer Vapor	B6-SV-001	B6-SV-001-01	Sewer vapor from Manhole near electricians shop of Bldg 6	1/25/2019 9:57	0.68	**0.81**		0.54	0.54	U	0.40	0.40	U

Notes:

[a] The Indoor Air RBSLs are the indoor air RSLs from the EPA RSL table (EPA, 2018b). The Indoor Air RBSL are based on either a target cancer risk of 1 x 10-6 or a non-cancer hazard quotient of 1, whichever results in the lower SL.

[b] The Indoor Air Tier 1 RALs are based on the indoor air RSLs from the EPA RSL table (EPA, 2018a) using either a target cancer risk of 1 x 10-5 or a non-cancer hazard quotient of 1, whichever results in the lower RAL.

[c] The Indoor Air Tier 2 RALs are based on the indoor air RSLs from the EPA RSL table (EPA, 2018a) using either a target cancer risk of 1 x 10-4 or a non-cancer hazard quotient of 3, whichever results in the lower RAL.

[d] = HAPSITE sample probe positioned at top of indoor source to collect sample.

Bold indicates detection

Red text are follow-up HAPSITE screening results from 1/30/19 after indoor sources were removed on 1/25/19

Shading indicates that a PSL was exceeded. PSLs are not applied to outdoor air samples.

Shading indicates that a Tier 2 RAL was exceeded. RALs are not applied to outdoor air samples.

µg/m³ = microgram(s) per cubic meter
CAS = Chemical Abstracts Service
EPA = U.S. Environmental Protection Agency
HAPSITE = Inficon HAPSITE
IA = indoor air
LOQ = limit of quantification; value that is reported for a non-detect sample
NB = non-breathing zone
OA = outdoor air
PCE = tetrachloroethene
PSL = project screening level
RAL = removal action level
RBSL = risk-based screening level
RSL = regional screening level
SL = screening level
SV = sewer vapor
U = not detected

Table 3. Veterans Health Administration Building 7 Indoor Air Results

2019 Indoor Air Data Summary Report, Operable Unit 2 Remedial Investigation, 700 South 1600 East PCE Plume, Salt Lake City, Utah

Building 7						Analyte	Tetrachloroethene			Trichloroethene			cis-1,2-Dichloroethene		
						CAS	127-18-4			79-01-6			156-59-2		
						Risk-Based Screening Level[a] (µg/m^3)	47			3			No Toxicity Information		
						Tier 1 Removal Action Level[b] (µg/m^3)	180			8.8					
						Tier 2 Removal Action Level[c] (µg/m^3)	540			26					
Sample Type	Location ID	Sample ID	Sample Location Description	Test Type	Pressure Value	Date & Time	LOQ (µg/m^3)	Results (µg/m^3)	Q	LOQ (µg/m^3)	Results (µg/m^3)	Q	LOQ (µg/m^3)	Results (µg/m^3)	Q
Indoor Air	B7-IA-001	B7-IA-001-01	NW corner of laundry facility	Initial	Baseline	1/25/2019 10:54	0.68	0.68	U	0.54	0.54	U	0.4	0.4	U
Indoor Air	B7-IA-002	B7-IA-002-01	Hallway near room 1B05	Initial	Baseline	1/25/2019 11:01	0.68	0.68	U	0.54	0.54	U	0.4	0.4	U
Indoor Air	B7-IA-003	B7-IA-003-01	Basement room BA05	Initial	Baseline	1/25/2019 11:12	0.68	0.68	U	0.54	0.54	U	0.4	0.4	U
Indoor Air	B7-IA-004	B7-IA-004-01	Basement room BA06	Initial	Baseline	1/25/2019 11:20	0.68	0.68	U	0.54	0.54	U	0.4	0.4	U
Indoor Air	B7-IA-005	B7-IA-005-01	East laundry room (dirty side)	Initial	Baseline	1/25/2019 11:31	0.68	0.68	U	0.54	0.54	U	0.4	0.4	U
Indoor Air	B7-IA-006	B7-IA-006-01	South end of laundry facility	Initial	Baseline	1/25/2019 11:38	0.68	0.68	U	0.54	0.54	U	0.4	0.4	U
Indoor Air	B7-IA-007	B7-IA-007-01	Center of laundry room	Initial	Baseline	1/25/2019 11:49	0.68	0.68	U	0.54	0.54	U	0.4	0.4	U
Indoor Air	B7-IA-008	B7-IA-008-01	Center of freight room	Initial	Baseline	1/25/2019 12:03	0.68	**0.77**		0.54	0.54	U	0.4	0.4	U
Indoor Air	B7-IA-009	B7-IA-009-01	Hallway near restroom	Initial	Baseline	1/25/2019 12:10	0.68	**0.82**		0.54	0.54	U	0.4	0.4	U
Indoor Air	B7-IA-010	B7-IA-010-01	East storage room	Initial	Baseline	1/25/2019 12:18	0.68	**0.70**		0.54	0.54	U	0.4	0.4	U
Indoor Air	B7-IA-011	B7-IA-011-01	West storage room	Initial	Baseline	1/25/2019 12:28	0.68	**0.72**		0.54	0.54	U	0.4	0.4	U
Indoor Air	B7-IA-012	B7-IA-012-01	Hallway near room 1A15B	Initial	Baseline	1/25/2019 13:31	0.68	**4.76**		0.54	0.54	U	0.4	0.4	U
Indoor Air	B7-IA-013	B7-IA-013-01	Hallway near east exit in animal lab	Initial	Baseline	1/25/2019 13:52	0.68	**0.95**		0.54	0.54	U	0.4	0.4	U
Indoor Air	B7-IA-014	B7-IA-014-01	Hallway near room 1A03	Initial	Baseline	1/25/2019 13:59	0.68	**1.54**		0.54	0.54	U	0.4	0.4	U
Indoor Air	B7-IA-015	B7-IA-015-01	Hallway near room 1A22	Initial	Baseline	1/25/2019 14:19	0.68	**1.23**		0.54	0.54	U	0.4	0.4	U
Indoor Air	B7-IA-016	B7-IA-016-01	Hallway near room 1A28C	Initial	Baseline	1/25/2019 14:25	0.68	**0.86**		0.54	0.54	U	0.4	0.4	U
Outdoor Air	B6-OA-003	B6-OA-003-01	Outdoor air between Bldg 6 and 7	Initial	Baseline	1/25/2019 16:00	0.68	0.68	U	0.54	0.54	U	0.40	0.40	U

Notes:

[a] The Indoor Air RBSLs are the indoor air RSLs from the EPA RSL table (EPA, 2018b). The Indoor Air RBSLs are based on either a target cancer risk of 1 x 10-6 or a non-cancer hazard quotient of 1, whichever results in the lower SL.

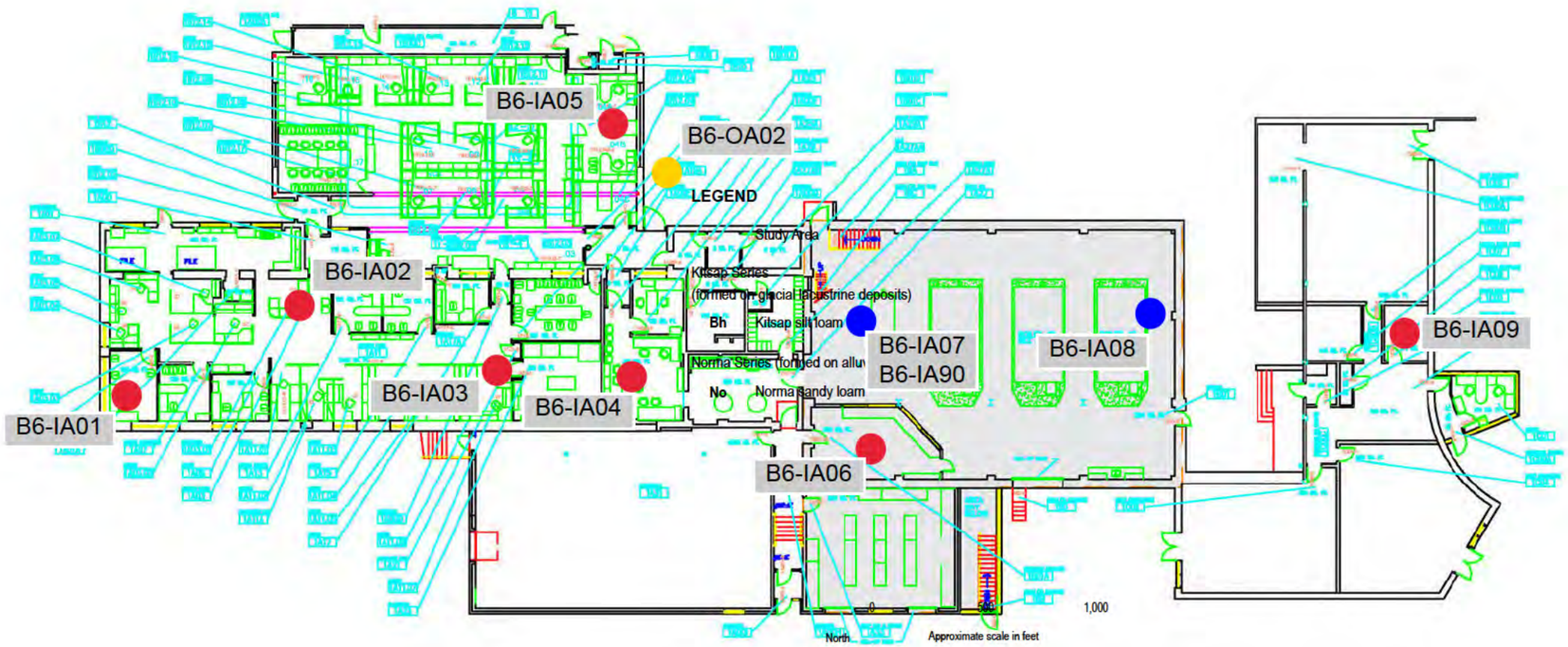
[b] The Indoor Air Tier 1 RALs are based on the indoor air RSLs from the EPA RSL table (EPA, 2018a) using either a target cancer risk of 1 x 10-5 or a non-cancer hazard quotient of 1, whichever results in the lower RAL.

[c] The Indoor Air Tier 2 RALs are based on the indoor air RSLs from the EPA RSL table (EPA, 2018a) using either a target cancer risk of 1 x 10-4 or a non-cancer hazard quotient of 3, whichever results in the lower RAL.

Bold indicates detection

µg/m^3 = microgram(s) per cubic meter
CAS = Chemical Abstracts Service
EPA = U.S. Environmental Protection Agency
HAPSITE = Inficon HAPSITE
IA = indoor air
LOQ = limit of quantification; value that is reported for a non-detect sample
OA = outdoor air
PCE = tetrachloroethene
RAL = removal action level
RBSL = risk-based screening level
RSL = regional screening level
SL = screening level
U = not detected

Attachment 2



B.6,1st FLOOR

30 feet (approximately)

- Basement
- Proposed outdoor air TO-15 sample location
- Proposed indoor air TO-15 ground level sample locations
- Proposed indoor air TO-15 basement sample location

Note:
Drawing provided by Department of Veterans Affairs engineering group. Drawing titled "B.6 & 7 FIRST FLOOR PLAN" and dated 2/17.
File name = CAD/B.6/ARCH/B.6, 7-A-1.DWG

BI0111190949SLC VI_Investigation_VHA_Building6.ai

Figure 1. Building 6 24-Hour Indoor Air TO-15 Sample Locations
Investigation of Veterans Healthcare Administration Buildings 6 and 7

700 South 1600 East PCE Plume
Salt Lake City, Utah

JACOBS

Attachment 3

B.7 1st FLOOR

20 feet (approximately)

Basement

Proposed outdoor air TO-15 sample location

Proposed indoor air TO-15 ground level sample locations

Proposed indoor air TO-15 basement sample location

Note:
Drawing provided by Department of Veterans Affairs engineering group. Drawing titled "B.6 & 7 FIRST FLOOR PLAN" and dated 2/17.
File name = CAD/B.6/ARCH/B.6, 7-A-1.DWG

BI0111190949SLC VI_Investigation_VHA_Building7.ai

Figure 2. Building 7 24-Hour Indoor Air TO-15 Sample Locations
Investigation of Veterans Healthcare Administration Buildings 6 and 7
700 South 1600 East PCE Plume
Salt Lake City, Utah

JACOBS

Data Summary Report
2021 Source Area Soil Gas and Indoor Air Sampling

CONTRACT NO.: W912DQ-18-D-3008
DELIVERY ORDER NO.: W912DQ19F3048

700 South 1600 East PCE Plume Site
Salt Lake City, Utah

U.S. Army Corps of Engineers
Kansas City District

Department of Veterans Affairs
Veterans Health Administration Salt Lake City Health Care System

August 18, 2021

CDM Smith

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Acronyms and Abbreviations

CDM Smith	CDM Federal Programs Corporation
DQO	data quality objective
DSR	data summary report
EPA	U.S. Environmental Protection Agency
ft	feet
MCL	maximum contaminant level
OU	operable unit
PCE	tetrachloroethene
QAPP	quality assurance project plan
RBSL	risk-based screening level
RI	remedial investigation
RSL	regional screening level
SOP	standard operating procedure
TCE	trichloroethene
VAMC	Veterans Affairs Medical Center
VHA	Veterans Health Administration
VOC	volatile organic compound
$\mu g/m^3$	micrograms per cubic meter

Section 1
Introduction

Under the U.S. Army Corps of Engineers, Kansas City District Contract No. W912DQ-18-D-3008, Task Order No. W912DQ19F3048, CDM Federal Programs Corporation (CDM Smith) was directed to perform a remedial investigation (RI) for Operable Unit (OU) 1 of the 700 South 1600 East Tetrachloroethene (PCE) Plume Superfund Site (Site) in Salt Lake City, Utah. CDM Smith prepared this data summary report (DSR) to present the results of soil vapor and indoor air sampling completed near Buildings 6 and 7 and Sunnyside Park. Sampling was completed to evaluate the extent of subsurface impacts at suspected source areas and provide multiple lines of evidence for evaluation of risks in these areas of the Site.

1.1 Background

The Salt Lake City Healthcare System George E. Wahlen Veterans Affairs Medical Center (VAMC) is in Salt Lake City, Utah (**Figure 1**). PCE contamination was first identified in groundwater in 1990 at the nearby Mt. Olivet Cemetery irrigation well during Salt Lake City Department of Public Utilities routine monitoring. This led to the U.S. Environmental Protection Agency (EPA) and Utah Department of Environmental Quality involvement at the Site and the preliminary determination that the source of PCE in groundwater was the historical dry-cleaning facility located at the VAMC. The Veterans Health Administration (VHA) operated a part-time dry-cleaning operation that used PCE over a 6-year period in the late 1970s and early 1980s. During this period, dry cleaning residuals were disposed in the sanitary sewer. A PCE groundwater plume is present beneath the VAMC property and in areas hydraulically downgradient, extending to the East Side Springs neighborhood. In addition, elevated concentrations of PCE in soil vapor and sub-slab vapor (up to 20,000 micrograms per cubic meter [µg/m^3]) have been observed adjacent to VAMC Buildings 6 and 7 (location of the former VAMC dry-cleaning facility) (Jacobs 2019).

1.2 Purpose and Scope

The purpose and scope of this DSR is to describe the work conducted and present the analytical and field data collected during the March 2021 soil vapor and indoor air sampling event. Soil vapor sampling in March 2021 was conducted to delineate the soil vapor plume as support for data quality objectives D1 (source mass) and D2 (source area vapor intrusion risk) as specified in the Phase 2 OU1 RI work plan (CDM Smith 2020b). As stated in the 2021 Source Area Soil Gas and Indoor Air Sampling Plan (CDM Smith 2021b), soil vapor data would be evaluated to assess whether there is evidence of sufficient source mass in the vadose zone to further consider it as an ongoing source of PCE to groundwater, and to delineate the extent of the soil vapor plume and the potential for vapor intrusion in nearby structures. Indoor air data would be evaluated to further assess the potential for vapor intrusion occurring at Buildings 6 and 7 and determine if an unacceptable risk is present. The data evaluation will be presented in the RI Report.

Section 2
Field Sampling Activities

The following sections describe the field sampling activities that were completed during the March 2021 soil vapor sampling event, which occurred from March 22 to 26, 2021.

2.1 Soil Vapor and Indoor Air Sampling

A total of 46 soil vapor locations/depths and 5 indoor/outdoor air locations were sampled during the March 2021 sampling event, including previously sampled probes and newly installed probes. Soil vapor locations included 12 single-depth soil vapor probes, 2 multi-depth soil vapor probes (SB-42 and SB-43), 5 multi-depth probes installed within monitoring well boreholes (MW-24, MW-25, MW-27, MW-28, and MW-29), one monitoring well installed with a screen interval in the vadose zone (MW-23), and 13 sub-slab vapor pins. Indoor air samples were collected at two locations, one on the ground floor and one in the basement, in both Building 6 and Building 7. One outdoor air sample was collected on the roof between Buildings 6 and 7 to be representative of ambient air. All sampling locations are shown in **Figures 1 and 2,** and location data and construction details are presented in **Table 1**. Soil gas analytical data for MW-32, MW-34, MW-37, and MW-38 are presented in the East Side Springs Investigation Data Summary Report (CDM Smith 2021a). MW-30 is a monitoring well with a soil vapor point (**Figure 1)** that was not sampled during this event.

Field forms associated with this event, including the field logbook pages, daily quality control reports, field logs, checklists, equipment calibration forms, and health and safety tailgate forms, are included in **Appendix A.** The sampling activities were conducted in accordance with the Phase 2 OU1 Quality Assurance Project Plan (QAPP) (CDM Smith 2020a), the Phase 2 OU1 RI Work Plan (CDM Smith 2020b), and the *Plan for Soil Vapor Probe Sampling and Indoor Air Sampling at Buildings 6 and 7* (CDM Smith 2021).

2.1.1 Soil Vapor Probe Sampling Procedures

All soil vapor probes were sampled in accordance with *Technical Standard Operating Procedure (SOP) 1-8, Vapor Sampling Using SUMMA Canister* presented in Appendix A of the QAPP (CDM Smith 2020a). Soil vapor probes were purged before sample collection. Purge volume was calculated based on tubing diameter (1/4-inch inner diameter) and probe depth. Three times the volume of the probe tubing was purged at each location. Shallow probes were purged using a hand vacuum pump. A flow rate of 70 pumps per one liter was calculated using the hand pump and a Tedlar® bag. Deeper probes were purged using an electric vacuum pump with an attached flow meter. The flow rate was adjusted to 1 liter per minute for most locations. At MW-23, a flow rate of two liters per minute was used because this location had a much larger purge volume, as the soil vapor probe is constructed of 1-inch diameter polyvinyl chloride casing with a screened interval in the vadose zone.

Once the probe was purged to remove the minimum volume, a 6-liter SUMMA® canister was connected using dedicated tubing. In some cases, new Swagelok connections were added to the

tubing to connect the canister. Soil vapor samples were collected using a 30-minute flow controller connected to the canister. Sample collection began when the valve on the canister was opened, and the initial vacuum reading was recorded. When the vacuum gauge was between two and five inches of mercury (approximately 30 minutes after start), the final vacuum reading was recorded, and the valve was closed. Field duplicate samples were collected by connecting dedicated probe tubing to a "T-bar." The T-bar was then connected to two canisters and the valves were opened simultaneously. Sample canisters were labeled and shipped in boxes (with the flow controllers) to Eurofins Air Toxics, LLC for analysis.

2.1.2 Sub-Slab Vapor Pin Sampling Procedures

Previously installed vapor pins were used to collect sub-slab samples in accordance with *Technical SOP 1-8, Vapor Sampling Using SUMMA Canister* presented in Appendix A of the QAPP (CDM Smith, 2020a). Sub-slab vapor pins were leak checked prior to connecting SUMMA canisters for sample collection. A hand vacuum pump was connected to the vapor pin, and distilled water was poured around the pin. The vapor pin was then purged briefly with the hand pump and observed for any leaks. This leak check procedure was completed in accordance with the *Standard Operating Procedure Leak Testing Vapor Pin Sampling Device Via Mechanical Means* (VaporPin 2021). During this event, no leaks were observed in any of the sampled vapor pins. Due to the shallow depth of the sub-slab vapor pins, no further purging was necessary following the leak check.

Following the leak check, new Teflon-lined tubing was used to connect the vapor pin and the 6-liter SUMMA canister. Sub-slab vapor pin samples were collected using a 30-minute flow controller connected to the canister. Sample collection began when the valve on the canister was opened, and the initial vacuum reading was recorded. When the vacuum gauge was between two and five inches of mercury (approximately 30 minutes after start), the final vacuum reading was recorded, and the valve was closed. Field duplicate samples were collected by connecting dedicated vapor pin tubing to a "T-bar." The T-bar was then connected to two canisters and the valves were opened simultaneously. Sample canisters were labeled and shipped in boxes (with the flow controllers) to Eurofins Air Toxics, LLC for analysis.

2.1.3 Indoor Air Sampling Procedures

All indoor air locations were sampled in accordance with *Technical SOP 1-8, Vapor Sampling Using SUMMA Canister* presented in Appendix A of the QAPP (CDM Smith 2020a). Indoor air sampling locations were determined prior to the event; however, exact canister placement was chosen at the time of sampling in consultation with VHA personnel. Canister placement was completed to ensure the intake level was above ground surface and as close to the area breathing zone as possible (generally three to five feet above ground surface). Canisters were also placed in specific locations to minimize interference from walking traffic/movement in the area, and to avoid potential features that could make a sample less representative of typical indoor air conditions (i.e., close proximity to vents, drains, cleaning supplies).

Indoor air samples were collected using 24-hour flow controllers with 6-liter SUMMA canisters. Sample collection began when the valve on the canister was opened and the initial vacuum reading was recorded. Sample collection was completed 24 hours after the start. The final vacuum reading was recorded, and the valve was closed. A field duplicate sample was collected by

connecting dedicated tubing to a "T-bar." The T-bar was then connected to two canisters and the valves were opened simultaneously. Sample canisters were labeled and shipped in boxes (with the flow controllers) to Eurofins Air Toxics, LLC for analysis.

A representative outdoor, or ambient, air sample was collected following the same procedures stated above for indoor air samples. The outdoor air sample was located on the roof between Buildings 6 and 7away from air intake or exhaust vents.

2.2 Sample Analysis

All soil vapor and indoor air samples were analyzed by EPA Method TO-15/TO-15 SIM for VOCs. SUMMA canisters were submitted to Eurofins Air Toxics, LLC in Folsom, California. The analytical results are discussed in Section 3. Laboratory data are included in **Appendix B**. Field quality control samples (field duplicates) were collected at a rate of 1 in 10 samples for both soil vapor and indoor air samples and are discussed in the Quality Control Summary Report in **Appendix B**.

2.3 Decontamination and Investigation-Derived Waste

Dedicated tubing and fittings were used at all locations. Sampling accessories not dedicated to a specific location were decontaminated following the procedures outlined in *SOP 4-5, Field Equipment Decontamination at Nonradioactive Sites* (CDM Smith 2020a). Any newly added fittings were dedicated and kept with that specific probe for use during any future sampling events. One T-bar used for duplicate sample collection was decontaminated in accordance with SOP 4-5 because of a broken T-bar provided by the laboratory. Investigation-derived waste included nitrile gloves and excess sample tubing, and was handled per SOP 2-2, *Guide to Handling Investigation-Derived Waste* presented in Appendix A of the QAPP (CDM Smith 2020a).

2.4 Data Quality Summary

During the March 2021 event, sample collection was unsuccessful at four of the proposed sampling locations/depths: MW-27 at depths of 48 feet (ft), 75 ft, and 155 ft, and VP-16. At the MW-27 depths, purging of the probes was attempted, but probes and/or the tubing were plugged or the formation at the screened interval was too tight, and air flow could not be initiated with a vacuum pump. VP-16, located in the basement of Building 6, was covered with water during the event, because of nearby construction and could not be accessed for sampling.

Data quality objectives are detailed in *the Phase 2 OU1 RI Work Plan* (CDM Smith 2020b). Specific data quality objectives addressed during this sampling event, detailed in the *Plan for Soil Vapor Probe Sampling and Indoor Air Sampling at Buildings 6 and 7 (CDM Smith 2021b),* are as follows:

D1: Assess evidence of sufficient source mass in the vadose zone and delineate the extent of the soil vapor plume.

D2: Assess potential risks for vapor intrusion at Buildings 6 and 7.

The soil vapor and indoor air data collected during this sampling event represent the source area spatially as described in D1 and provide measured VOC concentrations to evaluate human risk as described in D2. In addition to the data quality objectives, the completeness goal of 90 percent was achieved, with a completeness of 93 percent for the event. Data are usable for their intended

purpose. A detailed description of data quality and completeness goals is provided in the Quality Control Summary Report in Appendix B.

Section 3
Soil Vapor and Indoor Air Sampling Results

Soil vapor and indoor air sampling results are summarized below. Concentrations were compared with risk-based screening levels (RBSLs) based on EPA's Regional Screening Levels for composite worker air, updated in May 2021, and *Vapor Intrusion Screening Levels and Removal Action Levels, 700 South 1600 East Street PCE Plume, Salt Lake City, Utah* (CH2M Hill, 2015). Commercial/industrial ambient indoor air RBSLs correspond to an excess lifetime cancer risk of 1 × 10-6 and a hazard quotient of 1. Commercial/industrial soil vapor RBSLs correspond to an excess lifetime cancer risk of 1 × 10-6 and a hazard quotient of 1 divided by an attenuation factor of 0.03.

3.1 Soil Vapor Probe Results

Soil vapor probe analytical results for detected compounds are presented in **Table 2**. Detected results are summarized below.

- PCE was detected in all 33 soil vapor probes sampled during this event. PCE concentrations exceeded the industrial/commercial screening level of 1600 µg/m^3 in eight of the soil vapor probes (MW-23, MW-27 at 28 ft and 113ft, MW-28 at 48 ft and 118 ft, SG-03, SG-05, and SG-06). Overall, concentrations ranged from 0.2 µg/m^3 to 39,000 µg/m^3 (MW-27 at 28 ft). PCE results are shown in **Figures 3 and 5**.
- TCE was detected in 25 of the 33 soil vapor probes sampled during this event. TCE concentrations did not exceed the industrial/commercial screening level of 100 µg/m^3 in any of the soil vapor probes sampled. Detected concentrations ranged from 0.017 J µg/m^3 (at SG-60) to 52 µg/m^3 (at MW-27 at 28 ft). TCE results are shown in **Figures 3 and 5**.
- Trihalomethanes (specifically, chloroform and bromodichloromethane) were reported at multiple soil gas locations (**Table 2**). These chemicals are associated with water chlorination, along with other disinfection byproducts, and are commonly present in municipal tap water. Their detection in soil gas is likely associated with sprinkler irrigation or leaking water piping. They are not associated with PCE or its degradation products.

Other compounds were detected in soil vapor probes sampled during this event but below industrial/commercial screening levels. Note that J-flagged results are estimated results based on the data validation.

3.2 Sub-Slab Vapor Pin Results

Sub-slab vapor pin analytical results for detected compounds are presented in **Table 2**. Detected results are summarized below.

- PCE was detected in all 13 sub-slab vapor pins sampled during this event. PCE concentrations exceeded the industrial/commercial screening level of 1600 µg/m^3 in two of the sub-slab vapor pins: VP-04 (30,000 µg/m^3) and VP-15 (23,000 µg/m^3) located in the

basement of Building 6. Concentrations ranged from 0.58 µg/m³ to 30,000 µg/m³. PCE results are shown in **Figure 4**.

- TCE was detected in 9 of the 13 sub-slab vapor pins sampled during this event. TCE concentrations exceeded the industrial/commercial screening level of 100 µg/m³ in 1 of the sub-slab vapor pins; VP-15 (180 µg/m³). Detected concentrations ranged from 0.073 J µg/m³ (at VP-06) to 180 µg/m³ (at VP-15). TCE results are shown in **Figure 4**.
- Trihalomethanes (chloroform and bromodichloromethane) were also reported at multiple vapor pin locations (**Table 2**). For samples that required dilutions, some of the non-detect reporting limit values exceeded screening levels, including for bromodichloromethane. These chemicals are associated with water chlorination, along with other disinfection byproducts, and are commonly present in municipal tap water. Their detection in sub-slab vapor is likely associated with sprinkler irrigation, leaking water piping, or boiler plant operations. They are not associated with PCE or its degradation products.

Other compounds were detected in many of the sub-slab vapor pins sampled during this event, but below industrial/commercial screening levels. Note that J-flagged results are estimated results based on the data validation.

3.3 Indoor Air Results

Indoor air analytical results for detected compounds are presented in **Table 3**. Detected results are summarized below.

- PCE was detected in all four indoor air samples and one outdoor air sample during this event. PCE concentrations did not exceed the industrial/commercial screening level of 47 µg/m³ in any of the indoor/outdoor air samples. Concentrations ranged from 0.098 J µg/m³ to 2.3 µg/m³ (at B7-IA02). PCE results are shown in **Figure 4**.
- TCE was detected in three of the four indoor air samples during this event. TCE was not detected in the outdoor air sample. TCE concentrations did not exceed the industrial/commercial screening level of 3 µg/m³ in any of the indoor/outdoor air samples. Detected concentrations ranged from 0.042 J µg/m³ (at B6-IA06) to 0.13 J µg/m³ (at B7-IA02). TCE results are shown in **Figure 4**.
- Chloroform (a trihalomethane) was reported at multiple indoor and outdoor air sample locations (**Table 3**). Trihalomethanes are associated with water chlorination and are commonly present in municipal tap water. Its detection in air at these locations is likely associated with boiler plant operations. It is not associated with PCE or its degradation products.
- 1,2-Dibromoethane was detected slightly above the industrial/commercial screening level of 0.02 µg/m³ in one of the indoor air samples: B6-IA06 (0.028 J µg/m³). Other non-detect results had detection limits which were slightly greater than the indoor air screening levels. This compound was historically used as a fuel additive and a fumigant. It is not associated with PCE or its degradation products. 1,2-Dibromoethane was not detected in any of the other indoor or outdoor air samples.

- 1,1-dichloroethene, cis-1,2-dichloroethene, and vinyl chloride were not detected in any of the indoor air samples.

Other compounds were detected in indoor and outdoor air samples during this event but below industrial/commercial screening levels. Note that J-flagged results are estimated results based on the data validation.

Section 4
Summary

This report presents the results from the March 2021 soil vapor and indoor air sampling event. Further analysis and evaluation of these results will be presented in the RI report.

PCE was detected in all 33 soil vapor locations sampled during this event. The industrial/commercial screening level was exceeded in eight of these locations which were located between Buildings 6 and 7, beneath Building 6, and near the southern perimeter of Building 7. Detections that exceeded the screening level occurred at depths ranging from 6 ft to 135 ft. In general, PCE concentrations decrease as distance from midpoint between Buildings 6 and 7 increases, with the lowest concentrations occurring at locations MW-25 (28 ft and 100 ft), SG-10, VP-12, and VP-19. PCE was detected in all Sunnyside Park locations and depths at concentrations ranging from 37 µg/m^3 to 560 µg/m^3, but not exceeding the industrial/commercial screening level of 1600 µg/m^3. TCE was detected in most of the soil vapor and vapor pin locations but not above the commercial/industrial screening level, except in VP-15. The highest TCE concentrations also occurred in locations between Buildings 6 and 7 and beneath Building 6 at depths ranging from 6 ft to 135 ft. VP-15, which is located in the basement of Building 6, had the highest concentrations of TCE (180 µg/m^3). TCE was also detected in eight of the nine location depths in Sunnyside Park, at concentrations ranging from 0.27 µg/m^3 to 11 µg/m^3, but not exceeding the industrial/commercial screening level of 100 µg/m^3. Soil vapor results are presented in **Table 2** and in **Figures 3 and 5**.

PCE was detected in all of the indoor/outdoor air locations but was below the industrial/commercial screening level at all locations. The highest concentrations of PCE occurred in the basement sample in Building 6 (2.4 µg/m^3) and the ground floor sample in Building 7 (2.3 µg/m^3) were both well below the screening level of 47 µg/m^3. TCE was detected at concentrations well below the screening level of 3 µg/m^3 in the ground floor sample of Building 6 (0.042 J µg/m^3) and both samples in Building 7 (0.081 J µg/m^3 and 0.13 J µg/m^3). Indoor air PCE results are presented in **Table 3** and in **Figure 4**.

Trihalomethanes (chloroform and bromodichloromethane) were reported at multiple sample locations (**Table 2 and 3**). These chemicals are associated with water chlorination, along with other disinfection byproducts, and are commonly present in municipal tap water. Their detection is likely associated with sprinkler irrigation, leaking water piping, or boiler plant operations. They are not associated with PCE or its degradation products.

Data collected during this event are suitable to support evaluation of the Data Quality Objectives, D1 and D2, as described in the *Phase 2 OU1 RI Work Plan* (CDM Smith 2020b). Soil vapor and indoor air sample locations represent the source area spatially, and data collected provide measured VOC concentrations to further evaluate human health risk.

Section 5
References

CDM Smith. 2020a. *Phase 2 Quality Assurance Project Plan, Operable Unit 1, 700 South 1600 East PCE Plume, Salt Lake City, Utah*. Prepared for the U.S. Army Corps of Engineers.

CDM Smith. 2020b. *Phase 2 Remedial Investigation Work Plan, Operable Unit 1, 700 South 1600 East PCE Plume, Salt Lake City, Utah*. Prepared for the U.S. Army Corps of Engineers.

CDM Smith 2021a. *East Side Springs Investigation Data Summary Report, 700 South 1600 East PCE Plume, Salt Lake City, Utah*. Prepared for the U.S. Army Corps of Engineers.

CDM Smith. 2021b. *Memorandum. Plan for Soil Vapor Probe Sampling and Indoor Air Sampling at Buildings 6 and 7, 700 South 1600 East PCE Plume, Salt Lake City, Utah*. Prepared for the U.S. Army Corps of Engineers.

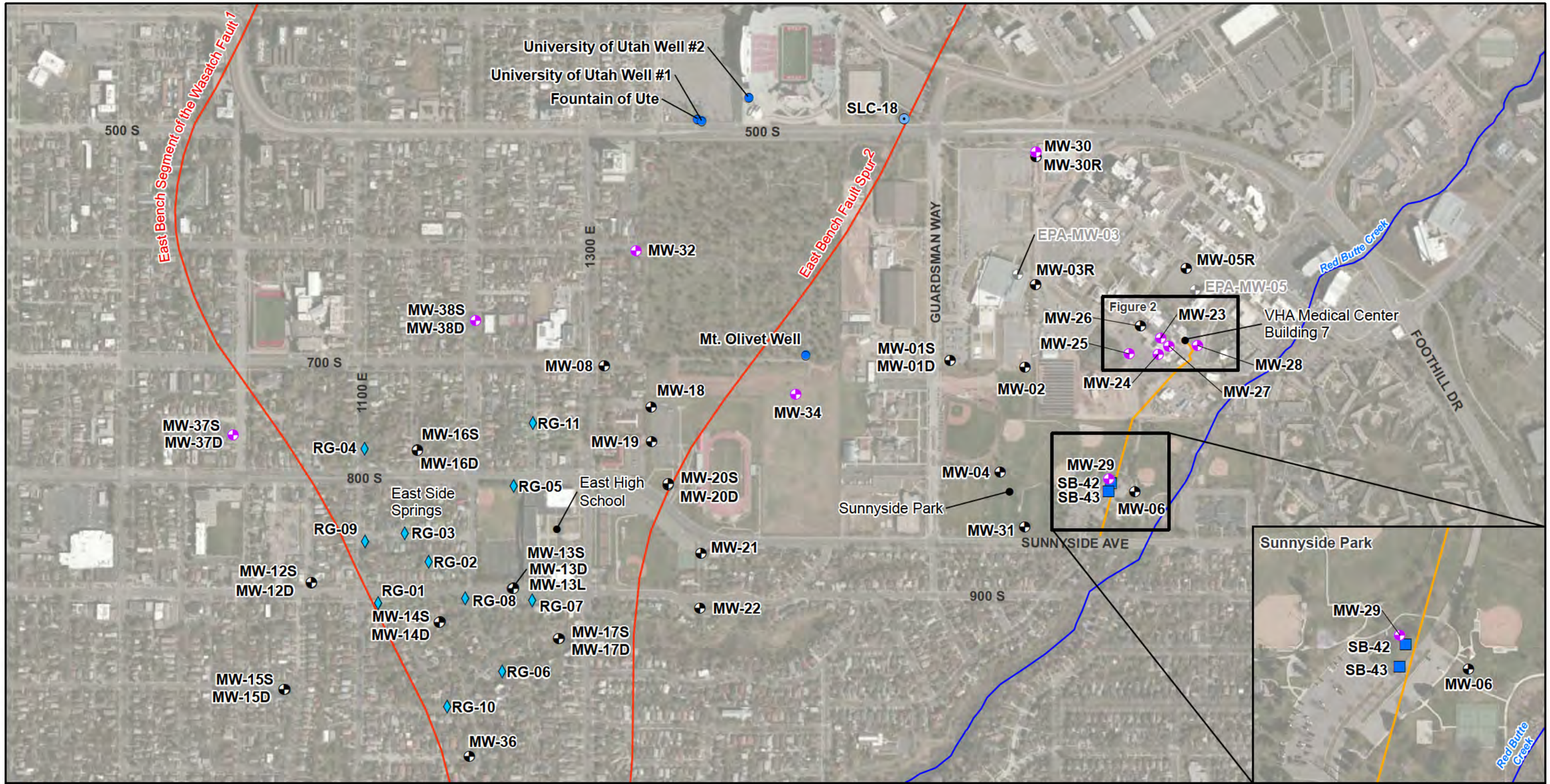
CH2M Hill. 2015. *Vapor Intrusion Screening Levels and Removal Action Levels, 700 South 1600 East Street PCE Plume, Salt Lake City, Utah.*

EPA. 2021. *Regional Screening Levels (RSLs) Generic Tables*. May. Available online at https://www.epa.gov/risk/regional-screening-levels-rsls.

Jacobs. 2019. *2019 Indoor Air Data Summary Report, Operable Unit 2 Remedial Investigation 700 South 1600 East PCE Plume, Salt Lake City, Utah*. Prepared for the U.S. Army Corps of Engineers.

VaporPin. 2021. *Standard Operating Procedure Leak Testing Vapor Pin Sampling Device Via Mechanical Means.*

Figures



Legend

- Monitoring Well
- Monitoring Well with Soil Vapor
- Sampling Location
- Decommissioned Monitoring Well
- Drinking Water Supply Well
- Irrigation Well
- Residential Groundwater Monitoring Well
- Landmark
- Red Butte Creek
- Sewer Line
- Fault Line

Notes:
(1) Location of University of Utah Well #1 is approximate; well is located less than 100 feet east of Fountain of Ute.

OU = operable unit
PCE = tetrachloroethene
VHA = Veterans Health Administration

[1] Davis, F.D. 1983. Geologic Map of the Central Wasatch Front, Utah. Utah Geological and Mineral Survey. Map 54-A – Wasatch Front Series. May.

[2] Personius, S.F. and Scott, W.E. 2009. Surficial Geologic Map of the Salt Lake City Segment and Parts of Adjacent Segments of the Wasatch Fault Zone, Davis, Salt Lake, and Utah Counties, Utah

N

0 500 1,000 Feet

Figure 1
Site Map

2021 Source Area Soil Gas and
Indoor Air Sampling Data Summary Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

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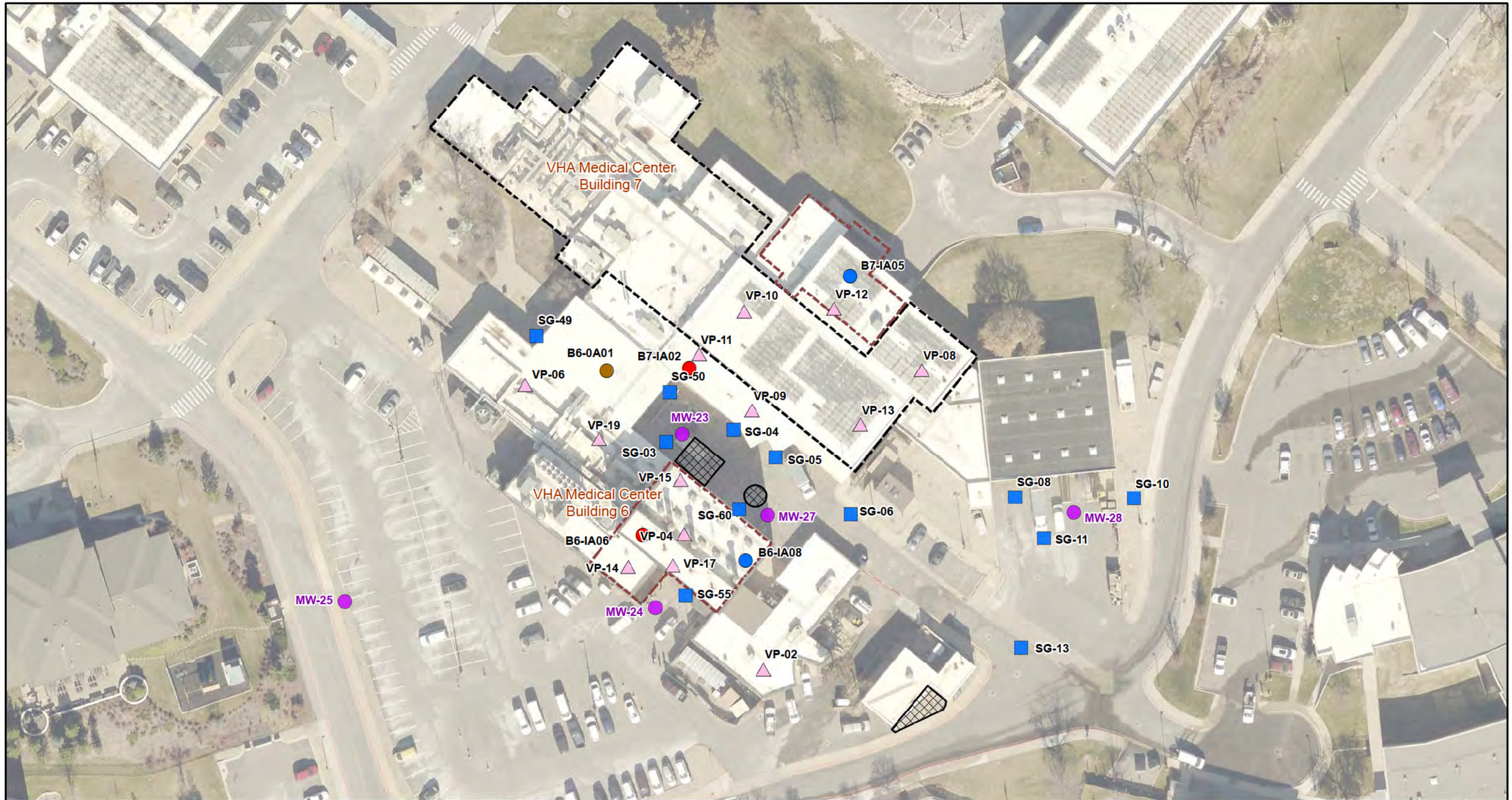

- Monitoring Well with Soil Vapor Probe
- Soil Vapor Probe
- Vapor Pin
- Indoor air samples locations (ground level)
- Indoor air samples locations (basement)
- Outdoor air sample location (roof top)

- Perimeter of Building 7 in 1981
- Basements
- Underground Storage Tank or Foundation

Notes:
SG = soil gas probe
VP = vapor pin. Locations for vapor pins are approximate.
VHA = Veterans Health Administration
PCE = tetrachloroethene
OU = operable unit

N

0 25 50 Feet

Figure 2
OU1 Source Area Soil Vapor and Indoor Air Sampling Locations

2021 Source Area Soil Gas and Indoor Air Sampling Data Summary Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

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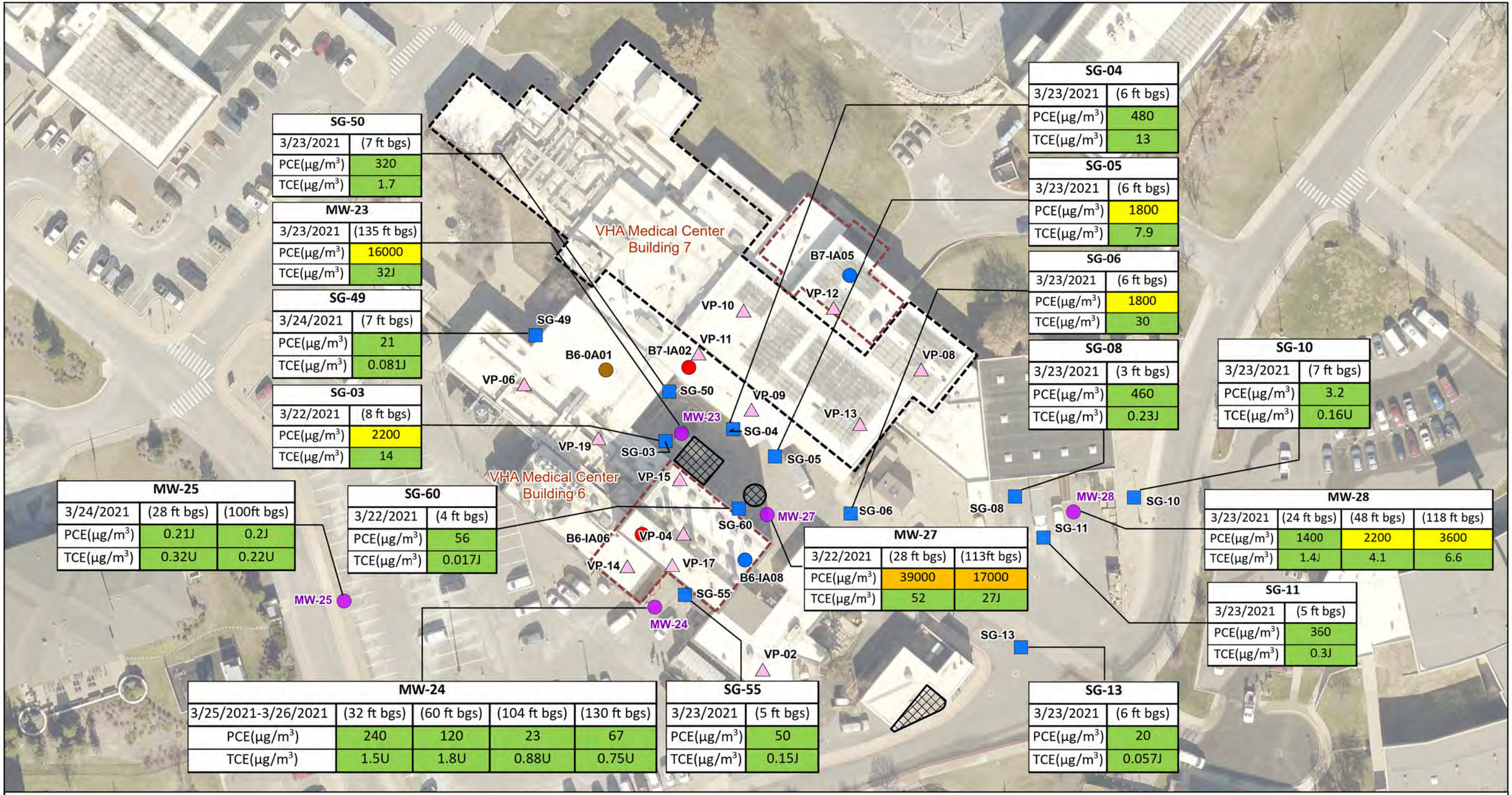

Figure 3
OU1 Source Area Soil Vapor
PCE and TCE results

2021 Source Area Soil Gas and
Indoor Air Sampling Data Summary Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

CDM Smith

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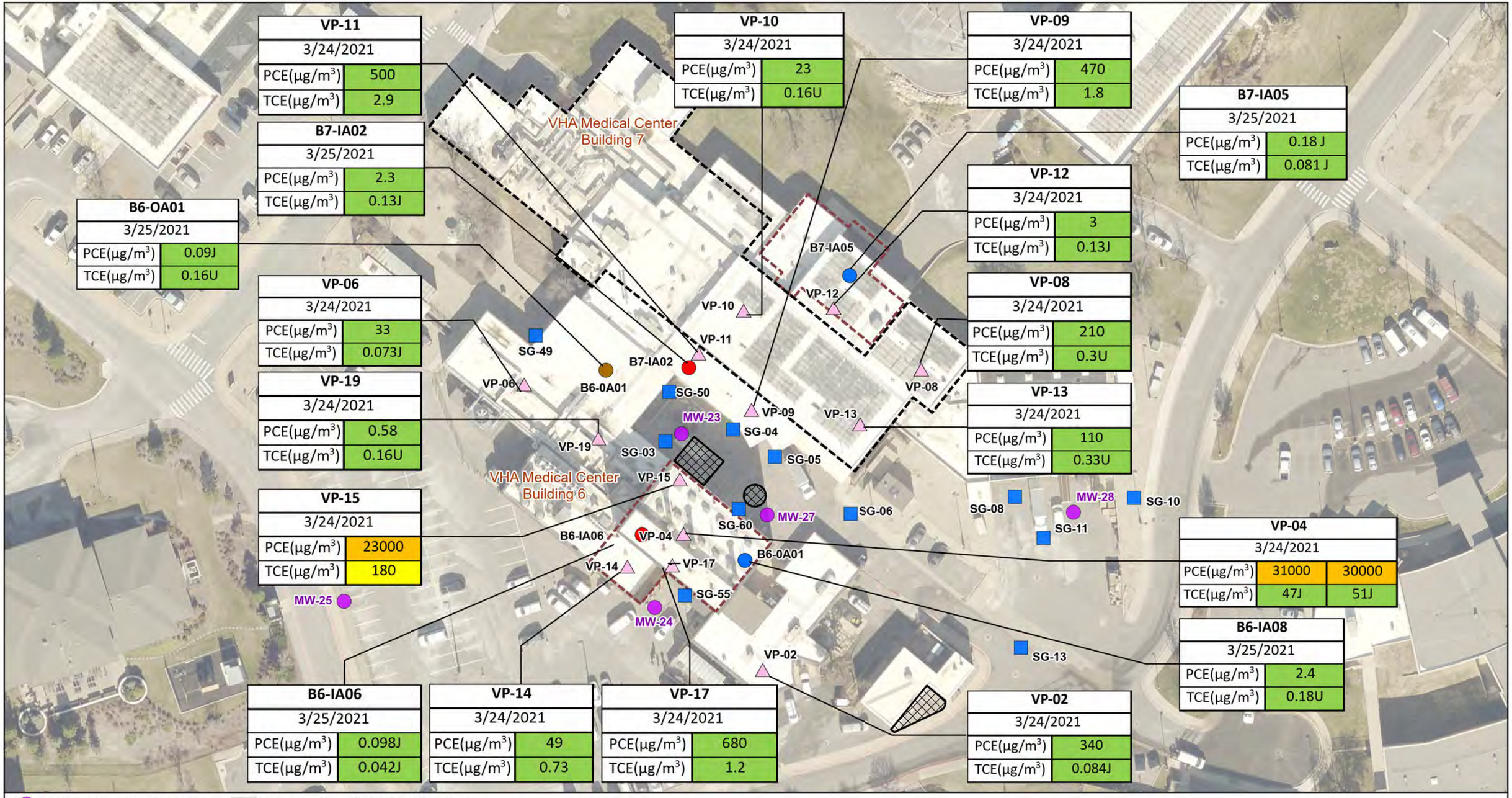

Monitoring Well with Soil Vapor Probe
Soil Vapor Probe
Vapor Pin
Indoor air samples locations (ground level)
Indoor air samples locations (basement)
Outdoor air sample location (roof top)
Perimeter of Building 7 in 1981
Basements

Underground Storage Tank or Foundation

PCE and TCE Concentrations (µg/m^3)

=<Screening Level
=Screening Level to 10 x Screening Level
>10 x Screening Level

Notes:

Screening levels are RBSL (risk-based screening level) for industrial/commercial soil gas or indoor air

PCE = 1600 µg/m^3 (soil gas) and 47 µg/m^3 (indoor air)
TCE = 100 µg/m^3 (soil gas) and 3 µg/m^3 (indoor air)

OU = operable unit
PCE = tetrachloroethene
TCE = trichloroethene
SG = soil vapor probe
VP = vapor pin
VHA = Veterans Health Administration
µg/m = micrograms per cubic meter
J = Result is estimated
U = Analyte was not detected at the associated value

N
0 25 50 Feet

Figure 4
OU1 Source Area Vapor Pin and Indoor Air PCE and TCE results

2021 Source Area Soil Gas and Indoor Air Sampling Data Summary Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

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SB-42				
3/25/2021	(7 ft bgs)	(13 ft bgs)	(17 ft bgs)	(26 ft bgs)
PCE(µg/m^3)	100	360	520	560
TCE(µg/m^3)	0.27	3.6	6	11

MW-29			
3/25/2021	(42 ft bgs)	(66 ft bgs)	(98 ft bgs)
PCE(µg/m^3)	260	250	170
TCE(µg/m^3)	4.4	4.7	3.6

SB-43		
3/25/2021	(8 ft bgs)	(15 ft bgs)
PCE(µg/m^3)	37	160
TCE(µg/m^3)	0.17	0.64

- Monitoring Well with Soil Vapor Probe
- Vapor Pin
- Soil Vapor Probe
- Indoor air samples locations (ground level)
- Indoor air samples locations (basement)
- Outdoor air sample location (roof top)
- Perimeter of Building 7 in 1981
- Basements
- Underground Storage Tank or Foundation

PCE and TCE Concentrations (µg/m^3)

- =<Screening Level
- =Screening Level to 10 x Screening Level
- >10 x Screening Level

Notes:

Screening levels below are RBSL (risk-based screening level) for industrial/commercial soil gas or indoor air

PCE = 1600 µg/m3(soil gas)
TCE = 100 µg/m3(soil gas)

OU = operable unit
PCE = tetrachloroethene
TCE = trichloroethene
µg/m^3= micrograms per cubic meter
J = Result is estimated
U = Analyte was not detected at the associated value

N

0 25 50 Feet

Figure 5
OU1 Sunnyside Park Soil Vapor
PCE and TCE results

2021 Source Area Soil Gas and
Indoor Air Sampling Data Summary Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

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Tables

Table 1
Soil Vapor Probe and Vapor Pin Construction Details

Location ID	Sample Area	Installation Date	Northing (feet)	Easting (feet)	Surface Elevation (ft amsl)	Sample Depth (ft bgs)
SG-03	VHA Building 7 Area	12/10/2018	7443809	1546268.75	4712.59	7.8 - 8.1
SG-04		12/11/2018	7443816.69	1546312.02	4712.07	5.5 - 5.8
SG-05		12/11/2018	7443799.27	1546338.69	4712.11	5.9 - 6.3
SG-06		12/10/2018	7443762.75	1546386.92	4712.83	5.8 - 6.1
SG-08		12/13/2018	7443773.66	1546492.04	4712.58	3.0 - 3.3
SG-10		12/14/2018	7443772.95	1546567.85	4717.55	6.3 - 6.8
SG-11		12/12/2018	7443747.47	1546510.21	4713.06	4.7 - 5.0
SG-13		12/11/2018	7443677.39	1546495.82	4711.88	5.3 - 6.0
SG-50		6/27/2019	7443840.69	1546271.18	*	6.7 - 7.3
VP-08	VHA Building 7 Interior - Ground Level		7443854.91	1546432.21	*	Sub-Slab
VP-09			7443829.16	1546323.72	*	Sub-Slab
VP-10			7443892.5	1546318.66	*	Sub-Slab
VP-11			7443865.08	1546289.95	*	Sub-Slab
VP-12	VHA Building 7 Interior - Basement		7443894.26	1546376.1	*	Sub-Slab
VP-13			7443820	1546392.95	*	Sub-Slab
SG-49	Building 6 Area	6/27/2019	7443876.64	1546186.02	*	6.1 - 6.7
SG-55		7/2/2019	7443710.81	1546281.23	*	4.5 - 5.0
SG-60			7443765.87	1546315.6	*	3.8 - 4.3
VP-02	VHA Building 6 Interior - Ground Level		7443663.25	1546330.89	*	Sub-Slab
VP-06			7443845.41	1546178.7	*	Sub-Slab
VP-19			7443810.95	1546225.98	*	Sub-Slab
VP-04	VHA Building 6 Interior - Basement		7443750.08	1546280.28	*	Sub-Slab
VP-14			7443729.23	1546244.48	*	Sub-Slab
VP-15		6/18/2019	7443784.84	1546278	*	Sub-Slab
VP-16		6/20/2019	7443740.98	1546332.69	*	Sub-Slab
VP-17		6/20/2019	7443730.05	1546273.15	*	Sub-Slab
MW-23	Building 6/7 Area	4/20/2020	7443809.38	1546280.59	4712.47	130-140
MW-24		5/20/2020	7443698.74	1546266.48	4709.77	32
						60
						104
						130
MW-25		5/10/2020	7443676.94	1546071.97	4703.04	28
						100
MW-27		3/26/2020	7443766.76	1546337.14	4712.61	28
						113
MW-28		3/20/2020	7443764.76	1546532.92	4712.8	24
						48
						118
SB-42	Sunnyside Park	12/7/2018	7442828.84	1545936.88	4679.06	6 - 7
						12 - 13
						16 - 17
						24.8 - 26
SB-43		12/7/2018	7442771.79	1545921.39	4676.97	7 - 8
						14.7 - 15.7
MW-29		6/7/2020	7442845.95	1545935.59	4679.35	42
						66
						98

Notes

Surface and top of casing elevations measured using the NAVD 88 vertical datum

amsl = above mean sea level bgs = below ground surface ft = feet

* = Elevation information not provided

Table 2
Source Area OU1 Soil Vapor Analytical Results

Sample ID	Sample Date	Analytical Method	Start Depth (ft)	End Depth (ft)	1,1,1-Trichloroethane	1,1,2-Trichlorotrifluoroethane	1,1-Dichloroethene	1,2,4-Trimethylbenzene	1,2-Dichloroethane	1,2-Dichlorotetrafluoroethane
Industrial / Commercial Screening Level for Soil Gas (µg/m^3)					730000	730000	29000	8700	16	#N/A
MW23-SG032321-135	3/23/2021	TO15	130	140	**15 J**	**14 J**	*30 U*	*150 U*	*30 U*	*53 U*
MW24-SG032521-104	3/25/2021	TO15	104	104		**9.2**		*4 U*		
		TO15SIM	104	104	**1.7**		*0.32 U*		*0.66 U*	**0.95 J**
MW24-SG032521-130	3/25/2021	TO15	130	130		**14**		*3.4 U*		
		TO15SIM	130	130	**7.8**		**2.3**		*0.57 U*	**1.3**
MW24-SG032521-60	3/25/2021	TO15	60	60		**2.3 J**		*8.3 U*		
		TO15SIM	60	60	**2**		*0.67 U*		*1.4 U*	**0.72 J**
MW24-SG032621-32	3/26/2021	TO15	32	32		**1.9 J**		*7 U*		
		TO15SIM	32	32	**2.1**		*0.57 U*		*1.2 U*	**0.37 J**
MW25-SG032421-100	3/24/2021	TO15	100	100		**6.6**		**0.089 J**		
		TO15SIM	100	100	**0.47**		*0.082 U*		*0.17 U*	**0.14 J**
MW25-SG032421-28	3/24/2021	TO15	28	28		**0.62 J**		**0.15 J**		
		TO15SIM	28	28	**0.98**		*0.12 U*		*0.24 U*	**0.18 J**
MW27-SG032221-113	3/22/2021	TO15	113	113	**8.8 J**	**11 J**	*29 U*	*140 U*	*30 U*	*51 U*
MW27-SG032221-28	3/22/2021	TO15	28	28	**6.3 J**	*58 U*	*30 U*	*37 U*	*31 U*	*53 U*
MW28-SG032321-118	3/23/2021	TO15	118	118		**7.8 J**		*8 U*		
		TO15SIM	118	118	**7.2**		*0.65 U*		*1.3 U*	**0.67 J**
MW28-SG032321-24	3/23/2021	TO15	24	24		**2.1 J**		*6.9 U*		
		TO15SIM	24	24	*1.5 U*		*0.56 U*		*1.1 U*	**0.2 J**
MW28-SG032321-48	3/23/2021	TO15	48	48		**2.4 J**		*7 U*		
		TO15SIM	48	48	**2**		*0.56 U*		*1.1 U*	**0.34 J**
MW29-SG032521-42	3/25/2021	TO15	42	42		**2.9 J**		**0.27 J**		
		TO15SIM	42	42	**0.68 J**		*0.3 U*		*0.62 U*	**0.68 J**
MW29-SG032521-66	3/25/2021	TO15	66	66		**2.1 J**		**0.39 J**		
		TO15SIM	66	66	**0.5**		*0.12 U*		*0.26 U*	**0.36 J**
MW29-SG032521-98	3/25/2021	TO15	98	98		**15**		*7 U*		
		TO15SIM	98	98	**1.7**		**1.6**		*1.1 U*	*2 U*
SB42-SG032521-13	3/25/2021	TO15	12	13		**0.66 J**		**0.61 J**		
		TO15SIM	12	13	**0.26 J**		*0.21 U*		*0.43 U*	**0.11 J**
SB42-SG032521-17	3/25/2021	TO15	16	17		*5.7 U*		**0.63 J**		
		TO15SIM	16	17	**0.31 J**		*0.3 U*		*0.6 U*	*1 U*
SB42-SG032521-26	3/25/2021	TO15	24.8	26		*5.8 U*		**0.5 J**		
		TO15SIM	24.8	26	**0.47 J**		*0.3 U*		*0.62 U*	*1.1 U*
SB42-SG032521-7	3/25/2021	TO15	6	7		**0.67 J**		**0.44 J**		
		TO15SIM	6	7	**0.091 J**		*0.06 U*		*0.12 U*	**0.11 J**
SB43-SG032521-15	3/25/2021	TO15	14.7	15.7		**1.2 J**		**0.67 J**		
		TO15SIM	14.7	15.7	**0.56**		*0.066 U*		*0.14 U*	**0.1 J**
SB43-SG032521-8	3/25/2021	TO15	7	8		**0.78 J**		**0.6 J**		
		TO15SIM	7	8	**0.2**		*0.062 U*		*0.13 U*	**0.1 J**
SG03-SG032221	3/22/2021	TO15	7.8	8.1		*12 U*		*7.8 U*		
		TO15SIM	7.8	8.1	*1.7 U*		*0.63 U*		*1.3 U*	*2.2 U*
SG04-SG032321	3/23/2021	TO15	5.5	5.8		**0.51 J**		**0.42 J**		
		TO15SIM	5.5	5.8	*0.39 U*		*0.14 U*		*0.29 U*	**0.11 J**
SG05-SG032321	3/23/2021	TO15	5.9	6.3		*12 U*		**0.59 J**		
		TO15SIM	5.9	6.3	*1.7 U*		*0.61 U*		*1.2 U*	*2.1 U*
SG06-SG032321	3/23/2021	TO15	5.8	6.1		*11 U*		*7.3 U*		
		TO15SIM	5.8	6.1	*1.6 U*		*0.59 U*		*1.2 U*	*2.1 U*
SG08-SG032321	3/23/2021	TO15	3	3.3		**1.1 J**		*2.4 U*		
		TO15SIM	3	3.3	*0.54 U*		*0.2 U*		*0.4 U*	**0.11 J**

Table 2
Source Area OU1 Soil Vapor Analytical Results

Sample ID	Sample Date	Analytical Method	Start Depth (ft)	End Depth (ft)	1,1,1-Trichloroethane	1,1,2-Trichlorotrifluoroethane	1,1-Dichloroethene	1,2,4-Trimethylbenzene	1,2-Dichloroethane	1,2-Dichlorotetrafluoroethane
Industrial / Commercial Screening Level for Soil Gas (µg/m^3)					730000	730000	29000	8700	16	#N/A
SG10-SG032321	3/23/2021	TO15	6.3	6.8		**0.52 J**		**0.54 J**		
		TO15SIM	6.3	6.8	**1.2**		*0.059 U*		*0.12 U*	**0.1 J**
SG11-SG032321	3/23/2021	TO15	4.7	5		**1.1 J**		*1.8 U*		
		TO15SIM	4.7	5	*0.39 U*		*0.14 U*		*0.29 U*	**0.11 J**
SG13-SG032321	3/23/2021	TO15	5.3	6		**0.51 J**		**0.07 J**		
		TO15SIM	5.3	6	*0.16 U*		*0.06 U*		**0.064 J**	**0.11 J**
SG49-SG032421	3/24/2021	TO15	6.1	6.7		**0.6 J**		*0.75 U*		
		TO15SIM	6.1	6.7	*0.16 U*		*0.06 U*		*0.12 U*	**0.11 J**
SG50-SG032321	3/23/2021	TO15	6.7	7.3		**0.57 J**		*1.2 U*		
		TO15SIM	6.7	7.3	*0.26 U*		*0.095 U*		*0.19 U*	**0.14 J**
SG55-SG032321	3/23/2021	TO15	4.5	5		**0.56 J**		*0.69 U*		
		TO15SIM	4.5	5	**0.35**		*0.056 U*		*0.11 U*	**0.13 J**
SG60-SG032221	3/22/2021	TO15	3.8	4.3		**0.54 J**		*0.74 U*		
		TO15SIM	3.8	4.3	*0.16 U*		*0.059 U*		*0.12 U*	**0.11 J**
VP02-SG032421	3/24/2021	TO15				**1.2 J**		**0.13 J**		
		TO15SIM			**0.96**		*0.15 U*		*0.3 U*	**0.12 J**
VP04-SG032421	3/24/2021	TO15			*83 U*	*120 U*	*60 U*	*300 U*	*62 U*	*110 U*
VP06-SG032421	3/24/2021	TO15				**0.59 J**		**0.1 J**		
		TO15SIM			**0.89**		*0.057 U*		*0.12 U*	**0.13 J**
VP08-SG032421	3/24/2021	TO15				**0.98 J**		**0.12 J**		
		TO15SIM			**0.18 J**		*0.11 U*		*0.23 U*	**0.13 J**
VP09-SG032421	3/24/2021	TO15				*4 U*		**0.47 J**		
		TO15SIM			**0.054 J**		*0.21 U*		*0.42 U*	**0.1 J**
VP10-SG032421	3/24/2021	TO15				**0.37 J**		**0.17 J**		
		TO15SIM			*0.16 U*		*0.06 U*		*0.12 U*	**0.11 J**
VP11-SG032421	3/24/2021	TO15				*5.8 U*		**0.72 J**		
		TO15SIM			*0.83 U*		*0.3 U*		*0.62 U*	**0.16 J**
VP12-SG032421	3/24/2021	TO15				**0.67 J**		**0.11 J**		
		TO15SIM			**0.032 J**		**0.069**		*0.13 U*	**0.12 J**
VP13-SG032421	3/24/2021	TO15				**0.95 J**		**0.11 J**		
		TO15SIM			**0.035 J**		*0.12 U*		*0.25 U*	**0.11 J**
VP14-SG032421	3/24/2021	TO15				**0.72 J**		**0.25 J**		
		TO15SIM			**0.28**		*0.063 U*		**0.026 J**	**0.24**
VP15-SG032421	3/24/2021	TO15			*80 U*	*110 U*	*58 U*	*290 U*	*59 U*	*100 U*
VP17-SG032421	3/24/2021	TO15				**1.7 J**		*3.8 U*		
		TO15SIM			**1.7**		*0.31 U*		*0.63 U*	**0.25 J**
VP19-SG032421	3/24/2021	TO15				**0.32 J**		**0.14 J**		
		TO15SIM			*0.16 U*		*0.058 U*		*0.12 U*	**0.14 J**

Notes

Results are in µg/m^3

Industrial / Commercial Screening Levels for Soil Gas from EPA Regional Screening Levels updated May 2021.

U = not detected above reporting limit

J = results is estimated.

Results in bold are detected over the reporting limit

Results in bold and shaded gray exceed the screening level

Table 2
Source Area OU1 Soil Vapor Analytical Results

Sample ID	Sample Date	Analytical Method	Start Depth (ft)	End Depth (ft)	1,3,5-Trimethylbenzene	1,3-Dichlorobenzene	1,4-Dioxane	2-Butanone (MEK)	2-Hexanone	4-Ethyltoluene
Industrial / Commercial Screening Level for Soil Gas (µg/m^3)					8700	NA	82	730000	4300	#N/A
MW23-SG032321-135	3/23/2021	TO15	130	140	*150 U*	*45 U*	*110 U*	*89 U*	*120 U*	*37 U*
MW24-SG032521-104	3/25/2021	TO15	104	104	*4 U*	*4.9 U*	*3 U*	*12 U*	*17 U*	*4 U*
		TO15SIM	104	104						
MW24-SG032521-130	3/25/2021	TO15	130	130	*3.4 U*	*4.2 U*	*2.5 U*	**1.5 J**	*14 U*	*3.4 U*
		TO15SIM	130	130						
MW24-SG032521-60	3/25/2021	TO15	60	60	*8.3 U*	*10 U*	*6.1 U*	*25 U*	*35 U*	*8.3 U*
		TO15SIM	60	60						
MW24-SG032621-32	3/26/2021	TO15	32	32	*7 U*	*8.6 U*	*5.2 U*	*21 U*	*29 U*	*7 U*
		TO15SIM	32	32						
MW25-SG032421-100	3/24/2021	TO15	100	100	*1 U*	*1.2 U*	*0.74 U*	**5**	**0.74 J**	*1 U*
		TO15SIM	100	100						
MW25-SG032421-28	3/24/2021	TO15	28	28	*1.5 U*	*1.8 U*	**0.14 J**	**5.4**	**0.65 J**	**0.11 J**
		TO15SIM	28	28						
MW27-SG032221-113	3/22/2021	TO15	113	113	*140 U*	*44 U*	*100 U*	*87 U*	*120 U*	*36 U*
MW27-SG032221-28	3/22/2021	TO15	28	28	*37 U*	*46 U*	*110 U*	*90 U*	*120 U*	*37 U*
MW28-SG032321-118	3/23/2021	TO15	118	118	*8 U*	*9.8 U*	*5.9 U*	*24 U*	*33 U*	*8 U*
		TO15SIM	118	118						
MW28-SG032321-24	3/23/2021	TO15	24	24	*6.9 U*	*8.5 U*	*5.1 U*	*21 U*	*29 U*	*6.9 U*
		TO15SIM	24	24						
MW28-SG032321-48	3/23/2021	TO15	48	48	*7 U*	*8.5 U*	*5.1 U*	*21 U*	*29 U*	*7 U*
		TO15SIM	48	48						
MW29-SG032521-42	3/25/2021	TO15	42	42	*3.7 U*	*4.6 U*	*2.7 U*	*11 U*	*16 U*	*3.7 U*
		TO15SIM	42	42						
MW29-SG032521-66	3/25/2021	TO15	66	66	*1.6 U*	*1.9 U*	*1.1 U*	*4.6 U*	*6.5 U*	*1.6 U*
		TO15SIM	66	66						
MW29-SG032521-98	3/25/2021	TO15	98	98	*7 U*	*8.5 U*	*5.1 U*	*21 U*	*29 U*	*7 U*
		TO15SIM	98	98						
SB42-SG032521-13	3/25/2021	TO15	12	13	*2.6 U*	*3.2 U*	*1.9 U*	*7.8 U*	*11 U*	*2.6 U*
		TO15SIM	12	13						
SB42-SG032521-17	3/25/2021	TO15	16	17	*3.7 U*	*4.5 U*	*2.7 U*	*11 U*	*15 U*	*3.7 U*
		TO15SIM	16	17						
SB42-SG032521-26	3/25/2021	TO15	24.8	26	*3.7 U*	*4.6 U*	*2.7 U*	*11 U*	*16 U*	**0.46 J**
		TO15SIM	24.8	26						
SB42-SG032521-7	3/25/2021	TO15	6	7	**0.14 J**	*0.91 U*	*0.54 U*	**0.48 J**	*3.1 U*	**0.29 J**
		TO15SIM	6	7						
SB43-SG032521-15	3/25/2021	TO15	14.7	15.7	**0.27 J**	*1 U*	*0.6 U*	**0.92 J**	*3.4 U*	**0.5 J**
		TO15SIM	14.7	15.7						
SB43-SG032521-8	3/25/2021	TO15	7	8	**0.24 J**	*0.94 U*	**0.15 J**	**1.2 J**	*3.2 U*	**0.44 J**
		TO15SIM	7	8						
SG03-SG032221	3/22/2021	TO15	7.8	8.1	*7.8 U*	*9.6 U*	*5.7 U*	*23 U*	*32 U*	*7.8 U*
		TO15SIM	7.8	8.1						
SG04-SG032321	3/23/2021	TO15	5.5	5.8	**0.17 J**	*2.2 U*	*1.3 U*	*5.3 U*	*7.3 U*	*1.8 U*
		TO15SIM	5.5	5.8						
SG05-SG032321	3/23/2021	TO15	5.9	6.3	*7.5 U*	*9.2 U*	*5.5 U*	*22 U*	*31 U*	*7.5 U*
		TO15SIM	5.9	6.3						
SG06-SG032321	3/23/2021	TO15	5.8	6.1	*7.3 U*	*8.9 U*	*5.3 U*	*22 U*	*30 U*	*7.3 U*
		TO15SIM	5.8	6.1						
SG08-SG032321	3/23/2021	TO15	3	3.3	*2.4 U*	*3 U*	*1.8 U*	*7.4 U*	*10 U*	*2.4 U*
		TO15SIM	3	3.3						

Table 2
Source Area OU1 Soil Vapor Analytical Results

Sample ID	Sample Date	Analytical Method	Start Depth (ft)	End Depth (ft)	1,3,5-Trimethylbenzene	1,3-Dichlorobenzene	1,4-Dioxane	2-Butanone (MEK)	2-Hexanone	4-Ethyltoluene
Industrial / Commercial Screening Level for Soil Gas (µg/m^3)					8700	NA	82	730000	4300	#N/A
SG10-SG032321	3/23/2021	TO15	6.3	6.8	**0.22 J**	*0.9 U*	**0.32 J**	**0.37 J**	*3.1 U*	*0.74 U*
		TO15SIM	6.3	6.8						
SG11-SG032321	3/23/2021	TO15	4.7	5	*1.8 U*	*2.2 U*	*1.3 U*	*5.3 U*	*7.4 U*	*1.8 U*
		TO15SIM	4.7	5						
SG13-SG032321	3/23/2021	TO15	5.3	6	*0.74 U*	*0.91 U*	**0.087 J**	**0.93 J**	*3.1 U*	**0.073 J**
		TO15SIM	5.3	6						
SG49-SG032421	3/24/2021	TO15	6.1	6.7	*0.75 U*	*0.91 U*	**0.092 J**	**0.27 J**	*3.1 U*	*0.75 U*
		TO15SIM	6.1	6.7						
SG50-SG032321	3/23/2021	TO15	6.7	7.3	*1.2 U*	*1.4 U*	*0.86 U*	**0.36 J**	*4.9 U*	*1.2 U*
		TO15SIM	6.7	7.3						
SG55-SG032321	3/23/2021	TO15	4.5	5	*0.69 U*	*0.85 U*	**0.068 J**	**2.2**	**0.24 J**	*0.69 U*
		TO15SIM	4.5	5						
SG60-SG032221	3/22/2021	TO15	3.8	4.3	*0.74 U*	*0.9 U*	*0.54 U*	**0.27 J**	*3.1 U*	*0.74 U*
		TO15SIM	3.8	4.3						
VP02-SG032421	3/24/2021	TO15			*1.8 U*	**6.5**	*1.4 U*	**2 J**	*7.7 U*	*1.8 U*
		TO15SIM								
VP04-SG032421	3/24/2021	TO15			*300 U*	*92 U*	*220 U*	*180 U*	*250 U*	*75 U*
VP06-SG032421	3/24/2021	TO15			*0.7 U*	**3.6**	**0.066 J**	**2 J**	*2.9 U*	**0.063 J**
		TO15SIM								
VP08-SG032421	3/24/2021	TO15			*1.4 U*	**7**	*1 U*	**2.2 J**	*5.8 U*	*1.4 U*
		TO15SIM								
VP09-SG032421	3/24/2021	TO15			*2.6 U*	**19**	*1.9 U*	**8.3**	*11 U*	**0.31 J**
		TO15SIM								
VP10-SG032421	3/24/2021	TO15			*0.74 U*	**9.2**	*0.54 U*	**2.7**	*3.1 U*	**0.12 J**
		TO15SIM								
VP11-SG032421	3/24/2021	TO15			*3.7 U*	**36**	*2.7 U*	**6.8 J**	*16 U*	**0.49 J**
		TO15SIM								
VP12-SG032421	3/24/2021	TO15			*0.77 U*	**2.7**	*0.56 U*	**2.2 J**	*3.2 U*	*0.77 U*
		TO15SIM								
VP13-SG032421	3/24/2021	TO15			*1.5 U*	**3.4**	*1.1 U*	**1.3 J**	*6.2 U*	*1.5 U*
		TO15SIM								
VP14-SG032421	3/24/2021	TO15			**0.066 J**	**15**	**0.13 J**	**4.6**	*3.2 U*	**0.17 J**
		TO15SIM								
VP15-SG032421	3/24/2021	TO15			*290 U*	*88 U*	*210 U*	*170 U*	*240 U*	*72 U*
VP17-SG032421	3/24/2021	TO15			*3.8 U*	**5.6**	**0.21 J**	**1.5 J**	*16 U*	*3.8 U*
		TO15SIM								
VP19-SG032421	3/24/2021	TO15			*0.72 U*	**4.7**	**0.12 J**	**2.4**	*3 U*	**0.1 J**
		TO15SIM								

Notes
Results are in µg/m^3
Industrial / Commercial Screening Levels for Soil Gas from EPA Regional S
U = not detected above reporting limit
J = results is estimated.
Results in bold are detected over the reporting limit
Results in bold and shaded gray exceed the screening level

Table 2
Source Area OU1 Soil Vapor Analytical Results

Sample ID	Sample Date	Analytical Method	Start Depth (ft)	End Depth (ft)	4-Methyl-2-Pentanone (MIBK)	Acetone	Allyl Chloride	Benzene	Bromodichloromethane	Carbon Disulfide
Industrial / Commercial Screening Level for Soil Gas (µg/m^3)					430000	4700000	#N/A	53	11	100000
MW23-SG032321-135	3/23/2021	TO15	130	140	*31 U*	*180 U*	94 **UJ**	*24 U*	**8 J**	*94 U*
MW24-SG032521-104	3/25/2021	TO15	104	104	*3.4 U*	*19 U*	*13 U*		**12**	*13 U*
		TO15SIM	104	104				**0.19 J**		
MW24-SG032521-130	3/25/2021	TO15	130	130	*2.9 U*	**69**	*11 U*		**6.4**	*11 U*
		TO15SIM	130	130				**0.42 J**		
MW24-SG032521-60	3/25/2021	TO15	60	60	*6.9 U*	*40 U*	*26 U*		**40**	*26 U*
		TO15SIM	60	60				**0.26 J**		
MW24-SG032621-32	3/26/2021	TO15	32	32	*5.8 U*	*34 U*	*22 U*		**81**	*22 U*
		TO15SIM	32	32				**0.28 J**		
MW25-SG032421-100	3/24/2021	TO15	100	100	*0.84 U*	**56**	*3.2 U*		**13**	**0.41 J**
		TO15SIM	100	100				**0.14 J**		
MW25-SG032421-28	3/24/2021	TO15	28	28	*1.2 U*	**86**	4.7 **UJ**		**8.4**	*4.7 U*
		TO15SIM	28	28				**0.19 J**		
MW27-SG032221-113	3/22/2021	TO15	113	113	*30 U*	*170 U*	92 **UJ**	*23 U*	*49 U*	*92 U*
MW27-SG032221-28	3/22/2021	TO15	28	28	*31 U*	*72 U*	95 **UJ**	*24 U*	*51 U*	*95 U*
MW28-SG032321-118	3/23/2021	TO15	118	118	*6.7 U*	*39 U*	26 **UJ**		**5.8 J**	*25 U*
		TO15SIM	118	118				**0.5 J**		
MW28-SG032321-24	3/23/2021	TO15	24	24	**0.63 J**	*33 U*	22 **UJ**		**0.96 J**	*22 U*
		TO15SIM	24	24				**0.49 J**		
MW28-SG032321-48	3/23/2021	TO15	48	48	**1 J**	*34 U*	22 **UJ**		**3.4 J**	**4.2 J**
		TO15SIM	48	48				**0.36 J**		
MW29-SG032521-42	3/25/2021	TO15	42	42	*3.1 U*	**9.5 J**	*12 U*		**3.7 J**	**6.1 J**
		TO15SIM	42	42				**0.87 J**		
MW29-SG032521-66	3/25/2021	TO15	66	66	*1.3 U*	**3.7 J**	*4.9 U*		*2.1 U*	**0.66 J**
		TO15SIM	66	66				**0.67**		
MW29-SG032521-98	3/25/2021	TO15	98	98	*5.8 U*	*34 U*	*22 U*		**2.1 J**	**7.1 J**
		TO15SIM	98	98				**0.47 J**		
SB42-SG032521-13	3/25/2021	TO15	12	13	*2.2 U*	*12 U*	*8.3 U*		*3.5 U*	*8.2 U*
		TO15SIM	12	13				**0.07 J**		
SB42-SG032521-17	3/25/2021	TO15	16	17	*3 U*	*18 U*	*12 U*		*5 U*	*12 U*
		TO15SIM	16	17				**0.12 J**		
SB42-SG032521-26	3/25/2021	TO15	24.8	26	*3.1 U*	*18 U*	*12 U*		**0.82 J**	*12 U*
		TO15SIM	24.8	26				**0.16 J**		
SB42-SG032521-7	3/25/2021	TO15	6	7	*0.62 U*	**7.8**	*2.4 U*		*1 U*	**0.73 J**
		TO15SIM	6	7				**0.034 J**		
SB43-SG032521-15	3/25/2021	TO15	14.7	15.7	*0.68 U*	**7**	*2.6 U*		*1.1 U*	**1.1 J**
		TO15SIM	14.7	15.7				**0.054 J**		
SB43-SG032521-8	3/25/2021	TO15	7	8	*0.64 U*	**7.3**	*2.4 U*		*1 U*	**0.89 J**
		TO15SIM	7	8				**0.035 J**		
SG03-SG032221	3/22/2021	TO15	7.8	8.1	*6.5 U*	*38 U*	25 **UJ**		*11 U*	*25 U*
		TO15SIM	7.8	8.1				*2.5 U*		
SG04-SG032321	3/23/2021	TO15	5.5	5.8	*1.5 U*	*8.5 U*	5.6 **UJ**		*2.4 U*	*5.6 U*
		TO15SIM	5.5	5.8				**0.13 J**		
SG05-SG032321	3/23/2021	TO15	5.9	6.3	*6.3 U*	*36 U*	24 **UJ**		*10 U*	*24 U*
		TO15SIM	5.9	6.3				*2.4 U*		
SG06-SG032321	3/23/2021	TO15	5.8	6.1	*6.1 U*	*35 U*	23 **UJ**		**38**	*23 U*
		TO15SIM	5.8	6.1				*2.4 U*		
SG08-SG032321	3/23/2021	TO15	3	3.3	*2 U*	*12 U*	7.8 **UJ**		*3.4 U*	*7.8 U*
		TO15SIM	3	3.3				*0.8 U*		

Table 2
Source Area OU1 Soil Vapor Analytical Results

Sample ID	Sample Date	Analytical Method	Start Depth (ft)	End Depth (ft)	4-Methyl-2-Pentanone (MIBK)	Acetone	Allyl Chloride	Benzene	Bromodichloromethane	Carbon Disulfide
Industrial / Commercial Screening Level for Soil Gas (µg/m^3)					430000	4700000	#N/A	53	11	100000
SG10-SG032321	3/23/2021	TO15	6.3	6.8	*0.61 U*	*3.6 U*	2.3 **UJ**		**0.12 J**	**0.44 J**
		TO15SIM	6.3	6.8				*0.24 U*		
SG11-SG032321	3/23/2021	TO15	4.7	5	**0.17 J**	*8.6 U*	5.6 **UJ**		*2.4 U*	*5.6 U*
		TO15SIM	4.7	5				*0.58 U*		
SG13-SG032321	3/23/2021	TO15	5.3	6	**0.11 J**	**5.8**	2.4 **UJ**		*1 U*	*2.4 U*
		TO15SIM	5.3	6				**0.35**		
SG49-SG032421	3/24/2021	TO15	6.1	6.7	*0.62 U*	**7.6**	2.4 **UJ**		*1 U*	*2.4 U*
		TO15SIM	6.1	6.7				**0.092 J**		
SG50-SG032321	3/23/2021	TO15	6.7	7.3	*0.98 U*	*5.7 U*	3.8 **UJ**		*1.6 U*	*3.7 U*
		TO15SIM	6.7	7.3				**0.038 J**		
SG55-SG032321	3/23/2021	TO15	4.5	5	*0.58 U*	**18**	2.2 **UJ**		*0.94 U*	*2.2 U*
		TO15SIM	4.5	5				**0.034 J**		
SG60-SG032221	3/22/2021	TO15	3.8	4.3	*0.61 U*	**7**	2.3 **UJ**		*1 U*	*2.3 U*
		TO15SIM	3.8	4.3				*0.24 U*		
VP02-SG032421	3/24/2021	TO15			*1.5 U*	**12**	5.9 **UJ**		*2.5 U*	*5.8 U*
		TO15SIM						*0.6 U*		
VP04-SG032421	3/24/2021	TO15			*62 U*	*360 U*	190 **UJ**	*49 U*	*100 U*	*190 U*
VP06-SG032421	3/24/2021	TO15			*0.58 U*	**9.2**	2.2 **UJ**		*0.96 U*	*2.2 U*
		TO15SIM						**0.08 J**		
VP08-SG032421	3/24/2021	TO15			*1.2 U*	**7.7**	*4.4 U*		*1.9 U*	*4.4 U*
		TO15SIM						**0.049 J**		
VP09-SG032421	3/24/2021	TO15			*2.1 U*	**16**	8.2 **UJ**		*3.5 U*	*8.1 U*
		TO15SIM						**0.12 J**		
VP10-SG032421	3/24/2021	TO15			*0.62 U*	**8.6**	2.4 **UJ**		*1 U*	*2.4 U*
		TO15SIM						**0.054 J**		
VP11-SG032421	3/24/2021	TO15			*3.1 U*	**14 J**	12 **UJ**		*5.1 U*	*12 U*
		TO15SIM						**0.19 J**		
VP12-SG032421	3/24/2021	TO15			*0.64 U*	**7.6**	2.4 **UJ**		*1 U*	*2.4 U*
		TO15SIM						**0.05 J**		
VP13-SG032421	3/24/2021	TO15			*1.2 U*	**5.7 J**	*4.8 U*		**13**	*4.7 U*
		TO15SIM						**0.42 J**		
VP14-SG032421	3/24/2021	TO15			*0.65 U*	**12**	2.5 **UJ**		**0.62 J**	*2.5 U*
		TO15SIM						**0.12 J**		
VP15-SG032421	3/24/2021	TO15			*60 U*	*350 U*	180 **UJ**	*47 U*	**37 J**	*180 U*
VP17-SG032421	3/24/2021	TO15			*3.2 U*	*18 U*	12 **UJ**		**18**	*12 U*
		TO15SIM						**0.14 J**		
VP19-SG032421	3/24/2021	TO15			*0.6 U*	**8.8**	*2.3 U*		*0.98 U*	*2.3 U*
		TO15SIM						**0.047 J**		

Notes
Results are in µg/m^3
Industrial / Commercial Screening Levels for Soil Gas from EPA Regional S
U = not detected above reporting limit
J = results is estimated.
Results in bold are detected over the reporting limit
Results in bold and shaded gray exceed the screening level

Table 2
Source Area OU1 Soil Vapor Analytical Results

Sample ID	Sample Date	Analytical Method	Start Depth (ft)	End Depth (ft)	Carbon Tetrachloride	Chlorobenzene	Chloroethane	Chloroform	Chloromethane	cis-1,2-Dichloroethene
Industrial / Commercial Screening Level for Soil Gas (µg/m^3)					67	7300	1500000	18	13000	NA
MW23-SG032321-135	3/23/2021	TO15	130	140	*48 U*	*35 U*	*80 U*	**82**	**21 J**	**6.7 J**
MW24-SG032521-104	3/25/2021	TO15	104	104		*3.8 U*				
		TO15SIM	104	104	**3**		*1.1 U*	**570**	*8.5 U*	*0.65 U*
MW24-SG032521-130	3/25/2021	TO15	130	130		*3.2 U*				
		TO15SIM	130	130	**2.7**		*0.92 U*	**490**	*7.2 U*	*0.56 U*
MW24-SG032521-60	3/25/2021	TO15	60	60		*7.8 U*				
		TO15SIM	60	60	**3**		*2.2 U*	**970**	*17 U*	*1.3 U*
MW24-SG032621-32	3/26/2021	TO15	32	32		*6.6 U*				
		TO15SIM	32	32	**2.8**		*1.9 U*	**1200**	*15 U*	*1.1 U*
MW25-SG032421-100	3/24/2021	TO15	100	100		*0.95 U*				
		TO15SIM	100	100	**0.96**		**0.082 J**	**200**	**0.086 J**	*0.16 U*
MW25-SG032421-28	3/24/2021	TO15	28	28		*1.4 U*				
		TO15SIM	28	28	**0.18 J**		**0.19 J**	**170**	**0.5 J**	*0.24 U*
MW27-SG032221-113	3/22/2021	TO15	113	113	*46 U*	**14 J**	*78 U*	**150**	*150 U*	**9 J**
MW27-SG032221-28	3/22/2021	TO15	28	28	*48 U*	*35 U*	*80 U*	**52**	*63 U*	*30 U*
MW28-SG032321-118	3/23/2021	TO15	118	118		*7.5 U*				
		TO15SIM	118	118	*2 U*		**0.15 J**	**100**	*17 U*	*1.3 U*
MW28-SG032321-24	3/23/2021	TO15	24	24		*6.5 U*				
		TO15SIM	24	24	*1.8 U*		**0.16 J**	**29**	**0.63 J**	*1.1 U*
MW28-SG032321-48	3/23/2021	TO15	48	48		*6.5 U*				
		TO15SIM	48	48	*1.8 U*		**0.29 J**	**98**	*15 U*	*1.1 U*
MW29-SG032521-42	3/25/2021	TO15	42	42		*3.5 U*				
		TO15SIM	42	42	**1.6**		*1 U*	**560**	**0.87 J**	**0.65**
MW29-SG032521-66	3/25/2021	TO15	66	66		*1.4 U*				
		TO15SIM	66	66	**1.1**		*0.42 U*	**290**	**0.074 J**	**0.49**
MW29-SG032521-98	3/25/2021	TO15	98	98		*6.5 U*				
		TO15SIM	98	98	**2.9**		*1.9 U*	**820**	**0.29 J**	**1.3**
SB42-SG032521-13	3/25/2021	TO15	12	13		*2.4 U*				
		TO15SIM	12	13	**0.17 J**		*0.7 U*	**15**	*5.5 U*	**0.21 J**
SB42-SG032521-17	3/25/2021	TO15	16	17		*3.4 U*				
		TO15SIM	16	17	*0.94 U*		*0.98 U*	**24**	*7.7 U*	**0.55 J**
SB42-SG032521-26	3/25/2021	TO15	24.8	26		*3.5 U*				
		TO15SIM	24.8	26	**0.49 J**		*1 U*	**82**	*7.8 U*	**3**
SB42-SG032521-7	3/25/2021	TO15	6	7		*0.7 U*				
		TO15SIM	6	7	*0.19 U*		*0.2 U*	**2.5**	*1.6 U*	*0.12 U*
SB43-SG032521-15	3/25/2021	TO15	14.7	15.7		*0.77 U*				
		TO15SIM	14.7	15.7	**0.081 J**		*0.22 U*	**25**	*1.7 U*	**0.033 J**
SB43-SG032521-8	3/25/2021	TO15	7	8		*0.72 U*				
		TO15SIM	7	8	*0.2 U*		*0.21 U*	**16**	*1.6 U*	*0.12 U*
SG03-SG032221	3/22/2021	TO15	7.8	8.1		*7.3 U*				
		TO15SIM	7.8	8.1	*2 U*		*2.1 U*	**0.3 J**	*16 U*	*1.3 U*
SG04-SG032321	3/23/2021	TO15	5.5	5.8		*1.6 U*				
		TO15SIM	5.5	5.8	*0.45 U*		*0.47 U*	*0.35 U*	*3.7 U*	**0.13 J**
SG05-SG032321	3/23/2021	TO15	5.9	6.3		*7 U*				
		TO15SIM	5.9	6.3	*1.9 U*		*2 U*	*1.5 U*	*16 U*	**0.24 J**
SG06-SG032321	3/23/2021	TO15	5.8	6.1		*6.8 U*				
		TO15SIM	5.8	6.1	**0.88 J**		**0.14 J**	**480**	*15 U*	*1.2 U*
SG08-SG032321	3/23/2021	TO15	3	3.3		*2.3 U*				
		TO15SIM	3	3.3	*0.63 U*		*0.66 U*	*0.49 U*	*5.2 U*	*0.4 U*

Table 2
Source Area OU1 Soil Vapor Analytical Results

Sample ID	Sample Date	Analytical Method	Start Depth (ft)	End Depth (ft)	Carbon Tetrachloride	Chlorobenzene	Chloroethane	Chloroform	Chloromethane	cis-1,2-Dichloroethene
Industrial / Commercial Screening Level for Soil Gas (µg/m^3)					67	7300	1500000	18	13000	NA
SG10-SG032321	3/23/2021	TO15	6.3	6.8		*0.69 U*				
		TO15SIM	6.3	6.8	*0.19 U*		*0.2 U*	**39**	**0.032 J**	*0.12 U*
SG11-SG032321	3/23/2021	TO15	4.7	5		*1.6 U*				
		TO15SIM	4.7	5	*0.45 U*		*0.47 U*	**3.9**	*3.7 U*	*0.28 U*
SG13-SG032321	3/23/2021	TO15	5.3	6		*0.7 U*				
		TO15SIM	5.3	6	**0.43**		**0.057 J**	*0.15 U*	**0.57 J**	**0.035 J**
SG49-SG032421	3/24/2021	TO15	6.1	6.7		*0.7 U*				
		TO15SIM	6.1	6.7	*0.19 U*		*0.2 U*	**0.52**	**0.24 J**	*0.12 U*
SG50-SG032321	3/23/2021	TO15	6.7	7.3		*1.1 U*				
		TO15SIM	6.7	7.3	*0.3 U*		*0.32 U*	*0.23 U*	**0.073 J**	*0.19 U*
SG55-SG032321	3/23/2021	TO15	4.5	5		*0.65 U*				
		TO15SIM	4.5	5	**0.15 J**		*0.19 U*	**14**	**0.02 J**	*0.11 U*
SG60-SG032221	3/22/2021	TO15	3.8	4.3		*0.69 U*				
		TO15SIM	3.8	4.3	**0.12 J**		*0.2 U*	**0.048 J**	**0.026 J**	*0.12 U*
VP02-SG032421	3/24/2021	TO15				*1.7 U*				
		TO15SIM			**0.27 J**		*0.49 U*	*0.37 U*	**0.082 J**	*0.3 U*
VP04-SG032421	3/24/2021	TO15			*96 U*	*70 U*	*160 U*	**43 J**	*310 U*	*60 U*
VP06-SG032421	3/24/2021	TO15				*0.66 U*				
		TO15SIM			**0.29**		*0.19 U*	**0.055 J**	**0.26 J**	*0.11 U*
VP08-SG032421	3/24/2021	TO15				*1.3 U*				
		TO15SIM			*0.36 U*		*0.37 U*	**0.062 J**	*2.9 U*	*0.22 U*
VP09-SG032421	3/24/2021	TO15				*2.4 U*				
		TO15SIM			**0.35 J**		*0.69 U*	*0.51 U*	*5.4 U*	*0.41 U*
VP10-SG032421	3/24/2021	TO15				*0.7 U*				
		TO15SIM			**0.52**		**0.05 J**	**0.11 J**	*1.6 U*	*0.12 U*
VP11-SG032421	3/24/2021	TO15				*3.5 U*				
		TO15SIM			**0.28 J**		*1 U*	*0.74 U*	*7.8 U*	*0.6 U*
VP12-SG032421	3/24/2021	TO15				*0.72 U*				
		TO15SIM			**0.5**		*0.2 U*	**0.64**	*1.6 U*	*0.12 U*
VP13-SG032421	3/24/2021	TO15				*1.4 U*				
		TO15SIM			**0.68**		**0.087 J**	**240**	*3.1 U*	*0.24 U*
VP14-SG032421	3/24/2021	TO15				*0.73 U*				
		TO15SIM			**0.17 J**		*0.21 U*	**73**	**0.099 J**	*0.12 U*
VP15-SG032421	3/24/2021	TO15			*92 U*	*67 U*	*150 U*	**180**	*300 U*	*58 U*
VP17-SG032421	3/24/2021	TO15				*3.6 U*				
		TO15SIM			**1.4**		*1 U*	**370**	*8 U*	*0.61 U*
VP19-SG032421	3/24/2021	TO15				*0.67 U*				
		TO15SIM			**0.48**		*0.19 U*	**0.052 J**	*1.5 U*	*0.12 U*

Notes

Results are in µg/m^3

Industrial / Commercial Screening Levels for Soil Gas from EPA Regional S

U = not detected above reporting limit

J = results is estimated.

Results in bold are detected over the reporting limit

Results in bold and shaded gray exceed the screening level

Table 2
Source Area OU1 Soil Vapor Analytical Results

Sample ID	Sample Date	Analytical Method	Start Depth (ft)	End Depth (ft)	Cyclohexane	Dibromochloromethane	Dichlorodifluoromethane	Ethanol	Ethylbenzene	Hexane
Industrial / Commercial Screening Level for Soil Gas (µg/m^3)					#N/A	NA	15000	#N/A	160	#N/A
MW23-SG032321-135	3/23/2021	TO15	130	140	*26 U*	*64 U*	**7 J**	*140 U*	*33 U*	*27 U*
MW24-SG032521-104	3/25/2021	TO15	104	104	*14 U*	*7 U*		*15 U*		*14 U*
		TO15SIM	104	104			**3.9**		*0.71 U*	
MW24-SG032521-130	3/25/2021	TO15	130	130	*12 U*	*6 U*		*13 U*		*12 U*
		TO15SIM	130	130			**5**		**0.12 J**	
MW24-SG032521-60	3/25/2021	TO15	60	60	*29 U*	*14 U*		*32 U*		*30 U*
		TO15SIM	60	60			**2.9 J**		*1.5 U*	
MW24-SG032621-32	3/26/2021	TO15	32	32	*25 U*	**1.8 J**		*27 U*		*25 U*
		TO15SIM	32	32			**3 J**		*1.2 U*	
MW25-SG032421-100	3/24/2021	TO15	100	100	*3.5 U*	**0.82 J**		*3.9 U*		*3.6 U*
		TO15SIM	100	100			**3.6**		**0.034 J**	
MW25-SG032421-28	3/24/2021	TO15	28	28	*5.2 U*	**0.37 J**		**2.3 J**		*5.3 U*
		TO15SIM	28	28			**2.3**		**0.069 J**	
MW27-SG032221-113	3/22/2021	TO15	113	113	*25 U*	*63 U*	*36 U*	*140 U*	*32 U*	*26 U*
MW27-SG032221-28	3/22/2021	TO15	28	28	*26 U*	*65 U*	*38 U*	*57 U*	*33 U*	*27 U*
MW28-SG032321-118	3/23/2021	TO15	118	118	*28 U*	*14 U*		*150 U*		**5.2 J**
		TO15SIM	118	118			**5.3**		*1.4 U*	
MW28-SG032321-24	3/23/2021	TO15	24	24	*24 U*	*12 U*		**3.2 J**		*25 U*
		TO15SIM	24	24			**4.8**		*1.2 U*	
MW28-SG032321-48	3/23/2021	TO15	48	48	*24 U*	*12 U*		*130 U*		**2.2 J**
		TO15SIM	48	48			**4.9**		*1.2 U*	
MW29-SG032521-42	3/25/2021	TO15	42	42	*13 U*	*6.5 U*		*14 U*		**1.7 J**
		TO15SIM	42	42			**3**		**0.2 J**	
MW29-SG032521-66	3/25/2021	TO15	66	66	**1.2 J**	*2.7 U*		*6 U*		*5.6 U*
		TO15SIM	66	66			**3**		**0.081 J**	
MW29-SG032521-98	3/25/2021	TO15	98	98	*24 U*	*12 U*		*27 U*		*25 U*
		TO15SIM	98	98			**5.6**		*1.2 U*	
SB42-SG032521-13	3/25/2021	TO15	12	13	*9.1 U*	*4.5 U*		*10 U*		*9.3 U*
		TO15SIM	12	13			**3.1**		**0.27 J**	
SB42-SG032521-17	3/25/2021	TO15	16	17	*13 U*	*6.3 U*		*14 U*		*13 U*
		TO15SIM	16	17			**3.4**		**0.22 J**	
SB42-SG032521-26	3/25/2021	TO15	24.8	26	*13 U*	*6.5 U*		*14 U*		*13 U*
		TO15SIM	24.8	26			**3.7**		**0.4 J**	
SB42-SG032521-7	3/25/2021	TO15	6	7	*2.6 U*	*1.3 U*		**1.1 J**		*2.7 U*
		TO15SIM	6	7			**2.6**		**0.2**	
SB43-SG032521-15	3/25/2021	TO15	14.7	15.7	*2.9 U*	*1.4 U*		*3.1 U*		**0.35 J**
		TO15SIM	14.7	15.7			**5.5**		**0.41**	
SB43-SG032521-8	3/25/2021	TO15	7	8	*2.7 U*	*1.3 U*		**1.2 J**		*2.8 U*
		TO15SIM	7	8			**3.4**		**0.32**	
SG03-SG032221	3/22/2021	TO15	7.8	8.1	*27 U*	*14 U*		*150 U*		*28 U*
		TO15SIM	7.8	8.1			**3.1 J**		*1.4 U*	
SG04-SG032321	3/23/2021	TO15	5.5	5.8	*6.2 U*	*3 U*		**3.5 J**		*6.3 U*
		TO15SIM	5.5	5.8			**2.4**		**0.11 J**	
SG05-SG032321	3/23/2021	TO15	5.9	6.3	*26 U*	*13 U*		*140 U*		*27 U*
		TO15SIM	5.9	6.3			**2.7 J**		*1.3 U*	
SG06-SG032321	3/23/2021	TO15	5.8	6.1	*25 U*	**4 J**		*140 U*		*26 U*
		TO15SIM	5.8	6.1			**2.7 J**		*1.3 U*	
SG08-SG032321	3/23/2021	TO15	3	3.3	*8.6 U*	*4.2 U*		**1.7 J**		*8.8 U*
		TO15SIM	3	3.3			**3.7**		*0.43 U*	

Table 2
Source Area OU1 Soil Vapor Analytical Results

Sample ID	Sample Date	Analytical Method	Start Depth (ft)	End Depth (ft)	Cyclohexane	Dibromochloromethane	Dichlorodifluoromethane	Ethanol	Ethylbenzene	Hexane
Industrial / Commercial Screening Level for Soil Gas (µg/m^3)					#N/A	NA	15000	#N/A	160	#N/A
SG10-SG032321	3/23/2021	TO15	6.3	6.8	*2.6 U*	*1.3 U*		**0.56 J**		*2.6 U*
		TO15SIM	6.3	6.8			**2.4**		**0.12 J**	
SG11-SG032321	3/23/2021	TO15	4.7	5	*6.2 U*	*3.1 U*		**2.2 J**		*6.3 U*
		TO15SIM	4.7	5			**3.7**		*0.31 U*	
SG13-SG032321	3/23/2021	TO15	5.3	6	*2.6 U*	*1.3 U*		**2 J**		**0.6 J**
		TO15SIM	5.3	6			**2.4**		**0.078 J**	
SG49-SG032421	3/24/2021	TO15	6.1	6.7	*2.6 U*	*1.3 U*		**0.6 J**		*2.7 U*
		TO15SIM	6.1	6.7			**2.3**		**0.029 J**	
SG50-SG032321	3/23/2021	TO15	6.7	7.3	*4.1 U*	*2 U*		*23 U*		*4.2 U*
		TO15SIM	6.7	7.3			**2.6**		*0.21 U*	
SG55-SG032321	3/23/2021	TO15	4.5	5	*2.4 U*	*1.2 U*		**1.2 J**		*2.5 U*
		TO15SIM	4.5	5			**2.4**		*0.12 U*	
SG60-SG032221	3/22/2021	TO15	3.8	4.3	*2.6 U*	*1.3 U*		**0.8 J**		*2.6 U*
		TO15SIM	3.8	4.3			**2.5**		*0.13 U*	
VP02-SG032421	3/24/2021	TO15			*6.4 U*	*3.2 U*		**1.3 J**		*6.6 U*
		TO15SIM					**3.1**		**0.1 J**	
VP04-SG032421	3/24/2021	TO15			*52 U*	*130 U*	*75 U*	*290 U*	*66 U*	*54 U*
VP06-SG032421	3/24/2021	TO15			*2.5 U*	*1.2 U*		**1.9 J**		*2.5 U*
		TO15SIM					**2.5**		**0.076 J**	
VP08-SG032421	3/24/2021	TO15			*4.9 U*	*2.4 U*		*5.4 U*		*5 U*
		TO15SIM					**2.8**		**0.1 J**	
VP09-SG032421	3/24/2021	TO15			*9 U*	*4.4 U*		*9.8 U*		*9.2 U*
		TO15SIM					**2.3**		**0.44 J**	
VP10-SG032421	3/24/2021	TO15			*2.6 U*	*1.3 U*		**1.8 J**		*2.7 U*
		TO15SIM					**2.2**		**0.12 J**	
VP11-SG032421	3/24/2021	TO15			*13 U*	*6.5 U*		*14 U*		*13 U*
		TO15SIM					**2.2**		**0.45 J**	
VP12-SG032421	3/24/2021	TO15			*2.7 U*	*1.3 U*		**2.6 J**		*2.7 U*
		TO15SIM					**2.2**		**0.13 J**	
VP13-SG032421	3/24/2021	TO15			*5.2 U*	**0.33 J**		*5.7 U*		**1.2 J**
		TO15SIM					**2.4**		**0.067 J**	
VP14-SG032421	3/24/2021	TO15			*2.7 U*	*1.3 U*		**2.4 J**		*2.8 U*
		TO15SIM					**2.8**		**0.22**	
VP15-SG032421	3/24/2021	TO15			*50 U*	*120 U*	*72 U*	*280 U*	*63 U*	*51 U*
VP17-SG032421	3/24/2021	TO15			*13 U*	*6.6 U*		*73 U*		*14 U*
		TO15SIM					**3.2**		**0.58 J**	
VP19-SG032421	3/24/2021	TO15			*2.5 U*	*1.2 U*		**14**		*2.6 U*
		TO15SIM					**2.3**		**0.095 J**	

Notes
Results are in µg/m^3
Industrial / Commercial Screening Levels for Soil Gas from EPA Regional S
U = not detected above reporting limit
J = results is estimated.
Results in bold are detected over the reporting limit
Results in bold and shaded gray exceed the screening level

Table 2
Source Area OU1 Soil Vapor Analytical Results

Sample ID	Sample Date	Analytical Method	Start Depth (ft)	End Depth (ft)	Isopropyl Alcohol	m,p-Xylene	Methylene Chloride	n-Heptane	n-Propylbenzene	o-Xylene
Industrial / Commercial Screening Level for Soil Gas (µg/m^3)					#N/A	15000	40000	#N/A	#N/A	15000
MW23-SG032321-135	3/23/2021	TO15	130	140	*74 U*	*33 U*	*260 U*	*120 U*	*37 U*	*33 U*
MW24-SG032521-104	3/25/2021	TO15	104	104	*10 U*		*5.7 U*	*17 U*	*4 U*	
		TO15SIM	104	104		**0.21 J**				**0.18 J**
MW24-SG032521-130	3/25/2021	TO15	130	130	*8.6 U*		*4.9 U*	*14 U*	*3.4 U*	
		TO15SIM	130	130		**0.28 J**				**0.24 J**
MW24-SG032521-60	3/25/2021	TO15	60	60	*21 U*		*12 U*	*35 U*	*8.3 U*	
		TO15SIM	60	60		*2.9 U*				*1.5 U*
MW24-SG032621-32	3/26/2021	TO15	32	32	*18 U*		*9.9 U*	*29 U*	*7 U*	
		TO15SIM	32	32		*2.5 U*				*1.2 U*
MW25-SG032421-100	3/24/2021	TO15	100	100	**1.1 J**		*1.4 U*	*4.2 U*	*1 U*	
		TO15SIM	100	100		**0.13 J**				**0.075 J**
MW25-SG032421-28	3/24/2021	TO15	28	28	**4.6**		*2.1 U*	**0.51 J**	*1.5 U*	
		TO15SIM	28	28		**0.27 J**				**0.14 J**
MW27-SG032221-113	3/22/2021	TO15	113	113	*72 U*	*32 U*	*260 U*	*120 U*	*36 U*	*32 U*
MW27-SG032221-28	3/22/2021	TO15	28	28	*75 U*	*33 U*	*100 U*	*31 U*	*37 U*	*33 U*
MW28-SG032321-118	3/23/2021	TO15	118	118	**6.2 J**		*11 U*	*33 U*	*8 U*	
		TO15SIM	118	118		*2.8 U*				*1.4 U*
MW28-SG032321-24	3/23/2021	TO15	24	24	*17 U*		*9.8 U*	*29 U*	*6.9 U*	
		TO15SIM	24	24		**0.41 J**				*1.2 U*
MW28-SG032321-48	3/23/2021	TO15	48	48	*17 U*		*9.9 U*	*29 U*	*7 U*	
		TO15SIM	48	48		*2.5 U*				*1.2 U*
MW29-SG032521-42	3/25/2021	TO15	42	42	*9.3 U*		*5.3 U*	*16 U*	*3.7 U*	
		TO15SIM	42	42		**0.27 J**				**0.29 J**
MW29-SG032521-66	3/25/2021	TO15	66	66	**3.6 J**		*2.2 U*	*6.5 U*	*1.6 U*	
		TO15SIM	66	66		**0.17 J**				**0.22 J**
MW29-SG032521-98	3/25/2021	TO15	98	98	*17 U*		*9.9 U*	*29 U*	*7 U*	
		TO15SIM	98	98		*2.5 U*				*1.2 U*
SB42-SG032521-13	3/25/2021	TO15	12	13	**1.8 J**		*3.7 U*	*11 U*	*2.6 U*	
		TO15SIM	12	13		**0.69 J**				**0.3 J**
SB42-SG032521-17	3/25/2021	TO15	16	17	*9.2 U*		*5.2 U*	*15 U*	*3.7 U*	
		TO15SIM	16	17		**0.53 J**				**0.24 J**
SB42-SG032521-26	3/25/2021	TO15	24.8	26	*9.3 U*		*5.3 U*	*16 U*	*3.7 U*	
		TO15SIM	24.8	26		**0.88 J**				**0.38 J**
SB42-SG032521-7	3/25/2021	TO15	6	7	**6.4**		*1 U*	*3.1 U*	**0.14 J**	
		TO15SIM	6	7		**0.46**				**0.2**
SB43-SG032521-15	3/25/2021	TO15	14.7	15.7	**2 J**		*1.2 U*	*3.4 U*	**0.2 J**	
		TO15SIM	14.7	15.7		**0.76**				**0.45**
SB43-SG032521-8	3/25/2021	TO15	7	8	**8.7**		*1.1 U*	*3.2 U*	**0.15 J**	
		TO15SIM	7	8		**0.65**				**0.34**
SG03-SG032221	3/22/2021	TO15	7.8	8.1	*20 U*		*11 U*	*32 U*	*7.8 U*	
		TO15SIM	7.8	8.1		*2.8 U*				*1.4 U*
SG04-SG032321	3/23/2021	TO15	5.5	5.8	**4.9**		*2.5 U*	*7.3 U*	*1.8 U*	
		TO15SIM	5.5	5.8		**0.37 J**				**0.27 J**
SG05-SG032321	3/23/2021	TO15	5.9	6.3	*19 U*		*11 U*	*31 U*	*7.5 U*	
		TO15SIM	5.9	6.3		**0.3 J**				*1.3 U*
SG06-SG032321	3/23/2021	TO15	5.8	6.1	*18 U*		*10 U*	*30 U*	*7.3 U*	
		TO15SIM	5.8	6.1		*2.6 U*				*1.3 U*
SG08-SG032321	3/23/2021	TO15	3	3.3	**9.9**		*3.5 U*	*10 U*	*2.4 U*	
		TO15SIM	3	3.3		*0.87 U*				*0.43 U*

Table 2
Source Area OU1 Soil Vapor Analytical Results

Sample ID	Sample Date	Analytical Method	Start Depth (ft)	End Depth (ft)	Isopropyl Alcohol	m,p-Xylene	Methylene Chloride	n-Heptane	n-Propylbenzene	o-Xylene
Industrial / Commercial Screening Level for Soil Gas (µg/m^3)					#N/A	15000	40000	#N/A	#N/A	15000
SG10-SG032321	3/23/2021	TO15	6.3	6.8	**0.92 J**		*1 U*	*3.1 U*	*0.74 U*	
		TO15SIM	6.3	6.8		**0.44**				**0.18**
SG11-SG032321	3/23/2021	TO15	4.7	5	**16**		*2.5 U*	*7.4 U*	*1.8 U*	
		TO15SIM	4.7	5		*0.62 U*				*0.31 U*
SG13-SG032321	3/23/2021	TO15	5.3	6	**1.7 J**		*1 U*	**0.36 J**	*0.74 U*	
		TO15SIM	5.3	6		**0.28**				**0.096 J**
SG49-SG032421	3/24/2021	TO15	6.1	6.7	**1.9**		*1 U*	*3.1 U*	*0.75 U*	
		TO15SIM	6.1	6.7		**0.038 J**				*0.13 U*
SG50-SG032321	3/23/2021	TO15	6.7	7.3	**0.98 J**		*1.7 U*	*4.9 U*	*1.2 U*	
		TO15SIM	6.7	7.3		*0.42 U*				*0.21 U*
SG55-SG032321	3/23/2021	TO15	4.5	5	**1.8**		*0.98 U*	*2.9 U*	*0.69 U*	
		TO15SIM	4.5	5		**0.028 J**				*0.12 U*
SG60-SG032221	3/22/2021	TO15	3.8	4.3	**2**		*1 U*	*3.1 U*	*0.74 U*	
		TO15SIM	3.8	4.3		*0.26 U*				*0.13 U*
VP02-SG032421	3/24/2021	TO15			**3 J**		*2.6 U*	*7.7 U*	*1.8 U*	
		TO15SIM				**0.32 J**				**0.12 J**
VP04-SG032421	3/24/2021	TO15			*150 U*	*66 U*	*530 U*	*250 U*	*75 U*	*66 U*
VP06-SG032421	3/24/2021	TO15			**3.2**		**1.2**	*2.9 U*	*0.7 U*	
		TO15SIM				**0.23 J**				**0.089 J**
VP08-SG032421	3/24/2021	TO15			**4.4**		*2 U*	*5.8 U*	*1.4 U*	
		TO15SIM				**0.34 J**				**0.13 J**
VP09-SG032421	3/24/2021	TO15			**8.4**		*3.6 U*	*11 U*	*2.6 U*	
		TO15SIM				**1.5**				**0.48**
VP10-SG032421	3/24/2021	TO15			**7.7**		**0.54 J**	*3.1 U*	*0.74 U*	
		TO15SIM				**0.42**				**0.15**
VP11-SG032421	3/24/2021	TO15			**12**		*5.3 U*	*16 U*	*3.7 U*	
		TO15SIM				**1.6**				**0.57 J**
VP12-SG032421	3/24/2021	TO15			**16**		*1.1 U*	*3.2 U*	*0.77 U*	
		TO15SIM				**0.42**				**0.14**
VP13-SG032421	3/24/2021	TO15			**2.9 J**		**1.6 J**	*6.2 U*	*1.5 U*	
		TO15SIM				**0.26 J**				**0.12 J**
VP14-SG032421	3/24/2021	TO15			**3.6**		*1.1 U*	*3.2 U*	**0.06 J**	
		TO15SIM				**0.72**				**0.28**
VP15-SG032421	3/24/2021	TO15			**25 J**	*63 U*	*510 U*	*240 U*	*72 U*	*63 U*
VP17-SG032421	3/24/2021	TO15			**2.2 J**		*5.4 U*	*16 U*	*3.8 U*	
		TO15SIM				**1.4**				**0.6 J**
VP19-SG032421	3/24/2021	TO15			**13**		*1 U*	*3 U*	*0.72 U*	
		TO15SIM				**0.32**				**0.12 J**

Notes
Results are in µg/m^3
Industrial / Commercial Screening Levels for Soil Gas from EPA Regional S
U = not detected above reporting limit
J = results is estimated.
Results in bold are detected over the reporting limit
Results in bold and shaded gray exceed the screening level

Table 2
Source Area OU1 Soil Vapor Analytical Results

Sample ID	Sample Date	Analytical Method	Start Depth (ft)	End Depth (ft)	Styrene	Tetrachloroethene	Tetrahydrofuran	Toluene	trans-1,2-Dichloroethene	Trichloroethene
Industrial / Commercial Screening Level for Soil Gas (µg/m^3)					150000	1600	#N/A	730000	6000	100
MW23-SG032321-135	3/23/2021	TO15	130	140	*32 U*	**16000**	*22 U*	*28 U*	*30 U*	**32 J**
MW24-SG032521-104	3/25/2021	TO15	104	104	*3.5 U*		*12 U*			
		TO15SIM	104	104		**23**		**0.1 J**	*3.2 U*	*0.88 U*
MW24-SG032521-130	3/25/2021	TO15	130	130	*3 U*		*10 U*			
		TO15SIM	130	130		**67**		**0.32 J**	*2.8 U*	*0.75 U*
MW24-SG032521-60	3/25/2021	TO15	60	60	*7.2 U*		*25 U*			
		TO15SIM	60	60		**120**		*3.2 U*	*6.7 U*	*1.8 U*
MW24-SG032621-32	3/26/2021	TO15	32	32	*6.1 U*		*21 U*			
		TO15SIM	32	32		**240**		*2.7 U*	*5.7 U*	*1.5 U*
MW25-SG032421-100	3/24/2021	TO15	100	100	*0.88 U*		*3 U*			
		TO15SIM	100	100		**0.2 J**		**0.12 J**	*0.82 U*	*0.22 U*
MW25-SG032421-28	3/24/2021	TO15	28	28	**0.06 J**		*4.4 U*			
		TO15SIM	28	28		**0.21 J**		**0.53 J**	*1.2 U*	*0.32 U*
MW27-SG032221-113	3/22/2021	TO15	113	113	*31 U*	**17000**	*22 U*	*28 U*	*29 U*	**27 J**
MW27-SG032221-28	3/22/2021	TO15	28	28	*32 U*	**39000**	*22 U*	*29 U*	*30 U*	**52**
MW28-SG032321-118	3/23/2021	TO15	118	118	*6.9 U*	**3600**	*24 U*			
		TO15SIM	118	118				**0.65 J**	*6.5 U*	**6.6**
MW28-SG032321-24	3/23/2021	TO15	24	24	*6 U*		*21 U*			
		TO15SIM	24	24		**1400**		**0.98 J**	*5.6 U*	**1.4 J**
MW28-SG032321-48	3/23/2021	TO15	48	48	*6 U*	**2200**	**2.5 J**			
		TO15SIM	48	48				**0.45 J**	*5.6 U*	**4.1**
MW29-SG032521-42	3/25/2021	TO15	42	42	*3.2 U*		*11 U*			
		TO15SIM	42	42		**260**		**1.9**	*3 U*	**4.4**
MW29-SG032521-66	3/25/2021	TO15	66	66	*1.3 U*		*4.6 U*			
		TO15SIM	66	66		**250**		**0.26 J**	*1.2 U*	**4.7**
MW29-SG032521-98	3/25/2021	TO15	98	98	*6 U*		*21 U*			
		TO15SIM	98	98		**170**		**0.28 J**	*5.6 U*	**3.6**
SB42-SG032521-13	3/25/2021	TO15	12	13	*2.2 U*		*7.8 U*			
		TO15SIM	12	13		**360**		**0.18 J**	*2.1 U*	**3.6**
SB42-SG032521-17	3/25/2021	TO15	16	17	*3.2 U*		*11 U*			
		TO15SIM	16	17		**520**		**0.2 J**	*3 U*	**6**
SB42-SG032521-26	3/25/2021	TO15	24.8	26	*3.2 U*		*11 U*			
		TO15SIM	24.8	26		**560**		**0.28 J**	*3 U*	**11**
SB42-SG032521-7	3/25/2021	TO15	6	7	*0.64 U*		*2.2 U*			
		TO15SIM	6	7		**100**		**0.14 J**	*0.6 U*	**0.27**
SB43-SG032521-15	3/25/2021	TO15	14.7	15.7	*0.71 U*		*2.5 U*			
		TO15SIM	14.7	15.7		**160**		**0.24 J**	*0.66 U*	**0.64**
SB43-SG032521-8	3/25/2021	TO15	7	8	*0.67 U*		*2.3 U*			
		TO15SIM	7	8		**37**		**0.19 J**	*0.62 U*	*0.17 U*
SG03-SG032221	3/22/2021	TO15	7.8	8.1	*6.8 U*		*23 U*			
		TO15SIM	7.8	8.1		**2200**		*3 U*	*6.3 U*	**14**
SG04-SG032321	3/23/2021	TO15	5.5	5.8	*1.5 U*		*5.3 U*			
		TO15SIM	5.5	5.8		**480**		**0.34 J**	**0.064 J**	**13**
SG05-SG032321	3/23/2021	TO15	5.9	6.3	*6.5 U*		*22 U*			
		TO15SIM	5.9	6.3		**1800**		*2.9 U*	*6.1 U*	**7.9**
SG06-SG032321	3/23/2021	TO15	5.8	6.1	*6.3 U*		*22 U*			
		TO15SIM	5.8	6.1		**1800**		*2.8 U*	*5.9 U*	**30**
SG08-SG032321	3/23/2021	TO15	3	3.3	*2.1 U*		*7.4 U*			
		TO15SIM	3	3.3		**460**		*0.94 U*	*2 U*	**0.23 J**

Table 2
Source Area OU1 Soil Vapor Analytical Results

Sample ID	Sample Date	Analytical Method	Start Depth (ft)	End Depth (ft)	Styrene	Tetrachloroethene	Tetrahydrofuran	Toluene	trans-1,2-Dichloroethene	Trichloroethene
Industrial / Commercial Screening Level for Soil Gas (µg/m^3)					150000	1600	#N/A	730000	6000	100
SG10-SG032321	3/23/2021	TO15	6.3	6.8	*0.64 U*		*2.2 U*			
		TO15SIM	6.3	6.8		**3.2**		**0.13 J**	*0.59 U*	*0.16 U*
SG11-SG032321	3/23/2021	TO15	4.7	5	*1.5 U*		*5.3 U*			
		TO15SIM	4.7	5		**360**		*0.68 U*	*1.4 U*	**0.3 J**
SG13-SG032321	3/23/2021	TO15	5.3	6	**0.031 J**		*2.2 U*			
		TO15SIM	5.3	6		**20**		**0.51**	*0.6 U*	**0.057 J**
SG49-SG032421	3/24/2021	TO15	6.1	6.7	*0.65 U*		*2.2 U*			
		TO15SIM	6.1	6.7		**21**		**0.026 J**	*0.6 U*	**0.081 J**
SG50-SG032321	3/23/2021	TO15	6.7	7.3	*1 U*		*3.5 U*			
		TO15SIM	6.7	7.3		**320**		**0.029 J**	*0.95 U*	**1.7**
SG55-SG032321	3/23/2021	TO15	4.5	5	*0.6 U*		*2.1 U*			
		TO15SIM	4.5	5		**50**		**0.072 J**	*0.56 U*	**0.15 J**
SG60-SG032221	3/22/2021	TO15	3.8	4.3	*0.64 U*		*2.2 U*			
		TO15SIM	3.8	4.3		**56**		**0.027 J**	*0.59 U*	**0.017 J**
VP02-SG032421	3/24/2021	TO15			*1.6 U*		**1.5 J**			
		TO15SIM				**340**		**0.14 J**	*1.5 U*	**0.084 J**
VP04-SG032421	3/24/2021	TO15			*65 U*	**30000**	*45 U*	*57 U*	*60 U*	**51 J**
VP06-SG032421	3/24/2021	TO15			**0.025 J**		**1.6 J**			
		TO15SIM				**33**		**0.15 J**	*0.57 U*	**0.073 J**
VP08-SG032421	3/24/2021	TO15			*1.2 U*		**1.6 J**			
		TO15SIM				**210**		**0.18 J**	*1.1 U*	*0.3 U*
VP09-SG032421	3/24/2021	TO15			*2.2 U*		**6.8 J**			
		TO15SIM				**470**		**0.52 J**	*2.1 U*	**1.8**
VP10-SG032421	3/24/2021	TO15			*0.64 U*		**1.8 J**			
		TO15SIM				**23**		**0.17 J**	**0.025 J**	*0.16 U*
VP11-SG032421	3/24/2021	TO15			*3.2 U*		**4.4 J**			
		TO15SIM				**500**		**0.69 J**	*3 U*	**2.9**
VP12-SG032421	3/24/2021	TO15			*0.66 U*		**1.8 J**			
		TO15SIM				**3**		**0.14 J**	*0.62 U*	**0.13 J**
VP13-SG032421	3/24/2021	TO15			*1.3 U*		**1.2 J**			
		TO15SIM				**110**		**0.27 J**	*1.2 U*	*0.33 U*
VP14-SG032421	3/24/2021	TO15			**0.057 J**		**3.7**			
		TO15SIM				**49**		**0.4**	*0.63 U*	**0.73**
VP15-SG032421	3/24/2021	TO15			*62 U*	**23000**	*43 U*	*55 U*	*58 U*	**180**
VP17-SG032421	3/24/2021	TO15			*3.3 U*		**4.5 J**			
		TO15SIM				**680**		**0.5 J**	*3.1 U*	**1.2**
VP19-SG032421	3/24/2021	TO15			*0.62 U*		**2.4**			
		TO15SIM				**0.58**		**0.14 J**	**0.046 J**	*0.16 U*

Notes

Results are in µg/m^3

Industrial / Commercial Screening Levels for Soil Gas from EPA Regional S

U = not detected above reporting limit

J = results is estimated.

Results in bold are detected over the reporting limit

Results in bold and shaded gray exceed the screening level

Table 2
Source Area OU1 Soil Vapor Analytical Results

Sample ID	Sample Date	Analytical Method	Start Depth (ft)	End Depth (ft)	Trichlorofluoromethane	Vinyl Chloride
Industrial / Commercial Screening Level for Soil Gas (µg/m^3)					NA	93
MW23-SG032321-135	3/23/2021	TO15	130	140	**46**	*19 U*
MW24-SG032521-104	3/25/2021	TO15	104	104	**41 J**	
		TO15SIM	104	104		*0.42 U*
MW24-SG032521-130	3/25/2021	TO15	130	130	**24 J**	
		TO15SIM	130	130		*0.36 U*
MW24-SG032521-60	3/25/2021	TO15	60	60	**20 J**	
		TO15SIM	60	60		*0.86 U*
MW24-SG032621-32	3/26/2021	TO15	32	32	**18 J**	
		TO15SIM	32	32		**0.15 J**
MW25-SG032421-100	3/24/2021	TO15	100	100	**170 J**	
		TO15SIM	100	100		*0.1 U*
MW25-SG032421-28	3/24/2021	TO15	28	28	**74**	
		TO15SIM	28	28		**0.039 J**
MW27-SG032221-113	3/22/2021	TO15	113	113	**43**	*19 U*
MW27-SG032221-28	3/22/2021	TO15	28	28	**30 J**	*19 U*
MW28-SG032321-118	3/23/2021	TO15	118	118	**66**	
		TO15SIM	118	118		*0.83 U*
MW28-SG032321-24	3/23/2021	TO15	24	24	**12**	
		TO15SIM	24	24		*0.72 U*
MW28-SG032321-48	3/23/2021	TO15	48	48	**21**	
		TO15SIM	48	48		*0.72 U*
MW29-SG032521-42	3/25/2021	TO15	42	42	**4.7 J**	
		TO15SIM	42	42		**0.23 J**
MW29-SG032521-66	3/25/2021	TO15	66	66	**3.8 J**	
		TO15SIM	66	66		**0.073 J**
MW29-SG032521-98	3/25/2021	TO15	98	98	**13 J**	
		TO15SIM	98	98		**0.17 J**
SB42-SG032521-13	3/25/2021	TO15	12	13	**1.9 J**	
		TO15SIM	12	13		*0.27 U*
SB42-SG032521-17	3/25/2021	TO15	16	17	**2 J**	
		TO15SIM	16	17		*0.38 U*
SB42-SG032521-26	3/25/2021	TO15	24.8	26	**2.5 J**	
		TO15SIM	24.8	26		*0.39 U*
SB42-SG032521-7	3/25/2021	TO15	6	7	**1.5 J**	
		TO15SIM	6	7		*0.077 U*
SB43-SG032521-15	3/25/2021	TO15	14.7	15.7	**2.1 J**	
		TO15SIM	14.7	15.7		*0.085 U*
SB43-SG032521-8	3/25/2021	TO15	7	8	**1.6 J**	
		TO15SIM	7	8		*0.08 U*
SG03-SG032221	3/22/2021	TO15	7.8	8.1	**5.9 J**	
		TO15SIM	7.8	8.1		*0.81 U*
SG04-SG032321	3/23/2021	TO15	5.5	5.8	**1.6 J**	
		TO15SIM	5.5	5.8		*0.18 U*
SG05-SG032321	3/23/2021	TO15	5.9	6.3	**2.4 J**	
		TO15SIM	5.9	6.3		*0.78 U*
SG06-SG032321	3/23/2021	TO15	5.8	6.1	**3.7 J**	
		TO15SIM	5.8	6.1		*0.76 U*
SG08-SG032321	3/23/2021	TO15	3	3.3	**7.1**	
		TO15SIM	3	3.3		*0.26 U*

Table 2
Source Area OU1 Soil Vapor Analytical Results

Sample ID	Sample Date	Analytical Method	Start Depth (ft)	End Depth (ft)	Trichlorofluoromethane	Vinyl Chloride
Industrial / Commercial Screening Level for Soil Gas (µg/m^3)					NA	93
SG10-SG032321	3/23/2021	TO15	6.3	6.8	**1.4**	
		TO15SIM	6.3	6.8		*0.077 U*
SG11-SG032321	3/23/2021	TO15	4.7	5	**6.9**	
		TO15SIM	4.7	5		*0.18 U*
SG13-SG032321	3/23/2021	TO15	5.3	6	**1.6**	
		TO15SIM	5.3	6		*0.077 U*
SG49-SG032421	3/24/2021	TO15	6.1	6.7	**22**	
		TO15SIM	6.1	6.7		*0.078 U*
SG50-SG032321	3/23/2021	TO15	6.7	7.3	**3.4**	
		TO15SIM	6.7	7.3		*0.12 U*
SG55-SG032321	3/23/2021	TO15	4.5	5	**1.9**	
		TO15SIM	4.5	5		*0.072 U*
SG60-SG032221	3/22/2021	TO15	3.8	4.3	**1.4**	
		TO15SIM	3.8	4.3		*0.077 U*
VP02-SG032421	3/24/2021	TO15			**6.9**	
		TO15SIM				*0.19 U*
VP04-SG032421	3/24/2021	TO15			**34 J**	*39 U*
VP06-SG032421	3/24/2021	TO15			**17**	
		TO15SIM				*0.073 U*
VP08-SG032421	3/24/2021	TO15			**4.8 J**	
		TO15SIM				*0.14 U*
VP09-SG032421	3/24/2021	TO15			**2.2 J**	
		TO15SIM				*0.27 U*
VP10-SG032421	3/24/2021	TO15			**0.84 J**	
		TO15SIM				*0.077 U*
VP11-SG032421	3/24/2021	TO15			**1.9 J**	
		TO15SIM				*0.39 U*
VP12-SG032421	3/24/2021	TO15			**1.2 J**	
		TO15SIM				*0.08 U*
VP13-SG032421	3/24/2021	TO15			**1.9 J**	
		TO15SIM				*0.16 U*
VP14-SG032421	3/24/2021	TO15			**7**	
		TO15SIM				**0.013 J**
VP15-SG032421	3/24/2021	TO15			**23 J**	*37 U*
VP17-SG032421	3/24/2021	TO15			**11**	
		TO15SIM				*0.4 U*
VP19-SG032421	3/24/2021	TO15			**0.8 J**	
		TO15SIM				*0.075 U*

Notes
Results are in µg/m^3
Industrial / Commercial Screening Levels for Soil Gas from EPA Regional S
U = not detected above reporting limit
J = results is estimated.
Results in bold are detected over the reporting limit
Results in bold and shaded gray exceed the screening level

Table 3
Source Area OU1 Indoor Air Analytical Results

Location	Sample ID	Analytical Method	Sample Date	1,1,1-Trichloroethane	1,1,2-Trichlorotrifluoroethane	1,2,4-Trimethylbenzene	1,2-Dibromoethane	1,2-Dichloroethane
Industrial / Commercial Screening Level for Soil Gas (µg/m^3)				22000	22000	260	0.02	0.47
Building 6	B6-IA06-IA032521	TO15	3/25/2021		**0.48 J**	**0.22 J**		
		TO15SIM		*0.16 U*			**0.028 J**	**0.083 J**
	B6-IA08-IA032521	TO15	3/25/2021		**0.54 J**	**0.12 J**		
		TO15SIM		**0.02 J**			*0.63 U*	*0.13 U*
	B6-OA01-OA032521	TO15	3/25/2021		**0.56 J**	**0.093 J**		
		TO15SIM		*0.16 U*			*0.56 U*	*0.12 U*
Building 7	B7-IA02-IA032521	TO15	3/25/2021		**0.48 J**	*0.75 U*		
		TO15SIM		*0.16 U*			*0.58 U*	**0.094 J**
	B7-IA05-IA032521	TO15	3/25/2021		**0.44 J**	**0.062 J**		
		TO15SIM		*0.16 U*			*0.56 U*	**0.074 J**

Notes

Results are in µg/m^3

Industrial / Commercial Screening Levels for Indoor Air from EPA Regional Screening Levels updated May 2021.

U = not detected above reporting limit

J = result is estimated.

Results in bold are detected over the reporting limit

Results in bold and shaded gray exceed the screening level

Table 3
Source Area OU1 Indoor Air Analytical Results

Location	Sample ID	Analytical Method	Sample Date	1,2-Dichlorotetrafluoroethane	1,3,5-Trimethylbenzene	1,4-Dioxane	2-Butanone (MEK)	4-Ethyltoluene
Industrial / Commercial Screening Level for Soil Gas (µg/m^3)				#N/A	260	2.5	22000	#N/A
Building 6	B6-IA06-IA032521	TO15	3/25/2021		**0.09 J**	*0.54 U*	**0.74 J**	**0.26 J**
		TO15SIM		**0.1 J**				
	B6-IA08-IA032521	TO15	3/25/2021		*0.8 U*	*0.59 U*	**5.4**	**0.15 J**
		TO15SIM		**0.098 J**				
	B6-OA01-OA032521	TO15	3/25/2021		*0.72 U*	*0.53 U*	**0.72 J**	**0.092 J**
		TO15SIM		**0.11 J**				
Building 7	B7-IA02-IA032521	TO15	3/25/2021		*0.75 U*	*0.55 U*	**0.64 J**	**0.049 J**
		TO15SIM		**0.1 J**				
	B7-IA05-IA032521	TO15	3/25/2021		*0.71 U*	**0.053 J**	**0.3 J**	**0.052 J**
		TO15SIM		**0.1 J**				

Notes

Results are in µg/m^3

Industrial / Commercial Screening Levels for Indoor Air from EPA Region

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Results in bold are detected over the reporting limit

Results in bold and shaded gray exceed the screening level

Table 3
Source Area OU1 Indoor Air Analytical Results

Location	Sample ID	Analytical Method	Sample Date	4-Methyl-2-Pentanone (MIBK)	Acetone	Allyl Chloride	Benzene	Bromodichloromethane
Industrial / Commercial Screening Level for Soil Gas (µg/m^3)				13000	140000	#N/A	1.6	0.33
Building 6	B6-IA06-IA032521	TO15	3/25/2021	*0.61 U*	**73**	2.3 **UJ**		*1 U*
		TO15SIM					**0.34**	
	B6-IA08-IA032521	TO15	3/25/2021	**0.19 J**	**24**	*2.6 U*		**0.17 J**
		TO15SIM					**0.38**	
	B6-OA01-OA032521	TO15	3/25/2021	*0.6 U*	**7.4**	*2.3 U*		*0.98 U*
		TO15SIM					**0.32**	
Building 7	B7-IA02-IA032521	TO15	3/25/2021	*0.62 U*	**36**	2.4 **UJ**		*1 U*
		TO15SIM					**0.33**	
	B7-IA05-IA032521	TO15	3/25/2021	*0.59 U*	**10**	2.3 **UJ**		*0.97 U*
		TO15SIM					**0.31**	

Notes

Results are in µg/m^3

Industrial / Commercial Screening Levels for Indoor Air from EPA Region

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Results in bold and shaded gray exceed the screening level

Table 3
Source Area OU1 Indoor Air Analytical Results

Location	Sample ID	Analytical Method	Sample Date	Carbon Tetrachloride	Chloroethane	Chloroform	Chloromethane	Dichlorodifluoromethane
Industrial / Commercial Screening Level for Soil Gas (µg/m^3)				2	44000	0.53	390	440
Building 6	B6-IA06-IA032521	TO15	3/25/2021					
		TO15SIM		**0.46**	**0.029 J**	**0.15**	**0.68 J**	**2.3**
	B6-IA08-IA032521	TO15	3/25/2021					
		TO15SIM		**0.5**	*0.22 U*	**1.4**	**0.78 J**	**2.2**
	B6-OA01-OA032521	TO15	3/25/2021					
		TO15SIM		**0.49**	*0.19 U*	**0.062 J**	**0.78 J**	**2.1**
Building 7	B7-IA02-IA032521	TO15	3/25/2021					
		TO15SIM		**0.46**	**0.021 J**	**0.11 J**	**0.68 J**	**2.3**
	B7-IA05-IA032521	TO15	3/25/2021					
		TO15SIM		**0.46**	**0.014 J**	**0.13 J**	**0.68 J**	**2.3**

Notes

Results are in µg/m^3

Industrial / Commercial Screening Levels for Indoor Air from EPA Region

U = not detected above reporting limit

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Results in bold are detected over the reporting limit

Results in bold and shaded gray exceed the screening level

Table 3
Source Area OU1 Indoor Air Analytical Results

Location	Sample ID	Analytical Method	Sample Date	Ethanol	Ethylbenzene	Hexane	Isopropyl Alcohol	m,p-Xylene
Industrial / Commercial Screening Level for Soil Gas (µg/m^3)				#N/A	4.9	#N/A	#N/A	440
Building 6	B6-IA06-IA032521	TO15	3/25/2021	**180 J**		**0.23 J**	**39**	
		TO15SIM			**1.5**			**8.7**
	B6-IA08-IA032521	TO15	3/25/2021	**7.9**		**0.34 J**	**3.8**	
		TO15SIM			**0.28**			**1.1**
	B6-OA01-OA032521	TO15	3/25/2021	**3.2**		**0.28 J**	**5.8**	
		TO15SIM			**0.073 J**			**0.28**
Building 7	B7-IA02-IA032521	TO15	3/25/2021	**28**		**0.22 J**	**14**	
		TO15SIM			**0.55**			**1.6**
	B7-IA05-IA032521	TO15	3/25/2021	**6.4 J**		**0.24 J**	**22**	
		TO15SIM			**0.08 J**			**0.29**

Notes

Results are in µg/m^3

Industrial / Commercial Screening Levels for Indoor Air from EPA Region

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J = result is estimated.

Results in bold are detected over the reporting limit

Results in bold and shaded gray exceed the screening level

Table 3
Source Area OU1 Indoor Air Analytical Results

Location	Sample ID	Analytical Method	Sample Date	Methylene Chloride	n-Heptane	n-Propylbenzene	o-Xylene	Styrene
Industrial / Commercial Screening Level for Soil Gas (µg/m^3)				1200	#N/A	#N/A	440	4400
Building 6	B6-IA06-IA032521	TO15	3/25/2021	*1 U*	**0.18 J**	**0.068 J**		*0.63 U*
		TO15SIM					**2.6**	
	B6-IA08-IA032521	TO15	3/25/2021	**1.1 J**	*3.3 U*	*0.8 U*		*0.69 U*
		TO15SIM					**0.43**	
	B6-OA01-OA032521	TO15	3/25/2021	*1 U*	*3 U*	*0.72 U*		*0.62 U*
		TO15SIM					**0.093 J**	
Building 7	B7-IA02-IA032521	TO15	3/25/2021	**4.7**	**0.78 J**	*0.75 U*		**0.068 J**
		TO15SIM					**0.41**	
	B7-IA05-IA032521	TO15	3/25/2021	*1 U*	**0.21 J**	*0.71 U*		**0.03 J**
		TO15SIM					**0.11 J**	

Notes

Results are in µg/m^3

Industrial / Commercial Screening Levels for Indoor Air from EPA Region

U = not detected above reporting limit

J = result is estimated.

Results in bold are detected over the reporting limit

Results in bold and shaded gray exceed the screening level

Table 3
Source Area OU1 Indoor Air Analytical Results

Location	Sample ID	Analytical Method	Sample Date	Tetrachloroethene	Tetrahydrofuran	Toluene	trans-1,2-Dichloroethene	Trichloroethene
Industrial / Commercial Screening Level for Soil Gas (µg/m^3)				47	#N/A	22000	180	3
Building 6	B6-IA06-IA032521	TO15	3/25/2021		**0.29 J**			
		TO15SIM		**0.098 J**		**0.64**	**0.025 J**	**0.042 J**
	B6-IA08-IA032521	TO15	3/25/2021		**26**			
		TO15SIM		**2.4**		**0.66**	**0.027 J**	*0.18 U*
	B6-OA01-OA032521	TO15	3/25/2021		*2.2 U*			
		TO15SIM		**0.09 J**		**0.55**	**0.024 J**	*0.16 U*
Building 7	B7-IA02-IA032521	TO15	3/25/2021		*2.2 U*			
		TO15SIM		**2.3**		**4.7**	**0.02 J**	**0.13 J**
	B7-IA05-IA032521	TO15	3/25/2021		*2.1 U*			
		TO15SIM		**0.18 J**		**0.41**	**0.026 J**	**0.081 J**

Notes

Results are in µg/m^3

Industrial / Commercial Screening Levels for Indoor Air from EPA Region

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Results in bold and shaded gray exceed the screening level

Table 3
Source Area OU1 Indoor Air Analytical Results

Location	Sample ID	Analytical Method	Sample Date	Trichlorofluoromethane
Industrial / Commercial Screening Level for Soil Gas (µg/m^3)				NA
Building 6	B6-IA06-IA032521	TO15	3/25/2021	**1.2**
		TO15SIM		
	B6-IA08-IA032521	TO15	3/25/2021	**1.3 J**
		TO15SIM		
	B6-OA01-OA032521	TO15	3/25/2021	**1.4 J**
		TO15SIM		
Building 7	B7-IA02-IA032521	TO15	3/25/2021	**1.2**
		TO15SIM		
	B7-IA05-IA032521	TO15	3/25/2021	**1.2**
		TO15SIM		

Notes

Results are in µg/m^3

Industrial / Commercial Screening Levels for Indoor Air from EPA Region

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Appendix A
Field Forms

Location SLC-VA Date 2/12/21

Project / Client 700S 1600E PCE Plume

Slug Testing / IDW

0900 Kiel will load IDW in rolloff + oversee pumping of poly tanks.
WT + KM to redeploy pumps in MW-13S + MW-26A.
NOTE: MW-26A had a hard time getting past the last 10 feet. It kept getting stuck. We were finally able to get it in ~15 minutes.

0950 Back at conexes. KK loading IDW (soil).

1000 KM offsite - no more slug testing tasks for him.
WT offsite to make returns at Lowes + ACE, and send equip at Fed EX.

1145 2 boxes to Pine + 1 box to In-Situ dropped off at FedEx.

1215 WT back at conex. Scan field forms and logbook.
KK waiting for vac truck for IDW water.

1315 WT offsite. Logbook at conex. Keys w/ KK.

WMT 2/12/21

Location SLC-VA Date 3/22/21

Project / Client 700S 1600E PCE Plume

SOIL GAS + VAPOR SAMPLING

WEATHER: AM: SUNNY PM: CLOUDY, 40°S F
PPE: LEVEL D + MASKS
PERSONNEL: WHITNEY TREADWAY (CDM SMITH), KIEL KELLER (WASATCH)
TASK: SOIL GAS + VAPOR SAMPLING
0730 WT + KK LOAD SUMMAS, AIR PID, PUMP FROM WASATCH OFFICE
0815 WT + KK ONSITE AT CONEX. PRINT FIELD FORMS AND SOPS. LOAD EXTRA TUBING, TOOLS. ATTEND HEACH + SAFETY MEETING WITH GROUNDWATER TEAM.
0945 SET UP AT MW-27. 5 DEPTHS. CALCULATE PURGE VOLUMES.

VOLUME (L)	DEPTH (FT)	DEPTH (IN)	RADIUS (IN)	VOLUME (IN^3)
0.81	28 x12	336 x	0.125^2 π	16.49 x3 49.47
1.39	48 x12	576 x	π	28.27 x3 84.81
2.17	75 x12	900 x	π	44.18 x3 132.54
3.27	113 x12	1356 x	π	66.56 x3 199.68
4.49	155 x12	1860 x	π	91.3 x3 273.9

~~IN^3 to L~~

Whitney

Rite in the Rain

Location SLC-vA Date 3/22/21

Project / Client 700S 1600E PCE PLUME

SOIL GAS/VAPOR SAMPLING

ALL 5 DEPTHS ARE LABELED, HOWEVER 2 ARE MISLABELED.

28'	AFTER CONVO WITH
48'	K. LESLIE, ASSUME
75'	13' IS 113' AND
~~13'~~ → 113'	302' IS 155', AS
~~302'~~ → 155'	SHOWN IN SAMPLE

TABLE.

WILL CORRECT LABELS AFTER SAMPLING.

1052 2 DEPTHS DO NOT HAVE SWAGELOCK CAPS, SO WE DECONTAMINATED TWO FROM CONEX AND ADDED TO TUBING.

1100 PURGE MW-27-28' WITH AIR PUMP SET AT 1 L/MIN. PURGE 1 MIN, ~0.8L.

1103 START MW27-SG032221-28 W/ 23.5 "Hg. CAN # 6L2355

1145 STOP, 4.0 "Hg. REG # 24407 AT SG-60 (4'), PURGE 0.12L W/ HAND PUMP

$4.3 \times 12 = 51.6"$ $V = \pi(0.25)^2 51.6$

$= 2.53 \times 3 = 7.59\ IN^3$

WMA 3/22/21

Location SLC-vA Date 3/22/21

Project / Client 700S 1600E PCE PLUME

SOIL GAS/VAPOR SAMPLING

HAND PUMP IS 70 PUMPS/1L TEDLAR

1148 START SG60-SG032221, 23.5 "Hg CAN # 6L2580 REG: 24139

1150 PURGE MW-27-48' ~1.5 MIN FOR 1.39L

1154 START MW27-SG032221-48, 22.5"Hg CAN # 6L0120, REG# 23125

1220 NOTICE VACUUM NOT GOING DOWN AT MW-27-48', STOP. TRY CAN + REG WITH AMBIENT AIR, WORKS OK. PROBE TOO TIGHT.

1229 STOP SG60, 4.25"Hg

1235 START PURGING MW-27-75'. FLOW METER BOUNCING ALOT. PURGE 2.17 L ~ 2.2 MIN

1240 START MW-27-SG032221-75', 23.5" Hg. CAN # 6L2003, REG # 23980.

1250 SAME ISSUE, TOO TIGHT. STOP CHECK W/ AMBIENT AIR. OK. BOTH CANS + REGS CAN'T BE USED.

1253 PURGE MW-27-113', 3.27L @ 1L/MIN

WMA 3/22/21

Rite in the Rain

Location SLC-VA Date 3/22/21

Project / Client 7005 16006E PCE PLUME
SOIL GAS/VAPOR SAMPLING

1257 STOP PURGE
1302 START SAMPLING
MW27-SG032221-113, 23" Hg
CAN # 6L0601, REG # 23381.
1349 STOP.
1400 MEET WITH WYNN.
THEY WANT TO USE B6-IA06
NOT B6-IA03. IN CONTROL ROOM
ON FILE DRAWERS, TO THE LEFT,
UNDER TV. MAKE SURE TO
REMOVE WIPES, SOLVENTS,
ETC.
REVIEW OTHER IA AND VP
LOCATIONS IN B6.
B6-IA08 IN BASEMENT ON
YELLOW PAD NEAR DRAIN.
VP-16 IS UNDER SOME DIRTY
WATER ON FLOOR.
VA WANTS 1 OA SAMPLE
ON ROOF BTWN B6 + B7.
B7-IA02 IN OFFICE.
COULD NOT LOCATE/ACCESS
VP-13, VP-08, VP-12, B7-IA05
WYNN WILL CHECK ON THESE.
WMA 3/22/21

Location SLC-VA Date 3/22/21

Project / Client 7005 16006E PCE PLUME
SOIL GAS/VAPOR SAMPLING

1527 AT MW-27. TRY TO PURGE
155' PROBE. IT'S BOUNCING
LIKE 75' AND CREATED
SUCTION WHEN ~~REAL~~ RELEASED
FROM PUMP.
NO SAMPLE.
1534 AT SG-3 (8')
8×12 = 96 $96(0.125)^2\pi = 4.71$
$4.71 \times 3 = 14.13\ in^3 = 0.23L$
PURGE FOR ~~30 SEC @ 1L/MIN~~
15 SEC @ 1L/MIN.
1538 START SG3-SG032221, 23.75" Hg
CAN # 6L07168 REG # 24498
WT TO PRINT COCS (HAVEN'T
FOUND THEM IN BOXES)
1618 STOP, 4.5" Hg.
COMPLETE COC, QC SUMMAS.
PACK 4 SUMMAS, 1 BOX.
1636 KK offsite to PUT CONES AT
MW-32 AND MW-38.
1700 WT TO SHIP 1 BOX AT FEDEX.
PHOTO OF COC. GROUND SHIPPING.

WMA 3/22/21

Rite in the Rain

Location SLC-VA Date 3/23/21

Project / Client 7005 1600E PCE Plume

SOIL GAS/AIR SAMPLING

Weather: Sunny in AM, flurries in PM, 40°F

PPE: Level D + masks

Personnel: W.T Readway, Tea Urtlar, Ben Carreon, Emma Roh (CDM Smith)
Kiel Keller, Kevin Murphy (Wasatch)

Task: Soil gas & sampling

0730 WT + KK load up at Wasatch office

0810 At conex. Calibrate PID. NOTE: charging cord is broken, PID is not charged + won't charge, and they sent Benzene, not Isobutylene. Used battery pack and ISO onsite.

0830 WT to badging office.

0900 H+S meeting w/ GEW ~~crew~~ WT crew

WMA 3/23/21

Location SLC-VA Date 3/23/21

Project / Client 7005 1600E PCE Plume

Soil Gas/Air Sampling

0930 At MW-28, purge volume =
24 × 12
= 0.7 L

0941 Purge MW-28 - 24'

0942 Stop purge.

0954 Start MW28-SG032321-24 @ 23" Hg
Can # 6L0227, Req # 23630

1005 At SG-11, purge vol =
54 × 12 = 60 in.
$V = \pi r^2 h = \pi(0.125^2)60 = 2.95$ cu. in.
2.95 × 3 = 8.85
8.85 / 61 = 0.145 L

1015 Purge SG-11

1020 Start SG11-SG032321 @ 23" Hg,
Can # 6L1535 Req # 25235

1043 Stop MW28-SG032321-24, 35" Hg.

1048 Purge MW-28-48' ~ 1.4 L
$\frac{[(48 \times 12)(0.125^2)\pi] \times 3}{61} = 1.39$ L

1050 Stop purging.

1052 Start MW28-SG032321-48 @ 24" Hg
Can # 6L2277, Req # 23192

1105 Stop SG11-SG032314, @ 3.5" Hg.

1035 Kiel Keller left to mark drilling locations

WMA 3/23/21

Rite in the Rain

Location SLC-VA Date 3/23/21

Project / Client 7003 16000E PCE Plume
Soil gas / air sampling

1125	At SG-808, 3.3ft purge vol = 0.096 L $\frac{[(3.3 \times 12)(0.125^2)\pi] \times 3}{61} = 0.1$ L Purge by hand.
1139	Start ~~At MW~~ SG08-SG032321 @ 23.5" Hg can # 6L1082, reg # 23751
1147	Stop MW28-SG032321-48 @ 3.5 "Hg. At MW-28-118' $\frac{[(118 \times 12)(0.125^2)\pi] \times 3}{61} = 3.42$ L
1154	Start purging MW-28-118' w/ air pump
1158	Stop purging.
1203	Start MW28-SG032321-118 @ 22" Hg can # 6L1950 reg # 24702 KK back onsite. Kevin Murphy and Ben Carreon onsite to trouble shoot (pressurize) MW-27 48', 75', 155'
1220	Stop SG08-SG032321 @ 3.5" Hg At SG-10 ~ 6.8' purge w/ hand pump ~0.17 L.
1230	At SG-13 ~ 6' purge w/ hand pump. ~ 0.17 L
1239	MW28 Stop MW28-SG032321-118 @ 4" Hg WMW 3/23/21

Location SLC-VA Date 3/23/21

Project / Client 7003 16000E PCE Plume
Soil gas / air sampling

1240	Start SG10-SG032321 @ 22.5" Hg ~~Start~~ can # 6L0681 reg # 24389
1240	Start FD01-SG032321 @ 23.5" Hg can # 6L2844 reg # 23804
1300	Start SG13-SG032321 @ 22.5" Hg can # 6L0760 reg # 23581 Ben C. said they pressurized all three plugged probes @ MW-27. Still seem plugged but will try to vac tomorrow.
1310	At MW-23; 130-140' screen calculate purge vol: 65 L
1324	SG10-SG032321 @ 3" Hg Stop.
1330	FD01-SG032321 @ 3" Hg Stop.
1347	Stop. SG13-SG032321 @ 3" Hg
1350	KK purged SG-50 earlier. 0.2 L by hand pump.
1352	Start SG50-SG032321 @ 22.5" Hg can # 6L0816 reg # 23534
1405	KK purged SG-04 earlier @ 0.17 L by hand pump.
1406	Start SG04-SG032321 @ 21.5" Hg can # 6L1778 reg # 23562

WMW 3/23/21

Rite in the Rain

Location SLC - vA Date 3/23/21

Project / Client 700S 1600E PCE Plume
Soil gas / air sampling

1410 Purged SG-05 ~ 0.18 L hand pump earlier
1412 Start SG05-SG032321 @ 22.5" Hg
can # CL2862 reg # 23414
~~UT 3/22/21~~

1417 Purged SG-06 -0.18 L by hand pump.
1419 Start SG06-SG032321 @ 23" Hg earlier
~~WMA 3/22/21~~

*1409 Start purging MW-23 (130-140) @ 2 L/min w/ air pump
1430 QC 1st 8 samples today, 2 boxes. Complete COCs. Pack 8 canisters in 2 boxes.
1444 Start MW23 - SG032321-135 @ 23" Hg
Can # CL00168 reg # 23615.
1450 Ben C. takes 2 QCd boxes to Fed Ex for shipping.
1500 At ~~MW~~ UT SG-55, 5' depth.
1503 Purge 0.15 L w/ hand pump.
1507 ~~Set up~~ UT Start SG55-SG032321 @ 23" Hg
Can # CA2181 reg # 24035
1520 Meet w/ Wynn + locksmith to view Bldg 7 sites not accesible yesterday.
UT 1527 Meet back Bldg 7 @ 9AM on 3/24/21
WMA 3/23/21

Location SLC - vA Date 3/23/21

Project / Client 700S 1600E PCE Plume
Soil gas / air sampling.

1527 Stop MW23-SG032321-135 @ 4" Hg
QC last 5 samples, complete COC.
Pack 1 box.
1602 Stop SG55-SG032321 @ 2.5" Hg.
QC last sample + pack box, ~~including~~ including 2 bad cans.
Complete COC.
1615 Emma offsite.
1630 At Conex to check for fittings for VP Samples.
Will need swagelock fittings (Can reuse if deconned), new 1/4" tubing + new silicone tubing.
1645 All offsite. Gates locked.
UT to Fed Ex. KM will try to get to Swagelock tonight or tomorrow morning.

WMA 3/23/21

Rite in the Rain

Location SLC-VA Date 3/24/21

Project / Client 7005 1600E PCE Plume

Soil Gas/Vapor Sampling

Weather: sunny, 40°F - 50°F

PPE: Level D + mask

Personnel: Whitney Treadway (CDM Smith)
Rick Keller, Ken Murphy (Wasatch)

Task: Soil gas / Indoor air sampling

0730 KK + WT load up at office.

0810 KK + WT onsite at conex, load up. Attempt to calibrate PID (from Geo team, Field Env.) No regulator.

WT 0820 Cut new tefl on lines 1/4" tubing for vapor pins. Cut small pieces of new Silicone tubing to connect 1/4" to vapor pin.

0840 KM onsite with new ~~Swage~~ Swagelok connections for vapor pins.

0850 H+S meeting: slips, trips, falls, heavy lifting, overhead hazards.

0900 Meet Locksmith + Wynn at bldg. 7. Review H+S with Wynn; hot to touch in boiler room, look for Exits in work areas.
Wynn + WT confirm B7-IA05 location.

0917 At VP12, leak check by adding water to space around vapor pin.

W/WtA 3/24/21

Location SLC-VA Date 3/24/21

Project / Client 7005 1600E PCE Plume

Soil Gas/Vapor Sampling

Connect hand pump and purge vapor pin. Make sure no water is lost. Purging lasts long enough to determine no leak. ~~1 to 2 min~~ WT
30sec to 1 minute.
This procedure will be followed at every vapor pin sampled.

0917 Start VP12-SG032421 @ 23.5" Hg
Can # LL2147 reg # 24310

0957 Stop VP12-SG032421 @ 4.0" Hg

0940 Leak check VP10

0944 Start VP10-SG032421 @ 24" Hg
Can # LL2253 reg # 23222

1023 Stop VP10-SG032421 @ 4" Hg.

0930 Start B7-IA05-IA032421 @ 25" Hg
on box ~ 3ft above ground (ags)

WT ~~0940 Start B7-IA02-IA032421 @~~ basement air transfer room near pipe into floor
Can # LL2346 reg # 7160

0940 Start B7-IA02-IA032421 @ 25" Hg
Can # LL1991, reg # 24467
on desk in corner, in office

1004 Start B16-IA016-IA032421 @ 24.75" Hg
Can # LL11616 reg # 20739
on file drawers under TV. control room

WtWtA 3/24/21

Rite in the Rain

Location SLC-VA Date 3/24/21

Project / Client 700S 1600E PCE Plume

Soil gas / vapor sampling

1004 Start FD01-IA032421 @ 24.5" Hg ~~@ 24.5" Hg~~
Can # 6L1718 reg # 22065
0950 Leak check VP11
0954 Start VP11-SG032421 @ 24" Hg
Can # 6L1969 reg # 23433
1034 Stop VP11-SG032421 @ 4" Hg
~~1010~~ 1005 Leak check VP09
1010 Start VP09-SG032421 @ 23" Hg
Can # 6L1946 reg # 23766
1054 Stop VP09-SG032421 @ 4" Hg
1015 Start B6-IA08-IA032421 @ 25" Hg
Can # 6L2990 reg # 22288
basement, towards back, near drain on 6" platform, on box
*1026 Start B6-DA032421 @ 24" Hg
Can # 6L1957 reg # 22283
on roof, btwn bldgs, N cooler w/ new teflon lined ¼" tubing coming out of cooler drain.
NOTE: all IA/DA samples have note "Please don't touch" on them.
1118 Leak check VP13
1121 Start VP13-SG032421 @ 22" Hg
Can # 6L1418 reg # 23953

3/24/21

Location SLC-VA Date 3/24/21

Project / Client 700S 1600E PCE Plume

Soil gas / vapor sampling

1121 Start FD02-SG032421 @ 23.25" Hg
Can # 6L2472 reg # 23930
1208 Stop VP13-SG032421 @ 3" Hg
1215 Stop FD02-SG032421 @ 3" Hg
1145 Leak check VP08
1147 Start VP08-SG032421 @ 22.5" Hg
Can # 6L2400, reg # 23744
1236 Stop VP08-~~SG~~SG032421 @ 3" Hg
1143 Leak check VP15
1145 Start VP15-SG032421 @ 24" Hg
Can # 6L1798 reg # 25184
1229 Stop VP15-SG032421 @ 4" Hg
1155 Leak check VP17
1157 Start VP17-SG032421 @ 22.5" Hg
Can # 6L2464 reg # 23218
1239 Stop VP17-SG032421 @ 3.5" Hg
1202 Leak check VP14
1204 Start VP14-SG032421 @ 23.5" Hg
Can # 6L0922 reg # 23282
1241 Stop VP14-SG032421 @ 3.5" Hg.
~~1216~~ 1214 Leak check VP04
1216 Start VP04-SG032421 @ 23.5" Hg
Can # 6L0359 reg # 25329
1257 Stop VP04-SG032421 @ 3.5" Hg

3/24/21

Rite in the Rain

Location SLC-VA Date 3/24/21

Project / Client 7005 1600E PCE Plume
Soil gas / vapor sampling

1216 Start FD03-SG032421 @ 23.5" Hg
Can # GL1973 req # 23638
1257 Stop FD03-SG032421 @ 3.5" Hg.
~~1445 leak check~~ UT
1255 Leak check VP06
1257 Start VP06-SG032421 @ 23" Hg
Can # GL0814 req # 23981
1347 Stop VP06-SG032421 @ 3" Hg
1302 Leak check VP19
1305 Start VP19-SG032421 @ 23.75" Hg
Can # GL 2688 req # 23647
1353 Stop VP19-SG032421 @ 3" Hg.
1340 Leak check VP02
1344 Start VP02-SG032421 @ ~~GL2713~~ 21.5" Hg
Can # GL 2713 req # 23794
1426 Stop VP02-SG032421 @ 4" Hg
~~1443 1440~~ UT
1440 Hand pump SG49 ~ L
1443 Start SG49-SG032421 @ 21.5" Hg
Can # GL 2648 req # 23368
1517 Stop SG49-SG032421 @ 4" Hg
1425 Purge MW-25-28' for 1 min (0.8L)
1431 Start MW25-SG032421-28 @ 24.5" Hg
Can # GL2570 req # 23214

WMA 3/24/21

Location SLC-VA Date 3/24/21

Project / Client 7005 1600E PCE Plume
Soil gas / Vapor Sampling.

1527 Stop MW25-SG032421-28 @ 4" Hg
1535 Purge MW-25-100' for 3 minutes,
2.9L w/ vacuum pump @ 1L/min
(Same vac pump + flow rate for
MW-25-28')
1539 Start MW25-SG032421-100 @ 22.75" Hg
Can # GL 2648 req # 24839
1623 Stop MW25-SG032421-100 @ 3.5" Hg.
QC 16 samples in 4 boxes.
Complete COCs.
~~Ship the following:~~ UT
~~Ship all samples~~ UT
Ship the following:

VP13	MW25-28'	VP15	SG49
FD02	VP12	VP17	
VP08	VP10	VP14	
VP06	VP11	VP04	
VP19	VP09	VP02	

NOT shipped today:
MW-25-100' + FD03
1700 All gates + cones locked, all off-site.
UT to Fed Ex.

WMA 3/24/21

Rite in the Rain

Location SLC-VA Date 3/25/21

Project / Client 7005 1600E PCE PLUME

SOIL GAS / VAPOR SAMPLING

Weather: cloudy, slight rain in PM, 40s F

PPE: level D + masks

Personnel: Whitney Treadway (CDM Smith)
Kid Keller, Kevin Murphy (Wasatch)

TASK: Soil Gas Sampling / Indoor Air Pick-up.

0730 KK and WT load up at Wasatch office. Calibrate PID w/ Wasatch regulator and isobutylene.

0800 KK and WT meet KM onsite at Corex. Load up equipment. KM picked up some Swagelok soil gas probe tubing connections + caps.

0830 Health + Safety meeting; weather: cold, slippery, traffic in parking lot, heavy lifting.

0900 KM and WT at Bldg 7 to meet Ed the lock Smith to open up doors. KK to Sunnyside Park to start sampling.

0930 Stop B7-IA05-IA032521 @ 3.75" Hg (NOTE: IA and OA samples have end date in name).

0940 Stop B7-IA02-IA032521 @ 4.25" Hg.

1004 Stop B16-IA01-IA032521 @ 3.5" Hg
WT 3/25/21
WMA 3/25/21

Location SLC-VA Date 3/25/21

Project / Client 7005 1600E PCE Plume

Soil Gas / Vapor Sampling

1004 Stop FD01-IA032521 @ 3.0" Hg

1015 Stop B16-IA08-IA032521 @ 5.75" Hg

1026 Stop B16-OA01-OA032521 @ 4.5" Hg.
NOTE: Name says "B16" but outdoor air sample is between B16 and B7 on roof. @ 1100 KM offsite.

** KK called and said SB-42 and SB-43 are only labeled with 1, 2, 3, or 4 strips of duct tape on tubing. We assume 1 = shallowest, 4 = deepest. Confirm w/ Karla Leslie and she agrees.
After starting what we thought were shallowest probes at SB42 + SB43, Karla finds documentation of 1 = deepest, 4 = shallowest.

0933 Start SB42-SG032521-26 @ 22.5" Hg
Can # CEL2576 reg # 23210
** We thought this was shallowest, so purge time is less than 3x volume, but still at least 1.5x tubing volume.

1022 Stop SB42-SG032521-26 @ 3.75" Hg.

WMA 3/25/21

Rite in the Rain

Location SLC-VA Date 3/25/21

Project / Client 7005 1600E PCE Plume

Soil Gas / Vapor Sampling

1101 Start SB42-SG032521-17 @ 23.75" Hg
Can # CeL2388 reg # 23520

1144 Stop SB42-SG032521-17 @ 3.75" Hg

1101 Start+ FD04-SG032521 @ 24.25" Hg
Can # ~~CeL2388~~ 6L0085 reg # 23923

Parent: SB42-SG032521-17.

1151 Stop FD04-SG032521 @ 4.5" Hg.

1202 Start SB42-SG032521-13 @ 21.75" Hg
Can # CeL1018 reg # 23526

1237 Stop SB42-SG032521-13 @ 4.0" Hg.

1243 Start SB42-SG032521-7 @ 22.25" Hg
Can # CeL2052 reg # 23759

1323 Stop SB42-SG032521-7 @ 3.75" Hg.

0938 Start SB43-SG032521-15 @ 23.0" Hg
Can # CeL2842 reg # 23356
** We thought this was shallowest, but purged more than 3x volume for shallow probe, so at least 3x volume for deep probe

1019 Stop SB43-SG032521-15 @ 4.0" Hg

1030 Start+ SB43-SG032521-8 @ 22.0" Hg
Can # CeL2325 reg # 24888

1109 Stop SB43-SG032521-8 @ 4.0" Hg

WMA 3/25/21

Location SLC-VA Date 3/25/21

Project / Client 7005 1600E PCE Plume

Soil Gas / Vapor Sampling

SB42 + SB42 purged w/ hand pump
Purge volume calculations below
(3x tubing volume).

SB42	3x vol	SB43	3x vol
7'	0.2L	8'	0.3L
13'	0.4L	15'	0.5L
17'	0.5L		
25'	0.8L		

0920 Purge MW-29-42' w/ vacuum pump for ~1.5 minutes (1.2L)

0924 Start MW29-SG032521-42 @ 23.0" Hg
Can # CeL2820 reg # 24219

1105 Stop MW29-SG032521-42 @ 1.5" Hg

1115 Purge MW-29-66' w/ vacuum pump for 2 minutes (2L)

1120 Start MW29-SG032521-66 @ 22.5" Hg
Can # CeL2439 reg # 24141

1158 Stop MW29-SG032521-66 @ 4.0" Hg

1205 Purge MW29-98' w/ vacuum pump for 3 minutes (3L)

1211 Start MW29-SG032521-98 @ 20.75" Hg
Can # CeL0480 reg # 24304

1248 Stop MW29-SG032521-98 @ 2.0" Hg

WMA 3/25/21

Rite in the Rain

Location SLC-VA Date 3/25/21

Project / Client 7005 1600E PCE Plume
Soil Gas / Vapor Sampling

NOTE: MW-29 probes were loosely labeled A, B, and C. Confirmed w/ Karla that A = 42', B = 66' C = 98'.
All probes at SB42, SB43, MW29 were relabeled w/ depths in feet w/ zip ties and duct tape. Caps and fittings were added to MW-29.

1250 Pack up and head to MW-24 on VA campus. SB boxes + MW-29 locking box closed + secured.

1310 ~~Set up at MW-24-130'.~~ ut Bathroom / lunch break

1330 At MW-24-130' (probes are clearly labeled and have tubing connections + caps.

1337 Purge MW-24-130' w/ vacuum pump for ~4 minutes (3.8L)

1342 Start MW24-SG032521-130 @ 23.0" Hg Can # 6L0332 reg # 23228

1428 Stop MW24-SG032521-130 @ 3.0" Hg

1432 Purge MW-24-104' w/ vacuum pump for 3 minutes (3L).

VMA 3/25/21

Location SLC-VA Date 3/25/21

Project / Client 7005 1600E PCE Plume
Soil Gas / Vapor Sampling

1436 Start MW24-SG032521-104 @ 21.5" Hg Can # 6L1353 reg # 23937

1510 Stop MW24-SG032521-104 @ 4.0" Hg

1513 Purge MW-24-60' w/ vacuum pump for 2 minutes (>1.7L)

1517 Start ~~MW-24~~ ut MW24-SG032521-60 @ 21.75" Hg, Can # 6L2219 reg # 23425

1553 Stop MW24-SG032521-60 @ 4.0" Hg. QC samples from today and complete COCs.

1615 At Conex, unload equipment. KK will take generator + 2 vac pumps back to Wasatch (used for 4 days (3/22-3/25)) keep hand pump for tomorrow.

1630 All offsite. Gates and Conex boxes locked.
Ut to FedEx w/ 5 boxes (20 samples).

VMA 3/25/21

Rite in the Rain

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 3/22/2021	**Prepared by:** Ben Carreon

Personnel on site, including Contractors:	CDM Smith – Ben Carreon, Maria Day, Tea Vrtlar, Emma Rott, Iona Campbell, Whitney Treadway Wasatch – Kevin Murphy, Kiel Keller
Visitors/Others:	VA – Wynn John

Weather	**Sunny**	**Partly Cloudy**	Overcast	Rain	**Snow**
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	**0 To 32 º F**
Wind	**Still**	Moderate	High		
Humidity	Dry	Moderate	**Humid**		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Low-flow groundwater sampling equipment • Soil gas/vapor sampling equipment

Description of Field Activities – including samples/data collected, etc:

- A H&S tailgate was conducted at the IDW yard area.
- Equipment was calibrated.
- Groundwater Sampling
    - Groundwater samples collected:
        - MW-01S (MW01S-GW032221)
            - For the following parameters:
                - VOCs
        - MW-01D (MW01D-GW032221)
            - For the following parameters:
                - VOCs
        - MW-04 (MW04-GW032221, FD01-GW032221)
            - For the following parameters:
                - VOCs
        - MW-06 (MW06-GW032221)
            - For the following parameters:
                - VOCs
        - MW-13S (MW13S-GW032221)
            - For the following parameters:
                - VOCs
        - MW-13L (MW13L-GW032221, FD04-GW032221)
            - For the following parameters:
                - VOCs
                - Geochemistry
                    - Metals
                    - Dissolved gases
                    - Sulfate, chloride
                    - Nitrate + nitrite (total N)
                    - TOC
                    - Alkalinity
                - 1,4-Dioxane
    - The following samples were shipped to EMAX:

        - Collected 3/18/21
            - MW31A-GW031821
            - MW31B-GW031821
            - MW31C-GW031821
        - Collected 3/19/21
            - MW17S-GW031921
            - MW17D-GW031921
            - MW20S-GW031921
            - MW20D-GW031921
            - MW29A-GW031921
            - MW29B-GW031921
            - MW29C-GW031921
            - MW34A-GW031921
            - MW34B-GW031921
            - MW34C-GW031921
            - MW34D-GW031921
        - Collected 3/21/21
            - MW03RA-GW032121
            - MW03RB-GW032121
            - MW03RC-GW032121
            - MW03RD-GW032121
            - MW13D-GW032121
            - FD03-GW032121
            - MW18-GW032121
            - MW19-GW032121
            - MW22-GW032121
            - MW24-GW032121
            - MW25A-GW032121
            - MW25B-GW032121
            - MW25C-GW032121
            - MW28-GW032121
        - Collected 3/22/21
            - MW01S-GW032221
            - MW01D-GW032221
            - MW04-GW032221
            - FD01-GW032221)
            - MW06-GW032221
            - MW13S-GW032221
            - MW13L-GW032221
            - FD04-GW032221
    - MW-24 pump was redeployed with a new cable.
    - Calibration gasses were inventoried and empty and/or expired calibration gasses will be properly disposed.
    - Most of the groundwater sampling equipment was returned to Field Environmental.
- Soil Gas Sampling
    - Collected the following samples:
        - MW27-SG032221-28
        - SG60-SG032221
        - MW27-SG032221-113
        - SG3-SG032221
    - Shipped all four soil gas samples above to Eurofins Air Toxics for TO-15 analysis.
    - Reviewed indoor/outdoor air sampling locations for Buildings 6 and 7 with VA.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

- Salt Lake County has a mandatory mask mandate in effect since Saturday, June 27. Masks are required in public.
- The pump at MW-02 was not functioning. The pump was cleaned and parts were replaced (o-rings, check balls, intake screen), but the pump remained nonfunctional. A non-dedicated QED sample pro pump will be used to attempt a sample on 3/23/21. A rinsate blank will be collected and submitted if a successful sample is collected using this pump. The issues encountered at this pump were consistent with some of the past issues (including MW-05R). The pitting and corrosion occurring within the pump internals is the presumed issue for pump problems, but Solinst will be contacted for further troubleshooting.
- Three depths at MW-27 (46 ft, 75 ft, and 155 ft) were too tight to properly purge or collect a soil gas sample. Two depths (28 ft and 113 ft) at this location were successfully purged and sampled.

Projected Work – Near Term:

- Finish groundwater sampling 3/22/21.
- Ship the remaining groundwater samples and return all groundwater sampling rental field equipment.
- Continue soil gas/indoor air sampling 3/23/21 to 3/26/21.

Other Activities/Remarks:

- None.

Photos:

Date: 3/22/2021

Location: MW-13L

Description: Equipment setup

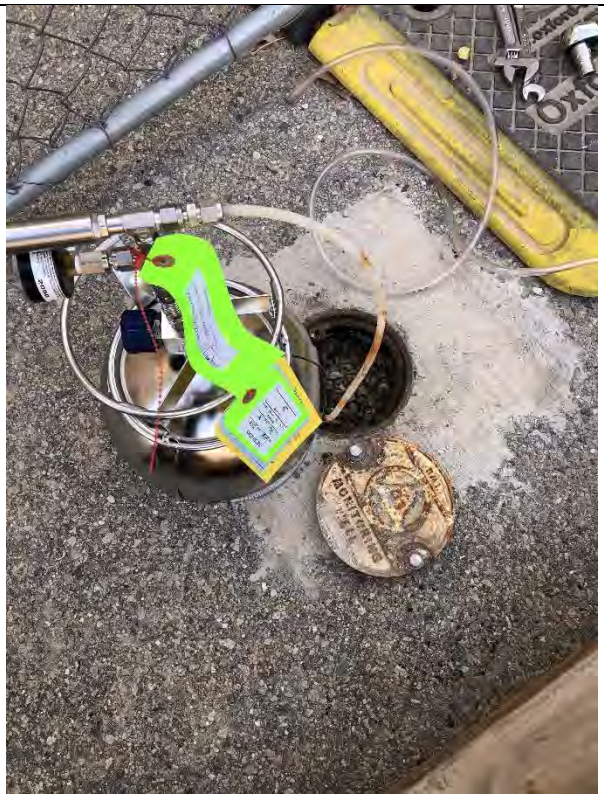
Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 3/22/2021 **Location:** MW-02 **Description:** Pump bladder in good condition
	Date: 3/22/2021 **Location:** MW-02 **Description:** Pump internals with significant staining and corrosion

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 3/22/2021 **Location:** MW-02 **Description:** Pump intake screen
	Date: 3/22/2021 **Location:** MW-02 **Description:** Pump internals

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 3/22/2021 **Location:** MW-27-113' **Description:** Tightening soil gas tubing to summa canister prior to starting the collection.
	**Date:** 3/22/2021 **Location:** SG-03 **Description:** Soil gas probe sample collection.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Date: 3/22/2021

Location: MW-27-75'

Description: Attempting to purge soil gas probe tubing with air pump.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 3/23/2021	**Prepared by:** Ben Carreon

Personnel on site, including Contractors:	CDM Smith – Ben Carreon, Maria Day, Tea Vrtlar, Emma Rott, Iona Campbell, Whitney Treadway Wasatch – Kevin Murphy, Kiel Keller
Visitors/Others:	VA – Wynn John

Weather	**Sunny**	**Partly Cloudy**	Overcast	Rain	**Snow**
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	**0 To 32 º F**
Wind	**Still**	Moderate	High		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Low-flow groundwater sampling equipment • Soil gas/vapor sampling equipment

Description of Field Activities – including samples/data collected, etc:

- A H&S tailgate was conducted at the IDW yard area.
- Equipment was calibrated.
- Groundwater Sampling completed.
    - Groundwater samples collected:
        - MW-02 (MW02-GW032321)
            - For the following parameters:
                - VOCs
        - An equipment blank (EB01-GW032321) was collected from the nondedicated pump at MW-02
            - For the following parameters:
                - VOCs
    - The following samples were shipped to EMAX:
        - FB01-GW032221
            - Field blank collected at MW-13L for the following parameters:
                - VOCs
                - 1,4-dioxane
        - EB01-GW032321
        - MW02-GW032321
    - The remainder of the groundwater sampling equipment was returned to Field Environmental.
    - A j-plug was added to MW-05R since the malfunctioning pump was pulled and a protective housing was no longer in place.
    - Organization in the conex buildings and around the IDW yard was performed.
- Soil Gas Sampling
    - Collected the following samples:
        - SG10-SG032321
        - SG08-SG032321
        - SG13-SG032321
        - FD01-SG032321
        - MW28-SG032321-24
        - MW28-SG032321-48
        - MW28-SG032321-118
        - SG11-SG032321

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

- SG50-SG032321
- SG55-SG032321
- SG04-SG032321
- SG05-SG032321
- SG06-SG032321
- MW23-SG032321-135

o Shipped all 14 soil gas samples to Eurofins Air Toxics for TO-15 analysis.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

- Salt Lake County has a mandatory mask mandate in effect since Saturday, June 27. Masks are required in public.
- The three depths at MW-27 (46 ft, 75 ft, and 155 ft) which were too tight to properly purge or sample were troubleshooted. Troubleshooting consisted of applying pressure through a nitrogen cylinder, regulator, pneumatic hose, and a Swagelok fitted airline. Pressure was applied at approximately 1 PSI per foot of the SG probe length or 50 psi, 75 psi, and 150 psi, respectively. The SG locations were pressurized for five minutes at which point the tank valve was closed. The regulator pressure was monitored for loss in pressure. The 46 and 75 ft probes bled pressure at approximately 10 and 5 psi per minute, respectively. The 155 ft probe did not drop any pressure over a minute after the tank valve was closed. None of the three locations resulted in any change in tank pressure over the duration of the 5-minute injection tests. Attempts were then made to purge the SG locations with the vacuum pump, which were unsuccessful. Based on observations from injection testing and vacuum pump purging, blockage in these three lines is apparent.
- A breaker for the conex was tripped and reset from charging a PID and running lights.

Projected Work – Near Term:

- Continue soil gas/indoor air sampling 3/24/21 to 3/26/21.
- The groundwater sampling team with demobilize 3/24/2021.

Other Activities/Remarks:

- None.

Photos:

Date: 3/23/2021

Location: MW-02

Description: QED sample pro

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 3/23/2021 **Location:** MW-05R **Description:** J-plug at MW-05R
	Date: 3/23/2021 **Location:** SG-10 **Description:** Soil gas parent and duplicate sample collection with t-bar.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 3/23/2021 **Location:** SG-55 **Description:** Purging soil gas probe with hand pump. Calculated volume of soil gas inside the tubing and purged three times that volume.
	Date: 3/23/2021 **Location:** MW-23 **Description:** Collecting soil gas sample at 1-inch PVC probe with a screened interval of 130 to 140 ft bgs. Casing was sealed at the surface with ¼-inch tubing extending down into the casing approximately 8 feet.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 3/24/2021	**Prepared by:** Whitney

Personnel on site, including Contractors:	CDM Smith – Whitney Treadway Wasatch – Kevin Murphy, Kiel Keller
Visitors/Others:	VA – Wynn John

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	0 To 32 º F
Wind	**Still**	Moderate	High		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Soil gas/vapor sampling equipment

Description of Field Activities – including samples/data collected, etc:

- A H&S tailgate was conducted at the IDW yard area.
- Soil Gas Sampling
  - Collected the following samples:
    - VP13-SG032421
    - FD-SG032421
    - VP08-SG032421
    - VP06-SG032421
    - VP19-SG032421
    - MW25-SG032421-28
    - MW25-SG032421-100
    - VP12-SG032421
    - VP10-SG032421
    - VP11-SG032421
    - VP09-SG032421
    - VP15-SG032421
    - VP17-SG032421
    - VP14-SG032421
    - VP04-SG032421
    - FD03-SG032421
    - VP02-SG032421
    - SG49-SG032421
  - Started the following 24-hour indoor and outdoor air samples:
    - B7-IA05-IA032521
    - B7-IA02-IA032521
    - B6-IA06-IA032521
    - FD01-IA032521
    - B6-IA08-IA032521
    - B6-OA01-0A1032521
  - Shipped 16 of the 18 soil gas samples to Eurofins Air Toxics for TO-15 analysis.
    - VP13-SG032421
    - FD-SG032421
    - VP08-SG032421

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Salt Lake City, Utah

- VP06-SG032421
- VP19-SG032421
- MW25-SG032421-28
- VP12-SG032421
- VP10-SG032421
- VP11-SG032421
- VP09-SG032421
- VP15-SG032421
- VP17-SG032421
- VP14-SG032421
- VP04-SG032421
- VP02-SG032421
- SG49-SG032421

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

- Salt Lake County has a mandatory mask mandate in effect since Saturday, June 27. Masks are required in public.
- One vapor pin, VP-16, is currently under water in the basement of Building 6. It is expected that this is due to the construction work going on directly above that area and likely will be under water through the end of the week. The team will check each day to confirm conditions at this location.

Projected Work – Near Term:

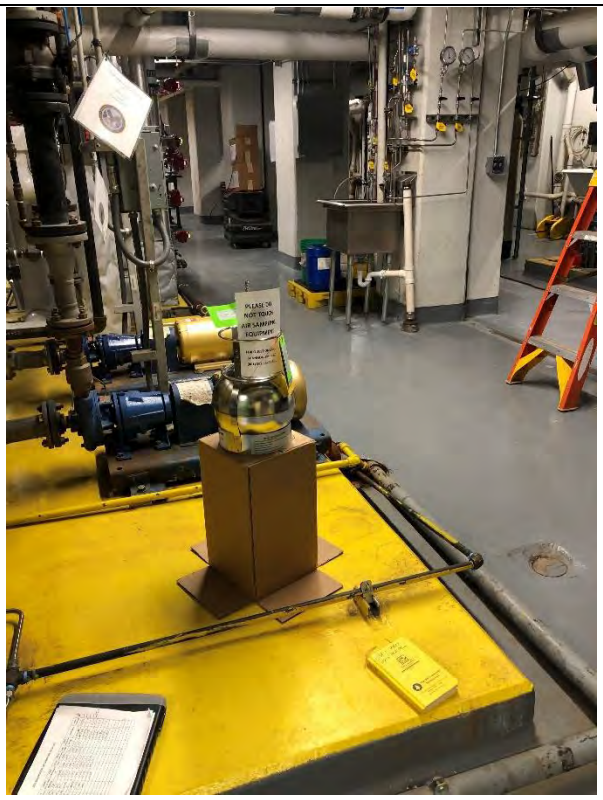
- Continue soil gas/indoor air sampling 3/25/21 to 3/26/21.

Other Activities/Remarks:

- None.

Photos:

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	**Date:** 3/24/2021 **Location:** B6-IA08-IA032421 **Description:** Indoor air sampling locations in basement of building 6
	Date: 3/24/2021 **Location:** VP-13 **Description:** Leak checking vapor pin with distilled water around the pin and hand pump to evacuate the vapor pin. No water loss observed.

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Salt Lake City, Utah

Date: 3/24/2021

Location: VP-06

Description: Vapor pin sampling set-up in building 6.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 3/25/2021	**Prepared by:** Whitney Treadway

Personnel on site, including Contractors:	CDM Smith – Whitney Treadway Wasatch – Kevin Murphy, Kiel Keller
Visitors/Others:	

Weather	Sunny	Partly Cloudy	**Overcast**	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	0 To 32 º F
Wind	**Still**	Moderate	High		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Soil gas/vapor sampling equipment

Description of Field Activities – including samples/data collected, etc:

- A H&S tailgate was conducted at the IDW yard area.
- Soil Gas Sampling
  - Collected the following samples:
    - SB42-SG032521-7
    - SB42-SG032521-13
    - SB42-SG032521-17
    - SB42-SG032521-26
    - SB43-SG032521-8
    - SB43-SG032521-15
    - MW29-SG032521-42
    - MW29-SG032521-66
    - MW29-SG032521-98
    - MW24-SG032521-60
    - MW24-SG032521-104
    - MW24-SG032521-130
    - FD04-SG032521
  - Stopped and collected the following 24-hour indoor and outdoor air samples:
    - B7-IA05-IA032521
    - B7-IA02-IA032521
    - B6-IA06-IA032521
    - FD01-IA032521
    - B6-IA08-IA032521
    - B6-OA01-0A1032521
  - Shipped 12 of the 13 soil gas samples collected Thursday, 2 soil gas samples collected on Wednesday, and 6 indoor/outdoor air samples to Eurofins Air Toxics for TO-15 analysis.
    - SB42-SG032521-7
    - SB42-SG032521-13
    - SB42-SG032521-17
    - SB42-SG032521-26
    - SB43-SG032521-8
    - SB43-SG032521-15

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- MW29-SG032521-42
- MW29-SG032521-66
- MW29-SG032521-98
- MW24-SG032521-104
- MW24-SG032521-130
- FD04-SG032521
- B7-IA05-IA032521
- B7-IA02-IA032521
- B6-IA06-IA032521
- FD01-IA032521
- B6-IA08-IA032521
- B6-OA01-0A1032521
- FD03-032421
- MW25-SG032421-100

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

- Salt Lake County has a mandatory mask mandate in effect since Saturday, June 27. Masks are required in public.
- One vapor pin, VP-16, is currently under water in the basement of Building 6. It is expected that this is due to the construction work going on directly above that area and likely will be under water through the end of the week. It was checked on Thursday and it is still underwater.
- Labels on SB-42 and SB-43 were unclearly labelled with strips of duct tape. New, clear, permanent labels were added to all the probes in each of these locations. New, permanent labels were also added to the 3 probes in MW-29.

Projected Work – Near Term:

- Continue soil gas/indoor air sampling 3/26/21.
- Demobilize from site on 3/26/21.

Other Activities/Remarks:

- None.

Photos:

Date: 3/25/2021

Location: SB-42

Description: soil gas sample and duplicate collection

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 3/25/2021 **Location:** SG-43 **Description:** New, clear, permanent labels added to SB-43 after sampling
	Date: 3/25/2021 **Location:** MW-24 **Description:** Soil gas sample collection at soil gas probe in MW-24.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 3/26/2021	**Prepared by:** Whitney Treadway

Personnel on site, including Contractors:	CDM Smith – Whitney Treadway Wasatch – Kiel Keller
Visitors/Others:	

Weather	Sunny	**Partly Cloudy**	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	0 To 32 º F
Wind	**Still**	Moderate	High		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Soil gas/vapor sampling equipment

Description of Field Activities – including samples/data collected, etc:

- A H&S tailgate was conducted at the IDW yard area.
- Soil Gas Sampling
  - Collected the following samples:
    - MW24-SG032621-32
    - FD05-SG032621
    - MW34-SG032621
    - MW32-SG032621
    - MW37-SG032621
    - MW38-SG032621
  - Shipped all 7 samples to Eurofins Air Toxics for TO-15 analysis (6 from Friday and 1 from Thursday).
    - MW24-SG032621-32
    - FD05-SG032621
    - MW34-SG032621
    - MW32-SG032621
    - MW37-SG032621
    - MW38-SG032621
    - MW24-SG032521-60
- Shipped 5 boxes of empty canisters back to lab.
- Shipped PID back to Field Environmental.
- Demobilized from site.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

- Salt Lake County has a mandatory mask mandate in effect since Saturday, June 27. Masks are required in public.

Projected Work – Near Term:

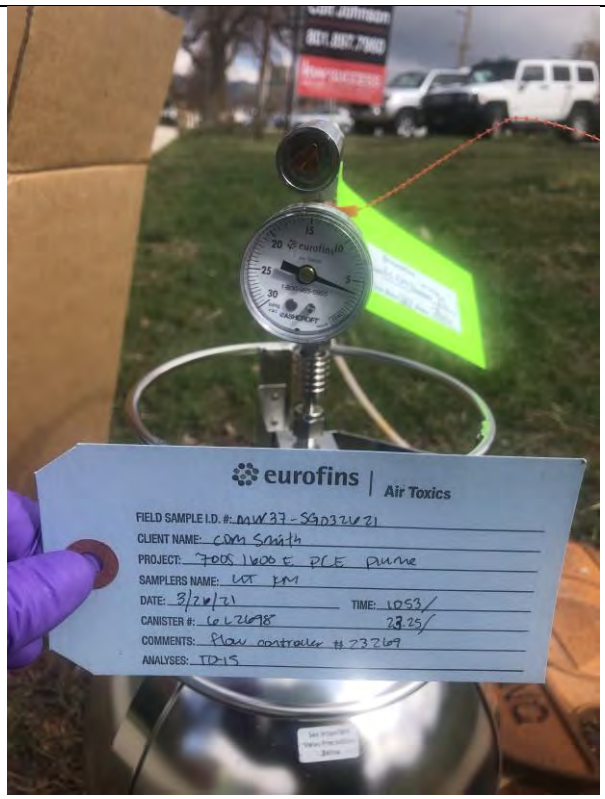
- Piezometer replacement drilling beginning next week.

Other Activities/Remarks:

- None.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Photos:

	Date: 3/26/2021 **Location:** MW-24 **Description:** parent and duplicate sample collection at 32 ft probe
	**Date:** 3/26/2021 **Location:** MW-37 **Description:** Starting 30-minute sample collection – initial vacuum

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Date: 3/26/2021

Location: MW-32

Description: Soil gas sample collection at soil gas probe at 18 ft depth

SOIL GAS/INDOOR AIR SAMPLING FIELD LOG

DATE: 3/22/21 - 3/23/21

	SAMPLE ID	DATE COLLECTED	SAMPLE COLLECTION INTERVAL	FLOW CONTROLLER ID	START TIME	INITIAL VACUUM (in Hg)	END TIME	FINAL VACUUM (in Hg)	CANISTER ID	DATE SHIPPED	QC?
1	MW27-SG032221-28	3/22/2021	30min ~~38'~~ UT 3/22/21	24407 ~~2046~~ UT 3/22/21	1103	23.5	1145	4.0	6L2355	3/22/21	✓ ✓
2	SG60-SG032221	3/22/2021	30min ~~4'~~ UT 3/22/21	24139	~~1145~~ 1148 UT	23.5	1229	4.25	6L2580	3/22/21	✓ ✓
	~~MW27-SG032221-48~~	~~3/22/2021~~	~~48'~~	UT 3/22/21 ~~23125~~	~~1154~~	~~22.5~~			~~6L0120~~	~~UT~~ 3/22/21	
				~~23980~~ UT 3/22/21					~~6L2003~~ UT 3/22/21		
	~~MW27-SG032221-75~~	~~3/22/2021~~	~~75'~~	~~23980~~	~~1240~~	~~23.5~~			~~6L2003~~ UT	3/22/21	
3	MW27-SG032221-113	3/22/2021	30min ~~113'~~ UT 3/22/21	23381	1302	~~22.75~~ 23 UT 3/22/21	1349	3.0	6L0601	3/22/21	✓ ✓
	~~MW27-SG032221-155~~	~~3/22/2021~~	~~155'~~ UT 3/22/21 ~~24498~~						~~6L0768~~ UT	3/22/21	
4	~~MW 3/22/21~~ ~~SG3~~ UT 3/26/21 SG3-SG032221	3/22/2021	30min ~~8'~~ UT 3/22/21	24498	1538	23.75	1648	4.5	6L0768	3/22/21	✓ ✓
5	MW28-SG032321-24	3/23/2021	30min ~~24'~~ UT 3/23/21	23630	0954	23	1043	3.5	6L0227	3/23/21	• 1 ✓
6	SG11-SG032321	3/23/2021	30min ~~5'~~ UT 3/23/21	25235	1020	23	1105	3.5	6L1535		• 2 ✓
7	MW28-SG032321-48	3/23/2021	30min ~~48'~~ UT 3/23/21	23192	1052	24	1147	3.5	6L2277		• 3 ✓
8	SG08-SG032321	3/23/2021	30min ~~3.3'~~ UT 3/23/21	23951	1139	23.5	1220	3.5	6L1082		• 4 ✓
9	MW28-SG032321-118	3/23/2021	30min ~~118'~~ UT 3/23/21	24702	1203	22	1239	4.0	~~6L0120~~ 6L1950 UT	3/23/21	• 5 ✓
10	SG10-SG032321	3/23/2021	30min ~~6.8'~~ UT 3/23/21	24389	~~1220~~ 1240 UT 3/23/21	22.5	1324	3.0	6L0681		• 6 ✓
	FD01-SG032321	3/23/2021	30min	23804	~~1220~~ 1240 UT 3/23/21	23.5	1330	3.0	6L2844		• 7 ✓
11	SG13-SG032321	3/23/2021	30min ~~6'~~ UT 3/23/21	23581	1300	22.5	1347	3.0	6L0760	↓	• 8 ✓
12	SG50-SG032321	3/23/2021	30min ~~7.3'~~ UT 3/23/21	23534	1352	22.5	1436	3.0	6L0814		• 1 ✓

Change to SG#3

SAMPLED BY: UT Whitney Treadway

QC'd BY: Kiel Keller

SOIL GAS/INDOOR AIR SAMPLING FIELD LOG

DATE: 3/23/21 – 3/24/21

	SAMPLE ID	DATE COLLECTED	SAMPLE COLLECTION INTERVAL	FLOW CONTROLLER ID	START TIME	INITIAL VACUUM (in Hg)	END TIME	FINAL VACUUM (in Hg)	CANISTER ID	DATE SHIPPED	QC?
13	SG04-SG032321	3/23/2021	30 min ~~5.8'~~ WT 3/23/21	23562	1406	21.5	1500	3.0	6L1778	3/23/21	2 ✓ ✓
14	SG05-SG032321	3/23/2021	30 min ~~6.3'~~ WT 3/24/21	23414	1412	22.5	1453	3.5	6L2862		3 ✓ ✓
15	SG06-SG032321	3/23/2021	30 min ~~6.1'~~ WT 3/24/21	23565	1419	23.0	1508	3.5	6L2540		4 ✓ ✓
16	~~SG~~ WT 3/23/21 MW23-SG032321-135	3/23/21	30 min ~~130-140~~ WT 3/24/21	23615	1444	23.0	1527	4.0	6L00068		5 ✓ ○
17	SG55-SG032321	3/23/21	30 min ~~5'~~ WT 3/24/21	24035	1507	23.0	1602	2.5	6L2181	✓	6 ✓ 1503 purge .15 ✓
1	B7-IA05-IA032[5]1/21	3/24/21	~~3' 24 hr abg ags~~ WT 3/24/21	7160	0930	25.0	3/25/21 0930	~~4.0~~ 3.75	6L2346	~~3/24/21~~ 3/25/21 WT	3/24/21 ✓ ✓
2	B7-IA02-IA032[5]1/21	3/24/21	24 hr ~~4' ags~~ WT 3/24/21	24467	0940	25.0	3/25/21 0940	4.25	6L1791	3/25/21	✓ ✓
3	B6-IA06-IA032[5]1/21 WT 3/25/21	3/24/21	24 hr ~~4' ags~~ WT 3/24/21	20739	1004	24.75	3/25/21 WT ~~0930~~ 1004	3.5	6L1186		✓ ✓
	FD01-IA032[5]4/21 WT 3/25/21	3/24/21	24 hr ~~4' ags~~ WT 3/24/21	22065	1004	24.5	3/25/21 1004	3.0	6L1718		✓ ✓
4	B6-IA08-IA032[5]4/21 WT 3/25/21	3/24/21	24 hr ~~3.5' ags~~ WT 3/24/21	22288	1015	25.0	3/25/21 1015	5.75	6L2990		✓ ✓
→	B6-OA01-OA032521 ~~B6-OA032421~~ WT 3/24/21	3/24/21	WT ~~3' ags~~, 24 hr intake at 15' ags	22183	1026	24.0	3/25/21 1026	4.5	6L1957	✓	✓ ✓
18	VP13-SG032421	3/24/21	30 min ~~NA~~ WT 3/24/21	23753	1121	22.0	1208	3.0	6L1918	3/24/21	✓ ✓
	FD02-SG032421	3/24/21	30 min ~~NA~~ WT 3/24/21	23930	1121	23.25	1215	3.0	6L2472		✓ ✓
19	WT 3/24/21 ~~VP04~~ VP08-SG032421	3/24/21	30 min ~~NA~~ WT 3/24/21	23744	1147	22.5	1236	3.0	6L2400		✓ ✓
20	VP06-SG032421	3/24/21	30 min ~~NA~~ WT 3/24/21	23981	1257	23.0	1347	3.0	6L0811		✓ ✓
21	VP19-SG032421	3/24/21	30 min ~~NA~~ WT 3/24/21	23647	1305	23.95	1353	3.0	6L2688		✓ ✓
22	MW25-SG032421-28	3/24/21	30 min ~~28'~~ WT 3/24/21	23214	1431	24.5	1527	4.0	6L2570	✓	✓ ✓

SAMPLED BY: UT Whitney Treadway, Kevin Murphy

QC'd BY: Kiel Keller

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SG49: V.7

SOIL GAS/INDOOR AIR SAMPLING FIELD LOG

DATE: 3/24/21

	SAMPLE ID	DATE COLLECTED	SAMPLE COLLECTION INTERVAL	FLOW CONTROLLER ID	START TIME	INITIAL VACUUM (in Hg)	END TIME	FINAL VACUUM (in Hg)	CANISTER ID	DATE SHIPPED	
23	~~VP12-SG032421~~ VP12-SG032421 KK 3/24/21	3/24/21	30 min	24310	917	23.5	957	4	6L2147	3/24/21	✓✓
24	VP10-SG032421	3/24/21	30 min	23222	944	24	1028	4	6L2253		✓✓
25	VP11-SG032421	3/24/21	30 min	23433	954	24	1034	4	6L1969		✓✓
26	VP09-SG032421	3/24/21	30 min	23766	1010	23	1054	4	6L1946		✓✓
27	VP15-SG032421	3/24/21	30 min	25184	1145	24	1229	4	6L1768		✓✓
28	VP17-SG032421	3/24/21	30 min	23218	1157	22.5	1236	3.5	6L2464		✓✓
29	VP14-SG032421	3/24/21	30 min	23282	1204	23.5	1241	3.5	6L0922		✓✓
30	VP04-SG032421	3/24/21	30 min	25329	1216	23.5	1257	3.5	6L0359	↓	✓✓
	FD03-SG032421	3/24/21	30 min	23638	1216	23.5	1257	3.5	6L1973	3/25/21	✓✓
31	VP02-SG032421	3/24/21	30 min	23794	1344	23.5	1426	4	6L2713	3/24/21	✓✓
32	SG49-SG032421	3/24/21	30 min	23368	1443	21.5	1517	4	6L1172	3/24/21	✓✓
33	~~SG~~ WT 3/24/21 MW25-SG032421-100 3/24/21		30 min	24839	1539	22.75	1623	3.5	6L2648	3/25/21	✓✓
34	~~SB4~~ WT 3/25/21 SB42-SG032521-26' 3/25/21		30 min	23210	0933	22.5	1022	3.75	6L2576	3/25/21	✓✓
35	SB43-SG032521-15	3/25/21	30 min	23356	0938	23.0	1019	4.0	6L2842	3/25/21	✓✓
36	~~SB42~~ WT 3/25/21 SB42-SG032521-17 3/25/21		30 min	23520	1101	23.75	1144	3.75	6L2388	3/25/21	✓✓
	FD04-SG032521	3/25/21	30 min	23923	1101	24.25	1151	4.5	6L0085	3/25/21	✓✓
37	MW29-SG032521-42	3/25/21	30 min	24219	~~1105~~ 0924 WT 3/25/21	23.0	1105	4.5	6L2820	3/25/21	✓✓

SAMPLED BY: KK Whitney Treadway, Kiel Keller

QC'd BY: KK | KW | WT Kiel Keller

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SOIL GAS/INDOOR AIR SAMPLING FIELD LOG

DATE: 3/25/21 - 3/26/21

	SAMPLE ID	DATE COLLECTED	SAMPLE COLLECTION INTERVAL	FLOW CONTROLLER ID	START TIME	INITIAL VACUUM (in Hg)	END TIME	FINAL VACUUM (in Hg)	CANISTER ID	DATE SHIPPED	
38	SB43-SG032521-8	3/25/21	30min	24888	1030	22.0	1109	4.0	6L2325	3/25/21	✓✓
39	MW29-SG032521-66	3/25/21	30min	24141	1120	22.5	1158	4.0	6L2439	3/25/21	✓✓
40	SB42-SG032521-13	3/25/21	30min	23526	1202	21.75	1237	4.0	6L1018	3/25/21	✓✓
41	MW29-SG032521-98	3/25/21	30min	24304	1211	20.75	1248	2.0	6L0480	3/25/21	✓✓
42	~~SB42~~ wt 3/25/21 SB42-SG032521-7	3/25/21	30min	23759	1243	22.25	1323	3.75	6L2052	3/25/21	✓✓
43	MW24-SG032521-130	3/25/21	30min	23228	1342	23.0	1428	3.0	6L0332	3/25/21	✓✓
44	MW24-SG032521-104	3/25/21	30min	23937	1436	21.5	1510	4.0	6L1353	3/25/21	✓✓
45	MW24-SG032521-60	3/25/21	30min	23425	1517	21.75	1553	4.0	6L2219	3/26/21	✓✓
46	MW24-SG032621-32	3/26/21	30min	24352	0824	22.5	0907	3.0	6L0603	3/26/21	✓✓
	FD05-SG032621	3/26/21	30min	23316	0824	21.75	0905	3.0	6L1198	3/26/21	✓✓
47	MW34-SG032621	3/26/21	30min	24715	0928	26.0	1026	4.0	6L0988	3/26/21	✓✓
48	MW37-SG032621	3/26/21	30min	23269	1053	23.25	~~to~~ 1138 wt 3/26/21	3.5	6L2698	3/26/21	✓✓
49	MW38-SG032621	3/26/21	30min	24056	1202	23.0	1242	3.5	6L2843	3/26/21	✓✓
50	MW32-SG032621	3/26/21	30min	24238	1258	24.0	1341	4.0	6L0188	3/26/21	✓✓

SAMPLED BY: WT | KK Whitney Treadway, Kiel Keller
QC'd BY: Kiel Keller

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EQUIPMENT CALIBRATION LOG

SITE NAME: VA Plume

Instrument (Name/Model No./Serial No.): MiniRae 3000 SN: 592-910457

Manufacturer: Rae Systems

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
03/23/21	0	Fresh air	—	None	0	Pass	TH
03/23/21	101.0	Isobutylene 100ppm	Lot: 334-433833-34 Exp: 03/2021 2024	None	100	PASS	JM
3/25/21	3.8	fresh air	NA	None	0.0	Pass	LT
3/25/21	100.0	ISOBUTYLENE 100PPM	Lot # 305-401898 305-1 exp. 9/14/24	None	100.0	Pass	LT

EQUIPMENT CALIBRATION LOG

SITE NAME: VA PLUME

Instrument (Name/Model No./Serial No.): MiniRae 3000 SN: 542-910957

Manufacturer: Rae Systems

Calibration Date	Initial Setting	Standard/ Gas Used (Concentration)	Lot Control No. Expiration Date	Adjustments Made	Final Reading	Comments Pass/Fail	Signature
03123121	0.0	Fresh air	—	None	0	PASS	
03123121	102.9	Isobutylene 100 ppm	Part# 103A1814CF742 0LL Use: 8/20/2024 Lot# 324-4038363	None	100	PASS	

PREPARATORY INSPECTION/MOBILIZATION CHECKLIST

Activity: SOIL GAS AND VAPOR SAMPLING **Date:** 3/22/2021

Answer each question by checking the appropriate column (yes, no, not observed [N/O] or not applicable [N/A]). If "no" is checked, provide an explanation on the form.

Activity	Yes	No	N/O	N/A	Remarks
1. Have copies of all work plans, including the health and safety plan, been printed for availability onsite? Have appropriate copies of all forms in the plans been prepared for site use?	✓ ✓				
2. Have pertinent work plans and requirements been explained to project personnel, including project documentation and recordkeeping requirements?	✓				
3. Have all personnel working onsite read over the health and safety plan provided by CDM Smith (acknowledgement is by signing the health and safety plan signature form from the SSHP)?	✓				
4. Are the required materials, supplies, and equipment available, on-hand, in working order, and in accordance with plans and technical specifications?	✓				
5. Have all applicable Safety Data Sheets been made available at the site?	✓				
6. Has all equipment been properly calibrated per manufacturer's requirements?	✓				
7. Have sample locations been marked out using a GPS unit or by a surveyor, as appropriate?				✓	already installed
8. Have all applicable permits, licenses, and certificates been identified and/or obtained?	✓				
9. Have all utilities been marked out prior to the start of activities?				✓	already installed
10. Does the subcontractor need to clear heavy underbrush or any overhead obstructions to access any locations?				✓	NO subcontractor
11. Was all subcontractor equipment thoroughly checked, including inspection and testing of the emergency shutdown button on the drilling rig, generators, etc.?				✓	NO subcontractor
12. Have the necessary laboratories been contracted to perform the requested analyses?	✓				Eurofins Air TOXICS
13. Has a designated staging area been established to store IDW and hold the decontamination pad?	✓				
14. For sample locations not in public right-of-way, have all appropriate access agreements ben obtained?	✓				
15. For existing wells, have keys been obtained?	✓				

FIELD DOCUMENTATION CHECKLIST

Activity: SOIL GAS AND VAPOR SAMPLING **Date:** 3/27/2021

Answer each question by checking the appropriate column (yes, no, or not applicable [N/A]). If "no" or "N/A" are checked, provide an explanation in the comments section.

Field Documentation	Yes	No	N/A
1. Was all original field data recorded in indelible ink?	✓		
2. Were log books and field forms (including DQCRs) filled out properly, accurately recounting the day's events? This includes documenting activities performed, weather conditions, personal protective equipment used, problems encountered, details of samples collected, site visitors, descriptions of photos taken, notes of conversations with Project Manager/Field Team Leader/Project Geologist, decontamination procedures used, etc.	✓		
3. Were deficiencies reported to the Project Manager?	✓		
4. Were the equipment arrival date, equipment type, onsite storage location, and serial number recorded on the log for each field instrument?			✓
5. Were factory calibration certificates received with the field instruments and recorded on the log?	✓		
6. Are instruments being calibrated before and after use when necessary, and against know standards and/or per manufacturer specifications? (Passing calibration is within 10% of the standard.)	✓		
7. Are all instrument calibrations being accurately documented on the appropriate logs, including frequency of calibration checks, calibration acceptance criteria, and corrective actions for calibration failures?	✓		
8. Was the date that the field instrument left the site recorded in the logbook or on the instrument's log?	✓		
9. Was all IDW segregated by matrix/type to facilitate analysis and disposal? Were all IDW containers properly labeled as required in the QAPP?			✓

Comments and Corrective Actions

List all corrective actions. Initial and date when corrective actions have been implemented.

PINE ENV. PID HAD BROKEN CHARGING CORD, SENT BACK WT 3/23/21
USED FIELD ENV. PID, BUT NO REGULATOR. WT 3/24/21, 3/26/21
USED WASATCH REGULATOR TO CALIBRATE 1 DAY WT 3/25/21

The Field Team Leader and Project Manager shall sign this checklist upon completion of all items on the checklist.

Field Team Leader: WMA Whitney Treadway Date 3/27/21

Project Manager: _____ Date _____

Field Health and Safety Meeting Record

Trainer: Whitney Treadway Date: 3/24/21 Time: 0850

Site: 700S 1600E PCE Plume

Review:

- Health & Safety Plan
- Buddy Teams
- Hospital Route/Nearest Phone Location
- Weather Concerns
- Potential Problems
- Problems Previously Occurred

Action Levels: >10 ppm *Other:*

Protective Clothing/Equipment: level D

Special Equipment: PID

Chemical Hazards: Soil vapor

Physical Hazards: Slips, trips, falls, ~~fm~~ heavy lifting, walking on roof, in boiler room w/ hot areas

Emergency Actions: call 911, alert VA safety if on campus, leave area if PID hit

Other Issues:

Check:

- H&S Monitoring Equipment/Calibration
- First Aid Kit/Eye Wash Station
- Fire Extinguisher Communications/Radio Check
- H&S Plan (each item) Respiratory Protection/Cartridges

Name/Firm/Office (Please Print)	***Signature***
Whitney Treadway CDM Smith PDX	WMA
Kevin Murphy Wasatch Environmental SLC	
Kiel Keller Wasatch Env. SLC	

Field Health and Safety Meeting Record

Trainer: W. Treadway Date: 3/25/21 Time: 0830

Site: 7005 WOODE PCE Plume

Review:

- Health & Safety Plan
- Buddy Teams
- Hospital Route/Nearest Phone Location
- Weather Concerns
- Potential Problems
- Problems Previously Occurred

Action Levels: >10 ppm *Other:*

Protective Clothing/Equipment: level D + masks

Special Equipment: PID

Chemical Hazards: VOCs in soil vapor

Physical Hazards: Lifting, Slips/trips/falls, Weather (cold)

Emergency Actions: call 911, alert VA Safety if on campus, leave area if PID hit

Other Issues:

Check:

- H&S Monitoring Equipment/Calibration
- First Aid Kit/Eye Wash Station
- Fire Extinguisher Communications/Radio Check
- H&S Plan (each item) Respiratory Protection/Cartridges

Name/Firm/Office (Please Print)	***Signature***
Kevin Murphy Wasatch Environmental SLC	
Kiel Keller wasatch Environmental	
Whitney Treadway CDM Smith PDX	

Field Health and Safety Meeting Record

Trainer: Whitney Treadway Date: 3/26/21 Time: 0810

Site: ~~VA~~ at 3/26/21 700 S 16000E PCE Plume

Review:

- Health & Safety Plan
- Buddy Teams
- Hospital Route/Nearest Phone Location
- Weather Concerns
- Potential Problems
- Problems Previously Occurred

Action Levels: >10 ppm *Other:*

Protective Clothing/Equipment: Level D + masks

Special Equipment: PID

Chemical Hazards: VOCs in soil vapor

Physical Hazards: slips, trips, falls, traffic, weather (slippery surfaces, cold stress)

Emergency Actions: call 911 if emergency, alert VA Safety if on campus, leave area if PID hit

Other Issues:

Check:

- H&S Monitoring Equipment/Calibration
- First Aid Kit/Eye Wash Station
- Fire Extinguisher Communications/Radio Check
- H&S Plan (each item) Respiratory Protection/Cartridges

Name/Firm/Office (Please Print)	***Signature***
Whitney Treadway CDM Smith PDX	WTA

Appendix B

Quality Control Summary Report

Quality Control Summary Report

Q1 2021 Air Sampling Event

Operable Unit 1 Remedial Investigation
700 South 1600 East PCE Plume,
Salt Lake City, Utah

June 2021

CDM Smith

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Attachment 2 Data Package Completeness Review Checklists
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Acronyms

%	percent
%D	percent difference
%R	percent recovery
CDM Smith	CDM Federal Programs Corporation
COC	chain-of-custody
DQI	data quality indicator
DQO	data quality objective
EPA	U.S. Environmental Protection Agency
ft	feet
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
Eurofins	Eurofins Air Toxics Laboratory
MDL	method detection limit
MRL	method reporting limit
PARCCS	precision, accuracy, representativeness, comparability, completeness, and sensitivity
PCE	tetrachloroethene
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
QCSR	quality control summary report
RIWP	Remedial Investigation Work Plan
RPD	relative percent difference
RSD	relative standard deviation
SDG	sample delivery group
SIM	selective ion monitoring
Site	700 South 1600 East Tetrachloroethene Plume Superfund Site
SM	standard method
USACE	U.S. Army Corps of Engineers
VOC	volatile organic compound

Section 1

Data Usability and Assessment Review

Under the U.S. Army Corps of Engineers (USACE), Kansas City District, Contract No. W912DQ-18-D-3008, Task Order No. W912DQ19F3048, CDM Federal Programs Corporation (CDM Smith) was directed to perform a remedial investigation for Operable Unit 1 of the 700 South 1600 East Tetrachloroethene (PCE) Plume Superfund Site (Site) in Salt Lake City, Utah. To assist in the ongoing remedial investigation at the Site, indoor air and soil gas samples were collected March 22, 2021 to March 26, 2021. Samples were shipped to Eurofins Air Toxics (Eurofins) in Folsom, California, for analysis.

The purpose of this quality control summary report (QCSR) is to summarize the data validation and to determine whether the sample results meet the data quality objective (DQO) of the data usability outlined in the *Phase 2 Quality Assurance Project Plan (QAPP), Operable Unit 1, 700 South 1600 East PCE Plume, Salt Lake City, Utah,* Prepared for the U.S. Army Corps of Engineers, Kansas City District (CDM Smith 2020a).

1.1 Usability Summary

Data collected and validated during this field investigation are usable as reported. Applicable data validation qualifiers were added if required. No sample results were rejected. Specific details are provided in the data validation reports summarized in Section 5 and presented in **Attachment 1** of this report.

Section 2
Quality Assurance Objectives

Quality assurance (QA) objectives for measurement data are expressed in terms of precision, accuracy, representativeness, comparability, completeness, and sensitivity (PARCCS). The PARCCS parameters characterize the quality of the data and as such are called data quality indicators (DQIs). The DQIs provide a mechanism for ongoing quality control (QC) and evaluating and measuring data quality throughout the project.

A review of the collected data is necessary to determine if data measurement objectives established in the QAPP (CDM Smith 2020a) were met. In general, the following data measurement objectives were considered:

- Achievement of analytical method and reporting limit requirements
- Adherence to and achievement of appropriate laboratory analytical and field QC requirements
- Achievement of required measurement performance criteria for DQIs (the PARCCS parameters)
- Adherence to sampling and sample handling procedures
- Adherence to the sampling design and deviations documented on field change notifications, if required

The data validation review of the DQIs and other QA objectives determines if the data are of sufficient quality to support their intended use.

Section 3
Field and Laboratory Quality Assurance Activities

CDM Smith completed field sampling activities between March 22 and March 26, 2021. All samples were received intact with proper chain-of-custody (COC) documentation at Eurofins. Sample identification was accurately documented by the laboratory.

Table 3-1 presents a list of the samples collected and the analyses performed. **Attachment 2** presents the completeness review checklists of the data packages. **Attachment 3** includes the analytical data packages.

Sample preparation and analyses were conducted within the method-specified holding times.

The QAPP (CDM Smith 2020a) defined the procedures to be followed and the data quality requirements for the field sampling events and associated analytical work.

3.1 Deviations from Field Procedures/Laboratory Procedures

As discussed in the Data Summary Report, the following deviations were encountered during the sampling events:

- During the March 2021 event, sample collection was unsuccessful at four of the proposed sampling locations/depths: MW-27 at depths 48 feet (ft), 75 ft, and 155 ft, and VP-16. At the MW-27 depths, purging of the probes was attempted, but probes and/ or the tubing were plugged or the formation at the screened interval was too tight and air flow could not be initiated with a vacuum pump.
- VP-16, located in the basement of Building 6, was covered with water during the event, likely due to construction directly above, and could not be accessed for sampling.

The remaining locations available for soil sampling are adequate for evaluation of the extent of subsurface volatile organic compound (VOC) impacts at the site to meet data quality objectives described in the Phase 2 OU1 RI Work Plan (CDM Smith 2020b).

- Samples MW27-SG032221-28, MW27-SG032221-113, and FD03-SG032421 were not able to be analyzed by the selective ion monitoring (SIM) low level analysis because of high levels of target compounds. Samples were analyzed by Modified Method TO-15.

These deviations do not impact the DQOs.

3.2 Field Quality Assurance/Quality Control

Six field duplicate pairs were analyzed for the 51 environmental air samples collected. The QC sample collection frequency requirements in the QAPP (CDM Smith 2020a) of 10 percent for field duplicates was met and exceeded.

Field QA/QC objectives were accomplished through the use of appropriate sampling techniques and collection of the required QC samples at the required frequencies.

3.3 Laboratory Quality Assurance/Quality Control

Analytical QA/QC was assessed by laboratory QC checks, method blanks, sample custody tracking, sample preservation, adherence to holding times, laboratory control samples (LCSs), calibration verifications, surrogates, internal standards, duplicate results, and other applicable QC parameters. As presented in the data validation reports in **Attachment 1** of this report, the laboratory QC samples met project criteria requirements with the appropriate qualifiers applied. All data are considered usable.

3.3.1 Laboratory Methods

Samples were analyzed using the following U.S. Environmental Protection Agency (EPA) or Standard Methods (SM):

- EPA Modified Method TO-15 –VOCs
- EPA Method TO-15 SIM - VOCs by SIM

The methods used met project objectives.

Table 3-1
Sample List and Analysis
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

Field Sample ID	Matrix	Date Sampled	Laboratory SDG	Method
B6-OA01-OA032521	AA	3/25/2021	2103816	TO-15, TO-15 SIM
B7-IA05-IA032521	AI	3/25/2021	2103813	TO-15, TO-15 SIM
B7-IA02-IA032521	AI	3/25/2021	2103813	TO-15, TO-15 SIM
B6-IA06-IA032521	AI	3/25/2021	2103813	TO-15, TO-15 SIM
FD01-IA032521	AI	3/25/2021	2103813	TO-15, TO-15 SIM
B6-IA08-IA032521	AI	3/25/2021	2103816	TO-15, TO-15 SIM
MW27-SG032221-113	GS	3/22/2021	2103701	TO15
MW27-SG032221-28	GS	3/22/2021	2103701	TO15
SG03-SG032221	GS	3/22/2021	2103701	TO-15, TO-15 SIM
SG60-SG032221	GS	3/22/2021	2103701	TO-15, TO-15 SIM
FD01-SG032321	GS	3/23/2021	2103703	TO-15, TO-15 SIM
MW23-SG032321-135	GS	3/23/2021	2103700	TO15
MW28-SG032321-118	GS	3/23/2021	2103702	TO-15, TO-15 SIM
MW28-SG032321-24	GS	3/23/2021	2103702	TO-15, TO-15 SIM
MW28-SG032321-48	GS	3/23/2021	2103702	TO-15, TO-15 SIM
SG04-SG032321	GS	3/23/2021	2103725	TO-15, TO-15 SIM
SG05-SG032321	GS	3/23/2021	2103725	TO-15, TO-15 SIM
SG06-SG032321	GS	3/23/2021	2103725	TO-15, TO-15 SIM
SG08-SG032321	GS	3/23/2021	2103703	TO-15, TO-15 SIM
SG10-SG032321	GS	3/23/2021	2103703	TO-15, TO-15 SIM
SG11-SG032321	GS	3/23/2021	2103702	TO-15, TO-15 SIM
SG13-SG032321	GS	3/23/2021	2103703	TO-15, TO-15 SIM
SG50-SG032321	GS	3/23/2021	2103725	TO-15, TO-15 SIM
SG55-SG032321	GS	3/23/2021	2103700	TO-15, TO-15 SIM
FD02-SG032421	GS	3/24/2021	2103752	TO-15, TO-15 SIM
MW25-SG032421-28	GS	3/24/2021	2103753	TO-15, TO-15 SIM
SG49-SG032421	GS	3/24/2021	2103753	TO-15, TO-15 SIM
VP02-SG032421	GS	3/24/2021	2103753	TO-15, TO-15 SIM
VP04-SG032421	GS	3/24/2021	2103751	TO15
VP06-SG032421	GS	3/24/2021	2103753	TO-15, TO-15 SIM
VP08-SG032421	GS	3/24/2021	2103752	TO-15, TO-15 SIM
VP09-SG032421	GS	3/24/2021	2103754R1	TO-15, TO-15 SIM
VP10-SG032421	GS	3/24/2021	2103754R1	TO-15, TO-15 SIM
VP11-SG032421	GS	3/24/2021	2103754R1	TO-15, TO-15 SIM
VP12-SG032421	GS	3/24/2021	2103754R1	TO-15, TO-15 SIM
VP13-SG032421	GS	3/24/2021	2103752	TO-15, TO-15 SIM
VP14-SG032421	GS	3/24/2021	2103751	TO-15, TO-15 SIM
VP15-SG032421	GS	3/24/2021	2103751	TO15
VP17-SG032421	GS	3/24/2021	2103751	TO-15, TO-15 SIM
VP19-SG032421	GS	3/24/2021	2103752	TO-15, TO-15 SIM
FD03-SG032421	GS	3/24/2021	2103816	TO15
MW25-SG032421-100	GS	3/24/2021	2103816	TO-15, TO-15 SIM
FD04-SG032521	GS	3/25/2021	2103815	TO-15, TO-15 SIM
MW24-SG032521-104	GS	3/25/2021	2103817	TO-15, TO-15 SIM
MW24-SG032521-130	GS	3/25/2021	2103817	TO-15, TO-15 SIM
MW24-SG032521-60	GS	3/25/2021	2103818	TO-15, TO-15 SIM
MW29-SG032521-42	GS	3/25/2021	2103814	TO-15, TO-15 SIM
MW29-SG032521-66	GS	3/25/2021	2103815	TO-15, TO-15 SIM
MW29-SG032521-98	GS	3/25/2021	2103817	TO-15, TO-15 SIM
SB42-SG032521-13	GS	3/25/2021	2103815	TO-15, TO-15 SIM
SB42-SG032521-17	GS	3/25/2021	2103815	TO-15, TO-15 SIM
SB42-SG032521-26	GS	3/25/2021	2103814	TO-15, TO-15 SIM
SB42-SG032521-7	GS	3/25/2021	2103817	TO-15, TO-15 SIM
SB43-SG032521-15	GS	3/25/2021	2103814	TO-15, TO-15 SIM

Table 3-1
Sample List and Analysis
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

Field Sample ID	Matrix	Date Sampled	Laboratory SDG	Method
SB43-SG032521-8	GS	3/25/2021	2103814	TO-15, TO-15 SIM
FD05-SG032621	GS	3/26/2021	2103818	TO-15, TO-15 SIM
MW24-SG032621-32	GS	3/26/2021	2103818	TO-15, TO-15 SIM

Acronyms:
AA - ambient air
AI - indoor air
EPA - United States Environmental Protection Agency
GS - soil gas
ID - identification
SDG - sample delivery group
TO-15 - Modified EPA Method TO-15 for volatile organic compounds
TO-15 SIM - Modified EPA Method TO-15 for volatile organic compounds by selective ion monitoring (SIM)

Section 4
Data Validation Procedures

For this QCSR, there were 15 laboratory sample delivery groups (SDGs) evaluated. Qualified CDM Smith data validators not associated with project sampling activities validated the data reported in the 15 SDGs. Data validation was performed in accordance with specified analytical methods and performance criteria outlined in the QAPP (CDM Smith 2020a), EPA's *National Functional Guidelines for Organic Superfund Methods Data Review* (EPA 2017), and EPA's *Analysis of Volatile Organic Compounds (VOCs) in Air Contained in Canisters by Method TO-15* (EPA 2014). Validation reports were prepared and are presented in **Attachment 1**. The following SDG data packages were validated:

- SDG 2103700
- SDG 2103701
- SDG 2103702
- SDG 2103703
- SDG 2103725
- SDG 2103751
- SDG 2103752
- SDG 2103753
- SDG 2103754
- SDG 2103813
- SDG 2103814
- SDG 2103815
- SDG 2103816
- SDG 2103817
- SDG 2103818 (MW24-SG032521-60, MW24-SG032621-32, FD05-SG032621 only)

Table 4-1 presents the results that were qualified and the reasons for the qualifications. Qualifiers applied are defined as follows:

- J → Result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

- U → Analyte was analyzed for but was not detected above the level of the sample method reporting limit (MRL).
- UJ → Analyte was analyzed for but was not detected above the level of the sample MRL. The MRL is approximate.

Table 4-1
Qualification Summary
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

Field Sample ID	Lab SDG	Method	Analyte	CAS #	Final Result	Unit	Validation Qualifier	Interpreted Qualifier	Qualifier Reason
B6-IA06-IA032521	2103813	TO15	Allyl Chloride	107-05-1	2.3	µg/m^3	UJ	UJ	ICV
B6-IA06-IA032521	2103813	TO15	4-Methyl-2-Pentanone (MIBK)	108-10-1	0.61	µg/m^3	U-RL	U	LB
B6-IA06-IA032521	2103813	TO15	Methylene Chloride	75-09-2	1	µg/m^3	U-RL	U	LB
B6-IA06-IA032521	2103813	TO15	Isopropylbenzene	98-82-8	0.73	µg/m^3	U-RL	U	LB
B6-IA08-IA032521	2103816	TO15SIM	1,2-Dichloroethane	107-06-2	0.13	µg/m^3	U-RL	U	LB
B6-IA08-IA032521	2103816	TO15	Trichlorofluoromethane	75-69-4	1.3	µg/m^3	J	J	ICV
B6-IA08-IA032521	2103816	TO15SIM	Trichloroethene	79-01-6	0.18	µg/m^3	U-RL	U	LB
B6-OA01-OA032521	2103816	TO15SIM	1,2-Dichloroethane	107-06-2	0.12	µg/m^3	U-RL	U	LB
B6-OA01-OA032521	2103816	TO15	Trichlorofluoromethane	75-69-4	1.4	µg/m^3	J	J	ICV
B6-OA01-OA032521	2103816	TO15SIM	Trichloroethene	79-01-6	0.16	µg/m^3	U-RL	U	LB
B7-IA02-IA032521	2103813	TO15	Allyl Chloride	107-05-1	2.4	µg/m^3	UJ	UJ	ICV
B7-IA02-IA032521	2103813	TO15	4-Methyl-2-Pentanone (MIBK)	108-10-1	0.62	µg/m^3	U-RL	U	LB
B7-IA05-IA032521	2103813	TO15	Allyl Chloride	107-05-1	2.3	µg/m^3	UJ	UJ	ICV
B7-IA05-IA032521	2103813	TO15	Methylene Chloride	75-09-2	1	µg/m^3	U-RL	U	LB
FD01-IA032521	2103813	TO15	Allyl Chloride	107-05-1	2.4	µg/m^3	UJ	UJ	ICV
FD01-SG032321	2103703	TO15	Allyl Chloride	107-05-1	2.2	µg/m^3	UJ	UJ	ICV
FD02-SG032421	2103752	TO15	Trichlorofluoromethane	75-69-4	2	µg/m^3	J	J	ICV
FD03-SG032421	2103816	TO15	Trichlorofluoromethane	75-69-4	32	µg/m^3	J	J	ICV
FD04-SG032521	2103815	TO15	Trichlorofluoromethane	75-69-4	2	µg/m^3	J	J	ICV
FD05-SG032621	2103818	TO15	Trichlorofluoromethane	75-69-4	18	µg/m^3	J	J	ICV
FD05-SG032621	2103818	TO15SIM	Trichloroethene	79-01-6	1.6	µg/m^3	U-RL	U	LB
MW23-SG032321-135	2103700	TO15	Allyl Chloride	107-05-1	94	µg/m^3	UJ	UJ	ICV
MW23-SG032321-135	2103700	TO15	Acetone	67-64-1	180	µg/m^3	U-RL	U	LB
MW24-SG032521-104	2103817	TO15	Trichlorofluoromethane	75-69-4	41	µg/m^3	J	J	ICV
MW24-SG032521-130	2103817	TO15	Trichlorofluoromethane	75-69-4	24	µg/m^3	J	J	ICV
MW24-SG032521-130	2103817	TO15SIM	Trichloroethene	79-01-6	0.75	µg/m^3	U-RL	U	LB
MW24-SG032521-60	2103818	TO15	Trichlorofluoromethane	75-69-4	20	µg/m^3	J	J	ICV
MW24-SG032621-32	2103818	TO15	Trichlorofluoromethane	75-69-4	18	µg/m^3	J	J	ICV
MW24-SG032621-32	2103818	TO15SIM	Trichloroethene	79-01-6	1.5	µg/m^3	U-RL	U	LB
MW25-SG032421-100	2103816	TO15	Trichlorofluoromethane	75-69-4	170	µg/m^3	J	J	ICV
MW25-SG032421-28	2103753	TO15	Allyl Chloride	107-05-1	4.7	µg/m^3	UJ	UJ	LCS, ICV
MW27-SG032221-113	2103701	TO15	Allyl Chloride	107-05-1	92	µg/m^3	UJ	UJ	ICV

Table 4-1
Qualification Summary
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

Field Sample ID	Lab SDG	Method	Analyte	CAS #	Final Result	Unit	Validation Qualifier	Interpreted Qualifier	Qualifier Reason
MW27-SG032221-113	2103701	TO15	Acetone	67-64-1	170	µg/m^3	U-RL	U	LB
MW27-SG032221-28	2103701	TO15	Allyl Chloride	107-05-1	95	µg/m^3	UJ	UJ	ICV
MW27-SG032221-28	2103701	TO15	1,2,4-Trichlorobenzene	120-82-1	220	µg/m^3	UJ	UJ	CCV
MW28-SG032321-118	2103702	TO15	Allyl Chloride	107-05-1	26	µg/m^3	UJ	UJ	ICV
MW28-SG032321-24	2103702	TO15	Allyl Chloride	107-05-1	22	µg/m^3	UJ	UJ	ICV
MW28-SG032321-24	2103702	TO15	Acetone	67-64-1	33	µg/m^3	U-RL	U	LB
MW28-SG032321-24	2103702	TO15SIM	1,1,1-Trichloroethane	71-55-6	1.5	µg/m^3	U-RL	U	LB
MW28-SG032321-48	2103702	TO15	Allyl Chloride	107-05-1	22	µg/m^3	UJ	UJ	ICV
MW29-SG032521-42	2103814	TO15	Trichlorofluoromethane	75-69-4	4.7	µg/m^3	J	J	ICV
MW29-SG032521-66	2103815	TO15SIM	1,2-Dichloroethane	107-06-2	0.26	µg/m^3	U-RL	U	LB
MW29-SG032521-66	2103815	TO15	Trichlorofluoromethane	75-69-4	3.8	µg/m^3	J	J	ICV
MW29-SG032521-98	2103817	TO15	Trichlorofluoromethane	75-69-4	13	µg/m^3	J	J	ICV
SB42-SG032521-13	2103815	TO15	Trichlorofluoromethane	75-69-4	1.9	µg/m^3	J	J	ICV
SB42-SG032521-17	2103815	TO15	Trichlorofluoromethane	75-69-4	2	µg/m^3	J	J	ICV
SB42-SG032521-26	2103814	TO15	Trichlorofluoromethane	75-69-4	2.5	µg/m^3	J	J	ICV
SB42-SG032521-7	2103817	TO15	Trichlorofluoromethane	75-69-4	1.5	µg/m^3	J	J	ICV
SB43-SG032521-15	2103814	TO15	Trichlorofluoromethane	75-69-4	2.1	µg/m^3	J	J	ICV
SB43-SG032521-8	2103814	TO15	Trichlorofluoromethane	75-69-4	1.6	µg/m^3	J	J	ICV
SB43-SG032521-8	2103814	TO15SIM	Trichloroethene	79-01-6	0.17	µg/m^3	U-RL	U	LB
SG03-SG032221	2103701	TO15	Allyl Chloride	107-05-1	25	µg/m^3	UJ	UJ	ICV
SG03-SG032221	2103701	TO15SIM	1,1,1-Trichloroethane	71-55-6	1.7	µg/m^3	U-RL	U	LB
SG04-SG032321	2103725	TO15	Allyl Chloride	107-05-1	5.6	µg/m^3	UJ	UJ	ICV
SG04-SG032321	2103725	TO15	Acetone	67-64-1	8.5	µg/m^3	U-RL	U	LB
SG04-SG032321	2103725	TO15SIM	1,1,1-Trichloroethane	71-55-6	0.39	µg/m^3	U-RL	U	LB
SG05-SG032321	2103725	TO15	Allyl Chloride	107-05-1	24	µg/m^3	UJ	UJ	ICV
SG05-SG032321	2103725	TO15	Acetone	67-64-1	36	µg/m^3	U-RL	U	LB
SG05-SG032321	2103725	TO15SIM	1,1,1-Trichloroethane	71-55-6	1.7	µg/m^3	U-RL	U	LB
SG06-SG032321	2103725	TO15	Allyl Chloride	107-05-1	23	µg/m^3	UJ	UJ	ICV
SG06-SG032321	2103725	TO15	Acetone	67-64-1	35	µg/m^3	U-RL	U	LB
SG06-SG032321	2103725	TO15SIM	1,1,1-Trichloroethane	71-55-6	1.6	µg/m^3	U-RL	U	LB
SG08-SG032321	2103703	TO15	Allyl Chloride	107-05-1	7.8	µg/m^3	UJ	UJ	ICV
SG08-SG032321	2103703	TO15	Acetone	67-64-1	12	µg/m^3	U-RL	U	LB

Table 4-1
Qualification Summary
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

Field Sample ID	Lab SDG	Method	Analyte	CAS #	Final Result	Unit	Validation Qualifier	Interpreted Qualifier	Qualifier Reason
SG08-SG032321	2103703	TO15SIM	1,1,1-Trichloroethane	71-55-6	0.54	µg/m^3	U-RL	U	LB
SG10-SG032321	2103703	TO15	Allyl Chloride	107-05-1	2.3	µg/m^3	UJ	UJ	ICV
SG10-SG032321	2103703	TO15	Acetone	67-64-1	3.6	µg/m^3	U-RL	U	LB
SG11-SG032321	2103702	TO15	Allyl Chloride	107-05-1	5.6	µg/m^3	UJ	UJ	ICV
SG11-SG032321	2103702	TO15	Acetone	67-64-1	8.6	µg/m^3	U-RL	U	LB
SG11-SG032321	2103702	TO15SIM	1,1,1-Trichloroethane	71-55-6	0.39	µg/m^3	U-RL	U	LB
SG13-SG032321	2103703	TO15	Allyl Chloride	107-05-1	2.4	µg/m^3	UJ	UJ	ICV
SG13-SG032321	2103703	TO15SIM	1,1,1-Trichloroethane	71-55-6	0.16	µg/m^3	U-RL	U	LB
SG49-SG032421	2103753	TO15	Allyl Chloride	107-05-1	2.4	µg/m^3	UJ	UJ	LCS, ICV
SG49-SG032421	2103753	TO15SIM	1,1,1-Trichloroethane	71-55-6	0.16	µg/m^3	U-RL	U	LB
SG50-SG032321	2103725	TO15	Allyl Chloride	107-05-1	3.8	µg/m^3	UJ	UJ	ICV
SG50-SG032321	2103725	TO15	Acetone	67-64-1	5.7	µg/m^3	U-RL	U	LB
SG50-SG032321	2103725	TO15SIM	1,1,1-Trichloroethane	71-55-6	0.26	µg/m^3	U-RL	U	LB
SG55-SG032321	2103700	TO15	Allyl Chloride	107-05-1	2.2	µg/m^3	UJ	UJ	ICV
SG55-SG032321	2103700	TO15	4-Methyl-2-Pentanone (MIBK)	108-10-1	0.58	µg/m^3	U-RL	U	LB
SG60-SG032221	2103701	TO15	Allyl Chloride	107-05-1	2.3	µg/m^3	UJ	UJ	ICV
SG60-SG032221	2103701	TO15SIM	1,1,1-Trichloroethane	71-55-6	0.16	µg/m^3	U-RL	U	LB
VP02-SG032421	2103753	TO15	Allyl Chloride	107-05-1	5.9	µg/m^3	UJ	UJ	LCS, ICV
VP02-SG032421	2103753	TO15	Methylene Chloride	75-09-2	2.6	µg/m^3	U-RL	U	LB
VP04-SG032421	2103751	TO15	Allyl Chloride	107-05-1	190	µg/m^3	UJ	UJ	ICV
VP06-SG032421	2103753	TO15	Allyl Chloride	107-05-1	2.2	µg/m^3	UJ	UJ	LCS, ICV
VP06-SG032421	2103753	TO15	4-Methyl-2-Pentanone (MIBK)	108-10-1	0.58	µg/m^3	U-RL	U	LB
VP08-SG032421	2103752	TO15	Trichlorofluoromethane	75-69-4	4.8	µg/m^3	J	J	ICV
VP09-SG032421	2103754R1	TO15	Allyl Chloride	107-05-1	8.2	µg/m^3	UJ	UJ	ICV
VP09-SG032421	2103754R1	TO15	Trichlorofluoromethane	75-69-4	2.2	µg/m^3	J	J	ICV
VP10-SG032421	2103754R1	TO15	Allyl Chloride	107-05-1	2.4	µg/m^3	UJ	UJ	ICV
VP10-SG032421	2103754R1	TO15SIM	1,2-Dichloroethane	107-06-2	0.12	µg/m^3	U-RL	U	LB
VP10-SG032421	2103754R1	TO15	Trichlorofluoromethane	75-69-4	0.84	µg/m^3	J	J	ICV
VP10-SG032421	2103754R1	TO15SIM	Trichloroethene	79-01-6	0.16	µg/m^3	U-RL	U	LB
VP11-SG032421	2103754R1	TO15	Allyl Chloride	107-05-1	12	µg/m^3	UJ	UJ	ICV
VP11-SG032421	2103754R1	TO15	Trichlorofluoromethane	75-69-4	1.9	µg/m^3	J	J	ICV
VP12-SG032421	2103754R1	TO15	Allyl Chloride	107-05-1	2.4	µg/m^3	UJ	UJ	ICV

Table 4-1
Qualification Summary
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

Field Sample ID	Lab SDG	Method	Analyte	CAS #	Final Result	Unit	Validation Qualifier	Interpreted Qualifier	Qualifier Reason
VP12-SG032421	2103754R1	TO15	Trichlorofluoromethane	75-69-4	1.2	µg/m^3	J	J	ICV
VP13-SG032421	2103752	TO15	Trichlorofluoromethane	75-69-4	1.9	µg/m^3	J	J	ICV
VP13-SG032421	2103752	TO15SIM	Trichloroethene	79-01-6	0.33	µg/m^3	U-RL	U	LB
VP14-SG032421	2103751	TO15	Allyl Chloride	107-05-1	2.5	µg/m^3	UJ	UJ	ICV
VP14-SG032421	2103751	TO15	4-Methyl-2-Pentanone (MIBK)	108-10-1	0.65	µg/m^3	U-RL	U	LB
VP14-SG032421	2103751	TO15	Methylene Chloride	75-09-2	1.1	µg/m^3	U-RL	U	LB
VP15-SG032421	2103751	TO15	Allyl Chloride	107-05-1	180	µg/m^3	UJ	UJ	ICV
VP17-SG032421	2103751	TO15	Allyl Chloride	107-05-1	12	µg/m^3	UJ	UJ	ICV
VP17-SG032421	2103751	TO15	Acetone	67-64-1	18	µg/m^3	U-RL	U	LB
VP17-SG032421	2103751	TO15	Methylene Chloride	75-09-2	5.4	µg/m^3	U-RL	U	LB
VP19-SG032421	2103752	TO15SIM	1,2-Dibromoethane	106-93-4	0.56	µg/m^3	U-RL	U	LB
VP19-SG032421	2103752	TO15SIM	1,2-Dichloroethane	107-06-2	0.12	µg/m^3	U-RL	U	LB
VP19-SG032421	2103752	TO15	Trichlorofluoromethane	75-69-4	0.8	µg/m^3	J	J	ICV
VP19-SG032421	2103752	TO15SIM	Trichloroethene	79-01-6	0.16	µg/m^3	U-RL	U	LB

Acronyms:

µg/m^3 - microgram per cubic meter
SDG - sample delivery group
CAS - chemical abstract service
CCV - continuing calibration verification
EPA - United States Environmental Protection Agency
ICV - initial calibration verification
ID - identification
LB - laboratory blank criteria
LCS - laboratory control sample criteria
J - estimated
U - nondetect
UJ - estimated nondetect result
U-RL - result is qualified as nondetect at the reporting limit value
TO-15 - Modified EPA Method TO-15 for volatile organic compounds
TO-15 SIM - Modified EPA Method TO-15 for volatile organic compounds by selective ion monitoring (SIM)

Section 5
Data Quality Indicators

This section summarizes the validation performed and the overall quality of the data. The validation reports are provided in **Attachment 1**.

Achievement of the DQO regarding data usability was determined by the use of DQIs. These DQIs are expressed in terms of PARCCS. The DQIs provide a mechanism to evaluate and measure data quality throughout the project. These criteria are defined in **Table 5-1** and in the following subsections.

5.1 Precision

Precision is a quantitative term that estimates the reproducibility of a set of replicate measurements under a given set of conditions. It is defined as a measurement of mutual agreement between measurements of the same property and is expressed in terms of relative percent difference (RPD) between duplicate determinations.

RPD is calculated as follows:

$$\mathbf{RPD = absolute\ value\ [(C1 - C2)/\{(C1 + C2)/2)\}] \times 100\%}$$

Where:

C1 = concentration of primary sample
C2 = concentration of duplicate sample

Field and analytical precision were determined from review of the field duplicate results, LCS/laboratory control sample duplicate (LCSDs), and laboratory duplicates. The duplicate sample results were compared after calculating their RPDs. Field duplicate samples were collected in the same manner as the original samples but collected in separate individual containers, given separate sample identifiers, and treated as unique samples by the laboratory.

Table 5-2 presents the field duplicate sample results for the air data. A control limit of 40 percent (%) RPD was used for both the soil gas and indoor air field duplicate samples when both sample concentrations were greater than five times the MRL. If the sample concentrations were below five times the MRL, the absolute difference between the samples is calculated; if that value is below the MRL, no qualification is required. Laboratory RPDs are specific to the QC parameter. RPD results are summarized below:

- Field duplicate RPDs or absolute criteria results were within control limits.
- LCS/LCSD RPDs were within control limits.
- Laboratory duplicate RPDs or absolute criteria were within control limits.

No field or laboratory issues were identified from the RPD results outside criteria; the exceedances are reasonable for this type of sampling activity.

5.2 Accuracy

Accuracy is the degree of agreement of a measurement with an accepted reference or true value and is a measure of the bias in a system. Two different metrics are evaluated to assess result accuracy: calculation of percent recovery (%R) for spiked analytes with known concentrations and review of blank results for cross-contamination.

5.2.1 Percent Recovery

Accuracy of the data was assessed by comparing recoveries of LCSs, calibration standards, surrogates, and internal standards. Accuracy is expressed as %R, which is calculated as:

$$\textbf{Percent Recovery} = \frac{\textbf{(Total Analyte Found – Analyte Originally Present)} \times 100}{\textbf{Analyte Added}}$$

Analytical accuracy for the entire data collection activity is difficult to measure because several sources of error exist. Errors can be introduced by any of the following:

- Sampling procedure and duration of sampling
- Field contamination
- Sample preservation and handling
- Sample matrix
- Sample preparation
- Analytical techniques

Accuracy is maintained by adhering to the laboratory method and approved field and analytical standard operating procedures.

The following is a summary of the accuracy parameters reviewed and the resulting qualifications for the data collected:

LCS/LCSD %Rs

The following SDGs had one or more LCS/LCSD %Rs that were outside of criteria. The associated analytes were either qualified as estimated or did not require qualification:

- SDGs 2103700, 2103701, 2103702, 2103703, 2103725, 2103751, 2103753, 2103813: allyl chloride (3-chloropropene) - Recoveries were greater than the acceptable criteria. Qualification is required for detected results only. Associated allyl chloride results were nondetect and did not require qualification.

Calibration %Rs, Percent Differences, and Relative Standard Deviations

The following SDGs had one or more calibration %Rs, percent differences (%Ds), and or relative standard deviation (RSDs) that were outside of criteria. The associated analytes were qualified as estimated:

- SDGs 2103700, 2130701, 2103702, 2103703, 2103725, 2103751, 2103753, 2103813: allyl chloride (3-chloropropene) (145.44 %R) – associated results qualified as estimated "J/UJ"
- SDGs 2103752, 2103814, 2103815, 2103816, 2103817, 2103818: trichlorofluoromethane (Freon 11) (130.34 %R) – associated results qualified as estimated "J/UJ"
- SDG 2103701: allyl chloride (3-chloropropene) (145.44), 1,2,4-trichlorobenzene (31.58) – associated results qualified as estimated "J/UJ"
- SDG 2103754R1: allyl chloride (3-chloropropene) (145.44 %R), trichlorofluoromethane (Freon 11) (130.34 %R) – associated results qualified as estimated "J/UJ"

Surrogates, Tunes, Internal Standards

- Surrogate results were within criteria.
- Tune results were within criteria.
- Internal standard results were within criteria.

Sample preservation, sample handling, holding times, canister pressure, and canister certification are additional measures of accuracy of the data. All sample handling information, holding times, canister pressure readings, and canister certification results were acceptable for both the indoor and soil gas air samples.

5.2.2 Blank Contamination

Blanks are used to determine the level of laboratory and field contamination introduced into the samples, independent of the level of target analytes found in the sample source. Sources of sample contamination can include the containers and equipment used to collect the sample, preservatives added to the sample, laboratory sample storage refrigerators, standards and solutions used to calibrate instruments, glassware and reagents used to process samples, airborne contamination in the laboratory preparation area, and the analytical instrument sample introduction equipment. Each analyte group has its own particular suite of common laboratory contaminants. Active measures must be performed to continually measure the ambient contamination level, and steps must be taken to discover the source of the contamination to eliminate or minimize the levels. Random spot contamination can also occur from analytes that are not common laboratory problems but arise as a problem for a specific project or over a short period. Field blanks, equipment blanks, trip blanks, and laboratory method blanks are analyzed to identify possible sources of contamination. No field blanks or trip blanks were collected during the March 2021 sampling event as indicated in the QAPP (CDM Smith 2020a).

The following text discusses validation actions required as a result of laboratory blank contamination. Associated sample results were qualified as nondetect "U" at the MRL.

- SDG 2103700 – acetone, 4-methyl-2-pentanone
- SDGs 2103701, 2103702, 2103703, 2103725 – acetone, 1,1,1-trichloroethane
- SDG 2103751 – 4-methyl-2-pentanone, acetone, methylene chloride
- SDG 2103752 – 1,2-dichloroethane, 1,2-dibromoethane, trichloroethene
- SDG 2103753 – 4-methyl-2-pentanone, methylene chloride, 1,1,1-trichloroethane
- SDGs 2103754, 2103816 – 1,2-dichloroethane, trichloroethene
- SDG 2103813 – 4-methyl-2-pentanone, methylene chloride, isopropylbenzene (cumene)
- SDGs 2103814, 2103817, 2103818 – trichloroethene
- SDG 2103815 – 1,2-dichloroethane

Ideally, no contaminants should be found in the blank samples. Blank samples are used to determine the validity of the analytical results by determining the existence and magnitude of contamination resulting from laboratory (or field) activities or baseline drift during analysis. As discussed above, analytes were detected in some of the laboratory blank samples. Concentrations were below the MRLs for all detected blank results. Analytes detected in laboratory blanks are common with laboratory analyses and are almost unavoidable.

Associated sample results for the laboratory blanks were qualified following the appropriate guidelines. Detected blank concentrations were below the MRLs and the resulting sample qualifications as nondetect or "U" does not falsely diminish identification of site-related contaminants.

5.3 Representativeness

Representativeness is a qualitative term that expresses the degree to which the sample data accurately and precisely represent the environmental conditions corresponding to the location and/or depth interval of sample collection. Requirements and procedures for sample collection were designed to maximize sample representativeness.

Representativeness can be monitored by reviewing field documentation and/or performing field audits. For this report, a detailed review was performed on the COC and field data collection forms. Appropriate laboratory QA/QC requirements were described in the QAPP (CDM Smith 2020a) and laboratory statement of work to confirm that the laboratory analytical results were representative of true field conditions.

Field sampling representativeness was attained through strict adherence to the sampling design (CDM Smith 2020b, 2021b) and the approved QAPP (CDM Smith 2020a) procedures and by using EPA-approved analytical methods for sample analyses. As a result, the data represents as near as possible the actual field conditions at the time of sampling.

Representativeness, as defined above, was met for the fieldwork and laboratory analyses. The data collected are suitable for project use.

5.4 Comparability

Comparability is a qualitative term that expresses the confidence with which a data set can be compared with another. Strict adherence to standard sample collection procedures, analytical detection limits, and analytical methods is necessary so that data from similar samples and sample conditions are comparable. This comparability is independent of laboratory personnel, data reviewers, or sampling personnel. Comparability criteria are met for the project if, based on data review, the sample collection and analytical procedures used are similar and are determined to have been followed.

To achieve comparability of data generated for the Site, CDM Smith followed standard sample collection procedures and EPA-approved analytical methods during sampling activities. The sample analyses were performed by Eurofins using approved standard operating procedures and reporting units. Using such procedures and methods enables the current data to be comparable to future data sets generated with similar methods and units.

5.5 Completeness

Completeness of the field program is defined as the percentage of samples planned for collection, as listed in the Remedial Investigation Work Plan (RIWP) (CDM Smith 2020b) and Planning Memorandum (CDM Smith 2021b), versus the actual number of samples collected during the field program (see equation A).

Completeness for acceptable data is defined as the percentage of acceptable data obtained judged to be valid versus the total quantity of data generated (see equation B). Acceptable data include both data that pass all the QC criteria (unqualified data) and data that may not pass all the QC criteria but had appropriate corrective actions taken (qualified but usable data).

A. $$\%\text{Completeness} = C_x \frac{100}{n}$$

Where:

C = actual number of samples collected
n = total number of samples planned

B. $$\%\text{Completeness} = V_x \frac{100}{n'}$$

Where:

V = number of measurements judged valid
n' = total number of measurements made

The overall completeness goal for this sampling event was 90% for all project data.

All samples outlined in the RIWP (CDM Smith 2020b) and planning memorandum (CDM Smith 2021) were collected as planned to meet specific sampling activity objectives except as discussed in Section 3. The locations that were sampled are adequate for evaluation of the extent of subsurface VOC impacts at the site to meet DQOs. The completeness for the number of samples planned to be collected versus the number of samples collected was 93% which meets the DQO of 90%.

Analyses for the sampling event exceeded the 90% completeness goal of acceptable data for the number of measurements judged to be valid versus the total number of measurements made.

One hundred percent of the data validated and reported are suitable for their intended use for site characterization. No results were rejected, and all data collected met the overall project objective for data usability. The completeness goals were met for both the number of samples collected for all sampling events and the number of measurements judged to be valid.

The data usability DQO was achieved; the data reported are suitable for their intended use as stated in the QAPP (CDM Smith 2020a) and RIWP (CDM Smith 2020b). The achievement of the completeness goals for the data provides sufficient data for project decisions.

5.6 Sensitivity

Sensitivity is related to the ability to compare analytical results with project-specific levels of interest such as delineation levels or action levels. Analytical quantitation limits for the various sample analytes should be below the level of interest to allow an effective comparison.

The method detection limit (MDL) study attempts to answer the question, “What is the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero?” The study is based upon repetitive analysis of an interference-free sample spiked with a known amount of the target analyte. The MDL is a measure of the ability of the test procedure to generate a positive response for the target analyte in the absence of any other interferences from the sample.

The MRL is generally defined as the lowest concentration at which an analyte can be confidently reported in a sample and its concentration reported with a reasonable degree of accuracy and precision. For samples that do not pose a particular matrix problem, the MRL is typically about three to five times higher than the MDL.

Laboratory results are reported according to rules that provide established certainty of detection. The result for an analyte is flagged with a "U" if that analyte was not detected and reported at the MRL value or qualified with a "J" flag if associated QC results fall outside the appropriate QC criteria. Additionally, if an analyte is present at a concentration between the MDL and the MRL, the analytical result is flagged with a "J," indicating an estimated quantity. Qualifying the result as an estimated concentration reflects uncertainty in the reported value.

When required, dilutions were performed and accounted for in the reported MRLs. Due to these required dilutions some nondetect MRL values exceeded the soil gas risk based screening levels for a few of the soil gas samples. These included analytes, 1,1,2,2-tetrachloroethane, 1,1,2-

trichloroethane, 1,2,4-trichlorobenzene, 1,2-dibromoethane, 1,2-dichloroethane, 1,4-dichlorobenzene, 1,4-dioxane, bromodichloromethane, and carbon tetrachloride.

For some of the indoor air samples, nondetect results were greater than the indoor air risk based screening levels which included 1,1,2,2-tetrachloroethane, 1,2-dibromoethane, and bromodichloromethane. However, these analytes are not a known constituent of potential concern for the site. All MRLs were below the Indoor Air Tier 1 and Tier 2 Removal Action Levels.

In the situation where the MRL was above a screening value, the MDL was below the screening value for almost all analytes, (based on dilutions) and as detected results are qualified as estimated between the MDL and MRL, no exceedances of the screening level occurred for the majority of these results. For the remaining analytes, laboratory MRLs were low enough to compare with the project criteria stated in the laboratory statement of work and the QAPP (CDM Smith 2020a).

Table 5-1 DQIs and Corresponding QC Parameters

Data Quality Indicators	QC Parameters Evaluation in Data Review/Validation
Precision	RPD values of: 1) Laboratory duplicates 2) Field duplicates 3) LCS/LCSD RSD values of: 1) Initial calibration verifications
Accuracy/Bias	%R or %D values of: 1) LCS/LCSD %R 2) Initial calibration verification/continuing calibration verification %R 3) Tune check 4) Surrogates 5) Internal standards Results of: 1) Instrument and calibration blanks 2) Method (preparation) blanks 3) Field blanks
Representativeness	Results of all blanks Adherence to field standard operating procedures Sample integrity (COC and sample receipt forms) Holding times
Comparability	Similar reporting limits and units Similar sample collection methods Similar laboratory analytical methods
Completeness	Data qualifiers Laboratory deliverables Requested/Reported valid results Field sample collection (primary and QC samples) Contract compliance (i.e., method and instrument QC within limits)
Sensitivity	Sample method reporting limits meet QAPP criteria Adequacy of sample dilution

Table 5-2
Summary of Field Duplicate Sampling Results
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

		Location	B6-IA06		B6-IA06		RPD	MW-24		MW-24		RPD
		Sample Name	B6-IA06-IA032521		FD01-IA032521			MW24-SG032621-32		FD05-SG032621		
		Sample Date	3/25/2021		3/25/2021			3/26/2021		3/26/2021		
		Sample Type	N		FD			N		FD		
Method	Analyte	Unit	Result	Q	Result	Q		Result	Q	Result	Q	
TO15	1,1,1-Trichloroethane	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	1,1,2,2-Tetrachloroethane	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	1,1,2-Trichloroethane	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	1,1,2-Trichlorotrifluoroethane (Freon 113)	µg/m^3	0.48	J	0.47	J	ABS Criteria	1.9	J	2	J	ABS Criteria
TO15	1,1-Dichloroethane	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	1,1-Dichloroethene	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	1,2,4-Trichlorobenzene	µg/m^3	5.5	U	5.8	U	NC	53	U	54	U	NC
TO15	1,2,4-Trimethylbenzene	µg/m^3	0.22	J	0.23	J	ABS Criteria	7	U	7.2	U	NC
TO15	1,2-Dibromoethane	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	1,2-Dichlorobenzene	µg/m^3	0.9	U	0.94	U	NC	8.6	U	8.8	U	NC
TO15	1,2-Dichloroethane	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	1,2-Dichloropropane	µg/m^3	0.69	U	0.72	U	NC	6.6	U	6.7	U	NC
TO15	1,2-Dichlorotetrafluoroethane;Fluorocarbon 114	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	1,3,5-Trimethylbenzene	µg/m^3	0.09	J	0.085	J	ABS Criteria	7	U	7.2	U	NC
TO15	1,3-Butadiene	µg/m^3	0.33	U	0.35	U	NC	3.2	U	3.2	U	NC
TO15	1,3-Dichlorobenzene	µg/m^3	0.9	U	0.94	U	NC	8.6	U	8.8	U	NC
TO15	1,4-Dichlorobenzene	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	1,4-Dioxane	µg/m^3	0.54	U	0.16	J	ABS Criteria	5.2	U	5.3	U	NC
TO15	2,2,4-Trimethylpentane	µg/m^3	3.5	U	3.7	U	NC	33	U	34	U	NC
TO15	2-Butanone (MEK)	µg/m^3	0.74	J	0.5	J	ABS Criteria	21	U	22	U	NC
TO15	2-Hexanone	µg/m^3	3	U	3.2	U	NC	29	U	30	U	NC
TO15	4-Ethyltoluene	µg/m^3	0.26	J	0.24	J	ABS Criteria	7	U	7.2	U	NC
TO15	4-Methyl-2-Pentanone (MIBK)	µg/m^3	0.61	U	0.64	U	NC	5.8	U	6	U	NC
TO15	Acetone	µg/m^3	73		61		17.91	34	U	35	U	NC
TO15	Allyl Chloride	µg/m^3	2.3	UJ	2.4	UJ	NC	22	U	23	U	NC
TO15	Benzene	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	Benzyl Chloride	µg/m^3	0.77	U	0.81	U	NC	7.4	U	7.6	U	NC
TO15	Bromodichloromethane	µg/m^3	1	U	1	U	NC	81		80		1.24
TO15	Bromoform	µg/m^3	1.5	U	1.6	U	NC	15	U	15	U	NC
TO15	Bromomethane	µg/m^3	2.9	U	3	U	NC	28	U	28	U	NC
TO15	Carbon Disulfide	µg/m^3	2.3	U	2.4	U	NC	22	U	23	U	NC
TO15	Carbon Tetrachloride	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	Chlorobenzene	µg/m^3	0.68	U	0.023	J	ABS Criteria	6.6	U	6.7	U	NC
TO15	Chloroethane	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	Chloroform	µg/m^3	---	---	---	---	NC	---	---	---	---	NC

Table 5-2
Summary of Field Duplicate Sampling Results
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

		Location	B6-IA06		B6-IA06		RPD	MW-24		MW-24		RPD
		Sample Name	B6-IA06-IA032521		FD01-IA032521			MW24-SG032621-32		FD05-SG032621		
		Sample Date	3/25/2021		3/25/2021			3/26/2021		3/26/2021		
		Sample Type	N		FD			N		FD		
TO15	Chloromethane	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	cis-1,2-Dichloroethene	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	cis-1,3-Dichloropropene	µg/m^3	0.68	U	0.71	U	NC	6.5	U	6.6	U	NC
TO15	Cyclohexane	µg/m^3	2.6	U	2.7	U	NC	25	U	25	U	NC
TO15	Dibromochloromethane	µg/m^3	1.3	U	1.3	U	NC	1.8	J	1.3	J	ABS Criteria
TO15	Dichlorodifluoromethane	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	Ethanol	µg/m^3	180	J	180	J	0.00	27	U	28	U	NC
TO15	Ethylbenzene	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	Hexachloro-1,3-Butadiene	µg/m^3	7.9	U	8.4	U	NC	76	U	78	U	NC
TO15	Hexane	µg/m^3	0.23	J	0.25	J	ABS Criteria	25	U	26	U	NC
TO15	Isopropyl Alcohol (Manufacturing-Strong Acid)	µg/m^3	39		38		2.60	18	U	18	U	NC
TO15	Isopropylbenzene	µg/m^3	0.73	U	0.042	J	ABS Criteria	7	U	7.2	U	NC
TO15	M,P-Xylene	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	Methyl Tert-Butyl Ether	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	Methylene Chloride	µg/m^3	1	U	1.1	U	NC	9.9	U	10	U	NC
TO15	N-Heptane	µg/m^3	0.18	J	0.17	J	ABS Criteria	29	U	30	U	NC
TO15	N-Propylbenzene	µg/m^3	0.068	J	0.066	J	ABS Criteria	7	U	7.2	U	NC
TO15	o-Xylene	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	Styrene	µg/m^3	0.63	U	0.67	U	NC	6.1	U	6.2	U	NC
TO15	Tetrachloroethene	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	Tetrahydrofuran	µg/m^3	0.29	J	0.29	J	ABS Criteria	21	U	22	U	NC
TO15	Toluene	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	Trans-1,2-Dichloroethene	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	Trans-1,3-Dichloropropene	µg/m^3	0.68	U	0.71	U	NC	6.5	U	6.6	U	NC
TO15	Trichloroethene	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	Trichlorofluoromethane (Freon 11)	µg/m^3	1.2		1.2		ABS Criteria	18	J	18	J	ABS Criteria
TO15	Vinyl Chloride	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15SIM	1,1,1-Trichloroethane	µg/m^3	0.16	U	0.17	U	NC	2.1		2		ABS Criteria
TO15SIM	1,1,2,2-Tetrachloroethane	µg/m^3	0.2	U	0.22	U	NC	2	U	2	U	NC
TO15SIM	1,1,2-Trichloroethane	µg/m^3	0.16	U	0.17	U	NC	1.6	U	1.6	U	NC
TO15SIM	1,1-Dichloroethane	µg/m^3	0.12	U	0.13	U	NC	1.2	U	1.2	U	NC
TO15SIM	1,1-Dichloroethene	µg/m^3	0.059	U	0.062	U	NC	0.57	U	0.58	U	NC
TO15SIM	1,2-Dibromoethane	µg/m^3	0.028	J	0.6	U	NC	5.5	U	5.6	U	NC
TO15SIM	1,2-Dichloroethane	µg/m^3	0.083	J	0.086	J	ABS Criteria	1.2	U	1.2	U	NC
TO15SIM	1,2-Dichlorotetrafluoroethane (Freon 114)	µg/m^3	0.1	J	0.1	J	ABS Criteria	0.37	J	0.39	J	ABS Criteria
TO15SIM	1,4-Dichlorobenzene	µg/m^3	0.45	U	0.47	U	NC	4.3	U	4.4	U	NC

Table 5-2
Summary of Field Duplicate Sampling Results
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

		Location	B6-IA06		B6-IA06		RPD	MW-24		MW-24		RPD
		Sample Name	B6-IA06-IA032521		FD01-IA032521			MW24-SG032621-32		FD05-SG032621		
		Sample Date	3/25/2021		3/25/2021			3/26/2021		3/26/2021		
		Sample Type	N		FD			N		FD		
TO15SIM	Benzene	µg/m^3	0.34		0.34		ABS Criteria	0.28	J	0.34	J	ABS Criteria
TO15SIM	Carbon Tetrachloride	µg/m^3	0.46		0.46		ABS Criteria	2.8		2.8		ABS Criteria
TO15SIM	Chloroethane	µg/m^3	0.029	J	0.021	J	ABS Criteria	1.9	U	1.9	U	NC
TO15SIM	Chloroform	µg/m^3	0.15		0.16		ABS Criteria	1200		1200		0.00
TO15SIM	Chloromethane	µg/m^3	0.68	J	0.67	J	ABS Criteria	15	U	15	U	NC
TO15SIM	cis-1,2-Dichloroethene	µg/m^3	0.12	U	0.12	U	NC	1.1	U	1.2	U	NC
TO15SIM	Dichlorodifluoromethane (Freon 12)	µg/m^3	2.3		2.3		0.00	3	J	3	J	ABS Criteria
TO15SIM	Ethylbenzene	µg/m^3	1.5		1.4		6.90	1.2	U	1.3	U	NC
TO15SIM	m/p-Xylene	µg/m^3	8.7		7.7		12.20	2.5	U	2.5	U	NC
TO15SIM	Methyl Tert-Butyl Ether	µg/m^3	0.54	U	0.57	U	NC	5.2	U	5.3	U	NC
TO15SIM	o-Xylene	µg/m^3	2.6		2.3		12.24	1.2	U	1.3	U	NC
TO15SIM	Tetrachloroethene	µg/m^3	0.098	J	0.1	J	ABS Criteria	240		230		4.26
TO15SIM	Toluene	µg/m^3	0.64		0.69		ABS Criteria	2.7	U	2.8	U	NC
TO15SIM	trans-1,2-Dichloroethene	µg/m^3	0.025	J	0.024	J	ABS Criteria	5.7	U	5.8	U	NC
TO15SIM	Trichloroethene	µg/m^3	0.042	J	0.17	U	NC	1.5	U	1.6	U	NC
TO15SIM	Vinyl Chloride	µg/m^3	0.076	U	0.08	U	NC	0.15	J	0.75	U	ABS Criteria

Acronyms

µg/m^3 - microgram per cubic meter
EPA - United States Environmental Protection Agency
FD - field duplicate
J - estimated
N - normal sample
NC - not calculated
Q - qualifier
RPD - relative percent difference
U - nondetect
UJ - estimated nondetect result
ABS Criteria = Sample concentrations less than 5x the reporting limit; absolute difference (ABS) between the two results less than the reporting limit

TO-15 - Modified EPA Method TO-15 for volatile organic compounds
TO-15 SIM - Modified EPA Method TO-15 for volatile organic compounds by selective ion monitoring (SIM)

Table 5-2
Summary of Field Duplicate Sampling Results
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

		Location	SB-42		SB-42		RPD	SG-10		SG-10		RPD
		Sample Name	SB42-SG032521-17		FD04-SG032521			SG10-SG032321		FD01-SG032321		
		Sample Date	3/25/2021		3/25/2021			3/23/2021		3/23/2021		
		Sample Type	N		FD			N		FD		
Method	Analyte	Unit	Result	Q	Result	Q		Result	Q	Result	Q	
TO15	1,1,1-Trichloroethane	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	1,1,2,2-Tetrachloroethane	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	1,1,2-Trichloroethane	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	1,1,2-Trichlorotrifluoroethane (Freon 113)	µg/m^3	5.7	U	5.2	U	NC	0.52	J	0.54	J	ABS Criteria
TO15	1,1-Dichloroethane	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	1,1-Dichloroethene	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	1,2,4-Trichlorobenzene	µg/m^3	28	U	25	U	NC	5.6	U	5.2	U	NC
TO15	1,2,4-Trimethylbenzene	µg/m^3	0.63	J	0.52	J	ABS Criteria	0.54	J	0.52	J	ABS Criteria
TO15	1,2-Dibromoethane	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	1,2-Dichlorobenzene	µg/m^3	4.5	U	4.1	U	NC	0.9	U	0.85	U	NC
TO15	1,2-Dichloroethane	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	1,2-Dichloropropane	µg/m^3	3.4	U	3.1	U	NC	0.69	U	0.65	U	NC
TO15	1,2-Dichlorotetrafluoroethane;Fluorocarbon 114	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	1,3,5-Trimethylbenzene	µg/m^3	3.7	U	3.3	U	NC	0.22	J	0.21	J	ABS Criteria
TO15	1,3-Butadiene	µg/m^3	1.6	U	1.5	U	NC	0.33	U	0.31	U	NC
TO15	1,3-Dichlorobenzene	µg/m^3	4.5	U	4.1	U	NC	0.9	U	0.85	U	NC
TO15	1,4-Dichlorobenzene	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	1,4-Dioxane	µg/m^3	2.7	U	2.4	U	NC	0.32	J	0.51	U	ABS Criteria
TO15	2,2,4-Trimethylpentane	µg/m^3	17	U	16	U	NC	3.5	U	3.3	U	NC
TO15	2-Butanone (MEK)	µg/m^3	11	U	10	U	NC	0.37	J	0.5	J	ABS Criteria
TO15	2-Hexanone	µg/m^3	15	U	14	U	NC	3.1	U	2.9	U	NC
TO15	4-Ethyltoluene	µg/m^3	3.7	U	3.3	U	NC	0.74	U	0.69	U	NC
TO15	4-Methyl-2-Pentanone (MIBK)	µg/m^3	3	U	2.8	U	NC	0.61	U	0.58	U	NC
TO15	Acetone	µg/m^3	18	U	16	U	NC	3.6	U	4.4		ABS Criteria
TO15	Allyl Chloride	µg/m^3	12	U	11	U	NC	2.3	UJ	2.2	UJ	NC
TO15	Benzene	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	Benzyl Chloride	µg/m^3	3.8	U	3.5	U	NC	0.78	U	0.73	U	NC
TO15	Bromodichloromethane	µg/m^3	5	U	4.6	U	NC	0.12	J	0.074	J	ABS Criteria
TO15	Bromoform	µg/m^3	7.7	U	7	U	NC	1.6	U	1.4	U	NC
TO15	Bromomethane	µg/m^3	14	U	13	U	NC	2.9	U	2.7	U	NC
TO15	Carbon Disulfide	µg/m^3	12	U	10	U	NC	0.44	J	0.54	J	ABS Criteria
TO15	Carbon Tetrachloride	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	Chlorobenzene	µg/m^3	3.4	U	3.1	U	NC	0.69	U	0.65	U	NC
TO15	Chloroethane	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	Chloroform	µg/m^3	---	---	---	---	NC	---	---	---	---	NC

Table 5-2
Summary of Field Duplicate Sampling Results
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

		Location	SB-42		SB-42		RPD	SG-10		SG-10		RPD
		Sample Name	SB42-SG032521-17		FD04-SG032521			SG10-SG032321		FD01-SG032321		
		Sample Date	3/25/2021		3/25/2021			3/23/2021		3/23/2021		
		Sample Type	N		FD			N		FD		
TO15	Chloromethane	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	cis-1,2-Dichloroethene	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	cis-1,3-Dichloropropene	µg/m^3	3.4	U	3.1	U	NC	0.68	U	0.64	U	NC
TO15	Cyclohexane	µg/m^3	13	U	12	U	NC	2.6	U	2.4	U	NC
TO15	Dibromochloromethane	µg/m^3	6.3	U	5.8	U	NC	1.3	U	1.2	U	NC
TO15	Dichlorodifluoromethane	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	Ethanol	µg/m^3	14	U	13	U	NC	0.56	J	0.74	J	ABS Criteria
TO15	Ethylbenzene	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	Hexachloro-1,3-Butadiene	µg/m^3	40	U	36	U	NC	8	U	7.5	U	NC
TO15	Hexane	µg/m^3	13	U	12	U	NC	2.6	U	2.5	U	NC
TO15	Isopropyl Alcohol (Manufacturing-Strong Acid)	µg/m^3	9.2	U	8.4	U	NC	0.92	J	1.9		ABS Criteria
TO15	Isopropylbenzene	µg/m^3	3.7	U	3.3	U	NC	0.74	U	0.69	U	NC
TO15	M,P-Xylene	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	Methyl Tert-Butyl Ether	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	Methylene Chloride	µg/m^3	5.2	U	4.7	U	NC	1	U	0.98	U	NC
TO15	N-Heptane	µg/m^3	15	U	14	U	NC	3.1	U	2.9	U	NC
TO15	N-Propylbenzene	µg/m^3	3.7	U	3.3	U	NC	0.74	U	0.69	U	NC
TO15	o-Xylene	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	Styrene	µg/m^3	3.2	U	2.9	U	NC	0.64	U	0.6	U	NC
TO15	Tetrachloroethene	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	Tetrahydrofuran	µg/m^3	11	U	10	U	NC	2.2	U	2.1	U	NC
TO15	Toluene	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	Trans-1,2-Dichloroethene	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	Trans-1,3-Dichloropropene	µg/m^3	3.4	U	3.1	U	NC	0.68	U	0.64	U	NC
TO15	Trichloroethene	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15	Trichlorofluoromethane (Freon 11)	µg/m^3	2	J	2	J	ABS Criteria	1.4		1.4		ABS Criteria
TO15	Vinyl Chloride	µg/m^3	---	---	---	---	NC	---	---	---	---	NC
TO15SIM	1,1,1-Trichloroethane	µg/m^3	0.31	J	0.3	J	ABS Criteria	1.2		1.2		0.00
TO15SIM	1,1,2,2-Tetrachloroethane	µg/m^3	1	U	0.93	U	NC	0.2	U	0.19	U	NC
TO15SIM	1,1,2-Trichloroethane	µg/m^3	0.81	U	0.74	U	NC	0.16	U	0.15	U	NC
TO15SIM	1,1-Dichloroethane	µg/m^3	0.6	U	0.55	U	NC	0.12	U	0.11	U	NC
TO15SIM	1,1-Dichloroethene	µg/m^3	0.3	U	0.27	U	NC	0.059	U	0.056	U	NC
TO15SIM	1,2-Dibromoethane	µg/m^3	2.9	U	2.6	U	NC	0.58	U	0.54	U	NC
TO15SIM	1,2-Dichloroethane	µg/m^3	0.6	U	0.55	U	NC	0.12	U	0.11	U	NC
TO15SIM	1,2-Dichlorotetrafluoroethane (Freon 114)	µg/m^3	1	U	0.95	U	NC	0.1	J	0.11	J	ABS Criteria
TO15SIM	1,4-Dichlorobenzene	µg/m^3	2.2	U	2	U	NC	0.45	U	0.42	U	NC

Table 5-2
Summary of Field Duplicate Sampling Results
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

		Location	SB-42		SB-42		RPD	SG-10		SG-10		RPD
		Sample Name	SB42-SG032521-17		FD04-SG032521			SG10-SG032321		FD01-SG032321		
		Sample Date	3/25/2021		3/25/2021			3/23/2021		3/23/2021		
		Sample Type	N		FD			N		FD		
TO15SIM	Benzene	µg/m^3	0.12	J	0.1	J	ABS Criteria	0.24	U	0.034	J	ABS Criteria
TO15SIM	Carbon Tetrachloride	µg/m^3	0.94	U	0.23	J	ABS Criteria	0.19	U	0.18	U	NC
TO15SIM	Chloroethane	µg/m^3	0.98	U	0.9	U	NC	0.2	U	0.19	U	NC
TO15SIM	Chloroform	µg/m^3	24		24		0.00	39		39		0.00
TO15SIM	Chloromethane	µg/m^3	7.7	U	7	U	NC	0.032	J	1.4	U	NC
TO15SIM	cis-1,2-Dichloroethene	µg/m^3	0.55	J	0.54		ABS Criteria	0.12	U	0.11	U	NC
TO15SIM	Dichlorodifluoromethane (Freon 12)	µg/m^3	3.4		3.3		ABS Criteria	2.4		2.4		0.00
TO15SIM	Ethylbenzene	µg/m^3	0.22	J	0.22	J	ABS Criteria	0.12	J	0.13		ABS Criteria
TO15SIM	m/p-Xylene	µg/m^3	0.53	J	0.53	J	ABS Criteria	0.44		0.44		ABS Criteria
TO15SIM	Methyl Tert-Butyl Ether	µg/m^3	2.7	U	2.4	U	NC	0.54	U	0.51	U	NC
TO15SIM	o-Xylene	µg/m^3	0.24	J	0.24	J	ABS Criteria	0.18		0.17		ABS Criteria
TO15SIM	Tetrachloroethene	µg/m^3	520		500		3.92	3.2		3.2		0.00
TO15SIM	Toluene	µg/m^3	0.2	J	0.15	J	ABS Criteria	0.13	J	0.14	J	ABS Criteria
TO15SIM	trans-1,2-Dichloroethene	µg/m^3	3	U	2.7	U	NC	0.59	U	0.56	U	NC
TO15SIM	Trichloroethene	µg/m^3	6		5.8		3.39	0.16	U	0.022	J	ABS Criteria
TO15SIM	Vinyl Chloride	µg/m^3	0.38	U	0.35	U	NC	0.077	U	0.072	U	NC

Acronyms

µg/m^3 - microgram per cubic meter
EPA - United States Environmental Protection Agency
FD - field duplicate
J - estimated
N - normal sample
NC - not calculated
Q - qualifier
RPD - relative percent difference
U - nondetect
UJ - estimated nondetect result
ABS Criteria = Sample concentrations less than 5x the reporting limit; absolute difference (ABS) between the two results less than the reporting limit

TO-15 - Modified EPA Method TO-15 for volatile organic compounds
TO-15 SIM - Modified EPA Method TO-15 for volatile organic compounds by selective ion monitoring (SIM)

Table 5-2
Summary of Field Duplicate Sampling Results
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

		Location	VP04		VP04		RPD	VP13		VP13		RPD
		Sample Name	VP04-SG032421		FD03-SG032421			VP13-SG032421		FD02-SG032421		
		Sample Date	3/24/2021		3/24/2021			3/24/2021		3/24/2021		
		Sample Type	N		FD			N		FD		
Method	Analyte	Unit	Result	Q	Result	Q		Result	Q	Result	Q	
TO15	1,1,1-Trichloroethane	µg/m^3	83	U	82	U	NC	---	---	---	---	NC
TO15	1,1,2,2-Tetrachloroethane	µg/m^3	100	U	100	U	NC	---	---	---	---	NC
TO15	1,1,2-Trichloroethane	µg/m^3	83	U	82	U	NC	---	---	---	---	NC
TO15	1,1,2-Trichlorotrifluoroethane (Freon 113)	µg/m^3	120	U	120	U	NC	0.95	J	1	J	ABS Criteria
TO15	1,1-Dichloroethane	µg/m^3	62	U	61	U	NC	---	---	---	---	NC
TO15	1,1-Dichloroethene	µg/m^3	60	U	60	U	NC	---	---	---	---	NC
TO15	1,2,4-Trichlorobenzene	µg/m^3	450	U	450	U	NC	11	U	11	U	NC
TO15	1,2,4-Trimethylbenzene	µg/m^3	300	U	300	U	NC	0.11	J	0.1	J	ABS Criteria
TO15	1,2-Dibromoethane	µg/m^3	120	U	120	U	NC	---	---	---	---	NC
TO15	1,2-Dichlorobenzene	µg/m^3	92	U	91	U	NC	1.8	U	1.7	U	NC
TO15	1,2-Dichloroethane	µg/m^3	62	U	61	U	NC	---	---	---	---	NC
TO15	1,2-Dichloropropane	µg/m^3	70	U	70	U	NC	1.4	U	1.3	U	NC
TO15	1,2-Dichlorotetrafluoroethane;Fluorocarbon 114	µg/m^3	110	U	100	U	NC	---	---	---	---	NC
TO15	1,3,5-Trimethylbenzene	µg/m^3	300	U	300	U	NC	1.5	U	1.4	U	NC
TO15	1,3-Butadiene	µg/m^3	34	U	33	U	NC	0.67	U	0.63	U	NC
TO15	1,3-Dichlorobenzene	µg/m^3	92	U	91	U	NC	3.4		3.7		ABS Criteria
TO15	1,4-Dichlorobenzene	µg/m^3	92	U	91	U	NC	---	---	---	---	NC
TO15	1,4-Dioxane	µg/m^3	220	U	220	U	NC	1.1	U	1	U	NC
TO15	2,2,4-Trimethylpentane	µg/m^3	71	U	70	U	NC	7.1	U	6.7	U	NC
TO15	2-Butanone (MEK)	µg/m^3	180	U	180	U	NC	1.3	J	1.6	J	ABS Criteria
TO15	2-Hexanone	µg/m^3	250	U	250	U	NC	6.2	U	5.8	U	NC
TO15	4-Ethyltoluene	µg/m^3	75	U	74	U	NC	1.5	U	1.4	U	NC
TO15	4-Methyl-2-Pentanone (MIBK)	µg/m^3	62	U	62	U	NC	1.2	U	1.2	U	NC
TO15	Acetone	µg/m^3	360	U	360	U	NC	5.7	J	7.5		ABS Criteria
TO15	Allyl Chloride	µg/m^3	190	UJ	190	U	NC	4.8	U	4.5	U	NC
TO15	Benzene	µg/m^3	49	U	48	U	NC	---	---	---	---	NC
TO15	Benzyl Chloride	µg/m^3	79	U	78	U	NC	1.6	U	1.5	U	NC
TO15	Bromodichloromethane	µg/m^3	100	U	100	U	NC	13		14		7.41
TO15	Bromoform	µg/m^3	160	U	160	U	NC	3.1	U	3	U	NC
TO15	Bromomethane	µg/m^3	590	U	590	U	NC	5.9	U	5.6	U	NC
TO15	Carbon Disulfide	µg/m^3	190	U	190	U	NC	4.7	U	4.4	U	NC
TO15	Carbon Tetrachloride	µg/m^3	96	U	95	U	NC	---	---	---	---	NC
TO15	Chlorobenzene	µg/m^3	70	U	70	U	NC	1.4	U	1.3	U	NC
TO15	Chloroethane	µg/m^3	160	U	160	U	NC	---	---	---	---	NC
TO15	Chloroform	µg/m^3	43	J	42	J	ABS Criteria	---	---	---	---	NC

Table 5-2
Summary of Field Duplicate Sampling Results
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

		Location	VP04		VP04		RPD	VP13		VP13		RPD
		Sample Name	VP04-SG032421		FD03-SG032421			VP13-SG032421		FD02-SG032421		
		Sample Date	3/24/2021		3/24/2021			3/24/2021		3/24/2021		
		Sample Type	N		FD			N		FD		
TO15	Chloromethane	µg/m^3	310	U	310	U	NC	---	---	---	---	NC
TO15	cis-1,2-Dichloroethene	µg/m^3	60	U	60	U	NC	---	---	---	---	NC
TO15	cis-1,3-Dichloropropene	µg/m^3	69	U	68	U	NC	1.4	U	1.3	U	NC
TO15	Cyclohexane	µg/m^3	52	U	52	U	NC	5.2	U	4.9	U	NC
TO15	Dibromochloromethane	µg/m^3	130	U	130	U	NC	0.33	J	0.38	J	ABS Criteria
TO15	Dichlorodifluoromethane	µg/m^3	75	U	75	U	NC	---	---	---	---	NC
TO15	Ethanol	µg/m^3	290	U	280	U	NC	5.7	U	5.4	U	NC
TO15	Ethylbenzene	µg/m^3	66	U	66	U	NC	---	---	---	---	NC
TO15	Hexachloro-1,3-Butadiene	µg/m^3	650	U	640	U	NC	16	U	15	U	NC
TO15	Hexane	µg/m^3	54	U	53	U	NC	1.2	J	5	U	NC
TO15	Isopropyl Alcohol (Manufacturing-Strong Acid)	µg/m^3	150	U	150	U	NC	2.9	J	1.6	J	ABS Criteria
TO15	Isopropylbenzene	µg/m^3	75	U	74	U	NC	1.5	U	1.4	U	NC
TO15	M,P-Xylene	µg/m^3	66	U	66	U	NC	---	---	---	---	NC
TO15	Methyl Tert-Butyl Ether	µg/m^3	220	U	220	U	NC	---	---	---	---	NC
TO15	Methylene Chloride	µg/m^3	530	U	520	U	NC	1.6	J	1.7	J	ABS Criteria
TO15	N-Heptane	µg/m^3	250	U	250	U	NC	6.2	U	5.9	U	NC
TO15	N-Propylbenzene	µg/m^3	75	U	74	U	NC	1.5	U	1.4	U	NC
TO15	o-Xylene	µg/m^3	66	U	66	U	NC	---	---	---	---	NC
TO15	Styrene	µg/m^3	65	U	64	U	NC	1.3	U	1.2	U	NC
TO15	Tetrachloroethene	µg/m^3	30000		31000		3.28	---	---	---	---	NC
TO15	Tetrahydrofuran	µg/m^3	45	U	44	U	NC	1.2	J	1.3	J	ABS Criteria
TO15	Toluene	µg/m^3	57	U	57	U	NC	---	---	---	---	NC
TO15	Trans-1,2-Dichloroethene	µg/m^3	60	U	60	U	NC	---	---	---	---	NC
TO15	Trans-1,3-Dichloropropene	µg/m^3	69	U	68	U	NC	1.4	U	1.3	U	NC
TO15	Trichloroethene	µg/m^3	51	J	47	J	ABS Criteria	---	---	---	---	NC
TO15	Trichlorofluoromethane (Freon 11)	µg/m^3	34	J	32	J	ABS Criteria	1.9	J	2	J	ABS Criteria
TO15	Vinyl Chloride	µg/m^3	39	U	38	U	NC	---	---	---	---	NC
TO15SIM	1,1,1-Trichloroethane	µg/m^3	---	---	---	---	NC	0.035	J	0.033	J	ABS Criteria
TO15SIM	1,1,2,2-Tetrachloroethane	µg/m^3	---	---	---	---	NC	0.42	U	0.39	U	NC
TO15SIM	1,1,2-Trichloroethane	µg/m^3	---	---	---	---	NC	0.33	U	0.31	U	NC
TO15SIM	1,1-Dichloroethane	µg/m^3	---	---	---	---	NC	0.25	U	0.23	U	NC
TO15SIM	1,1-Dichloroethene	µg/m^3	---	---	---	---	NC	0.12	U	0.11	U	NC
TO15SIM	1,2-Dibromoethane	µg/m^3	---	---	---	---	NC	1.2	U	1.1	U	NC
TO15SIM	1,2-Dichloroethane	µg/m^3	---	---	---	---	NC	0.25	U	0.23	U	NC
TO15SIM	1,2-Dichlorotetrafluoroethane (Freon 114)	µg/m^3	---	---	---	---	NC	0.11	J	0.12	J	ABS Criteria
TO15SIM	1,4-Dichlorobenzene	µg/m^3	---	---	---	---	NC	0.91	U	0.86	U	NC

Table 5-2
Summary of Field Duplicate Sampling Results
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

		Location	VP04		VP04		RPD	VP13		VP13		RPD
		Sample Name	VP04-SG032421		FD03-SG032421			VP13-SG032421		FD02-SG032421		
		Sample Date	3/24/2021		3/24/2021			3/24/2021		3/24/2021		
		Sample Type	N		FD			N		FD		
TO15SIM	Benzene	µg/m^3	---	---	---	---	NC	0.42	J	0.31	J	ABS Criteria
TO15SIM	Carbon Tetrachloride	µg/m^3	---	---	---	---	NC	0.68		0.71		ABS Criteria
TO15SIM	Chloroethane	µg/m^3	---	---	---	---	NC	0.087	J	0.099	J	ABS Criteria
TO15SIM	Chloroform	µg/m^3	---	---	---	---	NC	240		240		0.00
TO15SIM	Chloromethane	µg/m^3	---	---	---	---	NC	3.1	U	3	U	NC
TO15SIM	cis-1,2-Dichloroethene	µg/m^3	---	---	---	---	NC	0.24	U	0.23	U	NC
TO15SIM	Dichlorodifluoromethane (Freon 12)	µg/m^3	---	---	---	---	NC	2.4		2.4		ABS Criteria
TO15SIM	Ethylbenzene	µg/m^3	---	---	---	---	NC	0.067	J	0.065	J	ABS Criteria
TO15SIM	m/p-Xylene	µg/m^3	---	---	---	---	NC	0.26	J	0.2	J	ABS Criteria
TO15SIM	Methyl Tert-Butyl Ether	µg/m^3	---	---	---	---	NC	1.1	U	1	U	NC
TO15SIM	o-Xylene	µg/m^3	---	---	---	---	NC	0.12	J	0.072	J	ABS Criteria
TO15SIM	Tetrachloroethene	µg/m^3	---	---	---	---	NC	110		110		0.00
TO15SIM	Toluene	µg/m^3	---	---	---	---	NC	0.27	J	0.23	J	ABS Criteria
TO15SIM	trans-1,2-Dichloroethene	µg/m^3	---	---	---	---	NC	1.2	U	1.1	U	NC
TO15SIM	Trichloroethene	µg/m^3	---	---	---	---	NC	0.33	U	0.34		ABS Criteria
TO15SIM	Vinyl Chloride	µg/m^3	---	---	---	---	NC	0.16	U	0.15	U	NC

Acronyms

µg/m^3 - microgram per cubic meter
EPA - United States Environmental Protection Agency
FD - field duplicate
J - estimated
N - normal sample
NC - not calculated
Q - qualifier
RPD - relative percent difference
U - nondetect
UJ - estimated nondetect result
ABS Criteria = Sample concentrations less than 5x the reporting limit; absolute difference (ABS) between the two results less than the reporting limit

TO-15 - Modified EPA Method TO-15 for volatile organic compounds
TO-15 SIM - Modified EPA Method TO-15 for volatile organic compounds by selective ion monitoring (SIM)

Section 6
Data Usability Assessment

One hundred percent of the data reported and validated in this QCSR are suitable for their intended use as stated in the QAPP (CDM Smith 2020a). No sample results were rejected.

The achievement of the completeness goals for the number of samples collected and the number of sample results acceptable for use provides sufficient quality data to support project decisions. Sample results that were qualified as estimated are usable for project decisions.

Section 7
References

CDM Smith. 2020a. *Phase 2 Quality Assurance Project Plan, Operable Unit 1, 700 South 1600 East PCE Plume, Salt Lake City, Utah.* Prepared for the U.S. Army Corps of Engineers, Kansas City District. December 2020.

CDM Smith. 2020b. *Phase 2 Remedial Investigation Work Plan, Operable Unit 1, 700 South 1600 East PCE Plume, Salt Lake City, Utah*. Prepared for the U.S. Army Corps of Engineers.

CDM Smith. 2021a. *Memorandum. Plan for Soil Vapor Probe Sampling and Indoor Air Sampling at Buildings 6 and 7, 700 South 1600 East PCE Plume, Salt Lake City, Utah*. Prepared for the U.S. Army Corps of Engineers.

EPA. 2017. *National Functional Guidelines for Organic Superfund Methods Data Review*, EPA-540-R-2017-002. January 2017.

EPA. 2014. EPA's *Analysis of Volatile Organic Compounds (VOCs) in Air Contained in Canisters by Method TO-15*. June 2014.

Attachment 1

Data Validation Reports

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number:	2103700
Laboratory:	Eurofins Air Toxics
Matrix:	Air
Collection date:	03/23/21
Analysis/Methods:	
	Volatile Organic Compounds - EPA Method TO-15
	Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number
MW23-SG032321-135	2103700-01A
SG55-SG032321	2103700-02A / B

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:	Yes	No	N/A
Are the field duplicate relative percent differences (RPDs) ≤40%?			**N/A**
Laboratory Control Spike Duplicate RPDs within limits?			**Yes**
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Were the Laboratory Duplicate RPDs within limits?			**Yes**

Comments (note deviations):

Field Duplicates	**TO-15 / SIM**	**Sample (ug/m3)**	**Duplicate (ug/m3)**	**%RPD**	**Qualifiers**	**Associated Samples**
N/A						

LCS/LCSD	**TO-15 / SIM**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
2103700-05A /2103700-05AA		Acceptable			
2103700-05B /2103700-05BB (SIM)		Acceptable			
2103700-05C /2103700-05CC		Acceptable			

MS/MSD	**TO-15 / SIM**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
N/A					

Laboratory Duplicate	**Sample (ug/m3)**	**Duplicate (ug/m3)**	**RL**	**%RPD**	**Qualifiers**	**Associated Samples**
2103700-01A / 01AA				Acceptable		

Accuracy:	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?			**No**
Were the Laboratory Method Blank results all < RL?			**No**
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)			**Yes**
Was the CCV criteria met? (30%)			**Yes**
Was the Tuning criteria met?			**Yes**
Were the Surrogate % recoveries within laboratory determined control limits?			**Yes**
Were the Internal Standard areas within ± 60 - 140%?			**Yes**
Was canister certification criteria met?			**Yes**
Were sample results able to be recalculated from the laboratory raw data and were they accurate?			**Yes**
Was target compound identification correctly performed by the laboratory?			**Yes**
Were chromatograms representative of the sample results?			**Yes**

Comments (note deviations):

Blanks	TO-15 / SIM	Concentration (ug/m^3)	MDL / RL (ug/m^3)	Qualifiers	Associated Samples
Lab Blank					
2103700-03A	4-Methyl-2-pentanone	0.049 J	0.038 / 0.41	**U-RL**	**2103700-02A**
	Acetone	0.37 J	0.3 / 2.4	None	Sample result > RL
	Methylene Chloride	0.51 J	0.35 / 0.69	None	Sample results nondetect
2103700-03B (SIM)	1,1,1-Trichloroethane	0.016 J	0.0065/ 0.11	None	Sample result > RL
2103700-03C	Acetone	0.77 J	0.3 / 2.4	**U-RL**	**2103700-01A**
	Carbon Disulfide	1.0 J	0.58 / 6.2	None	Sample results nondetect

Field Blank	TO-15 / SIM	Concentration	MDL / RL	Qualifiers	Associated Samples
N/A					

Surrogates	TO-15 / SIM	%R	Limit	Qualifiers	Associated Samples
		Acceptable			

MS/MSD	TO-15 SIM	%R	Limits (%)	Qualifiers	Associated Samples
N/A					

LCS/LCSD	TO-15 / SIM	%R	Limits	Qualifiers	Associated Samples
2103700-05A /2103700-05AA					
	3-Chloropropene	137 / 139	70-130	**J****	**2103700-02A**
2103700-05B /2103700-05BB (SIM)		Acceptable			
2103700-05C /2103700-05CC		Acceptable			

**Qualification required for detected results only - associated sample results nondetect - no qualification required

ICV/CCV	TO-15 / SIM	%R	Qualifiers	Associated Samples
3/26/2021 16:10	3-Chloropropene	145.44	**J / UJ**	**All samples**
3/18/2021 8:59		Acceptable		

ICAL	TO-15 / SIM	RRF	%RSD	Qualifiers	Associated Samples
3/25/2021 20:36		Acceptable	Acceptable		
3/25/2021 18:24 (SIM)		Acceptable	Acceptable		
3/17/2021 15:23		Acceptable	Acceptable		

CCV	TO-15 / SIM	RRF	%D	Qualifiers	Associated Samples
4/1/2021 8:06		Acceptable	Acceptable		
4/1/2021 8:06 (SIM)		Acceptable	Acceptable		
4/2/2021 12:13		Acceptable	Acceptable		
4/2/2021 12:13 (SIM)		Acceptable	Acceptable		
4/5/2021 9:40 am		Acceptable	Acceptable		
4/5/2021 9:00 pm		Acceptable	Acceptable		

Tune	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Internal Standards	TO-15 / SIM	Area %	Area % Criteria	Qualifiers	Associated Samples
	All Internal Standards	Acceptable			

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review	TO-15 / SIM	Results
Recalculated Sample Result		Acceptable

Sample #	Laboratory Reported Result (ug/m3)	Recalculated Sample Result (ug/m3)
TO-15		RRF / Concentration
2103700-01A	Tetrachloroethene: 16000	0.3759 / 16467
2103700-01A	Trichloroethene: 32	0.25901 / 31.993
TO-15-SIM		
2103700-02B	Benzene: 0.03	1.4887 / 0.034
2103700-02B	Chloroform: 14	4.9368 /14.059

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc. = (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification	Acceptable
Chromatogram review	Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	**Yes**		
Were holding times met?	**Yes**		
Was preservation criteria met? (0° - 6° C)			**N/A**
Were Chain-of-Custody records complete and provided in data package?	**Yes**		

Comments (note

Holding Time / Canister Pressure Criteria	Days to Analysis	Criteria	Associated Samples
Holding Time	Acceptable		

	Initial and Final Canister Pressure Results
Canister Pressure Criteria	Acceptable

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	**Yes**		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	**Yes**		

Comments (note

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	**Yes**		
Do the reporting limits meet project requirements?	**Yes**		

Comments (note deviations):

Overall Comments: Data is usable with appropriate qualifiers applied.

Data Validator: *Kristine Molloy* Date: *4/18/2021*

Data Reviewer: *Cherie Zakowski* Date: *4/20/2021*

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number:	2103701
Laboratory:	Eurofins Air Toxics
Matrix:	Air
Collection date:	03/22/21
Analysis/Methods:	
	Volatile Organic Compounds - EPA Method TO-15
	Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number
MW27-SG032221-28	2103701-01A
SG60-SG032221	2103701-02A / B
MW27-SG032221-113	2103701-03A
SG03-SG032221	2103701-04A / B

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPDs) ≤40%?			**N/A**
Laboratory Control Spike Duplicate RPDs within limits?	**Yes**		
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Were the Laboratory Duplicate RPDs within limits?			**N/A**

Comments (note deviations):

Field Duplicates	**TO-15 / SIM**	**Sample (ug/m3)**	**Duplicate (ug/m3)**	**%RPD**	**Qualifiers**	**Associated Samples**
N/A						

LCS/LCSD	**TO-15 / SIM**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
2103701-07A /2103701-07AA		Acceptable			
2103701-07B /2103701-07BB (SIM)		Acceptable			
2103701-07C /2103701-07CC		Acceptable			
2103701-07D /2103701-07DD		Acceptable			

MS/MSD	**TO-15 / SIM**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
N/A					

Laboratory Duplicate	**Sample (ug/m3)**	**Duplicate (ug/m3)**	**RL**	**%RPD**	**Qualifiers**	**Associated Samples**
2103701-01A / -01AA				Acceptable		
2103701-04A / -04AA				Acceptable		
2103701-04B / -04BB (SIM)				Acceptable		

Accuracy:	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?		**No**	
Were the Laboratory Method Blank results all < RL?		**No**	
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)	**Yes**		
Was the CCV criteria met? (30%)		**No**	
Was the Tuning criteria met?	**Yes**		
Were the Surrogate % recoveries within laboratory determined control limits?	**Yes**		
Were the Internal Standard areas within ± 60 - 140%?	**Yes**		
Was canister certification criteria met?	**Yes**		
Were sample results able to be recalculated from the laboratory raw data and were they accurate?	**Yes**		
Was target compound identification correctly performed by the laboratory?	**Yes**		
Were chromatograms representative of the sample results?	**Yes**		

Comments (note deviations):

Blanks	**TO-15 / SIM**	**Concentration (ug/m^3)**	**MDL / RL (ug/m^3)**	**Qualifiers**	**Associated Samples**
Lab Blank	4-Methyl-2-pentanone	0.045 J	0.038 / 0.41	None	Sample results nondetect
2103701-05A	Acetone	0.42 J	0.3 / 2.4	None	Sample results > RL
	Methylene Chloride	0.47 J	0.35 / 0.69	None	Sample results nondetect
Lab Blank 2103701-05B (SIM)	1,1,1-Trichloroethane	0.016 J	0.0065/ 0.11	**U-RL**	**2103701-02B & 2103701-04B**
Lab Blank					
2103701-05C	Acetone	0.77 J	0.44 / 12	**U-RL**	**2103701-03A**
	Carbon Disulfide	1.0 J	0.58 / 6.2	None	Sample results nondetect
Lab Blank					
2103701-05D	1,3-Dichlorobenzene	5.3 J	5.3 / 30	None	Sample results nondetect

Field Blank	**TO-15 / SIM**	**Concentration**	**MDL / RL**	**Qualifiers**	**Associated Samples**
N/A					

Surrogates	**TO-15 / SIM**	**%R**	**Limit**	**Qualifiers**	**Associated Samples**
		Acceptable			

MS/MSD	**TO-15 SIM**	**%R**	**Limits (%)**	**Qualifiers**	**Associated Samples**
N/A					

LCS/LCSD	**TO-15 / SIM**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
2103701-07A /2103701-07AA					
	3-Chloropropene	131 / 135	71-131	**J****	**2103701-02A & 2103701-04A**
2103701-07B /2103701-07BB (SIM)		Acceptable			
2103701-07C /2103701-07CC		Acceptable			
2103701-07D /2103701-07DD		Acceptable			

**Qualification required for detected results only - associated sample results nondetect - no qualification required

ICV/CCV	**TO-15 / SIM**	**%R**	**Qualifiers**	**Associated Samples**
	3-Chloropropene	145.44	**J / UJ**	**All samples**

ICAL	**TO-15 / SIM**	**RRF**	**%RSD**	**Qualifiers**	**Associated Samples**
3/25/2021 20:36		Acceptable	Acceptable		
3/25/2021 18:24 (SIM)		Acceptable	Acceptable		

CCV	TO-15 / SIM	RRF	%D	Qualifiers	Associated Samples
4/2/2021 9:37		Acceptable	Acceptable		
4/2/2021 9:37 (SIM)		Acceptable	Acceptable		
4/5/2021 9:40		Acceptable	Acceptable		
4/6/2021 7:59		Acceptable	Acceptable		
4/2/2021 11:20		Acceptable	Acceptable		
4/2/2021 11:20 (SIM)		Acceptable	Acceptable		
4/5/2021 9:00		Acceptable	Acceptable		
4/6/2021 9:02	1,2,4-Trichlorobenzene	Acceptable	31.584	**J /UJ**	**2103701-01A**

Tune	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Internal Standards	TO-15 / SIM	Area %	Area % Criteria	Qualifiers	Associated Samples
	All Internal Standards	Acceptable			

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review — **TO-15 / SIM** — **Results**

Recalculated Sample Result — Acceptable

Sample #	Laboratory Reported Result (ug/m3)	Recalculated Sample Result (ug/m3)
TO-15		RRF / Concentration
2103701-02A	2-Propanol: 2.0	3.396 / 1.974
2103701-02A	Ethanol: 0.80	0.2445 / 0.801
TO-15-SIM		
2103701-02B	Carbon Tetrachloride: 0.12	3.5621 / 0.118
2103701-02B	Tetrachloroethene: 56	0.7745 / 56.561

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc. = (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification	Acceptable
Chromatogram review	Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	**Yes**		
Were holding times met?	**Yes**		
Was preservation criteria met? (0° - 6° C)			**N/A**
Were Chain-of-Custody records complete and provided in data package?	**Yes**		

Comments (note deviations):

Holding Time / Canister Pressure Criteria	Days to Analysis	Criteria	Associated Samples
Holding Time	Acceptable		

	Initial and Final Canister Pressure Results
Canister Pressure Criteria	Acceptable

	Yes	No	N/A
Comparability:			
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	**Yes**		
Comments (note deviations):			
Completeness (90%):	**Yes**	**No**	**N/A**
Are all data in this SDG usable?	**Yes**		
Comments (note deviations):			
Sensitivity:	**Yes**	**No**	**N/A**
Are MDLs present and reported?	**Yes**		
Do the reporting limits meet project requirements?	**Yes**		
Comments (note deviations):			

Overall Comments: Data are usable with appropriate qualifiers applied. Samples MW27-SG032221-28 and MW27-SG032221-113 were analyzed by full scan TO-15 instead of the SIM/Low Level method due to high levels of target compounds.

Data Validator: Kristine Molloy Date: 4/20/2021

Data Reviewer: Cherie Zakowski Date: 4/22/2021

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number: 2103702
Laboratory: Eurofins Air Toxics
Matrix: Air
Collection date: 03/23/21
Analysis/Methods:

Volatile Organic Compounds - EPA Method TO-15
Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number
MW28-SG032321-48	2103702-01A / B
MW28-SG032321-24	2103702-02A / B
MW28-SG032321-118	2103702-03A / B
SG11-SG032321	2103702-04A / B

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPDs) ≤40%?			**N/A**
Laboratory Control Spike Duplicate RPDs within limits?	**Yes**		
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Were the Laboratory Duplicate RPDs within limits?		**No**	

Comments (note deviations):

Field Duplicates	**TO-15 / SIM**	**Sample (ug/m3)**	**Duplicate (ug/m3)**	**%RPD**	**Qualifiers**	**Associated Samples**
N/A						

LCS/LCSD	**TO-15 / SIM**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
2103702-07A /2103702-07AA		Acceptable			
2103702-07B /2103702-07BB (SIM)		Acceptable			

MS/MSD	**TO-15 / SIM**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
N/A					

Laboratory Duplicate	**Sample (ug/m3)**	**Duplicate (ug/m3)**	**RL**	**%RPD**	**Qualifiers**	**Associated Samples**
2103702-01AA						
4-Methyl-2-pentanone	1.0 J	0.63 J	5.8	46	None	Sample results < 5xs RL; Abs Diff. < RL
Carbon Disulfide	4.2 J	22 U	22	NC	None	
Tetrahydrofuran	2.5 J	21 U	21	NC	None	
2103702-01BB (SIM)						
Benzene	0.36 J	0.29 J	2.3	23	None	Sample results < 5xs RL; Abs Diff. < RL

Accuracy:	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?		**No**	
Were the Laboratory Method Blank results all < RL?		**No**	
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)	**Yes**		
Was the CCV criteria met? (30%)	**Yes**		
Was the Tuning criteria met?	**Yes**		
Were the Surrogate % recoveries within laboratory determined control limits?	**Yes**		
Were the Internal Standard areas within ± 60 - 140%?	**Yes**		
Was canister certification criteria met?	**Yes**		
Were sample results able to be recalculated from the laboratory raw data and were they accurate?	**Yes**		
Was target compound identification correctly performed by the laboratory?	**Yes**		
Were chromatograms representative of the sample results?	**Yes**		

Comments (note deviations):

Blanks	**TO-15 / SIM**	**Concentration (ug/m^3)**	**MDL / RL (ug/m^3)**	**Qualifiers**	**Associated Samples**
Lab Blank					
2103702-05A	Acetone	0.40 J	0.3 / 2.4	**U-RL**	**2103702-02A & 2103702-04A**
	Methylene Chloride	0.55 J	0.35 / 0.69	None	Sample results nondetect
2103702-05B (SIM)	1,1,1-Trichloroethane	0.017 J	0.0065/ 0.11	**U-RL**	**2103702-02B & 2103702-04B**

Field Blank	**TO-15 / SIM**	**Concentration**	**MDL / RL**	**Qualifiers**	**Associated Samples**
N/A					

Surrogates	**TO-15 / SIM**	**%R**	**Limit**	**Qualifiers**	**Associated Samples**
		Acceptable			

MS/MSD	**TO-15 SIM**	**%R**	**Limits (%)**	**Qualifiers**	**Associated Samples**
N/A					

LCS/LCSD	**TO-15 / SIM**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
2103702-07A /2103702-07AA					
	3-Chloropropene	149 / 143	70-130	**J****	**All samples**
2103702-07B /2103702-07BB (SIM)		Acceptable			

**Qualification required for detected results only - associated sample results nondetect - no qualification required

ICV/CCV	**TO-15 / SIM**	**%R**	**Qualifiers**	**Associated Samples**
3/26/2021 16:10	3-Chloropropene	145.44	**J / UJ**	**All samples**

ICAL	**TO-15 / SIM**	**RRF**	**%RSD**	**Qualifiers**	**Associated Samples**
3/25/2021 20:36		Acceptable	Acceptable		
3/25/2021 18:24 (SIM)		Acceptable	Acceptable		

CCV	**TO-15 / SIM**	**RRF**	**%D**	**Qualifiers**	**Associated Samples**
3/31/2021 7:23		Acceptable	Acceptable		
4/1/2021 12:06		Acceptable	Acceptable		
3/31/2021 7:23 (SIM)		Acceptable	Acceptable		
4/1/2021 12:06 (SIM)		Acceptable	Acceptable		

Tune	**TO-15 / SIM**	**Qualifiers**	**Associated Samples**
	Acceptable		

Internal Standards	**TO-15 / SIM**	**Area %**	**Area % Criteria**	**Qualifiers**	**Associated Samples**
	All Internal Standards	Acceptable			

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review	TO-15 / SIM	Results
Recalculated Sample Result		Acceptable

Sample #	Laboratory Reported Result (ug/m^3)	Recalculated Sample Result (ug/m^3)
TO-15		**RRF / Concentration**
2103702-03A	2-Propanol: 6.2	3.396 / 6.236
2103702-03A	Freon 11: 66	4.5923 / 66.224
TO-15-SIM		
2103702-03B	Chloroethane: 0.15	0.7124 / 0.142
2103702-03B	Freon 12: 5.3	5.2326 / 5.337

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc.= (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification	Acceptable
Chromatogram review	Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	Yes		
Were holding times met?	Yes		
Was preservation criteria met? (0° - 6° C)			N/A
Were Chain-of-Custody records complete and provided in data package?	Yes		

Comments (note deviations):

Holding Time / Canister Pressure Criteria	Days to Analysis	Criteria	Associated Samples
Holding Time	Acceptable		

Initial and Final Canister Pressure Results

Canister Pressure Criteria	Acceptable

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	Yes		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	Yes		

Comments (note deviations):

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	Yes		
Do the reporting limits meet project requirements?	Yes		

Comments (note deviations):

Overall Comments: Data are usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 4/19/2021

Data Reviewer: Cherie Zakowski Date: 4/23/2021

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number:	2103703
Laboratory:	Eurofins Air Toxics
Matrix:	Air
Collection date:	03/23/21
Analysis/Methods:	Volatile Organic Compounds - EPA Method TO-15 Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number
SG10-SG032321	2103703-01A / B
SG08-SG032321	2103703-02A / B
SG13-SG032321	2103703-03A / B
FD01-SG032321	2103703-04A / B

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:

	Yes	No	N/A
Are the field duplicate relative percent differences (RPDs) ≤40%?	Yes		
Laboratory Control Spike Duplicate RPDs within limits?	Yes		
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			N/A
Were the Laboratory Duplicate RPDs within limits?			N/A

Comments (note deviations):

Field Duplicates	TO-15 / SIM	Sample (ug/m3) SG10-SG032321	Duplicate (ug/m3) FD01-SG032321	%RPD	Qualifiers	Associated Samples
	1,2,4-Trimethylbenzene	0.54 J	0.52 J	NC	None	Sample results < 5xs RL; ABS Diff. < RL
	1,3,5-Trimethylbenzene	0.22 J	0.21 J	NC	None	
	1,4-Dioxane	0.32 J	0.51 U	NC	None	
	2-Butanone (Methyl Ethyl Ketone)	0.37 J	0.5 J	NC	None	
	2-Propanol	0.92 J	1.9	NC	None	
	Acetone	3.0 J	4.4	NC	None	
	Bromodichloromethane	0.12 J	0.074 J	NC	None	
	Carbon Disulfide	0.44 J	0.54 J	NC	None	
	Ethanol	0.56 J	0.74 J	NC	None	
	Freon 11	1.4	1.4	NC	None	
	Freon 113	0.52 J	0.54 J	NC	None	
	Benzene (SIM)	0.24 U	0.034 J	NC	None	
	Chloromethane (SIM)	0.032 J	1.4 U	NC	None	
	Ethyl Benzene (SIM)	0.12 J	0.13 J	NC	None	
	Freon 114 (SIM)	0.10 J	0.11 J	NC	None	
	m,p-Xylene (SIM)	0.44	0.44	NC	None	
	o-Xylene (SIM)	0.18	0.17	NC	None	
	Trichloroethene (SIM)	0.16 U	0.022 J	NC	None	Sample results < 5xs RL; ABS Diff. < RL
	Toluene (SIM)	0.13 J	0.14 J	NC	None	

LCS/LCSD	TO-15 / SIM	%RPD	Limits	Qualifiers	Associated Samples
2103703-07A / 07AA		Acceptable			
2103703-07B / 07BB (SIM)		Acceptable			
2103703-07C / 07CC		Acceptable			
2103703-07D / 07DD		Acceptable			

MS/MSD	TO-15 / SIM	%RPD	Limit	Qualifiers	Associated Samples
N/A					

Laboratory Duplicate	Sample (ug/m3)	Duplicate (ug/m3)	RL	%RPD	Qualifiers	Associated Samples
2103703-04A / 04AA				Acceptable		
2103703-04B / 04BB				Acceptable		

Accuracy:	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?		**No**	
Were the Laboratory Method Blank results all < RL?		**No**	
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)	**Yes**		
Was the CCV criteria met? (30%)	**Yes**		
Was the Tuning criteria met?	**Yes**		
Were the Surrogate % recoveries within laboratory determined control limits?	**Yes**		
Were the Internal Standard areas within ± 60 - 140%?	**Yes**		
Was canister certification criteria met?	**Yes**		
Were sample results able to be recalculated from the laboratory raw data and were they accurate?	**Yes**		
Was target compound identification correctly performed by the laboratory?	**Yes**		
Were chromatograms representative of the sample results?	**Yes**		

Comments (note deviations):

Blanks	TO-15 / SIM	Concentration (ug/m^3)	MDL / RL (ug/m^3)	Qualifiers	Associated Samples
Lab Blank					
2103703-05A	Acetone	0.40 J	0.3 / 2.4	**U-RL**	**2103703-01A**
	Methylene Chloride	0.55 J	0.35 / 0.69	None	Sample results nondetect
2103703-05B (SIM)	1,1,1-Trichloroethane	0.017 J	0.0065 / 0.11	**U-RL**	**2103703-03B**
2103703-05C	4-Methyl-2-pentanone	0.049 J	0.038 / 0.41	None	Sample results nondetect
	Acetone	0.37 J	0.3 / 2.4	**U-RL**	**2103703-02A**
	Methylene Chloride	0.51 J	0.35 / 0.69	None	Sample results nondetect
2103703-05D (SIM)	1,1,1-Trichloroethane	0.016 J	0.0065 / 0.11	**U-RL**	**2103703-02B**

Field Blank	TO-15 / SIM	Concentration	MDL / RL	Qualifiers	Associated Samples
N/A					

Surrogates	TO-15 / SIM	%R	Limit	Qualifiers	Associated Samples
		Acceptable			

MS/MSD	TO-15 SIM	%R	Limits (%)	Qualifiers	Associated Samples
N/A					

LCS/LCSD	TO-15 / SIM	%R	Limits	Qualifiers	Associated Samples
2103703-07A / 07AA					
	3-Chloropropene	149 / 143	70-130	**J****	**2103703-01A, 2103703-03A**
2103703-07B / 07BB (SIM)		Acceptable			
2103703-07C / 07CC	3-Chloropropene	137 / 139	70-130	**J****	**2103703-02A, 2103703-04A**
2103703-07D / 07DD (SIM)		Acceptable			

**Qualification required for detected results only - associated sample results nondetect - no qualification required

ICV/CCV	TO-15 / SIM	%R	Qualifiers	Associated Samples
3/26/2021 16:10	3-Chloropropene	145.44	**J / UJ**	**All samples**

ICAL	TO-15 / SIM	RRF	%RSD	Qualifiers	Associated Samples
3/25/2021 20:36		Acceptable	Acceptable		
3/25/2021 18:24 (SIM)		Acceptable	Acceptable		

CCV	TO-15 / SIM	RRF	%D	Qualifiers	Associated Samples
3/31/2021 7:23		Acceptable	Acceptable		
4/1/2021 12:06		Acceptable	Acceptable		
4/1/2021 8:06		Acceptable	Acceptable		
4/2/2021 12:13		Acceptable	Acceptable		
3/31/2021 7:23 (SIM)		Acceptable	Acceptable		
4/1/2021 12:06 (SIM)		Acceptable	Acceptable		
4/1/2021 8:06 (SIM)		Acceptable	Acceptable		
4/2/2021 12:13 (SIM)		Acceptable	Acceptable		

Tune	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Internal Standards	TO-15 / SIM	Area %	Area % Criteria	Qualifiers	Associated Samples
	All Internal Standards	Acceptable			

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review	TO-15 / SIM	Results
Recalculated Sample Result		Acceptable

Sample #	Laboratory Reported Result (ug/m3)	Recalculated Sample Result (ug/m3)
TO-15		**RRF / Concentration**
2103703-01A	1,4-Dioxane: 0.32	0.3524 / 0.322
2103703-01A	Carbon Disulfide: 0.44	5.455 / 0.442
TO-15 - SIM		
2103703-01B	Chloroform: 39	4.9368 / 39.028
2103703-01B	Toluene: 0.13	1.7697 / 0.133

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc. = (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification	Acceptable
Chromatogram review	Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	Yes		
Were holding times met?	Yes		
Was preservation criteria met? (0° - 6° C)			N/A
Were Chain-of-Custody records complete and provided in data package?	Yes		
Comments (note			

Holding Time / Canister Pressure Criteria	Days to Analysis	Criteria	Qualifiers	Associated Samples
Holding Time	Acceptable			

Initial and Final Canister Pressure Results

Canister Pressure Criteria	Acceptable

	Yes	No	N/A
Comparability:			
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	Yes		
Comments (note deviations):			
Completeness (90%):			
Are all data in this SDG usable?	Yes		
Comments (note			
Sensitivity:			
Are MDLs present and reported?	Yes		
Do the reporting limits meet project requirements?	Yes		
Comments (note deviations):			

Overall Comments: Data are usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 4/22/2021

Data Reviewer: Cherie Zakowski Date: 4/26/2021

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number:	2103725
Laboratory:	Eurofins Air Toxics
Matrix:	Air
Collection date:	03/23/21
Analysis/Methods:	Volatile Organic Compounds - EPA Method TO-15 Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number
SG04-SG032321	2103725-01A / B
SG50-SG032321	2103725-02A / B
SG06-SG032321	2103725-03A / B
SG05-SG032321	2103725-04A / B

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPDs) ≤40%?			**N/A**
Laboratory Control Spike Duplicate RPDs within limits?			**Yes**
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Were the Laboratory Duplicate RPDs within limits?			**N/A**

Comments (note deviations):

Field Duplicates	**TO-15 / SIM**	**Sample (ug/m3)**	**Duplicate (ug/m3)**	**%RPD**	**Qualifiers**	**Associated Samples**
N/A						

LCS/LCSD	**TO-15 / SIM**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
2103725-07A / 07AA		Acceptable			
2103725-07B/ 07BB (SIM)		Acceptable			

MS/MSD	**TO-15 / SIM**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
N/A					

Laboratory Duplicate	**Sample (ug/m3)**	**Duplicate (ug/m3)**	**RL**	**%RPD**	**Qualifiers**	**Associated Samples**
N/A						

Accuracy:	**Yes**	**No**	**N/A**
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?			**No**
Were the Laboratory Method Blank results all < RL?			**No**
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)			**Yes**
Was the CCV criteria met? (30%)			**Yes**
Was the Tuning criteria met?			**Yes**
Were the Surrogate % recoveries within laboratory determined control limits?			**Yes**
Were the Internal Standard areas within ± 60 - 140%?			**Yes**
Was canister certification criteria met?			**Yes**
Were sample results able to be recalculated from the laboratory raw data and were they accurate?			**Yes**
Was target compound identification correctly performed by the laboratory?			**Yes**
Were chromatograms representative of the sample results?			**Yes**

Comments (note deviations):

Blanks	TO-15 / SIM	Concentration (ug/m^3)	MDL / RL (ug/m^3)	Qualifiers	Associated Samples
Lab Blank					
2103725-05A	4-Methyl-2-pentanone	0.049 J	0.038 / 0.41	None	Sample results nondetect
	Acetone	0.37 J	0.3 / 2.4	**U-RL**	**All samples**
	Methylene Chloride	0.51 J	0.35 / 0.69	None	Sample results nondetect
2103725-05B (SIM)	1,1,1-Trichloroethane	0.016 J	0.0065/ 0.11	**U-RL**	**All samples**

Field Blank	TO-15 / SIM	Concentration	MDL / RL	Qualifiers	Associated Samples
N/A					

Surrogates	TO-15 / SIM	%R	Limit	Qualifiers	Associated Samples
		Acceptable			

MS/MSD	TO-15 SIM	%R	Limits (%)	Qualifiers	Associated Samples
N/A					

LCS/LCSD	TO-15 / SIM	%R	Limits	Qualifiers	Associated Samples
2103725-07A / 07AA					
	3-Chloropropene	137 / 139	70-130	**J****	**All samples**
2103725-07B/ 07BB (SIM)		Acceptable			

**Qualification required for detected results only - associated sample results nondetect - no qualification required

ICV/CCV	TO-15 / SIM	%R	Qualifiers	Associated Samples
3/26/2021 16:10	3-Chloropropene	145.44	**J / UJ**	**All samples**

ICAL	TO-15 / SIM	RRF	%RSD	Qualifiers	Associated Samples
3/25/2021 20:36		Acceptable	Acceptable		
3/25/2021 18:24 (SIM)		Acceptable	Acceptable		

CCV	TO-15 / SIM	RRF	%D	Qualifiers	Associated Samples
4/1/2021 8:00		Acceptable	Acceptable		
4/2/2021 12:13		Acceptable	Acceptable		
4/1/2021 8:06 (SIM)		Acceptable	Acceptable		
4/2/2021 12:13 (SIM)		Acceptable	Acceptable		

Tune	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Internal Standards	TO-15 / SIM	Area %	Area % Criteria	Qualifiers	Associated Samples
	All Internal Standards	Acceptable			

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review **TO-15 / SIM** **Results**

Recalculated Sample Result Acceptable

Sample #	Laboratory Reported Result (ug/m3)	Recalculated Sample Result (ug/m3)
TO-15		**RRF / Concentration**
2103725-01A	Acetone: 7.9	1.041 / 8.154
2103725-01A	Bromodichloromethane: 38	1.060 / 36.618
TO-15 - SIM		
2103725-01B	Freon 114: 0.11	3.3554 / 0.113
2103725-01B	Freon 12: 2.4	5.2329 / 2.424

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc. = (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification Acceptable
Chromatogram review Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	Yes		
Were holding times met?	Yes		
Was preservation criteria met? (0° - 6° C)			N/A
Were Chain-of-Custody records complete and provided in data package?	Yes		

Comments (note deviations):

Holding Time / Canister Pressure Criteria	**Days to Analysis**	**Criteria**	**Associated Samples**
Holding Time	Acceptable		

	Initial and Final Canister Pressure Results
Canister Pressure Criteria	Acceptable

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	Yes		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	Yes		

Comments (note deviations):

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	Yes		
Do the reporting limits meet project requirements?	Yes		

Comments (note deviations):

Overall Comments: Data are usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 4/18/2021

Data Reviewer: Cherie Zakowski Date: 4/21/2021

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number:	2103751
Laboratory:	Eurofins Air Toxics
Matrix:	Air
Collection date:	03/24/21
Analysis/Methods:	Volatile Organic Compounds - EPA Method TO-15 Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number
VP14-SG032421	2103751-01A / B
VP04-SG032421	2103751-02A
VP15-SG032421	2103751-03A
VP17-SG032421	2103751-04A / B

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:

	Yes	No	N/A
Are the field duplicate relative percent differences (RPDs) ≤40%?			**N/A**
Laboratory Control Spike Duplicate RPDs within limits?			**Yes**
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Were the Laboratory Duplicate RPDs within limits?			**N/A**

Comments (note deviations):

Field Duplicates	TO-15 / SIM	Sample (ug/m3)	Duplicate (ug/m3)	%RPD	Qualifiers	Associated Samples
N/A						

LCS/LCSD	TO-15 / SIM	%RPD	Limits	Qualifiers	Associated Samples
2103751-07A / 07AA		Acceptable			
2103751-07B / 07BB (SIM)		Acceptable			
2103751-07C / 07CC		Acceptable			

MS/MSD	TO-15 / SIM	%RPD	Limit	Qualifiers	Associated Samples
N/A					

Laboratory Duplicate	Sample (ug/m3)	Duplicate (ug/m3)	RL	%RPD	Qualifiers	Associated Samples
2103751-03A / 03AA						
2-Propanol	25 J	140 U	140	NC	None	Sample result < 5xs RL; ABS Diff. < RL
Acetone	350 U	18 J	350	NC	None	
Freon 11	23 J	17 J	82	30	None	

Accuracy:

	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?			**No**
Were the Laboratory Method Blank results all < RL?			**No**
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)			**Yes**
Was the CCV criteria met? (30%)			**Yes**
Was the Tuning criteria met?			**Yes**
Were the Surrogate % recoveries within laboratory determined control limits?			**Yes**
Were the Internal Standard areas within ± 60 - 140%?			**Yes**
Was canister certification criteria met?			**Yes**
Were sample results able to be recalculated from the laboratory raw data and were they accurate?			**Yes**
Was target compound identification correctly performed by the laboratory?			**Yes**
Were chromatograms representative of the sample results?			**Yes**

Comments (note deviations):

Blanks	TO-15 / SIM	Concentration (ug/m^3)	MDL / RL (ug/m^3)	Qualifiers	Associated Samples
Lab Blank					
2103751-05A	4-Methyl-2-Pentanone	0.045 J	0.038 / 0.41	**U-RL**	**2103751-01A**
	Acetone	0.42 J	0.3 / 2.4	**U-RL**	**2103751-04A**
	Methylene Chloride	0.47 J	0.35 / 0.69	**U-RL**	**2103751-01A; 2103751-04A**
2103751-05B (SIM)	1,1,1-Trichloroethane	0.016 J	0.0065 / 0.11	None	Sample results > RL
2103751-05C	Acetone	0.78 J		None	Sample results nondetect

Field Blank	TO-15 / SIM	Concentration	MDL / RL	Qualifiers	Associated Samples
N/A					

Surrogates	TO-15 / SIM	%R	Limit	Qualifiers	Associated Samples
		Acceptable			

MS/MSD	TO-15 SIM	%R	Limits (%)	Qualifiers	Associated Samples
N/A					

LCS/LCSD	TO-15 / SIM	%R	Limits	Qualifiers	Associated Samples
2103751-07A / 07AA					
	3-Chloropropene	131 / 135	70-130	**J****	**2103751-01A; 2103751-04A**
2103751-07B / 07BB (SIM)		Acceptable			
2103751-07C / 07CC		Acceptable			

**Qualification required for detected results only - associated sample results nondetect - no qualification required

ICV/CCV	TO-15 / SIM	%R	Qualifiers	Associated Samples
3/26/2021 16:10	3-Chloropropene	145.44	**J / UJ**	**All samples**

ICAL	TO-15 / SIM	RRF	%RSD	Qualifiers	Associated Samples
3/25/2021 20:36		Acceptable	Acceptable		
3/25/2021 18:24 (SIM)		Acceptable	Acceptable		

CCV	TO-15 / SIM	RRF	%D	Qualifiers	Associated Samples
4/2/2021 9:37		Acceptable	Acceptable		
4/6/2021 11:20		Acceptable	Acceptable		
4/2/2021 11:20		Acceptable	Acceptable		
4/6/2021 8:01		Acceptable	Acceptable		
4/2/2021 9:37 (SIM)		Acceptable	Acceptable		
4/2/2021 11:20 (SIM)		Acceptable	Acceptable		

Tune	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Internal Standards	TO-15 / SIM	Area %	Area % Criteria	Qualifiers	Associated Samples
	All Internal Standards	Acceptable			

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review	TO-15 / SIM	Results
Recalculated Sample Result		Acceptable

Sample #	Laboratory Reported Result (ug/m3)	Recalculated Sample Result (ug/m3)
TO-15		**RRF / Concentration**
2103751-01A	1,3,5-Trimethylbenzene: 0.066	1.876 / 0.066
2103751-01A	2-Butanone: 4.6	1.26763 / 4.593
TO-15 - SIM		
2103751-01B	Carbon Tetrachloride: 0.17	3.5628 / 0.174
2103751-01B	Toluene: 0.4	1.76944 / 0.396

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc. = (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification	Acceptable
Chromatogram review	Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	**Yes**		
Were holding times met?	**Yes**		
Was preservation criteria met? (0° - 6° C)			**N/A**
Were Chain-of-Custody records complete and provided in data package?	**Yes**		

Comments (note

Holding Time / Canister Pressure Criteria	Days to Analysis	Criteria	Qualifiers	Associated Samples
Holding Time	Acceptable			

Initial and Final Canister Pressure Results

Canister Pressure Criteria	Acceptable

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	**Yes**		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	**Yes**		

Comments (note

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	**Yes**		
Do the reporting limits meet project requirements?	**Yes**		

Comments (note deviations):

Overall Comments: Data are usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 4/22/2021

Data Reviewer: Cherie Zakowski Date: 4/26/2021

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number: 2103752
Laboratory: Eurofins Air Toxics
Matrix: Air
Collection date: 03/24/21
Analysis/Methods:

Volatile Organic Compounds - EPA Method TO-15
Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number
VP19-SG032421	2103752-01A / B
FD02-SG032421	2103752-02A /B
VP08-SG032421	2103752-03A / B
VP13-SG032421	2103752-04A / B

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:

	Yes	No	N/A
Are the field duplicate relative percent differences (RPDs) ≤40%?			Yes
Laboratory Control Spike Duplicate RPDs within limits?			Yes
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			N/A
Were the Laboratory Duplicate RPDs within limits?			No

Comments (note deviations):

Field Duplicates	TO-15 / SIM	Sample (ug/m3) VP13-SG032421	Duplicate (ug/m3) FD02-SG032421	%RPD	Qualifiers	Associated Samples
1,1,2-Trichlorotrifluoroethane (Freon 113)		0.95 J	1.0 J	NC	None	Sample results < 5xs RL; ABS Diff. < RL
1,2,4-Trimethylbenzene		0.11 J	0.11 J	NC	None	
1,3-Dichlorobenzene		3.4	3.7	NC	None	
2-Butanone (MEK)		1.3 J	1.6 J	NC	None	
Acetone		5.7 J	7.5	NC	None	
Dibromochloromethane		0.33 J	0.38 J	NC	None	
Hexane		1.3 J	5.0 U	NC	None	
Isopropyl Alcohol (Manufacturing-Strong Acid)		2.9 J	1.6 J	NC	None	
Methylene Chloride		1.6 J	1.7 J	NC	None	
Tetrahydrofuran		1.2 J	1.3 J	NC	None	
Trichlorofluoromethane (Freon 11)		1.9 J	2.0 J	NC	None	
1,1,1-Trichloroethane (SIM)		0.035 J	0.033 J	NC	None	
1,2-Dichlorotetrafluoroethane (Freon 114) (SIM)		0.11 J	0.12 J	NC	None	
Benzene (SIM)		0.42 J	0.31 J	NC	None	
Carbon Tetrachloride (SIM)		0.68	0.71	NC	None	
Chloroethane (SIM)		0.087 J	0.099 J	NC	None	
Dichlorodifluoromethane (Freon 12) (SIM)		2.4	2.4	NC	None	
Ethylbenzene (SIM)		0.067 J	0.065 J	NC	None	
m/p-Xylene (SIM)		0.26 J	0.2 J	NC	None	
o-Xylene (SIM)		0.12 J	0.072 J	NC	None	
Toluene (SIM)		0.27 J	0.23 J	NC	None	Sample results < 5xs RL; ABS Diff. < RL
Trichloroethene (SIM)		0.33 U	0.34	NC	None	

LCS/LCSD	TO-15 / SIM	%RPD	Limits	Qualifiers	Associated Samples
2103752-07A / 07AA		Acceptable			
2103752-07B / 07BB (SIM)		Acceptable			

MS/MSD	TO-15 / SIM	%RPD	Limit	Qualifiers	Associated Samples
N/A					

Laboratory Duplicate	Sample (ug/m3)	Duplicate (ug/m3)	RL	%RPD	Qualifiers	Associated Samples
2103752-01A / 01AA						
1,4-Dioxane	0.12 J	0.53 U	0.53	None	Sample result < 5xs RL; ABS Diff. < RL	
Methylene Chloride	1 U	0.49 J	1	None		
2103752-01B / 01BB						
1,2-Dibromothane	0.068 J	0.56 U	0.56	None	Sample result < 5xs RL; ABS Diff. < RL	

Accuracy:	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?			**Yes**
Were the Laboratory Method Blank results all < RL?			**No**
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)			**Yes**
Was the CCV criteria met? (30%)			**Yes**
Was the Tuning criteria met?			**Yes**
Were the Surrogate % recoveries within laboratory determined control limits?			**Yes**
Were the Internal Standard areas within ± 60 - 140%?			**Yes**
Was canister certification criteria met?			**Yes**
Were sample results able to be recalculated from the laboratory raw data and were they accurate?			**Yes**
Was target compound identification correctly performed by the laboratory?			**Yes**
Were chromatograms representative of the sample results?			**Yes**

Comments (note deviations):

Blanks	TO-15 / SIM	Concentration (ug/m^3)	MDL / RL (ug/m^3)	Qualifiers	Associated Samples
Lab Blank					
2103752-05A		Nondetect			
2103752-05B (SIM)	1,2-Dibromoethane	0.055 J	0.044 / 0.38	**U-RL**	**2103752-01B**
	1,2-Dichloroethane	0.018 J	0.014 / 0.081	**U-RL**	**2103752-01B**
	Trichloroethene	0.033 J	0.018 / 0.11	**U-RL**	**2103752-01B; 2103752-04B**

Field Blank	TO-15 / SIM	Concentration	MDL / RL	Qualifiers	Associated Samples
N/A					

Surrogates	TO-15 / SIM	%R	Limit	Qualifiers	Associated Samples
		Acceptable			

MS/MSD	TO-15 SIM	%R	Limits (%)	Qualifiers	Associated Samples
N/A					

LCS/LCSD	TO-15 / SIM	%R	Limits	Qualifiers	Associated Samples
2103752-07A / 07AA		Acceptable			
2103752-07B / 07BB (SIM)		Acceptable			

ICV/CCV	TO-15 / SIM	%R	Qualifiers	Associated Samples
4/2/2021 13:32	Freon 11	130.34	**J / UJ**	**All samples**

ICAL	TO-15 / SIM	RRF	%RSD	Qualifiers	Associated Samples
4/01/2021 22:03		Acceptable	Acceptable		
4/01/2021 20:04 (SIM)		Acceptable	Acceptable		

CCV	TO-15 / SIM	RRF	%D	Qualifiers	Associated Samples
4/2/2021 2:53		Acceptable	Acceptable		
4/2/2021 2:53 (SIM)		Acceptable	Acceptable		
4/3/2021 1:40		Acceptable	Acceptable		
4/3/2021 1:40 (SIM)		Acceptable	Acceptable		

Tune	TO-15 / SIM			Qualifiers	Associated Samples
	Acceptable				

Internal Standards	TO-15 / SIM	Area %	Area % Criteria	Qualifiers	Associated Samples
	All Internal Standards	Acceptable			

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review	TO-15 / SIM	Results
Recalculated Sample Result		Acceptable

Sample #	Laboratory Reported Result (ug/m3)	Recalculated Sample Result (ug/m3)
TO-15		**RRF / Concentration**
2103752-03A	1,3-Dichlorobenzene: 7.0	1.3741 / 6.971
2103752-03A	Bromodichloromethane: 1.6	0.96706 / 1.62
TO-15 - SIM		
2103752-03B	Benzene: 0.049	1.1297 / 0.049
2103752-03B	Freon 12: 2.8	2.4433 / 2.799

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc. = (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification	Acceptable
Chromatogram review	Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	Yes		
Were holding times met?	Yes		
Was preservation criteria met? (0° - 6° C)			N/A
Were Chain-of-Custody records complete and provided in data package?	Yes		

Comments (note

Holding Time / Canister Pressure Criteria	Days to Analysis	Criteria	Qualifiers	Associated Samples
Holding Time	Acceptable			

	Initial and Final Canister Pressure Results
Canister Pressure Criteria	Acceptable

Comparability: **Yes No N/A**

Were analytical procedures and methods followed as defined in the QAPP or field change documentation? **Yes**

Comments (note deviations):

Completeness (90%): **Yes No N/A**

Are all data in this SDG usable? **Yes**

Comments (note

Sensitivity: **Yes No N/A**

Are MDLs present and reported? **Yes**

Do the reporting limits meet project requirements? **Yes**

Comments (note deviations):

Overall Comments: Data are usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 4/22/2021

Data Reviewer: Cherie Zakowski Date: 4/27/2021

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number:	2103753
Laboratory:	Eurofins Air Toxics
Matrix:	Air
Collection date:	03/24/21
Analysis/Methods:	Volatile Organic Compounds - EPA Method TO-15 Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number
SG49-SG032421	2103753-01A / B
VP02-SG032421	2103753-02A / B
MW25-SG032421-28	2103753-03A / B
VP06-SG032421	2103753-04A / B

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPDs) ≤40%?			**N/A**
Laboratory Control Spike Duplicate RPDs within limits?			**Yes**
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Were the Laboratory Duplicate RPDs within limits?			**N/A**

Comments (note deviations):

Field Duplicates	**TO-15 / SIM**	**Sample (ug/m3)**	**Duplicate (ug/m3)**	**%RPD**	**Qualifiers**	**Associated Samples**
N/A						

LCS/LCSD	**TO-15 / SIM**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
2103753-07A / 07AA		Acceptable			
2103753-07B / 07BB (SIM)		Acceptable			

MS/MSD	**TO-15 / SIM**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
N/A					

Laboratory Duplicate	**Sample (ug/m3)**	**Duplicate (ug/m3)**	**RL**	**%RPD**	**Qualifiers**	**Associated Samples**
N/A						

Accuracy:	**Yes**	**No**	**N/A**
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?			**Yes**
Were the Laboratory Method Blank results all < RL?			**No**
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)			**Yes**
Was the CCV criteria met? (30%)			**Yes**
Was the Tuning criteria met?			**Yes**
Were the Surrogate % recoveries within laboratory determined control limits?			**Yes**
Were the Internal Standard areas within ± 60 - 140%?			**Yes**
Was canister certification criteria met?			**Yes**
Were sample results able to be recalculated from the laboratory raw data and were they accurate?			**Yes**
Was target compound identification correctly performed by the laboratory?			**Yes**
Were chromatograms representative of the sample results?			**Yes**

Comments (note deviations):

Blanks	TO-15 / SIM	Concentration (ug/m^3)	MDL / RL (ug/m^3)	Qualifiers	Associated Samples
Lab Blank					
2103753-05A	4-Methyl-2-pentanone	0.049 J	0.038 / 0.41	**U-RL**	**2103753-04A**
	Acetone	0.37 J	0.3 / 2.4	None	Sample results > RL
	Methylene Chloride	0.51 J	0.35 / 0.69	**U-RL**	**2103753-02A**
2103753-05B (SIM)	1,1,1-Trichloroethane	0.016 J	0.0065 / 0.11	**U-RL**	**2103753-01B**

Field Blank	TO-15 / SIM	Concentration	MDL / RL	Qualifiers	Associated Samples
N/A					

Surrogates	TO-15 / SIM	%R	Limit	Qualifiers	Associated Samples
		Acceptable			

MS/MSD	TO-15 SIM	%R	Limits (%)	Qualifiers	Associated Samples
N/A					

LCS/LCSD	TO-15 / SIM	%R	Limits	Qualifiers	Associated Samples
2103753-07A / 07AA	3-Chloropropene	137 /139	70-130	**J****	**All samples**
2103753-07B / 07BB (SIM)		Acceptable			

**Qualification required for detected results only - associated sample results nondetect - no qualification required

ICV/CCV	TO-15 / SIM	%R	Qualifiers	Associated Samples
3/26/2021 16:10	3-Chloropropene	145.44	**J / UJ**	**All samples**

ICAL	TO-15 / SIM	RRF	%RSD	Qualifiers	Associated Samples
3/25/2021 20:36		Acceptable	Acceptable		
3/25/2021 18:24 (SIM)		Acceptable	Acceptable		

CCV	TO-15 / SIM	RRF	%D	Qualifiers	Associated Samples
4/1/2021 8:06		Acceptable	Acceptable		
4/2/2021 12:13		Acceptable	Acceptable		
4/1/2021 8:06 (SIM)		Acceptable	Acceptable		
4/2/2021 12:13 (SIM)		Acceptable	Acceptable		

Tune	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Internal Standards	TO-15 / SIM	Area %	Area % Criteria	Qualifiers	Associated Samples
	All Internal Standards	Acceptable			

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review **TO-15 / SIM** **Results**

Recalculated Sample Result Acceptable

Sample #	Laboratory Reported Result (ug/m3)	Recalculated Sample Result (ug/m3)
TO-15		**RRF / Concentration**
2103753-04A	Ethanol: 1.9	0.2446 / 1.864
2103753-04A	Methylene Chloride: 1.2	1.72395 / 1.163
TO-15 - SIM		
2103753-04B	1,1,1-Trichloroethane: 0.89	4.5731 / 0.923
2103753-04B	o-xylene: 0.089	0.6751 / 0.084

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc. = (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification Acceptable
Chromatogram review Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	**Yes**		
Were holding times met?	**Yes**		
Was preservation criteria met? (0° - 6° C)			**N/A**
Were Chain-of-Custody records complete and provided in data package?	**Yes**		

Comments (note

Holding Time / Canister Pressure Criteria	**Days to Analysis**	**Criteria**	**Qualifiers**	**Associated Samples**
Holding Time	Acceptable			

	Initial and Final Canister Pressure Results
Canister Pressure Criteria	Acceptable

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	**Yes**		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	**Yes**		

Comments (note

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	**Yes**		
Do the reporting limits meet project requirements?	**Yes**		

Comments (note deviations):

Overall Comments: Data are usable with appropriate qualifiers applied.

Data Validator: *Kristine Molloy* Date: *4/23/2021*

Data Reviewer: *Cherie Zakowski* Date: *4/28/2021*

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number:	2103754
Laboratory:	Eurofins Air Toxics
Matrix:	Air
Collection date:	03/24/21
Analysis/Methods:	Volatile Organic Compounds - EPA Method TO-15 Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number
VP09-SG032421	2103754R1-01A / B
VP11-SG032421	2103754R1-02A / B
VP12-SG032421	2103754R1-03A / B
VP10-SG032421	2103754R1-04A / B

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPDs) ≤40%?			**N/A**
Laboratory Control Spike Duplicate RPDs within limits?			**Yes**
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Were the Laboratory Duplicate RPDs within limits?			**N/A**

Comments (note deviations):

Field Duplicates	**TO-15 / SIM**	**Sample (ug/m3)**	**Duplicate (ug/m3)**	**%RPD**	**Qualifiers**	**Associated Samples**
N/A						

LCS/LCSD	**TO-15 / SIM**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
2103754-07A / 07AA		Acceptable			
2103754-07B / 07BB (SIM)		Acceptable			

MS/MSD	**TO-15 / SIM**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
N/A					

Laboratory Duplicate	**Sample (ug/m3)**	**Duplicate (ug/m3)**	**RL**	**%RPD**	**Qualifiers**	**Associated Samples**
N/A						

Accuracy:	**Yes**	**No**	**N/A**
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?			**Yes**
Were the Laboratory Method Blank results all < RL?			**No**
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)			**Yes**
Was the CCV criteria met? (30%)			**Yes**
Was the Tuning criteria met?			**Yes**
Were the Surrogate % recoveries within laboratory determined control limits?			**Yes**
Were the Internal Standard areas within ± 60 - 140%?			**Yes**
Was canister certification criteria met?			**Yes**
Were sample results able to be recalculated from the laboratory raw data and were they accurate?			**Yes**
Was target compound identification correctly performed by the laboratory?			**Yes**
Were chromatograms representative of the sample results?			**Yes**

Comments (note deviations):

Blanks	TO-15 / SIM	Concentration (ug/m^3)	MDL / RL (ug/m^3)	Qualifiers	Associated Samples
Lab Blank					
2103754-05A		Nondetect			
2103754-05B (SIM)	1,2-Dibromoethane	0.055 J	0.044 / 0.38	None	Sample results nondetect
	1,2-Dichloroethane	0.018 J	0.014 / 0.081	**U-RL**	**2103754R1-04B**
	Trichloroethene	0.033 J	0.018 / 0.11	**U-RL**	**2103754R1-04B**

Field Blank	TO-15 / SIM	Concentration	MDL / RL	Qualifiers	Associated Samples
N/A					

Surrogates	TO-15 / SIM	%R	Limit	Qualifiers	Associated Samples
		Acceptable			

MS/MSD	TO-15 SIM	%R	Limits (%)	Qualifiers	Associated Samples
N/A					

LCS/LCSD	TO-15 / SIM	%R	Limits	Qualifiers	Associated Samples
2103754-07A / 07AA		Acceptable			
2103754-07B / 07BB (SIM)		Acceptable			

ICV/CCV	TO-15 / SIM	%R	Qualifiers	Associated Samples
4/2/2021 13:32	3-Chloropropene	145.44	**J / UJ**	**All samples**
	Freon 11	130.34	**J / UJ**	**All samples**

ICAL	TO-15 / SIM	RRF	%RSD	Qualifiers	Associated Samples
4/01/2021 22:03		Acceptable	Acceptable		
4/01/2021 20:04 (SIM)		Acceptable	Acceptable		

CCV	TO-15 / SIM	RRF	%D	Qualifiers	Associated Samples
4/2/2021 2:53		Acceptable	Acceptable		
4/3/2021 1:40		Acceptable	Acceptable		
4/2/2021 2:53 (SIM)		Acceptable	Acceptable		
4/3/2021 1:40 (SIM)		Acceptable	Acceptable		

Tune	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Internal Standards	TO-15 / SIM	Area %	Area % Criteria	Qualifiers	Associated Samples
	All Internal Standards	Acceptable			

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review **TO-15 / SIM** **Results**

Recalculated Sample Result Acceptable

Sample #	Laboratory Reported Result (ug/m3)	Recalculated Sample Result (ug/m3)
TO-15		**RRF / Concentration**
2103754-03A	1,3-Dichlorobenzene: 2.7	1.3742 / 2.742
2103754-03A	Acetone: 7.6	0.45053 / 7.659
TO-15 - SIM		
2103754-03B	Ethylbenzene: 0.13	0.7029 / 0.128
2103754-03B	Tetrachloroethene: 3.0	1.1319 / 2.978

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc. = (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification Acceptable
Chromatogram review Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	**Yes**		
Were holding times met?	**Yes**		
Was preservation criteria met? (0° - 6° C)			**N/A**
Were Chain-of-Custody records complete and provided in data package?	**Yes**		

Comments (note

Holding Time / Canister Pressure Criteria	**Days to Analysis**	**Criteria**	**Qualifiers**	**Associated Samples**
Holding Time	Acceptable			

	Initial and Final Canister Pressure Results
Canister Pressure Criteria	Acceptable

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	**Yes**		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	**Yes**		

Comments (note

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	**Yes**		
Do the reporting limits meet project requirements?	**Yes**		

Comments (note deviations):

Overall Comments: Data are usable with appropriate qualifiers applied.

Data Validator: *Kristine Molloy* Date: *4/25/2021*

Data Reviewer: *Cherie Zakowski* Date: *4/29/2021*

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number: 2103813
Laboratory: Eurofins Air Toxics
Matrix: Air
Collection date: 03/25/21
Analysis/Methods:

Volatile Organic Compounds - EPA Method TO-15
Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number
B7-IA05-IA032521	2103813-01A / B
FD01-IA032521	2103813-02A / B
B7-IA02-IA032521	2103813-03A / B
B6-IA06-IA032521	2103813-04A / B

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:

	Yes	No	N/A
Are the field duplicate relative percent differences (RPDs) ≤40%?	Yes		
Laboratory Control Spike Duplicate RPDs within limits?	Yes		
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			N/A
Were the Laboratory Duplicate RPDs within limits?	Yes		

Comments (note deviations):

Field Duplicates	TO-15 / SIM	Sample (ug/m3) B6-IA06-IA032521	Duplicate (ug/m3) FD01-IA032521	%RPD	Qualifiers	Associated Samples
1,1,2-Trichlorotrifluoroethane (Freon 113)		0.48 J	0.47 J	NC	None	Sample results < 5xs RL; ABS Diff. < RL
1,2,4-Trimethylbenzene		0.22 J	0.23 J	NC	None	
1,3,5-Trimethylbenzene		0.09 J	0.085 J	NC	None	
1,4-Dioxane		0.54 U	0.16 J	NC	None	
2-Butanone (MEK)		0.74 J	0.5 J	NC	None	
4-Ethyltoluene		0.26 J	0.24 J	NC	None	
Chlorobenzene		0.68 J	0.023 J	NC	None	
Hexane		0.23 J	0.25 J	NC	None	
Isopropylbenzene		0.73 U	0.042 J	NC	None	
N-Heptane		0.18 J	0.17 J	NC	None	
N-Propylbenzene		0.068 J	0.066 J	NC	None	
Tetrahydrofuran		0.29 J	0.29 J	NC	None	
Trichlorofluoromethane (Freon 11)		1.2	1.2	NC	None	
1,2-Dibromoethane		0.028 J	0.6 J	NC	None	
1,2-Dichloroethane		0.083 J	0.086 J	NC	None	
1,2-Dichlorotetrafluoroethane (Freon 114)		0.1 J	0.1 J	NC	None	
Benzene		0.34	0.34	NC	None	
Carbon Tetrachloride		0.46	0.46	NC	None	
Chloroethane		0.029 J	0.021 J	NC	None	
Chloroform		0.15	0.16	NC	None	
Chloromethane		0.68 J	0.67 J	NC	None	
Tetrachloroethene		0.098 J	0.1 J	NC	None	
Toluene		0.64	0.69	NC	None	
trans-1,2-Dichloroethene		0.025 J	0.024 J	NC	None	Sample results < 5xs RL; ABS Diff. < RL
Trichloroethene		0.042 J	0.17 J	NC	None	

LCS/LCSD	TO-15 / SIM	%RPD	Limits	Qualifiers	Associated Samples
2103813-07A / 07AA		Acceptable			
2103813-07B / 07BB (SIM)		Acceptable			

MS/MSD	TO-15 / SIM	%RPD	Limit	Qualifiers	Associated Samples
N/A					

Laboratory Duplicate	Sample (ug/m3)	Duplicate (ug/m3)	RL	%RPD	Qualifiers	Associated Samples
2103813-03A / 03AA						
1,4-Dioxane	0.55 U	0.014	0.55	NC	None	Sample results < 5xs RL; ABS Diff. < RL
Hexane	0.22 J	2.7 U	2.7	NC	None	
Styrene	0.068 J	0.65 U	0.65	NC	None	
2103813-03B / 03BB				Acceptable		

Accuracy:	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?		**No**	
Were the Laboratory Method Blank results all < RL?		**No**	
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)	**Yes**		
Was the CCV criteria met? (30%)	**Yes**		
Was the Tuning criteria met?	**Yes**		
Were the Surrogate % recoveries within laboratory determined control limits?	**Yes**		
Were the Internal Standard areas within ± 60 - 140%?	**Yes**		
Was canister certification criteria met?	**Yes**		
Were sample results able to be recalculated from the laboratory raw data and were they accurate?	**Yes**		
Was target compound identification correctly performed by the laboratory?	**Yes**		
Were chromatograms representative of the sample results?	**Yes**		

Comments (note deviations):

Blanks	TO-15 / SIM	Concentration (ug/m^3)	MDL / RL (ug/m^3)	Qualifiers	Associated Samples
Lab Blank					
2103813-05A	4-Methyl-2-pentanone	0.045 J	0.038 / 0.41	None	Sample results nondetect
	Acetone	0.42 J	0.30 / 2.4	None	Sample results > RL
	Methylene Chloride	0.47 J	0.35 / 0.69	**U-RL**	**2103813-01A**
2103813-05B (SIM)	1,1,1-Trichloroethane	0.016 J	0.0065 / 0.11	None	Sample results nondetect
2103813-05C	4-Methyl-2-pentanone	0.077 J	0.038 / 0.41	**U-RL**	**2103813-03A, 2103813-04A**
	Acetone	0.47 J	0.30 / 2.4	None	Sample results > RL
	Cumene	0.026 J	0.017 / 0.49	**U-RL**	**2103813-04A**
	Methylene Chloride	0.40 J	0.35 / 0.69	**U-RL**	**2103813-04A**
2103813-05D (SIM)	1,1,1-Trichloroethane	0.016 J	0.0065 / 0.11	None	Sample results nondetect

Field Blank	TO-15 / SIM	Concentration	MDL / RL	Qualifiers	Associated Samples
N/A					

Surrogates	TO-15 / SIM	%R	Limit	Qualifiers	Associated Samples
		Acceptable			

MS/MSD	TO-15 SIM	%R	Limits (%)	Qualifiers	Associated Samples
N/A					

LCS/LCSD	TO-15 / SIM	%R	Limits	Qualifiers	Associated Samples
2103813-07A / 7AA	3-Chloropropene	131 / 135	70-130	**J****	**2103813-01A, 2103813-02A**
2103813-07B / 07BB (SIM)		Acceptable			
2103813-07C / 7CC	3-Chloropropene	155 / 125	70-130	**J****	**2103813-03A, 2103813-04A**
2103813-07D / 7DD (SIM)		Acceptable			

**Qualification required for detected results only - associated sample results nondetect - no qualification required

ICV/CCV	TO-15 / SIM	%R	Qualifiers	Associated Samples
3/26/2021 16:10	3-Chloropropene	145.44	**J / UJ**	**All samples**

ICAL	TO-15 / SIM	RRF	%RSD	Qualifiers	Associated Samples
3/25/2021 20:36		Acceptable	Acceptable		
3/25/2021 18:24 (SIM)		Acceptable	Acceptable		

CCV	TO-15 / SIM	RRF	%D	Qualifiers	Associated Samples
4/2/2021 9:37		Acceptable	Acceptable		
4/3/2021 7:20		Acceptable	Acceptable		
4/2/2021 11:20		Acceptable	Acceptable		
4/2/2021 11:45		Acceptable	Acceptable		
4/2/2021 9:37 (SIM)		Acceptable	Acceptable		
4/3/2021 7:20 (SIM)		Acceptable	Acceptable		
4/2/2021 11:20 (SIM)		Acceptable	Acceptable		
4/2/2021 11:45 (SIM)		Acceptable	Acceptable		

Tune	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Internal Standards	TO-15 / SIM	Area %	Area % Criteria	Qualifiers	Associated Samples
	All Internal Standards	Acceptable			

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review	TO-15 / SIM	Results
Recalculated Sample Result		Acceptable

Sample #	Laboratory Reported Result (ug/m3)	Recalculated Sample Result (ug/m3)
TO-15		**RRF / Concentration**
2103813-03A	2-Butanone:0.64	1.2677 / 0.644
2103813-03A	Acetone: 36	1.01511 / 36.039
TO-15 - SIM		
2103813-03B	Benzene: 0.33	1.489/ 0.0332
2103813-03B	Toluene: 4.7	1.7695 / 4.687

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc. = (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification	Acceptable
Chromatogram review	Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	Yes		
Were holding times met?	Yes		
Was preservation criteria met? (0° - 6° C)			N/A
Were Chain-of-Custody records complete and provided in data package?	Yes		

Comments (note

Holding Time / Canister Pressure Criteria	Days to Analysis	Criteria	Qualifiers	Associated Samples
Holding Time	Acceptable			

Initial and Final Canister Pressure Results

Canister Pressure Criteria	Acceptable

	Yes	No	N/A
Comparability:			
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	**Yes**		
Comments (note deviations):			
Completeness (90%):	**Yes**	**No**	**N/A**
Are all data in this SDG usable?	**Yes**		
Comments (note			
Sensitivity:	**Yes**	**No**	**N/A**
Are MDLs present and reported?	**Yes**		
Do the reporting limits meet project requirements?	**Yes**		
Comments (note deviations):			

Overall Comments: Data are usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 4/26/2021

Data Reviewer: Cherie Zakowski Date: 5/1/2021

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number:	2103814
Laboratory:	Eurofins Air Toxics
Matrix:	Air
Collection date:	03/25/21
Analysis/Methods:	Volatile Organic Compounds - EPA Method TO-15 Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number
SB43-SG032521-15	2103814-01A / B
SB43-SG032521-8	2103814-02A / B
SB42-SG032521-26	2103814-03A / B
MW29-SG032521-42	2103814-04A / B

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPDs) ≤40%?			**N/A**
Laboratory Control Spike Duplicate RPDs within limits?			**Yes**
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Were the Laboratory Duplicate RPDs within limits?			**N/A**

Comments (note deviations):

Field Duplicates	**TO-15 / SIM**	**Sample (ug/m3)**	**Duplicate (ug/m3)**	**%RPD**	**Qualifiers**	**Associated Samples**
N/A						

LCS/LCSD	**TO-15 / SIM**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
2103814-07A / 07AA		Acceptable			
2103814-07B / 07BB (SIM)		Acceptable			

MS/MSD	**TO-15 / SIM**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
N/A					

Laboratory Duplicate	**Sample (ug/m3)**	**Duplicate (ug/m3)**	**RL**	**%RPD**	**Qualifiers**	**Associated Samples**
N/A						

Accuracy:	**Yes**	**No**	**N/A**
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?			**Yes**
Were the Laboratory Method Blank results all < RL?			**No**
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)			**No**
Was the CCV criteria met? (30%)			**Yes**
Was the Tuning criteria met?			**Yes**
Were the Surrogate % recoveries within laboratory determined control limits?			**Yes**
Were the Internal Standard areas within ± 60 - 140%?			**Yes**
Was canister certification criteria met?			**Yes**
Were sample results able to be recalculated from the laboratory raw data and were they accurate?			**Yes**
Was target compound identification correctly performed by the laboratory?			**Yes**
Were chromatograms representative of the sample results?			**Yes**

Comments (note deviations):

Blanks	TO-15 / SIM	Concentration (ug/m^3)	MDL / RL (ug/m^3)	Qualifiers	Associated Samples
Lab Blank					
2103814-05A		Nondetect			
2103814-05B (SIM)	1,2-Dichloroethane	0.015 J	0.014 / 0.081	None	Sample results nondetect
	Trichloroethene	0.045 J	0.018 / 0.11	**U-RL**	**2103814-02B**

Field Blank	TO-15 / SIM	Concentration	MDL / RL	Qualifiers	Associated Samples
N/A					

Surrogates	TO-15 / SIM	%R	Limit	Qualifiers	Associated Samples
		Acceptable			

MS/MSD	TO-15 SIM	%R	Limits (%)	Qualifiers	Associated Samples
N/A					

LCS/LCSD	TO-15 / SIM	%R	Limits	Qualifiers	Associated Samples
2103814-07A / 7AA		Acceptable			
2103814-07B / 07BB (SIM)		Acceptable			

ICV/CCV	TO-15 / SIM		%R	Qualifiers	Associated Samples
4/2/2021 13:32	Freon 11		130.34	**J / UJ**	**All samples**

ICAL	TO-15 / SIM	RRF	%RSD	Qualifiers	Associated Samples
4/01/2021 22:03		Acceptable	Acceptable		
4/01/2021 20:04 (SIM)		Acceptable	Acceptable		

CCV	TO-15 / SIM	RRF	%D	Qualifiers	Associated Samples
4/6/2021 8:03		Acceptable	Acceptable		
4/7/2021 12:14		Acceptable	Acceptable		
4/6/2021 8:03 (SIM)		Acceptable	Acceptable		
4/7/2021 12:14 (SIM)		Acceptable	Acceptable		

Tune	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Internal Standards	TO-15 / SIM	Area %	Area % Criteria	Qualifiers	Associated Samples
	All Internal Standards	Acceptable			

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review **TO-15 / SIM** **Results**

Recalculated Sample Result Acceptable

Sample #	Laboratory Reported Result (ug/m3)	Recalculated Sample Result (ug/m3)
TO-15		**RRF / Concentration**
2103814-02A	2-Butanone:1.2	0.5719 / 1.242
2103814-02A	Carbon Disulfide: 0.89	2.96571 / 0.890
TO-15 - SIM		
2103814-02B	Tetrachloroethene: 37	1.1320/ 37.187
2103814-02B	Trichloroethene: 0.12	0.7317 / 0.122

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc. = (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification Acceptable
Chromatogram review Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	**Yes**		
Were holding times met?	**Yes**		
Was preservation criteria met? (0° - 6° C)			**N/A**
Were Chain-of-Custody records complete and provided in data package?	**Yes**		

Comments (note

Holding Time / Canister Pressure Criteria	**Days to Analysis**	**Criteria**	**Qualifiers**	**Associated Samples**
Holding Time	Acceptable			

	Initial and Final Canister Pressure Results
Canister Pressure Criteria	Acceptable

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	**Yes**		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	**Yes**		

Comments (note

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	**Yes**		
Do the reporting limits meet project requirements?	**Yes**		

Comments (note deviations):

Overall Comments: Data are usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 4/27/2021

Data Reviewer: Cherie Zakowski Date: 5/2/2021

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number:	2103815
Laboratory:	Eurofins Air Toxics
Matrix:	Air
Collection date:	03/25/21
Analysis/Methods:	Volatile Organic Compounds - EPA Method TO-15 Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number
SB42-SG032521-13	2103815-01A / B
MW29-SG032521-66	2103815-02A / B
SB42-SG032521-17	2103815-03A / B
FD04-SG032521	2103815-04A / B

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:

	Yes	No	N/A
Are the field duplicate relative percent differences (RPDs) ≤40%?		**No**	
Laboratory Control Spike Duplicate RPDs within limits?	**Yes**		
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Were the Laboratory Duplicate RPDs within limits?			**N/A**

Comments (note deviations):

Field Duplicates	TO-15 / SIM	Sample (ug/m3) SB42-SG032521-17	Duplicate (ug/m3) FD04-SG032521	%RPD	Qualifiers	Associated Samples
	Freon 11	2.0 J	2.0 J	NC	None	
	1,2,4-Trimethylbenzene	0.63 J	0.52 J	NC	None	
	1,1,1-Trichloroethane	0.31 J	0.30 J	NC	None	
	Benzene	0.12 J	0.10 J	NC	None	
	Carbon Tetrachloride	0.94 U	0.23 J	NC	None	Sample results < 5xs RL; ABS Diff. < RL
	cis-1,2-Dichloroethene	0.55 J	0.54	NC	None	
	Ethyl Benzene	0.22 J	0.22 J	NC	None	
	Freon 12	3.4	3.3	NC	None	
	m,p-Xylene	0.53 J	0.53 J	NC	None	
	o-Xylene	0.24 J	0.24 J	NC	None	
	Toluene	0.20 J	0.15 J	NC	None	

LCS/LCSD	TO-15 / SIM	%RPD	Limits	Qualifiers	Associated Samples
2103815-07A / 07AA		Acceptable			
2103815-07B / 07BB (SIM)		Acceptable			

MS/MSD	TO-15 / SIM	%RPD	Limit	Qualifiers	Associated Samples
N/A					

Laboratory Duplicate	Sample (ug/m3)	Duplicate (ug/m3)	RL	%RPD	Qualifiers	Associated Samples
N/A						

Accuracy:	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?			**Yes**
Were the Laboratory Method Blank results all < RL?			**No**
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)			**Yes**
Was the CCV criteria met? (30%)			**Yes**
Was the Tuning criteria met?			**Yes**
Were the Surrogate % recoveries within laboratory determined control limits?			**Yes**
Were the Internal Standard areas within ± 60 - 140%?			**Yes**
Was canister certification criteria met?			**Yes**
Were sample results able to be recalculated from the laboratory raw data and were they accurate?			**Yes**
Was target compound identification correctly performed by the laboratory?			**Yes**
Were chromatograms representative of the sample results?			**Yes**

Comments (note deviations):

Blanks	**TO-15 / SIM**	**Concentration (ug/m^3)**	**MDL / RL (ug/m^3)**	**Qualifiers**	**Associated Samples**
Lab Blank					
2103815-05A		Nondetect			
2103815-05B (SIM)	1,2-Dibromoethane	0.055 J	0.044 / 0.38	None	Sample results nondetect
	1,2-Dichloroethane	0.018 J	0.014 / 0.081	**U-RL**	**2103815-02B**
	Trichloroethene	0.033 J	0.018 / 0.11	None	Sample results > RL

Field Blank	**TO-15 / SIM**	**Concentration**	**MDL / RL**	**Qualifiers**	**Associated Samples**
N/A					

Surrogates	**TO-15 / SIM**	**%R**	**Limit**	**Qualifiers**	**Associated Samples**
		Acceptable			

MS/MSD	**TO-15 SIM**	**%R**	**Limits (%)**	**Qualifiers**	**Associated Samples**
N/A					

LCS/LCSD	**TO-15 / SIM**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
2103815-07A / 7AA		Acceptable			
2103815-07B / 07BB (SIM)		Acceptable			

ICV/CCV	**TO-15 / SIM**	**%R**	**Qualifiers**	**Associated Samples**
4/2/2021 13:32	Freon 11	130.34	**J / UJ**	**All samples**

ICAL	**TO-15 / SIM**	**RRF**	**%RSD**	**Qualifiers**	**Associated Samples**
4/01/2021 22:03		Acceptable	Acceptable		
4/01/2021 20:04 (SIM)		Acceptable	Acceptable		

CCV	**TO-15 / SIM**	**RRF**	**%D**	**Qualifiers**	**Associated Samples**
4/2/2021 2:53		Acceptable	Acceptable		
4/3/2021 1:40		Acceptable	Acceptable		
4/2/2021 2:53 (SIM)		Acceptable	Acceptable		
4/3/2021 1:40 (SIM)		Acceptable	Acceptable		

Tune	**TO-15 / SIM**	**Qualifiers**	**Associated Samples**
	Acceptable		

Internal Standards	**TO-15 / SIM**	**Area %**	**Area % Criteria**	**Qualifiers**	**Associated Samples**
	All Internal Standards	Acceptable			

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review	TO-15 / SIM	Results
Recalculated Sample Result		Acceptable

Sample #	Laboratory Reported Result (ug/m3)	Recalculated Sample Result (ug/m3)
TO-15		**RRF / Concentration**
2103815-01A	2-Propanol : 1.8	1.4448 / 1.834
2103815-01A	1,2,4-Trimethylbenzene: 0.61	1.87566 / 0.613
TO-15 - SIM		
2103815-01B	m,p-Xylene: 0.69	0.8479/ 0.691
2103815-01B	Trichloroethene: 3.6	0.7319 / 3.656

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc. = (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification	Acceptable
Chromatogram review	Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	Yes		
Were holding times met?	Yes		
Was preservation criteria met? (0° - 6° C)			N/A
Were Chain-of-Custody records complete and provided in data package?	Yes		

Comments (note

Holding Time / Canister Pressure Criteria	Days to Analysis	Criteria	Qualifiers	Associated Samples
Holding Time	Acceptable			

	Initial and Final Canister Pressure Results
Canister Pressure Criteria	Acceptable

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	Yes		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	Yes		

Comments (note

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	Yes		
Do the reporting limits meet project requirements?	Yes		

Comments (note deviations):

Overall Comments: Data are usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 4/29/2021

Data Reviewer: Cherie Zakowski Date: 5/3/2021

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number:	2103816
Laboratory:	Eurofins Air Toxics
Matrix:	Air
Collection date:	3/24/2021 & 3/25/2021
Analysis/Methods:	Volatile Organic Compounds - EPA Method TO-15 Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number
FD03-SG032421	2103816-01A / B
B6-OA01-OA032521	2103816-02A / B
B6-IA08-IA032521	2103816-03A / B
MW25-SG032421-100	2103816-04A / B

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:

	Yes	No	N/A
Are the field duplicate relative percent differences (RPDs) ≤40%?			**Yes**
Laboratory Control Spike Duplicate RPDs within limits?			**Yes**
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Were the Laboratory Duplicate RPDs within limits?			**N/A**

Comments (note deviations):

Field Duplicates	TO-15 / SIM	Sample (ug/m3) VP04-SG032421**	Duplicate (ug/m3) FD03-SG032421	%RPD	Qualifiers	Associated Samples
	Chloroform	43 J	42 J	NC	None	Sample results < 5xs RL; ABS Diff. < RL
	Freon 11	34 J	32 J	NC	None	
	Trichloroethene	51 J	47 J	NC	None	

**Results reported in SDG 2103751

LCS/LCSD	TO-15 / SIM	%RPD	Limits	Qualifiers	Associated Samples
2103816-07A / 07AA		Acceptable			
2103816-07B / 07BB (SIM)		Acceptable			
2103816-07C / 07CC		Acceptable			

MS/MSD	TO-15 / SIM	%RPD	Limit	Qualifiers	Associated Samples
N/A					

Laboratory Duplicate	Sample (ug/m3)	Duplicate (ug/m3)	RL	%RPD	Qualifiers	Associated Samples
N/A						

Accuracy:

	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?			**Yes**
Were the Laboratory Method Blank results all < RL?			**No**
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)			**Yes**
Was the CCV criteria met? (30%)			**Yes**
Was the Tuning criteria met?			**Yes**
Were the Surrogate % recoveries within laboratory determined control limits?			**Yes**
Were the Internal Standard areas within ± 60 - 140%?			**Yes**
Was canister certification criteria met?			**Yes**
Were sample results able to be recalculated from the laboratory raw data and were they accurate?			**Yes**
Was target compound identification correctly performed by the laboratory?			**Yes**
Were chromatograms representative of the sample results?			**Yes**

Comments (note deviations):

Blanks	TO-15 / SIM	Concentration (ug/m^3)	MDL / RL (ug/m^3)	Qualifiers	Associated Samples
Lab Blank					
2103816-05A		Nondetect			
2103816-05B (SIM)	1,2-Dibromoethane	0.055 J	0.044 / 0.38	None	Sample results nondetect
	1,2-Dichloroethane	0.018 J	0.014 / 0.077	**U-RL**	**2103816-02B, 2103816-03B**
	Trichloroethene	0.033 J	0.018 / 0.10	**U-RL**	**2103816-02B, 2103816-03B**
2103816-05C	Acetone	0.77 J	0.44 / 12	None	Sample results nondetect or > RL
	Carbon Disulfide	1.0 J	0.58 / 6.2	None	Sample results nondetect or > RL

Field Blank	TO-15 / SIM	Concentration	MDL / RL	Qualifiers	Associated Samples
N/A					

Surrogates	TO-15 / SIM	%R	Limit	Qualifiers	Associated Samples
		Acceptable			

MS/MSD	TO-15 SIM	%R	Limits (%)	Qualifiers	Associated Samples
N/A					

LCS/LCSD	TO-15 / SIM	%R	Limits	Qualifiers	Associated Samples
2103816-07A / 07AA		Acceptable			
2103816-07B / 07BB (SIM)		Acceptable			
2103816-07C / 07CC		Acceptable			

ICV/CCV	TO-15 / SIM	%R	Qualifiers	Associated Samples
4/2/2021 13:32	Freon 11	130.34	**J / UJ**	**All samples**

ICAL	TO-15 / SIM	RRF	%RSD	Qualifiers	Associated Samples
4/01/2021 22:03		Acceptable	Acceptable		
4/01/2021 20:04 (SIM)		Acceptable	Acceptable		
3/17/2021 15:23		Acceptable	Acceptable		

CCV	TO-15 / SIM	RRF	%D	Qualifiers	Associated Samples
4/2/2021 2:53		Acceptable	Acceptable		
4/2/2021 2:53 (SIM)		Acceptable	Acceptable		
4/5/2021 9:40		Acceptable	Acceptable		
4/3/2021 1:40		Acceptable	Acceptable		

Tune	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Internal Standards	TO-15 / SIM	Area %	Area % Criteria	Qualifiers	Associated Samples
	All Internal Standards	Acceptable			

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review	TO-15 / SIM	Results
Recalculated Sample Result		Acceptable

Sample #	Laboratory Reported Result (ug/m3)	Recalculated Sample Result (ug/m3)
TO-15		**RRF / Concentration**
2103816-02A	2-Propanol : 5.8	1.4448 / 5.833
2103816-02A	2-Butanone: 0.72	0.57188 / 0.716
TO-15 - SIM		
2103816-02B	Benzene: 0.32	1.1298 / 0.317
2103816-02B	Carbon Tetrachloride: 0.49	1.9248 / 0.492

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc. = (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification	Acceptable
Chromatogram review	Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	**Yes**		
Were holding times met?	**Yes**		
Was preservation criteria met? (0° - 6° C)			**N/A**
Were Chain-of-Custody records complete and provided in data package?	**Yes**		

Comments (note deviations):

Holding Time / Canister Pressure Criteria	Days to Analysis	Criteria	Qualifiers	Associated Samples
Holding Time	Acceptable			

Initial and Final Canister Pressure Results

Canister Pressure Criteria	Acceptable

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	**Yes**		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	**Yes**		

Comments (note deviations):

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	**Yes**		
Do the reporting limits meet project requirements?	**Yes**		

Comments (note deviations):

Sample FD03-SG032421 was analyzed by full scan TO-15 instead of SIM/Low Level analysis due to high levels of target compounds.

Overall Comments: Data are usable with appropriate qualifiers applied.

Data Validator: *Kristine Molloy* Date: *5/6/2021*

Data Reviewer: *Cherie Zakowski* Date: *5/8/2021*

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number:	2103817
Laboratory:	Eurofins Air Toxics
Matrix:	Air
Collection date:	03/25/21
Analysis/Methods:	Volatile Organic Compounds - EPA Method TO-15 Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number
MW24-SG032521-130	2103817-01A / B
MW24-SG032521-104	2103817-02A / B
SB42-SG032521-7	2103817-03A / B
MW29-SG032521-98	2103817-04A / B

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPDs) ≤40%?			**N/A**
Laboratory Control Spike Duplicate RPDs within limits?			**Yes**
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Were the Laboratory Duplicate RPDs within limits?			**N/A**

Comments (note deviations):

Field Duplicates	**TO-15 / SIM**	**Sample (ug/m3)**	**Duplicate (ug/m3)**	**%RPD**	**Qualifiers**	**Associated Samples**
N/A						

LCS/LCSD	**TO-15 / SIM**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
2103817-07A / 07AA		Acceptable			
2103817-07B / 07BB (SIM)		Acceptable			

MS/MSD	**TO-15 / SIM**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
N/A					

Laboratory Duplicate	**Sample (ug/m3)**	**Duplicate (ug/m3)**	**RL**	**%RPD**	**Qualifiers**	**Associated Samples**
N/A						

Accuracy:	**Yes**	**No**	**N/A**
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?			**Yes**
Were the Laboratory Method Blank results all < RL?			**No**
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)			**Yes**
Was the CCV criteria met? (30%)			**Yes**
Was the Tuning criteria met?			**Yes**
Were the Surrogate % recoveries within laboratory determined control limits?			**Yes**
Were the Internal Standard areas within ± 60 - 140%?			**Yes**
Was canister certification criteria met?			**Yes**
Were sample results able to be recalculated from the laboratory raw data and were they accurate?			**Yes**
Was target compound identification correctly performed by the laboratory?			**Yes**
Were chromatograms representative of the sample results?			**Yes**

Comments (note deviations):

Blanks	TO-15 / SIM	Concentration (ug/m^3)	MDL / RL (ug/m^3)	Qualifiers	Associated Samples
Lab Blank					
2103817-05A		Nondetect			
2103817-05B (SIM)	1,2-Dichloroethane	0.015 J	0.014 / 0.077	None	Sample results nondetect
	Trichloroethene	0.045 J	0.018 / 0.10	**U-RL**	**2103817-01B**

Field Blank	TO-15 / SIM	Concentration	MDL / RL	Qualifiers	Associated Samples
N/A					

Surrogates	TO-15 / SIM	%R	Limit	Qualifiers	Associated Samples
		Acceptable			

MS/MSD	TO-15 SIM	%R	Limits (%)	Qualifiers	Associated Samples
N/A					

LCS/LCSD	TO-15 / SIM	%R	Limits	Qualifiers	Associated Samples
2103817-07A / 07AA		Acceptable			
2103817-07B / 07BB (SIM)		Acceptable			

ICV/CCV	TO-15 / SIM	%R	Qualifiers	Associated Samples
4/2/2021 13:32	Freon 11	130.34	**J / UJ**	**All samples**

ICAL	TO-15 / SIM	RRF	%RSD	Qualifiers	Associated Samples
4/01/2021 22:03		Acceptable	Acceptable		
4/01/2021 20:04 (SIM)		Acceptable	Acceptable		

CCV	TO-15 / SIM	RRF	%D	Qualifiers	Associated Samples
4/6/2021 8:03		Acceptable	Acceptable		
4/7/2021 12:14		Acceptable	Acceptable		
4/6/2021 8:03 (SIM)		Acceptable	Acceptable		
4/7/2021 12:14 (SIM)		Acceptable	Acceptable		

Tune	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Internal Standards	TO-15 / SIM	Area %	Area % Criteria	Qualifiers	Associated Samples
	All Internal Standards	Acceptable			

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review	TO-15 / SIM	Results
Recalculated Sample Result		Acceptable

Sample #	Laboratory Reported Result (ug/m3)	Recalculated Sample Result (ug/m3)
TO-15		**RRF / Concentration**
2103817-04A	Bromodichloromethane : 2.1	0.6896 / 1.989
2103817-04A	Carbon Disulfide: 7.1	2.96577 / 7.131
TO-15 - SIM		
2103817-04B	Benzene: 0.47	1.1297/ 0.473
2103817-04B	Tetrachloroethene: 170	1.1320 / 168.738

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc. = (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification	Acceptable
Chromatogram review	Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	**Yes**		
Were holding times met?	**Yes**		
Was preservation criteria met? (0° - 6° C)			**N/A**
Were Chain-of-Custody records complete and provided in data package?	**Yes**		

Comments (note

Holding Time / Canister Pressure Criteria	Days to Analysis	Criteria	Qualifiers	Associated Samples
Holding Time	Acceptable			

	Initial and Final Canister Pressure Results
Canister Pressure Criteria	Acceptable

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	**Yes**		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	**Yes**		

Comments (note

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	**Yes**		
Do the reporting limits meet project requirements?	**Yes**		

Comments (note deviations):

Overall Comments: Data are usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 4/30/2021

Data Reviewer: Cherie Zakowski Date: 5/4/2021

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number: 2103818
Laboratory: Eurofins Air Toxics
Matrix: Air
Collection date: 03/26/21
Analysis/Methods:

Volatile Organic Compounds - EPA Method TO-15
Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number
FD05-SG032621	2103818-01A / B
MW34-SG032621**	2103818-02A / B
MW24-SG032521-60	2103818-03A / B
MW24-SG032621-32	2103818-04A / B

**This sample is applicable to the East Side Springs Data Summary Report only.

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:

	Yes	No	N/A
Are the field duplicate relative percent differences (RPDs) ≤40%?			**Yes**
Laboratory Control Spike Duplicate RPDs within limits?			**Yes**
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Were the Laboratory Duplicate RPDs within limits?			**Yes**

Comments (note deviations):

Field Duplicates	TO-15 / SIM	Sample (ug/m3) MW24-SG032621-32	Duplicate (ug/m3) FD05-SG032621	%RPD	Qualifiers	Associated Samples
	1,1,1-Trichloroethane	2.1	2.0	NC	None	Sample results < 5xs RL; ABS Diff. < RL
	Benzene	0.28 J	0.34 J	NC	None	
	Carbon Tetrachloride	2.8	2.8	NC	None	
	Dibromochloromethane	1.8 J	1.3 J	NC	None	
	Freon 11	18 J	18 J	NC	None	
	Freon 113	1.9 J	2 J	NC	None	
	Freon 114	0.37 J	0.39 J	NC	None	
	Freon 12	3.0 J	3.0 J	NC	None	
	Vinyl Chloride	0.15 J	0.75 U	NC	None	

LCS/LCSD	TO-15 / SIM	%RPD	Limits	Qualifiers	Associated Samples
2103818-07A / 07AA		Acceptable			
2103818-07B / 07BB (SIM)		Acceptable			
2103818-07C / 7CC		Acceptable			
2103818-07D / 7DD (SIM)		Acceptable			

MS/MSD	TO-15 / SIM	%RPD	Limit	Qualifiers	Associated Samples
N/A					

Laboratory Duplicate	Sample (ug/m3)	Duplicate (ug/m3)	RL	%RPD	Qualifiers	Associated Samples
2103818-03A / 03AA						
Freon 113	2.3	3.0	13.0	27	None	Sample results < 5xs RL; ABS Diff. < RL
2103818-03B / 03BB				Acceptable		

Accuracy:	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?			**Yes**
Were the Laboratory Method Blank results all < RL?			**No**
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)			**Yes**
Was the CCV criteria met? (30%)			**Yes**
Was the Tuning criteria met?			**Yes**
Were the Surrogate % recoveries within laboratory determined control limits?			**Yes**
Were the Internal Standard areas within ± 60 - 140%?			**Yes**
Was canister certification criteria met?			**Yes**
Were sample results able to be recalculated from the laboratory raw data and were they accurate?			**Yes**
Was target compound identification correctly performed by the laboratory?			**Yes**
Were chromatograms representative of the sample results?			**Yes**

Comments (note deviations):

Blanks	**TO-15 / SIM**	**Concentration (ug/m^3)**	**MDL / RL (ug/m^3)**	**Qualifiers**	**Associated Samples**
Lab Blank					
2103818-05A		Nondetect			
2103818-05B (SIM)	1,2-Dichloroethane	0.015 J	0.014 / 0.077	None	Sample results nondetect
	Trichloroethene	0.045 J	0.018 / 0.10	**U-RL**	**2103818-01B, 2103818-2B**
2103818-05C	1,2,4-Trichlorobenzene	0.74 J	0.52 / 3.7	None	Sample results nondetect
	1,2-Dichlorobenzene	0.099 J	0.059 / 0.60	None	Sample results nondetect
	1,3-Dichlorobenzene	0.085 J	0.065 / 0.6	None	Sample results nondetect
	1,4-Dioxane	0.088 J	0.074 / 0.36	None	Sample results nondetect
	alpha-Chlorotoluene	0.20 J	0.10 / 0.52	None	Sample results nondetect
2103818-05D (SIM)	1,2-Dibromoethane	0.047 J	0.044 / 0.38	None	Sample results nondetect
	1,2-Dichloroethane	0.021 J	0.014 / 0.081	None	Sample results nondetect
	1,4-Dichlorobenzene	0.085 J	0.078 / 0.3	None	Sample results nondetect
	Tetrachloroethene	0.033 J	0.03 / 0.14	None	Sample results> RL
	Trichloroethene	0.051 J	0.018 / 0.11	**U-RL**	**2103818-04B**

Field Blank	**TO-15 / SIM**	**Concentration**	**MDL / RL**	**Qualifiers**	**Associated Samples**
N/A					

Surrogates	**TO-15 / SIM**	**%R**	**Limit**	**Qualifiers**	**Associated Samples**
		Acceptable			

MS/MSD	**TO-15 SIM**	**%R**	**Limits (%)**	**Qualifiers**	**Associated Samples**
N/A					

LCS/LCSD	**TO-15 / SIM**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
2103818-07A / 7AA		Acceptable			
2103818-07B / 07BB (SIM)		Acceptable			
2103818-07C / 7CC		Acceptable			
2103818-07D / 7DD (SIM)		Acceptable			

ICV/CCV	**TO-15 / SIM**	**%R**	**Qualifiers**	**Associated Samples**
4/2/2021 13:32 ICV	Freon 11	130.34	**J / UJ**	**All samples**

ICAL	**TO-15 / SIM**	**RRF**	**%RSD**	**Qualifiers**	**Associated Samples**
4/01/2021 22:03		Acceptable	Acceptable		
4/01/2021 20:04 (SIM)		Acceptable	Acceptable		

CCV	TO-15 / SIM	RRF	%D	Qualifiers	Associated Samples
4/6/2021 8:03		Acceptable	Acceptable		
4/7/2021 7:50		Acceptable	Acceptable		
4/7/2021 12:14		Acceptable	Acceptable		
4/7/2021 11:59		Acceptable	Acceptable		
4/6/2021 8:03 (SIM)		Acceptable	Acceptable		
4/7/2021 7:50 (SIM)		Acceptable	Acceptable		
4/7/2021 12:14 (SIM)		Acceptable	Acceptable		
4/7/2021 11:59 (SIM)		Acceptable	Acceptable		

Tune	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Internal Standards	TO-15 / SIM	Area %	Area % Criteria	Qualifiers	Associated Samples
	All Internal Standards	Acceptable			

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review — **TO-15 / SIM** — **Results**

Recalculated Sample Result — Acceptable

Sample #	Laboratory Reported Result (ug/m3)	Recalculated Sample Result (ug/m3)
TO-15		**RRF / Concentration**
2103818-03A	Bromodichloromethane: 40	0.6833 / 37.429
2103818-03A	Freon 11: 20	1.99360 / 20.246
TO-15 - SIM		
2103818-03B	Carbon Tetrachloride: 3.0	1.9248 / 2.961
2103818-03B	Freon 12: 2.9	2.4436 / 2.912

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc. = (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification	Acceptable
Chromatogram review	Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	Yes		
Were holding times met?	Yes		
Was preservation criteria met? (0° - 6° C)			N/A
Were Chain-of-Custody records complete and provided in data package?	Yes		

Comments (note

Holding Time / Canister Pressure Criteria	Days to Analysis	Criteria	Qualifiers	Associated Samples
Holding Time	Acceptable			

	Initial and Final Canister Pressure Results
Canister Pressure Criteria	Acceptable

Comparability: **Yes No N/A**

Were analytical procedures and methods followed as defined in the QAPP or field change documentation? **Yes**

Comments (note deviations):

Completeness (90%): **Yes No N/A**

Are all data in this SDG usable? **Yes**

Comments (note

Sensitivity: **Yes No N/A**

Are MDLs present and reported? **Yes**

Do the reporting limits meet project requirements? **Yes**

Comments (note deviations):

Overall Comments: Data are usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 5/7/2021

Data Reviewer: Cherie Zakowski Date: 5/9/2021

Attachment 2

Data Package Completeness Review Checklists

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 2103700

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		None
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	X		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation Cherie Zakowski Date: 4/17/2021

Signature

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 2103701

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		None
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	X		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation Cherie Zakowski Date: 4/17/2021

Signature

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 2103702

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		None
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	X		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation Cherie Zakowski Date: 4/17/2021

Signature

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 2103703

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		None
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	X		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation Cherie Zakowski Date: 4/17/2021

Signature

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 2103725

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		None
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	X		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation Cherie Zakowski Date: 4/18/2021

Signature

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 2103751

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		None
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	X		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation Cherie Zakowski Date: 4/18/2021

Signature

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 2103752

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		None
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	X		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation Cherie Zakowski Date: 4/19/2021

Signature

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 2103753

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		None
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	X		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation Cherie Zakowski Date: 4/19/2021

Signature

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 2103754

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		None
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	X		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation Cherie Zakowski Date: 4/19/2021

Signature

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 2103813

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		None
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	X		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation Cherie Zakowski Date: 4/18/2021

Signature

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 2103814

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		None
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	X		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation Cherie Zakowski Date: 4/20/2021

Signature

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 2103815

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		None
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	X		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation Cherie Zakowski Date: 4/20/2021

Signature

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 2103816

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		None
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	X		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation Cherie Zakowski Date: 4/20/2021

Signature

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 2103817

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		None
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	X		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation Cherie Zakowski Date: 4/20/2021

Signature

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 2103818

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		None
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	X		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation Cherie Zakowski Date: 4/18/2021

Signature

Attachment 3

Analytical Data Packages

Note: Laboratory Data Reports removed from report and provided separately.

Final Data Summary Report
East Side Springs Vapor Intrusion Lines of Evidence

CONTRACT NO.: W912DQ-18-D-3008
DELIVERY ORDER NO.: W912DQ19F3048

700 South 1600 East PCE Plume Site
Salt Lake City, Utah

U.S. Army Corps of Engineers
Kansas City District

Department of Veterans Affairs
Veterans Health Administration Salt Lake City Health Care System

September 22, 2021

CDM Smith

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Section 1
Introduction

Under the U.S. Army Corps of Engineers (USACE), Kansas City District, Contract No. W912DQ-18-D-3008, Task Order No. W912DQ19F3048, CDM Federal Programs Corporation (CDM Smith) was directed to perform a remedial investigation (RI) for Operable Unit (OU) 1 of the 700 South 1600 East Tetrachloroethene (PCE) Plume Superfund Site in Salt Lake City, Utah. CDM Smith prepared this data summary report (DSR) to present the results of the East Side Springs (ESS) well installation, groundwater, surface water and soil gas sampling as part of the RI field characterization activities. The work presented in this DSR was conducted to address the following data quality objectives (CDM Smith 2020a):

- D3 (Groundwater Risk): Would human exposures to site-related VOCs in groundwater within the plume area result in unacceptable risks?
- D4 (Surface Water Risk): Would human and ecological exposures to site-related VOCs in surface water (i.e., springs, creeks, ponds, irrigation water) within the groundwater plume area result in unacceptable risks?

1.1 Background

The Salt Lake City Healthcare System George E. Wahlen Veterans Affairs Medical Center (VAMC) is in Salt Lake City, Utah (**Figure 1**). PCE contamination was first identified in groundwater in 1990 at the nearby Mt. Olivet Cemetery irrigation well during routine monitoring by the Salt Lake City Department of Public Utilities. This led to U.S. Environmental Protection Agency (EPA) and Utah Department of Environmental Quality involvement at the site and the preliminary determination that the source of PCE in groundwater was the historical dry-cleaning facility at the VAMC. The Veterans Health Administration (VHA) operated a part-time dry-cleaning operation that used PCE over a 6-year period in the late 1970s and early 1980s. During this period, dry-cleaning residuals were disposed in the sanitary sewer. The PCE plume is present beneath the VAMC property and in areas hydraulically downgradient, extending to the ESS neighborhood (Jacobs 2019).

In 2016, as part of the AOU1 RI, fifty soil borings were completed in the ESS area. Of the fifty borings, thirty-four temporary groundwater monitoring points were installed to collect groundwater samples. Ten of the locations were left installed with ¾-inch Schedule 40 polyvinyl chloride (PVC) and flush mount vault covers. Soil vapor, surface water sampling, and groundwater sampling of locations in the ESS neighborhood identified areas with elevated PCE with potential for vapor intrusion (EA 2019).

In 2018, as part of the RI for the former OU2, 18 shallow monitoring wells (including 7 monitoring well pairs and 4 individual wells) were constructed at the site. Additionally, two deep monitoring wells were installed: MW-03R on the VAMC campus, installed as a multilevel completion with four screened intervals, and MW-08, installed on 700 South near 1300 East as a

multilevel completion with three screened intervals (Jacobs Engineering Group Inc. [Jacobs] 2019).

Soil vapor investigations and surface water and groundwater sampling were also conducted as part of the RI effort. The soil vapor investigation identified elevated PCE concentrations around Buildings 6 and 7 on the VAMC campus and along the sanitary sewer line that runs from Building 7 through Sunnyside Park to the main sewer line on 900 South, specifically near a manhole in Sunnyside Park (Jacobs 2019).

As part of the Phase 1 RI field investigation, 27 groundwater monitoring wells were installed at 11 boring locations. Seven boring locations (MW-23 through MW-29) were selected to evaluate conditions in and immediately downgradient of suspected source areas. Four boring locations (MW-30, MW-31, MW-32, and MW-34) were advanced to delineate the plume laterally and vertically (CDM Smith 2021a).

During the Phase 2 OU1 RI field investigation, six groundwater monitoring wells were installed at four locations in the ESS neighborhood. MW-36 was installed to delineate the plume to the south of MW-17S/D and MW14S/D. MW-37S/D were installed to delineate the plume to west of MW-16S/D and northwest of MW-12S/D. MW-38S/D were installed to delineate the plume north of MW-16S/D and west of MW-08. MW-13L was installed in a deeper water bearing zone near MW-13S/D (CDM Smith 2021b). Soil vapor points were installed at MW-37 and MW-38. Monitoring wells in the ESS area are presented in **Figure 2**.

1.2 Purpose and Scope

The purpose of this DSR is to present the field work conducted and data collected during the 2021 ESS investigation including the piezometer replacement with residential groundwater monitoring wells, groundwater sampling, surface water sampling, and soil gas sampling. The rationale and approach for completing the piezometer replacement and sampling, surface water sampling, and soil vapor sampling were presented in the Final Phase 2 OU1 RI Work Plan (CDM Smith 2020a) and minor field modification (MFM) #4 to the Phase 2 Field Sampling Plan (CDM Smith 2021c).

The surface water sampling was completed to aid in the delineation of the PCE plume extent, evaluate volatile organic compound (VOC) concentration trends over time at select surface water sampling locations, and evaluate the rate of groundwater discharge to surface water in the ESS area. The soil gas sampling was completed to collect additional lines of evidence to identify areas of potential vapor intrusion (VI) risk. The groundwater sampling from the residential groundwater monitoring wells was completed to further delineate shallow groundwater VOC concentrations and to collect additional lines of evidence to identify areas of concern for VI.

This report summarizes the field work conducted and presents the data collected during the event. The ESS site features are presented in **Figure 2**. **Appendix A** includes the daily quality control reports submitted to USACE and VHA during the event. **Appendix B** includes copies of field logbook notes for the field work.

Section 2

Residential Groundwater Monitoring Well Installation

The following sections outline the field activities completed during the residential groundwater (RG) monitoring well installation and piezometer abandonment. The field activities were conducted per the EPA approved Phase 2 OU1 RI Work Plan and Quality Assurance Project Plan (QAPP) (CDM Smith 2020b) and MFM #4 to the Phase 2 Field Sampling Plan (CDM Smith 2021c), with deviations outlined in Section 6.

2.1 Utility Clearance and Permitting

Prior to drilling, all locations were surveyed for utilities using geophysical survey methods. Location clearance requests were submitted to Blue Stakes of Utah, and the utility location notifications were updated as required during the drilling event. TWS Environmental, LLC conducted the geophysical surveys for the boring locations in the ESS area in November 2020 during the Phase 2 drilling investigation. Due to limited availability, GPRS, LLC conducted the geophysical survey for locations that were not accessed during Phase 2 or that were relocated prior to drilling in April 2020. Utility locate reports are included in **Appendix C.**

2.1.1 Hand Auger Preclearing

Prior to drilling, the new or relocated boring locations were precleared using a hand auger in a three-hole pattern to 5 feet below ground surface (bgs). Piezometer replacements that did not have any identified utilities were probed around the boring location using a t-probe, a hand held slim metal rod used to probe for obstructions or utilities. If utilities were identified in the area, the RG well replacing the piezometer was offset from the original piezometer location.

2.1.2 Permitting

The Salt Lake City Corporation Engineering Division issued right-of-way (ROW) permits for the monitoring well installations. A performance bond and certificate of liability insurance accompanied the ROW permit application. Utah Barricade created traffic control plans, included in **Appendix D**, which were submitted to the Salt Lake City Division of Transportation for traffic control permits at the boring locations.

Copies of the ROW permit, traffic control permit, and associated documents can be found in **Appendix E**.

2.2 Drilling

Drilling occurred between April 1 and 8, 2021. Vista Geosciences used a Geoprobe 7822DT track-mounted direct push technology (DPT) drill rig with hollow-stem auger (HSA) capabilities to advance the borings. Auger cuttings or soil cores were collected and field screened using a photoionization detector. The lithology was logged, and photographs were taken of the cuttings

or core intervals. Borehole logs are included in **Appendix F** and photographs of the soil cores and cuttings are included in **Appendix G**. Well construction details are discussed in Section 2.4 and presented in **Table 1**. Soil cuttings were placed in drums and managed as investigation derived waste (IDW). The RG monitoring well locations are shown in **Figure 2**.

2.2.1 Piezometer Abandonment and Well Installation

Eight of the original ten piezometer locations were still intact. The GW-10 and GW-53 locations were destroyed during construction activities along 900 South. At the eight locations with existing piezometers, the flush mount surface completion was removed. The ¾-inch PVC piezometer was pulled by hand. At locations GW-20, GW-49, and GW-61, a 3-inch DPT sampler was advanced to the total depth of the piezometer. The 3-inch boring was backfilled with bentonite, hydrated, and covered with topsoil.

Installation of the RG wells was completed using HSA drilling methods. At the five locations where existing piezometers were being replaced (GW-11, GW-16, GW-50, GW-52, GW-59), the PVC piezometer was removed by hand, and the boring was overdrilled with HSA to construct the new well. At the remaining locations, a DPT soil core was collected for lithologic logging and the borehole was overdrilled using HSA to construct the well. Well construction details are provided in Section 2.3 and **Appendix F**.

2.2.2 RG-01 Drilling

RG-01 was drilled to replace GW-10 near the intersection of 900 South, 1100 East, and Gilmer Drive. GW-10 was destroyed during construction of a traffic circle at the intersection. During the AOU-1 investigation, GW-10 was drilled to 20 feet bgs. The ¾-inch PVC piezometer screen was installed from 13 to 18 feet bgs. The RG-01 location was drilled to 20 feet bgs with DPT to verify lithology, then drilled with HSA to create an annulus.

2.2.3 RG-02 Drilling

RG-02 was drilled to replace GW-11 in the alley between the 1100 block of Sunnyside Avenue and 900 South. GW-11 was drilled to 15 feet bgs and screened from 10 to 15 feet bgs. The GW-11 PVC was pulled by hand, and the boring was drilled with HSA to 15 feet bgs.

2.2.4 RG-03 Drilling

RG-03 was drilled to replace GW-16 near 1133 East Sunnyside Avenue. GW-16 was drilled to 10 feet bgs and screened from 3 to 8 feet bgs. The GW-16 piezometer was pulled by hand, and the boring was drilled with HSA to 8 feet bgs.

2.2.5 RG-04 Drilling

RG-04 was drilled to replace GW-20 near 761 South 1100 East. GW-20 was drilled to 20 feet bgs and screened from 11.5 to 16.5 feet bgs. Because of unclear utility markings, the RG-04 location was offset from the GW-20 drilling location. The GW-20 piezometer was abandoned using DPT as described in Section 2.2.1. The offset location was drilled on 1100 East in the parking lane. The asphalt was cored, and the boring was hand-augered to 5 feet bgs in a three-hole pattern prior to HSA advancement of the RG-04 borehole. The RG-04 boring was advanced to 20 feet bgs.

2.2.6 RG-05 Drilling

RG-05 was drilled north of the East High School property along 800 South. During the AOU-1 investigation, GW-27 was temporarily installed in a similar location but was abandoned after sampling. The RG-05 location was hand-augered to 5 feet bgs in a three-hole pattern before drilling. RG-05 was advanced to 30 feet bgs with DPT core prior to HSA advancement for well construction.

2.2.7 RG-06 Drilling

RG-06 was drilled to replace GW-50 near 1190 East Gilmer Drive. GW-50 was drilled to 10 feet bgs and screened from 4 to 9 feet bgs. The GW-50 PVC was pulled by hand, and the boring was drilled with HSA to 10 feet bgs.

2.2.8 RG-07 Drilling

RG-07 was drilled to replace GW-52 near 1244 East 900 South. GW-52 was drilled to 30 feet bgs with screen installed from 25 to 30 feet bgs. The GW-52 piezometer was pulled, and the boring was drilled with HSA. The HSA boring encountered refusal at approximately 17 feet bgs. The RG-07 boring was relocated approximately 4 feet south. The boring was advanced to 30 feet bgs.

2.2.9 RG-08 Drilling

RG-08 was drilled to replace GW-53 near the southwest corner of the intersection of 900 South and 1200 East. GW-53 was likely destroyed during road/utility construction in the area. GW-53 was drilled to 15 feet bgs and screened from 10 to 15 feet bgs. RG-08 was drilled along the south side of 900 South in the parking lane. RG-08 was drilled with DPT prior to augering with the HSA. The boring was advanced to 20 feet bgs.

2.2.10 RG-09 Drilling

RG-09 was drilled to replace GW-59 at the intersection of Sunnyside Avenue and 1100 East. The GW-59 piezometer was pulled, and the HSA boring was drilled to 15 feet bgs. RG-09-was screened from 10 to 15 feet bgs.

2.2.11 RG-10 Drilling

RG-10 was drilled to replace GW-61 along Michigan Avenue between 1100 East and 1200 East. GW-61 was located near 1146 E Michigan Avenue. GW-61 was drilled to 20 feet bgs and screened 15 to 20 feet bgs. The GW-61 piezometer was pulled, drilled to a depth of 20 feet using DPT, and abandoned with bentonite. The RG-10 boring was relocated to the east along Michigan Avenue closer to 1200 East. The RG-10 boring was drilled with DPT to 30 feet bgs prior to HSA drilling for the well installation.

2.2.12 RG-11 Drilling

RG-11 was drilled along the parking lane near 741 Douglas Street. The initial DPT boring encountered refusal at 12.5 feet bgs. The boring was offset approximately three feet to the south. The RG-11 boring was advanced to 40 feet bgs prior to HSA drilling for the well installation. Well construction details are provided in **Section 2.3** and **Appendix F.**

2.3 Well Construction

A summary of the well construction information for the wells installed during this event is presented in **Table 1**. Two-inch diameter polyvinyl chloride (PVC) well casings were installed with the HSA flights in place. Wells were installed according to the procedures described in the section 4.2.1 of the Phase 2 OU1 RI Work Plan (CDM Smith 2020a) and SOP 4-4, *Design and Installation of Monitoring Wells in Aquifers* included in the Appendix A of the QAPP (CDM Smith 2020b). Screens consisted of a 0.010-inch slot screen in 5- or 10-foot intervals. The well screen intervals were similar to the previous piezometer screen intervals, except for RG-10 and RG-11. The filter pack was constructed using 10/20 silica sand and extended 2 to 3 feet above the top of the screened intervals. Hydrated bentonite chips were installed above sand filter pack interval to approximately 2 feet bgs.

Soil vapor probes (SVPs) were installed at RG-01, RG-04, RG-05, RG-07, RG-08, RG-10, and RG-11 at approximately 5 feet bgs to assess the extent of volatile organic compounds in soil vapor in the ESS. SVPs are manufactured by AMS and consist of a 6-inch long, double-woven stainless-steel wire screens (0.0057-inch pore) with Swagelok fittings connected to 0.25-inch outer diameter Teflon-lined tubing. SVPs were installed within a 2- to 3-foot sand pack using 10/20 silica sand.

Each monitoring well location was completed at the surface with a flush-mounted manhole vault. RG-02, RG-04, RG-08, and RG-11 required a Salt Lake City-approved concrete batch mix for the surface completion because the location was in the ROW. Well completion diagrams, including screen, sand, and bentonite intervals, and SVP depths, are included on the boring logs in **Appendix F**. Survey data for the well locations are presented in **Appendix H.** The finalized survey information is included in the remedial investigation report.

2.3.1 RG-01

The RG-01 well design consists of one 2-inch monitoring well with an SVP.

- A 2-inch PVC monitoring well was installed with a 0.010 slot screen from 9 to 19 feet bgs. Groundwater was encountered at approximately 9 feet bgs during drilling.
- The SVP was installed at 4.5 feet bgs with a sand pack from 4.5 to 7 feet bgs.

2.3.2 RG-02

The RG-02 well design consists of one 2-inch monitoring well.

- A 2-inch PVC monitoring well was installed with a 0.010 slot screen from 5 to 15 feet bgs. Groundwater was encountered at approximately 3 feet bgs during drilling.
- Because of the depth to groundwater no soil vapor probe was installed.

2.3.3 RG-03

The RG-03 well design consists of one 2-inch monitoring well.

- A 2-inch PVC monitoring well was installed with a 0.010 slot screen from 3 to 8 feet bgs. Groundwater was encountered at approximately 3 feet bgs during drilling.

- Because of the depth to groundwater, no soil vapor probe was installed.

2.3.4 RG-04

The RG-04 well design consists of one 2-inch monitoring well with an SVP.

- A 2-inch PVC monitoring well was installed with a 0.010 slot screen from 10 to 20 feet bgs. Groundwater was encountered at approximately 14 feet bgs during drilling.
- The SVP was installed at 5 feet bgs with a sand pack from 4 to 7 feet bgs.

2.3.5 RG-05

The RG-05 well design consists of one 2-inch monitoring well with an SVP.

- A 2-inch PVC monitoring well was installed with a 0.010 slot screen from 20 to 30 feet bgs. Groundwater was encountered at approximately 24 feet bgs during drilling.
- The SVP was installed at 5 feet bgs with a sand pack from 4 to 7 feet bgs.

2.3.6 RG-06

The RG-06 well design consists of one 2-inch monitoring well with an SVP.

- A 2-inch PVC monitoring well was installed with a 0.010 slot screen from 4 to 9 feet bgs. Groundwater was encountered at approximately 2.3 feet bgs during drilling.
- No SVP was installed because of shallow groundwater.

2.3.7 RG-07

The RG-07 well design consists of one 2-inch monitoring well with an SVP.

- A 2-inch PVC monitoring well was installed with a 0.010 slot screen from 20 to 30 feet bgs. Groundwater was encountered at approximately 21 feet bgs during drilling.
- The SVP was installed at 5 feet bgs with a sand pack from 4 to 7 feet bgs.

2.3.8 RG-08

The RG-08 well design consists of one 2-inch monitoring well with an SVP.

- A 2-inch PVC monitoring well was installed with a 0.010 slot screen from 8 to 18 feet bgs. Groundwater was encountered at approximately 6 feet bgs during drilling.
- The SVP was installed at 4.5 feet bgs with a sand pack from 4 to 6 feet bgs.

2.3.9 RG-09

The RG-09 well design consists of one 2-inch monitoring well with an SVP.

- A 2-inch PVC monitoring well was installed with a 0.010 slot screen from 5 to 15 feet bgs. Groundwater was encountered at approximately 5.5 feet bgs during drilling.
- No SVP was installed because of shallow groundwater.

2.3.10 RG-10

The RG-10 well design consists of one 2-inch monitoring well with an SVP.

- A 2-inch PVC monitoring well was installed with a 0.010 slot screen from 20 to 30 feet bgs. Groundwater was encountered at approximately 26 feet bgs during drilling.
- The SVP was installed at 5 feet bgs with a sand pack from 4 to 7 feet bgs.

2.3.11 RG-11

The RG-11 well design consists of one 2-inch monitoring well with an SVP.

- A 2-inch PVC monitoring well was installed with a 0.010 slot screen from 30 to 40 feet bgs. Groundwater was encountered at approximately 29 feet bgs during drilling.
- The SVP was installed at 5 feet bgs with a sand pack from 4 to 7 feet bgs.

2.4 Well Development

The 2-inch monitoring wells installed during the ESS investigation were developed by purging with a bailer (to remove sediment from the screened interval) and a submersible pump, according to methods described in standard operating procedure (SOP) 4-3 *Well Development and Purging* which is included in Appendix A of the Phase 2 QAPP (CDM Smith 2020b). A minimum purge volume was calculated prior to development (three times the volume of water column in the well casing). The wells were purged until the minimum volume had been removed or parameter stabilization and turbidity requirements (less than 10 nephelometric turbidity units [NTU] or within 10 percent) were met. **Table 2** lists the development technique used and volume purged from each well. Well development field notes are included in **Appendix B**. The development water was handled as IDW.

2.5 Decontamination and Investigation-Derived Waste

All decontamination waste produced during the drilling effort was collected and managed in accordance with SOP 4-5, *Field Equipment Decontamination at Nonradioactive Sites* (CDM Smith 2020b). Waste was produced from decontaminating all downhole drilling equipment prior to drilling activities, between boreholes, and after the drilling investigation. Additional equipment decontaminated after each use include the drilling tag line, water level meters, development pump, and nondedicated bailer.

All IDW was handled per SOP 2-2, *Guide to Handling Investigation-Derived Waste* (CDM Smith 2020b). All decontamination and purge/development water was transferred to the holding tanks at the VAMC campus IDW yard. The soils from drilling and pre-clearing were placed in 55-gallon steel drums. Prior to disposal, groundwater and soil were characterized and determined to be nonhazardous. Approximately 2,300 gallons of decontamination, development, and purge water IDW was generated. Twenty 55-gallon drums of soil were disposed off-site at Wasatch Regional Landfill.

Waste profiles and nonhazardous manifests are included in **Appendix I.**

Section 3
Residential Groundwater Monitoring Well Sampling

The following section outlines the RG monitoring well field sampling activities, which occurred from April 13 to 16, 2021.

The RG wells were installed to replace temporary piezometer groundwater sampling locations that were installed during the AOU-1 RI. As described in MFM #4 to Phase 2 Field Sampling Plan (CDM Smith, 2021c), the RG wells were sampled for VOC using HydraSleeve samplers.

Depth to water and depth to bottom of the well measurements were collected prior to deploying the HydraSleeve samplers. At least 24 hours passed between the end of well development activities and deployment of a HydraSleeve. the HydraSleeve samplers were deployed, and the groundwater was allowed to equilibrate for a minimum of 48 hours before retrieving the sampler. Groundwater quality parameters were collected if there was sufficient water in the sampler following filling of bottles for laboratory analysis.

All samples were submitted to EMAX Laboratories Inc. in Torrance, California. The analytical results are discussed in Section 3.1. Laboratory data are included in **Appendix J**. Field quality control samples were collected, including field duplicates, matrix spike/matrix duplicates, and trip blanks and are discussed in the Quality Control Summary Report in **Appendix J**.

3.1 Residential Groundwater Monitoring Well Sampling

Groundwater samples were collected and analyzed for VOCs. Groundwater elevations and depths to water are presented in **Table 3**. **Table 4** presents the concentrations of detected VOCs compared with the EPA maximum contaminant levels (MCLs) or regional screening levels (RSLs) for tap water (for compounds without an established MCL). The RG well locations and results for PCE and trichloroethene (TCE) are shown in **Figure 3**.

A total of 11 locations were sampled for VOC analysis. PCE was detected in all the samples ranging from 1.5 microgram per liter (µg/L) to 60 µg/L. Of those, PCE exceeded the groundwater MCL (5 µg/L) in nine samples. The highest PCE concentrations were in RG-02 (57 µg/L), RG-03 (60 µg/L), and RG-08 (56 µg/L). The locations that did not exceed the PCE MCL were RG-06 (1.5 µg/L) and RG-10 (3 µg/L).

TCE was detected in 9 of the 11 sample locations. TCE concentrations ranged from 0.17 J µg/L to 7.4 µg/L. RG-06 (7.4 µg/L) was the only location that exceeded the TCE MCL of 5 µg/L. TCE was not detected in RG-05 or RG-11. Cis-1,2-Dichloroethene (cis-1,2-DCE) was detected at six of the locations. All detections were less than the cis-1,2-DCE MCL (70 µg/L). The cis-1,2-DCE concentrations ranged from 0.11 J µg/L to 2.2 µg/L. Vinyl chloride was not detected in any of the samples.

Groundwater remaining in the HydraSleeve following sample collection was handled as IDW. Any nondedicated sampling equipment was decontaminated following procedures described in Section 2.6 and SOP 4-5, *Field Equipment Decontamination at Nonradioactive Sites* (CDM Smith 2020b).

Section 4
Surface Water Sampling

Surface water samples were collected and analyzed for VOCs, metals, and general chemistry. Field parameters and flow rates were also collected at or near the sampling locations. The surface water sampling locations are seeps or springs and are presented in **Table 5**. Sample locations and procedures were discussed in the *Plan for Surface Water Sampling and Flow Measurement* memorandum (CDM Smith 2021d). Ten surface water locations were sampled either by grab (gravity flow) or peristaltic pump. A field duplicate was collected at SW-54. Only flow rate was measured at the downgradient Benson Spring location (SW-15). Six of the sampled locations were previously sampled during the AOU1 or OU2 investigations. Four of the locations were sampled for the first time during the April 2021 surface water sampling event. The surface water locations are presented in **Figure 4.**

All surface water samples were submitted to EMAX Laboratories Inc. in Torrance, California. The analytical results are discussed in Section 4.2. Laboratory data are included in **Appendix J**. Field quality control samples were collected, including field duplicates, matrix spike/matrix duplicates, and trip blanks, and are discussed in the Quality Control Summary Report in **Appendix J**. At SW-16I, the flow was sampled via a small floor grate which was too small for flow rate equipment.

4.1 Surface Water Flow Rates

Flow rates were collected at 10 of the 11 surface water locations. At location SW-54 (the primary source flow for Benson Springs), a flow rate was not recorded due to the flow being widely dispersed and flowing over a concrete barrier. At SW-16I (interior sump in Our Lady of Lourdes) and SW-35, the flow rates were estimated. At SW-16I, the flow was sampled via a small floor grate which was too small for flow rate equipment. Limited flow was observed at SW-35, therefore it also had to be estimated. Flow rates were measured using an area-velocity technique with a velocity meter (OTT MF Pro) or by measuring time to fill a known volume (a quart or 5-gallon bucket with graduated measurements printed on the side). The recorded flow rates ranged from estimated 1 liter per minute (L/min) (SW-35) to 807 L/min (SW-15). The measured and estimated flow rates are included in **Table 5.**

4.2 Surface Water VOC Results

Table 6 presents the concentrations of detected VOCs compared with the EPA MCLs or RSLs for tap water (for compounds without an established MCL) for screening purposes. Detections are presented as bolded values and exceedances of the MCL or RSL are presented as highlighted values. The surface water locations and results for PCE and TCE are shown in **Figure 4**.

PCE was detected at 7 of the 10 sampled locations. PCE concentrations ranged from 5.7 µg/L to 59 µg/L. Seven locations had PCE detections at concentrations greater than the MCL (5 µg/L). TCE was detected in five of the surface water samples. The TCE concentrations ranged from 0.35 J µg/L to 4.6 µg/L. None of the samples had TCE concentrations greater than the MCL (5 µg/L). Cis-1,2-DCE was also detected in five samples. The concentrations of cis-1,2-DCE ranged from 0.12 J

µg/L to 1.3 µg/L and were all below the MCL (70 µg/L). Vinyl chloride was not detected in any of the samples.

4.3 Surface Water General Chemistry

Total (unfiltered) metal concentrations provide information on the general chemistry of groundwater (i.e., salinity), and redox conditions (i.e., redox-sensitive metals such as arsenic). Analytical results for total (unfiltered) metals are presented in **Table 7**. The highest observed concentrations of redox-sensitive metals were as follows:

- Concentrations of arsenic greater than 1 µg/L were observed at SW-12, SW-34, SW-35, SW-39, SW-53, and SW-166.
- Iron concentrations greater than 500 µg/L were not detected in any of the samples.
- Manganese concentrations greater than 500 µg/L were not detected in any of the samples.

Dissolved oxygen (DO), oxidation-reduction potential, sulfate, nitrate, ferrous iron, and methane are geochemical parameters that can be used to evaluate redox conditions. These parameters, along with other water quality and geochemical parameters, are presented in **Table 8.** Reductive dechlorination of PCE to TCE and cis-1,2-DCE generally occurs under iron-reducing to sulfate-reducing conditions, while complete dechlorination to ethene and ethane generally occurs under sulfate-reducing to methanogenic conditions (EPA 2006). Conditions are considered aerobic when DO is greater than 0.5 milligrams per liter (mg/L), iron-reducing when ferrous iron is greater than 0.5 mg/L, and methanogenic when methane is greater than 1 mg/L (EPA 2006). The surface water samples have all been exposed to atmosphere therefore all the samples have elevated DO (greater than 6 mg/L), positive oxidation-reduction potential, and low ferrous iron (less than 0.3 mg/L).

Methane was detected in eight locations. The detected methane concentrations ranged from 0.18 J µg/L (SW-39) to 1.1 J µg/L (SW-166). Methane was not detected at SW-16I or SW-54. Where detected, sulfate concentrations ranged from 101 mg/L (SW-12) to 175 mg/L (SW-16I). Low ferrous iron (less than 0.3 mg/L), low methane (less than 1.1 J µg/L), and high sulfate (101 to 175 mg/L) in the surface water samples further support the observation that conditions are generally aerobic (**Table 8**).

Chloride concentrations ranged from 121 mg/L (SW-08) to 404 mg/L (SW-39). Alkalinity ranged from 219 mg/L (SW-16E) to 306 mg/L (SW-53). Total organic carbon was less than 2 mg/L for all samples, with the highest detection of 1.41 mg/L at SW-34.

Section 5
Soil Vapor Sampling

The following section outlines the soil vapor sampling at soil vapor monitoring locations installed on groundwater monitoring wells and RG wells, which occurred from March 26 to April 14, 2021.

Single soil vapor probes were installed on monitoring wells MW-32, MW-34, MW-37, and MW-38 during the Phase 1 and Phase 2 drilling investigations in 2020. Single soil vapor probes were also installed on 7 of the 11 residential groundwater monitoring wells in April 2021. Soil vapor probes were not installed on the RG wells with shallow depth to groundwater (RG-02, RG-03, RG-06, and RG-09). The soil vapor sampling locations are presented in **Figure 5.**

5.1 Soil Vapor Probe Sampling Procedures

All soil vapor probes were sampled in accordance with *Technical SOP 1-8, Vapor Sampling Using SUMMA Canister* presented in Appendix A of the QAPP (CDM Smith 2020b). Soil vapor probes were purged before sample collection. Purge volume was calculated based on tubing diameter (¼-inch inner diameter) and probe depth. Three times the volume of the probe tubing was purged at each location. Shallow probes were purged using a hand vacuum pump. Deeper probes were purged using an electric vacuum pump with an attached flow meter. The flow rate was adjusted to 1 L/min for most locations.

Once the probe was purged to remove the minimum volume, a 6-liter SUMMA canister was connected using dedicated tubing. In some cases, new Swagelok connections were added to the tubing to connect the canister. Soil vapor samples were collected using a 30-minute flow controller connected to the canister. Sample collection began when the valve on the canister was opened and the initial vacuum reading was recorded. When the vacuum gauge was between 2 and 5 inches of mercury (approximately 30 minutes after start), the final vacuum reading was recorded, and the valve was closed. The field duplicate sample was collected by connecting dedicated probe tubing to a "T-bar." The T-bar was then connected to two canisters and the valves were opened simultaneously. Sample canisters were labeled and shipped in boxes (with the flow controllers) to Eurofins Air Toxics, LLC for analysis.

The analytical results are discussed in Section 5.2. Laboratory data are included in **Appendix J**. Field quality control samples were collected and are discussed in the Quality Control Summary Report in **Appendix J**.

5.2 Soil Vapor VOC Results

Table 9 presents the concentrations of detected VOCs compared with the residential soil vapor risk-based screening levels (RBSLs). Detections are presented as bolded values and exceedances of the RSBL are presented as highlighted values. The soil vapor sampling locations and results for PCE and TCE are shown in **Figure 5**.

Eleven locations were sampled for VOC analysis. One field duplicate was collected at RG-10. PCE was detected in all the samples at concentrations ranging from 0.41 microgram per cubic meter (µg/m^3) to 570 µg/m^3. Of those, PCE exceeded the residential soil gas RBSL (360 µg/m^3) in one sample (RG-08).

TCE was detected in 7 of the 11 sample locations. TCE concentrations ranged from 0.11 J µg/m^3 to 4 µg/m^3. None of the locations exceeded the TCE RBSL of 16 µg/m^3. TCE was not detected in MW-32, MW-34, MW-37, or MW-38. Cis-1,2-DCE was detected at three of the locations. An RBSL for cis-1,2-DCE has not been established. The cis-1,2-DCE concentrations ranged from 0.03 J µg/m^3 to 0.52 µg/m^3. Vinyl chloride was detected at seven of the locations. The detected vinyl chloride concentrations ranged from 0.07 µg/m^3 to 0.13 µg/m^3. All vinyl chloride concentrations were less than the RBSL of 5.6 µg/m^3.

Two locations had estimated 1,4-dioxane detections. Both locations with 1,4-dioxane detections, MW-34 (0.12 J µg/m^3) and MW-38 (0.19 J µg/m^3), were less than the RBSL of 19 µg/m^3. Benzene was detected at 11 sample locations. Benzene concentrations ranged from 0.07 J µg/m^3 to 20 µg/m^3. The benzene concentration at RG-08 (20 µg/m^3) exceeded the RBSL of 12 µg/m^3. Benzene was not detected in groundwater samples in this area of the site. Chloroform was detected at all 11 locations. Chloroform concentrations ranged from 0.7 µg/m^3 to 110 µg/m^3. Seven of the locations had chloroform detections equal to or greater than the RBSL of 4 µg/m^3. MW-34, MW-38, RG-04, and RG-10 had chloroform concentrations less than the RBSL. Benzene and chloroform are not considered to be site related compounds.

Section 6

Deviations from the Quality Assurance Project Plan

During RG well development, the minimum purge volume was calculated according to methods described in SOP 4-3 *Well Development and Purging,* which is included in Appendix A of the Phase 2 QAPP (CDM Smith 2020b). Information regarding development was documented in a field book rather than on field forms. Several locations had slow recharge; therefore, many of the locations were purged dry and then allowed to recharge. Since many of the locations were purged dry, parameter stabilization was not measured. After the minimum calculated purge volume was removed and the groundwater recharged, a bailer was pulled with the recharge water to visually examine the clarity. The water in the RG monitoring wells was visibly clear, and turbidity should not affect future sampling efforts or quality of the data.

Field forms were not completed with field parameters during surface water and RG well sampling. This will not affect the quality of the data, as the field parameters measured at the RG wells and surface water sample locations were included in the field notes included in **Appendix A** and are presented in **Tables 4** and **8** for the RG wells and surface water samples, respectively. Field parameters were only collected at RG wells with sufficient water present in the HydraSleeve following filling containers for laboratory analysis.

The hollow stem auger cuttings from RG-06 (GW-50) over-drilling and installation were not photographed for a photolog of the soil cuttings. RG-06 has a relatively shallow depth to water (2.24 feet bgs); therefore, the HSA cuttings were mixed and saturated.

Section 7
Summary

This report presents a summary of field activities, monitoring well construction details, and sample results from the East Side Springs area investigation completed in March and April 2021. The sample results include RG well groundwater sampling, surface water sampling, and soil vapor sampling of locations in the ESS. Further analysis and evaluation of these results will be presented in the RI report.

Eleven residential groundwater monitoring wells were installed as part of the ESS investigation. Nine temporary piezometers, installed in the ESS area during the AOU1 RI, were replaced with 2-inch monitoring wells. One location (GW-49) was abandoned. Another location (GW-61 to RG-10) was abandoned and relocated approximately 200 feet east. RG-05 was installed on the north side of East High School near where a groundwater sample (GW-27) was collected, but a piezometer was not installed during the AOU1 RI. RG-11 was installed in the 700 block of Douglas Street to identify depth to groundwater and PCE concentrations in an area without a nearby sampling point.

PCE was detected in all RG monitoring well groundwater samples. PCE exceeded the groundwater MCL (5 µg/L) in nine samples. TCE was detected in 9 of the 11 sample locations. RG-06 (7.4 µg/L) was the only location that exceeded the TCE MCL of 5 µg/L.

PCE was detected above the MCL (5 µg/L) at 7 of the 10 sampled surface water locations. Concentrations ranged from 5.7 µg/L to 59 µg/L..

Soil vapor monitoring points were installed on seven of the RG wells in April 2021. Soil vapor monitoring points were also installed at four monitoring wells during the Phase 1 OU2 and Phase 2 OU1 investigation in 2020. These 11 SVPs were sampled for soil vapor. PCE was detected in all samples, ranging from 0.41 µg/m^3 to 570 µg/m^3. Of those, PCE exceeded the residential soil gas RBSL (360 µg/m^3) in one sample (RG-08). TCE was detected in 7 of the 11 soil vapor sample locations. None of the locations exceeded the TCE RBSL of 16 µg/m^3. Benzene was detected at 11 sample locations. Benzene concentrations ranged from 0.07 J µg/m^3 to 20 µg/m^3. The benzene concentration at RG-08 (20 µg/m^3) exceeded the RBSL of 12 µg/m^3. Benzene is not considered to be a site related compound and the source is undetermined. Chloroform was detected at all 11 locations. Chloroform concentrations ranged from 0.7 µg/m^3 to 110 µg/m^3. Seven of the locations had chloroform detections equal to or greater than the RBSL of 4 µg/m^3. Chloroform is not considered to be a site related compound but is commonly associated with treated drinking water. 1,4-Dioxane was detected at two soil vapor sampling locations, but concentrations did not exceed the RBSL of 16 µg/m^3.

Data collected during this investigation will be evaluated further to refine the conceptual site model and will be summarized in the RI report.

Section 8
References

Jacobs. 2019. *OU-2 Data Summary Report, Operable Unit 2 Remedial Investigation 700 South 1600 East PCE Plume, Salt Lake City, Utah*. Prepared for the U.S. Army Corps of Engineers.

EA Engineering, Science, and Technology, Inc. (EA). 2019. *700 South 1600 East PCE Plume AOU-1: East Side Springs Remedial Investigation Report*. Prepared for the U.S. Department of Veterans Affairs. February. https://semspub.epa.gov/work/08/1769131.pdf.

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CDM Smith. 2021c. *Minor Field Modification #4 to the Phase 2 Field Sampling Plan, 700 South 1600 East PCE Plume, Salt Lake City, Utah.* Prepared for the U.S. Army Corps of Engineers.

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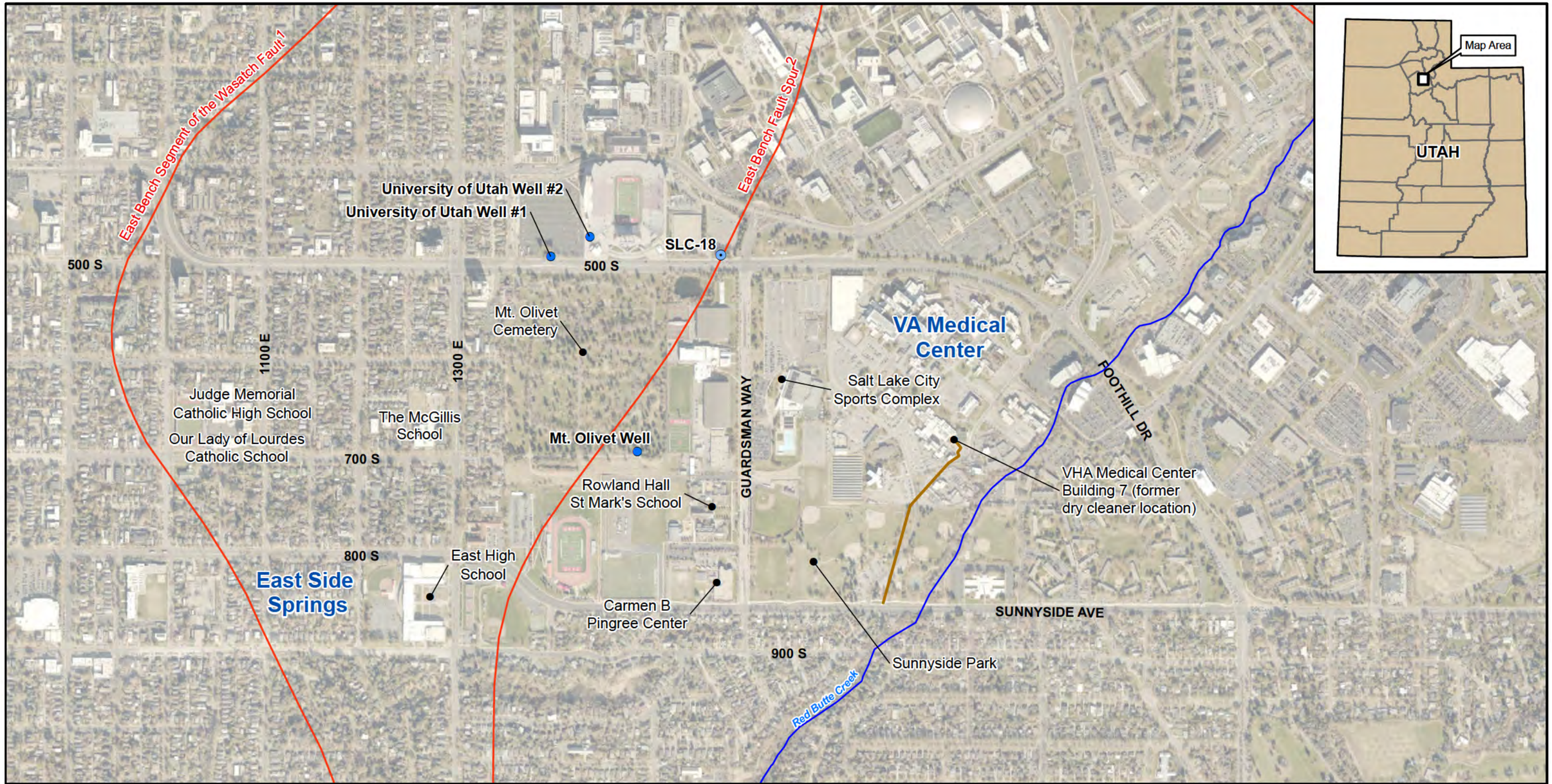
CDM Smith. 2020b. *Phase 2 Quality Assurance Project Plan, Operable Unit 1, 700 South 1600 East PCE Plume, Salt Lake City, Utah*. Prepared for the U.S. Army Corps of Engineers, Kansas City District.

EPA. 2006. *Evaluation of the Role of Dehalococcoides Organisms in the Natural Attenuation of Chlorinated Ethylenes in Groundwater.* U.S. Environmental Protection Agency Office of Research and Development.

Figures



Legend

- Drinking Water Supply Well
- Irrigation Well
- Landmark
- Red Butte Creek
- Sewer Line
- Fault Line

Notes:
1. Location of University of Utah Well #1 is approximate.

OU = operable unit
PCE = tetrachloroethene
VHA = Veterans Health Administration

[1] Davis, F.D. 1983. Geologic Map of the Central Wasatch Front, Utah. Utah Geological and Mineral Survey. Map 54-A – Wasatch Front Series. May.

[2] Personius, S.F. and Scott, W.E. 2009. Surficial Geologic Map of the Salt Lake City Segment and Parts of Adjacent Segments of the Wasatch Fault Zone, Davis, Salt Lake, and Utah Counties, Utah

N

0 500 1,000 Feet

Figure 1
Site Location

East Side Springs Data Summary Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

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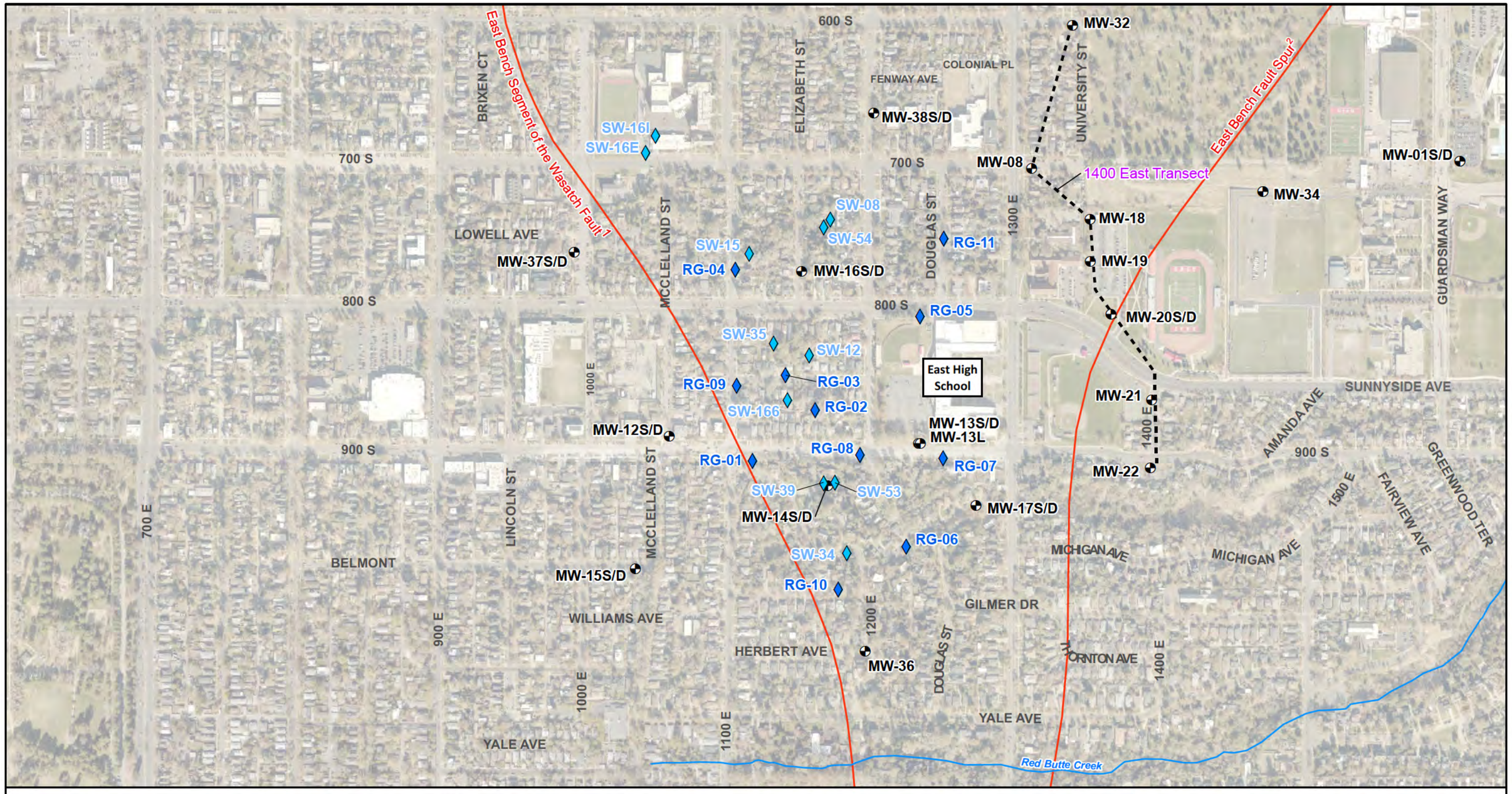

Legend

- Monitoring Well
- Residential Groundwater Monitoring Well
- Surface Water Sample Location
- Red Butte Creek
- Fault Line
- Transect Line

Notes:
RG = residential groundwater sampling location
SW = surface water sampling location
OU = operable unit
PCE = tetrachloroethene

[1] Davis, F.D. 1983. Geologic Map of the Central Wasatch Front, Utah. Utah Geological and Mineral Survey. Map 54-A – Wasatch Front Series. May.
[2] Personius, S.F. and Scott, W.E. 2009. Surficial Geologic Map of the Salt Lake City Segment and Parts of Adjacent Segments of the Wasatch Fault Zone, Davis, Salt Lake, and Utah Counties, Utah

Figure 2
East Side Springs Site Features

East Side Springs Data Summary Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

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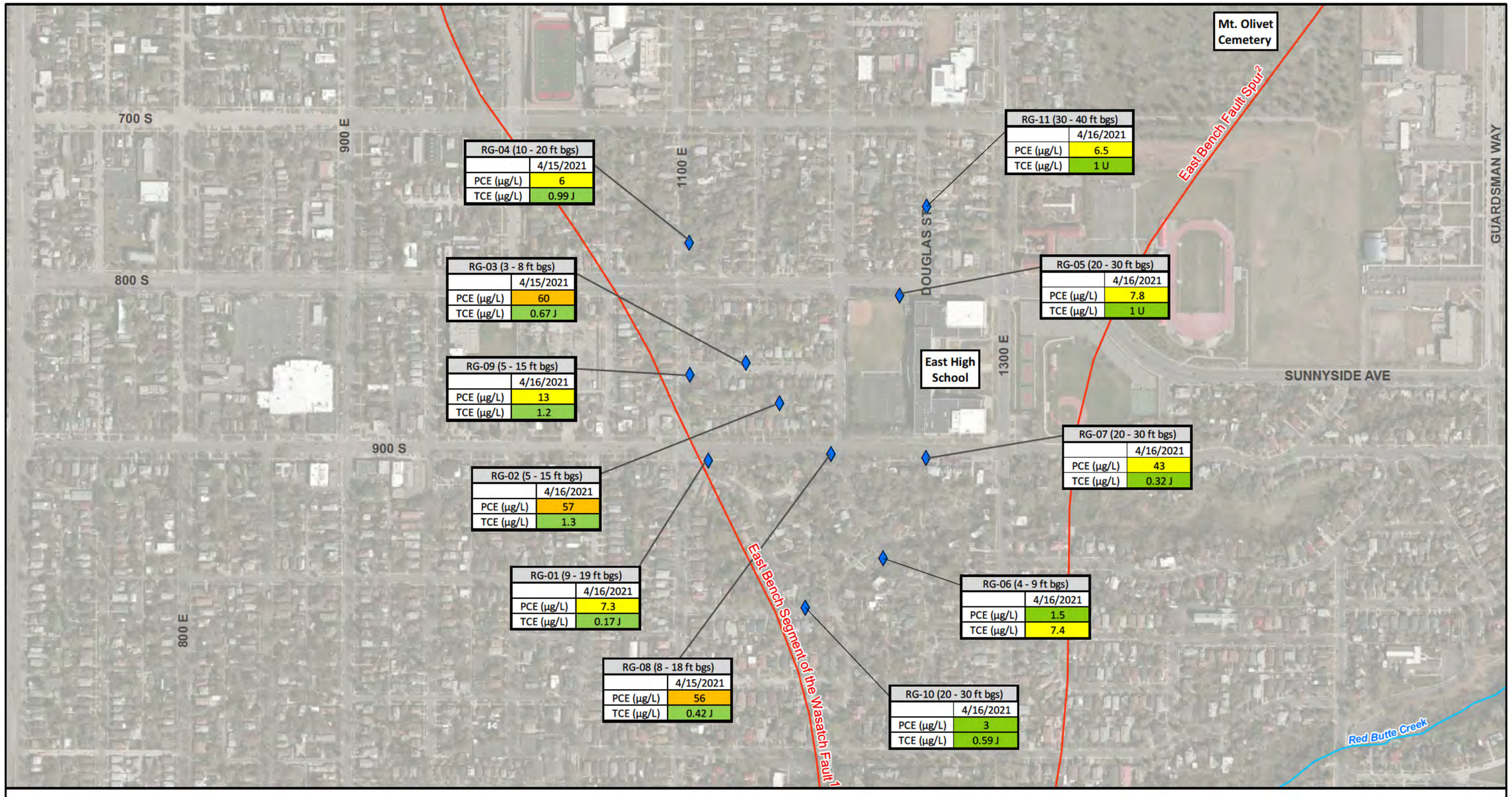


Legend

- Residential Groundwater Monitoring Well
- Red Butte Creek
- Fault Line

PCE and TCE Concentrations (µg/L)

- = < 5 µg/L
- = 5 - 50 µg/L
- = > 50 µg/L

Notes:
OU = operable unit
PCE = tetrachloroethene
TCE = trichloroethene
µg/L = micrograms per liter
J = Result is estimated
U = Analyte was not detected at the associated value

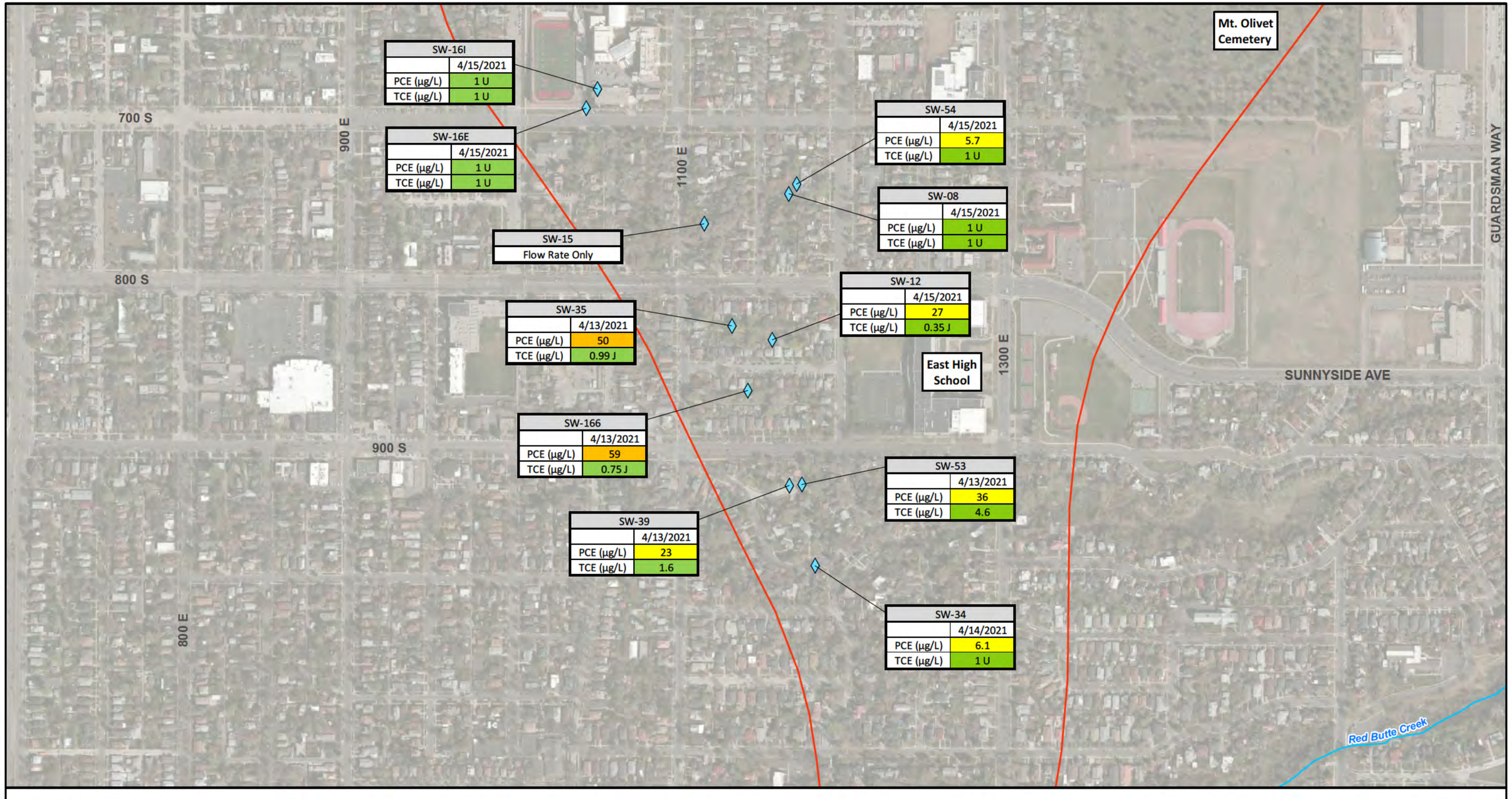
[1] Davis, F.D. 1983. Geologic Map of the Central Wasatch Front, Utah. Utah Geological and Mineral Survey. Map 54-A – Wasatch Front Series. May.
[2] Personius, S.F. and Scott, W.E. 2009. Surficial Geologic Map of the Salt Lake City Segment and Parts of Adjacent Segments of the Wasatch Fault Zone, Davis, Salt Lake, and Utah Counties, Utah

N W E S
0 250 500 Feet

Figure 3
Residential Groundwater Monitoring Well PCE and TCE Results

East Side Springs Data Summary Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

File Path: J:\238824_VA_Medical_Salt_Lake\MXD\Sampling_2021\ESS_2021\Fig3_RG_Well_Results.mxd WAGNERA 9/22/2021



Legend

- Surface Water Sampling Location
- Red Butte Creek
- Fault Line

PCE and TCE Concentrations (µg/L)

- = < 5 µg/L
- = 5 - 50 µg/L
- = > 50 µg/L

Notes:

OU = operable unit
PCE = tetrachloroethene
TCE = trichloroethene
µg/L = micrograms per liter
J = Result is estimated
U = Analyte was not detected at the associated value

N W E S

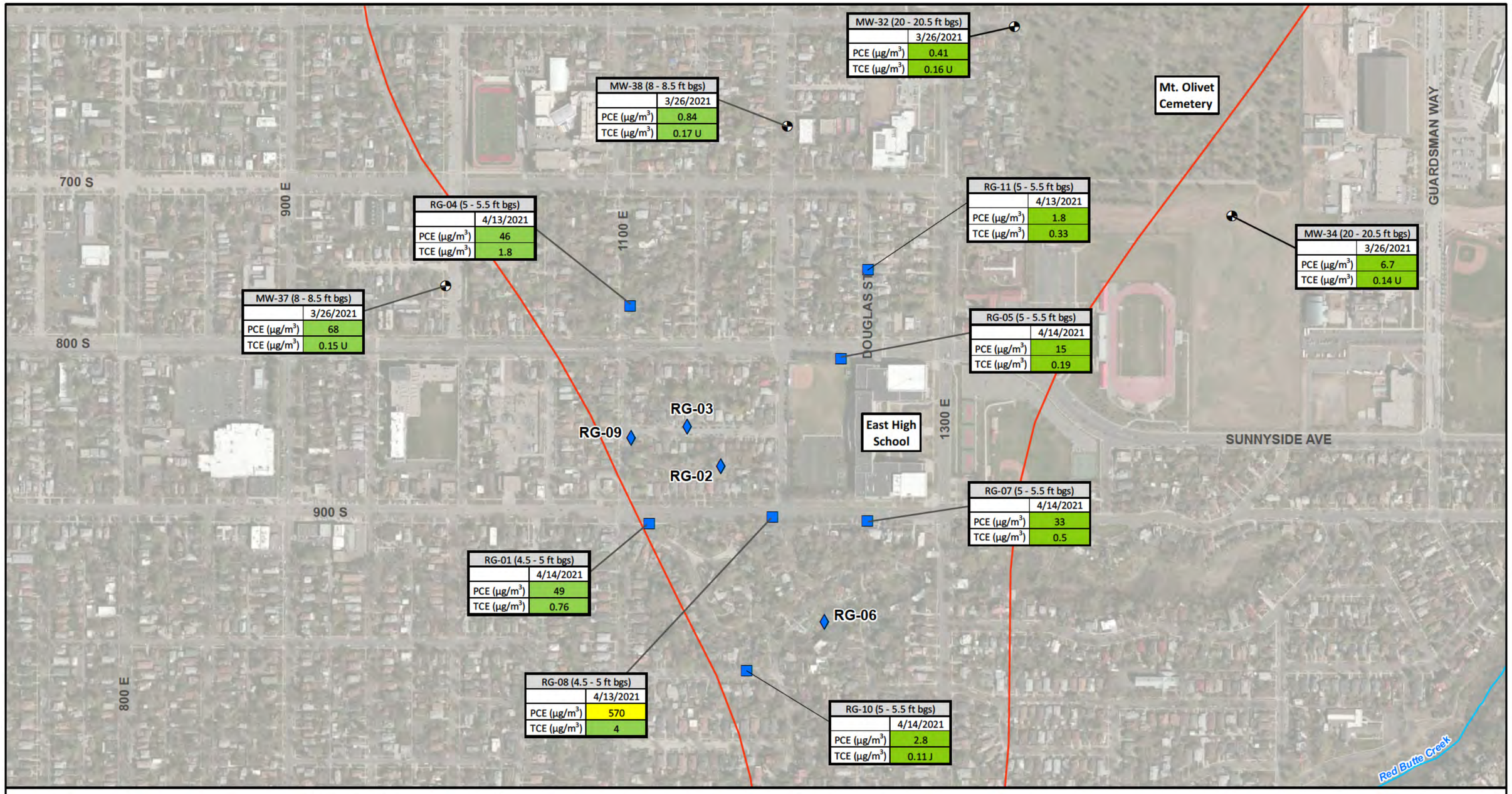
0 250 500 Feet

CDM Smith

Figure 4
ESS Surface Water
PCE and TCE Results

East Side Springs Data Summary Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

File Path: J:\238824_VA_Medical_Salt_Lake\MXD\Sampling_2021\ESS_2021\Fig4_SW_Results.mxd WAGNERA 9/22/2021



Legend

- Monitoring Well
- Soil Vapor Monitoring Point
- Residential Groundwater Monitoring Well without Soil Vapor Monitoring Point
- Red Butte Creek
- Fault Line

PCE and TCE Concentrations (µg/m^3)

- = < Screening Level
- = Screening Level to 10X Screening Level
- = > 10X Screening Level

Notes:

1. Screening Levels: PCE = 360 µg/mg^3
   TCE = 16 µg/mg^3

OU = operable unit
PCE = tetrachloroethene
TCE = trichloroethene
µg/m^3 = micrograms per cubic meter
J = Result is estimated
U = Analyte was not detected at the associated value

N W E S

0 250 500 Feet

CDM Smith

Figure 5
ESS Soil Vapor Monitoring Point PCE and TCE Results

East Side Springs Data Summary Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

File Path: J:\238824_VA_Medical_Salt_Lake\MXD\Sampling_2021\ESS_2021\Fig5_Soil_Vapor_Results.mxd WAGNERA 9/22/2021

Tables

Table 1
Piezometer Replacement Information

Residential Groundwater Location	Installation Date	Piezometer Location	Abandonment Date	Y Coordinate (Utah State Plane, ft)[1]	X Coordinate (Utah State Plane, ft)[1]	Surface Elevation (ft amsl)[2]	Top of casing elevation (ft amsl)[2]	Total Well Depth (ft bgs)	Screen Start (ft bgs)	Screen End (ft bgs)	Soil Vapor Probe (ft bgs)
RG-01	4/5/2021	GW-10	4/5/2021	7442006.70	1540924.03	4383.92	4383.49	19	9	19	4.5
RG-02	4/2/2021	GW-11	4/2/2021	7442286.89	1541270.19	4437.32	4436.95	15.28	5	15	NA
RG-03	4/2/2021	GW-16	4/2/2021	7442479.61	1541107.48	4422.98	4422.53	8.19	3	8	NA
RG-04	4/5/2021	GW-20	4/5/2021	7443062.83	1540830.39	4415.83	4415.47	20.29	10	20	5
RG-05	4/3/2021	GW-27	4/3/2021	7442805.72	1541851.88	4497.38	4496.96	30.3	20	30	5
RG-06	4/5/2021	GW-50	4/5/2021	7441534.16	1541771.71	4443.66	4443.23	9.2	4	9	NA
RG-07	4/2/2021	GW-52	4/2/2021	7442021.00	1541979.13	4490.30	4490.05	30.28	20	30	5
RG-08	4/6/2021	GW-53	4/6/2021	7442038.61	1541519.86	4455.17	4454.74	17.93	8	18	4.5
RG-09	4/1/2021	GW-59	4/1/2021	7442423.54	1540835.33	4385.39	4384.93	15.01	5	15	NA
RG-10	4/7/2021	GW-61	4/7/2021	7441296.08	1541395.71	4410.37	4409.82	30.3	20	30	5
RG-11	4/7/2021	NA	NA	7443236.76	1541982.64	4504.70	4504.39	40.28	30	40	5
NA	NA	GW-49	4/5/2021	NA	NA	NA	NA	12.5	NA	NA	NA

Notes:
[1] X/Y Coordinates measured using NAD 83 State Plane Coordinate System
[2] Elevations measured using NAVD 88 vertical datum

Acronyms:
amsl = above mean sea level
bgs = below ground surface
ft = feet
NA= Not Applicable

Table 2
Residential Groundwater Well Development Summary

Location	Development Method	Date Developed	Volume of Water Added During Drilling (gallons)	Initial Measured Depth to Bottom (ft BTOC)	Final Measured Depth to Bottom (ft BTOC)	Calculated Minimum Purge Volume (gallons)	Volume of Water Removed During Development (gallons)
RG-01	Bailer	4/13/2021	0	18.56	18.83	5.0	20
RG-02	Bailer	4/13/2021	0	14.02	15.28	6.4	25
RG-03	Bailer	4/9/2021	0	8.18	8.19	2.5	6.5
RG-04	Bailer/Submersible Pump	4/9/2021	0	20.29	20.29	5.0	50
RG-05	Bailer	4/13/2021	0	29.47	30.3	3.3	11.5
RG-06	Bailer	4/12/2021	0	9.19	9.2	3.4	6.5
RG-07	Bailer/Submersible Pump	4/12/2021	0	29.2	30.28	4.5	107
RG-08	Bailer/Submersible Pump	4/12/2021	0	17.82	17.93	6.0	78
RG-09	Bailer	4/10/2021	0	14.14	15.01	4.6	24
RG-10	Bailer	4/13/2021	0	30.29	30.3	2.0	2.75
RG-11	Bailer	4/10/2021	0	38.98	40.28	5.5	11.5

Acronyms:
bgs = below ground surface
BTOC = below top of casing
ft = feet

Table 3
Residential Groundwater Well Water Elevations

Location	Screen Start (ft bgs)	Screen End (ft bgs)	Top of Casing Elevation (ft amsl)[1]	Water Level Measurement Date and Time	Water Level Depth (ft btoc)	Water Level Elevation (ft amsl)[1]
RG-01	9	19	4383.49	4/16/2021 14:55	8.42	4375.07
RG-02	5	15	4436.95	4/16/2021 15:45	2.59	4434.36
RG-03	3	8	4422.53	4/15/2021 15:50	3.04	4419.49
RG-04	10	20	4415.47	4/15/2021 16:15	9.96	4405.51
RG-05	20	30	4496.96	4/16/2021 13:40	23.63	4473.33
RG-06	4	9	4443.23	4/16/2021 10:00	2.24	4440.99
RG-07	20	30	4490.05	4/16/2021 10:27	21.08	4468.97
RG-08	8	18	4454.74	4/15/2021 16:34	5.63	4449.11
RG-09	5	15	4384.93	4/16/2021 14:00	5.24	4379.69
RG-10	20	30	4409.82	4/16/2021 13:00	26.16	4383.66
RG-11	30	40	4504.39	4/16/2021 9:05	29.11	4475.28

Notes:
[1] Elevations measured using NAVD 88 vertical datum

Acronyms:
amsl = above mean sea level
bgs = below ground surface
BTOC = below top of casing
ft = feet

Table 4
Residential Groundwater Monitoring Well VOC Results and Field Parameters

Location			RG-01		RG-02		RG-03		RG-04		RG-05		RG-06		RG-07		RG-08		RG-08		RG-09		RG-10		RG-11	
Sample Name			RG01-GW041621		RG02-GW041621		RG03-GW041521		RG04-GW041521		RG05-GW041621		RG06-GW041621		RG07-GW041621		FD01-GW041521		RG08-GW041521		RG09-GW041621		RG10-GW041621		RG11-GW041621	
Sample Date			2021-04-16		2021-04-16		2021-04-15		2021-04-15		2021-04-16		2021-04-16		2021-04-16		2021-04-15		2021-04-15		2021-04-16		2021-04-16		2021-04-16	
Sample Type			N		N		N		N		N		N		N		FD		N		N		N		N	
Analyte	Screening Level	Unit	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,1,1-Trichloroethane	200[a]	µg/L	*1*	*U*	**0.5**	**J**	**0.62**	**J**	*1*	*U*	**0.17**	**J**	*1*	*U*	**0.37**	**J**	**0.48**	**J**	**0.49**	**J**	**0.11**	**J**	*1*	*U*	**0.14**	**J**
1,1-Dichloroethene	2.8[b]	µg/L	*1*	*U*	**0.17**	**J**	**0.22**	**J**	*1*	*U*	*1*	*U*	*1*	*U*	**0.11**	**J**	**0.14**	**J**	**0.15**	**J**	*1*	*U*	*1*	*U*	*1*	*U*
Benzene	5[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Chloroform	80[a]	µg/L	**0.24**	**J**	**2.7**		**2.5**		**0.8**	**J**	**2.8**		*1*	*U*	**2.3**		**2.9**		**2.9**		**1.5**		**0.4**	**J**	**2.8**	
Chloromethane	190[b]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Cis-1,2-Dichloroethene	70[a]	µg/L	*1*	*U*	**1.1**		**0.41**	**J**	*1*	*U*	*1*	*U*	**2.2**		**0.11**	**J**	**0.15**	**J**	**0.15**	**J**	**0.49**	**J**	*1*	*U*	*1*	*U*
Styrene	100[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	**0.26**	**J**	**0.29**	**J**	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	**0.27**	**J**	*1*	*U*
Tetrachloroethene	5[a]	µg/L	**7.3**		**57**		**60**		**6**		**7.8**		**1.5**		**43**		**58**		**56**		**13**		**3**		**6.5**	
Toluene	1000[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	**0.12**	**J**	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	**0.15**	**J**	*1*	*U*
Trichloroethene	5[a]	µg/L	**0.17**	**J**	**1.3**		**0.67**	**J**	**0.99**	**J**	*1*	*U*	**7.4**		**0.32**	**J**	**0.43**	**J**	**0.42**	**J**	**1.2**		**0.59**	**J**	*1*	*U*
Vinyl Chloride	2[a]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Dissolved Oxygen	-	mg/L	**4.95**		**7.17**		NR		NR		**6.07**		NR		**8.9**		NR		NR		**7.97**		NR		**5.1**	
Ferrous Iron	-	mg/L	**0.06**		**0.1**		NR		NR		NR		NR		**0.02**		NR		NR		**0.11**		NR		**0.07**	
Oxidation-Reduction Potential	-	mV	**150.1**		**150.6**		NR		NR		**127.1**		NR		**169.2**		NR		NR		**172.9**		NR		**147.3**	
Ph	-	su	**6.92**		**6.83**		NR		NR		**7.2**		NR		**6.88**		NR		NR		**6.96**		NR		**7.7**	
Specific Conductance	-	mS/cm	**2.084**		**1.4**		NR		NR		**2.977**		NR		**2.223**		NR		NR		**1.596**		NR		**0.2982**	
Temperature	-	deg C	**12.7**		**12.2**		NR		NR		**13**		NR		**11.5**		NR		NR		**11.5**		NR		**10.4**	
Turbidity	-	NTU	**3.41**		**6.23**		NR		NR		**44.7**		NR		**10.28**		NR		NR		**2.39**		NR		**45.18**	

[a] Screening level is EPA MCL

[b] Screening level is EPA Tap Water RSL (target cancer risk 1 x 10-6, hazard quotient = 1)

Bold indicates detected values

Italics indicates nondetected values

Highlight indicates values greater than screening level

Acronyms:

µg/L = microgram per liter

Q = qualifier

J = Result is estimated

U = Analyte was not detected at the associated value, which is the reporting limit

deg C = degrees Celsius

ORP = oxidation reduction potential

mg/L = milligram per liter

µg/L = microgram per liter

mS/cm = millisiemens per centimeter

mV = millivolts

NTU = nephelometric turbidity unit

NR = not recorded due to insufficient water collected

su = standard units

Table 5
Surface Water Sampling Locations

Location ID	Location Type	Y Coordinate (Utah State Plane, ft)[a]	X Coordinate (Utah State Plane, ft)[a]	Sampling Method	Flow Rate (L/min)
SW-08	Spring (Benson Springs)	7443296.66	1541315.16	Grab	48
SW-12	Spring	7442589.42	1541235.30	Peristaltic Pump	84
SW-15	Spring (Benson Springs)	7443150.02	1540904.50	No Sample[b]	807
SW-16I (Interior)	Sump (Our Lady of Lourdes)	7443803.55	1540388.19	Peristaltic Pump	13 E
SW-16E (Exterior)	Spring (Our Lady of Lourdes)	7443710.13	1540333.23	Grab	8
SW-34	Spring	7441495.55	1541442.90	Grab	462
SW-35	Seep	7442656.89	1541038.29	Peristaltic Pump	1 E
SW-39	Mitigated spring water[c] (Smith Spring)	7441883.72	1541316.99	Grab	11
SW-53	Pond Inlet	7441888.22	1541377.41	Grab	6
SW-54	Spring (Benson Springs)	7443342.42	1541352.19	Grab	-
SW-166	Seep	7442343.60	1541117.39	Peristaltic Pump	2

Notes:
a. X/Y Coordinates measured using NAD 83 State Plane Coordinate System
b. Only a flow rate measurement was collected.
c. Mitigated spring water is spring water that has been diverted off of private property through a drainage system into storm drains.

ID = Identification
L/min = Liter per minute
E = Estimated
- = not measured

Table 6
Surface Water VOC Results

Location			SW-08		SW-12		SW-16E		SW-16I		SW-34		SW-35		SW-39		SW-53		SW-54		SW-54		SW-166	
Sample Name			SW08-SW041521		SW12-SW041521		SW16E-SW041521		SW16I-SW041521		SW34-SW041421		SW35-SW041321		SW39-SW041321		SW53-SW041321		FD01-SW041521		SW54-SW041521		SW166-SW041321	
Sample Date			2021-04-15		2021-04-15		2021-04-15		2021-04-15		2021-04-14		2021-04-13		2021-04-13		2021-04-13		2021-04-15		2021-04-15		2021-04-13	
Sample Type			N		N		N		N		N		N		N		N		FD		N		N	
Analyte	Screening Level	Unit	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,1,1-Trichloroethane	200[a]	µg/L	*1*	*U*	**0.29**	**J**	*1*	*U*	*1*	*U*	*1*	*U*	**0.38**	**J**	**0.15**	**J**	**0.21**	**J**	**0.12**	**J**	**0.13**	**J**	**0.46**	**J**
1,1-Dichloroethene	2.8[b]	µg/L	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	**0.12**	**J**	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	**0.17**	**J**
Bromodichloromethane	80[a]	µg/L	**0.10**	**J**	*1*	*U*	*1*	*U*	*1*	*U*	**0.17**	**J**	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*	*1*	*U*
Chloroform	80[a]	µg/L	**2.0**		**3.2**		**2.9**		**3**		**1.5**		**2.1**		**0.53**	**J**	**0.35**	**J**	**4.6**		**5**		**2.4**	
Cis-1,2-Dichloroethene	70[a]	µg/L	*1*	*U*	**0.12**	**J**	*1*	*U*	*1*	*U*	*1*	*U*	**0.56**	**J**	**0.63**	**J**	**1.3**		*1*	*U*	*1*	*U*	**0.49**	**J**
Tetrachloroethene	5[a]	µg/L	*1*	*U*	**27**		*1*	*U*	*1*	*U*	**6.1**		**50**		**23**		**36**		**5.2**		**5.7**		**59**	
Trichloroethene	5[a]	µg/L	*1*	*U*	**0.35**	**J**	*1*	*U*	*1*	*U*	*1*	*U*	**0.99**	**J**	**1.6**		**4.6**		*1*	*U*	*1*	*U*	**0.75**	**J**

Notes:

[a] Screening level is EPA MCL

[b] Screening level is EPA Tap Water RSL (target cancer risk 1 x 10-6, hazard quotient = 1)

Highlight indicates values greater than screening level

Bold indicates detected values

Italics indicates nondetected values

EPA MCLs and RSLs are shown for screening purposes

Acronyms:

VOC = volatile organic compound
µg/L = microgram per liter
EPA = U.S. Environmental Protection Agency
MCL = maximum contaminant level
NS = not sampled
RSL = regional screening level
Q = qualifier
J = Result is estimated
U = Analyte was not detected at the associated value

Table 7
Surface Water Metals Results

Location		SW-08	SW-12	SW-16E	SW-16I	SW-34	SW-35	SW-39	SW-53	SW-54	SW-54	SW-166
Sample Name		SW08-SW041521	SW12-SW041521	SW16E-SW041521	SW16I-SW041521	SW34-SW041421	SW35-SW041321	SW39-SW041321	SW53-SW041321	FD01-SW041521	SW54-SW041521	SW166-SW041321
Sample Date		2021-04-15	2021-04-15	2021-04-15	2021-04-15	2021-04-14	2021-04-13	2021-04-13	2021-04-13	2021-04-15	2021-04-15	2021-04-13
Sample Type		N	N	N	N	N	N	N	N	FD	N	N
Analyte	Unit	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q	Result Q
Aluminum	µg/L	*100 U*	**58.6 J**	*100 U*	*100 U*	*100 U*	**38.3 J**	*100 U*	*100 U*	*100 U*	*100 U*	**94 J**
Antimony	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	**0.293 J**	*1 U*	*1 U*	*1 U*
Arsenic	µg/L	**0.408 J**	**1.61**	**0.582 J**	**0.746 J**	**1.02**	**2.21**	**1.97**	**8.85**	**0.646 J**	**0.641 J**	**3.54**
Barium	µg/L	**27.3**	**68.6**	**56.6**	**51.2**	**52.3**	**65**	**72.8**	**85**	**58.7**	**58.7**	**72.5**
Beryllium	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Cadmium	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Calcium	µg/L	**124000**	**157000**	**131000**	**145000**	**141000**	**167000**	**172000**	**180000**	**140000**	**141000**	**183000**
Chromium	µg/L	**1.03**	**0.349 J**	**1.12**	**1.05**	**0.753 J**	**0.591 J**	**0.222 J**	*1 U*	**0.614 J**	**0.66 J**	**0.859 J**
Cobalt	µg/L	*1 U*	**0.126 J**	*1 U*	*1 U*	**0.111 J**	**0.114 J**	*1 U*	**0.127 J**	*1 U*	*1 U*	**0.359 J**
Copper	µg/L	*2 U*	**0.857 J**	**0.658 J**	*2 U*	**0.883 J**	**0.752 J**	*2 U*	*2 U*	*2 U*	*2 U*	**1.41 J**
Iron	µg/L	*100 U*	**63.5 J**	*100 U*	*100 U*	**29.5 J**	**53.2 J**	*100 U*	*100 U*	*100 U*	*100 U*	**322**
Lead	µg/L	*1 U*	**1.21**	**0.224 J**	*1 U*	**0.31 J**	**2.67**	*1 U*	**0.0914 J**	*1 U*	*1 U*	**3.52**
Magnesium	µg/L	**43100**	**61100**	**45900**	**52200**	**50200**	**59600**	**61600**	**60100**	**48900**	**48600**	**65200**
Manganese	µg/L	*1 U*	**4.34**	**0.307 J**	*1 U*	**3.12**	**9.86**	**0.291 J**	**6.78**	**0.29 J**	**0.432 J**	**76**
Mercury	µg/L	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*	*0.5 U*
Nickel	µg/L	*1 U*	**0.433 J**	*1 U*	*1 U*	**0.254 J**	*1 U*	**0.32 J**	**0.354 J**	*1 U*	*1 U*	**0.402 J**
Potassium	µg/L	**2090**	**2740**	**2160**	**2470**	**2920**	**2300**	**3050**	**3840**	**2540**	**2580**	**2880**
Selenium	µg/L	**0.983 J**	**1.34**	**1.19**	**1.67**	**0.999 J**	**1.09**	**1.91**	**2.12**	**0.726 J**	**0.784 J**	**0.991 J**
Silver	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Sodium	µg/L	**34200**	**85700**	**64700**	**67500**	**89100**	**66500**	**106000**	**97400**	**61800**	**62300**	**75200**
Thallium	µg/L	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*	*1 U*
Vanadium	µg/L	**1.21**	**3.49**	**1.68**	**2.03**	**2.79**	**1.73**	**1.89**	**1.88**	**1.46**	**1.45**	**2.27**
Zinc	µg/L	*20 U*	*20 U*	*20 U*	*20 U*	*20 U*	*20 U*	*20 U*	*20 U*	*20 U*	*20 U*	*20 U*

Notes:
Bold indicates detected values
Italics indicates nondetected values

Acronyms:
µg/L = microgram per liter
Q = qualifier
U = Analyte was not detected at the associated value, which is the reporting limit

Table 8
Surface Water General Chemistry Results

Location ID		SW-08		SW-12		SW-15	SW-16E		SW-16I		SW-34		SW-35		SW-39		SW-53		SW-54		SW-54		SW-166	
Sample ID		SW08-SW041521		SW12-SW041521		NS	SW16E-SW041521		SW16I-SW041521		SW34-SW041421		SW35-SW041321		SW39-SW041321		SW53-SW041321		SW54-SW041521		FD01-SW041521		SW166-SW041321	
Sample Date		4/15/2021		4/15/2021		4/15/2021	4/15/2021		4/15/2021		4/14/2021		4/13/2021		4/13/2021		4/13/2021		4/15/2021		4/15/2021		4/13/2021	
Sample Type		N		N			N		N		N		N		N		N		N		FD		N	
Analyte	Unit	Result	Q	Result	Q	Result	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Nitrate/Nitrite[1]	mg/L	**1.73**		**2.85**		-	**3.23**		**3.91**		**4.07**		**3.3**		**2.58**		**1.73**		**3.09**		**3.05**		**4**	
Chloride	mg/L	**121**		**323**		-	**194**		**231**		**293**		**325**		**404**		**358**		**224**		**227**		**365**	
Sulfate	mg/L	**153**		**101**		-	**147**		**175**		**121**		**102**		**118**		**119**		**102**		**102**		**103**	
Ethane	µg/L	*2*	*U*	*2*	*U*	-	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*
Ethene	µg/L	*2*	*U*	*2*	*U*	-	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*	*2*	*U*
Methane	µg/L	**0.28**	**J**	**0.25**	**J**	-	**0.23**	**J**	*2*	*U*	**0.29**	**J**	**0.24**	**J**	**0.18**	**J**	**0.32**	**J**	*2*	*U*	*2*	*U*	**1.1**	**J**
Alkalinity[2]	mg/L	**224**		**284**		-	**219**		**241**		**278**		**262**		**278**		**306**		**262**		**256**		**254**	
Total Organic Carbon	mg/L	**0.64**	**J**	**1.16**		-	**0.976**	**J**	**0.873**	**J**	**1.41**		**0.614**	**J**	**0.865**	**J**	**1.16**		**0.493**	**J**	**0.768**	**J**	**1.05**	
Dissolved Oxygen	mg/L	**9.41**		**6.35**		-	**10.88**		**10.24**		**10.81**		**7.92**		**10.35**		**8.43**		**8.93**		-		**9.2**	
Ferrous Iron	mg/L	**0**		**0.02**		-	**0.03**		**0**		**0.01**		**0**		**0**		**0.02**		**0.25**		-		**0.11**	
Flow	L/min	**48**		**84**		**807**	**8**		**16**	**E**	**462**		**< 1**	**E**	**11**		**6**		**NR**		-		**2**	
ORP	mV	**97.3**		**129.3**		-	**85.7**		**141.1**		**120.1**		**101**		**68.4**		**101.3**		**122.1**		-		**162**	
pH	su	**7.28**		**6.89**		-	**7.79**		**7.47**		**7.41**		**7.83**		**7.67**		**7.15**		**7.01**		-		**7.25**	
Specific Conductance	mS/cm	**NR**		**1.281**		-	**0.987**		**1.081**		**1.242**		**1.479**		**1.689**		**1.64**		**1.052**		-		**1.618**	
Temperature	deg C	**11.7**		**11.6**		-	**13.1**		**15**		**12.1**		**10.5**		**11.3**		**11.7**		**11.9**		-		**10.7**	
Turbidity	NTU	**0.1**		**7.88**		-	-0.09		**0.24**		**0.27**		**21.88**		**55**		**3.44**		**0.42**		-		**7.02**	

Notes:
Bold indicates detected values
Italics indicates nondetected values
[1] Nitrate and Nitrite as total Nitrogen
[2] Total Alkalinity as calcium carbonate

Acronyms:
deg C = degrees Celsius
ORP = oxidation reduction potential
mg/L = milligram per liter
µg/L = microgram per liter
mS/cm = millisiemens per centimeter
mV = millivolts
NTU = nephelometric turbidity unit
NR = not recorded
NS = not sampled
su = standard units
Q = qualifier
J = Result is estimated
J+ = Result is estimated, biased high
U = Analyte was not detected at the associate value, which is the reporting limit
E= estimated flow rate
L/min = Liter per minit
N = normal samples
FD = Field Duplicate

Table 9
East Side Springs Soil Vapor Results

Location			MW-32		MW-34		MW-37		MW-38		RG-01		RG-04		RG-05		RG-07		RG-08		RG-10		RG-10		RG-11	
Sample Name			MW32-SG032621		MW34-SG032621		MW37-SG032621		MW38-SG032621		RG01-SG041421		RG04-SG041321		RG05-SG041421		RG07-SG041421		RG08-SG041321		FD01-SG041421		RG10-SG041421		RG11-SG041321	
Start Depth			20		20		8		8		4.5		5		5		5		4.5		5		5		5	
End Depth			20.5		20.5		8.5		8.5		5		5.5		5.5		5.5		5		5.5		5.5		5.5	
Sample Date			2021-03-26		2021-03-26		2021-03-26		2021-03-26		2021-04-14		2021-04-13		2021-04-14		2021-04-14		2021-04-13		2021-04-14		2021-04-14		2021-04-13	
Analyte	Screening Level[1]	Unit	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,1,1-Trichloroethane	170000	µg/m3	**0.11**	J	**37**		**0.05**	J	**0.26**		**2.7**		**2.7**		**4.4**		**0.48**		**27**		**0.09**	J	**0.084**	J	**0.68**	
1,1,2-Trichlorotrifluoroethane	170000	µg/m3	**0.76**	J	**1.10**		**0.57**	J	**2.8**		**1.2**		**3.3**		**1.1**	J	**0.92**	J	**4.5**		**2.3**		**2.3**		**2.7**	
1,1-Dichloroethane	60	µg/m3	*0.12*	U	*0.11*	U	*0.11*	U	*0.12*	U	**0.15**		**0.26**		*0.12*	U	*0.12*	U	*0.44*	U	*0.12*	U	*0.12*	U	*0.14*	U
1,1-Dichloroethene	7000	µg/m3	*0.06*	U	*0.05*	U	*0.06*	U	*0.06*	U	*0.06*	U	*0.062*	U	*0.061*	U	*0.058*	U	**3.7**		*0.057*	U	*0.06*	U	*0.067*	U
1,2,4-Trimethylbenzene	2100	µg/m3	*0.71*	U	**0.16**	J	**0.18**	J	**0.16**	J	**0.36**	J	**1**		**2.3**		**0.35**	J	*2.7*	U	**4.8**		**4.5**		**0.64**	J
1,2-Dichloroethane	3.7	µg/m3	*0.12*	U	*0.11*	U	**0.18**		*0.12*	U	**0.21**		**0.25**		**0.17**		**0.055**	J	**0.39**	J	**0.5**		**0.51**		**0.13**	J
1,2-Dichlorotetrafluoroethane;Fluorocarbon 114	NA	µg/m3	**0.15**	J	**0.12**	J	**0.12**	J	**0.12**	J	**0.12**	J	**0.17**	J	**0.12**	J	**0.11**	J	*0.76*	U	**0.15**	J	**0.16**	J	**0.15**	J
1,3,5-Trimethylbenzene	2100	µg/m3	*0.71*	U	*0.65*	U	**0.10**	J	*0.76*	U	*0.72*	U	*0.77*	U	**0.67**	J	**0.88**		*2.7*	U	**1.3**		**1**		*0.83*	U
1,3-Butadiene	NA	µg/m3	*0.32*	U	*0.29*	U	*0.31*	U	*0.34*	U	**0.48**		**1.2**		**1.2**		*0.32*	U	**1.6**		**1.6**		**1.4**		**3.3**	
1,3-Dichlorobenzene	NA	µg/m3	*0.87*	U	*0.80*	U	*0.84*	U	*0.93*	U	**2**		**0.83**	J	**2**		*0.88*	U	*3.3*	U	**0.62**	J	**0.81**	J	*1*	U
1,4-Dioxane	19	µg/m3	*0.52*	U	**0.12**	J	*0.50*	U	**0.19**	J	*0.53*	U	*0.56*	U	*0.55*	U	*0.53*	U	*2*	U	*0.52*	U	*0.54*	U	*0.61*	U
2,2,4-Trimethylpentane	NA	µg/m3	*3.4*	U	**0.51**	J	*3.2*	U	*3.6*	U	**43**	J	**39**	J	**28**	J	**36**	J	**59**	J	**52**	J	**51**	J	**17**	J
2-Butanone (Mek)	170000	µg/m3	**0.52**	J	**0.45**	J	**0.95**	J	**0.54**	J	**3.6**		**1.9**	J	**2.1**	J	**0.56**	J	**9.2**		**4.5**	J	**1.8**	J	**1.4**	J
2-Hexanone	1000	µg/m3	*3.0*	U	*2.7*	U	*2.8*	U	*3.2*	U	*3.0*	U	*3.2*	U	*3.2*	U	*3*	U	*11*	U	**0.96**	J	*3.1*	U	*3.5*	U
4-Ethyltoluene	NA	µg/m3	*0.71*	U	**0.10**	J	*0.68*	U	**0.10**	J	*0.72*	U	**0.64**	J	**1.6**		**0.3**	J	**1**	J	**3.3**		**3.3**		**0.67**	J
4-Methyl-2-Pentanone (Mibk)	100000	µg/m3	*0.59*	U	*0.54*	U	*0.57*	U	*0.63*	U	**0.85**		*0.64*	U	*0.63*	U	*0.6*	U	*2.2*	U	*0.59*	U	*0.62*	U	**0.62**	J
Acetone	1100000	µg/m3	**4.4**		**4.2**		**11**		**6**		**20**		**8.2**		**8.2**		**5.1**		**85**		**11**	J	**6.8**	J	**8**	
Benzene	12	µg/m3	**0.07**	J	**0.38**		**1.0**		**0.62**		**2.9**		**2.4**		**1.9**		**3.4**		**20**		**2.6**		**2.6**		**2.9**	
Bromodichloromethane	2.5	µg/m3	**2.4**		*0.89*	U	*0.93*	U	*1.00*	U	*0.98*	U	*1*	U	*1*	U	**1.2**		*3.6*	U	*0.96*	U	*1*	U	*1.1*	U
Carbon Disulfide	24000	µg/m3	*2.2*	U	**0.26**	J	**15**		**31**		**4.6**		**24**		**13**		**1.4**	J	**19**		**12**		**12**		**8.3**	
Carbon Tetrachloride	16	µg/m3	**0.51**		**0.29**		**0.07**	J	*0.20*	U	**2.3**		**3.9**		**1**		**0.16**	J	**2.4**		**1.8**		**1.8**		**1.9**	
Chloroethane	330000	µg/m3	*0.19*	U	**0.15**	J	*0.18*	U	**0.25**		**0.18**	J	**0.27**		**0.21**		*0.19*	U	**0.2**	J	**0.17**	J	**0.13**	J	**0.3**	
Chloroform	4	µg/m3	**110**		**0.7**		**9.80**		**2.8**		**4.0**		**3.6**		**6.4**		**32**		**30**		**2.9**		**2.8**		**9.2**	
Chloromethane	3100	µg/m3	**0.13**	J	**0.33**	J	**0.20**	J	**1.0**	J	*1.50*	U	*1.6*	U	*1.6*	U	*1.5*	U	*5.6*	U	*1.5*	U	*1.6*	U	*1.7*	U
Cis-1,2-Dichloroethene	NA	µg/m3	*0.11*	U	**0.03**	J	*0.11*	U	*0.12*	U	*0.12*	U	**0.14**		*0.12*	U	*0.12*	U	**0.52**		*0.11*	U	*0.12*	U	*0.13*	U
Cyclohexane	NA	µg/m3	*2.5*	U	**0.55**	J	**5.5**		**5.4**		**25**		**54**		**21**		**0.63**	J	**37**		**44**		**45**		**36**	
Dichlorodifluoromethane	3300	µg/m3	**2.3**		**2.2**		**2.2**		**2.3**		**5.0**		**2.4**		**2.2**		**2.3**		**3.2**		**2.4**		**2.3**		**2.4**	
Ethanol	NA	µg/m3	*2.7*	U	*2.5*	U	*2.6*	U	*2.9*	U	**7.2**		**5.4**		**4.7**		*2.8*	U	**20**		**3.1**		**2**	J	*3.2*	U
Ethylbenzene	37	µg/m3	**0.03**	J	**0.13**		**0.50**		**0.36**		**0.31**		**0.44**		**1.7**		**0.27**		**2.2**		**2.7**		**2.7**		**0.68**	
Hexachloro-1,3-Butadiene	NA	µg/m3	*7.7*	U	*7.1*	U	*7.4*	U	*8.3*	U	*7.8*	U	*8.4*	U	*8.2*	U	*7.8*	U	*29*	U	*7.7*	U	*8*	U	*9*	U
Hexane	NA	µg/m3	*2.6*	U	**1.40**	J	**1.80**	J	**1.90**	J	**85**		**85**		**66**		**6.7**		**140**		**78**		**81**		**60**	
Isopropyl Alcohol (Manufacturing-Strong Acid)	NA	µg/m3	**0.79**	J	**1.80**		**2.00**		**0.93**	J	**2.4**		**1.9**		**3.3**		**1.2**	J	**2.6**	J	**3.7**		**3.4**		**2.4**	
Isopropylbenzene	14000	µg/m3	*0.71*	U	*0.65*	U	*0.68*	U	*0.76*	U	*0.72*	U	*0.77*	U	**0.36**	J	*0.72*	U	*2.7*	U	*0.71*	U	**0.4**	J	*0.83*	U
M,P-Xylene	3300	µg/m3	**0.05**	J	**0.23**		**0.26**		**0.37**		**0.8**		**1.3**		**4.4**		**0.5**		**4.3**		**7**		**7.1**		**1.5**	
N-Heptane	NA	µg/m3	*3.0*	U	*2.7*	U	*2.8*	U	*3.2*	U	**9.6**		**19**		**12**		**8.3**		**37**		**42**		**44**		**9.7**	
N-Propylbenzene	NA	µg/m3	*0.71*	U	*0.65*	U	*0.68*	U	*0.76*	U	*0.72*	U	*0.77*	U	**0.46**	J	*0.72*	U	*2.7*	U	**0.68**	J	**0.85**		*0.83*	U
O-Xylene	3300	µg/m3	**0.03**	J	**0.19**		**0.31**		**0.34**		**0.34**		**0.51**		**1.8**		**1.6**		**2**		**2.8**		**2.9**		**0.66**	
Styrene	33000	µg/m3	*0.62*	U	*0.57*	U	*0.59*	U	*0.66*	U	*0.63*	U	*0.67*	U	**0.22**	J	*0.63*	U	*2.3*	U	**0.43**	J	**0.58**	J	*0.72*	U
Tetrachloroethene	360	µg/m3	**0.41**		**6.70**		**68**		**0.84**		**49**		**46**		**15**		**33**		**570**		**2.8**		**2.8**		**1.8**	
Tetrahydrofuran	NA	µg/m3	*2.1*	U	*2.0*	U	*2.0*	U	*2.3*	U	**4.2**		**4.5**		**2.5**		*2.2*	U	**7.8**	J	**1.2**	J	**0.87**	J	**1.3**	J
Toluene	170000	µg/m3	**0.25**	J	**0.49**		**1.6**		**5.4**		**3.2**		**7.9**		**9.6**		**1**		**20**		**18**		**18**		**7.5**	
Trichloroethene	16	µg/m3	*0.16*	U	*0.14*	U	*0.15*	U	*0.17*	U	**0.76**		**1.8**		**0.19**		**0.5**		**4**		**0.12**	J	**0.11**	J	**0.33**	
Trichlorofluoromethane	NA	µg/m3	**2.2**	J	**3.5**	J	**2.1**	J	**3.3**	J	**2.1**		**3.7**		**4.1**		**2.3**		**18**		**2.3**		**2.4**		**3.9**	
Vinyl Chloride	5.6	µg/m3	*0.07*	U	**0.13**		**0.07**		**0.1**		**0.1**		**0.12**		*0.079*	U	*0.075*	U	*0.28*	U	**0.13**		**0.13**		**0.076**	J

Notes:
Bold indicates detected values
Italics indicates nondetected values
es values greater than screening level

Table 9
East Side Springs Soil Vapor Results

1 Screening level is Residential Soil Gas Risk based screening level
Soil gas RBSLs are the EPA indoor air RSLs corresponding to an excess lifetime cancer risk of 1x10-6 and a hazard quotient of 1 divided by an attenuation factor of 0.3 (November 2020 RSL table version).
Acronyms:
µg/L = microgram per liter
Q = qualifier
J = Result is estimated
U = Analyte was not detected at the associated value, which is the reporting limit
NA = Not Applicable

Appendix A

Daily Quality Control Reports

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 3/26/2021	**Prepared by:** Whitney Treadway

Personnel on site, including Contractors:	CDM Smith – Whitney Treadway Wasatch – Kiel Keller
Visitors/Others:	

Weather	Sunny	**Partly Cloudy**	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	0 To 32 º F
Wind	**Still**	Moderate	High		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Soil gas/vapor sampling equipment

Description of Field Activities – including samples/data collected, etc:

- A H&S tailgate was conducted at the IDW yard area.
- Soil Gas Sampling
  - Collected the following samples:
    - MW24-SG032621-32
    - FD05-SG032621
    - MW34-SG032621
    - MW32-SG032621
    - MW37-SG032621
    - MW38-SG032621
  - Shipped all 7 samples to Eurofins Air Toxics for TO-15 analysis (6 from Friday and 1 from Thursday).
    - MW24-SG032621-32
    - FD05-SG032621
    - MW34-SG032621
    - MW32-SG032621
    - MW37-SG032621
    - MW38-SG032621
    - MW24-SG032521-60
- Shipped 5 boxes of empty canisters back to lab.
- Shipped PID back to Field Environmental.
- Demobilized from site.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

- Salt Lake County has a mandatory mask mandate in effect since Saturday, June 27. Masks are required in public.

Projected Work – Near Term:

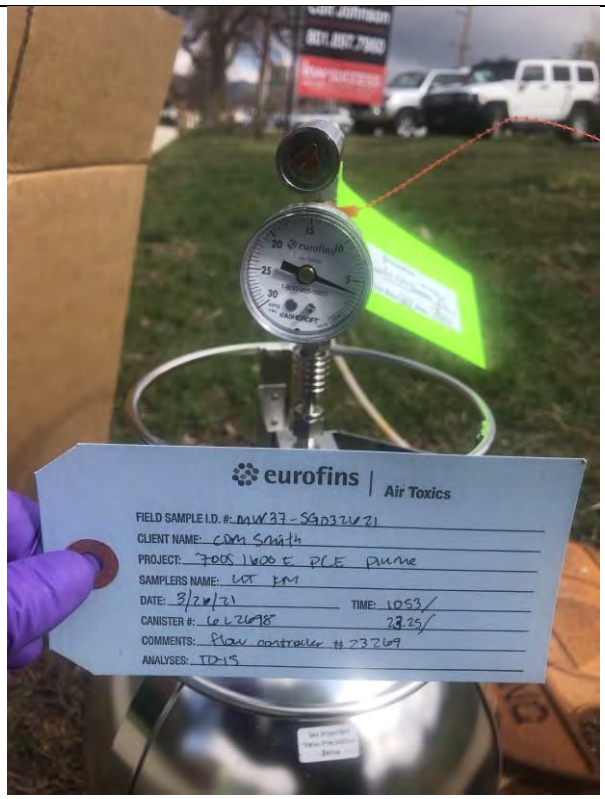
- Piezometer replacement drilling beginning next week.

Other Activities/Remarks:

- None.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Photos:

	Date: 3/26/2021 **Location:** MW-24 **Description:** parent and duplicate sample collection at 32 ft probe
	**Date:** 3/26/2021 **Location:** MW-37 **Description:** Starting 30-minute sample collection – initial vacuum

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Date: 3/26/2021

Location: MW-32

Description: Soil gas sample collection at soil gas probe at 18 ft depth

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 4/1/2021	**Prepared by:** Joe Miller

Personnel Onsite, including Contractors:	CDM Smith -Joe Miller Wasatch Environmental – Anna Fiorini Vista Geoscience – Peter Wethington Vista Geoscience – Ben Alcox Vista Geoscience – David Fontana VA – Wynn John
Visitors/Others:	B&B Drilling Supplies delivery United site services stage road plates near ROW boring locations

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	**50 to 70 º F**	**32 to 50 º F**	To 32 º F
Wind	**Still**	Moderate	High		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Geoprobe 7822 DT drill rig • 2 support trucks • Forklift • PID

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

Site Orientation: H&S Tailgate and site orientation with Vista Geoscience.

Set up decon pad and decontaminate all down hole drill steel.

Visit boring locations. Relocate RG-11 to 741 Douglas Street. Relocate RG-08 around the corner to the south side of 900 S from 1200 E.

RG-09 Installation: Overdrill RG-09 (GW-59) location. Reinstall well with 2" schedule 40 PVC. 0.010 slot screen and 10/20 sand pack from 3.5 ft bgs to 15 feet bgs. Depth to water prior to overdrilling was 5.87 feet BTOC.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

Badging office stated that they don't have temporary badges. They have openings for appointments on Tuesday 4/6. But stated if temporary building access is needed then we can go to the lock smith shop. No building access is needed.

Projected Work – Near Term:

Reinstallation of RG-03 (GW-16) on Sunnyside Avenue.

Reinstallation of RG-02 (GW-11) in the alley south of Sunnyside Avenue.

Other Activities/Remarks:

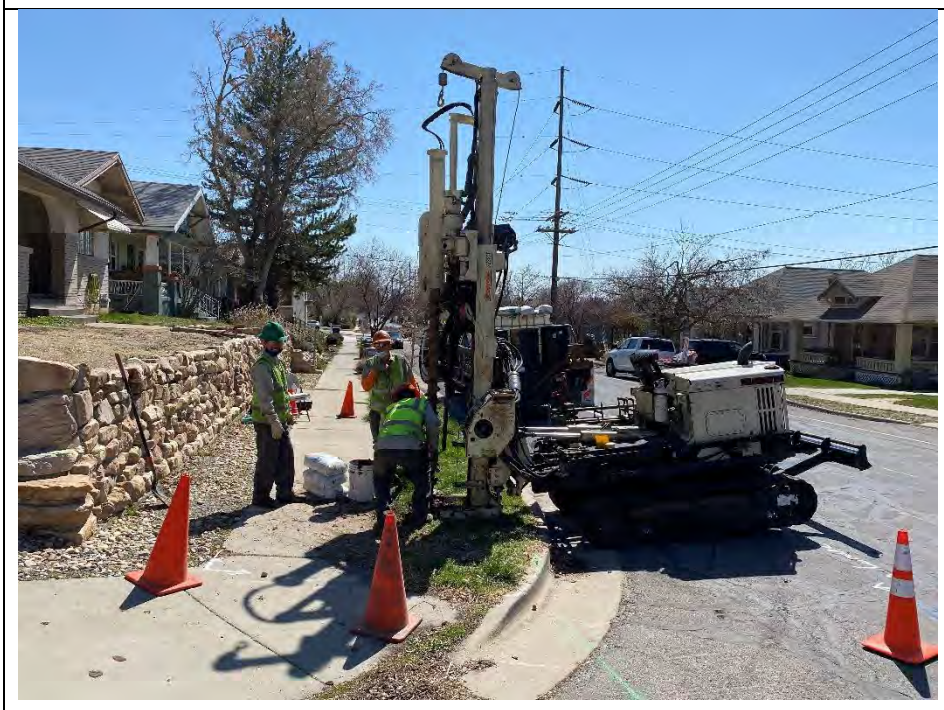
4/2/2021: A safety Tailgate will be conducted at the laydown area at the VA.

Photos:

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 4/1/2021 **Location:** RG-11 **Description:** Location repositioned (~150 feet south) to 741 Douglas street.
	Date: 4/1/2021 **Location**: RG-08 **Description**: Location repositioned to parking lane along 900 South.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 4/1/2021 **Location:** RG-09 **Description:** Hand augered to 5 feet bgs between original location and marked storm sewer line.
	**Date**: 4/1/2021 **Location**: RG-09 **Description**: Vista Geoscience geoprobe setup at RG-09. Boring to 15 feet bgs and begin building well.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 4/2/2021	**Prepared by:** Joe Miller

Personnel Onsite, including Contractors:	CDM Smith -Joe Miller Vista Geoscience – Peter Wethington Vista Geoscience – Ben Alcox Vista Geoscience – David Fontana VA – Wynn John
Visitors/Others:	None

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	**50 to 70 º F**	**32 to 50 º F**	To 32 º F
Wind	**Still**	Moderate	High		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Geoprobe 7822 DT drill rig • 2 support trucks • PID

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

The Health and Safety tailgate meeting was conducted at the VA laydown area.

RG-02 Installation: The casing at the GW-11 location was pulled and the surface completion was removed. RG-02 was drilled to 15 feet bgs. Ten feet of 0.010 slot 2-inch schedule 40 PVC screen was installed from 5-15 feet bgs. The 10/20 sand filter pack was installed from 3.5 feet bgs to 15 feet bgs. Prior to drilling DTW was 1.07 feet btoc.

RG-03 Installation: The casing at the GW-16 location was pulled and the surface completion was removed. The boring was drilled to 8 feet bgs. Five feet of 0.010 slot 2-inch schedule 40 PVC screen was installed from 3-8 feet bgs. The 10/20 sand filter pack was installed from 2 feet bgs to 8 feet bgs.

RG-07 Installation: The casing at the GW-52 location was pulled and the surface completion was removed. The boring in the original location encountered refusal (likely large cobble) at 16 feet bgs. The boring was offset approximately 3 feet. The offset boring was advanced to 30 feet bgs. Ten feet of 0.010 slot 2-inch schedule 40 PVC screen was installed from 20-30 feet bgs. The 10/20 sand filter pack was installed from 18 feet bgs to 30 feet bgs. Prior to drilling DTW was 21.14 feet btoc. A soil vapor probe was installed from 5 to 5.5 feet with a sand pack from 4-7 feet bgs.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

RG-07 boring encountered refusal at 16 feet bgs. The boring was backfilled with bentonite and offset approximately 3 feet to the west.

Projected Work – Near Term:

Reinstallation of RG-01 (GW-10) on 900 South.

Reinstallation of RG-05 (GW-27) north of East High School.

Other Activities/Remarks:

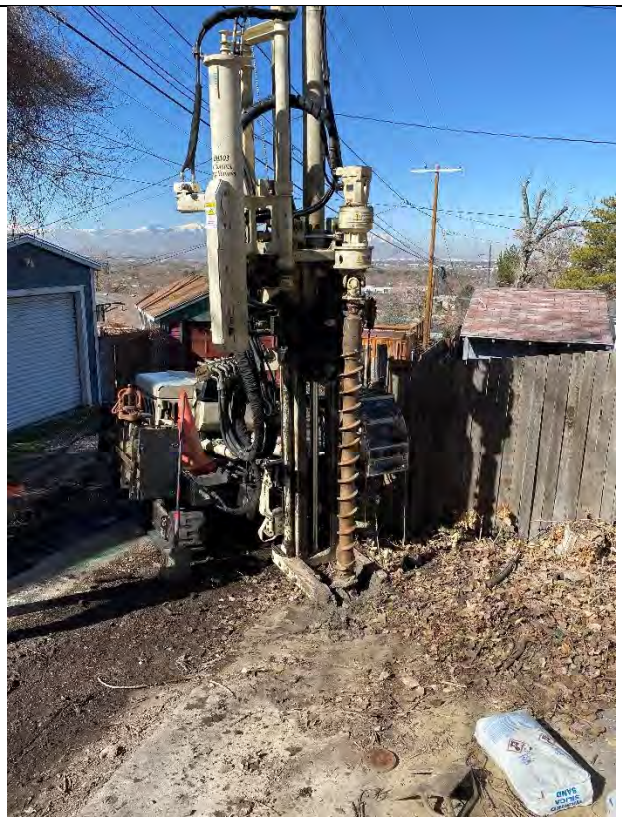
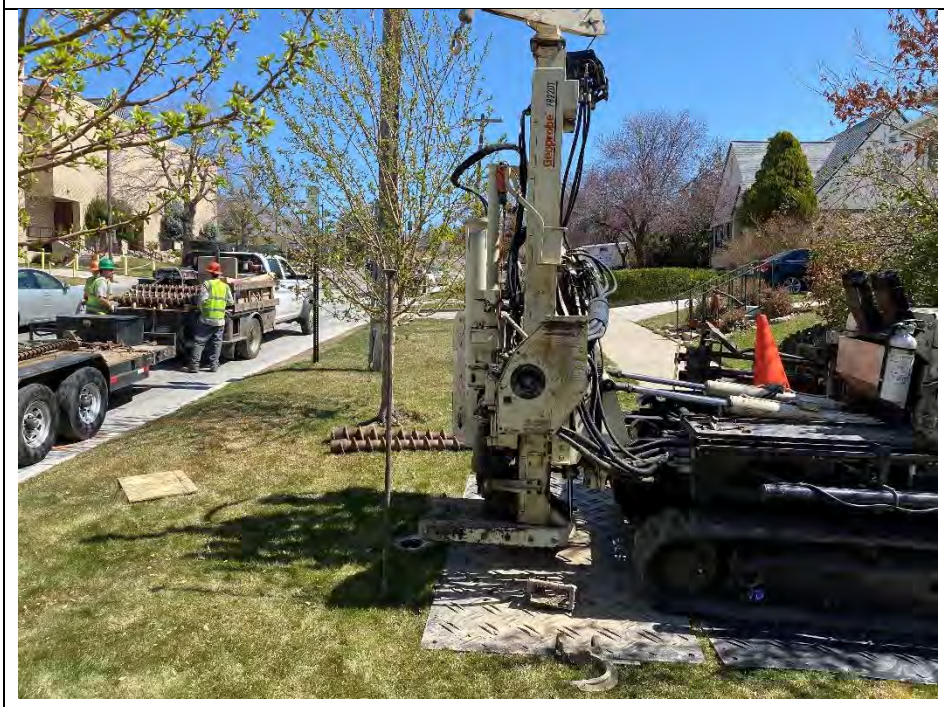
4/3/2021: A safety Tailgate will be conducted at the laydown area at the VA at 0800.

Photos:

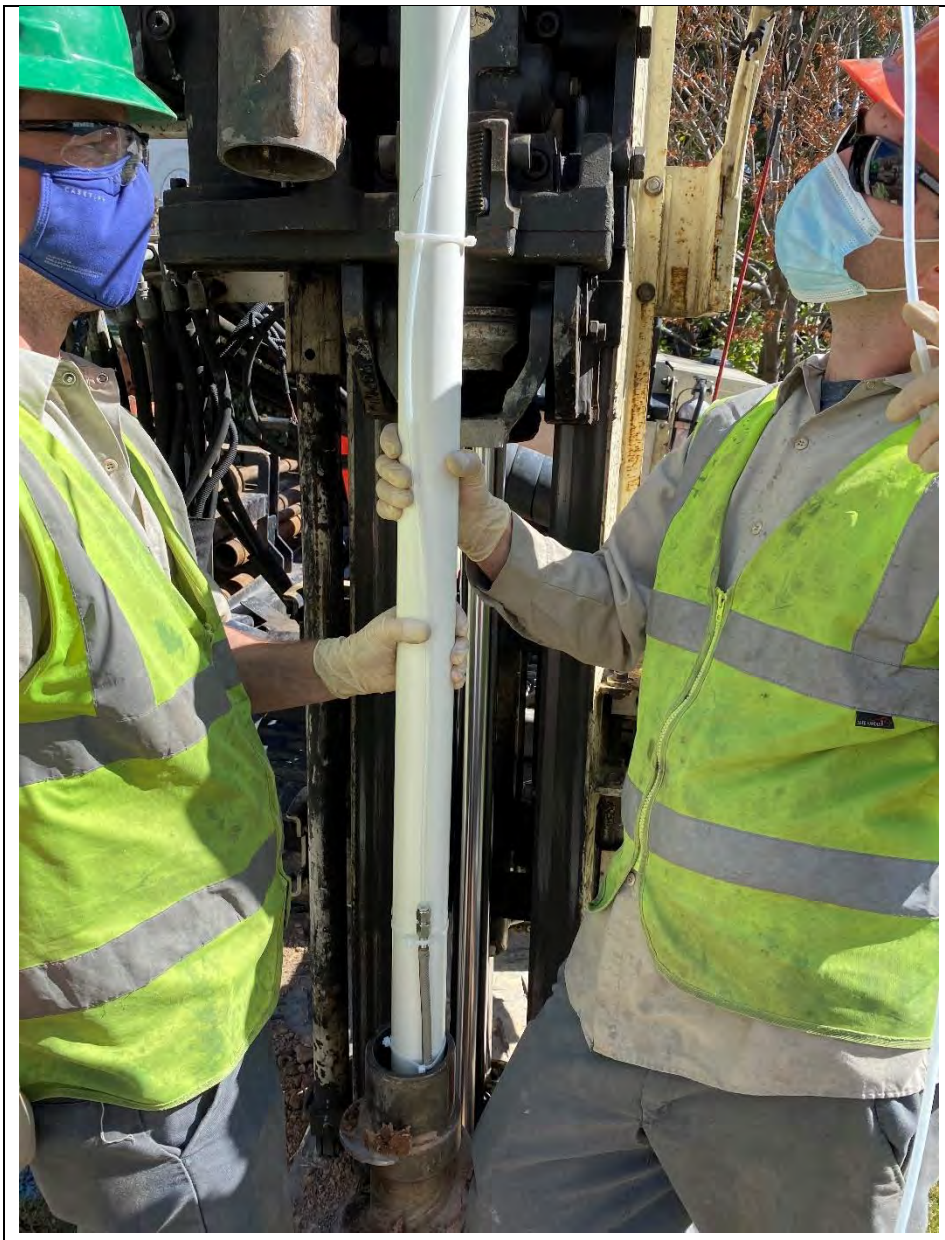
Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 4/2/2021 **Location:** RG-03 **Description:** Geoprobe set up at RG-03.
	Date: 4/2/2021 **Location**: RG-02 **Description**: Vista pulling 1-inch PVC from GW-11 location.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	**Date:** 4/2/2021 **Location:** RG-02 **Description:** Geoprobe setup in alley south of Sunnyside Avenue.
	**Date**: 4/2/2021 **Location**: RG-07 **Description**: Geoprobe setup at RG-07 original location prior to offset.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah



Date: 4/2/2021

Location: RG-07

Description: Soil vapor probe and tubing installed at 5 feet bgs on RG-07.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 4/3/2021	**Prepared by:** Joe Miller

Personnel Onsite, including Contractors:	CDM Smith -Joe Miller Vista Geoscience – Peter Wethington Vista Geoscience – Ben Alcox Vista Geoscience – David Fontana
Visitors/Others:	None

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	**50 to 70 º F**	**32 to 50 º F**	To 32 º F
Wind	**Still**	Moderate	High		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Geoprobe 7822 DT drill rig • 2 support trucks • PID

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

The Health and Safety tailgate meeting was conducted at the VA laydown area.

RG-05 Installation: The RG-05 (GW-27) location was hand augered to 5 feet in a 3-hole pattern. Soil cores were collected using a 3-inch DPT with 2-inch acetate sleeve cores. The cores were scanned with a PID and logged to 30 feet bgs. Then the boring was reamed with hollow-stem augers to 6.5-inches.

Ten feet of 0.010 slot 2-inch schedule 40 PVC screen was installed from 20-30 feet bgs. The 10/20 sand filter pack was installed from 18 feet bgs to 30 feet bgs. A soil vapor probe was installed from 5 to 5.5 feet with a sand pack from 4-7 feet bgs. After drilling DTW was 22.45 feet btoc.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

None

Projected Work – Near Term:

Private locate at RG-11 and RG-08 locations.

Reinstallation of RG-01 (GW-10) on 900 South.

Reinstallation of RG-06 (GW-50) near 1200 E and Gilmer.

Other Activities/Remarks:

4/5/2021: A safety tailgate will be conducted at the laydown area at the VA at 0730.

Photos:

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 4/3/2021 **Location:** RG-05 **Description:** Hand augered 3-hole pattern to 5 feet bgs.
	Date: 4/3/2021 **Location**: RG-05 **Description**: Work zone setup at RG-05 while reaming boring with 6.5-inch augers.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Date: 4/3/2021

Location: RG-05

Description: Soil core from 25-30 feet bgs. Saturated silty sand above gravel unit.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 4/5/2021	**Prepared by:** Joe Miller

Personnel Onsite, including Contractors:	CDM Smith -Joe Miller Vista Geoscience – Peter Wethington Vista Geoscience – Ben Alcox Vista Geoscience – David Fontana GPRS
Visitors/Others:	None

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	**50 to 70 º F**	32 to 50 º F	To 32 º F
Wind	Still	**Moderate**	**High**		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Geoprobe 7822 DT drill rig • 2 support trucks • PID • GPR sled

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

The Health and Safety tailgate meeting was conducted at the VA laydown area.

GPRS Private utility locate: GPRS performed a geophysical survey at the relocated RG-04, RG-08 and RG-11 locations. No utilities were identified at the relocated RG-08 location. At RG-11 the boring was offset from an identified utility 3.5 feet. The Blue Stakes of Utah remarked utility locations at RG-04. They provided clarity for the gas line, but the communication marking near the boring was difficult to decipher. Therefore we offset the boring into the parking lane. GPRS did not identify any utilities at the offset location.

RG-01 Installation: The RG-01 location (former GW-10 area) was drilled to 20 feet bgs with DPT. The soil cores were screened and logged. The RG-01 well was set with screen from 9 to 19 feet bgs with 0.010 slot screen of 2-inch Schedule 40 PVC. The sand pack was installed from 8 to 19 feet bgs. A soil vapor probe was installed from 4.5 to 5 feet bgs with a sand pack from 3 to 6 feet bgs. After installation DTW was 11.00 feet BTOC.

RG-06 Installation: Prior to drilling the GW-50 location depth to water was 2.38 feet BTOC. The piezometer was pulled and over-drilled to 10 feet bgs. The 2" schedule 40 PVC 0.010 slot screen was set from 4 to 9 feet bgs. The sand pack was set from 3 to 9 feet bgs.

GW-49 abandonment: Prior to abandonment DTW was 7.17 feet bgs. The 1" PVC was pulled and the 3-inch DPT advanced to 12.5 feet bgs. The boring was backfilled with bentonite.

RG-04 Installation: DTW was measured in GW-20 to 10.94 feet BTOC. Due to unclear utility markings, the GW-20 location was pulled, drilled with DPT and abandoned with bentonite. The offset boring was advanced to 20 feet bgs. The well screen was installed from 10 to 20 feet bgs. The sand pack was installed from 9 to 20 feet bgs. A soil vapor point was installed from 5 to 5.5 feet bgs with a sand pack from 4 to 7 feet bgs.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

None

Projected Work – Near Term:

Install RG-08 and RG-10 locations.

Other Activities/Remarks:

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

4/6/2021: A safety tailgate will be conducted at the laydown area at the VA at 0800.

Photos:

	Date: 4/5/2021 **Location:** RG-01 **Description:** Saturated DPT soil core from 15 to 20 feet. Note that bottom foot is clayey gravel, less wet than sand above.
	Date: 4/5/2021 **Location**: RG-04 **Description**: Unclear utility markings near GW-20. RG-04 location offset.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Date: 4/5/2021

Location: RG-04

Description: Offset location clear of utilities.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Date: 4/5/2021

Location: GW-49

Description: Vista pulling piezometer at GW-49.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Date: 4/5/2021

Location: RG-06

Description: Work zone setup at RG-06. Vista pulling augers after drilling to depth.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 4/6/2021	**Prepared by:** Joe Miller

Personnel Onsite, including Contractors:	CDM Smith -Joe Miller Vista Geoscience – Peter Wethington Vista Geoscience – Ben Alcox Vista Geoscience – David Fontana VA – Wynn John
Visitors/Others:	None

Weather	Sunny	**Partly Cloudy**	Overcast	Rain	**Snow**
Temperature	85+ º F	70 to 85º F	**50 to 70 º F**	**32 to 50 º F**	To 32 º F
Wind	Still	**Moderate**	High		
Humidity	**Dry**	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Geoprobe 7822 DT drill rig • 2 support trucks • PID

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

The Health and Safety tailgate meeting was conducted at the VA laydown area.

RG-08 Installation: The RG-08 location (GW-53) was drilled to 20 feet bgs with DPT. The soil cores were screened and logged. The RG-08 well was set with screen from 8 to 18 feet bgs with 0.010 slot screen of 2-inch Schedule 40 PVC. The sand pack was installed from 7 to 18 feet bgs. A soil vapor probe was installed from 4.5 to 5 feet bgs with a sand pack from 4 to 6 feet bgs. Prior to installation DTW was 9.03 feet bgs.

GW-61 abandonment: Prior to abandonment DTW was 11.25 feet bgs. The 1" PVC was pulled and the 3-inch DPT advanced to 20 feet bgs. The boring was backfilled with bentonite.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

None

Projected Work – Near Term:

Install RG-10 and RG-11 locations.

Other Activities/Remarks:

4/7/2021: A safety tailgate will be conducted at the laydown area at the VA at 0800.

Photos:

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Date: 4/6/2021

Location: RG-08

Description: Vista setting up to core concrete at RG-08

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 4/6/2021 **Location**: RG-08 **Description**: Soil core from 10-15 feet bgs. Saturated silty sand and gravel units.
	Date: 4/6/2021 **Location:** GW-61 **Description:** Vista pulling PVC from piezometer location

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 4/7/2021	**Prepared by:** Joe Miller

Personnel Onsite, including Contractors:	CDM Smith -Joe Miller Vista Geoscience – Peter Wethington Vista Geoscience – Ben Alcox Vista Geoscience – David Fontana
Visitors/Others:	None

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	**50 to 70 º F**	**32 to 50 º F**	To 32 º F
Wind	Still	**Moderate**	High		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Geoprobe 7822 DT drill rig • 2 support trucks • PID

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

The Health and Safety tailgate meeting was conducted at the VA laydown area.

RG-10 Installation: The RG-10 (relocated GW-61 location) boring hit refusal at 20' bgs. The boring was offset 3 feet to west and continued. The RG-10 boring was drilled to 30 feet bgs with DPT. The soil cores were screened and logged. The RG-10 well was set with screen from 20 to 30 feet bgs with 0.010 slot screen of 2-inch Schedule 40 PVC. The sand pack was installed from 18 to 30 feet bgs. A soil vapor probe was installed from 5 to 5.5 feet bgs with a sand pack from 4 to 7 feet bgs.

RG-11 Installation: The RG-11 boring hit refusal at 12.5' bgs. The boring was offset 3 feet to south and continued. The RG-11 was drilled to 40 feet bgs with DPT. The soil cores were screened and logged. The RG-11 well was set with screen from 30 to 40 feet bgs with 0.010 slot screen of 2-inch Schedule 40 PVC. The sand pack was installed from 28 to 40 feet bgs. A soil vapor probe was installed from 5 to 5.5 feet bgs with a sand pack from 4 to 7 feet bgs.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

None

Projected Work – Near Term:

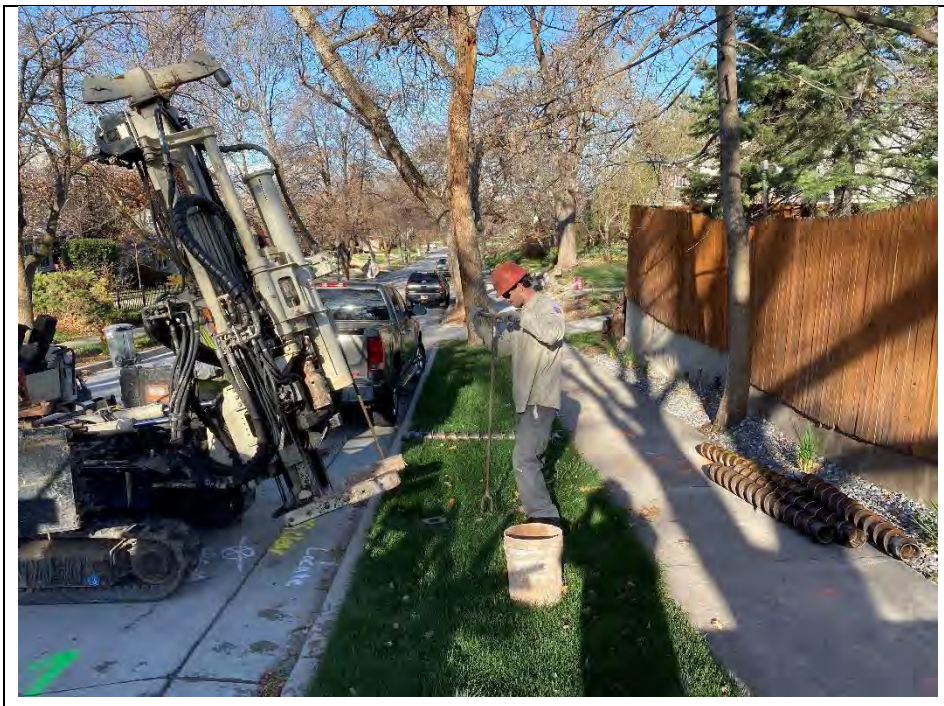
Install flush mount surface completion monuments.

Other Activities/Remarks:

4/8/2021: A safety tailgate will be conducted at the laydown area at the VA at 0800.

Photos:

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah



Date: 4/7/2021

Location: RG-10

Description: Vista setting at RG-10 after hand augering.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Date: 4/7/2021

Location: RG-10

Description: Saturated gravel at 28 bgs in RG-10.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 4/7/2021 **Location:** RG-11 **Description:** Saturated soil core at 39 feet bgs.
	Date: 4/7/2021 **Location:** RG-11 **Description:** Augering RG-11 location after DPT drilling.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 4/8/2021	**Prepared by:** Joe Miller

Personnel Onsite, including Contractors:	CDM Smith -Joe Miller Vista Geoscience – Peter Wethington Vista Geoscience – Ben Alcox Vista Geoscience – David Fontana VA – Wynn John
Visitors/Others:	None

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	**50 to 70 º F**	32 to 50 º F	To 32 º F
Wind	Still	**Moderate**	High		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Geoprobe 7822 DT drill rig • 2 support trucks • PID

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

The Health and Safety tailgate meeting was conducted at the VA laydown area.

Surface completions: Vista installed the surface completions at the 11 residential groundwater well locations. The GW-49 and GW-20 locations were topped off with potting soil.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

Vista identified a damaged sprinkler irrigation line at RG-10. The damaged section was repaired and the homeowner tested the sprinkler system to verify it was working with no leaks.

Projected Work – Near Term:

Survey RG locations and begin well development.

Other Activities/Remarks:

4/9/2021: A safety tailgate will be conducted at the laydown area at the VA at 0800.

Photos:

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Date: 4/8/2021

Location: RG-01

Description: Setting flush mount monument at RG-01

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Date: 4/8/2021

Location: RG-10

Description: Repaired irrigation line at RG-10.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Date: 4/8/2021

Location: GW-49

Description: Backfilled boring topped of with potting soil.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 4/9/2021	**Prepared by:** Joe Miller

Personnel Onsite, including Contractors:	CDM Smith -Joe Miller Redcon Surveying
Visitors/Others:	None

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	**50 to 70 º F**	32 to 50 º F	To 32 º F
Wind	Still	**Moderate**	High		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• PID • YSI • Survey equipment

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

The Health and Safety tailgate meeting was conducted at the VA laydown area.

VISTA Demobilization: Vista demobilized their equipment from site for travel back to Golden, CO.

Surveying: Redcon Surveying was onsite to survey the location and elevation of the 11 new RG locations.

Well Development
RG-11: DTW was measured at 29.08 feet BTOC. Depth to bottom was 38.98' BTOC. Approximately 4 gallons of water was purged from the well. After purging the depth to bottom was 40.28 feet BTOC indicating over 1 foot of sediment was removed. The well was allowed to recover and was revisited after 3 hours. DTW had recovered to 30.20 feet BTOC. An additional 2.5 gallons was bailed from RG-11. RG-11 will be revisited tomorrow to continue development.

RG-04: Prior to development DTW was 10.08 feet BTOC. Depth to bottom was 20.29 feet BTOC. Approximately 50 gallons was purged using a pump from RG-04 and turbidity was below 50 NTU.

RG-03: Prior to development DTW was 3.14 feet BTOC. Depth to bottom was 8.18 feet BTOC. Approximately 3.5 gallons was purged using a pump and bailer. RG-04 will be revisited to continue development.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

None

Projected Work – Near Term:

Well development

Other Activities/Remarks:

4/10/2021: A safety tailgate will be conducted at the IDW area at the VA at 0730.

Photos:

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 4/9/2021 **Location:** RG-04 **Description:** Redcon surveying north edge of monument.
	Date: 4/9/2021 **Location**: RG-05 **Description**: Redcon documenting survey at RG-05.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Date: 4/9/2021

Location: RG-11

Description: Bailed sediment at RG-11 during initial purge.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Date: 4/9/2021

Location: RG-04

Description: Initial sediment water from RG-04.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 4/10/2021	**Prepared by:** Joe Miller

Personnel Onsite, including Contractors:	CDM Smith -Joe Miller
Visitors/Others:	None

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	**50 to 70 º F**	32 to 50 º F	To 32 º F
Wind	Still	**Moderate**	High		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• PID • YSI • Survey equipment

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

The Health and Safety tailgate meeting was conducted at the VA laydown area.

Well Development

RG-11: RG-11 was bailed dry twice purging an extra 5 gallons. During the final purge the turbidity was less than 50 NTU

RG-03: RG-03 was bailed dry, purging approximately 3 gallons. The turbidity during the purge was less than 50 NTU.

RG-09: Prior to development at RG-09 DTW was 5.63 feet BTOC. Depth to bottom was 14.14 feet BTOC. Approximately 15 gallons was purged by bailing. After bailing Depth to bottom was 15.01 feet BTOC. RG-09 was allowed to recover and will be revisited for additional development.

RG-05: Prior to development DTW was 23.63 feet BTOC. Depth to bottom was 29.47 feet BTOC. Approximately 2 gallons was bailed. After bailing dry depth to bottom was 30.30 feet BTOC. RG-05 will be revisited for additional development.

RG-08: Prior to development DTW was 5.73 feet BTOC. Depth to bottom 17.82 feet BTOC. Approximately 75 gallons was pumped from RG-08. After development depth to bottom was 17.93 feet BTOC and turbidity was 175 NTU. RG-08 will be revisited and additional water will be purged to reach a lower NTU.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

None

Projected Work – Near Term:

Continued Well development

Prepare for surface water sampling

Other Activities/Remarks:

4/12/2021: A safety tailgate will be conducted at the IDW area at the VA at 0730.

Photos:

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 4/10/2021 **Location:** RG-03 **Description:** Clear purge water from bailer.
	Date: 4/10/2021 **Location**: RG-08 **Description**: Initial purge light brown and cloudy.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Date: 4/10/2021

Location: RG-08

Description: After purging 75 gallons. Turbidity still greater than 50 NTU.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 4/12/2021	**Prepared by:** Joe Miller

Personnel Onsite, including Contractors:	CDM Smith -Joe Miller CDM Smith -Connor Kelley Wasatch Environmental – Anna Fiorini Wasatch Environmental - Kiel Keller
Visitors/Others:	None

Weather	**Sunny**	Partly Cloudy	Overcast	Rain	Snow
Temperature	85+ º F	70 to 85º F	**50 to 70 º F**	32 to 50 º F	To 32 º F
Wind	Still	**Moderate**	High		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• PID • YSI • Turbidity meter • Flow rate meter • Submersible pump

Description of Field Activities – including borings completed/started (include footages), samples/data collected, etc.:

The Health and Safety tailgate meeting was conducted at the VA IDW area.

Well Development

RG-01: Prior to development depth to bottom was 8.82 feet BTOC. The well was bailed dry 3 times with a total purge volume of 15 gallons. After development, depth to bottom was 18.83 feet BTOC. RG-01 will be bailed again tomorrow after allowing recharge and settling.

RG-07: Approximately 1 foot of sediment was removed by bailing and approximately 100 gallons were pumped from RG-07. The well would pump dry, but recovered quickly. There was significant reduction in turbidity during development.

RG-05: RG-05 was bailed dry three times today, and during the final purge there was significant reduction in turbidity. A total of 6.5 gallons has been purged from RG-05. RG-05 will be bailed again tomorrow after allowing recharge and settling.

RG-06: Depth to water was 2.29 feet BTOC and depth to bottom was 9.19 feet BTOC. RG-06 was bailed dry two times today, and during the final purge there was significant reduction in turbidity. A total of 6.5 gallons has been purged from RG-06.

RG-10: Depth to water was 26.21 feet BTOC and depth to bottom was 30.29 feet BTOC. RG-10 was bailed dry once. RG-10 will be bailed again tomorrow after allowing recharge and settling.

RG-08: An additional 3 gallons was bailed from RG-08 to assess turbidity after purging 75 gallons on Saturday. The initial turbidity was clear.

RG-02: Prior to development RG-02 depth to water was 2.23 feet BTOC and depth to bottom was 14.02 feet BTOC. After bailing 15 gallons, depth to bottom was 15.28 feet BTOC. There was a reduction in turbidity, but RG-02 will be bailed again tomorrow after allowing recharge and settling.

Surface Water Sampling

The surface water sampling team was shown the seep and RG well locations. Preparation of equipment of supplies was completed.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

IDW Characterization
Two composite IDW samples were collected from the soil drums generated during the piezometer replacement and shipped to the lab.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

1 out of 4 coolers from EMAX did not arrive during the shipment. A replacement cooler and bottle will be sent. There were sufficient bottles to begin the surface water sampling.

Projected Work – Near Term:

Continue well development

Begin surface water sampling

Other Activities/Remarks:

4/13/2021: A safety tailgate will be conducted at the IDW area at the VA at 0730.

Photos:

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Date: 4/12/2021

Location: RG-05

Description: Clear purge water from bailer.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 4/12/2021 **Location**: RG-02 **Description**: Initial purge light brown and cloudy.
	Date: 4/12/2021 **Location:** RG-02 **Description**: Less turbid and brown water after 10 gallon purge at RG-02

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Date: 4/12/2021

Location: RG-08

Description: Clear purge water from bailer after purging and settling since Saturday.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 4/13/2021	**Prepared by:** Connor Kelley

Personnel on site, including Contractors:	CDM Smith –Connor Kelley Wasatch – Anna Fiorini, Kiel Keller VA – Wynn John
Visitors/Others:	None

Weather	Sunny	Partly Cloudy	**Overcast**	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	0 To 32 º F
Wind	Still	Moderate	**High**		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Development equipment • Water level and low-flow groundwater sampling equipment • Surface water sampling equipment • Soil vapor sampling equipment

Description of Field Activities – including samples/data collected, etc:

- A H&S tailgate was conducted at the IDW yard area.
- Equipment was calibrated.
- Groundwater and soil vapor sampling in ESS
    - Hydrasleeves were deployed at wells RG-3, RG-4, RG-8, and RG-11. The bottom of the Hydrasleeves were set between 1 and 2 feet above the bottom of the well.
    - Soil vapor samples were taken at the following wells using Summa canisters:
        - RG-04 (RG04-SG041321)
        - RG-08 (RG08-SG041321)
        - RG-11 (RG11-SG041321)
- Surface water sampling. All surface water locations were sampled for the following analytes:
        - VOCs
        - MEE
        - Metals/Mercury
        - TOC
        - Anions/Alkalinity
        - Nitrate/Nitrite
    - SW-166 (SW166-SW041321)
        - Multiple seeps present in yard (1148 East Sunnyside Ave). Two seeps with most prominent flow merged before continuing offsite. Sampled at this convergence.
        - Dug out small ponded area in runoff stream while daming downgradient side to create deeper pool. Removed dam and ponded area to resemble conditions prior to sampling. Samples were collected using a peristaltic pump.
        - Flow rate was measured by installing 18-inch gutter downspout in dam to allow all flow to travel through gutter downspout. Flow rate was then determined by putting a bucket under gutter for a set amount of time. Flow rate: 2 L/minute.
        - Field parameters were taken after samples were collected.
    - SW-35 (SW35-SW041321)
        - Small seep reaching ground surface at the corner of garage before flowing offsite. (1126 East 800 Street).
        - Small ponded area already present but slightly deepened area. Removed ponded area to resemble conditions prior to sampling. Samples were collected using a peristaltic pump.

        - Flow rate was estimated using professional judgement due to limited flow observed. Estimated flow rate: < 1 L/minute.
        - Field parameters were taken after samples were collected.
    - SW-39 (SW39-SW041321)
        - Sample taken from effluent pipe in storm drain located in Alpine Court. Grate was removed for sampling activities.
        - Flow rate was taken from effluent pipe using timer and bucket. Flow rate: 11 L/minute.
        - Field parameters were taken after samples were collected.
        - Grate was replaced following sampling activities.
    - SW-53 (SW53-SW041321)
        - Sample taken from effluent pipe typically discharging into another pipe leading away from the property. Moved effluent pipe to take samples which temporarily discharged into coy pond.
        - Flow rate was taken from effluent pipe using timer and bucket. Flow rate: 6 L/minute.
        - Field parameters were taken after samples were collected.
        - Effluent pipe was reconnected to pipe which leaves the property.
    - No samples were shipped to EMAX Labs.
- Development
    - Kiel Keller (Wasatch) finished developing wells RG-1, 2, 5, 9, and 10.
        - **RG-01:** An additional 5 gallons was removed with a bailer. After recharge and settling the turbidity was less than 50NTU.
        - **RG-02:** An additional 9 gallons was removed with a bailer. After recharge and settling the turbidity was less than 50NTU.
        - **RG-05:** An additional 5 gallons was removed with a bailer. After recharge and settling the turbidity was less than 50NTU.
        - **RG-09:** An additional 8.75 gallons was removed with a bailer. After recharge and settling the turbidity was less than 50NTU.
        - **RG-10:** An additional 0.75 gallons was removed with a bailer. After recharge and settling the turbidity was less than 50NTU.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

- None

Projected Work – Near Term:

- Continue surface water sampling. Per discussion with W. John (VA) he does not need to be present for sampling of SW-34. He would like to be notified and present for SW-12. Completed reconnaissance of the property today and identified several surface water features including seeps and sump pumps, all which lead to low point on property where it discharges to street storm drain.
- Continue deploying Hydrasleeves.
- Continue taking soil vapor samples.

Other Activities/Remarks:

- None.

Photos:

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 4/13/2021 **Location:** SW-166 **Description:** Sampling location and flow rate collection setup through gutter downspout.
	Date: 4/13/2021 **Location:** SW-35 **Description:** Seep location.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 4/13/2021 **Location:** SW-39 **Description:** Discharge pipe into storm drain. Grate removed in photo.
	Date: 4/13/2021 **Location:** SW-53 **Description:** Sampling from discharge pipe.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Date: 4/13/2021

Location: RG-02

Description: Purged water from first bailer after recharging is clear.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 4/14/2021	**Prepared by:** Connor Kelley

Personnel on site, including Contractors:	CDM Smith –Connor Kelley Wasatch – Anna Fiorini
Visitors/Others:	None

Weather	Sunny	Partly Cloudy	Overcast	**Rain**	**Snow**
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	0 To 32 º F
Wind	Still	Moderate	**High**		
Humidity	Dry	**Moderate**	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Water level and low-flow groundwater sampling equipment • Surface water sampling equipment • Soil vapor sampling equipment

Description of Field Activities – including samples/data collected, etc:

- A H&S tailgate was conducted at the IDW yard area.
- Equipment was calibrated.
- Groundwater and soil vapor sampling
    - Hydrasleeves were deployed at wells RG-1, RG-2, RG-5, RG-6, RG-7, RG-9, and RG-10. The bottom of the Hydrasleeves were set between 1 and 2 feet above the bottom of the well.
        - At RG-10, only 3.35 ft of water in well. (DTW: 26.95', DTB: 30.30'). Hydrasleeve was set at bottom of the well.
    - Soil vapor samples were taken at the following wells using Summa canisters:
        - RG-01 (RG01-SG041421)
        - RG-05 (RG05-SG041421)
        - RG-07 (RG07-SG041421)
        - RG-10 (RG10-SG041421) plus Duplicate (FD01-SG041421)
    - All samples were shipped to the laboratory at the end of the day.
- Surface water sampling. All surface water locations were sampled for the following analytes:
        - VOCs
        - MEE
        - Metals/Mercury
        - TOC
        - Anions/Alkalinity
        - Nitrate/Nitrite
    - SW-34 (SW166-SW041421)
        - Sample was taken in the decorative stream area in the yard, downstream of the convergence of two forks. Per the homeowner, these forks were artificially made from 'Y' installed in underground upgradient pipe.
        - Flow rate was measured using velocity meter at multiple locations across sample location.
        - A second flow rate was measured approximately 8 feet downstream where stream narrows significantly.
        - Field parameters were taken after samples were collected.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

- At RG-10, only 3.35 ft of water in the well. The Hydrasleeve was set at the bottom of the well to hopefully collect sufficient water for VOC samples.

Daily Quality Control Report
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Salt Lake City, Utah

Projected Work – Near Term:

- Continue surface water sampling. Per discussion with W. John (VA) he does not need to be present for sampling of SW-12. Will continue with surface water sampling with W. John.
- Collect Hydrasleeve samples.
- Ship all samples taken to date.

Other Activities/Remarks:

- None.

Photos:

Date: 4/14/2021

Location: SW-34

Description: Obtaining flow rate at sample location.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Date: 4/14/2021

Location: SW-34

Description: Looking downstream of sampling location where stream narrows and second flow rate was measured.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 4/15/2021	**Prepared by:** Connor Kelley

Personnel on site, including Contractors:	CDM Smith –Connor Kelley Wasatch – Anna Fiorini VA - Wynn John
Visitors/Others:	None

Weather	Sunny	Partly Cloudy	**Overcast**	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	0 To 32 º F
Wind	**Still**	**Moderate**	High		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Water level and low-flow groundwater sampling equipment • Surface water sampling equipment

Description of Field Activities – including samples/data collected, etc:

- A H&S tailgate was conducted at the IDW yard area.
- Equipment was calibrated.
- Groundwater sampling
    - The following groundwater samples were taken using hydrasleeves which had been deployed a minimum of 48 hours prior. All samples were analyzed for VOCs.
        - RG-03 (RG03-GW041521) no field parameters were taken due to a lack of water – only about half the hydrosleeve was filled).
        - RG-04 (RG04-GW041521) + MS/MSD. No field parameters were taken due to lack of water after MS/MSD samples.
        - RG-08 (RG08-GW041521 and FD01-GW041521). No field parameters were taken due to lack of water after FD sample.
- Surface water sampling. All surface water locations were sampled for the following analytes:
        - VOCs
        - MEE
        - Metals/Mercury
        - TOC
        - Anions/Alkalinity
        - Nitrate/Nitrite
    - SW-16I (Interior) (SW16I-SW041521)
        - Sample was taken inside Lady of the Lourdes School, in basement in small closet. A drain was present which opened to surface water piping, per Brad, who works for the school and showed us around. Per Brad, it is surface water that is piped underneath the school and is discharged into the sanitary sewer system.
        - Flow rate had to be estimated due to inaccessibility of any flow rate equipment. Estimated at 3-4 gallons/minute.
        - Field parameters were taken after samples were collected.
    - SW-16E (Exterior) (SW16E-SW041521)
        - Sample was taken outside in stormwater access point. Surface water flowed in from pipe which ran downgradient along school landscaping/sidewalk.
        - Flow rate had was measured using bucket and stopwatch. 8 L/minute.
        - Field parameters were taken after samples were collected.
    - SW-8 (SW08-SW041521)

        - Sample was taken from effluent pipe which collected surface water upstream and fed coy pond on property before being collected in another pipe to be discharged on other side of the road.
        - Flow rate had was measured using bucket and stopwatch. 48 L/minute.
        - Field parameters were taken after samples were collected.
    - SW-54 (SW54-SW041521)
        - This is a new sample point which Wynn John (VA) showed the sampling team. Surface water is discharging from underneath apartment building foundation.
        - Flow rate could not be estimated due to wide discharge and inability to dam up or redirect flow to make it more measurable.
        - Field parameters were taken after samples were collected.
    - SW-12 (SW12-SW041521)
        - Sample was taken from most upgradient point in yard where water discharged out of soil and into trenches cut in by homeowner.
        - Flow rate was measured by daming up flow path and using a bucket and stopwatch. Flow rate: about 5 L/minute.
        - Flow rate was also obtained downgradient in stormdrain which collected all surface water from property, not just portion that was sampled. Flow rate: 84 L/minute.
    - Benson Spring
        - A sample was not taken at the Benson Spring location, which is located in the gulch between S. Elizabeth Street and South 1100 East Street. Only a flow rate was measured using a velocity meter.
- All surface water samples were shipped at the end of the day.

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

- None

Projected Work – Near Term:

- Sample remainder of groundwater wells containing Hydrasleeves.
- Ship back all rental equipment.
- Organize connex area.
- Demobilize from site.

Other Activities/Remarks:

- None.

Photos:

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 4/15/2021 **Location:** Benson Spring **Description:** Obtaining flow rate
	Date: 4/15/2021 **Location:** SW-08 **Description:** Sample location (pipe).

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

	Date: 4/15/2021 **Location:** SW-12 **Description:** Sample location (behind shovel used to dam water).
	Date: 4/15/2021 **Location:** SW-16I **Description:** Interior sample location. Water entered from left side and drained down.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Date: 4/15/2021

Location: SW-54

Description: New sample location.

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

DATE: 4/16/2021	**Prepared by:** Connor Kelley

Personnel on site, including Contractors:	CDM Smith –Connor Kelley
Visitors/Others:	None

Weather	Sunny	Partly Cloudy	**Overcast**	Rain	Snow
Temperature	85+ º F	70 to 85º F	50 to 70 º F	**32 to 50 º F**	0 To 32 º F
Wind	**Still**	Moderate	High		
Humidity	**Dry**	Moderate	Humid		

Equipment in Use (field instruments, subcontractor equip, etc.)	• Water level and low-flow groundwater sampling equipment

Description of Field Activities – including samples/data collected, etc:

- A H&S tailgate was conducted at the IDW yard area.
- Equipment was calibrated.
- Groundwater sampling
    - The following groundwater samples were taken using hydrasleeves which had been deployed a minimum of 48 hours prior. All samples were analyzed for VOCs.
        - RG-11 (RG11-GW041621) Field parameters were taken.
        - RG-06 (RG06-GW041621). No field parameters were taken due to lack of water (the Hydrasleeve was approximately half full).
        - RG-07 (RG07-GW041621). Field parameters were taken.
        - RG-10 (RG10-GW041621). No field parameters were taken due to lack of water (the Hydrasleeve was approximately half full).
        - RG-05 (RG05-GW041621). Field parameters were taken.
        - RG-01 (RG01-GW041621). Field parameters were taken.
        - RG-02 (RG02-GW041621). Field parameters were taken.
        - RG-09 (RG09-GW041621). Field parameters were taken.
- All field equipment was shipped back at the end of the day.
- Demobilized from site, taking groundwater samples to be shipped on Monday and leaving keys with Anna Fiorini (Wasatch).

Issues/Problems Encountered/Deficiencies/Deviations from QAPP (and resolutions):

- None

Projected Work – Near Term:

- Groundwater samples will be shipped Monday (4/19).

Other Activities/Remarks:

- None.

Photos:

Daily Quality Control Report
700 South 1600 East PCE Plume
Salt Lake City, Utah

Date: 4/16/2021

Location: RG-05

Description: Hydrasleeve pulled from RG-05, some sediment at bottom. Took sample above sediment.

Appendix B

Field Logbook Notes

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4-12-20 SLC VA C. KELLER

0800 ONSITE: JOE MILLER (COM SMITH), ANNA FIORINI, KIEL KELLER (WASATCH) ONSITE. CONDUCT H&S MEETING. CALIBRATE YSI.

0900 JOE MILLER PROVIDES TOUR OF WELL LOCATIONS & SURFACE WATER LOCATIONS.

1030 OFFSITE TO COLLECT FIELD EQUIPMENT SHIPPED TO HOTEL.

1205 A. FIORINI OFFSITE TO GET BOTTLEWARE FROM WASATCH OFFICE. CONTINUE TO ORGANIZE/PREPARE FOR SAMPLING.

1300 1 COOLER DID NOT ARRIVE, INFORM C. ZAKOWSKI (COM SMITH).

1440 TAKE IDW SAMPLE IDW01-SB04121

1450 SPEAK W/ WYNN JOHN (VA) PLAN ON MEETING TOMORROW (4-13) @ 0900

1500 TAKE IDW SAMPLE ON 4-12-21 FR IDW02-SB04D21

1715 PACK SAMPLES TO SHIP. OFFSITE.

4-12-21

C. KELLEY SLCVA 4-13-21

WEATHER: 36°F SUNNY, VERY WINDY

PPE: LEVEL D.

PERSONNEL: C. KELLEY (COMSMITH) A. FIORINI,
K. KELLER (WASATCH)
W. JOHN (VA)

0755 ONSITE.

0805 A. FIORINI (WASATCH) ONSITE. CONDUCT H&S.

0830 CALIBRATE YSI & LOAD TRUCKS W/
SURFACE WATER SAMPLING SUPPLIES.

0942 ARRIVE @ 1148 E. SUNNYSIDE AVE
FOR SURFACE WATER SAMPLING.
NO PREVIOUS SAMPLE, WILL BE
CALLED SW 166. W. JOHN (VA) ONSITE.
MULTIPLE SEEPS IN YARD. CAPTURE
2 SEEPS & DIG SMALL PONDED AREA
LET WATER SETTLE.

1010 SAMPLE SW-166.
WATER QUALITY PARAMETERS:
TEMP: 10.7°C DO: 9.30 mg/L 4-13-21 SPC: 1618 µS/cm
pH: 7.25 ORP: 162.0 mV TURBIDITY: 7.02
3 ESTIMATED FLOW MEASUREMENTS.
1: 0.5L/15SEC. 2: 0.5L/15SEC.
3: 0.5L/15SEC. = ~2L/MIN.
TAKE PHOTOS, DESTROY PONDED
AREA, CLOSE GATE, LEAVE SITE.
FERROUS IRON: 0.11 mg/L

Rite in the Rain 2

4-13-21 SLC VA C. KELLEY

1045 RECON SW-12 AREA W/ W. JOHN.
3 INLET LOCATIONS IN BACKYARD,
ALL EMOING UP IN STORM DRAIN.
TOOK PHOTOS. DECONED YSI.

1105 @ APPT. LOCATION. 1126 E 800 S.
TO SAMPLE. ESTIMATING < 1 L/MIN.

1130 SAMPLE SW-35.
PARAMETERS: TEMP: 10.5°C DO: 7.92 mg/L
SPC: 1479 µS/cm pH: 7.83 ORP: 101.0 mV
TURB: 21.88 FERROUS IRON: 0.0

1155 LEAVE SITE.

1215 @ SW-39.

1220 OPEN GRATE & SAMPLE SW-39
FROM PIPE.
FLOWRATE: 1: 3 L/15SEC 2: 2.75 L/15SEC,
3: 2.75 L/15SEC, 4: 2.75 L/15SEC.
11 L/MIN.
TEMP: 11.3°C DO: 10.35 mg/L
SPC: 1689 µS/cm pH: 7.67
ORP: 68.4 mV TURB: 55.0
FERROUS IRON: 0.00 mg/L.

1230 FINISH @ SW-39. REPLACE GRATE.

1240 @ SW 53.

1245 SAMPLE SW-53. FROM PIPE.
TEMP: 11.7°C DO: 8.43 mg/L SPC: 1640 µS/cm
pH: 7.15 ORP: 103 mV TURB: 3.44 NTU F. IRON: 0.02

C. Kelley SLC VA 4-13-21

FLOWS: 1: ~~6~~ 4 CW 4-13-21 3/30SEC., 2: 3L/30SEC

3: 3L/30SEC. = 6L/MIN.

1258 OFFSITE.

1335 ONSITE

1427 ARRIVE @ RG-03 DTW: 3.15' (TO-PVC)

TD: 8.2'. SET BOTTOM OF

HYDRASLEEVE @ ~7' BELOW TOPVC.

@ RG-04 PURGE AIR FROM SOIL

VAPOR LINE & INSTALL SWAGLOCK

QUICK CONNECT.

1512 CONNECT & OPEN SUMMA. ~~FIRST~~ INITIAL CW 4-13-21

VAC: 23 CANISTER #: 6L0986

REGULATOR #: 24926

RG04-SG041321

RG-04 DTW: 10.02' DTB: 20.30'

1528 DEPLOY HYDRASLEEVE 18' BGS CW 4-13-21 TOC.

1552 STOP SUMMA @ RG-04.

END VACUUM: 3.5

1605 @ RG-08

EVACUATE AIR USING PERI. PUMP (~30 SEC.)

1616 BEGIN SUMMA FILL: INITIAL VAC: 23

CANISTOR #: 6L1020

REGULATOR #: 23559

1618 RG-08 DTW: 5.72' DTB: 17.85

SET HYDRASLEEVE @ 16'

1650 STOP SUMMA @ RG-08. END: 4.0

Rite in the Rain 4

4-13-21 SLC VA C. KELLEY

1710 @ RG-11. EVACUATE AIR FROM LINE w/ PERI. PUMP FOR ~ 30 SECONDS.

REGULATOR #: 23279

CANISTER #: 6L2086

1716 BEGIN FILLING SUMMA.

STARTING VAC: 24.5

1717 RG-11 DTW: 29.09'

DTB: 40.31'

SET HYDRASLEEVE @ 38.0'.

NOTE: HAVE DECONED WATER LEVEL METER BETWEEN EACH WELL.

1749 STOP SUMMA @ RG-11 END VAC: 4.0

1805 LOCK GATES. OFFSITE, LOCK VA MAINTENANCE GATE.

CK
4-13-21

C. KELLEY SLC VA 4-14-24

WEATHER: 30's °F, WIND, RAIN, SNOW

PERSONNEL: C. KELLEY (CDM SMITH), A. FIORINI (WASATCH),

PPE: LEVEL D.

0745 ONSITE.

0830 CONDUCT H&S MEETING.

CALIBRATE YSI & PID.

0850 ARRIVE @ SW-04 (CAN 4-14-24) RG-06.

DTW: 2.31 DTB: 9.20

0915 DEPLOY HYDRASLEEVE @ 7'

0920 @ RG-7

REGULATOR #: 25196

CAN #: 6L0683.

EVACUATE AIR W/ PERI PUMP.

0928 START SUMMA. INITIAL VAC: 23

DTW ~~DTB~~: (CAN 4-14-24) 21.09 DTB: 30.50

SET HYDRASLEEVE @ 29.0'

1007 STOP SUMMA. END VAC: 4.0

1115 @ SW-34 INFORM HOMEOWNER WE ARE HERE TO SAMPLE.

1120 SAMPLE SW-34.

TEMP: 2.1°C DO: 10.81 mg/L

COND: 1242 mS/cm pH: 7.41 ORP: 120.1 mV

TURB: 0.27 NTU FERROUS IRON: 0.01

FLOW: @ SAMPLE LOCATION:

W: 44" D: 3.5" 22": 0.624 FT/SEC

Rite in the Rain 6

4-14-21 SLC VA C. KELLY

12": 0.049 FT/SEC. D: 3.5"
34": 0.383 FT/SEC DEPTH: 2"
@ NARROW SPOT:
W: 15" MEASURED @ 7.5"
FLOW: 0.515 FT/SEC.
DEPTH: 4", SENSOR @ 3".
SENSOR IS 1" ABOVE BOTTOM
IN ALL MEASUREMENTS.

1147 LOAKS ~~on SLF~~ on 4424 SW-34

1235 @ RG-10. REGULATOR#: 23979
CAN: 6L2025
DUP: REGULATOR#: 23680
CAN: 6L2423
EVACUATE AIR LINE (80 PUMPS)

1237 START SAMPLE: RG-10 + DUP
VAC DUP: 24
VAC REGULAR: 24
RG-10 DTW: 26.95 DTB: 30.30'
SET HYDRASLEEVE @ 30.30

1319 STOP SUMMA:
DUP: 1.5
REG: 5

1325 @ RG-05 EVACUATE AIR IN LINE (80 PUMPS)
REGULATOR #: 23563
CAN # 6L2819

C. KELLEY SLC VA 4-14-21

1332 START SUMMA @ RG-05
START VAC: 23.5
RG-05 DTW: 23.64' DTB: 30.30'
1335 SET HYDRASLEEVE @ 29'
1415 STOP SUMMA. END VAC: 4.0
1423 AT RG-1. EVACUATE LINE W/ 80 PUMPS.
REGULATOR #: 23143
CAN #: 6L2676
1431 START SUMMA. START VAC: 24.5
RG-1 DTW: 8.67' DTB: 18.82'
1434 SET ~~HYDR~~ CAN 4.14-21 HYDRASLEEVE @ 18.0'
1518 STOP SUMMA: END VAC: 4.5
1526 @ RG-02. DTW: 2.72' DTB: 15.26'
SET HYDRASLEEVE @: 14'
1537 @ RG-09 DTW: 5.21'
1539 DTB: 14.98' SET HYDRASLEEVE @ 14.0'.
1645 PACKED SUMMAS FOR SHIPMENT.
OFFSITE: LOCK MAINTENANCE GATE.

4-14-21

4-15-21 SLC VA C. KELLEY

WEATHER: ~40°F OVERCAST.

PERSONEL: C. KELLEY (CDMSMITH), A. FIORINI (WATCH), W. JOHN (VA)

PPE: LEVEL D

0745 ONSITE.

0805 A. FIORINI (WATCH) ONSITE. CONDUCTS: CALIBRATE YSI. PID CALIBRATED FRESH AIR BUT NOT 100PPB ISOBUTYLENE. SUSPECTED PROBLEM W/REGULATOR.

0840 TAKE LOW SAMPLE FROM BLACK TANK. APPROX. 925 GAL. IN WHITE TANK. I-JW03-GW-041524

1025 ARRIVE @ LADY OF THE LOURDES SCHOOL. CONDUCT WALKTHROUGH W/ SCHOOL EMPLOYEE. IN BASEMENT OF SCHOOL (BETWEEN BOYS & GIRLS BATHROOM) IS SMALL CLOSET (SMALL DOOR) THAT HAS DRAIN. WILL TAKE SAMPLE FROM THERE & FROM STORM DRAIN JUST OUTSIDE SCHOOL FENCING. 2 SAMPLES WERE FROM DIVERTED WATER UPGRADIENT.

INSIDE SAMPLE: SW-16I

OUTSIDE SAMPLE: SW-16OE

4-15-21

1110 SAMPLES SW-16I

4-15-21

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C. KELLEY SLC VA 4-15-21

TEMP: 15.0°C DO: 10.24 mg/L

SPC: 1081 µS/cm pH: 7.47 ORP: 141.1 mV

TURD: 0.24 NTU F. IRON.

CLOSE GRATE & EMPLOYEE LOCKS DOOR

1130 BEGIN SAMPLING SW-16E

TEMP: 13.1°C DO: 10.88 mg/L SPC: 987 µS/cm

pH: 7.79 ORP: 85.7 mV TURB: -0.09 NTU

F. IRON: 0.03

FLOW: 3 ~~MEASUREMENT~~ 4-15-21 MEASUREMENTS

@ 2L / 15 SEC... = 8 L/MIN

FOR SW-16E - ESTIMATED FLOW: ~4 g/min.

1150 ARRIVE @ BENSON SPRING

FLOWRATE. 79" WIDE

2': 0.056 FT/SEC D: 2"

3': ~~0.0~~ 4-15-21 0.959 FT/SEC D: 2.25"

4': 0.841 FT/SEC. D: 2"

5': 0.736 FT/SEC D: 2"

6': 0.130 FT/SEC D: 2"

1' TOO SHALLOW. D: 2"

1230 RECON SW-8 & SW-54.

1 SW-54: ON 729 S. ELIZABETH (57H)

SW-8 741 S. ELIZABETH.

1235 SAMPLE SW-8

TEMP: 11.7°C DO: 9.41 mg/L

pH: 7.28 ORP: 97.3 mV

TURB: 0.10 NTU F. IRON: 0.00

Rite in the Rain

4-15-21 SLC VA C. KELLEY

TAKE MS/MSD SAMPLE @ SW-08

SW-8 FLOW: 8 L/10 SEC. (DID 3 TIMES)

= 48 L/MIN.

1305 SAMPLE @ SW-54

1310 SAMPLE @ SW-54 DUP

TEMP: 11.9°C DO: 8.93 pH: 7.01

ORP: 122.1 mV TURB: 0.42 NTU SPC: 1052 µS/cm

F. IRON: 0.25 mg/L.

1321 FINISH. W. JOHN DEPARTS.

1345 ARRIVE @ SW-12. DAM UP LOCATION ~2 FT DOWNSTREAM OF SEEP. USE SHOVEL FOR DAM.

1400 SAMPLE SW12-SW041521

TEMP: 11.6 DO: 6.35 mg/L

SPC: 1281 µS/cm pH: 6.89 ORP: 129.3 mV

TURB: 7.88 NTU F. IRON: 0.02 mg/L CW 4.15.21

FLOW RATE: ~~800~~ 850 mL/MIN 10 SEC.

= 5.1 L/MIN. (MEASURED 3 TIMES).

FLOW RATE @ STORM DRAIN.

7 L/55 SEC. (MEASURED 3 TIMES).

= 8 L/MIN.

1545 1555 FINISH WRITING SAMPLE LABELS FOR CW 4.15.21 4-15 SURFACE WATER SAMPLING.

1550 @ RG-03 DTW: 3.04'

1600 SAMPLE RG 03-GW041521

NOT ENOUGH WATER FOR PARAMETERS.

C. KELLEY SLC VA 4-15-21

PER K. LESLIE, CUT OFF STRING HOLDING HYDRASLEEVE.

1615 @RG-04 SAMPLE RG-04. TMS/MSD

DTW: 9.96' NOT ENOUGH WATER FOR PARAMETERS.

1634 @RG-08 DTW: 5.63'

1640 SAMPLE RG08-GW041521

1645 DUP FD01-GW041521

1651 LEAVE FOR CONEX.

CLK 4-15-21

Rite in the Rain

4-16-21 SLC VA C. KELLEY

WEATHER: 37°F OVERCAST, SOME RAIN/SNOW

PERSONNEL: C. KELLEY (LOMSMITH)

PPE: LEVEL D:

0745 ONSITE CALIBRATE YSI & PID.
COMPLETE H&S TAILGATE.

0905 ARRIVE @ RG-11. DTW: 29.11'

0930 SAMPLE RG-11, RG11-GW041621
TEMP: 10.4°C DO: 5.10 mg/L SPC: 298.2 uS/cm
pH: 7.70 ORP: 147.3 mV
TURB: 45.18 F. IRON: 0.07 mg/L

0950. ADD LOCK TO WELL. PICK UP CONES.

1000 @ RG-06. DTW: 2.24'

1010 SAMPLE RG06-GW041621
NOT ENOUGH WATER FOR FIELD PARAMETERS
LOCK WELL.

1027 @ RG-7 DTW: 21.08'

1040 SAMPLE RG07-GW041621
F. IRON: 0.02 mg/L TEMP: 11.5°C
DO: 8.90 mg/L SPC: 2223 uS/cm
pH: 6.88 ORP: 169.2 mV TURB: 10.28 NTU.
LOCK WELL CAP.

1300 ARRIVE @ RG-10. DTW: 26.16'

1315 SAMPLE RG10-GW041621. NOT ENOUGH SAMPLE WATER FOR PARAMETERS.

13 LOCK WELL CAP.

C. KELLEY SLCVA 4-16-21

1340 @ RG-05 DTW 23.63'

1345 SAMPLE RG05-GW041621

NOT ENOUGH WATER FOR FERROUS IRON AFTER GETTING WATER FOR YSI.

TEMP: 13.0°C ORP: 127.1 mV

pH: 7.20 DO: 6.07 mg/L

TURB: 44.7 SPC: 2977 ms/cm

LOCKED WELL CAP & CLOSED LID.

1455 @ RG-01 DTW: 8.42'

1503 SAMPLE RG01-GW041621

TEMP: 12.7°C DO: 4.95 mg/L ORP: 150.1 mV

pH: 6.92 TURB: 3.41 NTU SPC: 2084 ms/cm

F. IRON: 0.06 mg/L

LOCK WELLCAP.

@ RG-2 DTW: 2.59

1545 SAMPLE RG02-GW041621

TEMP: 12.2°C ORP: 150.6 mV SPC: 1400 ms/cm

TURB: 6.23 pH: 6.83 DO: 7.17 mg/L

F. IRON: 0.10 mg/L

1555 @ RG-9 DTW: 5.24'

1600 SAMPLE RG09-GW041621

F. IRON: 0.11 mg/L TEMP: 11.5°C TURB: 2.39 NTU

pH: 6.96 DO: 7.97 mg/L SPC: 1596 ms/cm

ORP: 172.9 mV. LOCK WELL CAP.

1650 LEAVING SITE. REPORTED MAINTENANCE GATE FOR W. JOHN (VA). HE WILL CLOSE. CK 4/16/21

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Location SLC VA Date 4/1/2021

Project / Client 700 S 1600 E PCE Plume

Piezometer Replacement

0715	J. Miller CDM Smith Onsite
	Prep for activities
	Activities Today
	Site Orientation w/ Vista
	Decon
	Badges
	Site walk w/ Wynn
0745	Anna Fiorini - Wasatch Onsite
0800	Vista Onsite
	H+S Tailgate
	Attendees
	J. Miller - CDM Smith
	A. Fiorini - Wasatch
	Pete Wethington - Vista
	Ben Alcox - Vista
	David Fatumu - Vista
	Topics: Site Orientation, Traffic
	Lifting, Crushpoints, Communication
	Weather 35-65°F Clear
0815	Setup Decon Pad
0930	B+B delivery Onsite Sand, Drums
	Bentonite, PVC
0950	B+B Offsite

4/1/21 JM

63

Location SLC VA Date 4/1/2021

Project / Client 700 S 1600 E PCE Plume

Piezometer Replacement

1000	CDM Smith + Vista to Badging Office. No Appt Available until Tuesday. Badging Personnel States that badge likely not Needed since workers won't be onsite much or need Building access.
1030	Call Wynn about visiting locations RG-11, RG-03, RG-08. Also visit a few ~~Storm water~~ Surface water sites JM 4/1/2021
1040	Call Susanne leave Message about Badging
1100	Meet Wynn RG-11 Point in front of 741 Dangers visit RG-11, RG-3, RG-08, RG-04
1	and a couple of ~~Storm~~ Surface water locations
210	Visit Sites w/ Vista
1350	Setup RG-09 DTW 5.87
1400	Hand ~~auger~~ augered to 5' Next to Boring
1408	Begin to Overdrill RG-09
1425	Set well w/ 10' Screen from 15-5' Bgs Sch. 40 2" PVC

Rite in the Rain

64

Location SLC VA Date 4/1/21

Project / Client 700 S 1600 ~~East~~ PCE Plume

60°F Sunny Clear

1430 Begin Adding 10/20 Silica Sand

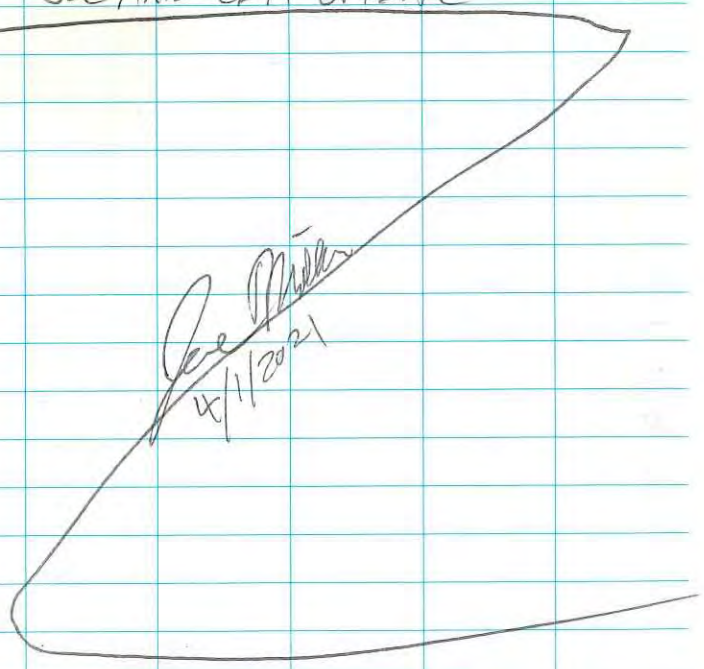
1450 Sand to 3.5' BGS DTW 6.17'
1 bag Bentonite to ~ 1' BGS

1520 Mob back to VA
Prep to decon Augers

1530 Call in Blue Stakes for RG-11 and RG-08 while Vista Decon
wrap up site activities

1630 Vista Offsite for Errands

1635 Joe Miller CDM Offsite



Location SLC VA Date 4/2/2021 65

Project / Client 700 S 1600 E PCE Plume

0735 Joe Miller CDM Smith Onsite
Calibrate PID Open Connection Drum Area

0800 Vista Onsite

0805 H&S Tailgate
Topics: Focus, Traffic, Hydration
Slips trips Falls Communication
Attendees:
Joe Miller CDM Smith
Pete Wethington - Vista
~~JM 4/2/21~~ Ben Alcox - Vista
David Fontana - Vista
weather: 45- 70°F Clear
Tasks: Reinstall RG02 + RG03

0825 Load up Equipment

0835 Arrive RG03 Setup Traffic Control

0900 Pull PVC + Surface Completion

0905 Begin Augering

0920 Auger to 8' BGS

0925 Begin Building well
2" Sch 40 PVC 0.010 slot screen
from 3 to 8' BGS
10/20 Sand to 2' BGS
Hydrated Bentonite to 0.5' BGS

Rite in the Rain

Location SLC VA Date 4/2/21

Project / Client 700 S 1600 E PCE Plume

1000	Setup R602
1005	DTW 1.07' BGS
1010	Pull 15' ~~casing from~~ SM 4/2/21 PVC from Borehole
1045	TD @ 15' BGS
1055	Begin to Build well 10' screen 0.010 Slot 2" Sch. 40 PVC
1115	Augers Removed Resume adding 10/20 Sand 4.5 bags Sand
1125	Begin Adding Bent.
1140	Pack up Traffic Control
1200	~~AM~~ SM 4/2 Arrive @ VA for Decon/Lunch Break
1220	DTW MW03RA 188.42
1230	United Site Services Onsite to pickup forklift
1300	Setup at R6-07
1325	DTW 21.14'
1335	Begin Overdrilling
1400	Wynn Onsite
1415	Rock about 7/17' Bgs pull auger flights to look at teeth
1420	~~Augers~~ SM 4/2 Lead Auger slid down boring Begin fishing
1500	Lead auger Retrieved

Location SLC VA Date 4/2/21

Project / Client 700 S 1600 E PCE Plume

1510	Resume drilling offset Boring to West 3'
1535	Boring to 30' Bgs
1600	Set 2" PVC well Sch 40 0.010 Slot Screen 20-30' 10/20 Sand to 18' 6" Soil Vapor probe 5-5.5'
1640	Begin adding Bentonite ~~4.5~~ 4 bags Bentonite
1645	Sand 7-4' 5.5 bags Sand total
1650	Move Rig wrap up activities at R6-07
1730	Return to VA Decon drill steel from R6-07 and sampler Rods for tomorrow
1820	Wrap up site
1825	Vista/CDM offsite

4/2/21

Rite in the Rain

Location SLC VA Date 4/3/21

Project / Client 700 S 1600 E PCE Plume

0745	J. Miller Onsite
	Calibrate PID
0800	H+S Tailgate
	Attendees
	J. Miller – CDM Smith
	Peter Wethington – Vista
	Aben Alcoy – Vista
	David Fontana – Vista
	Topics: Heat Focus, Traffic ~~Lifting~~ JM 4/3/21
	Lifting, Fatigue, COVID
	Weather 55-80°F Clear
	Task: Install RG-01 RG05
0825	USE Rig to Move drums to IDW
	Area 3 soil drums
	RG-02 1 Drum
	RG-07 1 Drum
	RG-03, 09 1 Drum
	Pump 55 gal Decon water into
	Tank 1
0930	Return to Layden Load up
	well Materials
1000	Setup RG05 (Northend of E. High
	Hand Auger 3 spots to 5'
1045	Set up Rig for Direct push

Location SLC VA Date 4/3/21

Project / Client 700 S 1600 E PCE Plume

1050	Begin DPT @ RG05
1045	DPT to 30' pull Rods Begin Augering
1230	Augers to 30' Bgs
1240	Build well w/ 10' screen
	from 20-30' SVP 5-5.5'
	0.010 Slot screen 2" sch 40 PVC
1245	Begin to pull Auger / Add Sand
1310	DTW 22.45'
Late Entry	Sand to 18' Bgs 10/20
	Bentonite to 7'
	Sand 4-7'
	Bentonite to 1'
	5.5 Bags Bent 5.5 Bags Sand
1340	Mob to VA to Decon
1350	Begin Decanning
1430	Decon Complete Head to IDW area
	Dump up Vac Cutting Remnant
1620	Containment cleared Setup drums
	6 drums total
1630	Pump 55 Gal water into tank
	from Decon
1655	CDM/Vista offside

Joel Miller 4/3/21

Rite in the Rain

Location SLC VA Date 4/5/21

Project / Client 700 S 1600E PCE Plume

Piezo Replacement

0705	Joe Miller COM Smith Onsite
0730	H&S Tailgate w/ Vista
	Weather: 50-80°F clear
	Attendees:
	Joe Miller - COM Smith
	Peter Wethington - Vista
	Ben Alcoy - Vista
	David Fontana - Vista
	Topics: Heat, Focus, Traffic, Lifting
	Tasks: Drill RG-01, and RG-06
0750	Vista Mob to RG01
0805	Joe Mob to ~~RG-04~~ RG11 to meet GPRS
	GPRS can't make it until 10am
	Joe to RG-~~04~~ JM 01
815	Vista Hand Augering 3-hole pattern @ RG-01
0845	Hand Augered to 5' x3
0900	Rig @ RG-01
0905	George (Neighbor) Stopped by to chat about well location / utilities
	General information
	Gave him a Flyer w/ my information
0945	DPT to 20' call Neil about adjusting screen from 8-18 to 9-19'
	Sand to 8' then Bento 6-8

Location SLC VA Date 4/5/21

Project / Client 700 S 1600 PCE Plume

Piezo Replacement

1000	~~T~~ JM 4/5 Set well w/ screen 9-19
	Sch 40 PVC 2" 0.010 slot
1015	Begin adding Sand to 8'
1020	add Bentonite 6 to 8' Sand 3 to 6'
1030	DTW 11.00' BTOC
1040	Move Rig wrap up site
1100	GPRS Onsite RG08 Okays site
1110	GPRS to RG-11
1130	Setup TC walk rig Back to site
1150	DTW ~~2~~ 2.38' GW-56
1155	Pull 9' PVC
1200	Begin HSA Over drill RG-06
1210	Boring to 10' BGS
1215	well Sand 10-3
	Screen 4-9' 0.010 slot sch. 40 RG-06
1220	Begin adding Bentonite
1230	Setup @ GW-49 for Abandonment
1240	Call from Susanne, Southbridge.
	She Okays Status Quo
1245	DTW 7.17' BTOC
1300	Begin DPT 3" to abandon GW-49
1310	3" to 12.5' Begin adding Bentonite chips
1320	Mob rig from GW-49

JM

Rite in the Rain

Location SLC VA Date 4/5/21

Project / Client 7005 1600E PCE Plume

Piezometer install

1340	Arrive VA Laydown to Decon
1450	Decon Complete Mob to ~~M~~ RC-04
1510	DTW - RC04 ~~D~~ 10.94' BTOC
1515	Call to Neil about 6w elevation He says drill to 20' assess where to set screen possibly 10-20'
1520	Begin 3" Boring in old piezo
1530	6w-20 Reamed 3" to 16.5' BGS pull DPT Begin adding Bentonite
1535	Core asphalt 6"
1540	Begin HA to 5'
1545	Begin Augering
1610	Confirm 10' Screen w/ Neil
1615	Install well 10' sch. 40 2" PVC 0.010 slot screen 10' Riser SWL 5-5.5' 10/20 Sand 20-9' Bent 7-9 Sand 4-7' Bent. 4-1'
1650	DTW 6.95' BTOC
1715	Mob to Laydown
1740	CDM/Vista Offsite

Joe Miller 4/5/21

Location SLC VA Date 4/6/21

Project / Client 7005 1600E PCE Plume

Piezometer install

0735	JC Miller CDM Smith Onsite
0800	H+S Tailgate Attendees: Joe Miller CDM Smith Peter Washington - Vista Ben Moore - Vista David Fontana - Vista Topics: weather, Focus, traffic Communication weather: 34-50°F Snow/Rain Task: Decon/IDW management Drill: RC-08 and -10
0815	Begin Decanning Drill steel from RC-04
0920	walk Rig to IDW area to offload Drums 3- 1-RC-01, 1-RC-~~04~~/05 1-RC-04
0945	Pump 100 Gallon Decon water into tank
1015	Load up Rig/well Supplies
1020	Rig maintenance
1100	Rig loaded Head to RC-08
1110	Setup TC + Rig @ RC-08
1130	Begin to Core continuously

Rite in the Rain

Location SLC VA Date 4/6/21

Project / Client 700S 1600E PCE Plume

Piezometer Install

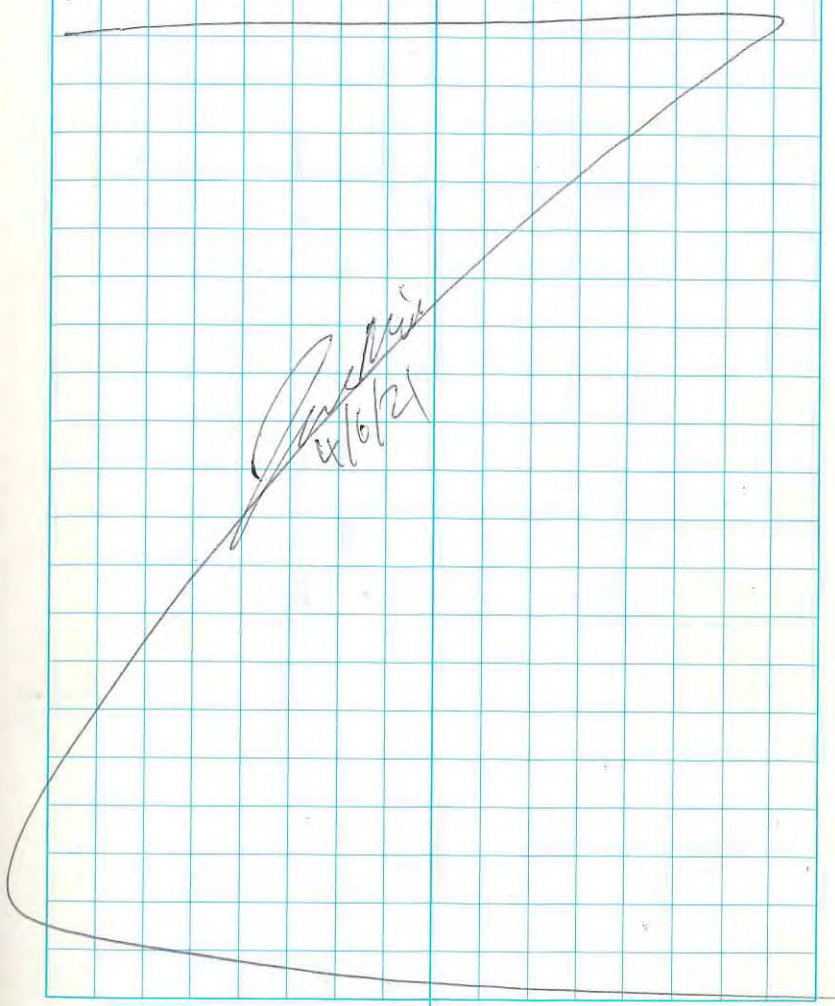
1145	Broke Bolt in Drill Head Visit to Ace Hardware for Replacement
1205	Begin HA. to 5'
1210	Begin DPT
1240	DPT to 20' Call Neil Discuss Screen interval Decide 8-18' w/ Sand to 7 Bent. 6-7 SUP Sand 4-6 Bent. 3-4
1300	Begin Augering to 15'
1340	Build well w/ 0.010 Slot screen from 8 to 18' Bgs. SUP 4.5-5'
1350	Pull Augers
1400	Add 10/20 Sand from 18 to 7' Bgs
1413	Bentonite 6-7 added
1415	Add Sand 4-6 Bent. 1-4' BGS
1430	clean up site Move Road plate to Boring
1458	Wynn Onsite
1520	Arrive Gw-6 Setup TC / PID
1530	DTW 11.25' BTOC ~~Gw-6~~ JM 4/6/21
1535	Pull Surface Pull Casing
1542	DPT to 20' pull Solid Core
1545	Backfill w/ Bentonite chips Hydrat
1555	Mob Equipment Back to Van

Location SLC VA Date 4/6/21

Project / Client 700S 1600E PCE Plum

Pie zometer installation

1010	Begin Decon of tooling
1615	RG-03 DTW 3.01' BTOC
1730	Decon Finished Offsite



Rite in the Rain

Location SLC VA Date 4/7/21

Project / Client 7005 1600E PCE Plume
Piezometer Installation

0730	J. Miller CDM Smith Onsite
0740	Calibrate PID
0800	H&S Tailgate
	weather 37°F - 65°F Clear
	Task Install RG-10 and RG11
	Topics: Focus, Traffic, Lifting, Communication
	Attendees: Joe Miller - CDM Smith
	Peter Worthington
	Ben Alcox
	David Fontana
0820	Offload 1 Soil Drum 55 Gallon
	water into tank from Decon.
	Soil Drum from RG-08
0850	Arrive RG-10 Setup TC
0910	Begin Hand Augering 3 Hole Pattern
0940	HA to 5' in 3 hole pattern
0945	Begin DPT @ RG-10
1015	Refusal @ 20' Bgs Drill thinks Rock not Formal
1020	Neighbor asked for information about well when Results would be in
1030	City cleaning Storm Drains
1035	Backfill RG-10 w/ Bentonite
	Begin HA offset location

Location SLC VA Date 4/7/21

Project / Client 7005 1600E PCE Plum

1045	Resume DPT @ offset locat.
1130	DPT to 30' Call Neil
	Discuss WB Zone @ 28' + Sand @ 33'
	Decide to set well 10' screen
	SVP
1145	Pull 3' DPT
1155	Begin HSA
1230	HSA to 30' Begin Building well
	w/ 10' Screen SVP 5-5.5'
1250	Bottom hole cave pull well Re-aug to 30'
1310	Auger back in Boring
1330	Boring Back to 30' Reinstall well
1337	Begin to pull Augers
1342	Begin adding 10/20 Sand 18-30'
1355	Bentonite to 7'
1358	Sand 4-7 5 Bags Sand total
1415	Clean up Site Mob Rig to VA
	to decon Augers soon
1430	Begin Decon
1530	Mob to RG-11
1547	Begin Putting Asphalt @ RG-11
1551	Core through 3" Asphalt

Rite in the Rain

Location SLC VA Date 4/7/21

Project / Client 7005 1600E PCE Plume

Piezometer Replacement

1650 ~~HSM~~ JM 4/7 Hand Auger 5'

1620 Refusal @ 12.5' offset 3' south

1730 Boring to 40' met ~32.5-34 and 37-38

1720 ~~Chec~~ JM/4/7 late Entry) Check with Neil about Going to 40'

1745 Begin Augering

1845 Augers to 40' Begin Building well
10' screen from 30-40'
Sand to 28' Bentonite from 7-28'
Sand from 4-7' Bentonite from 1-4'

~~1800~~ 2000 Mob equipment Back to VA

2015 Offsite from VA

Location SLC VA Date 4/8/21

Project / Client 7005 1600E PCE Plume

Piezometer Replacement

0730 JMiller CDM Smith Onsite

0800 HASP Tailgate w/ ~~Holt~~ JM 4/8/21 Vista
Weather 45-65°F Clear
Task: Surface completions + Decon
Attendees: Joe Miller CDM Smith
Ben Alcox - Vista
David Fortuna - Vista
Peter Washington - Vista
Topics: Focus, Traffic, Fatigue, Lifting

0815 Decon Augers from RG-11

0845 Offload 4 soil drums from 4/7
1.5 from RG-10 2.5 from RG-11

~~1000~~ 0900 Arrive RG-11 for DTW

JM 4/8 DTW 29.06' BTOC

~~DTW~~ JM 4/8 1015 ~~DTW~~ RG-10 DTW 26.07

1115 Decon finished clean up decon Pad

1130 Pump 55 gallon into tank

1200 Arrive RG-07 for surface completion

1230 Prep RG-01 for surface completion

1245 Prep RG-10 for surface completion

1305 Set up RG-09 for surface completion

1315 Peter Finishing RG-08

1320 Ben/David working on RG-02

Rite in the Rain

Location SLC VA Date 4/8/21

Project / Client SLC VA 700S 1600E PCF

1335	Vista to R6-04 to prep for surface completion
1350	Vista to R6-03 to prep surface completion
1400	R6-05 Surface prep
1414	R6-11 surface monument installed
1430	Install topsoil at R6-04 old location concrete monument @ R6-04
1440	Add soil to GBV-49 in Park
1450	chat w/ wynn looting @ Surfacecrete
1500	Finish @ R6-03 & R6-04
1510	Arrive @ R6-02
1530	Vista Identifies damaged Sprinkler line @ R6-10. Homeowner Notified Get materials to fix Hose, clamps, connecto
1600	Finish Monument @ R6-05, R6-06
1700	Try sprinkler system. works No leaks.
1730	Finish Monument @ R6-10 Mob to VA to cleanup
1000	Late Entry Pete to Geneva Rock for Batch mix UDOT
1800	Pack up Equipment
1900	offload 1P from Soil (Surface)
1945	Offsite

4/8/21

Location SLC VA Date 4/9/21

Project / Client 700S 1600E PCF Plume Pie Remediation Survey

0800	Onsite / offload Equipment
0830	Meet Redcon in Sunnyside park H&S tailgate Redcon / CDM Smith Topics: Traffic, lifting, Roading weather 40-60°F clear Task Survey then Development
0850	Arrive R6-11 for Survey
0900	Arrive R6-04 for Survey
0910	R6-02 for Survey
0918	R6-04 Survey
0925	Survey R6-03
0931	Survey R6-05
0940	Survey R6-06
0948	Survey R6-10
0956	Survey R6-01
1002	Survey R6-08
1015	Survey R6-07
1100	prep for development calibrate PID/YSI get tubing Hose connectors
130	Setup R6-11 DTW 29.08 DTB 38.98'

Rite in the Rain

Location SLC VA Date 4/9/21

Project / Client 700 S 1600 E PCE Plan

1240	Pump On Purge ~ 4gallon Well Runs Dry
1300	Pump On Purge Dry ~ 2gall
1311	pull pump Measure DTB 40.28
1333	Arrive @ RG-04 while RG-11 Recharges
1335	RG-04 DTW 10.08 DTB 20.29
1340	Pump on pump 3.5 gal well pumps Dry Stop pump allow for Recharge
1500	Pumped Dry 6X, Tank <50 7.45gal Purged Development Complete RG04
1510	Mob from RG-04 to Smith for DT
1530	DTW RG-11 30.20
1540	Bail 2.5 gal DTW 36.37' Demob allow to Recharge
1555	RG-03 DTW 3.14 'BTOC
1605	Pumped 2.5 gallon Let Recharge
1620	pump 0.5 gal
1625	Bail 0.5 gal Demob Let Recharge
1640	Return to IDW yard pump off water
1715	offsite

Quinn 4/4/21

Location SLC VA Date 4/10/21

Project / Client 700 S 1600 E PCE Plan

0730	Onsite H+S tailgate Joe Miller topics: lone worker, Lifting, traffic, Driving Tasks: well Development Weather 40-65°F clear
0800	Calibrate PID/YSI
0845	Load Equipment
0900	setup RG-11
0907	RG-11 DTW 29.08
0918	Bailed 2 Gallon DTW 39.70 BTOC DTB ~~30~~ 40.28' BTOC
0930	Arrive RG-03 DTW 3.20 DTP 8.19' BTOC Initial purge cle
0955	Call from tank about Development continue w/ purging/sampling more concerned about NTU than Volume/Stabilization
1000	Resume Bailing
1006	2.5 Gallon Bailed from ~~RG-04~~ RG-03 TM 4/10/21
1015	RG-09 DTW 5.63 DTB 14.14 Begin Bailing
1050	Bail 9 gal total DTB 14.85
1115	Bail 3 gal
1135	Bail 3 gal DTB 15.01 Allow Recha

Rite in the Rain

Location SLC VA Date 4/10/21

Project / Client 700S 1600E PCE Plume

Purge total gal

RG-04 50gal

RG-03 4.5+2.5

RG-11 4+2+2.5+2

RG-09 9+6

RG-08 7.5

RG-05 3+1.5+1+1

4/12/21 Kyle Kellar

RG-01 4+6+5.5

RG-07 4.5+5+5+5+5+5+5+5+5+5+5+5+5+5+5+5+5+5+5+5+5+5

Location SLC VA Date 4/10/21

Project / Client 700S 1600E PCE Plume

1155 RG-11 DTW 29.43 DTB 40.29

Begin Boiling MTH 47.6

1205 Boil 2gal Allan Rechard

1214 RG-05 ~~DTB 29.63~~ DTW 23.63 JM 4/10

DTB 29.47 Boiled 3gallon

1225 DTB 30.30' JM 4/10

1245 RG-08 DTW 5.73 DTB ~~16.22~~ 17.82 JM 4/10

Purge 3gal DTB 17.43

1310 deploy pump

1333 pump off 75gal purged MTH 175'

1350 Head to DDW area pump out 110gal

1500 pumped off 110gal

1545 JM left office

4/10/21

Rite in the Rain

Location SLC VA Date 4/12/21

Project / Client 7005 1600E PCE Plume

KK

0430	Bailed RG-01 dry, lots of fine sand? ~4 gals removed, will move to RG-07
0945 -	Bailed 4.5 gals from RG-07, removed 12 in sediment, water recovering quickly, will use pump.
0955 -	starting to pump RG-07
0957 -	about 2 gals removed before pump starts to sputter. will continue to let recharge and track volume
1035 -	Joe miller next to RG-05, DTW - 23.66 DTB - 30.30, Bailed 1.5 gallons, allow to recharge
1125 -	4.5 gallons removed from RG07 starting to clear up
1130 -	Joe miller arrived at RG01, DTW - 8.82, DTB - 18.83, baled 6 gals
1135 -	DTB - 18.83
1240 -	Removed ~10.5 gallons from RG07 turbidity at 95-138 when clear during pump cycle. Taking PH + conductivity now

Location SLC VA Date 4/12/21

Project / Client 7005 1600E PCE Plume

1208 -	RG-06 (Joe miller) DTW - 2.29 DTB - 9.19, baled 2.5 gals
1215 -	DTB 9.20' (Joe at RG-06)
1220 -	RG-05 (Joe) DTW - 24.03 DTB 30.30, (hard), baled 1 gallon
1240 -	(Joe) RG-08, DTW - 5.70, DTB - 17.92, baled 3 gallons intial purge was clear
1320 -	waterbug not working, will wait for Joe to get another pump. will empty purge water drums and then back at it.
1402 -	drums empty, will go find Joe
1426 -	RG01 DTW - 8.87, DTB - 18.83 to done with 1st one for now initial purge clear, final turbid, will allow recharge
1438	RG-06 - DTW - 2.33. DTB - 9.20
1427 -	3 gals removed, first clear, final turbid, will let recharge
1454 -	RG10 - DTW - 26.21, DTB - 30.29
1500 -	0.75 gals removed, initial clear then very fine sand. DTB - 30.30

Rite in the Rain

Location SLC VA Date 4/12/21

Project / Client 700S 1600E PCE Plume Development

1518 RG-02 (alley) DTW = 2.23; DTB = 14.02

1530 just over 5 gallons removed. grey and lots of sediment DTB = 15.28; lots of sediment Removed.

1602 16 gallons removed, bailed dry 4 times, not much sediment coming out but still very cloudy will let set overnight. DTB 15.28

1616 RG-05; DTW: 23.76; DTB: 30.30

1620 first Bailer very clear, then gets turbid 1.5 gals removed before dry.

1630 J. Miller Becomes Field Boss Author Head to VA

1700 Offload DDW water / Organize DDW Area

1735 offsite

4/12/21

Location SLC VA Date 4/13/21

Project / Client 700 S/1600E PCE Plume

* Joe Miller transcribing Kiel Keller (unsigned)

Field notes from 4/13/21

1125 - Kiel Onsite at SLC VA

1140 - RG-02 DTW - 2.49 Bailed 4.75 gal Initial purge clear

1200 - RG-09 DTW 5.74 Bailed 4.75 gal First 2 Bailers clear then gets turbid

1240 - RG-10 DTW 26.14 Bailed 0.75 gal initial purge clear

1225 - RG-01 DTW 8.60 5 gallons purged Initial Bailer clear

1235 - RG-02 DTW 3.40 ~~Sat purge~~ DTW 4/13/21 4.25 gallon purge Bottom feels clean

1250 - RG-09 DTW 6.00 4 gallon purge some sand in purge, but not bottom half

1300 - RG-05 DTW 23.64, 1.5 gallon purge Initial purge clear

1310 - Kiel calls Joe Miller to discuss progress Determine development complete

1315 - Kiel to VA to pump off Development water

1345 - Kiel Offsite

Rite in the Rain

Location SLC-VA Date 3/24/21

Project / Client 7005 11600E PCE Plume

Soil Gas / Vapor Sampling

Weather: partly sunny, 40°S F

PPE: Level D + masks

Personnel: Whitney Treadway (CDM Smith)
Kirk Keller, Kevin Murphy (Wasatch)

Task: Soil Gas Sampling / Demobilization

0800 KK and WT meet at conex on campus, load up equipment.

0810 H+S tailgate meeting: traffic, slips, trips, falls.

NOTE: YESTERDAY, KK took apart 1 T-bar from lab because the last clean one would not fully connect to tubing fittings. We deconaminated the pieces w/ Alconox + DI water and allowed to dry. Put back together when dry and will use today.

0815 Set up at MW-24.

0824 Start ~~AMW-24~~ WT 3/24/21 MW24-SG032621-32 @ 22.5" Hg can # CeL0Ce03 flow # 24352

WT 3/24/21 0824 Start FD05-SG032621 @ 21.75" Hg can # CeL1198 reg # 23314 (using decon. T-bar).

WhA 3/24/21

Location SLC-VA Date 3/26/21

Project / Client 7005 11600E PCE Plume

Soil Gas/Vapor Sampling

0905 Stop FDOS-SG032621 @ 3.0" Hg

0907 Stop MW24-SG032621-32 @ 3.0" Hg

WT 3/26/21
0928 Head to MW-34 and set up.

0915
0928 Start MW34-SG032621 @ 26.0" Hg
Can # 6L0988 reg # 24715.
Kevin Murphy onsite to replace KK while KK meets w/ utility locator for new piezometers.

1024 Stop MW34-SG032621 @ 4.0" Hg.

1040 KM + ct head to MW-37. Set up.

1053 Start MW37-SG032621 @ 23.25" Hg
can # 6L2698 reg # 23269

~1100 KM offsite. KK will help later after utd. loc. and I don't need KM's extra help until then.

1138 Stop MW37-SG032621 @ 3.5" Hg.
KK has already set up traffic control at MW-38.

1145 CT to MW-38.

1202 Start MW38-SG032621 @ 23" Hg
can # 6L2843 reg # 24056
KK onsite.

1242 Stop MW38-SG032621 @ 3.5" Hg

WMA 3/26/21

Rite in the Rain.

Location SLC - VA Date 3/26/21

Project / Client 7005 1600E PCE Plume
Soil Gas / Vapor Sampling

1250 KK + UT to MW-32. Set up.
1258 Start MW32-SG032621 @ 24" Hg
can # 610188 reg # 24238.
1341 Stop MW32-SG032621 • 4.0" Hg.
1350 KK + UT to Conex to unload supplies.
Decon +-bar again w/ DI water to use for new soil probe sampling in a couple weeks.
1415 KK + UT to Wasatch office.
Leave 4 boxes (11e cans) w/ 30-min reg. + 1 +-bar for piezo. soil gas sampling. Will ship back 5 boxes of unused cans + regulators.
1500 UT ships 2 boxes w/ samples + 5 boxes w/ unused cans. Also shipped 1 Field Env. 4-gas PID. UT 3/24/21
Back to hotel to organize field forms, etc. Check lab logins.

KK 3/26/21

Appendix C

Utility Locate Reports

Utility Locate Report

SITE

VA Plume, Salt Lake City, Utah

11/3/2020

PREPARED FOR

CDM Smith

PREPARED BY

TWS ENVIRONMENTAL, LLC

Denver, CO

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3.2 Results 8
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CLIENT NAME:	CDM Smith
CLIENT ADDRESS:	555 17th Street Suite 500 Denver, CO 80202
PROJECT NAME & LOCATION ADDRESS:	VA Plume – Salt Lake City, Utah
TWS PROJECT MANAGER:	Jeff Baker
TWS TEAM REPRESENTATIVE:	Jeff Baker

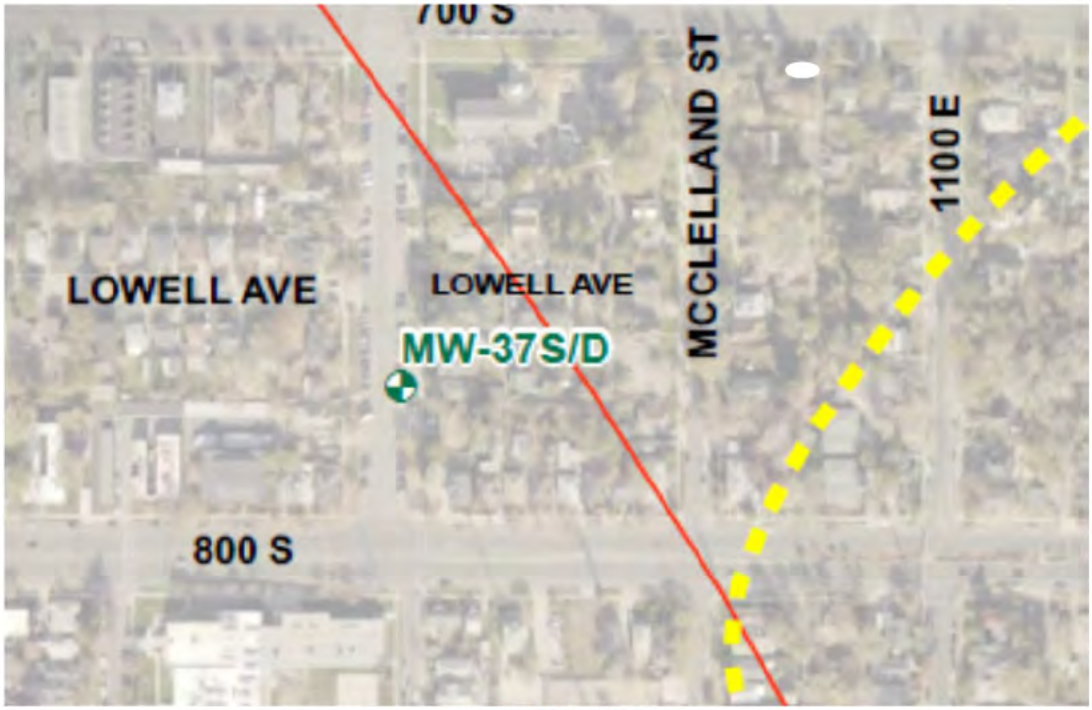


Fig 1. MW-37 S/D

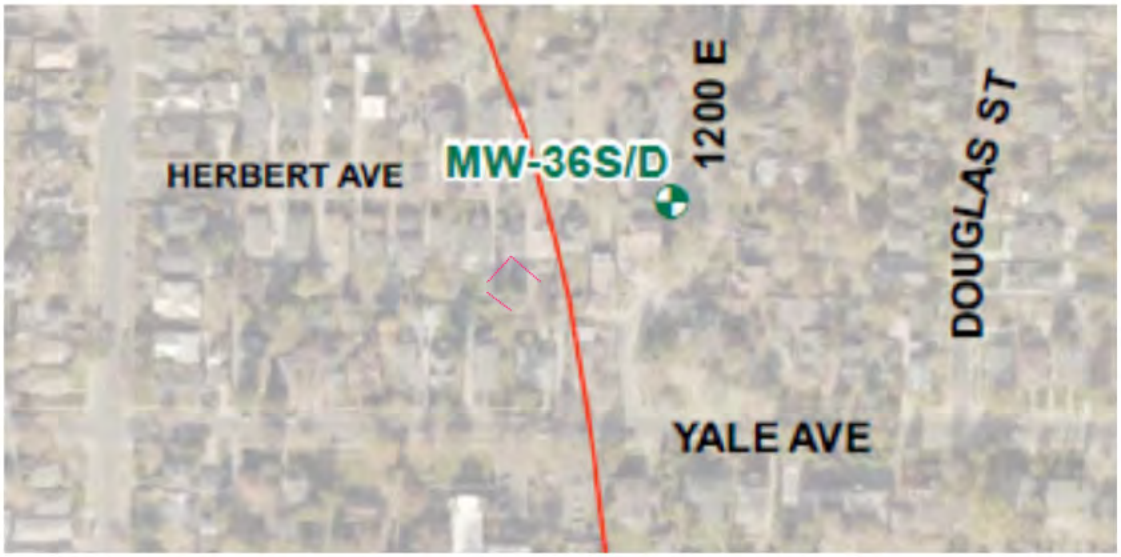


Fig 2. MW-36 S/D

Fig 3. MW-38 S/D

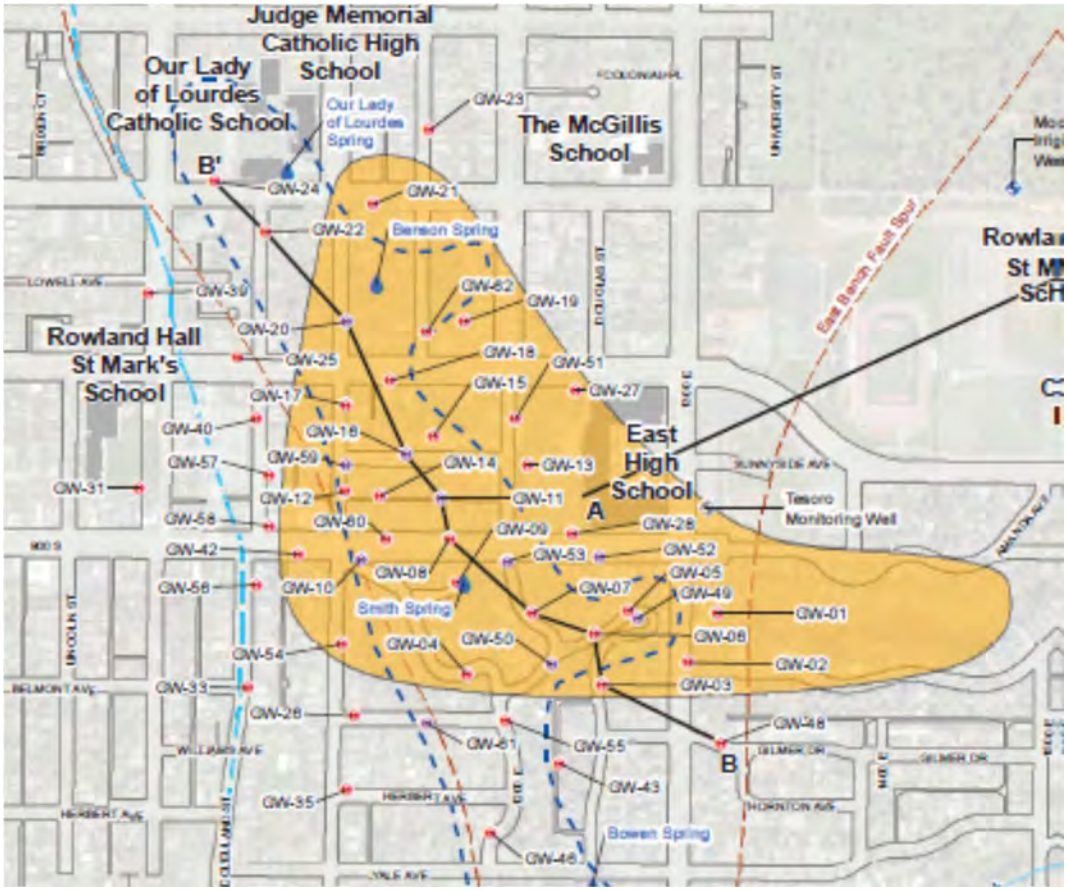


Fig 4. AOU-1

2.1 Site Location

The sites are located across East Side Springs and are part of OU-2 Remedial Investigation 700 South 1600 East PCE Plume Salt Lake City, Utah.

2.2 Equipment on Site:

- **SeekTech SR-20 Line Tracer and Underground Utility Locator**
- **SeekTech ST-305 Line Transmitter**
- **Schonstedt GA-52-Cx Magnetometer**
- **Ground-penetrating radar: GSSI UtilityScan/ rough terrain cart**

2.3 Equipment Capabilities:

Electromagnetic Induction

Electromagnetic Inductions consists of two steps. First, a transmitter is used to transfer an alternating electrical current to the pipe or wire to be located. Next, a receiver is used to analyze the transmitted signal, and localize the position and depth of the facility. The transmitter can transfer the signal to the facility either by a direct connections, or by inducing a signal. The direct connect method introduces a signal into pipes or cables (or the fluids within pipes) that is radiated from the facility to aid its detection and location. The surface-induced method generates a signal a t the ground surface that will induce a response in the cable, pipe or tracer wire underground.

Typical applications:

- Conductive utilities: Steel or copper pipes (water service, gas service) Copper telecom cables.
- Tracer lines on non-conductive utilities

Limitations:

- EM/RF locating requires a conductive object (pipe, cable, conduit, or tracer) into which a radio signal can be introduced. The signal cannot travel through non-conductive (insulating) materials. The signal may be interrupted or lost on a conductive utility that is not continuous (damaged, broken, corroded, repaired with non-conductive materials, or constructed of segments with non-conductive gaskets, i.e. rubber)
- RF locating requires some level of access or prior knowledge to effectively introduce the radio signal. An exposed portion (or end) of a utility is needed for direct connections or to utilize an inductive clamp. A point of well-known location and direction is needed for an inductive drop.
- RF locating signals are susceptible to “bleeding” onto nearby conductive utilities. Due care will be taken to recognize and minimize bleed-off, and to confirm utility locations with alternate methods. All utility marks should be afforded and industry-standard tolerance zone of 24” to either side.

- A known (or visible) point of connection is generally needed to identify the function of a

utility.
- A hand-dug or vacuum-excavated test hole should be used to precisely confirm horizontal or vertical locations of any utility.

Magnetometer

The GA-52Cx magnetic locator detects the magnetic field of ferromagnetic objects. It responds to the difference in the magnetic field between two sensors that are spaced approximately 20 inches apart. This difference is referred to as the "signal strength" and is represented in the instrument by an audio tone.

Typical applications:

- Locating ferrous pipes/utilities: Steel or other ferrous metal objects or pipes can be located with this tool.

Limitations:

- The instrument will not detect non-ferrous metals, such as gold, silver, copper, brass and aluminum.

Ground-Penetrating Radar (GPR)

350 MHz "HyperStacking" GPR Antenna – GPR works by sending a tiny pulse of energy into a material and recording the strength and the time required for the return of any reflected signal. Our GPR system uses state of the art HyperStacking Technology which provides excellent near-surface resolution and increased depth penetration in all soil types. We will be able to quickly search the location and depth of service utilities such as gas, communications, and sewer lines – as well as other metallic and nonmetallic targets including underground storage tanks and PVC pipes. For rough terrain conditions, we are able to place the unit into a rugged utility cart to complete the search.

Principle of operation:

- Ground- penetrating radar (GPR) uses a pair of radio antennas (transmitting and receiving), moved together across the ground surface. The transmitted radar wave penetrates into the ground until it reaches an "interface", or boundary, between materials of differing electrical properties. The wave is then reflected and detected by the receiving antenna.

Typical applications:

- Non- conductive utilities: Plastic pipes, gas and water main/services, etc. Bituminous fiber pipe ("Orangeburg", "Bermico"), asbestos-cement pipes ("Transite"). Cast iron pipe with rubber gaskets, or other insulating materials.

- Subsurface structures: Buried tanks, cisterns, septic tanks, cesspools, dry wells and oil-water separators. Buried vaults, manholes, and utility tunnels. Historical building foundations and other structures.

Limitations:

- For an object to produce a signal that is able to be interpreted by operations, the transmitted radar wave must penetrate to the depth of the object of interest, reflect, and return the receiving antenna.

- Depth of penetration is reduced by soils that are electrically conductive, due to water saturation or otherwise. Depth of penetrating is reduced by especially rocky, mixed, or inconsistent soil. A metallic ground surface (i.e. steel plate), or standing water, interferes with penetration of the transmitted signal into the soil.

- A reflection of the radar signal depends on the "interface", or boundary, of materials of differing electrical properties – such as the encountered at boundaries between soil layers of differing compaction, or at the surface of a hard object embedded in the soil. The reflection is weakened when the boundary has a lower contrast in electrical properties. An object of a give diameter will producte a reflection of decreasing strength with increasing depth to cover. Generally, one inch of diameter is required, per foot of cover, to produce a strong reflection.

- A known (or visible) point of connecting is generally needed to identify the function of a utility.

- Any utility, subsurface structure, or anomaly located with GPR and marked on site should be afforded an industry – standard tolerance zoned of 24'.

- A hand-dug or vacuum-excavated test hole should be used to precisely confirm horizontal or vertical location of any utility.

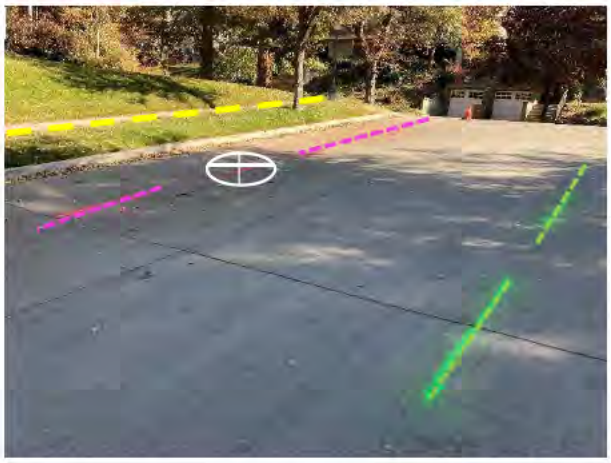
3.1 Physical Setting

The sites are located in Salt Lake City, Utah. These sites are a combination of neighbor hoods that are near the VA hospital campus including residential neighborhoods to the West of the campus. There are a total of three (3) proposed well locations MW 37, MW 36 and MW 38 (MW-38 had two areas scanned as options) and 10 ground water locations that were scanned on this round of work. There were no locations on the VA campus on this round of work. The well locations were all in or near parking lanes on the street. The majority of the ground water locations were located in landscaped/grass areas near residential homes and included GW-20, GW-16, GW-59, GW-11, GW-10, GW-53, GW52, GW-49, GW-50 and GW-61. Once all health and safety discussions and a tailgate meeting with the CDM field staff was completed, the crew proceeded to clear the area around each proposed location. This occurred over the course of one day on Tuesday, November 3rd, 2020. The temperature was in the low to mid 60's during this engagement. Skies were mostly clear.

3.2 Results

TWS personnel worked on site to locate and mark utilities, and to survey the areas of the proposed boring/well locations residential locations on November 3rd, 2020. Methods used include both radio-frequency (EM/RF) locating and ground-penetrating radar (GPR) as well as utilizing a magnetometer/pipe locator. As disclosed at the bidding stage, GPR penetration rates in the Salt Lake area were expected to be between 0-3 feet bgs. Depths beyond that may be impacted by soil conditions and data quality may be affected. Utilities located and marked in the vicinity of the work areas included anomalies/unknowns electrical, gas, water, and communication. There were also storm water drains and sewer networks across the properties. A combination of paint on the ground and paint and pin flags in the grassy areas were utilized to mark out utilities and anomalies in the general areas where there are proposed boring/well locations are planned. It is recommended that the areas for MW-38 (both the location off Elizabeth and 1200 E) as well as all of the ground water (GW) locations be called in to Blue Stake of Utah 811 prior to any drilling activities.

3.3 Project Photos



MW-36, anomaly (pink) located running through the proposed boring location, gas and sewer marked as well..

MW-37, gas and sewer (located in the grass parallel to the roadway) located and marked.

MW 38 (Elizabeth Street option) note proximity of water line markings. Sewer in center of street, recommend engaging Blue Stake before proceeding.

MW 38 (1200 E option) Water located along sidewalk and crossing the street to the North of the proposed location. Recommend engaging Blue Stake before proceeding.

GW-10, multiple communication and sewer lines nearby proposed location.

GW-11, storm water drainage runs down the alley approximately in the middle of the road.

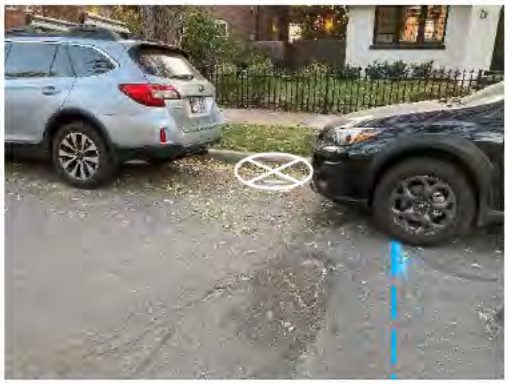
Storm water lines and unknown line located in street adjacent form existing GW-16 location

Water line located running up the street adjacent to planter where GW-20 was located in the planter area.

GW-49, possible storm water line running along the road parallel to the site.

GW-52, Communication running along the road, gas and power between the sidewalk and GW-52.

Water, sewer and power near intersection near proposed work area for GW-53.



Water near proposed work area for GW-53. (Relocated by CDM Staff)

Water and drain lines near proposed work area for GW-59.

Electrical lines in planter near proposed work area for GW-61

Metal landscaping rings potentially interfering with magnetometer readings near. MW-61.

Job Summary

Job Date : 3/26/2021

Customer	WASATCH ENVIRONMENTAL	**Phone Number**	(801) 209-5211

Billing Address	City	State	Zip
2410 W CALIFORNIA AVE	SALT LAKE CITY	UT	84104

Job Details

Jobsite Location	CDM VA MEDICAL CENTER
City	SLC
State	UT

WA Number	255430
Job Num	
PO Num	

Lead Technician	SWARTZ, RYAN	**Phone**	612-704-0456	**Email**	ryan.swartz@gprsinc.com

Thank you for using GPRS on your project. We appreciate the opportunity to work with you. If you have questions regarding the results of this scanning, please contact the lead GPRS technician on this project.

EQUIPMENT USED

The following equipment was used on this project:

- Underground Scanning GPR antenna. Typically capable of detecting objects up to 8' deep or more in ideal conditions but maximum effective depth can vary widely and depends on site and soil conditions. Depth penetration is most commonly limited by moisture and clay/conductive soils. Depths provided should always be treated as estimates as their accuracy can be affected by multiple factors.
- Electromagnetic Pipe and Cable Locator. Detects electromagnetic fields. Used to actively trace conductive pipes and tracer wires, or passively detect power and radio signals traveling along conductive pipes and utilities. Depths provided should always be treated as estimates as their accuracy can be affected by multiple factors.
- The CCTV crawler inspection camera has the ability of inspecting sewer lines from 6” and up by modifying the wheels configurations. The camera’s head has the ability to completely pan and tilt 360 degrees to inspect taps or any features on the side walls of the pipe/culvert. The crawler camera has a capability up to 1,000 linear feet as that is the length of the cable for the system; however, the operator may choose to not reach the maximum length as a precaution. The operator will have the ability of deeming a pipe unsafe, inaccessible, or determine if any obstacle is unsafe for the equipment to pass. Access to confined spaces such as manholes would need to be provided and facilitated by the client. Video and photos of the interior of the pipe can be provided with NASSCO certified annotations of all pipe features, but GPRS cannot make judgments regarding the integrity of the pipes.

Work Performed

Ground Penetrating Radar Systems performed the following work on this project:

Underground Utility

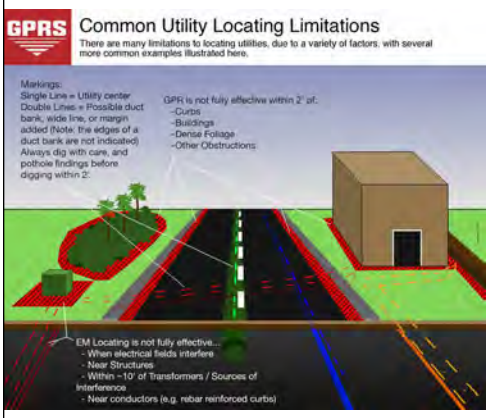
The scope of work included scanning the specified area to locate underground utilities. A tracer signal was sent along any accessible metallic utility or tracer wire, and the area was scanned with GPR to locate any additional targets. The locations of any detected utilities and anomalies were marked directly at the site with paint, flags, stakes, or other appropriate means, and results were reviewed with onsite personnel unless otherwise noted.

Job Summary

Job Date : 3/26/2021

- Scan for 8 soil borings.
- The effective depth of GPR will vary throughout a site depending on surface and soil conditions. In this area, the maximum effective GPR depth was approximately 3 feet.
- Scanned 6 locations for soil borings. All detected targets are marked with paint on the surface.
  Water, sewer and drains could not be seen due to depth, size and possible plastic pipes. Gas lines would have to be cleared by the residents so could not locate those lines due to a residential area.
  Reviewed all scan areas, markings and limitations with the client onsite.

Pictures



Utility Limitations

TERMS & CONDITIONS

http://www.gprsinc.com/termsandconditions.html

SIGNATURE

Contact Name

Michael Cronin (801) 209-5211 mc@wasatch-environmental.com

Job Summary

Job Date : 3/26/2021

GPRS

1 866 914 4718 GPRSINC COM

UTILITY LOCATING

To ensure the overall timely success of your project, utility detection is critical to any construction project where subsurface excavation is planned. If this critical first step is ignored, the risk for injury increases, budget overruns can multiply and your schedule can be delayed.

VIDEO PIPE INSPECTION

Video Pipe Inspection (CCTV) is a service used to inspect underground water, sewer and lateral pipelines. VPI is a great tool for investigating cross-bores, structural faults and damages, and lateral line inspection.

CONCRETE SCANNING

With new build construction and renovation projects, the likelihood of needing to cut or core concrete is high. There is an inherent risk of striking rebar, conduits, and post tension cables during the cutting or coring process. Our industry-leading concrete scanning services can mitigate the risks associated with saw cutting and core drilling concrete slabs.

REPORTS & DRAWINGS

The goal of the GPRS Deliverables Department is to deliver clear and understandable findings with each of our outputs from field markings to field sketches, KMZ files, or CAD drawings that provide 2D site plans or even 3D CAD models. In addition, upon the completion of every project, our customers receive a job summary that includes job scope information, site photos, description of site conditions, equipment used, and notes from the project.

NATIONWIDE SERVICE

With team members located in every major metropolitan area in the U.S., we're just a short drive away from any project. Our footprint allows us to service all of your projects, nationwide.

RAPID RESPONSE

Time is always critical in any construction project. We understand this and have, accordingly, developed and perfected our operations to quickly and efficiently respond to our customers within 24-48 hours, or less.

CONSULTATIVE APPROACH

Our Project Managers are trained to ask questions and provide you with answers. This project-specific consultative approach - a GPRS trademark – helps us hone in on your subsurface issues and ensure we provide valuable problem-solving solutions to keep your job moving.

PROVEN RESULTS

GPRS deploys the best equipment, operated by skilled Project Managers, who know how to solve your subsurface locating issues. Since our inception, GPRS has completed hundreds of thousands of projects in North America. Our accuracy rate on these projects? Over 99%.

The SIM Specification standard is the industry-leading, metrics-based guideline for the underground locating and concrete scanning industries. SIM includes these three main elements:

Job Summary

Job Date : 4/5/2021

Customer	WASATCH ENVIRONMENTAL	**Phone Number**	(801) 209-5211

Billing Address	City	State	Zip
2410 W CALIFORNIA AVE	SALT LAKE CITY	UT	84104

Job Details

Jobsite Location	VETERANS ADMINISTRATION
City	SLC
State	UT

WA Number	257676
Job Num	
PO Num	

Lead Technician	SWARTZ, RYAN	**Phone**	612-704-0456	**Email**	ryan.swartz@gprsinc.com

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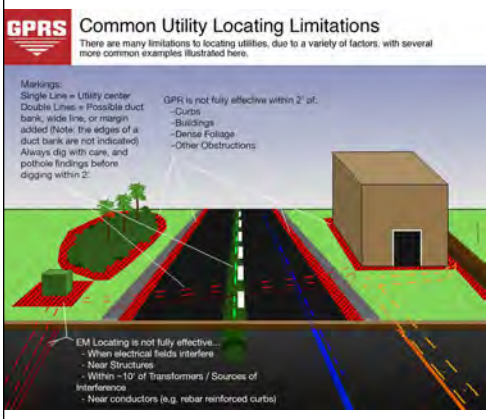
- Locate underground utilities in 3 locations.
- The effective depth of GPR will vary throughout a site depending on surface and soil conditions. In this area, the maximum effective GPR depth was approximately 3 feet.
- Scanned 3 locations to clear soil boring areas in a 20ft radius. Water, sewer, drains and gas could not be seen due to residential houses. Size of pipes, depth and possible plastic lines.
  All detected utilities are marked with paint on the surface.
  Reviewed all scan areas, limitations and markings with the customer onsite.

Job Summary

Job Date : 4/5/2021

Pictures



Utility Limitations

TERMS & CONDITIONS

http://www.gprsinc.com/termsandconditions.html

SIGNATURE

Contact Name

Michael Cronin (801) 209-5211 mc@wasatch-environmental.com

Job Summary

Job Date : 4/5/2021

GPRS

1 866 914 4718 GPRSINC COM

UTILITY LOCATING

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SUBSURFACE INVESTIGATION METHODOLOGY SIM

The SIM Specification standard is the industry-leading, metrics-based guideline for the underground locating and concrete scanning industries. SIM includes these three main elements:

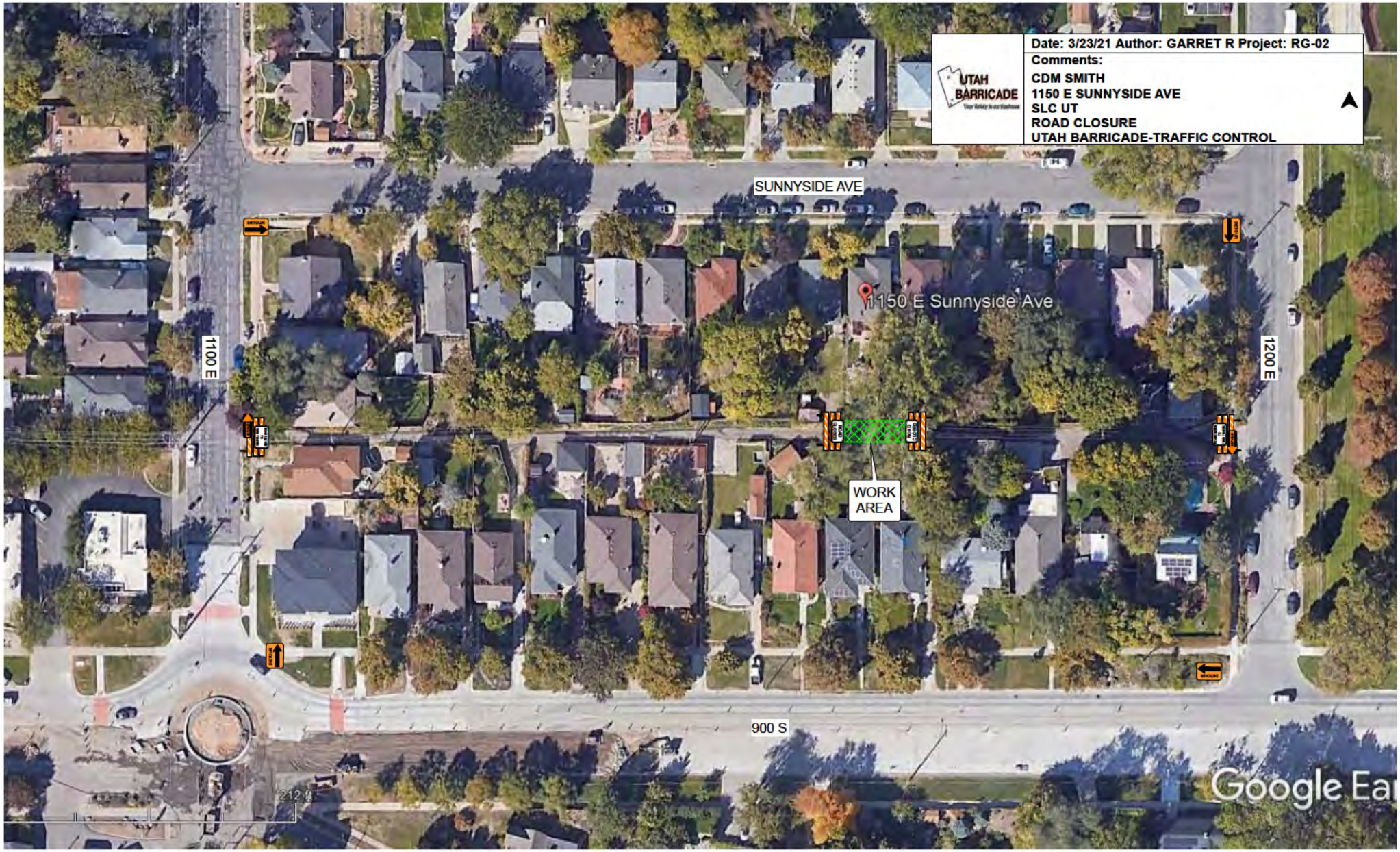
TRAINING
EQUIPMENT
METHODOLOGY

Appendix D

Traffic Control Plan

Date: 3/23/21 Author: GARRET R Project: RG-01
Comments:
CDM SMITH
1115 E GILMER DR
SLC UT
SHOULDER CLOSURE
UTAH BARRICADE-TRAFFIC CONTROL
UTAH BARRICADE
ROAD WORK AHEAD
SHOULDER WORK AHEAD
100'
S 1100 E
E 900 S
WORK AREA
Gilmer Dr

Date: 3/23/21 Author: GARRET R Project: RG-05
Comments:
CDM SMITH
1224 E GILMER DR
SLC UT
SHOULDER CLOSURE
UTAH BARRICADE-TRAFFIC CONTROL
UTAH BARRICADE
Your Safety is our Endeavor
WORK AREA
GILMER DR
1224 E Gilmer Dr
SHOULDER WORK AHEAD
100'
ROAD WORK AHEAD
100'
© 2021 Google


UTAH BARRICADE
Date: 3/23/21 Author: GARRET R Project: RG-02
Comments:
CDM SMITH
1150 E SUNNYSIDE AVE
SLC UT
ROAD CLOSURE
UTAH BARRICADE-TRAFFIC CONTROL
SUNNYSIDE AVE
1150 E Sunnyside Ave
1100 E
1200 E
WORK AREA
900 S
212 ft
Google Ea

UTAH BARRICADE
Date: 3/23/21 Author: GARRET R Project: RG-02
Comments:
CDM SMITH
1133 E SUNNYSIDE AVE
SLC UT
ROAD CLOSURE
UTAH BARRICADE-TRAFFIC CONTROL
WORK AREA
1133 E Sunnyside Ave
100'
100'
SHOULDER WORK AHEAD
ROAD WORK AHEAD
SUNNYSIDE AVE
1100 E
1200 E

www.invarion.com

Date: 3/23/21 Author: GARRET R Project: RG-05
Comments:
CDM SMITH
840 S 1300 E
SLC UT
SHOULDER CLOSURE
UTAH BARRICADE-TRAFFIC CONTROL
UTAH BARRICADE
E 800 S
E 800 S
S 1200 E
ROAD WORK AHEAD
SHOULDER WORK AHEAD
350'
350'
WORK AREA

UTAH BARRICADE
Date: 3/23/21 Author: GARRET R Project: RG-07
Comments:
CDM SMITH
1190 E GILMER DR
SLC UT
SHOULDER CLOSURE
UTAH BARRICADE-TRAFFIC CONTROL
WORK AREA
1190 E Gilmer Dr
Gilmer Dr
SHOULDER WORK AHEAD
ROAD WORK AHEAD
100'
100'
© 2021 Google

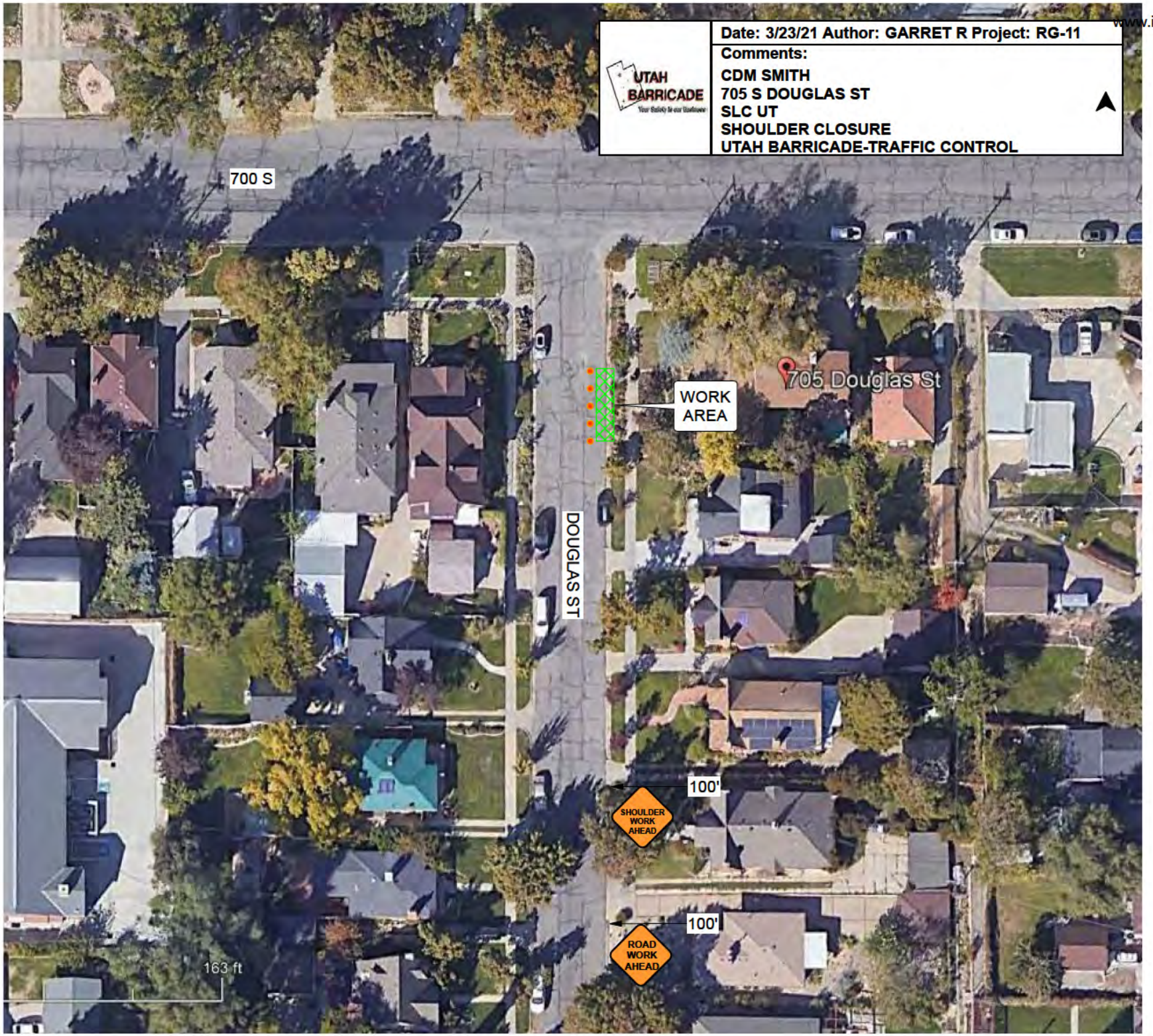
Date: 3/23/21 Author: GARRET R Project: RG-07
Comments:
CDM SMITH
1244 E 900 S
SLC UT
SHOULDER CLOSURE
UTAH BARRICADE-TRAFFIC CONTROL
ROAD WORK AHEAD
350'
SHOULDER WORK AHEAD
350'
WORK AREA
130 ft
Google Earth

Date: 3/23/21 Author: GARRET R Project: RG-08
Comments:
CDM SMITH
906 S 1200 E
SLC UT
SHOULDER CLOSURE
UTAH BARRICADE-TRAFFIC CONTROL
UTAH BARRICADE
ROAD WORK AHEAD
100'
SHOULDER WORK AHEAD
100'
E 900 S
WORK AREA
906 S 1200 E
© 2021 Google
Google Earth

Date: 3/23/21 Author: GARRET R Project: RG-08
Comments:
CDM SMITH
849 S 1100 E
SLC UT
SHOULDER CLOSURE
UTAH BARRICADE-TRAFFIC CONTROL
UTAH BARRICADE
1100 E
SUNNYSIDE AVE
WORK AREA
849 S 1100 E
SHOULDER WORK AHEAD
ROAD WORK AHEAD
S 1100 E
© 2021 Google

Date: 3/23/21 Author: GARRET R Project: RG-10
Comments:
CDM SMITH
1146 E MICHIGAN AVE
SLC UT
SHOULDER CLOSURE
UTAH BARRICADE-TRAFFIC CONTROL
UTAH BARRICADE
1100 E
1200 E
Michigan Ave
WORK AREA
WORK AREA
ROAD WORK AHEAD
SHOULDER WORK AHEAD
ROAD WORK AHEAD
100'
100'
1146 E Michigan Ave

www.invarion.com



Appendix E

Salt Lake City Traffic Control, Engineering, and Right-of-Way Permits

SALT LAKE CITY CORPORATION
ENGINEERING DIVISION
349 SOUTH 200 EAST, SUITE 100
SALT LAKE CITY, UTAH 84111
PHONE (801) 535-6396
FAX (801) 535-6093
engpermit@slcgov.com

ENG2021-00617

Assigned Inspector: Stephen Hetman
Office Phone: 801-535-7910
Cell Phone:

Please contact inspector 24 hours before beginning work

PERMIT TO WORK IN THE PUBLIC WAY

Job Address:	**Contractor Phone**
[redacted]	Phone1: Phone2: FAX:

Applicant Name:	Business Name: CDM FEDERAL PROGRAMS	Mailing Address: SALT LAKE CITY, UT

Traffic Control Plan		**Starting and Ending Dates**		**Fee**	
Barricade Manual Figure	**NA**	Begin Date:	**04/01/2021**	Total Fee:	**$296.00**
Traffic Permit Number:	**Multiple Locations**	Expiration	**05/01/2021**		

Certificate of Insurance as Per City Ordinance – Chapter 14.32.065	Number: TB7611B8T8Z6040T
Bonds As Per City Ordinance – Chapter 14.32.070	Number: 9340850
State Contractors License As Per City Ordinance – Chapter 14.32.025	Number:

Work Type: **Test Bore**
Drawing Included: **Yes**
APWA Standard:

Field Contact: Joe Miller **Phone:** 513.602.1619

Comments or Additional Requirements:
Testing wells to be installed at: [redacted] - Install Joe Miller 513.602.1619

Notice: CALL 24 HOURS BEFORE COMMENCING WORK (535-6727) for Public Utility inspections or assigned inspector for all other inspections or 48 hours if work is scheduled on holidays and weekends. **Digging within ten feet (10') of any parkstrip street tree requires written authorization from Salt Lake City Urban Forestry. Contact Urban Forestry at (801) 535-7818, before any excavation with in ten feet of a street tree, for inspection and authorization.**
BEFORE EXCAVATION CONTACT BLUE STAKES – 811 or 1-800-662-4111

PERMIT APPLICATION: Application is hereby made for a permit to work in the public way as specified above. Applicant agrees to the terms on the reverse side and to any increase in fees should they be required by Engineering.
Print name of Applicant:

Signature of Applicant: Joe Miller Date: 4/1/2021

Permit Issued By: Jack Crockett

**** WORK GUARANTEED - 3 YEARS FROM ACCEPTANCE DATE ****

GENERAL CONDITIONS

ACCEPTANCE OF CONDITIONS. It is understood and agreed by the Permittee that performing any work under this permit constitutes acceptance of Title 14 Chapter 32 of the Revised Ordinances of Salt Lake City and the City's Regulations for controlling construction, excavation and obstructions in the Public Right ¬of ¬Way, latest revision.
PROXIMATE WORK. Applicant agrees that no other work shall be done under this permit except that specifically set forth herein. It is the applicants responsibility to verify the exact location of city and private facilities prior to commencing excavation operations.
PERMIT AND DRAWINGS AT JOB SITE. The permittee shall have at the work site a copy of the permit, the traffic control plan, and the City approved drawings. NOTIFICATION. Notify the assigned inspector 24 hours before commencing work. Provide the following information: permit number, name and telephone number of permittee, date/time work is to commence, location of work and any other information which may be relevant to the work.
CONFORMANCE TO EXISTING LAWS AND CITY SPECIFICATIONS. Permittee agrees to be fully informed of all federal, state and local laws, ordinances, rules, regulations, and City Construction Specifications which, in any manner, affect the work, and at all times shall observe and comply with such laws, ordinances, rules, regulations and specifications. The City Engineer reserves the right to shut down and/or issue a citation for violation of these provisions.
ENVIRONMENTAL LIABILITY. Permittee agrees to indemnify, defend and hold harmless Salt Lake City, its officers, agents and employees against any claims, losses, damages, or expenses, including, without limitation, any fees or penalties imposed by the United States Environmental Protection Agency, the Utah State Department of Environmental Protection Agency, the Utah State Department of Environmental Quality or any other government or regulatory agency and any attorney's fees or costs sustained on account of, or related to, the presence, release, discovery or creation of hazardous wastes or similar materials as those materials are defined under applicable federal or state statutes or regulations, including, without limitation, the Resource Conservation and Recovery Act of 1976.
STANDARD SPECIFICATIONS AND STANDARD DRAWINGS. Comply with all Salt Lake City Standard Specifications and Standard Drawings for cutting surface, traffic control, backfill, compaction, selection of subgrade materials, asphalt and concrete surfacing requirements. Printed copies of the Regulations and Specifications can be obtained through the City Engineer's Office.
WARRANTY. Permittee shall guarantee the worksite restoration for a period of three years from completion and acceptance of the work, reasonable wear and tear excepted.

SPECIAL CONDITIONS

EXCAVATION OPERATIONS BLUE STAKES. Before commencing excavation operations, Permittee shall call "Blue Stakes" at 811
TRAFFIC CONTROL DEVICES. Traffic control devices must be in place before excavation begins.
ENVIRONMENTAL CONTROL DUST AND DEBRIS. Keep dust and debris controlled at the work site at all times. If necessary, wet down dusty areas with water and provide containers for debris.
WHEEL CLEANING ORDINANCE. Conform to Section 18.20.210 of the Revised Ordinances of Salt Lake City, 1987. The ordinance describes the City's requirements for keeping the public way clean.
NOISE. Permittee shall control noise in accordance with the Salt Lake County Health Department Noise Ordinance.
CLEANUP. Remove all equipment, material, barricades and similar items from the right of way. Areas used for storage of excavated material will be smoothed and returned to their original contour. Vacuum sweeping or hand sweeping is required when Engineer determines cleaning equipment is ineffective.
CONFORMANCE TO ENGINEERING REGULATIONS. All provisions of Salt Lake City Engineering Regulation 5¬R¬4, "Regulations for Controlling Construction in the City's Public Way", and other pertinent Engineering Regulations, will be adhered to. Engineering Regulations can be obtained in the office of the City Engineer, 349 South 200 East, Suite 100, Salt Lake City, Utah 84111.
TRAFFIC INTERRUPTION. Construction operations will be conducted in a manner to minimize the amount of interference or interruption of roadway traffic. Except during emergency conditions or unless authorized by the Engineer, construction operations such as excavation, backfill and pavement restoration on major/collector and CBD streets are prohibited during peak traffic hours of 7:00 to 9:00 a.m. and 4:00 to 6:00 p.m.
TRAFFIC CONTROL MANUAL. All provisions of the current "Traffic Control Manual" shall be adhered to. This manual provides regulations concerning traffic control construction barricades, road closures, public and private access, traffic control signing, traffic control in Central Business Area and traffic control devices.
EMERGENCY INFORMATION. Permittee shall clearly post on barricades in letters not less than two inches (2 in.) high emergency information consisting of the name and emergency telephone number of the permittee, and the permittee shall cause at least one such barricade per block to be erected at every job site until the work is complete and formally accepted by the City.
STREET EXCAVATION IN WINTER. Excavation of City Streets during the winter months (herein defined as November 15 to April 1) will be allowed only if the work is a new service connection, required maintenance or emergency, or otherwise approved by the Engineer. Permanent patching of City streets excavated in the winter may be delayed until April 1, provided the permittee provides and maintains a temporary asphalt surface until such time as the permanent surfacing is accomplished.
PRECONSTRUCTION PICTURES OF EXISTING PUBLIC WAY IMPROVEMENTS. Prior to commencing the permit work, the permittee is encouraged to secure pictures of the conditions of the existing public way improvements such as curbing, sidewalk, landscaping, asphalt surfaces, etc.
TIME LIMIT. Unless authorized otherwise by the Engineer on the permit, all paving and replacement of street facilities shall be done within seven (7) calendar days from the time the excavation commences, or within three (3) calendar days on major or collector streets from the time excavation commences, except as provided for during excavation in winter or during weather conditions that do not allow paving according to applicable standards and specifications. If work is expected to exceed the above duration, the permittee shall submit a detailed construction schedule for approval. The schedule will address means and methods to minimize traffic disruption and complete the construction as soon as possible.
EXCAVATION WITHIN 10 FEET OF STREET TREES. Before commencing excavation activities, Permittee shall contact Salt Lake City Urban Forestry (801) 535-7818 for an inspection.

SALT LAKE CITY CORPORATION
ENGINEERING DIVISION
349 SOUTH 200 EAST, SUITE 100
SALT LAKE CITY, UTAH 84111
PHONE (801) 535-6396
FAX (801) 535-6093
engpermit@slcgov.com

ENG2021-00618

Assigned Inspector: Kevin Liptrot
Office Phone: 8015356164
Cell Phone: 8014195668

Please contact inspector 24 hours before beginning work

PERMIT TO WORK IN THE PUBLIC WAY

Job Address:	**Contractor Phone**
[redacted]	Phone1: Phone2: FAX:

Applicant Name:	Business Name: CDM FEDERAL PROGRAMS	Mailing Address: SALT LAKE CITY, UT

Traffic Control Plan		**Starting and Ending Dates**		**Fee**	
Barricade Manual Figure	**NA**	Begin Date:	**04/01/2021**	Total Fee:	**$311.00**
Traffic Permit Number:	**Multiple Locations**	Expiration	**05/01/2021**		

Certificate of Insurance as Per City Ordinance – Chapter 14.32.065	Number: TB7611B8T8Z6040T
Bonds As Per City Ordinance – Chapter 14.32.070	Number: 9340850
State Contractors License As Per City Ordinance – Chapter 14.32.025	Number:

Work Type: **Test Bore**
Drawing Included: **Yes**
APWA Standard:

Field Contact: Joe Miller **Phone:** 513.602.1619

Comments or Additional Requirements:
Installation of testing wells: [redacted]
[redacted] Joe Miller 513.602.1619

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PERMIT APPLICATION: Application is hereby made for a permit to work in the public way as specified above. Applicant agrees to the terms on the reverse side and to any increase in fees should they be required by Engineering.
Print name of Applicant:

Signature of Applicant: Joe Miller Date: 4/1/2021

Permit Issued By: Jack Crockett

**** WORK GUARANTEED - 3 YEARS FROM ACCEPTANCE DATE ****

GENERAL CONDITIONS

ACCEPTANCE OF CONDITIONS. It is understood and agreed by the Permittee that performing any work under this permit constitutes acceptance of Title 14 Chapter 32 of the Revised Ordinances of Salt Lake City and the City's Regulations for controlling construction, excavation and obstructions in the Public Right ¬of ¬Way, latest revision.
PROXIMATE WORK. Applicant agrees that no other work shall be done under this permit except that specifically set forth herein. It is the applicants responsibility to verify the exact location of city and private facilities prior to commencing excavation operations.
PERMIT AND DRAWINGS AT JOB SITE. The permittee shall have at the work site a copy of the permit, the traffic control plan, and the City approved drawings. NOTIFICATION. Notify the assigned inspector 24 hours before commencing work. Provide the following information: permit number, name and telephone number of permittee, date/time work is to commence, location of work and any other information which may be relevant to the work.
CONFORMANCE TO EXISTING LAWS AND CITY SPECIFICATIONS. Permittee agrees to be fully informed of all federal, state and local laws, ordinances, rules, regulations, and City Construction Specifications which, in any manner, affect the work, and at all times shall observe and comply with such laws, ordinances, rules, regulations and specifications. The City Engineer reserves the right to shut down and/or issue a citation for violation of these provisions.
ENVIRONMENTAL LIABILITY. Permittee agrees to indemnify, defend and hold harmless Salt Lake City, its officers, agents and employees against any claims, losses, damages, or expenses, including, without limitation, any fees or penalties imposed by the United States Environmental Protection Agency, the Utah State Department of Environmental Protection Agency, the Utah State Department of Environmental Quality or any other government or regulatory agency and any attorney's fees or costs sustained on account of, or related to, the presence, release, discovery or creation of hazardous wastes or similar materials as those materials are defined under applicable federal or state statutes or regulations, including, without limitation, the Resource Conservation and Recovery Act of 1976.
STANDARD SPECIFICATIONS AND STANDARD DRAWINGS. Comply with all Salt Lake City Standard Specifications and Standard Drawings for cutting surface, traffic control, backfill, compaction, selection of subgrade materials, asphalt and concrete surfacing requirements. Printed copies of the Regulations and Specifications can be obtained through the City Engineer's Office.
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TRAFFIC INTERRUPTION. Construction operations will be conducted in a manner to minimize the amount of interference or interruption of roadway traffic. Except during emergency conditions or unless authorized by the Engineer, construction operations such as excavation, backfill and pavement restoration on major/collector and CBD streets are prohibited during peak traffic hours of 7:00 to 9:00 a.m. and 4:00 to 6:00 p.m.
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TIME LIMIT. Unless authorized otherwise by the Engineer on the permit, all paving and replacement of street facilities shall be done within seven (7) calendar days from the time the excavation commences, or within three (3) calendar days on major or collector streets from the time excavation commences, except as provided for during excavation in winter or during weather conditions that do not allow paving according to applicable standards and specifications. If work is expected to exceed the above duration, the permittee shall submit a detailed construction schedule for approval. The schedule will address means and methods to minimize traffic disruption and complete the construction as soon as possible.
EXCAVATION WITHIN 10 FEET OF STREET TREES. Before commencing excavation activities, Permittee shall contact Salt Lake City Urban Forestry (801) 535-7818 for an inspection.

Traffic Control Permit

Salt Lake City Community and Neighborhoods
Division of Transportation
349 South 200 East #150
Salt Lake City, Utah 84111
Telephone (801) 535-6630
E-Mail TechPermit@slcgov.com

Permit # TRN2021-00702

Organization Name: CDM Federal Programs Corp
Address: 10560 Arrowhead Drive Suite 500 Fairfax, 22030
Contact Person: Joseph Miller Phone: 5136021619 Cell: 5136021619
Barricade Company: Utah Barricade Barricade Phone:

WORK SHALL COMPLY WITH PART 6 OF THE 2009 MUTCD.
PERMITS MUST BE EXTENDED 24 HOURS IN ADVANCE OF EXPIRATION.
IF THE TRAFFIC CONTROL PERMIT IS ALLOWED TO EXPIRE, A NEW PERMIT, AND AN ADDITIONAL FEE WILL BE REQUIRED.
CLOSURES ON A DIFFERENT STREET THAN LISTED WILL REQUIRE AN ADDITIONAL TRAFFIC CONTROL, AND ENGINEERING PERMIT.
THE ORGANIZATION ISSUED THE TRAFFIC CONTROL PERMIT SHALL BE RESPONSIBLE FOR ALL BARRICADE PLACEMENT AND MAINTENENCE.
AN ADDITIONAL PERMIT FROM SLC ENGINEERING MAY ALSO BE REQUIRED.
SHALL MAINTAIN ACCESS TO ALL PROPERTIES.
SHALL INFORM BUSINESSES & RESIDENTS OF PROJECT & DURATION.
SHALL COORDINATE WITH BUSINESSES & RESIDENTS AFFECTED.
SHALL OBTAIN A PERMIT FOR ALL PARKING METERS OR OTHER RESTRICTED PARKING MADE UNAVAILBABLE TO THE PUBLIC.
TRAFFIC CONTROL PERMITS ARE NOT VALID UNTIL PAID IN FULL.
CHANGES TO PERMIT MAY BE REQUIRED AND MADE UPON REVIEW and/or COMPLAINT.

Project Name / Description: Parking lane closure for monitoring well reinstallation.
General Work Type: Construction Specific Work Type: Barricade
City Project # Public Way Permit #
Special Event Permit # Block Party Permit #

Closure Type	*On Street Name*	*From Number*	*To Number*	*Side of Street*
Street	**Gilmer Dr**	**1190**	**1192**	**S**

Start Date	*End Date*	*Full Road Closure?*	*Barricade Manual Fig #*	*Description*
04/01/2021	04/12/2021	No	TA-6	Parking lane closure for monitoring well reinstallation

Approved By: Joseph Jacobsen Issue Date: 3/24/2021

Traffic Control Permit

Salt Lake City Community and Neighborhoods
Division of Transportation
349 South 200 East #150
Salt Lake City, Utah 84111
Telephone (801) 535-6630
E-Mail TechPermit@slcgov.com

Permit # TRN2021-00693

Organization Name: CDM Smith
Address: 619 Logan St, 301 Denver, 80203
Contact Person: Joseph Miller Phone: 5136021619 Cell: 5136021619
Barricade Company: Utah Barricade Barricade Phone:

WORK SHALL COMPLY WITH PART 6 OF THE 2009 MUTCD.
PERMITS MUST BE EXTENDED 24 HOURS IN ADVANCE OF EXPIRATION.
IF THE TRAFFIC CONTROL PERMIT IS ALLOWED TO EXPIRE, A NEW PERMIT, AND AN ADDITIONAL FEE WILL BE REQUIRED.
CLOSURES ON A DIFFERENT STREET THAN LISTED WILL REQUIRE AN ADDITIONAL TRAFFIC CONTROL, AND ENGINEERING PERMIT.
THE ORGANIZATION ISSUED THE TRAFFIC CONTROL PERMIT SHALL BE RESPONSIBLE FOR ALL BARRICADE PLACEMENT AND MAINTENENCE.
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SHALL COORDINATE WITH BUSINESSES & RESIDENTS AFFECTED.
SHALL OBTAIN A PERMIT FOR ALL PARKING METERS OR OTHER RESTRICTED PARKING MADE UNAVAILBABLE TO THE PUBLIC.
TRAFFIC CONTROL PERMITS ARE NOT VALID UNTIL PAID IN FULL.
CHANGES TO PERMIT MAY BE REQUIRED AND MADE UPON REVIEW and/or COMPLAINT.

Project Name / Description: Closure for work in sidewalk area
General Work Type: Construction Specific Work Type: Barricade
City Project # Public Way Permit #
Special Event Permit # Block Party Permit #

Closure Type	*On Street Name*	*From Number*	*To Number*	*Side of Street*
Street	**E 900 S**	**1100**	**1100**	**S**

Start Date	*End Date*	*Full Road Closure?*	*Barricade Manual Fig #*	*Description*
04/01/2021	04/12/2021	No	TA-6	Closure for monitoring well installation in sidewalk area

Approved By: Joseph Jacobsen Issue Date: 3/23/2021

Traffic Control Permit

Salt Lake City Community and Neighborhoods
Division of Transportation
349 South 200 East #150
Salt Lake City, Utah 84111
Telephone (801) 535-6630
E-Mail TechPermit@slcgov.com

Permit # TRN2021-00694

Organization Name: CDM Federal Programs Corp
Address: 10560 Arrowhead Drive Suite 500 Fairfax, 22030
Contact Person: Joseph Miller Phone: 5136021619 Cell: 5136021619
Barricade Company: Utah Barricade Barricade Phone:

WORK SHALL COMPLY WITH PART 6 OF THE 2009 MUTCD.
PERMITS MUST BE EXTENDED 24 HOURS IN ADVANCE OF EXPIRATION.
IF THE TRAFFIC CONTROL PERMIT IS ALLOWED TO EXPIRE, A NEW PERMIT, AND AN ADDITIONAL FEE WILL BE REQUIRED.
CLOSURES ON A DIFFERENT STREET THAN LISTED WILL REQUIRE AN ADDITIONAL TRAFFIC CONTROL, AND ENGINEERING PERMIT.
THE ORGANIZATION ISSUED THE TRAFFIC CONTROL PERMIT SHALL BE RESPONSIBLE FOR ALL BARRICADE PLACEMENT AND MAINTENENCE.
AN ADDITIONAL PERMIT FROM SLC ENGINEERING MAY ALSO BE REQUIRED.
SHALL MAINTAIN ACCESS TO ALL PROPERTIES.
SHALL INFORM BUSINESSES & RESIDENTS OF PROJECT & DURATION.
SHALL COORDINATE WITH BUSINESSES & RESIDENTS AFFECTED.
SHALL OBTAIN A PERMIT FOR ALL PARKING METERS OR OTHER RESTRICTED PARKING MADE UNAVAILBABLE TO THE PUBLIC.
TRAFFIC CONTROL PERMITS ARE NOT VALID UNTIL PAID IN FULL.
CHANGES TO PERMIT MAY BE REQUIRED AND MADE UPON REVIEW and/or COMPLAINT.

Project Name / Description: Alley closure for monitoring well reinstallation
General Work Type: Construction Specific Work Type: Barricade
City Project # Public Way Permit #
Special Event Permit # Block Party Permit #

Closure Type	*On Street Name*	*From Number*	*To Number*	*Side of Street*
Street	**Sunnyside Ave ALLEY**	**1150**	**1160**	**N**

Start Date	*End Date*	*Full Road Closure?*	*Barricade Manual Fig #*	*Description*
04/01/2021	04/09/2021	Yes	SSTC	Alleyway closure between Sunnyside Ave and 900 South

Approved By: Joseph Jacobsen Issue Date: 3/23/2021

Traffic Control Permit

Salt Lake City Community and Neighborhoods
Division of Transportation
349 South 200 East #150
Salt Lake City, Utah 84111
Telephone (801) 535-6630
E-Mail TechPermit@slcgov.com

Permit # TRN2021-00695

Organization Name: CDM Federal Programs Corp
Address: 10560 Arrowhead Drive Suite 500 Fairfax, 22030
Contact Person: Joseph Miller Phone: 5136021619 Cell: 5136021619
Barricade Company: Utah Barricade Barricade Phone:

WORK SHALL COMPLY WITH PART 6 OF THE 2009 MUTCD.
PERMITS MUST BE EXTENDED 24 HOURS IN ADVANCE OF EXPIRATION.
IF THE TRAFFIC CONTROL PERMIT IS ALLOWED TO EXPIRE, A NEW PERMIT, AND AN ADDITIONAL FEE WILL BE REQUIRED.
CLOSURES ON A DIFFERENT STREET THAN LISTED WILL REQUIRE AN ADDITIONAL TRAFFIC CONTROL, AND ENGINEERING PERMIT.
THE ORGANIZATION ISSUED THE TRAFFIC CONTROL PERMIT SHALL BE RESPONSIBLE FOR ALL BARRICADE PLACEMENT AND MAINTENENCE.
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SHALL MAINTAIN ACCESS TO ALL PROPERTIES.
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SHALL COORDINATE WITH BUSINESSES & RESIDENTS AFFECTED.
SHALL OBTAIN A PERMIT FOR ALL PARKING METERS OR OTHER RESTRICTED PARKING MADE UNAVAILBABLE TO THE PUBLIC.
TRAFFIC CONTROL PERMITS ARE NOT VALID UNTIL PAID IN FULL.
CHANGES TO PERMIT MAY BE REQUIRED AND MADE UPON REVIEW and/or COMPLAINT.

Project Name / Description: Monitoring well reinstall along north side of the road
General Work Type: Construction Specific Work Type: Barricade
City Project # Public Way Permit #
Special Event Permit # Block Party Permit #

Closure Type	*On Street Name*	*From Number*	*To Number*	*Side of Street*
Street	**Sunnyside Ave**	**1133**	**1137**	**N**

Start Date	*End Date*	*Full Road Closure?*	*Barricade Manual Fig #*	*Description*
04/01/2021	04/12/2021	No	TA-6	North side shoulder closure for monitoring well reinstall

Closure Type	*On Street Name*	*From Number*	*To Number*	*Side of Street*
Street	**Sunnyside**	**1133**	**1137**	**N**

Start Date	*End Date*	*Full Road Closure?*	*Barricade Manual Fig #*	*Description*
04/01/2021	04/12/2021	No	TA-6	Shoulder closure for work in parking lane

Approved By: Joseph Jacobsen Issue Date: 3/23/2021

Traffic Control Permit

Salt Lake City Community and Neighborhoods
Division of Transportation
349 South 200 East #150
Salt Lake City, Utah 84111
Telephone (801) 535-6630
E-Mail TechPermit@slcgov.com

Permit # TRN2021-00696

Organization Name: CDM Smith
Address: 619 Logan St, 301 Denver, 80203
Contact Person: Joseph Miller Phone: 5136021619 Cell: 5136021619
Barricade Company: Utah Barricade Barricade Phone:

WORK SHALL COMPLY WITH PART 6 OF THE 2009 MUTCD.
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Project Name / Description: Closure of east shoulder for monitoring well reinstallation.
General Work Type: Construction Specific Work Type: Barricade
City Project # Public Way Permit #
Special Event Permit # Block Party Permit #

Closure Type	*On Street Name*	*From Number*	*To Number*	*Side of Street*
Street	**S 1100 E**	**761**	**761**	**E**

Start Date	*End Date*	*Full Road Closure?*	*Barricade Manual Fig #*	*Description*
04/01/2021	04/12/2021	No	TA-6	Closure of east side of road for monitoring well reinstallation

Approved By: Joseph Jacobsen Issue Date: 3/23/2021

Traffic Control Permit

Salt Lake City Community and Neighborhoods
Division of Transportation
349 South 200 East #150
Salt Lake City, Utah 84111
Telephone (801) 535-6630
E-Mail TechPermit@slcgov.com

Permit # TRN2021-00701

Organization Name: CDM Federal Programs Corp
Address: 10560 Arrowhead Drive Suite 500 Fairfax, 22030
Contact Person: Joseph Miller Phone: 5136021619 Cell: 5136021619
Barricade Company: Utah Barricade Barricade Phone:

WORK SHALL COMPLY WITH PART 6 OF THE 2009 MUTCD.
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Project Name / Description: Parking lane closure on south side of 800 South next to East High School for monitoring well installation
General Work Type: Construction Specific Work Type: Barricade
City Project # Public Way Permit #
Special Event Permit # Block Party Permit #

Closure Type	*On Street Name*	*From Number*	*To Number*	*Side of Street*
Street	**800 S**	**1218**	**1240**	**S**

Start Date	*End Date*	*Full Road Closure?*	*Barricade Manual Fig #*	*Description*
04/01/2021	04/12/2021	No	TA-6	Parking lane closure for monitoring well installation.

Approved By: Joseph Jacobsen Issue Date: 3/24/2021

Traffic Control Permit

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Division of Transportation
349 South 200 East #150
Salt Lake City, Utah 84111
Telephone (801) 535-6630
E-Mail TechPermit@slcgov.com

Permit # TRN2021-00703

Organization Name: CDM Federal Programs Corp
Address: 10560 Arrowhead Drive Suite 500 Fairfax, UT 22030
Contact Person: Joseph Miller Phone: 5136021619 Cell: 5136021619
Barricade Company: Utah Barricade Barricade Phone:

WORK SHALL COMPLY WITH PART 6 OF THE 2009 MUTCD.
PERMITS MUST BE EXTENDED 24 HOURS IN ADVANCE OF EXPIRATION.
IF THE TRAFFIC CONTROL PERMIT IS ALLOWED TO EXPIRE, A NEW PERMIT, AND AN ADDITIONAL FEE WILL BE REQUIRED.
CLOSURES ON A DIFFERENT STREET THAN LISTED WILL REQUIRE AN ADDITIONAL TRAFFIC CONTROL, AND ENGINEERING PERMIT.
THE ORGANIZATION ISSUED THE TRAFFIC CONTROL PERMIT SHALL BE RESPONSIBLE FOR ALL BARRICADE PLACEMENT AND MAINTENENCE.
AN ADDITIONAL PERMIT FROM SLC ENGINEERING MAY ALSO BE REQUIRED.
SHALL MAINTAIN ACCESS TO ALL PROPERTIES.
SHALL INFORM BUSINESSES & RESIDENTS OF PROJECT & DURATION.
SHALL COORDINATE WITH BUSINESSES & RESIDENTS AFFECTED.
SHALL OBTAIN A PERMIT FOR ALL PARKING METERS OR OTHER RESTRICTED PARKING MADE UNAVAILBABLE TO THE PUBLIC.
TRAFFIC CONTROL PERMITS ARE NOT VALID UNTIL PAID IN FULL.
CHANGES TO PERMIT MAY BE REQUIRED AND MADE UPON REVIEW and/or COMPLAINT.

Project Name / Description: Parking lane closure for monitoring well reinstallation in planting strip.
General Work Type: Construction Specific Work Type: Barricade
City Project # Public Way Permit #
Special Event Permit # Block Party Permit #

Closure Type	*On Street Name*	*From Number*	*To Number*	*Side of Street*
Street	**900 South**	**1244 E**	**1244 E**	**S**

Start Date	*End Date*	*Full Road Closure?*	*Barricade Manual Fig #*	*Description*	*Special Requirements*
04/01/2021	04/12/2021	No	TA-6, T-28	Parking lane closure for Monitoring well reinstallation	Shoulder work only. Shall maintain access to all properties and notify businesses and residents affected of project and duration. May close sidewalk for safety, barricading as may be required for pedestrians and persons with disabilities.

Approved By: Dave Pratt Issue Date: 3/24/2021

Traffic Control Permit

Salt Lake City Community and Neighborhoods
Division of Transportation
349 South 200 East #150
Salt Lake City, Utah 84111
Telephone (801) 535-6630
E-Mail TechPermit@slcgov.com

Permit # TRN2021-00704

Organization Name: CDM Federal Programs Corp
Address: 10560 Arrowhead Drive Suite 500 Fairfax, UT 22030
Contact Person: Joseph Miller Phone: 5136021619 Cell: 5136021619
Barricade Company: Utah Barricade Barricade Phone:

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Project Name / Description: Parking lane closure on east side of 900 S for monitoring well reinstallation.
(I think you meant the e/side of 1200 E because 900 S is n/side or s/side).
General Work Type: Construction Specific Work Type: Barricade
City Project # Public Way Permit #
Special Event Permit # Block Party Permit #

Closure Type	*On Street Name*	*From Number*	*To Number*	*Side of Street*
Street	**1200 E**	**906 S**	**906 S**	**E**

Start Date	*End Date*	*Full Road Closure?*	*Barricade Manual Fig #*	*Description*	*Special Requirements*
04/01/2021	04/12/2021	No	TA-6	Parking lane closure on east side of 900 S	Shoulder work only. Shall maintain access to all properties and notify businesses and residents affected of project and duration.

Approved By: Dave Pratt Issue Date: 3/24/2021

Traffic Control Permit

Salt Lake City Community and Neighborhoods
Division of Transportation
349 South 200 East #150
Salt Lake City, Utah 84111
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E-Mail TechPermit@slcgov.com

Permit # TRN2021-00705

Organization Name: CDM Federal Programs Corp
Address: 10560 Arrowhead Drive Suite 500 Fairfax, 22030
Contact Person: Joseph Miller Phone: 5136021619 Cell: 5136021619
Barricade Company: Utah Barricade Barricade Phone:

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Project Name / Description: Parking lane closure for monitoring well reinstallation near the corner of S 1100 E and sunnyside avenue
General Work Type: Construction Specific Work Type: Barricade
City Project # Public Way Permit #
Special Event Permit # Block Party Permit #

Closure Type	*On Street Name*	*From Number*	*To Number*	*Side of Street*
Street	**1100 E**	**849 S**	**849 S**	**E**

Start Date	*End Date*	*Full Road Closure?*	*Barricade Manual Fig #*	*Description*	*Special Requirements*
04/01/2021	04/12/2021	No	TA-6	Parking lane closure along 1100E	Shall maintain access to all properties and notify residents affected of project and duration.

Approved By: Dave Pratt Issue Date: 3/24/2021

Traffic Control Permit

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Division of Transportation
349 South 200 East #150
Salt Lake City, Utah 84111
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Permit # TRN2021-00706

Organization Name: CDM Federal Programs Corp
Address: 10560 Arrowhead Drive Suite 500 Fairfax, 22030
Contact Person: Joseph Miller Phone: 5136021619 Cell: 5136021619
Barricade Company: Utah Barricade Barricade Phone:

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Project Name / Description: Parking lane closure for well abandonment on the south side of michigan avenue
General Work Type: Construction Specific Work Type: Barricade
City Project # Public Way Permit #
Special Event Permit # Block Party Permit #

Closure Type	*On Street Name*	*From Number*	*To Number*	*Side of Street*
Street	**Michigan Ave**	**1146 E**	**1146 E**	**S**

Start Date	*End Date*	*Full Road Closure?*	*Barricade Manual Fig #*	*Description*	*Special Requirements*
04/01/2021	04/12/2021	No	TA-6	Parking lane closure on South side of michigan avenue	Shoulder work only. Shall maintain access to all properties and notify residents affected of project and duration if parking needs to be restricted for safety.

Approved By: Dave Pratt Issue Date: 3/24/2021

Traffic Control Permit

Salt Lake City Community and Neighborhoods
Division of Transportation
349 South 200 East #150
Salt Lake City, Utah 84111
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Permit # TRN2021-00707

Organization Name: CDM Federal Programs Corp
Address: 10560 Arrowhead Drive Suite 500 Fairfax, UT 22030
Contact Person: Joseph Miller Phone: 5136021619 Cell: 5136021619
Barricade Company: Utah Barricade Barricade Phone:

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Project Name / Description: Parking lane closure on north side of Michigan ave near the intersection with 1200 E.
General Work Type: Construction Specific Work Type: Barricade
City Project # Public Way Permit #
Special Event Permit # Block Party Permit #

Closure Type	*On Street Name*	*From Number*	*To Number*	*Side of Street*
Street	**Michigan**	**1161 S**	**1163 S**	**N**

Start Date	*End Date*	*Full Road Closure?*	*Barricade Manual Fig #*	*Description*	*Special Requirements*
04/01/2021	04/12/2021	No	TA-6	Parking lane closure on north side of michigan ave	Shoulder work only. Shall maintain access to all properties and coordinate with residents and businesses affected. Shall notify residents and businesses affected if parking must be restricted for safety and access to properties.

Closure Type	*On Street Name*	*From Number*	*To Number*	*Side of Street*
Sidewalk	**Michigan**	**1161 S**	**1163 S**	**N**

Start Date	*End Date*	*Full Road Closure?*	*Barricade Manual Fig #*	*Description*	*Special Requirements*
04/01/2021	04/12/2021	No	TA-28, TA-29	May close sidewalk as needed for safety.	Shall barricade as may be required for pedestrians and persons with disabilities.

Approved By: Dave Pratt Issue Date: 3/24/2021

Traffic Control Permit

Salt Lake City Community and Neighborhoods
Division of Transportation
349 South 200 East #150
Salt Lake City, Utah 84111
Telephone (801) 535-6630
E-Mail TechPermit@slcgov.com

Permit # TRN2021-00709

Organization Name: CDM Federal Programs Corp
Address: 10560 Arrowhead Drive Suite 500 Fairfax, UT 22030
Contact Person: Joseph Miller Phone: 5136021619 Cell: 5136021619
Barricade Company: Utah Barricade Barricade Phone:

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Project Name / Description: Parking lane closure on east side of douglas street for monitoring well installation
General Work Type: Construction Specific Work Type: Barricade
City Project # Public Way Permit #
Special Event Permit # Block Party Permit #

Closure Type	*On Street Name*	*From Number*	*To Number*	*Side of Street*
Street	**Douglas**	**705 S**	**707 S**	**E**

Start Date	*End Date*	*Full Road Closure?*	*Barricade Manual Fig #*	*Description*	*Special Requirements*
04/01/2021	04/12/2021	No	TA-6	Parking lane closure on east side of douglas st.	Shoulder work only. Shall maintain access to all properties and coordinate with residents affected. Shall notify residents of project and duration if parking is to be restricted for safety.

Approved By: Dave Pratt Issue Date: 3/24/2021

Appendix F

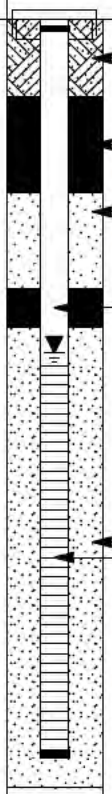
Borehole Logs with Well Construction Diagrams

CDM Smith
555 17th Street, Suite 500
Denver, CO 80202
(303) 383-2300

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER	238824.6495-F3048-005.DRILL	**BORING/WELL NUMBER**	RG-01
PROJECT NAME	700 S 1600 E PCE Plume	**DATE DRILLED**	4/5/2021
LOCATION	Salt Lake City, UT	**CASING TYPE/DIAMETER**	2-inch Schedule 40 PVC
DRILLING METHOD	HSA/DPT	**SCREEN TYPE/SLOT**	2-inch Schedule 40 0.010-slot
SAMPLING METHOD	DPT Core	**GRAVEL PACK TYPE**	#10/20 sand
GROUND ELEVATION (FT MSL)	4383.92	**GROUT TYPE/QUANTITY**	Hydrated Bentonite Chips
TOP OF CASING (FT MSL)	4383.49	**DEPTH TO WATER (FT BGS)**	8.67
LOGGED BY	Joe Miller	**GROUND WATER ELEVATION (FT MSL)**	4375.25
REMARKS	Replacing GW-10		

PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
0							Top soil; dark brown	1.0
0					ML		Sandy SILT; non-cohesive; non-plastic; (7.5YR 3/3) dark brown with gray mottling; moist	
0				5				5.0
0					CL		Lean CLAY; stiff; low to medium plasticity; cohesive; trace gravel; (5Y 5/2) olive gray; moist	
0								7.0
					SM		Silty SAND; medium dense; fine sand; cohesive; reddish brown/grayish brown mottled; wet	
				10			- Increase clay; trace fine gravel	10.0
0					CL		Sandy CLAY; lean; medium plasticity; mottled reddish brown/grayish brown; moist to wet	
								13.0
0					SP		Poorly graded SAND with silt; fine sand, (5YR 6/6) yellowish red; wet; saturated	
				15				15.0
0					SM		Silty SAND; fine sand; slightly cohesive; (7.5YR 4/3) brown; moist to wet	16.5
0					SP		Poorly Graded SAND; fine to coarse; (7.5YR 4/3) brown; wet	
								18.5
					CL		CLAY; lean; trace gravel; medium plasticity; moist	19.0
					GM		Silty GRAVEL with Sand; fine to coarse gravel; fine sand; dense; moist	20.0
				20			Boring TD at 20' bgs	



WHITNEY'S BORING LOG SLC VA PLUME DRAFT_051921.GPJ LAEWNN01.GDT 6/14/21

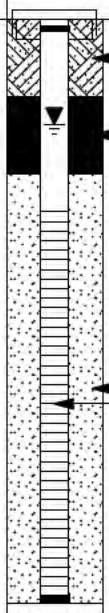
CDM Smith
555 17th Street, Suite 500
Denver, CO 80202
(303) 383-2300

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER	238824.6495-F3048-005.DRILL	**BORING/WELL NUMBER**	RG-02
PROJECT NAME	700 S 1600 E PCE Plume	**DATE DRILLED**	4/2/2021
LOCATION	Salt Lake City, UT	**CASING TYPE/DIAMETER**	2-inch Schedule 40 PVC
DRILLING METHOD	HSA	**SCREEN TYPE/SLOT**	2-inch Schedule 40 0.010-slot
SAMPLING METHOD	HSA Cuttings	**GRAVEL PACK TYPE**	#10/20 sand
GROUND ELEVATION (FT MSL)	4437.32	**GROUT TYPE/QUANTITY**	Hydrated Bentonite Chips
TOP OF CASING (FT MSL)	4436.95	**DEPTH TO WATER (FT BGS)**	2.72
LOGGED BY	Joe Miller	**GROUND WATER ELEVATION (FT MSL)**	4434.60
REMARKS	Replacing GW-11		

PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
3.8					ML		Sandy SILT; cohesive; (5YR 3/1) very dark gray; moist	5.0
6.2				5	ML		Sandy SILT; slightly cohesive; fine sand; (7.5Y 3/1) very dark gray; wet	10.0
1.4				10	SM		Silty SAND; fine to medium sand; loose; (2.5Y 5/2) grayish brown; wet (saturated)	15.0
				15			Boring TD at 15' bgs	

WELL DIAGRAM



- Flush-mounted vault (6-inch).
- Hydrated bentonite chips (2 to 4 ft bgs).
- #10/20 sand filter pack (4 to 15 ft bgs).
- 2-inch SCH 40 PVC 0.010-slot screen well (5 to 15 ft bgs).

WHITNEY'S BORING LOG SLC VA PLUME DRAFT_051921.GPJ LAEWNN01.GDT 6/14/21

CDM Smith
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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER	238824.6495-F3048-005.DRILL	**BORING/WELL NUMBER**	RG-03
PROJECT NAME	700 S 1600 E PCE Plume	**DATE DRILLED**	4/2/2021
LOCATION	Salt Lake City, UT	**CASING TYPE/DIAMETER**	2-inch Schedule 40 PVC
DRILLING METHOD	HSA	**SCREEN TYPE/SLOT**	2-inch Schedule 40 0.010-slot
SAMPLING METHOD	HSA Cuttings	**GRAVEL PACK TYPE**	#10/20 sand
GROUND ELEVATION (FT MSL)	4422.98	**GROUT TYPE/QUANTITY**	Hydrated Bentonite Chips
TOP OF CASING (FT MSL)	4422.53	**DEPTH TO WATER (FT BGS)**	3.15
LOGGED BY	Joe Miller	**GROUND WATER ELEVATION (FT MSL)**	4419.83
REMARKS	Replacing GW-16		

PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
4.0					ML		Topsoil	0.4	Flush-mounted vault (6-inch).
							Sandy SILT; non-plastic; soft; fine to coarse sand; trace fine gravel; (7.5YR 5/3) brown; moist	2.0	Hydrated bentonite chips (1 to 2 ft bgs).
					GC		Clayey GRAVEL with Sand; fine angular to subrounded gravel; fine to coarse sand; loose; (10YR 5/4) yellowish brown; moist		
2.9				5					#10/20 sand filter pack (2 to 8 ft bgs).
					SC		Clayey SAND; fine to medium sand; medium dense; cohesive; (5YR 5/2) grayish brown; wet	6.0	
							TD boring at 8' bgs	8.0	2-inch SCH 40 PVC 0.010-slot screen well (3 to 8 ft bgs).

WHITNEY'S BORING LOG SLC VA PLUME DRAFT_051921.GPJ LAEWNN01.GDT 6/14/21

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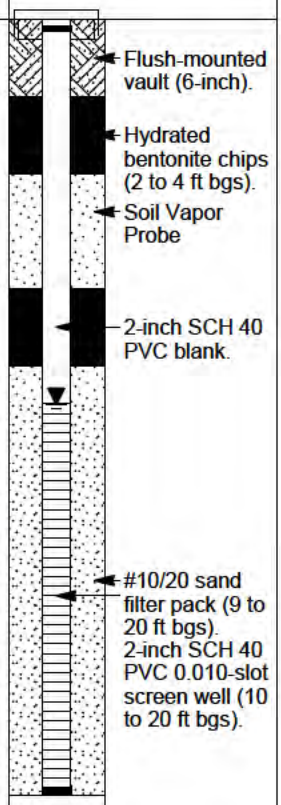
BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER	238824.6495-F3048-005.DRILL	**BORING/WELL NUMBER**	RG-04
PROJECT NAME	700 S 1600 E PCE Plume	**DATE DRILLED**	4/5/2021
LOCATION	Salt Lake City, UT	**CASING TYPE/DIAMETER**	2-inch Schedule 40 PVC
DRILLING METHOD	HSA	**SCREEN TYPE/SLOT**	2-inch Schedule 40 0.010-slot
SAMPLING METHOD	HSA Cuttings	**GRAVEL PACK TYPE**	#10/20 sand
GROUND ELEVATION (FT MSL)	4415.83	**GROUT TYPE/QUANTITY**	Hydrated Bentonite Chips
TOP OF CASING (FT MSL)	4415.47	**DEPTH TO WATER (FT BGS)**	10.02
LOGGED BY	Joe Miller	**GROUND WATER ELEVATION (FT MSL)**	4405.81
REMARKS	Replacing GW-20		

PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
0.0					ML		Sandy SILT with Gravel; fine to medium sand; fine subrounded to rounded gravel; stiff; cohesive; (7.5YR 3/3) dark brown; moist	0.3
0.0				5	CL		CLAY, lean; stiff; plastic; trace fine sand; (5Y 7/2) light gray; dry	6.0 6.5
					CL		Sandy CLAY; lean; cohesive; fine to medium sand; trace fine gravel; stiff; (7.5YR 4/6) strong brown; dry to moist	
0.0				10				12.0
0.0					CL		Gravelly CLAY; lean; cohesive; subangular to subrounded fine gravel; low plasticity; moist	13.0
0.0					ML		Sandy SILT; lean; cohesive; fine sand; stiff; (5Y 7/2) light gray; wet	15.0
0.0				15	SP		Poorly graded SAND with Silt and Gravel; fine to coarse sand; fine gravel; loose; (5Y 7/2) light gray; wet	18.0
					CL		Sandy CLAY; lean; cohesive; low to medium plasticity; stiff; gray and light brown mottled; moist	20.0
				20			TD boring at 20' bgs	



WHITNEY'S BORING LOG SLC VA PLUME DRAFT_051921.GPJ LAEWNN01.GDT 6/14/21

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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER	238824.6495-F3048-005.DRILL	**BORING/WELL NUMBER**	RG-05
PROJECT NAME	700 S 1600 E PCE Plume	**DATE DRILLED**	4/3/2021
LOCATION	Salt Lake City, UT	**CASING TYPE/DIAMETER**	2-inch Schedule 40 PVC
DRILLING METHOD	HSA/DPT	**SCREEN TYPE/SLOT**	2-inch Schedule 40 0.010-slot
SAMPLING METHOD	DPT Core	**GRAVEL PACK TYPE**	#10/20 sand
GROUND ELEVATION (FT MSL)	4497.38	**GROUT TYPE/QUANTITY**	Hydrated Bentonite Chips
TOP OF CASING (FT MSL)	4496.96	**DEPTH TO WATER (FT BGS)**	23.64
LOGGED BY	Joe Miller	**GROUND WATER ELEVATION (FT MSL)**	4473.74
REMARKS	Drilled near former well GW-27		

PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
4.8							Topsoil	1.0
					CL		CLAY; lean; cohesive; stiff; (10YR 4/2) dark grayish brown; moist	
0.7				5				6.0
					ML		Sandy SILT; fine sand; laminated; stiff; (10YR 4/4) dark yellowish brown; moist	
0.7				10				11.0
					SM		Silty SAND; poorly graded fine; medium dense; (10YR 5/8) yellowish brown; moist	
0.0				15				16.0
					ML		Sandy SILT; fine sand; cohesive; (7.5YR 4/4) brown; moist to wet	17.0
					SP		Poorly Graded SAND; fine to coarse sand; medium dense; (7.5YR 4/4) brown; moist	18.0
					GM		Silty GRAVEL; fine to coarse gravel; subangular to angular; cemented in places; (5YR 4/4) reddish brown; moist	20.0
0.0				20	GP		Poorly Graded GRAVEL; fine to coarse gravel; fine to coarse sand; dense; weakly cemented; brown and gray mottled; moist	21.0
					CL		Sandy CLAY; lean; low plasticity; firm; trace gravel; (5YR 5/6) yellowish red; moist	23.5
0.0				25	SM		Silty SAND; poorly graded fine sand; medium dense; (5YR 5/4) reddish brown; wet	27.0
					GP		Poorly Graded GRAVEL with Sand and Silt; fine to coarse gravel; fine to coarse sand; medium dense; (5YR 5/3) reddish brown; wet	
				30			TD boring at 30' bgs	30.0

WELL DIAGRAM

- Flush-mounted vault (6-inch).
- Hydrated bentonite chips (2 to 4 ft bgs).
- Soil Vapor Probe
- 2-inch SCH 40 PVC blank.
- Hydrated bentonite chips (7 to 18 ft bgs).
- #10/20 sand filter pack (18 to 30 ft bgs).
- 2-inch SCH 40 PVC 0.010-slot screen well (20 to 30 ft bgs).

WHITNEY'S BORING LOG SLC VA PLUME DRAFT_051921.GPJ LAEWNN01.GDT 6/14/21

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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER	238824.6495-F3048-005.DRILL	**BORING/WELL NUMBER**	RG-06
PROJECT NAME	700 S 1600 E PCE Plume	**DATE DRILLED**	4/5/2021
LOCATION	Salt Lake City, UT	**CASING TYPE/DIAMETER**	2-inch Schedule 40 PVC
DRILLING METHOD	HSA	**SCREEN TYPE/SLOT**	2-inch Schedule 40 0.010-slot
SAMPLING METHOD	HSA Cuttings	**GRAVEL PACK TYPE**	#10/20 sand
GROUND ELEVATION (FT MSL)	4443.66	**GROUT TYPE/QUANTITY**	Hydrated Bentonite Chips
TOP OF CASING (FT MSL)	4443.23	**DEPTH TO WATER (FT BGS)**	2.31
LOGGED BY	Joe Miller	**GROUND WATER ELEVATION (FT MSL)**	4441.35
REMARKS	Replacing GW-50		

PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
0.0							Topsoil	0.8	Flush-mounted vault (6-inch).
							Sandy SILT; cohesive; fine sand; dark gray; moist		Hydrated bentonite chips (1.5 to 3 ft bgs).
					ML		- becomes wet		
0.0				5					
								6.5	#10/20 sand filter pack (3 to 10 ft bgs). 2-inch SCH 40 PVC 0.010-slot screen well (4 to 9 ft bgs).
							Silty SAND; fine sand; cohesive; gray; wet		
					SM				
				10			TD boring at 10' bgs	10.0	

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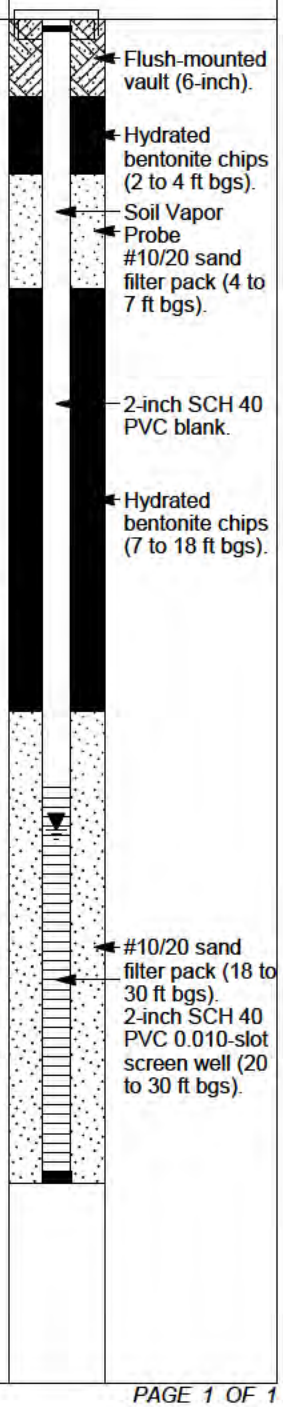
BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER	238824.6495-F3048-005.DRILL	**BORING/WELL NUMBER**	RG-07
PROJECT NAME	700 S 1600 E PCE Plume	**DATE DRILLED**	4/2/2021
LOCATION	Salt Lake City, UT	**CASING TYPE/DIAMETER**	2-inch Schedule 40 PVC
DRILLING METHOD	HSA	**SCREEN TYPE/SLOT**	2-inch Schedule 40 0.010-slot
SAMPLING METHOD	HSA Cuttings	**GRAVEL PACK TYPE**	#10/20 sand
GROUND ELEVATION (FT MSL)	4490.30	**GROUT TYPE/QUANTITY**	Hydrated Bentonite Chips
TOP OF CASING (FT MSL)	4490.05	**DEPTH TO WATER (FT BGS)**	21.09
LOGGED BY	Joe Miller	**GROUND WATER ELEVATION (FT MSL)**	4469.21
REMARKS	Replacing GW-52		

PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
0.0				0			Topsoil	1.5
					SM		Silty SAND; Fine; loose; 5YR 4/4 reddish brown; moist	5.0
9.1				5	CL		CLAY with Sand; low plasticity; fine sand; stiff; (2.5Y 7/2) light gray; dry	6.0
							Silty SAND; poorly graded fine sand; laminated in places; dense; (5YR 4/3) reddish brown; moist	
2.5				10	SM			
3.4				15	SW		Well Graded SAND with Gravel; fine to coarse sand; fine to coarse rounded to subangular gravel; loose; (5YR 4/3) reddish brown; moist	15.0
0				20	SM		Silty SAND; fine to coarse; cohesive; compact; trace gravel; (5YR 3/4) dark reddish brown; moist to wet	20.0
0				25			-Increase moisture	26.0
					SC		Clayey SAND; fine sand; medium dense; (5YR 4/6) yellowish red; wet	
				30			TD boring at 30' bgs	30.0



WHITNEY'S BORING LOG SLC VA PLUME DRAFT_051921.GPJ LAEWNN01.GDT 6/14/21

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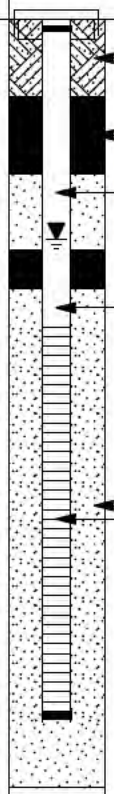
BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER	238824.6495-F3048-005.DRILL	**BORING/WELL NUMBER**	RG-08
PROJECT NAME	700 S 1600 E PCE Plume	**DATE DRILLED**	4/6/2021
LOCATION	Salt Lake City, UT	**CASING TYPE/DIAMETER**	2-inch Schedule 40 PVC
DRILLING METHOD	HSA/DPT	**SCREEN TYPE/SLOT**	2-inch Schedule 40 0.010-slot
SAMPLING METHOD	DPT Core	**GRAVEL PACK TYPE**	#10/20 sand
GROUND ELEVATION (FT MSL)	4455.17	**GROUT TYPE/QUANTITY**	Hydrated Bentonite Chips
TOP OF CASING (FT MSL)	4454.74	**DEPTH TO WATER (FT BGS)**	5.72
LOGGED BY	Joe Miller	**GROUND WATER ELEVATION (FT MSL)**	4449.45
REMARKS	Replacing GW-53		

PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
0.0							Concrete	1.0
					CL		Gravelly CLAY; cohesive; low plasticity; fine gravel; (2.5YR 6/2) light brownish gray; moist	2.0
					SM		Silty SAND; poorly graded fine to coarse sand; medium dense; (2.5YR 6/2) light brownish gray; moist	3.0
					GP		Sandy GRAVEL with SILT; poorly graded, fine to coarse rounded to subrounded gravel; dense; (10YR 6/2) light brownish gray with orange/yellow mottling; moist	5.0
0.0				5	ML		Clayey SILT; slightly cohesive; trace fine gravel; stiff; (10YR 6/4) light yellowish brown; moist to wet	7.0
					SM		Silty SAND; poorly graded fine sand; cohesive; dense; (7.5YR 5/4) brown; wet -saturated	
0.0				10				12.0
					GP		Poorly graded GRAVEL; fine to coarse gravel; fine sand; loose; (7.5YR 5/4) brown; wet	13.0
					ML		SILT; shoesive; stiff; (7.5YR 5/4) brown; moist	15.0
0.0				15	GM		Silty GRAVEL with Sand; fine to coarse angular to rounded gravel; fine sand; cohesive; medium dense; (5YR 6/4) light reddish brown; wet	18.5
					ML		Clayey SILT; cohesive; firm; (5YR 4/4) reddish brown; moist	19.0
				20	ML		Gravelly SILT; cohesive; fine gravel; firm; (5YR 4/4) reddish brown; moist TD boring at 20' bgs	20.0



Flush-mounted vault (6-inch).
Hydrated bentonite chips (2 to 4 ft bgs).
Soil Vapor Probe
2-inch SCH 40 PVC blank.
#10/20 sand filter pack (7 to 20 ft bgs).
2-inch SCH 40 PVC 0.010-slot screen well (8 to 18 ft bgs).

WHITNEY'S BORING LOG SLC VA PLUME DRAFT_051921.GPJ LAEWNN01.GDT 6/14/21

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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER	238824.6495-F3048-005.DRILL	**BORING/WELL NUMBER**	RG-09
PROJECT NAME	700 S 1600 E PCE Plume	**DATE DRILLED**	4/1/2021
LOCATION	Salt Lake City, UT	**CASING TYPE/DIAMETER**	2-inch Schedule 40 PVC
DRILLING METHOD	HSA	**SCREEN TYPE/SLOT**	2-inch Schedule 40 0.010-slot
SAMPLING METHOD	HSA Cuttings	**GRAVEL PACK TYPE**	#10/20 sand
GROUND ELEVATION (FT MSL)	4385.39	**GROUT TYPE/QUANTITY**	Hydrated Bentonite Chips
TOP OF CASING (FT MSL)	4384.93	**DEPTH TO WATER (FT BGS)**	5.21
LOGGED BY	Joe Miller	**GROUND WATER ELEVATION (FT MSL)**	4380.18
REMARKS	Replacing GW-59		

PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
7.1							Topsoil	0.5	Flush-mounted vault (6-inch).
							Silty CLAY; trace gravel; low plasticity; (2.5Y 5/3) light olive brown; moist		Hydrated bentonite chips (1.5 to 3.5 ft bgs).
					ML				
6.5				5					
								7.0	
							Sandy SILT; fine sand; stiff; (10YR 4/3) brown; wet		
									#10/20 sand filter pack (3.5 to 15 ft bgs). 2-inch SCH 40 PVC 0.010-slot screen well (5 to 15 ft bgs).
5.3				10					
					ML		-increase sand		
								15.0	
				15			TD boring at 15' bgs		

WHITNEY'S BORING LOG SLC VA PLUME DRAFT_051921.GPJ LAEWNN01.GDT 6/14/21

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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER	238824.6495-F3048-005.DRILL	**BORING/WELL NUMBER**	RG-10
PROJECT NAME	700 S 1600 E PCE Plume	**DATE DRILLED**	4/7/2021
LOCATION	Salt Lake City, UT	**CASING TYPE/DIAMETER**	2-inch Schedule 40 PVC
DRILLING METHOD	HSA/DPT	**SCREEN TYPE/SLOT**	2-inch Schedule 40 0.010-slot
SAMPLING METHOD	DPT Core	**GRAVEL PACK TYPE**	#10/20 sand
GROUND ELEVATION (FT MSL)	4410.37	**GROUT TYPE/QUANTITY**	Hydrated Bentonite Chips
TOP OF CASING (FT MSL)	4409.82	**DEPTH TO WATER (FT BGS)**	26.95
LOGGED BY	Joe Miller	**GROUND WATER ELEVATION (FT MSL)**	4383.42
REMARKS	Replacing GW-61		

PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
0.2							Topsoil	1.0
0.0					GM		Silty GRAVEL; fine to coarse gravel; dense; (2.5Y 5/4) light olive brown; moist	2.5
							SILT; cohesive; firm; (2.5Y 3/3) dark olive brown; moist	
0.1				5	ML			
								7.5
					ML		Sandy SILT; cohesive; firm; fine sand; (2.5Y 13/1) very dark gray; moist	
				10				10.0
0.3					SM		Silty SAND; poorly graded fine to coarse sand; dense; (7.5YR 4/4) brown; moist	12.0
					GM		Silty GRAVEL with Sand; fine to coarse rounded to subangular gravel; fine to coarse sand; dense; (7.5YR 3/3) dark brown; moist	14.0
				15			Poorly graded SAND; fine to coarse sand; fine gravel; compact; (7.5YR 4/3) brown; moist	
0.1					SP		- moist to wet (not saturated)	18.0
							Poorly graded GRAVEL with Silt and Sand; fine to coarse gravel; fine sand; dense; (7.5YR 4/3) brown; moist	
0.0				20	GP			22.5
					CL		Sandy CLAY; fine sand; cohesive; (7.5YR 4/3) brown; moist	
							-trace fine rounded gravel	24.0
					SP		Poorly graded SAND; fine to medium sand; dense; (10YR 4/6) dark yellowish brown; wet	25.0
0.0				25	GP		Poorly graded GRAVEL; fine to coarse angular to subrounded gravel; dense; moist	
							-becomes wet; increase sand	28.0
					GP		Poorly graded GRAVEL with Sand; fine to coarse rounded to subrounded gravel; coarse sand; dense; (10YR 4/6) dark yellowish brown; wet	29.0
					ML			30.0
				30			SILT; cohesive; firm; dark gray to light gray mottled; moist	
							TD boring at 30' bgs	

WELL DIAGRAM

WHITNEY'S BORING LOG SLC VA PLUME DRAFT_051921.GPJ LAEWNN01.GDT 6/14/21

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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER	238824.6495-F3048-005.DRILL	**BORING/WELL NUMBER**	RG-11
PROJECT NAME	700 S 1600 E PCE Plume	**DATE DRILLED**	4/7/2021
LOCATION	Salt Lake City, UT	**CASING TYPE/DIAMETER**	2-inch Schedule 40 PVC
DRILLING METHOD	HSA/DPT	**SCREEN TYPE/SLOT**	2-inch Schedule 40 0.010-slot
SAMPLING METHOD	DPT Core	**GRAVEL PACK TYPE**	#10/20 sand
GROUND ELEVATION (FT MSL)	4504.70	**GROUT TYPE/QUANTITY**	Hydrated Bentonite Chips
TOP OF CASING (FT MSL)	4504.39	**DEPTH TO WATER (FT BGS)**	29.09
LOGGED BY	Joe Miller	**GROUND WATER ELEVATION (FT MSL)**	4475.61
REMARKS			

PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
0.4							Asphalt	0.5
					ML		Sandy SILT; trace fine gravel; firm; (7.5YR 5/3) brown; moist	3.0
0.3				5	SM		Silty SAND; fine to medium sand; compact; (10YR 4/4) dark yellowish brown; moist	
0							-increase moisture -quartzite cobble from 8-9'	
0				10	SC		Clayey SAND; fine to coarse sand; slightly cohesive; (5YR 4/4) reddish brown; moist	10.0 11.5
0					SP		Poorly graded SAND with Gravel; fine to coarse sand; fine to coarse subangular to subangular gravel; (2.5YR 5/3) reddish brown; moist -Cobble	
0				15				17.0
					CL		Lean CLAY; trace fine sand; cohesive; soft; moist to wet	18.0
					SC		Clayey SAND; fine to coarse sand; trace fine gravel; compact; cohesive; moist to wet	
0				20	GP		Poorly graded GRAVEL; fine to coarse gravel; fine to coarse sand; cemented in places; very dense; dry to moist	20.5
0				25				26.0
0					CL		Lean CLAY; low to medium plasticity; trace fine gravel; cohesive; hard; (10YR 5/4) yellowish brown; moist	29.0
0				30	ML		SILT with Sand; cohesive; firm; (10YR 5/4) yellowish brown; moist to wet	
0					SM		Silty SAND; fine to coarse sand; trace fine gravel; medium dense; (7.5YR 5/6) strong brown; moist to wet	33.5 35.0
				35			*Continued Next Page*	

WELL DIAGRAM

- Flush-mounted vault (6-inch).
- Hydrated bentonite chips (2 to 4 ft bgs).
- Soil Vapor Probe
- 2-inch SCH 40 PVC blank.
- Hydrated bentonite chips (7 to 28 ft bgs).
- #10/20 sand filter pack (18 to

WHITNEY'S BORING LOG SLC VA PLUME DRAFT_051921.GPJ LAEWNN01.GDT 6/14/21

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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 238824.6495-F3048-005.DRILL **BORING/WELL NUMBER** RG-11
PROJECT NAME 700 S 1600 E PCE Plume **DATE DRILLED** 4/7/2021

Continued from Previous Page

PID (ppm)	Magnetic Susceptibility	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
0					GM		Silty GRAVEL; fine to coarse subrounded to subangular gravel; cemented in places; dense; moist to wet -becomes saturated		30 ft bgs). 2-inch SCH 40 PVC 0.010-slot screen well (30 to 40 ft bgs).
				40			TD boring at 40' bgs	40.0	

Appendix G

Soil Core/Cuttings Photolog

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No.	Date:
1	4/5/21

Location:

RG-01

Description:

0-5'

Photo No.	Date:
2	4/5/21

Location:

RG-01

Description:

5-10'

Photo No.	Date:
3	4/5/21

Location:

RG-01

Description:

10-15'

CDM Smith **PHOTOGRAPHIC LOG**	**Site:** 700 South 1600 East PCE Plume	**Project No.** 238824

Photo No.	**Date:**
4	4/5/21

Location:

RG-01

Description:

15-20’

CDM Smith **PHOTOGRAPHIC LOG**	**Site:** 700 South 1600 East PCE Plume	**Project No.** 238824

Photo No. **1**	**Date:** 4/2/21

Location:

RG-02

Description:

0-5’

Photo No. **2**	**Date:** 4/2/21

Location:

RG-02

Description:

5-10’

Photo No. 3	Date: 4/2/21
Location: RG-02	
Description: 10-15’	

CDM Smith PHOTOGRAPHIC LOG	Site: 700 South 1600 East PCE Plume	Project No. 238824

Photo No. 1	Date: 4/2/21

Location:

RG-03

Description:

0-5’

Photo No. 2	Date: 4/2/21

Location:

RG-03

Description:

5-8’

CDM Smith **PHOTOGRAPHIC LOG**	**Site:** 700 South 1600 East PCE Plume	**Project No.** 238824

Photo No. **1**	**Date:** 4/5/21

Location:

RG-04

Description:

Hollow-stem auger cuttings
0-5'

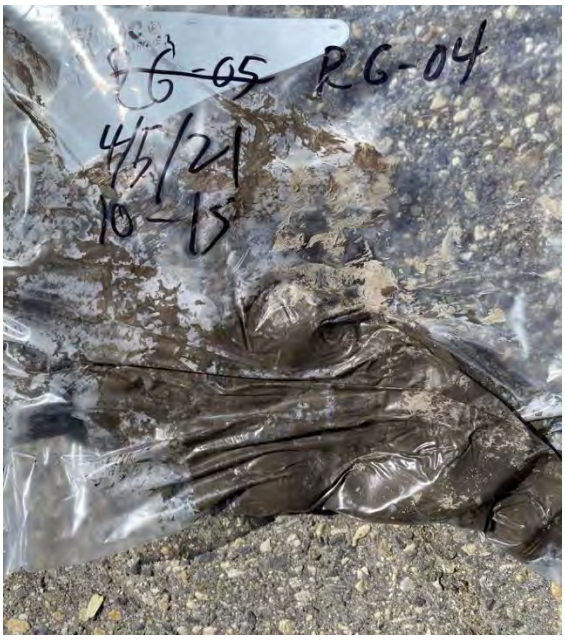
Photo No. **2**	**Date:** 4/5/21

Location:

RG-04

Description:

Hollow-stem auger cuttings
5-10'

Photo No. 3	Date: 4/5/21	
Location: RG-04		
Description: Hollow-stem auger cuttings 10-15’		

CDM Smith **PHOTOGRAPHIC LOG**	**Site:** 700 South 1600 East PCE Plume	**Project No.** 238824

Photo No. 4	Date: 4/5/21	
Location: RG-04		
Description: Hollow-stem auger cuttings 15-20’		

CDM Smith **PHOTOGRAPHIC LOG**

Site:	Project No.
700 South 1600 East PCE Plume	238824

Photo No.	Date:
1	4/3/21

Location:

RG-05

Description:

0-5'

Photo No.	Date:
2	4/3/21

Location:

RG-05

Description:

3'

Photo No.	Date:
3	4/3/21

Location:

RG-05

Description:

5-10'

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No.	Date:
4	4/3/21

Location:

RG-05

Description:

10-15'

Photo No.	Date:
5	4/3/21

Location:

RG-05

Description:

15-20'

Photo No.	Date:
6	4/3/21

Location:

RG-05

Description:

20-25'

CDM Smith **PHOTOGRAPHIC LOG**	**Site:** 700 South 1600 East PCE Plume	**Project No.** 238824

Photo No.	**Date:**
7	4/3/21

Location:

RG-05

Description:

25-30’

CDM Smith **PHOTOGRAPHIC LOG**	**Site:** 700 South 1600 East PCE Plume	**Project No.** 238824

Photo No. **1**	**Date:** 4/5/21
Location: RG-06	
Description: 0-5’ NO PHOTO	

Photo No. **2**	**Date:** 4/5/21
Location: RG-06	
Description: 5-10’ NO PHOTO	

CDM Smith PHOTOGRAPHIC LOG	Site: 700 South 1600 East PCE Plume	Project No. 238824

Photo No. 1	Date: 4/2/21
Location: RG-07	
Description: 0-5’ NO PHOTO	

Photo No. 2	Date: 4/2/21
Location: RG-07	
Description: 5-10’	

Photo No. 3	Date: 4/2/21
Location: RG-07	
Description: 10-20’ NO PHOTO	

CDM Smith PHOTOGRAPHIC LOG	Site: 700 South 1600 East PCE Plume	Project No. 238824

Photo No. 4	Date: 4/5/21
Location: RG-01	
Description: 20-25'	

Photo No. 5	Date: 4/5/21
Location: RG-01	
Description: 25-30'	

CDM Smith **PHOTOGRAPHIC LOG**	**Site:** 700 South 1600 East PCE Plume	**Project No.** 238824

Photo No. **1**	**Date:** 4/6/21
Location: RG-08	
Description: 0-5’	

Photo No. **2**	**Date:** 4/6/21
Location: RG-08	
Description: 5-10’	

Photo No. **3**	**Date:** 4/6/21
Location: RG-08	
Description: 10-15’	

CDM Smith **PHOTOGRAPHIC LOG**	**Site:** 700 South 1600 East PCE Plume	**Project No.** 238824

Photo No. **4**	**Date:** 4/6/21
Location: RG-08	
Description: 15-20’	

CDM Smith **PHOTOGRAPHIC LOG**	**Site:** 700 South 1600 East PCE Plume	**Project No.** 238824

Photo No. **1**	**Date:** 4/1/21
Location: RG-09	
Description: 0-5’	

Photo No. **2**	**Date:** 4/1/21
Location: RG-09	
Description: 5-10’	

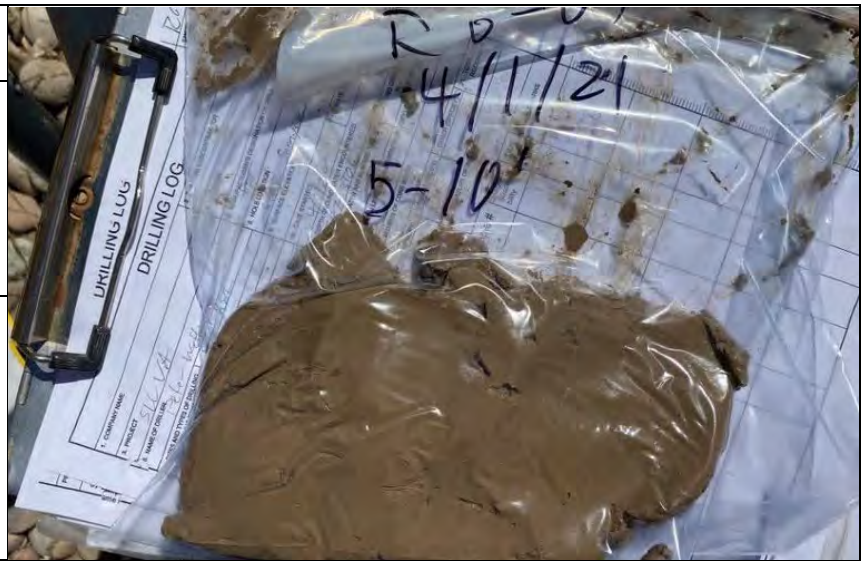


Photo No. **3**	**Date:** 4/1/21
Location: RG-09	
Description: 10-15’	

CDM Smith PHOTOGRAPHIC LOG	Site: 700 South 1600 East PCE Plume	Project No. 238824

Photo No. 1	Date: 4/7/21
Location: RG-10	
Description: 0-5’	

Photo No. 2	Date: 4/7/21
Location: RG-10	
Description: 5-10’	

Photo No. 3	Date: 4/7/21
Location: RG-10	
Description: 10-15’ NO PHOTO – Core visible in Photo 4	

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No.	Date:
4	4/7/21

Location:

RG-10

Description:

15-20'

Photo No.	Date:
5	4/7/21

Location:

RG-10

Description:

20-25'

Photo No.	Date:
6	4/7/21

Location:

RG-10

Description:

25-30'

CDM Smith **PHOTOGRAPHIC LOG**

Site:	Project No.
700 South 1600 East PCE Plume	238824

Photo No.	Date:
1	4/7/21

Location:

RG-11

Description:

0-5'

Photo No.	Date:
2	4/7/21

Location:

RG-11

Description:

5-10'

Photo No.	Date:
3	4/7/21

Location:

RG-11

Description:

10-15'

CDM Smith **PHOTOGRAPHIC LOG**

Site: 700 South 1600 East PCE Plume

Project No. 238824

Photo No.	Date:
4	4/7/21

Location:

RG-11

Description:

15-20'

Photo No.	Date:
5	4/7/21

Location:

RG-11

Description:

20-25'

Photo No.	Date:
6	4/7/21

Location:

RG-11

Description:

25-30'

CDM Smith **PHOTOGRAPHIC LOG**

Site:	Project No.
700 South 1600 East PCE Plume	238824

Photo No.	Date:
7	4/7/21

Location:

RG-11

Description:

30-33'

Photo No.	Date:
8	4/7/21

Location:

RG-11

Description:

33-37.5'

Photo No.	Date:
9	4/7/21

Location:

RG-11

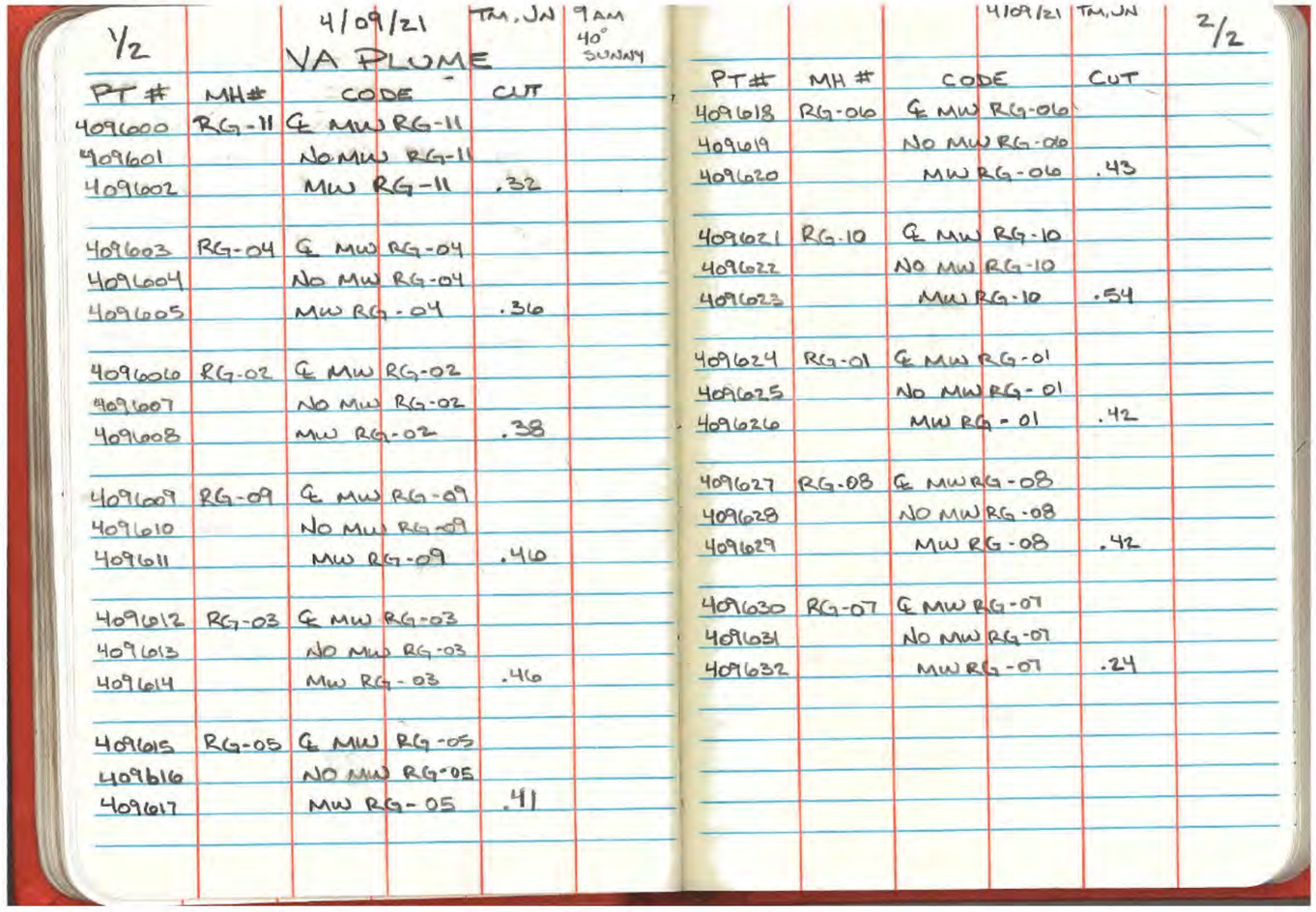
Description:

37-40'

Appendix H

Survey Data

409600	7443236.76	1541982.64	4504.70	CL MW RG-11
409601	7443237.11	1541982.63	4504.71	NO MW RG-11
409602	7443236.69	1541982.6	4504.39	MW RG-11
409603	7443062.83	1540830.39	4415.83	CL MW RG-04
409604	7443063.16	1540830.36	4415.84	NO MW RG-04
409605	7443062.99	1540830.47	4415.47	MW RG-04
409606	7442286.89	1541270.19	4437.32	CL MW RG-02
409607	7442287.26	1541270.26	4437.32	NO MW RG-02
409608	7442287.01	1541270.21	4436.95	MW RG-02
409609	7442423.54	1540835.33	4385.39	CL MW RG-09
409610	7442423.86	1540835.33	4385.41	NO MW RG-09
409611	7442423.59	1540835.35	4384.93	MW RG-09
409612	7442479.61	1541107.48	4422.98	CL MW RG-03
409613	7442479.95	1541107.51	4423.00	NO MW RG-03
409614	7442479.64	1541107.49	4422.53	MW RG-03
409615	7442805.72	1541851.88	4497.38	CL MW RG-05
409616	7442806.05	1541851.88	4497.36	NO MW RG-05
409617	7442805.83	1541851.86	4496.96	MW RG-05
409618	7441534.16	1541771.71	4443.66	CL MW RG-06
409619	7441534.39	1541771.95	4443.67	NO MW RG-06
409620	7441534.2	1541771.85	4443.23	MW RG-06
409621	7441296.08	1541395.71	4410.37	CL MW RG-10
409622	7441296.43	1541395.65	4410.36	NO MW RG-10
409623	7441296.35	1541395.71	4409.82	MW RG-10
409624	7442006.7	1540924.03	4383.92	CL MW RG-01
409625	7442007.03	1540923.96	4383.90	NO MW RG-01
409626	7442006.8	1540924.02	4383.49	MW RG-01
409627	7442038.61	1541519.86	4455.17	CL MW RG-08
409628	7442038.97	1541519.85	4455.16	NO MW RG-08
409629	7442038.77	1541519.82	4454.74	MW RG-08
409630	7442021	1541979.13	4490.30	CL MW RG-07
409631	7442021.31	1541979.12	4490.30	NO MW RG-07
409632	7442021.04	1541979.12	4490.05	MW RG-07



1/2

4/09/21 TM, JN 9AM 40° SUNNY

VA PLUME

PT #	MH#	CODE	CUT
4091600	RG-11	& MW RG-11	
4091601		NO MW RG-11	
4091602		MW RG-11	.32
4091603	RG-04	& MW RG-04	
4091604		NO MW RG-04	
4091605		MW RG-04	.36
4091606	RG-02	& MW RG-02	
4091607		NO MW RG-02	
4091608		MW RG-02	.38
4091609	RG-09	& MW RG-09	
4091610		NO MW RG-09	
4091611		MW RG-09	.46
4091612	RG-03	& MW RG-03	
4091613		NO MW RG-03	
4091614		MW RG-03	.46
4091615	RG-05	& MW RG-05	
4091616		NO MW RG-05	
4091617		MW RG-05	.41

4/09/21 TM, JN 2/2

PT#	MH #	CODE	CUT
4091618	RG-06	& MW RG-06	
4091619		NO MW RG-06	
4091620		MW RG-06	.43
4091621	RG-10	& MW RG-10	
4091622		NO MW RG-10	
4091623		MW RG-10	.54
4091624	RG-01	& MW RG-01	
4091625		NO MW RG-01	
4091626		MW RG-01	.42
4091627	RG-08	& MW RG-08	
4091628		NO MW RG-08	
4091629		MW RG-08	.42
4091630	RG-07	& MW RG-07	
4091631		NO MW RG-07	
4091632		MW RG-07	.24

Appendix I

Investigation-Derived Waste Manifest

AMERICAN LABEL MARK CO. – CHICAGO, IL 60648 239592-DO

NON-HAZARDOUS WASTE MANIFEST

Please print or type. (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.: UTD 981 548 985

Manifest Document No.: 21044

2. Page 1 of 1

3. Generator's Name and Mailing Address: VETERANS HEALTH ADMINISTRATION
CERCLA PROGRAM, 500 FOOTHILL DR., MAIL CODE 138
BUILDING 6, CERCLA PROGRAM, ATTN: S. FAIRCLOUGH
SALT LAKE CITY, UT 84148

4. Generator's Phone: (385) 272-4672

5. Transporter 1 Company Name: MP ENVIRONMENTAL SERVICES

6. US EPA ID Number: CAT 000 624 247

7. Transporter 2 Company Name:

8. US EPA ID Number:

9. Designated Facility Name and Site Address: WASATCH REGIONAL LANDFILL
8833 NORTH RAWLEY RD,
SKULL VALLEY, UT 84029

10. US EPA ID Number:

A. State Transporter's ID:

B. Transporter 1 Phone: 435-884-0808

C. State Transporter's ID:

D. Transporter 2 Phone:

E. State Facility's ID:

F. Facility's Phone: 801-924-8450

11. WASTE DESCRIPTION	12. Containers No.	Type	13. Total Quantity	14. Unit Wt./Vol.
a. NONHAZARDOUS, NON REGULATED (SOIL CUTTINGS FROM DRILLING MONITORING WELLS)		DM	20	P
b.				
c.				
d.				

GENERATOR

G. Additional Descriptions for Materials Listed Above: APPROVAL # 4186205538

H. Handling Codes for Wastes Listed Above:

15. Special Handling Instructions and Additional Information:

16. GENERATOR'S CERTIFICATION: I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name: W. Wynn John — Signature: W. Wynn John — Date: Month 06 Day 12 Year 2021

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: Paris Irvin — Signature: P — Date: Month 06 Day 12 Year 2021

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name: — Signature: — Date: Month Day Year

FACILITY

19. Discrepancy Indication Space:

20. Facility Owner or Operator: Certification of receipt of the waste materials covered by this manifest, except as noted in item 19.

Printed/Typed Name: — Signature: — Date: Month Day Year

5-14 © 2013 LABEL MASTER

Special Waste Profile

REPUBLIC SERVICES

Disposal Facility: 4186 Wasatch Regional Landfill, Inc. UT

Waste Profile #:

Sales Rep #:

I. Generator Information

Generator Name: VETERANS HEALTH ADMINISTRATION CERCLA Program

Generator Site Address: 500 FOOTHILL DRIVE Mail Code 138 Building 6 CERCLA Program

City: SALT LAKE CITY County: SALT LAKE State: Utah Zip: 84148

State ID/Reg No: State Approval/Waste Code: NAICS #:

Generator Mailing Address ☐ (if different) SAME

City: County: State: --Select State-- Zip:

Generator Contact Name: SUSANNE FAIRCLOUGH Email: Susanne.fairclough@va.gov

Phone Number: 385-272-4672 Ext: Fax Number:

II. Billing Information

Bill To: SEACOAST ENVIRONMENTAL SVCS, II Contact Name: EUGENE R. STREITER

Billing Address: 37 LONDONBERRY DRIVE Email: streiterseacoast@gmail.com

City: HOLMDEL State: --Select State-- Zip: 07733 Phone: 732-275-1616

III. Waste Stream Information

Name of Waste: SOIL CUTTINGS from drilling Monitoring Wells

Process Generating Waste: Waste soil generated from installation of boring and monitoring wells at area contaminated with chlorinated solvents. Waste is not a listed waste. Source is undetermined.

Type of Waste: --Select Waste Type-- Physical State: --Select Physical Stat Method of Shipment: --Select Shipment Metho

Estimated Volume: 120 Volume Type: Cubic Yards

Frequency: On-going Waste Stream Disposal Consideration: Landfill

IV. Representative Sample Certification

☐ **No Sample Taken**

☑ **Sample Taken** **Type of Sample** Composite Sample

Is the representative sample collected to prepare this profile and laboratory analysis, collected in accordance with U.S. EPA 40 CFR 261.20(c) guidelines or equivalent? ☑ **Yes** ☐ **No**

Sample Date: 3/26/20

Sample ID Numbers or SDS: IDW02-SB032620

Remember to attach Laboratory Analytical Report (and/or Material Safety Data Sheet) including Chain of Custody and required parameters provided for this profile.

Special Waste Profile

REPUBLIC SERVICES

V. Physical Characteristics of Waste

Characteristic Components (must equal 100%:)	% By Weight (out of 100% - ranges acceptable):
1. SOIL	95% - 100
2. Debris (plastic, concrete, asphalt)	0% - 5%
3.	
4.	
5.	

Color:	Odor (describe):	Does Waste Contain Free Liquids?	% Solids:	pH:	Flash Point:
BROWN	NONE	☐ Yes ☑ No	100	NA	>200 °F

Attach Laboratory Analytical Report (and/or Material Safety Data Sheet) including Chain of Custody and required parameters provided for this profile.

RCRA Regulatory Questions

1. Does this waste or generating process contain regulated concentrations of the following Pesticides and/ or Herbicides: Chlordane, Endrin, Heptachlor (and its epoxides), Lindane, Methoxychlor, Toxaphene, 2,4-D, or 2,4,5-TP Silvex as defined in 40 CFR 261.33? ☐ Yes ☑ No
2. Does this waste contain reactive sulfides (greater than 500 ppm) or reactive cyanide (greater than 250 ppm) [reference 40 CFR 261.23(a)(5)]? ☐ Yes ☑ No
3. Does this waste contain regulated concentrations of Polychlorinated Biphenyls (PCBs) as defined in 40 CFR Part 761? ☐ Yes ☑ No
4. Does this waste contain concentrations of listed hazardous wastes defined in 40 CFR 261.31, 261.32, 261.33, including RCRA F-Listed Solvents? ☐ Yes ☑ No
5. Has this waste been delisted under 40 CFR 260.20 and 260.22? If yes, attach the final decision to delist the waste as published in the Federal Register. ☐ Yes ☑ No
6. Does this waste exhibit a Hazardous Characteristic as defined by Federal and/or State regulations? If Yes, identify the applicable waste code and specify if the waste is hazardous as defined by Federal, State or both? ☐ Yes ☑ No

   [ ]
7. Does this waste contain regulated concentrations of 2,3,7,8-Tetrachlorodibenzodioxin (2,3,7,8-TCCD), or any other dioxin as defined in 40 CFR 261.31? ☐ Yes ☑ No
8. Is this a regulated Medical or Infectious Waste as defined by Federal and/or State regulations? ☐ Yes ☑ No
9. Is this a regulated Radioactive Waste as defined by Federal and/or State regulations? ☐ Yes ☑ No
10. Is this a solid waste that is not a hazardous waste in accordance with 40 CFR 261.4(b)? If yes, please provide the corresponding regulatory citation. ☐ Yes ☑ No

    [ ]

Republic Services Waste Handling Questions

1. Does this waste generate heat or react when contacted with water/moisture? ☐ Yes ☑ No
2. Does the waste contain sulfur or sulfur by-products? ☐ Yes ☑ No
3. Is this waste generated at a State or Federal Superfund cleanup site subject to regulation under CERCLA? ☑ Yes ☐ No

4a. Is this waste from a TSD facility, TSD-like facility or consolidator (i.e. multiple wastes/multiple generators)? ☐ Yes ☑ No

4b. If yes to the above question, please provide clarification.

[ ]

Special Waste Profile

REPUBLIC SERVICES

VI. Certification

I hereby certify that to the best of my knowledge and belief, the information contained herein is a true, complete and accurate description of the waste material being offered for disposal and all known or suspected hazards have been disclosed. All Analytical Results/Material Safety Data Sheets submitted are truthful and complete and are representative of the waste.

I further certify that by utilizing this profile, neither myself nor any other employee of the company will deliver for disposal or attempt to deliver for disposal any waste which is classified as toxic waste, hazardous waste or infectious waste, or any other waste material this facility is prohibited from accepting by law. I shall immediately give written notice of any change or condition pertaining to the waste not provided herein. Our company hereby agrees to fully indemnify this disposal facility against any damages resulting from this certification being inaccurate or untrue.

I understand that attaching an electronic signature, I am signing this document, consent to complete this transaction and receive all related communication electronically, and agree this document will be binding as though I had physically signed it. A printout of this document may be accepted with the same authority as the original.

If electronic signature is preferred, please submit completed (unsigned) form to your Special Waste Coordinator or Special Waste Sales Executive to initiate signature process.

I further certify that the company has not altered the form or content of this profile sheet as provided by Republic Services.

Susanne M Fairclough	VA CERCLA Contracts Manager	Veterans Health Administration CERCLA Program
Authorized Representative Name (Printed)	Title (Printed)	Company Name
Susanne M Fairclough	040820	
Representative Signature		Date

Special Waste Profile

REPUBLIC SERVICES

Disposal Facility: 4186 Wasatch Regional Landfill, Inc. UT

Waste Profile #:

Sales Rep #:

I. Generator Information

Generator Name: VETERANS HEALTH ADMINISTRATION CERCLA Program

Generator Site Address: 500 FOOTHILL DRIVE Mail Code 138 Buidling 6 CERCLA Program

City: SALT LAKE CITY County: SALT LAKE State: --Select State-- Zip: 84148

State ID/Reg No: State Approval/Waste Code: NAICS #:

Generator Mailing Address ☐ (if different) SAME

City: County: State: --Select State-- Zip:

Generator Contact Name: SUSANNE FAIRCLOUGH Email: Susanne.fairclough@va.gov

Phone Number: 385-272-4672 Ext: Fax Number:

II. Billing Information

Bill To: SEACOAST ENVIRONMENTAL SVCS, II Contact Name: EUGENE R. STREITER

Billing Address: 37 LONDONBERRY DRIVE Email: streiterseacoast@gmail.com

City: HOLMDEL State: New Jersey Zip: 07733 Phone: 732-275-1616

III. Waste Stream Information

Name of Waste: GROUNDWATER from drilling Monitoring Well

Process Generating Waste: Waste water generated from installation of boring and monitoring wells at area contaminated with chlorinated solvents. Waste is not a listed waste. Source is undetermined.

Type of Waste: --Select Waste Type-- Physical State: --Select Physical Stat Method of Shipment: --Select Shipment Meth

Estimated Volume: 15000-20000 Volume Type: Gallons

Frequency: On-going Waste Stream Disposal Consideration: Landfill

IV. Representative Sample Certification

☐ **No Sample Taken**

☑ **Sample Taken** **Type of Sample** Grab Sample

Is the representative sample collected to prepare this profile and laboratory analysis, collected in accordance with U.S. EPA 40 CFR 261.20(c) guidelines or equivalent? ☑ **Yes** ☐ **No**

Sample Date: 3/24/2020

Sample ID Numbers or SDS: IDW01-GW032420

Remember to attach Laboratory Analytical Report (and/or Material Safety Data Sheet) including Chain of Custody and required parameters provided for this profile.

Special Waste Profile

REPUBLIC SERVICES

V. Physical Characteristics of Waste

Characteristic Components (must equal 100%:)	% By Weight (out of 100% - ranges acceptable):
1. water	95% - 100%
2. sediment (silt)	0% - 5%
3.	
4.	
5.	

Color:	Odor (describe):	Does Waste Contain Free Liquids?	% Solids:	pH:	Flash Point:
Clear/Brown	none	☑ Yes ☐ No	<5%	~7	>200 °F

Attach Laboratory Analytical Report (and/or Material Safety Data Sheet) including Chain of Custody and required parameters provided for this profile.

RCRA Regulatory Questions

1. Does this waste or generating process contain regulated concentrations of the following Pesticides and/ or Herbicides: Chlordane, Endrin, Heptachlor (and its epoxides), Lindane, Methoxychlor, Toxaphene, 2,4-D, or 2,4,5-TP Silvex as defined in 40 CFR 261.33? ☐ Yes ☑ No
2. Does this waste contain reactive sulfides (greater than 500 ppm) or reactive cyanide (greater than 250 ppm) [reference 40 CFR 261.23(a)(5)]? ☐ Yes ☑ No
3. Does this waste contain regulated concentrations of Polychlorinated Biphenyls (PCBs) as defined in 40 CFR Part 761? ☐ Yes ☑ No
4. Does this waste contain concentrations of listed hazardous wastes defined in 40 CFR 261.31, 261.32, 261.33, including RCRA F-Listed Solvents? ☐ Yes ☑ No
5. Has this waste been delisted under 40 CFR 260.20 and 260.22? If yes, attach the final decision to delist the waste as published in the Federal Register. ☐ Yes ☑ No
6. Does this waste exhibit a Hazardous Characteristic as defined by Federal and/or State regulations? If Yes, identify the applicable waste code and specify if the waste is hazardous as defined by Federal, State or both? ☐ Yes ☑ No
7. Does this waste contain regulated concentrations of 2,3,7,8-Tetrachlorodibenzodioxin (2,3,7,8-TCCD), or any other dioxin as defined in 40 CFR 261.31? ☐ Yes ☑ No
8. Is this a regulated Medical or Infectious Waste as defined by Federal and/or State regulations? ☐ Yes ☑ No
9. Is this a regulated Radioactive Waste as defined by Federal and/or State regulations? ☐ Yes ☑ No
10. Is this a solid waste that is not a hazardous waste in accordance with 40 CFR 261.4(b)? If yes, please provide the corresponding regulatory citation. ☐ Yes ☑ No

Republic Services Waste Handling Questions

1. Does this waste generate heat or react when contacted with water/moisture? ☐ Yes ☑ No
2. Does the waste contain sulfur or sulfur by-products? ☐ Yes ☑ No
3. Is this waste generated at a State or Federal Superfund cleanup site subject to regulation under CERCLA? ☑ Yes ☐ No

4a. Is this waste from a TSD facility, TSD-like facility or consolidator (i.e. multiple wastes/multiple generators)? ☐ Yes ☑ No

4b. If yes to the above question, please provide clarification.

Special Waste Profile

REPUBLIC SERVICES

VI. Certification

I hereby certify that to the best of my knowledge and belief, the information contained herein is a true, complete and accurate description of the waste material being offered for disposal and all known or suspected hazards have been disclosed. All Analytical Results/Material Safety Data Sheets submitted are truthful and complete and are representative of the waste.

I further certify that by utilizing this profile, neither myself nor any other employee of the company will deliver for disposal or attempt to deliver for disposal any waste which is classified as toxic waste, hazardous waste or infectious waste, or any other waste material this facility is prohibited from accepting by law. I shall immediately give written notice of any change or condition pertaining to the waste not provided herein. Our company hereby agrees to fully indemnify this disposal facility against any damages resulting from this certification being inaccurate or untrue.

I understand that attaching an electronic signature, I am signing this document, consent to complete this transaction and receive all related communication electronically, and agree this document will be binding as though I had physically signed it. A printout of this document may be accepted with the same authority as the original.

If electronic signature is preferred, please submit completed (unsigned) form to your Special Waste Coordinator or Special Waste Sales Executive to initiate signature process.

I further certify that the company has not altered the form or content of this profile sheet as provided by Republic Services.

Susanne M Fairclough	VA CERCLA Contracts Manager	Veterans Administration CERCLA Program
Authorized Representative Name (Printed)	Title (Printed)	Company Name
Susanne M Fairclough		04/08/2020
Representative Signature		Date

Appendix J

Quality Control Summary Report

Quality Control Summary Report

East Side Springs Investigation

Operable Unit 1 Remedial Investigation
700 South 1600 East PCE Plume,
Salt Lake City, Utah

June 2021

CDM Smith

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Attachments

Attachment 1 Data Validation Reports
Attachment 2 Data Package Completeness Review Checklists
Attachment 3 Analytical Data Packages

Acronyms

%	percent
%D	percent difference
%R	percent recovery
CDM Smith	CDM Federal Programs Corporation
COC	chain-of-custody
DQI	data quality indicator
DQO	data quality objective
DSR	data summary report
EPA	U.S. Environmental Protection Agency
ICP	inductively coupled plasma
ICP-MS	inductively coupled plasma mass spectrometry
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
EMAX	EMAX Laboratories, Inc.
Eurofins	Eurofins Air Toxics Laboratory
MDL	method detection limit
MRL	method reporting limit
MS/MSD	matrix spike/matrix spike duplicate
PARCCS	precision, accuracy, representativeness, comparability, completeness, and sensitivity
PCE	tetrachloroethene
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
QCSR	quality control summary report
RG	residential groundwater
RPD	relative percent difference
RSD	relative standard deviation
SDG	sample delivery group
SIM	selective ion monitoring
Site	700 South 1600 East Tetrachloroethene Plume Superfund Site
SM	standard method
SOP	standard operating procedure
TOC	total organic carbon
USACE	U.S. Army Corps of Engineers
VOC	volatile organic compound

Section 1

Data Usability and Assessment Review

Under the U.S. Army Corps of Engineers (USACE), Kansas City District, Contract No. W912DQ-18-D-3008, Task Order No. W912DQ19F3048, CDM Federal Programs Corporation (CDM Smith) was directed to perform a remedial investigation for Operable Unit 1 of the 700 South 1600 East Tetrachloroethene (PCE) Plume Superfund Site (Site) in Salt Lake City, Utah. To assist in the ongoing remedial investigation at the Site, soil gas samples were collected on March 26, April 13, and April 14, 2021 and groundwater and surface water samples were collected April 13 to April 16, 2021. Aqueous samples were shipped to EMAX Laboratories, Inc. (EMAX) in Torrance, California, for analysis. Soil gas samples were shipped to Eurofins Air Toxics (Eurofins) in Folsom, California, for analysis.

The purpose of this quality control summary report (QCSR) is to summarize the data validation and determine whether the sample results meet the data quality objective (DQO) of the data usability outlined in the *Phase 2 Quality Assurance Project Plan (QAPP), Operable Unit 1, 700 South 1600 East PCE Plume, Salt Lake City, Utah,* Prepared for the U.S. Army Corps of Engineers, Kansas City District (CDM Smith 2020).

1.1 Usability Summary

Data collected and validated during this field investigation are usable as reported. Applicable data validation qualifiers were added if required. No sample results were rejected. Specific details are provided in the data validation reports summarized in Section 5 and presented in **Attachment 1** of this report.

Section 2
Quality Assurance Objectives

Quality assurance (QA) objectives for measurement data are expressed in terms of precision, accuracy, representativeness, comparability, completeness, and sensitivity (PARCCS). The PARCCS parameters characterize the quality of the data and as such are called data quality indicators (DQIs). The DQIs provide a mechanism for ongoing quality control (QC) and evaluating and measuring data quality throughout the project.

A review of the collected data is necessary to determine if data measurement objectives established in the QAPP (CDM Smith 2020) were met. In general, the following data measurement objectives were considered:

- Achievement of analytical method and reporting limit requirements
- Adherence to and achievement of appropriate laboratory analytical and field QC requirements
- Achievement of required measurement performance criteria for DQIs (the PARCCS parameters)
- Adherence to sampling and sample handling procedures
- Adherence to the sampling design and deviations documented on field change notifications, if required

The data validation review of the DQIs and other QA objectives determines if the data are of sufficient quality to support their intended use.

Section 3

Field and Laboratory Quality Assurance Activities

CDM Smith completed field sampling activities between March 26 and April 16, 2021. The following table provides a summary of the number of samples collected and the dates each sampling event occurred:

EMAX SDG* 21D206 – Surface Water – April 13 through 15, 2021
10 samples
1 field duplicate sample
3 trip blank samples
EMAX SDG 21D236 – Groundwater – April 15 through 16, 2021
11 samples
1 field duplicate sample
1 trip blank sample
Eurofins SDG 2103818 – Soil Gas – March 26, 2021
1 sample
Eurofins SDG 2103819 – Soil Gas – March 26, 2021
3 samples
Eurofins SDG 2104424 – Soil Gas – April 13 and 14, 2021
7 samples
1 field duplicate sample

*SDG – sample delivery group

For SDG 210383, only one sample in this SDG is applicable to this QCSR. The other samples are discussed in their applicable data summary report (DSR).

All samples were received intact with proper chain-of-custody (COC) documentation at EMAX and Eurofins. Sample identification was accurately documented by the laboratories.

Tables 3-1 and 3-2 present a list of the samples collected and the analyses performed. **Attachment 2** presents the completeness review checklists of the data packages. **Attachment 3** includes the analytical data packages.

Sample preparation and analyses were conducted within the method-specified holding times.

The QAPP (CDM Smith 2020) defined the procedures to be followed and the data quality requirements for the field sampling events and associated analytical work.

3.1 Deviations from Field Procedures

As discussed in the DSR, the following deviations were encountered during the sampling events:

- During residential groundwater (RG) well development, the minimum purge volume was calculated according to methods described in technical standard operating procedure (SOP) 4-3 *Well Development and Purging* which is included in Appendix A of the Phase 2 QAPP (CDM Smith 2020). Information regarding development was documented in a field logbook rather than on field forms. Several locations had low recharge, therefore many of the locations were purged dry then allowed to recharge. Since many of the locations were purged dry, parameter stabilization was not measured. After the minimum calculated purge volume was removed and the groundwater recharged, a bailer was pulled with the recharge water to visually examine the clarity. The water in the RG monitoring wells was visibly clear, and turbidity should not affect future sampling efforts or quality of the data.
- Field forms were not completed with field parameters during surface water and RG well sampling. This will not affect the quality of the data as the field parameters measured at the RG wells and surface water sample locations were included in the field notes in Appendix A and are presented in Tables 4 and 8 of the DSR for the RG wells and surface water samples, respectively. Field parameters were only collected at RG wells with sufficient water present in the HydraSleeve following filling containers for laboratory analysis.
- The hollow stem auger cuttings from RG-06 (GW-50) over-drilling and installation were not photographed for a photolog of the soil cuttings. RG-06 has a relatively shallow depth to water (2.24 feet below ground surface), therefore the hollow stem auger cuttings were mixed and saturated.

These deviations do not impact the DQOs.

3.2 Field Quality Assurance/Quality Control

Groundwater / Surface Water

One field duplicate pair was collected for 11 environmental groundwater samples and one field duplicate pair was collected for 10 environmental surface water samples. One matrix spike/matrix spike duplicate (MS/MSD) sample was analyzed for the groundwater samples and one for the surface water samples. The QC sample collection frequency requirements in the QAPP (CDM Smith 2020) of 10 percent (%) for field duplicates and 5% for MS/MSD samples were met except for the groundwater samples. The frequency was slightly above the 10% criteria by one sample. This does not affect DQOs.

Trip blanks were submitted with each cooler sent to the laboratory, for a total of four trip blank samples. **Table 3-3** presents the results for the trip blank sample results.

Soil Gas

One field duplicate pair was analyzed for the 11 environmental soil gas samples. The QC sample collection frequency requirement in the QAPP (CDM Smith 2020) is 10% for field duplicates. The frequency was slightly above the 10% criteria by one sample. This does not affect DQOs.

Field QA/QC objectives were accomplished through the use of appropriate sampling techniques and collection of the required QC samples at the required frequencies.

3.3 Laboratory Quality Assurance/Quality Control

Analytical QA/QC was assessed by laboratory QC checks, method blanks, sample custody tracking, sample preservation, adherence to holding times, laboratory control samples (LCSs), MS samples, calibration verifications, surrogates, inductively coupled plasma (ICP) interference checks, and other applicable QC parameters. As presented in the data validation reports in **Attachment 1** of this report, the laboratory QC samples met project criteria requirements with the appropriate qualifiers applied. All data are considered usable.

3.3.1 Laboratory Methods

Samples were analyzed using the following U.S. Environmental Protection Agency (EPA) or Standard Methods (SM) (EPA 2004):

Groundwater / Surface Water

- EPA Method SW8260C – Volatile Organic Compounds (VOCs)
- EPA Method SW6020A – Metals
- EPA Method SW7470A – Mercury
- Method RSK-175 – Dissolved Gases (Ethane, Ethene, Methane)
- EPA Method E300.0 – Chloride, Sulfate
- Method SM2320B – Total Alkalinity
- Method SM4500-NO3E – Nitrogen, Nitrate-Nitrite
- EPA Method SW9060 – Total Organic Carbon (TOC)

Soil Gas

- EPA Method TO-15 – VOCs
- EPA Method TO-15 selective ion monitoring (SIM) - VOCs by SIM

The methods used met project objectives.

Table 3-1
Sample List and Analyses
Groundwater / Surface Water

Field Sample ID	Matrix	Sample Date	Lab SDG	Method
FD01-GW041521	WG	4/15/2021	21D236	SW8260C
RG01-GW041621	WG	4/16/2021	21D236	SW8260C
RG02-GW041621	WG	4/16/2021	21D236	SW8260C
RG03-GW041521	WG	4/15/2021	21D236	SW8260C
RG04-GW041521	WG	4/15/2021	21D236	SW8260C
RG05-GW041621	WG	4/16/2021	21D236	SW8260C
RG06-GW041621	WG	4/16/2021	21D236	SW8260C
RG07-GW041621	WG	4/16/2021	21D236	SW8260C
RG08-GW041521	WG	4/15/2021	21D236	SW8260C
RG09-GW041621	WG	4/16/2021	21D236	SW8260C
RG10-GW041621	WG	4/16/2021	21D236	SW8260C
RG11-GW041621	WG	4/16/2021	21D236	SW8260C
FD01-SW041521	WS	4/15/2021	21D206	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
SW08-SW041521	WS	4/15/2021	21D206	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
SW12-SW041521	WS	4/15/2021	21D206	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
SW166-SW041321	WS	4/13/2021	21D206	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060

Table 3-1
Sample List and Analyses
Groundwater / Surface Water

Field Sample ID	Matrix	Sample Date	Lab SDG	Method
SW16E-SW041521	WS	4/15/2021	21D206	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
SW16I-SW041521	WS	4/15/2021	21D206	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
SW34-SW041421	WS	4/14/2021	21D206	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
SW35-SW041321	WS	4/13/2021	21D206	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
SW39-SW041321	WS	4/13/2021	21D206	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060
SW53-SW041321	WS	4/13/2021	21D206	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060

Table 3-1
Sample List and Analyses
Groundwater / Surface Water

Field Sample ID	Matrix	Sample Date	Lab SDG	Method
SW54-SW041521	WS	4/15/2021	21D206	A4500NE E300.0 RSK-175 SM2320B SW6020A SW7470A SW8260C SW9060

Acronyms:

A4500NE - nitrogen, nitrate-nitrite

E300.0 - chloride, sulfate

ID - identification

RSK-175 - dissolved gases

SDG - sample delivery group

SM2320B - total alkalinity

SW6020A - metals

SW7470A - mercury

SW8260C - volatile organic compounds

SW9060 - total organic carbon

WG - groundwater

WS - surface water

Table 3-2
Sample List and Analyses
Soil Gas

Field Sample ID	Matrix	Sample Date	Lab SDG	Method
FD01-SG041421	GS	4/14/2021	2104424	TO15 / TO15 SIM
MW32-SG032621	GS	3/26/2021	2103819	TO15 / TO15 SIM
MW34-SG032621	GS	3/26/2021	2103818	TO15 / TO15 SIM
MW37-SG032621	GS	3/26/2021	2103819	TO15 / TO15 SIM
MW38-SG032621	GS	3/26/2021	2103819	TO15 / TO15 SIM
RG01-SG041421	GS	4/14/2021	2104424	TO15 / TO15 SIM
RG04-SG041321	GS	4/13/2021	2104424	TO15 / TO15 SIM
RG05-SG041421	GS	4/14/2021	2104424	TO15 / TO15 SIM
RG07-SG041421	GS	4/14/2021	2104424	TO15 / TO15 SIM
RG08-SG041321	GS	4/13/2021	2104424	TO15 / TO15 SIM
RG10-SG041421	GS	4/14/2021	2104424	TO15 / TO15 SIM
RG11-SG041321	GS	4/13/2021	2104424	TO15 / TO15 SIM

Acronyms:

EPA - U.S. Environmental Protection Agency

GS - soil gas

ID - identification

SDG - sample delivery group

TO-15 - Modified EPA Method TO-15 for volatile organic compounds

TO-15 SIM - Modified EPA Method TO-15 for volatile organic compounds by selective ion monitoring (SIM)

Table 3-3
Blank Sample Results
Groundwater / Surface Water

		Sample Name	TB01-SW041521		TB02-GW041621		TB02-SW041521		TB03-SW041521	
		Sample Date	4/15/2021		4/16/2021		4/15/2021		4/15/2021	
		Sample Type	TB		TB		TB		TB	
Method	Analyte	Unit	Result	Q	Result	Q	Result	Q	Result	Q
SW8260C	1,1,1-Trichloroethane	µg/L	1	U	1	U	1	U	1	U
SW8260C	1,1,2,2-Tetrachloroethane	µg/L	1	U	1	U	1	U	1	U
SW8260C	1,1,2-Trichloroethane	µg/L	1	U	1	U	1	U	1	U
SW8260C	1,1,2-Trichlorotrifluoroethane	µg/L	1	U	1	U	1	U	1	U
SW8260C	1,1-Dichloroethane	µg/L	1	U	1	U	1	U	1	U
SW8260C	1,1-Dichloroethene	µg/L	1	U	1	U	1	U	1	U
SW8260C	1,2,3-Trichlorobenzene	µg/L	1	U	1	U	1	U	1	U
SW8260C	1,2,4-Trichlorobenzene	µg/L	1	U	1	U	1	U	1	U
SW8260C	1,2,4-Trimethylbenzene	µg/L	1	U	1	U	1	U	1	U
SW8260C	1,2-Dibromo-3-Chloropropane	µg/L	2	U	2	U	2	U	2	U
SW8260C	1,2-Dibromoethane	µg/L	1	U	1	U	1	U	1	U
SW8260C	1,2-Dichlorobenzene	µg/L	1	U	1	U	1	U	1	U
SW8260C	1,2-Dichloroethane	µg/L	1	U	1	U	1	U	1	U
SW8260C	1,2-Dichloropropane	µg/L	1	U	1	U	1	U	1	U
SW8260C	1,3,5-Trimethylbenzene	µg/L	1	U	1	U	1	U	1	U
SW8260C	1,3-Dichlorobenzene	µg/L	1	U	1	U	1	U	1	U
SW8260C	1,4-Dichlorobenzene	µg/L	1	U	1	U	1	U	1	U
SW8260C	2-Butanone (MEK)	µg/L	20	U	20	U	20	U	20	U
SW8260C	2-Hexanone	µg/L	20	U	20	U	20	U	20	U
SW8260C	4-Methyl-2-Pentanone (MIBK)	µg/L	20	U	20	U	20	U	20	U
SW8260C	Acetone	µg/L	**4.2**	**J**	20	U	**4.5**	**J**	20	U
SW8260C	Benzene	µg/L	1	U	1	U	1	U	1	U
SW8260C	Bromochloromethane	µg/L	1	U	1	U	1	U	1	U
SW8260C	Bromodichloromethane	µg/L	1	U	1	U	1	U	1	U
SW8260C	Bromoform	µg/L	1	U	1	U	1	U	1	U
SW8260C	Bromomethane	µg/L	1	U	1	U	1	U	1	U
SW8260C	Carbon Disulfide	µg/L	1	U	1	U	1	U	1	U
SW8260C	Carbon Tetrachloride	µg/L	1	U	1	U	1	U	1	U
SW8260C	Chlorobenzene	µg/L	1	U	1	U	1	U	1	U
SW8260C	Chloroethane	µg/L	1	U	1	U	1	U	1	U
SW8260C	Chloroform	µg/L	1	U	1	U	1	U	1	U
SW8260C	Chloromethane	µg/L	1	U	1	U	1	U	1	U
SW8260C	cis-1,2-Dichloroethene	µg/L	1	U	1	U	1	U	1	U
SW8260C	cis-1,3-Dichloropropene	µg/L	1	U	1	U	1	U	1	U
SW8260C	Dibromochloromethane	µg/L	1	U	1	U	1	U	1	U
SW8260C	Dichlorodifluoromethane	µg/L	1	U	1	U	1	U	1	U
SW8260C	Ethylbenzene	µg/L	1	U	1	U	1	U	1	U
SW8260C	Isopropylbenzene	µg/L	1	U	1	U	1	U	1	U

Table 3-3
Blank Sample Results
Groundwater / Surface Water

		Sample Name	TB01-SW041521		TB02-GW041621		TB02-SW041521		TB03-SW041521	
		Sample Date	4/15/2021		4/16/2021		4/15/2021		4/15/2021	
		Sample Type	TB		TB		TB		TB	
SW8260C	m/p-Xylenes	µg/L	2	U	2	U	2	U	2	U
SW8260C	Methyl Acetate	µg/L	2	U	2	U	2	U	2	U
SW8260C	Methyl Tert-Butyl Ether	µg/L	1	U	1	U	1	U	1	U
SW8260C	Methylene Chloride	µg/L	2	U	2	U	2	U	2	U
SW8260C	o-Xylene	µg/L	1	U	1	U	1	U	1	U
SW8260C	Styrene	µg/L	1	U	1	U	1	U	1	U
SW8260C	Tetrachloroethene	µg/L	1	U	1	U	1	U	1	U
SW8260C	Toluene	µg/L	1	U	1	U	1	U	1	U
SW8260C	trans-1,2-Dichloroethene	µg/L	1	U	1	U	1	U	1	U
SW8260C	trans-1,3-Dichloropropene	µg/L	1	U	1	U	1	U	1	U
SW8260C	Trichloroethene	µg/L	1	U	1	U	1	U	1	U
SW8260C	Trichlorofluoromethane	µg/L	1	U	1	U	1	U	1	U
SW8260C	Vinyl Acetate	µg/L	2	U	2	U	2	U	2	U
SW8260C	Vinyl Chloride	µg/L	1	U	1	U	1	U	1	U

Acronyms:
SW8260C - volatile organic compounds
µg/L - micrograms per liter
J - estimated
Q - qualifier
TB - trip blank
U - nondetect
Highlighted and bolded results are detect.

Section 4
Data Validation Procedures

For this QCSR, there were two aqueous and three soil gas SDGs, for a total of five laboratory SDGs. Qualified CDM Smith data validators not associated with project sampling activities validated the data reported in the five SDGs. Data validation was performed in accordance with specified analytical methods and performance criteria outlined in the QAPP (CDM Smith 2020) and in the EPA's *National Functional Guidelines for Inorganic Superfund Methods Data Review* (EPA 2017a), the EPA's *National Functional Guidelines for Organic Superfund Methods Data Review* (EPA 2017b), and EPA's *Analysis of Volatile Organic Compounds (VOCs) in Air Contained in Canisters by Method TO-15* (EPA 2014). Validation reports were prepared and are presented in **Attachment 1**. The following SDG data packages were validated:

Groundwater / Surface Water

- EMAX – SDG 21D206
- EMAX – SDG 21D236

Soil Gas

- Eurofins – SDG 2103818 (MW34-SG032621 only)
- Eurofins – SDG 2103819
- Eurofins – SDG 2104424

Tables 4-1 and 4-2 present the results that were qualified and the reasons for the qualifications. Qualifiers applied are defined as follows:

- J → Result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- U → Analyte was analyzed for but was not detected above the level of the sample method reporting limit (MRL).
- UJ → Analyte was analyzed for but was not detected above the level of the sample MRL. The MRL is approximate.

Table 4-1
Qualification Summary
Groundwater / Surface Water

Field Sample ID	Lab SDG	Method	Analyte	CAS #	Final Result	Unit	Validation Qualifier	Interpreted Qualifier	Qualifier Reason
RG05-GW041621	21D236	SW8260C	Acetone	67-64-1	20	µg/L	U-RL	U	TB
RG10-GW041621	21D236	SW8260C	Acetone	67-64-1	20	µg/L	U-RL	U	TB
RG11-GW041621	21D236	SW8260C	Acetone	67-64-1	20	µg/L	U-RL	U	TB

Acronyms:
ID - identification
SDG - sample delivery group
CAS - Chemical Abstract Service
SW8260C - volatile organic compounds
µg/L - microgram per liter
U - nondetect
U-RL - result is qualified as nondetect at the method reporting limit value
RL - reporting limit
TB - trip blank criteria

Table 4-2
Qualification Summary
Soil Gas

Field Sample ID	Lab SDG	Method	Analyte	CAS #	Final Result	Unit	Validation Qualifier	Interpreted Qualifier	Qualifier Reason
MW34-SG032621	2103818	TO15	Trichlorofluoromethane	75-69-4	3.5	µg/m^3	J	J	ICV
MW34-SG032621	2103818	TO15 SIM	Trichloroethene	79-01-6	0.14	µg/m^3	U-RL	U	LB
MW32-SG032621	2103819	TO15	Trichlorofluoromethane	75-69-4	2.2	µg/m^3	J	J	ICV
MW32-SG032621	2103819	TO15 SIM	Trichloroethene	79-01-6	0.16	µg/m^3	U-RL	U	LB
MW37-SG032621	2103819	TO15	Trichlorofluoromethane	75-69-4	2.1	µg/m^3	J	J	ICV
MW37-SG032621	2103819	TO15 SIM	Trichloroethene	79-01-6	0.15	µg/m^3	U-RL	U	LB
MW38-SG032621	2103819	TO15	Trichlorofluoromethane	75-69-4	3.3	µg/m^3	J	J	ICV
MW38-SG032621	2103819	TO15 SIM	1,2-Dichloroethane	107-06-2	0.12	µg/m^3	U-RL	U	LB
FD01-SG041421	2104424	TO15	2,2,4-Trimethylpentane	540-84-1	52	µg/m^3	J	J	LCS
FD01-SG041421	2104424	TO15	2-Butanone (MEK)	78-93-3	4.5	µg/m^3	J	J	FD
FD01-SG041421	2104424	TO15	Acetone	67-64-1	11	µg/m^3	J	J	FD
FD01-SG041421	2104424	TO15	Bromomethane	74-83-9	2.8	µg/m^3	UJ	UJ	CCV
RG01-SG041421	2104424	TO15	2,2,4-Trimethylpentane	540-84-1	43	µg/m^3	J	J	LCS
RG01-SG041421	2104424	TO15	Bromomethane	74-83-9	2.8	µg/m^3	UJ	UJ	CCV
RG04-SG041321	2104424	TO15	2,2,4-Trimethylpentane	540-84-1	39	µg/m^3	J	J	LCS
RG04-SG041321	2104424	TO15	Bromomethane	74-83-9	3	µg/m^3	UJ	UJ	CCV
RG05-SG041421	2104424	TO15	2,2,4-Trimethylpentane	540-84-1	28	µg/m^3	J	J	LCS
RG05-SG041421	2104424	TO15	Bromomethane	74-83-9	3	µg/m^3	UJ	UJ	CCV
RG07-SG041421	2104424	TO15	2,2,4-Trimethylpentane	540-84-1	36	µg/m^3	J	J	LCS
RG07-SG041421	2104424	TO15	Bromomethane	74-83-9	2.8	µg/m^3	UJ	UJ	CCV
RG07-SG041421	2104424	TO15	Methylene Chloride	75-09-2	1	µg/m^3	U-RL	U	LB
RG08-SG041321	2104424	TO15	2,2,4-Trimethylpentane	540-84-1	59	µg/m^3	J	J	LCS
RG08-SG041321	2104424	TO15	Bromomethane	74-83-9	10	µg/m^3	UJ	UJ	CCV
RG10-SG041421	2104424	TO15	2,2,4-Trimethylpentane	540-84-1	51	µg/m^3	J	J	LCS
RG10-SG041421	2104424	TO15	2-Butanone (MEK)	78-93-3	1.8	µg/m^3	J	J	FD
RG10-SG041421	2104424	TO15	Acetone	67-64-1	6.8	µg/m^3	J	J	FD
RG10-SG041421	2104424	TO15	Bromomethane	74-83-9	2.9	µg/m^3	UJ	UJ	CCV
RG11-SG041321	2104424	TO15	2,2,4-Trimethylpentane	540-84-1	17	µg/m^3	J	J	LCS
RG11-SG041321	2104424	TO15	Bromomethane	74-83-9	3.3	µg/m^3	UJ	UJ	CCV

Acronyms:

µg/m^3 - micrograms per cubic meter
CAS - chemical abstract service
CCV - continuing calibration verification
EPA - U.S. Environmental Protection Agency
FD - field duplicate criteria
ICV - initial calibration verification
ID - identification
J - estimated
LB - laboratory blank criteria
LCS - laboratory control sample criteria
RL - reporting limit
SDG - sample delivery group
U - nondetect
UJ - estimated nondetect result
U-RL - result is qualified as nondetect at the method reporting limit value
TO-15 - Modified EPA Method TO-15 for volatile organic compounds
TO-15 SIM - Modified EPA Method TO-15 for volatile organic compounds by selective ion monitoring (SIM)

Section 5
Data Quality Indicators

This section summarizes the validation performed and the overall quality of the data. The validation reports are provided in **Attachment 1**.

Achievement of the DQO regarding data usability was determined by the use of DQIs. These DQIs are expressed in terms of PARCCS. The DQIs provide a mechanism to evaluate and measure data quality throughout the project. These criteria are defined in **Table 5-1** and in the following subsections.

5.1 Precision

Precision is a quantitative term that estimates the reproducibility of a set of replicate measurements under a given set of conditions. It is defined as a measurement of mutual agreement between measurements of the same property and is expressed in terms of relative percent difference (RPD) between duplicate determinations.

RPD is calculated as follows:

$$\mathbf{RPD = absolute\ value\ [(C1 - C2)/\{(C1 + C2)/2)\}] \times 100\%}$$

Where:

C1 = concentration of primary sample
C2 = concentration of duplicate sample

Field and analytical precision were determined from review of the field duplicate results, MS/MSDs, LCS/laboratory control sample duplicate (LCSDs), laboratory duplicates, and ICP serial dilution tests. The duplicate sample results were compared after calculating their RPDs. Field duplicate samples were collected in the same manner as the original samples but collected in separate individual containers, given separate sample identifiers, and treated as unique samples by the laboratory.

Groundwater / Surface Water

Tables 5-2 and 5-3 present the field duplicate sample results for groundwater and surface water, respectively. A control limit of 30% RPD was used for the groundwater and surface water field duplicate samples when both sample concentrations were greater than five times the MRL. If the sample concentrations were below five times the MRL, the absolute difference between the samples is calculated; if that value is below the MRL, no qualification is required. Laboratory RPDs are specific to the QC parameter. RPD results are summarized below:

- Field duplicate RPDs or absolute criteria results were within control limits.
- LCS/LCSD RPDs were within control limits.

- MS/MSD RPD results were within control limits except for carbon disulfide in SDG 21D236, which had an RPD of 37%. Qualification for MS/MSD RPDs outside of criteria is only required for detected results. Associated carbon disulfide results were nondetect and did not require qualification.
- ICP serial dilution results were within criteria.

Soil Gas

Table 5-4 presents the soil gas field duplicate sample results. A control limit of 40% RPD was used for the soil gas field duplicate samples when both sample concentrations were greater than five times the MRL. If the sample concentrations were below five times the MRL, the absolute difference between the samples is calculated; if that value is below the MRL, no qualification is required. Laboratory RPDs are specific to the QC parameter. RPD results are summarized below:

- Field duplicate RPDs or the absolute criteria results were within control limits except for the acetone and 2-butanone results in field duplicate pair RG10-SG041421/FD01-SG041421 (absolute criteria not met) in SDG 2104424. The difference between the sample results was greater than the MRL; therefore, the acetone and 2-butanone results for these samples were qualified as estimated "J."
- LCS/LCSD RPDs were within control limits.
- Laboratory duplicate RPDs were within control limits.

No field or laboratory issues were identified from the RPD results outside criteria; the exceedances are reasonable for this type of sampling activity.

5.2 Accuracy

Accuracy is the degree of agreement of a measurement with an accepted reference or true value and is a measure of the bias in a system. Two different metrics are evaluated to assess result accuracy: calculation of percent recovery (%R) for spiked analytes with known concentrations and review of blank results for cross-contamination.

5.2.1 Percent Recovery

Accuracy of the data was assessed by comparing recoveries of LCSs, MSs, calibration standards, surrogates, internal standards, and from ICP interference checks during metals analyses. Accuracy is expressed as %R, which is calculated as:

$$\text{Percent Recovery} = \frac{(\text{Total Analyte Found} - \text{Analyte Originally Present}) \times 100}{\text{Analyte Added}}$$

Analytical accuracy for the entire data collection activity is difficult to measure because several sources of error exist. Errors can be introduced by any of the following:

- Sampling procedure and duration of sampling
- Field contamination
- Sample preservation and handling
- Sample matrix
- Sample preparation
- Analytical techniques

Accuracy is maintained by adhering to the laboratory method and approved field and analytical standard operating procedures.

The following is a summary of the accuracy parameters reviewed and the resulting qualifications for the data collected:

SDG 21D206 (Surface Water)

- LCS/LCSD %Rs were within criteria.
- MS/MSD %Rs were within criteria except for calcium (67/67%) and magnesium (127%). Initial sample concentrations were greater than 4× the spike level; therefore, no qualifications were required.
- Initial and continuing calibration verifications were within criteria.
- Surrogate results were within criteria.
- ICP interference checks were within criteria.
- Inorganic and organic tune results were within criteria.
- Internal standard results were within criteria.

SDG 21D236 (Groundwater)

- LCS/LCSD %Rs were within criteria.
- MS/MSD %Rs were within criteria.
- Initial and continuing calibration verifications were within acceptable criteria.
- Surrogate results were within criteria.
- Tune results were within criteria.
- Internal standard results were within criteria.

SDG 2103818 (Soil Gas) (Evaluation applies to MW34-SG032621)

- LCS/LCSD %Rs were within criteria.

- Initial and continuing calibration verifications were within criteria, except for Freon 11 (trichlorofluoromethane) with an initial calibration verification %R of 130.34%. The Freon 11 sample result for sample MW34-SG032621 was qualified as estimated "J."
- Surrogate results were within criteria.
- Tune results were within criteria.
- Internal standard results were within criteria.

SDG 2103819 (Soil Gas)

- LCS/LCSD %Rs were within criteria.
- Initial and continuing calibration verifications were within criteria, except for Freon 11 (trichlorofluoromethane) with an initial calibration verification %R of 130.34%. Associated results were qualified as estimated "J."
- Surrogate results were within criteria.
- Tune results were within criteria.
- Internal standard results were within criteria.

SDG 2104424 (Soil Gas)

- LCS/LCSD %Rs were within criteria except for bromomethane (134.78/127.22%) and 2,2,4-trimethylpentane (126.88%). Associated 2,2,4-trimethylpentane results were qualified as estimated "J." Associated bromomethane results were nondetect and did not require qualification.
- Initial and continuing calibrations were within criteria, except for bromomethane with a percent relative standard deviation of 32.93% and a percent difference (%D) of 135%. Associated bromomethane results were qualified as estimated "J/UJ."
- Surrogate results were within criteria.
- Tune results were within criteria.
- Internal standard results were within criteria.

Sample preservation, sample handling, holding times, and canister pressure are additional measures of accuracy of the data. All cooler temperatures, sample handling information, and holding times were acceptable for aqueous samples. Holding times, canister pressure readings, and canister certification results were acceptable for soil gas samples.

5.2.2 Blank Contamination

Blanks are used to determine the level of laboratory and field contamination introduced into the samples, independent of the level of target analytes found in the sample source. Sources of sample contamination can include the containers and equipment used to collect the sample, preservatives added to the sample, other samples in transport coolers, laboratory sample storage

refrigerators, standards and solutions used to calibrate instruments, glassware and reagents used to process samples, airborne contamination in the laboratory preparation area, and the analytical instrument sample introduction equipment. Each analyte group has its own particular suite of common laboratory contaminants. Active measures must be performed to continually measure the ambient contamination level, and steps must be taken to discover the source of the contamination to eliminate or minimize the levels. Random spot contamination can also occur from analytes that are not common laboratory problems but arise as a problem for a specific project or over a short period. Field blanks, equipment blanks, trip blanks, and laboratory method blanks are analyzed to identify possible sources of contamination.

For this project, four trip blank samples were sent with the coolers of aqueous samples to assess potential cooler transportation cross contamination. VOC results for the trip blank samples are presented in **Table 3-3**. The following text discusses validation actions required as a result of laboratory and/or trip blank contamination.

SDG 21D206 (Surface Water)

- Acetone was detected in two of the trip blank samples. Associated sample results were nondetect and did not require qualification.
- Sodium and mercury were detected in some of the continuing calibration blanks. Applicable sample results were either greater than the MRL, or the negative blank result was greater than the negative MRL value and did not require qualification.

SDG 21D236 (Groundwater)

- Acetone was detected in the associated trip blank sample. Applicable sample results for acetone were qualified as nondetect "U" at the MRL.

SDG 2103818 (Soil Gas)

- Trichloroethene and 1,2-dichloroethane were detected in the laboratory blank samples associated with sample MW34-SG032621. The trichloroethene result for sample MW34-SG032621 was qualified as nondetect "U" at the MRL. The 1,2-dichloroethane result for sample MW34-SG032621 was nondetect and did not require qualification.

SDG 2103819 (Soil Gas)

- Trichloroethene and 1,2-dichloroethane were detected in some of the laboratory blank samples. Applicable trichloroethene and 1,2-dichloroethane sample results were qualified as nondetect "U" at the MRL.

SDG 2104424 (Soil Gas)

- Methylene chloride was detected in one of the laboratory blank samples. Applicable methylene chloride sample results were qualified as nondetect "U" at the MRL.

Ideally, no contaminants should be found in the blank samples. Blank samples are used to determine the validity of the analytical results by determining the existence and magnitude of contamination resulting from laboratory (or field) activities or baseline drift during analysis. As discussed above, analytes were detected in some of the laboratory blank samples and/or field and

trip blank samples. Concentrations were below the MRLs for all detected blank results. Analytes detected in laboratory blanks are common with laboratory analyses and are almost unavoidable.

Associated sample results for the laboratory blanks and/or trip blank samples were qualified following the appropriate guidelines. Detected blank concentrations were below the MRLs and the resulting sample qualifications as nondetect or "U" does not falsely diminish identification of site-related contaminants.

5.3 Representativeness

Representativeness is a qualitative term that expresses the degree to which the sample data accurately and precisely represent the environmental conditions corresponding to the location and/or depth interval of sample collection. Requirements and procedures for sample collection were designed to maximize sample representativeness.

Representativeness can be monitored by reviewing field documentation and/or performing field audits. For this report, a detailed review was performed on the COC and field data collection forms. Appropriate laboratory QA/QC requirements were described in the QAPP (CDM Smith 2020) and laboratory statement of work to confirm that the laboratory analytical results were representative of true field conditions.

Field sampling representativeness was attained through strict adherence to the sampling design and the approved QAPP (CDM Smith 2020) procedures and by using EPA-approved analytical methods for sample analyses. As a result, the data represent as near as possible the actual field conditions at the time of sampling.

Representativeness, as defined above, was met for the fieldwork and laboratory analyses. The data collected are suitable for project use.

5.4 Comparability

Comparability is a qualitative term that expresses the confidence with which a data set can be compared with another. Strict adherence to standard sample collection procedures, analytical detection limits, and analytical methods is necessary so that data from similar samples and sample conditions are comparable. This comparability is independent of laboratory personnel, data reviewers, or sampling personnel. Comparability criteria are met for the project if, based on data review, the sample collection and analytical procedures used are similar and are determined to have been followed.

To achieve comparability of data generated for the Site, CDM Smith followed standard sample collection procedures and EPA-approved analytical methods during sampling activities. The sample analyses were performed by EMAX and Eurofins using approved standard operating procedures and reporting units. Using such procedures and methods enables the current data to be comparable to future data sets generated with similar methods and units.

5.5 Completeness

Completeness of the field program is defined as the percentage of samples planned for collection, as listed in the QAPP (CDM Smith 2020), versus the actual number of samples collected during the field program (see equation A).

Completeness for acceptable data is defined as the percentage of acceptable data obtained judged to be valid versus the total quantity of data generated (see equation B). Acceptable data include both data that pass all the QC criteria (unqualified data) and data that may not pass all the QC criteria but had appropriate corrective actions taken (qualified but usable data).

A. $$\%Completeness = Cx\frac{100}{n}$$

Where:

C = actual number of samples collected
n = total number of samples planned

B. $$\%Completeness = Vx\frac{100}{n'}$$

Where:

V = number of measurements judged valid
n' = total number of measurements made

The overall completeness goal for this sampling event was 90% for all project data.

All samples outlined in the QAPP (CDM Smith 2020) were collected as planned to meet specific sampling activity objectives. The completeness for the number of samples planned to be collected versus the number of samples collected was 100% for all analyses.

Analyses for the sampling event exceeded the 90% completeness goal of acceptable data for the number of measurements judged to be valid versus the total number of measurements made.

One hundred percent of the data validated and reported are suitable for their intended use for site characterization. No results were rejected, and all data collected met the overall project objective for data usability. The completeness goals were met for both the number of samples collected for all sampling events and the number of measurements judged to be valid.

The data usability DQO was achieved; the data reported are suitable for their intended use as stated in the QAPP (CDM Smith 2020). The achievement of the completeness goals for the data provides sufficient data for project decisions.

5.6 Sensitivity

Sensitivity is related to the ability to compare analytical results with project-specific levels of interest such as delineation levels or action levels. Analytical quantitation limits for the various sample analytes should be below the level of interest to allow an effective comparison.

The method detection limit (MDL) study attempts to answer the question, “What is the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero?” The study is based upon repetitive analysis of an interference-free sample spiked with a known amount of the target analyte. The MDL is a measure of the ability of the test procedure to generate a positive response for the target analyte in the absence of any other interferences from the sample.

The MRL is generally defined as the lowest concentration at which an analyte can be confidently reported in a sample and its concentration reported with a reasonable degree of accuracy and precision. For samples that do not pose a particular matrix problem, the MRL is typically about three to five times higher than the MDL.

Laboratory results are reported according to rules that provide established certainty of detection. The result for an analyte is flagged with a "U" if that analyte was not detected and reported at the MRL value or qualified with a "J" flag if associated QC results fall outside the appropriate QC criteria. Additionally, if an analyte is present at a concentration between the MDL and the MRL, the analytical result is flagged with a "J," indicating an estimated quantity. Qualifying the result as an estimated concentration reflects uncertainty in the reported value.

When required, dilutions were performed and accounted for in the reported MRLs. All MRLs were met as specified in the QAPP (CDM Smith 2020), but due to the low groundwater screening level for 1,2-dibromo-3-chloropropane, 1,2-dibromoethane, 1,1,2,2-tetrachloroethane, cis-1,3-dichloropropene, and trans-1,3-dichloropropene, the MRL is greater than the screening level. However, these analytes are not a known constituent of potential concern for the site. For the soil gas results, all MRLs were met as specified in the QAPP, (CDM Smith 2020) except for a couple of results where the MRL was slightly above the soil gas screening level. In these situations though, the MDL was below the screening value and as detected results are qualified as estimated between the MDL and MRL, no exceedances of the screening level occurred. For the remaining analytes, laboratory MRLs were low enough to compare with the project criteria stated in the laboratory statement of work and the QAPP (CDM Smith 2020).

Table 5-1 DQIs and Corresponding QC Parameters

Data Quality Indicators	QC Parameters Evaluation in Data Review/Validation
Precision	RPD values of: 1) Laboratory duplicates 2) Field duplicates 3) MS/MSD 4) LCS/LCSD 5) Serial dilution (ICP metals) Relative standard deviation (RSD) values of: 1) Initial calibration verifications
Accuracy/Bias	%R or %D values of: 1) LCS/LCSD %R 2) MS/MSD %R 3) Initial calibration verification/continuing calibration verification %R 4) ICP interference check standards 5) ICP-mass spectrometry (MS) tune percent RSD 6) ICP-MS internal standard %R intensity 7) Surrogates 8) Internal standards Results of: 1) Instrument and calibration blanks 2) Method (preparation) blanks 3) Field blanks 4) Trip blanks
Representativeness	Results of all blanks Adherence to field standard operating procedures Sample integrity (COC and sample receipt forms) Holding times
Comparability	Similar reporting limits and units Similar sample collection methods Similar laboratory analytical methods
Completeness	Data qualifiers Laboratory deliverables Requested/Reported valid results Field sample collection (primary and QC samples) Contract compliance (i.e., method and instrument QC within limits)
Sensitivity	Sample method reporting limits meet QAPP criteria Adequacy of sample dilution

Table 5-2
Summary of Field Duplicate Sampling Results
Groundwater

		Location	RG-08		RG-08		RPD (%)
		Sample Name	RG08-GW041521		FD01-GW041521		
		Parent Sample Code			RG08-GW041521		
		Sample Date	4/15/2021		4/15/2021		
		Sample Type	N		FD		
Method	Analyte	Unit	Result	Q	Result	Q	
SW8260C	1,1,1-Trichloroethane	µg/L	0.49	J	0.48	J	Abs Criteria
SW8260C	1,1,2,2-Tetrachloroethane	µg/L	1	U	1	U	NC
SW8260C	1,1,2-Trichloroethane	µg/L	1	U	1	U	NC
SW8260C	1,1,2-Trichlorotrifluoroethane	µg/L	1	U	1	U	NC
SW8260C	1,1-Dichloroethane	µg/L	1	U	1	U	NC
SW8260C	1,1-Dichloroethene	µg/L	0.15	J	0.14	J	Abs Criteria
SW8260C	1,2,3-Trichlorobenzene	µg/L	1	U	1	U	NC
SW8260C	1,2,4-Trichlorobenzene	µg/L	1	U	1	U	NC
SW8260C	1,2,4-Trimethylbenzene	µg/L	1	U	1	U	NC
SW8260C	1,2-Dibromo-3-Chloropropane	µg/L	2	U	2	U	NC
SW8260C	1,2-Dibromoethane	µg/L	1	U	1	U	NC
SW8260C	1,2-Dichlorobenzene	µg/L	1	U	1	U	NC
SW8260C	1,2-Dichloroethane	µg/L	1	U	1	U	NC
SW8260C	1,2-Dichloropropane	µg/L	1	U	1	U	NC
SW8260C	1,3,5-Trimethylbenzene	µg/L	1	U	1	U	NC
SW8260C	1,3-Dichlorobenzene	µg/L	1	U	1	U	NC
SW8260C	1,4-Dichlorobenzene	µg/L	1	U	1	U	NC
SW8260C	2-Butanone (MEK)	µg/L	20	U	20	U	NC
SW8260C	2-Hexanone	µg/L	20	U	20	U	NC
SW8260C	4-Methyl-2-Pentanone (MIBK)	µg/L	20	U	20	U	NC
SW8260C	Acetone	µg/L	20	U	20	U	NC
SW8260C	Benzene	µg/L	1	U	1	U	NC
SW8260C	Bromochloromethane	µg/L	1	U	1	U	NC
SW8260C	Bromodichloromethane	µg/L	1	U	1	U	NC
SW8260C	Bromoform	µg/L	1	U	1	U	NC
SW8260C	Bromomethane	µg/L	1	U	1	U	NC
SW8260C	Carbon Disulfide	µg/L	1	U	1	U	NC
SW8260C	Carbon Tetrachloride	µg/L	1	U	1	U	NC
SW8260C	Chlorobenzene	µg/L	1	U	1	U	NC
SW8260C	Chloroethane	µg/L	1	U	1	U	NC
SW8260C	Chloroform	µg/L	2.9		2.9		Abs Criteria
SW8260C	Chloromethane	µg/L	1	U	1	U	NC
SW8260C	cis-1,2-Dichloroethene	µg/L	0.15	J	0.15	J	Abs Criteria
SW8260C	cis-1,3-Dichloropropene	µg/L	1	U	1	U	NC
SW8260C	Dibromochloromethane	µg/L	1	U	1	U	NC
SW8260C	Dichlorodifluoromethane	µg/L	1	U	1	U	NC
SW8260C	Ethylbenzene	µg/L	1	U	1	U	NC
SW8260C	Isopropylbenzene	µg/L	1	U	1	U	NC
SW8260C	m / p -Xylenes	µg/L	2	U	2	U	NC
SW8260C	Methyl Acetate	µg/L	2	U	2	U	NC
SW8260C	Methyl Tert-Butyl Ether	µg/L	1	U	1	U	NC
SW8260C	Methylene Chloride	µg/L	2	U	2	U	NC
SW8260C	o-Xylene	µg/L	1	U	1	U	NC
SW8260C	Styrene	µg/L	1	U	1	U	NC
SW8260C	Tetrachloroethene	µg/L	56		58		4%
SW8260C	Toluene	µg/L	1	U	1	U	NC
SW8260C	trans-1,2-Dichloroethene	µg/L	1	U	1	U	NC
SW8260C	trans-1,3-Dichloropropene	µg/L	1	U	1	U	NC
SW8260C	Trichloroethene	µg/L	0.42	J	0.43	J	Abs Criteria
SW8260C	Trichlorofluoromethane	µg/L	1	U	1	U	NC
SW8260C	Vinyl Acetate	µg/L	2	U	2	U	NC
SW8260C	Vinyl Chloride	µg/L	1	U	1	U	NC

Table 5-2
Summary of Field Duplicate Sampling Results
Groundwater

Location	RG-08	RG-08	RPD (%)
Sample Name	RG08-GW041521	FD01-GW041521	
Parent Sample Code		RG08-GW041521	
Sample Date	4/15/2021	4/15/2021	
Sample Type	N	FD	

Notes:
N - Normal sample
FD- Field Duplicate
µg/L - microgram per liter
Q - qualifier
ABS - absolute difference
RPD - Relative Percent Difference
U - nondetect
J - estimated value
NC - not calculated

ABS Criteria - One or both of the sample results are less than 5 times the reporting limit. The absolute value between the two results is within acceptable criteria.

Yellow highlighting - RPD value is outside of 30% criteria and/or the ABS Criteria is outside of control limits

Table 5-3
Summary of Field Duplicate Sampling Results
Surface Water

		Location	SW-54		SW-54		RPD (%)
		Sample Name	SW54-SW041521		FD01-SW041521		
		Sample Date	4/15/2021		4/15/2021		
		Sample Type	N		FD		
Method	Analyte	Unit	Result	Q	Result	Q	
Volatile Organic Compounds							
SW8260C	1,1,1-Trichloroethane	µg/L	0.13	J	0.12	J	ABS Criteria
SW8260C	1,1,2,2-Tetrachloroethane	µg/L	1	U	1	U	NC
SW8260C	1,1,2-Trichloroethane	µg/L	1	U	1	U	NC
SW8260C	1,1,2-Trichlorotrifluoroethane	µg/L	1	U	1	U	NC
SW8260C	1,1-Dichloroethane	µg/L	1	U	1	U	NC
SW8260C	1,1-Dichloroethene	µg/L	1	U	1	U	NC
SW8260C	1,2,3-Trichlorobenzene	µg/L	1	U	1	U	NC
SW8260C	1,2,4-Trichlorobenzene	µg/L	1	U	1	U	NC
SW8260C	1,2,4-Trimethylbenzene	µg/L	1	U	1	U	NC
SW8260C	1,2-Dibromo-3-Chloropropane	µg/L	2	U	2	U	NC
SW8260C	1,2-Dibromoethane	µg/L	1	U	1	U	NC
SW8260C	1,2-Dichlorobenzene	µg/L	1	U	1	U	NC
SW8260C	1,2-Dichloroethane	µg/L	1	U	1	U	NC
SW8260C	1,2-Dichloropropane	µg/L	1	U	1	U	NC
SW8260C	1,3,5-Trimethylbenzene	µg/L	1	U	1	U	NC
SW8260C	1,3-Dichlorobenzene	µg/L	1	U	1	U	NC
SW8260C	1,4-Dichlorobenzene	µg/L	1	U	1	U	NC
SW8260C	2-Butanone (MEK)	µg/L	20	U	20	U	NC
SW8260C	2-Hexanone	µg/L	20	U	20	U	NC
SW8260C	4-Methyl-2-Pentanone (MIBK)	µg/L	20	U	20	U	NC
SW8260C	Acetone	µg/L	20	U	20	U	NC
SW8260C	Benzene	µg/L	1	U	1	U	NC
SW8260C	Bromochloromethane	µg/L	1	U	1	U	NC
SW8260C	Bromodichloromethane	µg/L	1	U	1	U	NC
SW8260C	Bromoform	µg/L	1	U	1	U	NC
SW8260C	Bromomethane	µg/L	1	U	1	U	NC
SW8260C	Carbon Disulfide	µg/L	1	U	1	U	NC
SW8260C	Carbon Tetrachloride	µg/L	1	U	1	U	NC
SW8260C	Chlorobenzene	µg/L	1	U	1	U	NC
SW8260C	Chloroethane	µg/L	1	U	1	U	NC
SW8260C	Chloroform	µg/L	5		4.6		ABS Criteria
SW8260C	Chloromethane	µg/L	1	U	1	U	NC
SW8260C	Cis-1,2-Dichloroethene	µg/L	1	U	1	U	NC
SW8260C	cis-1,3-Dichloropropene	µg/L	1	U	1	U	NC
SW8260C	Dibromochloromethane	µg/L	1	U	1	U	NC
SW8260C	Dichlorodifluoromethane	µg/L	1	U	1	U	NC
SW8260C	Ethylbenzene	µg/L	1	U	1	U	NC
SW8260C	Isopropyl benzene	µg/L	1	U	1	U	NC
SW8260C	m / p -Xylenes	µg/L	2	U	2	U	NC
SW8260C	Methyl Acetate	µg/L	2	U	2	U	NC
SW8260C	Methyl Tert-Butyl Ether	µg/L	1	U	1	U	NC
SW8260C	Methylene Chloride	µg/L	2	U	2	U	NC
SW8260C	o-Xylene	µg/L	1	U	1	U	NC
SW8260C	Styrene	µg/L	1	U	1	U	NC
SW8260C	Tetrachloroethene	µg/L	5.7		5.2		9.17
SW8260C	Toluene	µg/L	1	U	1	U	NC
SW8260C	Trans-1,2-Dichloroethene	µg/L	1	U	1	U	NC
SW8260C	Trans-1,3-Dichloropropene	µg/L	1	U	1	U	NC
SW8260C	Trichloroethene	µg/L	1	U	1	U	NC
SW8260C	Trichlorofluoromethane	µg/L	1	U	1	U	NC
SW8260C	Vinyl Acetate	µg/L	2	U	2	U	NC
SW8260C	Vinyl Chloride	µg/L	1	U	1	U	NC

Table 5-3
Summary of Field Duplicate Sampling Results
Surface Water

		Location	SW-54		SW-54		RPD (%)
		Sample Name	SW54-SW041521		FD01-SW041521		
		Sample Date	4/15/2021		4/15/2021		
		Sample Type	N		FD		
Total Metals							
SW6020A	Aluminum	µg/L	100	U	100	U	NC
SW6020A	Antimony	µg/L	1	U	1	U	NC
SW6020A	Arsenic	µg/L	0.641	J	0.646	J	ABS Criteria
SW6020A	Barium	µg/L	58.7		58.7		0.00
SW6020A	Beryllium	µg/L	1	U	1	U	NC
SW6020A	Cadmium	µg/L	1	U	1	U	NC
SW6020A	Calcium	µg/L	141000		140000		0.71
SW6020A	Chromium	µg/L	0.66	J	0.614	J	ABS Criteria
SW6020A	Cobalt	µg/L	1	U	1	U	NC
SW6020A	Copper	µg/L	2	U	2	U	NC
SW6020A	Iron	µg/L	100	U	100	U	NC
SW6020A	Lead	µg/L	1	U	1	U	NC
SW6020A	Magnesium	µg/L	48600		48900		0.62
SW6020A	Manganese	µg/L	0.432	J	0.29	J	ABS Criteria
SW6020A	Nickel	µg/L	1	U	1	U	NC
SW6020A	Potassium	µg/L	2580		2540		1.56
SW6020A	Selenium	µg/L	0.784	J	0.726	J	ABS Criteria
SW6020A	Silver	µg/L	1	U	1	U	NC
SW6020A	Sodium	µg/L	62300		61800		0.81
SW6020A	Thallium	µg/L	1	U	1	U	NC
SW6020A	Vanadium	µg/L	1.45		1.46		ABS Criteria
SW6020A	Zinc	µg/L	20	U	20	U	NC
SW7470A	Mercury	µg/L	0.5	U	0.5	U	NC
Dissolved Gases							
RSK-175	Ethane	µg/L	2	U	2	U	NC
RSK-175	Ethene	µg/L	2	U	2	U	NC
RSK-175	Methane	µg/L	2	U	2	U	NC
General Chemistry Parameters							
A4500NE	Nitrate/Nitrite	mg/L	3.09		3.05		1.30
E300.0	Chloride	mg/L	224		227		1.33
E300.0	Sulfate	mg/L	102		102		0.00
SM2320B	Alkalinity	mg/L	262		256		2.32
SW9060	Total Organic Carbon	mg/L	0.493	J	0.768	J	ABS Criteria

Notes:
N - Normal sample
FD- Field Duplicate
µg/L - microgram per liter
mg/L - milligram per liter
Q - qualifier
ABS - absolute difference
RPD - Relative Percent Difference
U - nondetect
J - estimated value
NC - not calculated

ABS Criteria - One or both of the sample results are less than 5 times the reporting limit. The absolute value between the two results is within acceptable criteria.

Yellow highlighting - RPD value is outside of 30% criteria and/or the ABS Criteria is outside of control limits

Table 5-4
Summary of Field Duplicate Sampling Results
Soil Gas

		Location	RG-10		RG-10		RPD (%)
		Sample Name	RG10-SG041421		FD01-SG041421		
		Sample Date	4/14/2021		4/14/2021		
		Sample Type	N		FD		
Method	Analyte	Unit	Result	Q	Result	Q	
TO15	1,1,2-Trichlorotrifluoroethane (Freon 113)	µg/m^3	2.3		2.3		Abs Criteria
TO15	1,2,4-Trichlorobenzene	µg/m^3	5.6	U	5.3	U	NC
TO15	1,2,4-Trimethylbenzene	µg/m^3	4.5		4.8		6%
TO15	1,2-Dichlorobenzene	µg/m^3	0.91	U	0.86	U	NC
TO15	1,2-Dichloropropane	µg/m^3	0.7	U	0.66	U	NC
TO15	1,3,5-Trimethylbenzene	µg/m^3	1		1.3		Abs Criteria
TO15	1,3-Butadiene	µg/m^3	1.4		1.6		Abs Criteria
TO15	1,3-Dichlorobenzene	µg/m^3	0.81	J	0.62	J	Abs Criteria
TO15	1,4-Dioxane	µg/m^3	0.54	U	0.52	U	NC
TO15	2,2,4-Trimethylpentane	µg/m^3	51	J	52	J	2%
TO15	2-Butanone (MEK)	µg/m^3	1.8	J	4.5	J	**Abs Criteria**
TO15	2-Hexanone	µg/m^3	3.1	U	0.96	J	Abs Criteria
TO15	4-Ethyltoluene	µg/m^3	3.3		3.3		Abs Criteria
TO15	4-Methyl-2-Pentanone (MIBK)	µg/m^3	0.62	U	0.59	U	NC
TO15	Acetone	µg/m^3	6.8	J	11	J	**Abs Criteria**
TO15	Allyl Chloride	µg/m^3	2.4	U	2.2	U	NC
TO15	Benzyl Chloride	µg/m^3	0.78	U	0.74	U	NC
TO15	Bromodichloromethane	µg/m^3	1	U	0.96	U	NC
TO15	Bromoform	µg/m^3	1.6	U	1.5	U	NC
TO15	Bromomethane	µg/m^3	2.9	UJ	2.8	UJ	NC
TO15	Carbon Disulfide	µg/m^3	12		12		0%
TO15	Chlorobenzene	µg/m^3	0.7	U	0.66	U	NC
TO15	cis-1,3-Dichloropropene	µg/m^3	0.68	U	0.65	U	NC
TO15	Cyclohexane	µg/m^3	45		44		2%
TO15	Dibromochloromethane	µg/m^3	1.3	U	1.2	U	NC
TO15	Ethanol	µg/m^3	2	J	3.1		Abs Criteria
TO15	Hexachloro-1,3-Butadiene	µg/m^3	8	U	7.7	U	NC
TO15	Hexane	µg/m^3	81		78		4%
TO15	Isopropyl Alcohol (Manufacturing-Strong Acid)	µg/m^3	3.4		3.7		Abs Criteria
TO15	Isopropylbenzene	µg/m^3	0.4	J	0.71	U	Abs Criteria
TO15	Methylene Chloride	µg/m^3	1	U	1	U	NC
TO15	N-Heptane	µg/m^3	44		42		5%
TO15	N-Propylbenzene	µg/m^3	0.85		0.68	J	Abs Criteria
TO15	Styrene	µg/m^3	0.58	J	0.43	J	Abs Criteria
TO15	Tetrahydrofuran	µg/m^3	0.87	J	1.2	J	Abs Criteria
TO15	trans-1,3-Dichloropropene	µg/m^3	0.68	U	0.65	U	NC
TO15	Trichlorofluoromethane (Freon 11)	µg/m^3	2.4		2.3		Abs Criteria
TO15SIM	1,1,1-Trichloroethane	µg/m^3	0.084	J	0.09	J	Abs Criteria
TO15SIM	1,1,2,2-Tetrachloroethane	µg/m^3	0.21	U	0.2	U	NC
TO15SIM	1,1,2-Trichloroethane	µg/m^3	0.16	U	0.16	U	NC
TO15SIM	1,1-Dichloroethane	µg/m^3	0.12	U	0.12	U	NC
TO15SIM	1,1-Dichloroethene	µg/m^3	0.06	U	0.057	U	NC
TO15SIM	1,2-Dibromoethane	µg/m^3	0.58	U	0.55	U	NC
TO15SIM	1,2-Dichloroethane	µg/m^3	0.51		0.5		Abs Criteria
TO15SIM	1,2-Dichlorotetrafluoroethane (Freon 114)	µg/m^3	0.16	J	0.15	J	Abs Criteria
TO15SIM	1,4-Dichlorobenzene	µg/m^3	0.45	U	0.43	U	NC

Table 5-4
Summary of Field Duplicate Sampling Results
Soil Gas

			Location		RG-10		RG-10		RPD (%)
			Sample Name		RG10-SG041421		FD01-SG041421		
			Sample Date		4/14/2021		4/14/2021		
			Sample Type		N		FD		
TO15SIM	Benzene	µg/m^3		2.6		2.6		0%
TO15SIM	Carbon Tetrachloride	µg/m^3		1.8		1.8		0%
TO15SIM	Chloroethane	µg/m^3		0.13	J	0.17	J	Abs Criteria
TO15SIM	Chloroform	µg/m^3		2.8		2.9		4%
TO15SIM	Chloromethane	µg/m^3		1.6	U	1.5	U	NC
TO15SIM	cis-1,2-Dichloroethene	µg/m^3		0.12	U	0.11	U	NC
TO15SIM	Dichlorodifluoromethane (Freon 12)	µg/m^3		2.3		2.4		4%
TO15SIM	Ethylbenzene	µg/m^3		2.7		2.7		0%
TO15SIM	m / p - Xylene	µg/m^3		7.1		7		1%
TO15SIM	Methyl tert-butyl ether	µg/m^3		0.54	U	0.52	U	NC
TO15SIM	o -Xylene	µg/m^3		2.9		2.8		4%
TO15SIM	Tetrachloroethene	µg/m^3		2.8		2.8		0%
TO15SIM	Toluene	µg/m^3		18		18		0%
TO15SIM	trans-1,2-Dichloroethene	µg/m^3		0.6	U	0.57	U	NC
TO15SIM	Trichloroethene	µg/m^3		0.11	J	0.12	J	Abs Criteria
TO15SIM	Vinyl Chloride	µg/m^3		0.13		0.13		Abs Criteria

Notes:
ABS - absolute value
N - normal sample
FD - field duplicate
µg/m^3 micrograms per meter cubed
J - estimated value
NC - not calculated
Q - qualifier
RPD - relative percent difference
U - nondetect
UJ - estimated nondetect
ABS. Criteria - One or both of the sample results are less than 5 times the reporting limit. The absolute value between the two results is within acceptable criteria.
Yellow highlighting - RPD value is outside of 40% criteria and/or the ABS. Criteria is outside of control limits

Section 6

Data Usability Assessment

One hundred percent of the data reported and validated in this QCSR are suitable for their intended use as stated in the QAPP (CDM Smith 2020). No sample results were rejected.

The achievement of the completeness goals for the number of samples collected and the number of sample results acceptable for use provides sufficient quality data to support project decisions. Sample results that were qualified as estimated are usable for project decisions.

Section 7
References

CDM Smith. 2020. *Phase 2 Quality Assurance Project Plan, Operable Unit 1, 700 South 1600 East PCE Plume, Salt Lake City, Utah.* Prepared for the U.S. Army Corps of Engineers, Kansas City District. December 2020.

EPA. 2017a. *National Functional Guidelines for Inorganic Superfund Methods Data Review*, EPA-540-R-2017-001. January 2017.

EPA. 2017b. *National Functional Guidelines for Organic Superfund Methods Data Review*, EPA-540-R-2017-002. January 2017.

EPA. 2014. EPA's *Analysis of Volatile Organic Compounds (VOCs) in Air Contained in Canisters by Method TO-15*. June 2014.

EPA 2004. EPA's *Test Methods for Evaluating Solid Wastes: Physical/Chemical Methods* (SW-846 2nd edition 1982, revised 1984; 3rd edition 1986; and Updates I, II, IIA, III, IIIA, and IIIB, 1996, 1998, and 2004).

Attachment 1

Data Validation Reports

VA Salt Lake City
Salt Lake City, Utah
Groundwater Validation Report

Sample Delivery Group (SDG) Number: 21D206
Laboratory: EMAX Laboratories, Inc.

Matrix: Surface water
Collection date: 04/13/2021 through 04/15/2021
Analysis/Methods:

Volatile Organic Compounds SW 846 8260C
Dissolved Gases - RSK 175
Metals SW 846 6020A
Mercury SW 846 7470A
Wet Chemistry Parameters:
Chloride EPA 300.0
Sulfate EPA 300.0
Total Alkalinity SM 2320B
Nitrate / Nitrite - N SM 4500 NO3E
Total Organic Carbon (TOC) SW 9060

Samples in SDG:

Lab ID	Sample Number	Lab ID	Sample Number
D206-01	SW166-SW041321	D206-08	SW12-SW041521
D206-02	SW35-SW041321	D206-09	SW08-SW041521
D206-03	SW39-SW041321	D206-10	SW54-SW041521
D206-04	SW53-SW041321	D206-11	FD01-SW041521
D206-05	SW34-SW041421	D206-12	TB01-SW041521
D206-06	SW16I-SW041521	D206-13	TB02-SW041521
D206-07	SW16E-SW041521	D206-14	TB03-SW041521

Data validation was performed in accordance with the specific analytical methods, National Functional Guidelines for Organic Superfund Methods Data Review (EPA January 2017), and the National Functional Guidelines for Inorganic Superfund Methods Data Review (EPA January 2017).

Volatile Organic Compounds 8260C

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?	**Yes**		
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)	**Yes**		
Laboratory Control Spike Duplicates RPD within limits?	**Yes**		

Comments (note deviations):

Field Duplicates	**8260C**	**Sample SW54-SW041521**	**Duplicate FD01-SW041521**	**%RPD**	**Qualifiers**	**Associated Samples**
	1,1,1-Trichloroethane	0.13 J	0.12 J	NC	None	Sample results ≤ 5xs RL; ABS Diff. < RL
	Chloroform	5.0	4.6	NC	None	

MS/MSD	**8260C**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
SW08-SW041521 MS/MSD (D206-09)		Acceptable			

LCS/LCSD	**8260C**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
LCS1W / LCSD1W		Acceptable			

Accuracy:	**Yes**	**No**	**N/A**
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)	**Yes**		
Laboratory Control Sample criteria met?	**Yes**		
Were the Laboratory Method Blank results all < RL?	**Yes**		
Were the Field Blanks results all < RL?		**No**	
Was the ICAL criteria met?	**Yes**		
Was the CCV criteria met?	**Yes**		
Was the Tuning criteria met?	**Yes**		
Were the Surrogate % recoveries within laboratory determined control limits?	**Yes**		
Were the Internal Standard areas within ± 50 - 150%?	**Yes**		

Comments (note deviations):

Blanks	8260C	Concentration	MDL /RL	Qualifiers	Associated Samples
MBLK1W		Nondetect			

Field Blank	8260C	Concentration	MDL /RL	Qualifiers	Associated Samples
TB01-SW041521	Acetone	4.2 J	2.5 / 20	None	Sample results nondetect
TB02-SW041521	Acetone	4.5 J	2.5 / 20	None	Sample results nondetect
TB03-SW041521		Nondetect			

Surrogates	8260C	%R	Limit	Qualifiers	Associated Samples
		Acceptable			

MS/MSD	8260C	%R	Limit	Qualifiers	Associated Samples
SW08-SW041521 MS/MSD (D206-09)		Acceptable			

LCS/LCSD	8260C	%R	Limits	Qualifiers	Associated Samples
LCS1W / LCSD1W		Acceptable			

ICAL	8260C	RRF	%RSD	Qualifiers	Associated Samples
4/6/2021 15:38		Acceptable	Acceptable		

CCV	8260C	RRF	%D	Limits	Qualifiers	Associated Samples
04/21/21 12:45		Acceptable	Acceptable			

Tune	8260C
	Acceptable

Internal Standards	8260C	Area	Area Lower / Upper Limit	Qualifiers	Associated Samples
		Acceptable			

Dissolved Gases RSK-175

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?	**Yes**		
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)	**Yes**		
Laboratory Control Spike Duplicates RPD within limits?	**Yes**		
Are the laboratory duplicate RPDs ≤ 20% for water ≤35% for soils or within CRQL criteria?			**N/A**

Comments (note deviations):

Field Duplicates	**RSK-175**	**Sample**	**Duplicate**	**%RPD**	**Qualifiers**	**Associated Samples**
		SW54-SW041521	**FD01-SW041521**			
		ND	ND			

MS/MSD	**RSK-175**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
SW08-SW041521 MS/MSD (D206-09)		Acceptable			

LCS/LCSD	**RSK-175**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
LCS1W / LCD1W		Acceptable			

Laboratory Duplicates	**RSK-175**	**Sample (ug/L)**	**Duplicate (ug/L)**	**RPD**	**Qualifiers**	**Associated Samples**
N/A						

Accuracy:	**Yes**	**No**	**N/A**
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)	**Yes**		
Laboratory Control Sample criteria met?	**Yes**		
Were the Laboratory Method Blank results all < RL?	**Yes**		
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met?	**Yes**		
Was the CCV criteria met?	**Yes**		
Was the Tuning criteria met?			**N/A**
Were the Surrogate % recoveries within laboratory determined control limits?			**N/A**
Were the Internal Standard areas within ± 50 - 150%?			**N/A**

Comments (note deviations):

Blanks	**RSK-175**	**Concentration (ug/L)**	**MDL / RL**	**Qualifiers**	**Associated Samples**
MBLK1W		Nondetect			

Field Blank	**RSK-175**	**Concentration**	**MDL / RL**	**Qualifiers**	**Associated Samples**
N/A					

Surrogates	**RSK-175**	**%R**	**Limit**	**Qualifiers**	**Associated Samples**
N/A					

MS/MSD	**RSK-175**	**%R**	**Limits (%)**	**Qualifiers**	**Associated Samples**
SW08-SW041521 MS/MSD (D206-09)		Acceptable			

LCS/LCSD	**RSK-175**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
LCS1W / LCD1W		Acceptable			

ICAL	**RSK-175**	**RRF**	**%RSD**	**Qualifiers**	**Associated Samples**
4/29/2020		Acceptable	Acceptable		

CCV	**RSK-175**	**RRF**	**%D**	**Limits**	**Qualifiers**	**Associated Samples**
4/29/2020 '14:39		Acceptable	Acceptable			

Tune	RSK-175
N/A	

Internal Standards	RSK-175	Area	Area Lower / Upper Limit	Qualifiers	Associated Samples
N/A					

Metals SW 6020A / Mercury 7470A

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?	**Yes**		
Are the laboratory duplicate RPDs ≤ 20% for (water / soil) or within CRQL criteria?			**N/A**
Are the matrix spike duplicates RPD ≤ 20%?	**Yes**		
Are the laboratory control sample duplicates RPDs ≤ 20%?	**Yes**		

Comments (note deviations):

Field Duplicates		**Sample (ug/L) SW54-SW041521**	**Duplicate (ug/L) FD01-SW041521**	**%RPD**	**Qualifier**	**Associated Samples**
	Arsenic	0.641 J	0.646 J	NC	None	Sample results ≤ 5xs RL; ABS Diff. < RL
	Chromium	0.66 J	0.614 J	NC	None	
	Manganese	0.432 J	0.29 J	NC	None	
	Selenium	0.784 J	0.726 J	NC	None	
	Vanadium	1.45	1.46	NC	None	

MS/MSD	**RPD**	**Qualifiers**	**Associated Samples**
SW08-SW041521 MS/MSD (D206-09)	Acceptable		

LCS / LCSD	**RPD**	**Qualifiers**	**Associated Samples**
LCS1W / LCD1W	Acceptable		
LCS1W / LCD1W (Hg)	Acceptable		

Laboratory Duplicate	**Sample**	**Duplicate**	**RPD**	**Qualifier**	**Associated Samples**
N/A					

Accuracy:	**Yes**	**No**	**N/A**
Were serial dilutions analyzed and within control limits of ±10% for waters (± for 15% for soils) or initial sample result less than 50x MDL?	**Yes**		
Was matrix spike criteria met (frequency 20% and % recovery 75-125%)?		**No**	
Was post digestion spike criteria met (if applicable)?			**N/A**
Was laboratory control sample criteria met?	**Yes**		
Was laboratory blank criteria met (within control limits)?	**Yes**		
Were ICV/CCV % recoveries within 90-110%?	**Yes**		
Were the Detection Limit PQL Standards within 70-130?			**N/A**
Was the %D on form 16-IN for the initial calibration instrument response and concentration data <30%?			**N/A**
Were ICSA/ICSAB % recoveries acceptable or within CRQL criteria?	**Yes**		
Was the tune %RPD <5% (Peak width < 0.75)?	**Yes**		
Was internal standard criteria met?	**Yes**		

Comments (note deviations):

Serial Dilution	**Analyte**	**Initial Sample Result**	**%D**	**50 x MDL**	**Qualifier**	**Associated Samples**
			Acceptable			

MS/MSD	**Analyte**	**%R**	**Limits**	**Post Digestion**	**Qualifiers**	**Associated Samples**
SW08-SW041521 MS/MSD (D206-09)	Calcium	67 / 67	75-125	100	None	ISR > 4xs the spike added
	Magnesium	127 / 110	75-125	104	None	ISR > 4xs the spike added

ISR = Initial Sample Result

LCS/LCSD	**Analyte**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
LCS1W / LCD1W		Acceptable			
LCS1W / LCD1W (Hg)		Acceptable			

ICV/CCV	**Analyte**	**%R**	**Limits**	**Qualifier**	**Associated Samples**
		Acceptable			

Blanks

Prep Blank	Result (ug/L)	MDL/RL (ug/L)	Qualifier	Associated Samples
MBLK1W	Nondetect			

ICBs	Analyte	Result (ug/L)	MDL/RL (ug/L)	Qualifier	Associated Samples
		Nondetect			
	Mercury	Nondetect			

CCBs	Analyte	Result (ug/L)	MDL/RL (ug/L)	Qualifier	Associated Samples
CCB8 through CCB10	Sodium	100 / 50 /30	25 / 100	None	Sample results > RL
CCB1	Mercury	-0.021	0.1 / 0.5	None	-Blank results > - RL
CCB2	Mercury	-0.020	0.1 / 0.5	None	-Blank results > - RL
CCB3	Mercury	-0.020	0.1 / 0.5	None	-Blank results > - RL

Field Blank	6020A	Concentration (ug/L)	MDL/RL (ug/L)	Qualifiers	Associated Samples
N/A					

ICSA/AB	Analyte - Solution A	%R	Found Sol. A / True A	RL	Qualifier	Associated Samples
		Acceptable				

PQL Standard Check	%R	Qualifiers	Associated Samples
N/A			

Tune

Acceptable

Internal Standards	Qualifier	Associated Samples
Acceptable		

Wet Chemistry Parameters

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPD) ≤30% (soils / water) or within CRQL criteria?	**Yes**		
Are the laboratory duplicate RPDs ≤ 20% for water ≤35% for soils or within CRQL criteria?	**Yes**		
Are the matrix spike duplicates RPD ≤ 20%?	**Yes**		
Are the laboratory control spike duplicates RPD ≤ 20%?	**Yes**		

Comments (note deviations):

Field Duplicates	**Sample (mg/L) SW54-SW041521**	**Duplicate (mg/L) FD01-SW041521**	**RPD**	**Qualifier**	**Associated Samples**
TOC	0.493	0.768	NC	None	Sample results < 5xs RL; ABS Diff. < RL

MS/MSD	**%R**	**Limits**	**RPD %**	**Qualifiers**	**Associated Samples**
SW08-SW041521 MS/MSD (D206-09)			Acceptable		

** Numerous analytes evaluated for MS/MSDs %R and %RPD - all QC data within acceptable criteria.

LCS/ LCSD	**Limits**	**RPD**	**Qualifiers**	**Associated Samples**
		Acceptable		

** Numerous LCS/LCSDs performed / evaluated all QC data within acceptable criteria

Laboratory Duplicate	**Sample**	**Duplicate**	**RPD**	**Qualifiers**	**Associated Samples**
			Acceptable		

Accuracy:	**Yes**	**No**	**N/A**
Was matrix spike criteria met (frequency 20% and % recovery 75-125%)?	**Yes**		
Was post digestion spike criteria met (if applicable)?			**N/A**
Was laboratory control sample criteria met?	**Yes**		
Was laboratory blank criteria met (within control limits)?	**Yes**		
Were the Field Blanks results all < RL?			**N/A**
Were ICV/CCV % recoveries within 90-110%?	**Yes**		
Was the tune %RSD <5% ?			**N/A**
Was internal standard criteria met?			**N/A**

Comments (note deviations):

MS /MSD	**Analyte**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
SW08-SW041521 MS/MSD (D206-09)		Acceptable			

** Numerous analytes evaluated for MS/MSDs %R and %RPD - all QC data within acceptable criteria.

LCS / LCSD	**Analyte**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
		Acceptable			

** Numerous LCS/LCSD performed / evaluated all QC data within acceptable criteria

ICV/CCV	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
	Acceptable			

** Multiple ICV/CCVs were reported - all were within acceptable criteria

Blanks	**Analyte**	**Result**	**MDL/RL**	**Qualifiers**	**Associated Samples**
		Nondetect			

** Numerous prep. blanks performed / evaluated all QC blanks were nondetect

ICB / CCBs	**Analyte**	**Result**	**MDL/RL**	**Qualifier**	**Associated Samples**
		Nondetect			

** Numerous ICB/CCBs performed / evaluated all QC blanks were nondetect.

Field Blank	Analyte	Result (mg/L)	MDL/RL	Qualifiers	Associated Samples
N/A					

Tune	Analyte	%RSD	Limits	Qualifiers	Associated Samples
N/A					

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	Yes		
Were holding times met?	Yes		
Was preservation criteria met? (0° C - 6° C)	Yes		
Were Chain-of-Custody records complete and provided in data package?	Yes		

Comments (note

The cooler temperatures were 1.2, 3.1 & 3.2°C

Preservation	Cooler Temperature (Degrees C)	Preservation Criteria	Qualifier	Associated Samples
	Acceptable			

Holding Times	Analyte	Days to Extraction	HT Criteria	Qualifier	Associated Samples
		Acceptable			

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	Yes		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	Yes		

Comments (note deviations):

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	Yes		
Do the reporting limits meet project requirements?	Yes		

Comments (note deviations):

Comment:

Data is usable as reported.

Data Validator: Kristine Molloy Date: 5/21/2021

Data Reviewer: Cherie Zakowski Date: 5/23/2021

VA Salt Lake City
Salt Lake City, Utah
Groundwater Validation Report

Sample Delivery Group (SDG) Number: 21D236
Laboratory: EMAX Laboratories, Inc.

Matrix: Groundwater
Collection date: 04/15/2021 & 04/16/2021
Analysis/Methods:

Volatile Organic Compounds SW 846 8260C

Samples in SDG:

Lab ID	Sample Number	Lab ID	Sample Number
D236-01	RG03-GW041521	D236-08	RG10-GW041621
D236-02	RG08-GW041521	D236-09	RG05-GW041621
D236-03	RG04-GW041521	D236-10	RG01-GW041621
D236-04	FD01-GW041521	D236-11	RG02-GW041621
D236-05	RG11-GW041621	D236-12	RG09-GW041621
D236-06	RG06-GW041621	D236-13	TB02-GW041621
D236-07	RG07-GW041621		

Data validation was performed in accordance with the specific analytical methods and National Functional Guidelines for Organic Superfund Methods Data Review (EPA January 2017).

Volatile Organic Compounds 8260C

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPD) ≤50% (soils), <30% (water) or within CRQL criteria?	**Yes**		
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)		**No**	
Laboratory Control Spike Duplicates RPD within limits?	**Yes**		

Comments (note deviations):

Field Duplicates	**8260C**	**Sample RG08-GW041521**	**Duplicate FD01-GW041521**	**%RPD**	**Qualifiers**	**Associated Samples**
	1,1,1-Trichloroethane	0.49 J	0.48 J	NC	None	Sample results < 5xs RL; ABS Diff. < RL
	1,1-Dichloroethene	0.15 J	0.14 J	NC	None	
	Chloroform	2.9	2.9	NC	None	
	cis-1,2-Dichloroethylene	0.15 J	0.15 J	NC	None	
	Trichloroethylene	0.42 J	0.43 J	NC	None	

MS/MSD	**8260C**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
RG04-GW041521 MS/MSD (D236-03)	Carbon Disulfide	37%	20%	**J****	**D236-03**

** Qualification required for detected results only - associated sample results nondetect- no qualification required

LCS/LCSD	**8260C**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
LCS1W / LCSD1W		Acceptable			
LCS2W / LCSD2W		Acceptable			

Accuracy:	**Yes**	**No**	**N/A**
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)	**Yes**		
Laboratory Control Sample criteria met?	**Yes**		
Were the Laboratory Method Blank results all < RL?	**Yes**		
Were the Field Blanks results all < RL?		**No**	
Was the ICAL criteria met?	**Yes**		
Was the CCV criteria met?	**Yes**		
Was the Tuning criteria met?	**Yes**		
Were the Surrogate % recoveries within laboratory determined control limits?	**Yes**		
Were the Internal Standard areas within ± 50 - 150%?	**Yes**		

Comments (note deviations):

Blanks	**8260C**	**Concentration**	**MDL /RL**	**Qualifiers**	**Associated Samples**
MBLK1W		Nondetect			
MBLK2W		Nondetect			

Field Blank	8260C	Concentration	MDL /RL	Qualifiers	Associated Samples
TB02-GW041621	Acetone	4.0 J	2.5 / 20	U-RL	D236-05, D236-08, D236-09

Surrogates	8260C	%R	Limit	Qualifiers	Associated Samples
		Acceptable			

MS/MSD	8260C	%R	Limit	Qualifiers	Associated Samples
RG04-GW041521 MS/MSD (D236-03)		Acceptable			

LCS/LCSD	8260C	%R	Limits	Qualifiers	Associated Samples
LCS1W / LCSD1W		Acceptable			
LCS2W / LCSD2W		Acceptable			

ICAL	8260C	RRF	%RSD	Qualifiers	Associated Samples
04/06/2021 15:38		Acceptable	Acceptable		

CCV	8260C	RRF	%D	Limits	Qualifiers	Associated Samples
04/21/2021 12:45		Acceptable	Acceptable			
04/22/2021 14:23		Acceptable	Acceptable			

Tune	8260C
	Acceptable

Internal Standards	8260C	Area	Area Lower / Upper Limit	Qualifiers	Associated Samples
		Acceptable			

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	Yes		
Were holding times met?	Yes		
Was preservation criteria met? (0° C - 6° C)	Yes		
Were Chain-of-Custody records complete and provided in data package?	Yes		

Comments (note

The cooler temperature was 4.3°C

Preservation	Cooler Temperature (Degrees C)	Preservation Criteria	Qualifier	Associated Samples
	Acceptable			

Holding Times	Analyte	Days to Extraction	HT Criteria	Qualifier	Associated Samples
		Acceptable			

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	Yes		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	Yes		

Comments (note deviations):

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	Yes		
Do the reporting limits meet project requirements?	Yes		

Comments (note deviations):

Comment: Data is usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 5/11/2021

Data Reviewer: Cherie Zakowski Date: 5/13/2021

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number: 2103818
Laboratory: Eurofins Air Toxics
Matrix: Air
Collection date: 03/26/21
Analysis/Methods:

Volatile Organic Compounds - EPA Method TO-15
Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number
FD05-SG032621	2103818-01A / B
MW34-SG032621**	2103818-02A / B
MW24-SG032521-60	2103818-03A / B
MW24-SG032621-32	2103818-04A / B

**This sample is applicable to the East Side Springs Data Summary Report only.

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPDs) ≤40%?	**Yes**		
Laboratory Control Spike Duplicate RPDs within limits?	**Yes**		
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Were the Laboratory Duplicate RPDs within limits?	**Yes**		

Comments (note deviations):

Field Duplicates	**TO-15 / SIM**	**Sample (ug/m3) MW24-SG032621-32**	**Duplicate (ug/m3) FD05-SG032621**	**%RPD**	**Qualifiers**	**Associated Samples**
	1,1,1-Trichloroethane	2.1	2.0	NC	None	
	Benzene	0.28 J	0.34 J	NC	None	
	Carbon Tetrachloride	2.8	2.8	NC	None	
	Dibromochloromethane	1.8 J	1.3 J	NC	None	
	Freon 11	18	18	NC	None	Sample results < 5xs RL; ABS Diff. < RL
	Freon 113	1.9 J	2 J	NC	None	
	Freon 114	0.37 J	0.39 J	NC	None	
	Freon 12	3.0 J	3.0 J	NC	None	
	Trichloroethene	1.5 U	0.31 J	NC	None	
	Vinyl Chloride	0.15 J	0.75 U	NC	None	

LCS/LCSD	**TO-15 / SIM**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
2103818-07A / 07AA		Acceptable			
2103818-07B / 07BB (SIM)		Acceptable			
2103818-07C / 7CC		Acceptable			
2103818-07D / 7DD (SIM)		Acceptable			

MS/MSD	**TO-15 / SIM**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
N/A					

Laboratory Duplicate	**Sample (ug/m3)**	**Duplicate (ug/m3)**	**RL**	**%RPD**	**Qualifiers**	**Associated Samples**
2103818-03A / 03AA						
Freon 113	2.3	3.0	13.0	27	None	Sample results < 5xs RL; ABS Diff. < RL
2103818-03B / 03BB				Acceptable		

Accuracy:	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?			**Yes**
Were the Laboratory Method Blank results all < RL?			**No**
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)			**Yes**
Was the CCV criteria met? (30%)			**Yes**
Was the Tuning criteria met?			**Yes**
Were the Surrogate % recoveries within laboratory determined control limits?			**Yes**
Were the Internal Standard areas within ± 60 - 140%?			**Yes**
Was canister certification criteria met?			**Yes**
Were sample results able to be recalculated from the laboratory raw data and were they accurate?			**Yes**
Was target compound identification correctly performed by the laboratory?			**Yes**
Were chromatograms representative of the sample results?			**Yes**

Comments (note deviations):

Blanks	**TO-15 / SIM**	**Concentration (ug/m^3)**	**MDL / RL (ug/m^3)**	**Qualifiers**	**Associated Samples**
Lab Blank					
2103818-05A		Nondetect			
2103818-05B (SIM)	1,2-Dichloroethane	0.015 J	0.014 / 0.077	None	Sample results nondetect
	Trichloroethene	0.045 J	0.018 / 0.10	**U-RL**	**2103818-01B, 2103818-2B**
2103818-05C	1,2,4-Trichlorobenzene	0.74 J	0.52 / 3.7	None	Sample results nondetect
	1,2-Dichlorobenzene	0.099 J	0.059 / 0.60	None	Sample results nondetect
	1,3-Dichlorobenzene	0.085 J	0.065 / 0.6	None	Sample results nondetect
	1,4-Dioxane	0.088 J	0.074 / 0.36	None	Sample results nondetect
	alpha-Chlorotoluene	0.20 J	0.10 / 0.52	None	Sample results nondetect
2103818-05D (SIM)	1,2-Dibromoethane	0.047 J	0.044 / 0.38	None	Sample results nondetect
	1,2-Dichloroethane	0.021 J	0.014 / 0.081	None	Sample results nondetect
	1,4-Dichlorobenzene	0.085 J	0.078 / 0.3	None	Sample results nondetect
	Tetrachloroethene	0.033 J	0.03 / 0.14	None	Sample results> RL
	Trichloroethene	0.051 J	0.018 / 0.11	**U-RL**	**2103818-04B**

Field Blank	**TO-15 / SIM**	**Concentration**	**MDL / RL**	**Qualifiers**	**Associated Samples**
N/A					

Surrogates	**TO-15 / SIM**	**%R**	**Limit**	**Qualifiers**	**Associated Samples**
		Acceptable			

MS/MSD	**TO-15 SIM**	**%R**	**Limits (%)**	**Qualifiers**	**Associated Samples**
N/A					

LCS/LCSD	**TO-15 / SIM**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
2103818-07A / 7AA		Acceptable			
2103818-07B / 07BB (SIM)		Acceptable			
2103818-07C / 7CC		Acceptable			
2103818-07D / 7DD (SIM)		Acceptable			

ICV/CCV	**TO-15 / SIM**	**%R**	**Qualifiers**	**Associated Samples**
4/2/2021 13:32 ICV	Freon 11	130.34	**J / UJ**	**All samples**

ICAL	**TO-15 / SIM**	**RRF**	**%RSD**	**Qualifiers**	**Associated Samples**
4/01/2021 22:03		Acceptable	Acceptable		
4/01/2021 20:04 (SIM)		Acceptable	Acceptable		

CCV	TO-15 / SIM	RRF	%D	Qualifiers	Associated Samples
4/6/2021 8:03		Acceptable	Acceptable		
4/7/2021 7:50		Acceptable	Acceptable		
4/7/2021 12:14		Acceptable	Acceptable		
4/7/2021 11:59		Acceptable	Acceptable		
4/6/2021 8:03 (SIM)		Acceptable	Acceptable		
4/7/2021 7:50 (SIM)		Acceptable	Acceptable		
4/7/2021 12:14 (SIM)		Acceptable	Acceptable		
4/7/2021 11:59 (SIM)		Acceptable	Acceptable		

Tune	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Internal Standards	TO-15 / SIM	Area %	Area % Criteria	Qualifiers	Associated Samples
	All Internal Standards	Acceptable			

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review — **TO-15 / SIM** — **Results**

Recalculated Sample Result — Acceptable

Sample #	Laboratory Reported Result (ug/m3)	Recalculated Sample Result (ug/m3)
TO-15		**RRF / Concentration**
2103818-03A	Bromodichloromethane: 40	0.6833 / 37.429
2103818-03A	Freon 11: 20	1.99360 / 20.246
TO-15 - SIM		
2103818-03B	Carbon Tetrachloride: 3.0	1.9248 / 2.961
2103818-03B	Freon 12: 2.9	2.4436 / 2.912

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc.= (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification	Acceptable
Chromatogram review	Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	Yes		
Were holding times met?	Yes		
Was preservation criteria met? (0° - 6° C)			N/A
Were Chain-of-Custody records complete and provided in data package?	Yes		

Comments (note

Holding Time / Canister Pressure Criteria	Days to Analysis	Criteria	Qualifiers	Associated Samples
Holding Time	Acceptable			

	Initial and Final Canister Pressure Results
Canister Pressure Criteria	Acceptable

Comparability: **Yes No N/A**

Were analytical procedures and methods followed as defined in the QAPP or field change documentation? **Yes**

Comments (note deviations):

Completeness (90%): **Yes No N/A**

Are all data in this SDG usable? **Yes**

Comments (note

Sensitivity: **Yes No N/A**

Are MDLs present and reported? **Yes**

Do the reporting limits meet project requirements? **Yes**

Comments (note deviations):

Overall Comments: Data are usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 5/7/2021

Data Reviewer: Cherie Zakowski Date: 5/9/2021

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number:	2103819
Laboratory:	Eurofins Air Toxics
Matrix:	Air
Collection date:	03/26/21
Analysis/Methods:	Volatile Organic Compounds - EPA Method TO-15 Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number
MW37-SG032621	2103819-01A / B
MW38-SG032621	2103819-02A / B
MW32-SG032621	2103819-03A / B

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPDs) ≤40%?			**N/A**
Laboratory Control Spike Duplicate RPDs within limits?			**Yes**
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Were the Laboratory Duplicate RPDs within limits?			**No**

Comments (note deviations):

Field Duplicates	**TO-15 / SIM**	**Sample (ug/m3)**	**Duplicate (ug/m3)**	**%RPD**	**Qualifiers**	**Associated Samples**
N/A						

LCS/LCSD	**TO-15 / SIM**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
2103819-06A / 06AA		Acceptable			
2103819-06B / 06BB (SIM)		Acceptable			

MS/MSD	**TO-15 / SIM**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
N/A					

Laboratory Duplicate	**Sample (ug/m3)**	**Duplicate (ug/m3)**	**RL**	**%RPD**	**Qualifiers**	**Associated Samples**
2103819-01A / 01AA						
1,3,5-Trimethylbenzene	0.10 J	0.68 U	0.68	NC	None	Sample results < 5xs RL; ABS Diff.
Ethanol	2.6 U	0.98 J	2.6 U	NC	None	< RL
2103819-01B / 01BB				Acceptable		

Accuracy:	**Yes**	**No**	**N/A**
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?			**Yes**
Were the Laboratory Method Blank results all < RL?			**No**
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)			**Yes**
Was the CCV criteria met? (30%)			**Yes**
Was the Tuning criteria met?			**Yes**
Were the Surrogate % recoveries within laboratory determined control limits?			**Yes**
Were the Internal Standard areas within ± 60 - 140%?			**Yes**
Was canister certification criteria met?			**Yes**
Were sample results able to be recalculated from the laboratory raw data and were they accurate?			**Yes**
Was target compound identification correctly performed by the laboratory?			**Yes**
Were chromatograms representative of the sample results?			**Yes**

Comments (note deviations):

Blanks	TO-15 / SIM	Concentration (ug/m^3)	MDL / RL (ug/m^3)	Qualifiers	Associated Samples
Lab Blank					
2103819-04A		Nondetect			
2103819-04B (SIM)	1,2-Dichloroethane	0.015 J	0.014 / 0.081	U-RL	2103819-02B
	Trichloroethene	0.045 J	0.018 / 0.11	U-RL	2103819-01B, 2103819-03B

Field Blank	TO-15 / SIM	Concentration	MDL / RL	Qualifiers	Associated Samples
N/A					

Surrogates	TO-15 / SIM	%R	Limit	Qualifiers	Associated Samples
		Acceptable			

MS/MSD	TO-15 SIM	%R	Limits (%)	Qualifiers	Associated Samples
N/A					

LCS/LCSD	TO-15 / SIM	%R	Limits	Qualifiers	Associated Samples
2103819-06A / 06AA		Acceptable			
2103819-06B / 06BB (SIM)		Acceptable			

ICV/CCV	TO-15 / SIM		%R	Qualifiers	Associated Samples
4/2/2021 13:32	Freon 11		130.34	J / UJ	All samples
ICV					

ICAL	TO-15 / SIM	RRF	%RSD	Qualifiers	Associated Samples
4/01/2021 22:03		Acceptable	Acceptable		
4/01/2021 20:04 (SIM)		Acceptable	Acceptable		

CCV	TO-15 / SIM	RRF	%D	Qualifiers	Associated Samples
4/6/2021 8:03		Acceptable	Acceptable		
4/7/2021 12:14		Acceptable	Acceptable		
4/6/2021 8:03 (SIM)		Acceptable	Acceptable		
4/7/2021 12:14 (SIM)		Acceptable	Acceptable		

Tune	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Internal Standards	TO-15 / SIM	Area %	Area % Criteria	Qualifiers	Associated Samples
	All Internal Standards	Acceptable			

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review **TO-15 / SIM** **Results**

Recalculated Sample Result Acceptable

Sample #	Laboratory Reported Result (ug/m3)	Recalculated Sample Result (ug/m3)
TO-15		**RRF / Concentration**
2103819-02A	2-Propanol : 0.93	1.4448 / 0.927
2103819-02A	Acetone: 6.1	0.45053 / 6.096
TO-15 - SIM		
2103819-02B	Ethylbenzene: 0.36	0.703/ 0.359
2103819-02B	Toluene: 5.4	1.4361 / 5.379

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc. = (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification Acceptable
Chromatogram review Acceptable

Representativeness:

	Yes	No	N/A
Were sampling procedures and design criteria met?	**Yes**		
Were holding times met?	**Yes**		
Was preservation criteria met? (0° - 6° C)			**N/A**
Were Chain-of-Custody records complete and provided in data package?	**Yes**		

Comments (note

Holding Time / Canister Pressure Criteria	**Days to Analysis**	**Criteria**	**Qualifiers**	**Associated Samples**
Holding Time	Acceptable			

	Initial and Final Canister Pressure Results
Canister Pressure Criteria	Acceptable

Comparability:

	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	**Yes**		

Comments (note deviations):

Completeness (90%):

	Yes	No	N/A
Are all data in this SDG usable?	**Yes**		

Comments (note

Sensitivity:

	Yes	No	N/A
Are MDLs present and reported?	**Yes**		
Do the reporting limits meet project requirements?	**Yes**		

Comments (note deviations):

Overall Comments: Data are usable with appropriate qualifiers applied.

Data Validator: *Kristine Molloy* Date: *4/30/2021*

Data Reviewer: *Cherie Zakowski* Date: *5/2/2021*

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number: 2104424
Laboratory: Eurofins Air Toxics
Matrix: Air
Collection date: 4/13/2021 & 4/14/2021
Analysis/Methods:

Volatile Organic Compounds - EPA Method TO-15
Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number	Sample Number	Laboratory Number
RG04-SG041321	2104424-01A / B	RG10-SG041421	2104424-05A / B
RG08-SG041321	2104424-02A / B	FD01-SG041421	2104424-06A / B
RG11-SG041321	2104424-03A / B	RG05-SG041421	2104424-07A / B
RG07-SG041421	2104424-04A / B	RG01-SG041421	2104424-08A / B

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPDs) ≤40%?		**No**	
Laboratory Control Spike Duplicate RPDs within limits?	**Yes**		
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Were the Laboratory Duplicate RPDs within limits?			**N/A**

Comments (note deviations):

Field Duplicates	**TO-15 / SIM**	**Sample (ug/m3) RG10-SG041421**	**Duplicate (ug/m3) FD01-SG041421**	**%RPD**	**Qualifiers**	**Associated Samples**
	Acetone	6.8	11	NC	**J****	
	2-Butanone (MEK)	1.8 J	4.5	NC	**J****	**RG10-SG041421, FD01-SG041421**
	1,3,5-Trimethylbenzene	1.0	1.3	NC	None	
	1,3-Butadiene	1.4 J	1.6	NC	None	
	1,3-Dichlorobenzene	0.81	0.62 J	NC	None	
	2-Hexanone	3.1 U	0.96 J	NC	None	
	2-Propanol	3.4	3.7	NC	None	
	4-Ethyltoluene	3.3	3.3	NC	None	Sample results < 5xs RL;
	Cumene	0.4 J	0.71 U	NC	None	ABS Diff. < RL
	Ethanol	2.0 J	3.1	NC	None	
	Freon 11	2.4	2.3	NC	None	
	Freon 113	2.3	2.3	NC	None	
	Propylbenzene	0.85	0.68 J	NC	None	
	Styrene	0.58 J	0.43 J	NC	None	
	Tetrahydrofuran	0.87 J	1.2 J	NC	None	
	1,1,1-Trichloroethane	0.084 J	0.09	NC	None	
	1,2-Dichloroethane	0.51	0.057 U	NC	None	
	Chloroethane	0.13 J	0.17	NC	None	Sample results < 5xs RL;
	Freon 114	0.16 J	0.15	NC	None	ABS Diff. < RL
	Trichloroethene	0.11 J	0.12	NC	None	
	Vinyl Chloride	0.13	0.13	NC	None	

** ABS Diff. > RL

LCS/LCSD	**TO-15 / SIM**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
2104424-11A / 11AA		Acceptable			
2104424-11B / 11BB (SIM)		Acceptable			

MS/MSD	**TO-15 / SIM**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
N/A					

Laboratory Duplicate	Sample (ug/m3)	Duplicate (ug/m3)	RL	%RPD	Qualifiers	Associated Samples
2104424-1A / 1AA						
Tetrahydrofuran	4.5	3.5	2.3	25	None	Sample results < 5xs RL; ABS Diff. < RL
2104424-1B / 1BB (SIM)				Acceptable		

Accuracy:	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?		**No**	
Were the Laboratory Method Blank results all < RL?		**No**	
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)		**No**	
Was the CCV criteria met? (30%)	**Yes**		
Was the Tuning criteria met?	**Yes**		
Were the Surrogate % recoveries within laboratory determined control limits?	**Yes**		
Were the Internal Standard areas within ± 60 - 140%?	**Yes**		
Was canister certification criteria met?	**Yes**		
Were sample results able to be recalculated from the laboratory raw data and were they accurate?	**Yes**		
Was target compound identification correctly performed by the laboratory?	**Yes**		
Were chromatograms representative of the sample results?	**Yes**		

Comments (note deviations):

Blanks	TO-15 / SIM	Concentration (ug/m^3)	MDL / RL (ug/m^3)	Qualifiers	Associated Samples
Lab Blank					
2104424-09A	Methylene Chloride	0.56 J	0.17 / 0.69	**U-RL**	**2104424-04A**
2104424-09B (SIM)		Acceptable			

Field Blank	TO-15 / SIM	Concentration	MDL / RL	Qualifiers	Associated Samples
N/A					

Surrogates	TO-15 / SIM	%R	Limit	Qualifiers	Associated Samples
		Acceptable			

MS/MSD	TO-15 SIM	%R	Limits (%)	Qualifiers	Associated Samples
N/A					

LCS/LCSD	TO-15 / SIM	%R	Limits	Qualifiers	Associated Samples
2104424-11A / 11AA					
	2,2,4-Trimethylpentane	126.88 / 126.88	68-121	**J**	**All samples**
	Bromomethane	134.78 / 127.22	63-134	**J****	**All samples**
2104424-11B / 11BB (SIM)		Acceptable			

** Qualification required for detected results only - associated results nondetect, no qualification required

ICV/CCV	TO-15 / SIM	%R	Qualifiers	Associated Samples
4/16/2021 19:16		Acceptable		

ICAL	TO-15 / SIM	RRF	%RSD	Qualifiers	Associated Samples
4/16/2021 6:18	Bromomethane	Acceptable	32.93	**J****	**All samples**
4/15/2021 23:40 (SIM)		Acceptable	Acceptable		

** Qualification required for detected results only - associated results nondetect, no qualification required

CCV	TO-15 / SIM	RRF	%D	Qualifiers	Associated Samples
4/26/2021 7:10	Bromomethane	Acceptable	135	J / UJ	All samples
4/26/2021 9:01		Acceptable	Acceptable		
4/26/2021 7:10 (SIM)		Acceptable	Acceptable		
4/26/2021 9:01 (SIM)		Acceptable	Acceptable		

Tune	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Internal Standards	TO-15 / SIM	Area %	Area % Criteria	Qualifiers	Associated Samples
	All Internal Standards	Acceptable			

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review — **TO-15 / SIM** — **Results**

Recalculated Sample Result — Acceptable

Sample #	Laboratory Reported Result (ug/m3)	Recalculated Sample Result (ug/m3)
TO-15		**RRF / Concentration**
2104424-03A	4-Methyl-2-Pentanone : 0.62	1.02126 / 0.617
2104424-03A	1,2,4-Trimethylbenzene: 0.64	1.5753 / 0.639
TO-15 - SIM		
2104424-03B	Benzene: 2.9	1.2281/ 2.927
2104424-03B	m,p-Xylene: 1.5	0.5993/ 1.490

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc. = (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification	Acceptable
Chromatogram review	Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	Yes		
Were holding times met?	Yes		
Was preservation criteria met? (0° - 6° C)			N/A
Were Chain-of-Custody records complete and provided in data package?	Yes		

Comments (note

Holding Time / Canister Pressure Criteria	Days to Analysis	Criteria	Qualifiers	Associated Samples
Holding Time	Acceptable			

	Initial and Final Canister Pressure Results
Canister Pressure Criteria	Acceptable

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	Yes		

Comments (note deviations):

Completeness (90%):	**Yes**	**No**	**N/A**
Are all data in this SDG usable?	**Yes**		

Comments (note

Sensitivity:	**Yes**	**No**	**N/A**
Are MDLs present and reported?	**Yes**		
Do the reporting limits meet project requirements?	**Yes**		

Comments (note deviations):

Overall Comments: Data are usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 5/7/2021

Data Reviewer: Cherie Zakowski Date: 5/9/2021

Attachment 2

Data Package Completeness Review Checklists

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 21D206

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		None
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt	X		1.2°C, 3.1 °C & 3.2 °C
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)			Not Applicable
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)	X		
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)	X		
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)	X		
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)	X		
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks	X		

Data package complete and ready for Validation Cherie Zakowski Date: 5/23/2021

Signature

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 21D236

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		None
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt	X		4.3 °C
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)			Not Applicable
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks	X		

Data package complete and ready for Validation Cherie Zakowski Date: 5/09/2021

Signature

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 2103818

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		None
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	X		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation Cherie Zakowski Date: 4/17/2021

Signature

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 2103819

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		None
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	X		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation Cherie Zakowski Date: 4/20/2021

Signature

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 2104424

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		None
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	X		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation Cherie Zakowski Date: 5/07/2021

Signature

Attachment 3

Analytical Data Packages

Note: Laboratory Data Reports removed from report and provided separately.

Memorandum

To: *Josephine Newton-Lund, PMP, Senior Project Manager, Environmental Branch, U.S. Army Corps of Engineers*
Shannon Smith, PE, Program Manager, Veterans Health Administration

From: *Nathan Smith, PMP, Senior Project Manager, CDM Federal Programs Corporation*
Whitney Treadway, Project Geologist, CDM Federal Programs Corporation

Date: *October 19, 2021*

Subject: *Aquifer Testing Analysis at the 700 South 1600 East PCE Plume Superfund Site, Salt Lake, City, Utah*

Overview

CDM Federal Programs Corporation (CDM Smith) has been contracted to provide remedial investigation activities at the 700 South 1600 East PCE Plume Site (Site) under Contract No. W912DQ-18-D-3008, Task Order No. W912DQ19f3048, in accordance with the Phase 2 Remedial Investigation Work Plan (CDM Smith 2020), Attachment A, Field Sampling Plan (FSP), and the Minor Field Modification (MFM) #3 to the Phase 2 FSP (CDM Smith 2021). In February 2021, aquifer (slug) tests were conducted at 27 wells at the Site to provide hydraulic conductivity (K) and transmissivity (T) estimates across the project area. The hydraulic conductivity and transmissivity estimates were used to support the data quality objectives (DQOs) described in the Work Plan including an evaluation of mass discharge of PCE in the groundwater at the source area and downgradient. The hydraulic conductivity and transmissivity estimates described in this memo are used in combination with groundwater VOC concentrations, hydraulic gradients, and lithology to evaluate mass discharge across the site.

The following wells were tested: MW-01S, MW-02, MW-03RA, MW-03RB, MW-03RC, MW-04, MW-08A, MW-08B, MW-08C, MW-13S, MW-13D, MW-13L, MW-15D, MW-18, MW-19, MW-20S, MW-20D, MW-21, MW-22, MW-26B, MW-26C, MW-26D, MW-32A, MW-34A, MW-34B, MW-34C, and MW-34D on the Veterans Health Administration (VHA) campus, Sunnyside Park, and East Side Springs area (Figure 1). Well locations for slug testing were selected based on review of lithologic logs, well screened intervals, water level data, and location relative to the groundwater plume. The slug tests were analyzed to estimate hydraulic conductivity and transmissivity of the shallow, intermediate, and deep aquifer zones.

Hydrogeologic Conceptual Model

The hydrogeologic conceptual model for this site has been previously defined using lithologic logs, well construction diagrams, and drilling notes. Lithology and aquifer characteristics vary widely

across the site. Tested wells were completed in deep semi-confined and shallow unconfined aquifers. An anisotropy ratio of 0.01 was assumed for all wells to be consistent with the groundwater flow model (see the Groundwater Modeling Report for more information on the anisotropy ratio). Using data from lithologic logs and the groundwater flow model, aquifer thickness was defined as the distance from the bottom of the semi-confining unit to the bottom of the aquifer for semi-confined wells, and from the water table to the bottom of the aquifer for unconfined wells (Table 1).

Data Collection

Data were collected following CDM Smith Technical Standard Operating Procedure 4-6, Hydraulic Conductivity Testing, and supplemented by Midwest Geosciences' *Field Guide for Slug Testing and Data Analysis* (Midwest Geosciences 2015). Slug test analysis parameters, including depth to water and well depth, were recorded in the field prior to starting testing at each location. Other data required for slug test analysis, such as the well screened interval and total depth, were taken from lithologic and well construction logs (Table 1). The well depth was measured in the field and was compared to the well depth previously reported. In all wells, the measured well depth at the time of testing was used in the analysis and to calculate other well input parameters. The slug test data collection forms completed in the field are included in Attachment A.

Wells tested included 1-inch, 2-inch, and 4-inch diameter wells constructed with polyvinyl chloride [PVC] casing and screen. Mechanical slug and pneumatic slug testing methods were employed. Mechanical slug tests were conducted in 2-inch wells using Midwest Geosciences mechanical slugs with expected displacements of 1 foot and 2 feet[1]. Mechanical slug tests were conducted in 4-inch wells using Midwest Geosciences mechanical slugs with expected displacements of 0.92 feet (11 inches) and 1.42 feet (17 inches)[2]. Falling head and rising head tests were conducted using both the mechanical slugs. At least six tests were completed at each mechanically tested well in the following order: 12-inch falling head displacement, 12-inch rising head displacement, 24-inch falling head displacement, 24-inch rising head displacement, 12-inch falling head displacement, and 12-inch rising head displacement. In some instances a test may have been disrupted during initiation and more than six tests were run. In the case of MW-13S, only four tests (12-inch falling head displacement, 12-inch rising head displacement, 24-inch falling head displacement, and 24-inch rising head displacement) were completed because of long water level recovery times.

During all tests, water level data were monitored using an In-situ Level-Troll 700 transducer with a vented cable. The transducer was lowered into each well far enough below the water level so that it would not be affected by the movement of the slug. After the transducer was in place, the cable was allowed to stabilize, and the transducer was allowed to equilibrate to the water temperature prior

[1] Midwest Geosciences slugs for use in 2-inch wells are tapered at both ends to reduce splashing. The 1-foot displacement slug is 24.48 inches (2.04 feet) long and 1.63 inches in diameter. The 2-foot displacement slug is 45.6 inches (3.8 feet) long and 1.63 inches in diameter.

[2] Midwest Geosciences slugs for use in 4-inch wells are tapered at both ends to reduce splashing. The 0.92-foot displacement slug is 25.56 inches (2.13 feet) long and 2.8 inches in diameter. The 1.42-foot displacement slug is 39.48 inches (3.29 feet) long and 2.8 inches in diameter.

to starting any tests. The mechanical slug was lowered into the well and positioned immediately above the water level. The field team started data collection using the pressure transducer prior to inserting or withdrawing the slug to ensure the data included the pretest static water level. The pressure transducer recorded water level data at a rate of up to one reading every 0.25 or 0.5 seconds (depending on recharge conditions) to capture rapid water level changes. The height of water column above the transducer was recorded. To start the falling head test, the slug was lowered into the water in one smooth, quick motion to create a near instantaneous change in the water level in the well. The change in water level was recorded until it recovered, in most cases, to at least 95 (percent) % of the pretest, static level. Following recovery, data collection on the transducer was then stopped and a new test was started. The rising head test was then started by raising the slug in one smooth, quick motion out of the water while continuing to collect water level data with the transducer. The test was completed once the water level recovered to 95% of the pretest, static water level (in most cases).

Pneumatic slug testing was completed on all eleven 1-inch wells (MW-03RA, MW-03RB, MW-03RC, MW-08C, MW-26B, MW-26C, MW-26D, MW-34A, MW-34B, MW-34C, and MW-34D). Pneumatic slug testing was also completed at well MW-02 because a 4-inch to 2-inch reducer at the surface inhibited using the appropriate size mechanical slug. Pneumatic slug tests were completed by attaching a Midwest Geosciences pneumatic test kit to the top of the PVC casing and increasing air pressure inside the well casing to displace the water level downward to create an initial displacement of 1 foot or 2 feet. Once the displacement stabilized, the air pressure was then released all at once and the water level recovery was observed. All pneumatic tests were rising head tests, as it was not possible to pull a vacuum on the well casings with the pneumatic kit set up to conduct a falling head test. During pneumatic tests, water level data were monitored using an In-situ Level-Troll 700 transducer with a vented cable in the same manner as during mechanical slug tests.

Data Analysis

Introduction

Slug test data were analyzed following the guidelines in Chapter 12 of Butler (2020). Data required for slug test analysis were either collected in the field, calculated, or obtained from existing sources (e.g., well construction). The parameters compiled and used for slug test analysis are included in Table 1.

At least two falling head tests and two rising head tests, one of each with 1-foot displacement and one of each with 2-foot displacement, were conducted at each 2-inch, mechanically tested well. At least two falling head tests and two rising head tests, one of each with 11-inch displacement and one of each with 17-inch displacement, were conducted at each 4-inch (except for MW-02). This series of tests makes it possible to assess the validity of the assumptions underlying standard slug test analysis methods or to determine if skin effects are present (Butler 2020). Further discussion of skin effects is presented in the following section. At least three rising head tests, two with 1-foot displacement and one with 2-foot displacement, were conducted at the pneumatically slug tested wells.

Post Processing of Slug Test Data

The water level and test time data from each test were reviewed in table and graphical format to identify when the test started by observing the change in water level caused by insertion or withdrawal of the slug. Test time was set to zero at the last static water level reading prior to when displacement started.

After the test start time was determined, the data were reviewed to identify the maximum displacement, H(0). In general, H(0) was selected after rapid increases and decreases in displacement (defined as noise) dissipated and displacement began to decrease steadily. All displacement data, starting at test time zero, were then normalized by dividing the observed displacement, H, by the expected displacement, H(0)*, of 1 foot (12 inches) or 2 feet (24 inches) for 2-inch wells, and 0.92 feet (11 inches), and 1.42 feet (17 inches) for the 4-inch wells.

Normalized water level displacement data were graphed versus test time and the tests from each well were plotted together in a coincident plot. If the plots of the falling and rising head tests were coincident then this indicated the assumptions used in the analysis methods are valid, that a skin effect is not present or, if present, that the skin effect is static, and analysis proceeded following the flow chart in Figure 12.1a in Butler (2020). In this case, only one test was selected for analysis because the coincidence indicates all tests will produce the same results. If the data were not coincident this suggests either a dynamic or directional skin effect is present, and analysis of the test with the least noise proceeded following the flow chart in Figure 12.1b in Butler (2020).

A skin effect, or well skin, is caused by the impact of drilling on the near borehole environment. Types of skin effects include static, dynamic, and directional. A static skin effect is difficult to detect because it has the same effect on all tests. A dynamic skin changes with each test so it causes random changes in test data. A directional skin effect is dependent on the direction of water flow, into or out of the well during the test, so falling head and rising head tests plot separately.

The displacement data from each location were reviewed and the test with the least noise (i.e., fluctuation in displacement early in the test) was selected for analysis. The test time and displacement data from the selected tests were then imported into Aqtesolv for analysis to estimate transmissivity or hydraulic conductivity (Duffield 2007). In Aqtesolv, the displacement data are normalized using H(0). A total of 27 slug tests, one from each of the 27 locations, were analyzed.

Converting Transmissivity (T) to Hydraulic Conductivity (K)

When the result of the Cooper et al. method was accepted, the estimate of T was converted to K using the screen length because flow is constrained to the screened interval (Butler 2020, p. 232). When the Peres et al. method was used, the estimate of T was converted to K using the screen length and aquifer thickness to provide a range of K values. This was done because the Peres et al. method assumes the well is fully penetrating and the amount of vertical flow is uncertain. Using the screen length to convert T to K provides a conservatively high estimate of K.

Slug Test Data Analysis

Following is a review of the analysis of the data from each well. Table 2 presents the process used for slug test data analysis based on the approach described in Chapter 12 of Butler (2020).

MW-01S

- Lithology: the well is screened in silty clay with gravel, sand clay, silty sand, clayey silt, and sandy clay with gravel.
- Number of tests and displacement: eight tests were run. Tests 1 and 2 were run with H(0)* = 1 foot, tests 3 and 4 were run with H(0)* = 2 feet, and tests 5, 6, 7, and 8 were run with H(0)* = 1 foot. Tests 5 and 6 were not used in the analysis because H(0) in both tests was only about 0.2 feet indicating poor test initiation.
- Review of coincident plot: the eight normalized displacement data from the tests were not coincident. No reproducible dependence on H(0)* or flow direction was observed (see plot in Attachment B). This may indicate a dynamic well skin effect.
- The well is unconfined. The well is partially penetrating because it is screened from 184 feet below ground surface (bgs) to 224 feet bgs and the aquifer extends from 157.58 feet bgs (depth to water) to 226.6 feet bgs (bottom of the aquifer). The well screen is submerged, and a double straight-line effect, indicative of filter pack drainage, was not observed in the data plot.
- Test selected for analysis: evaluated test 8, 12-inch rising head test because it had low noise, H(0) was near expected H(0)*, and recovery was greater than 99%.
- Data analysis and results: data are not coincident and therefore data analysis followed the flow chart in Figure 12.1b in Chapter 12 of Butler (2020).
    - H(0) was 0.855 feet, which is not approximately equal to the H(0)* of 1 foot, so equation 3.2 (in Butler 2020) or 3.1 (in Aqtesolv) was used for effective casing radius correction.
    - No reproducible dependence on H(0)* was observed so the data were analyzed using the Hvorslev quasi-steady state model for unconfined aquifers (Figure 2). The estimated K from the model is 12 feet per day (ft/day).

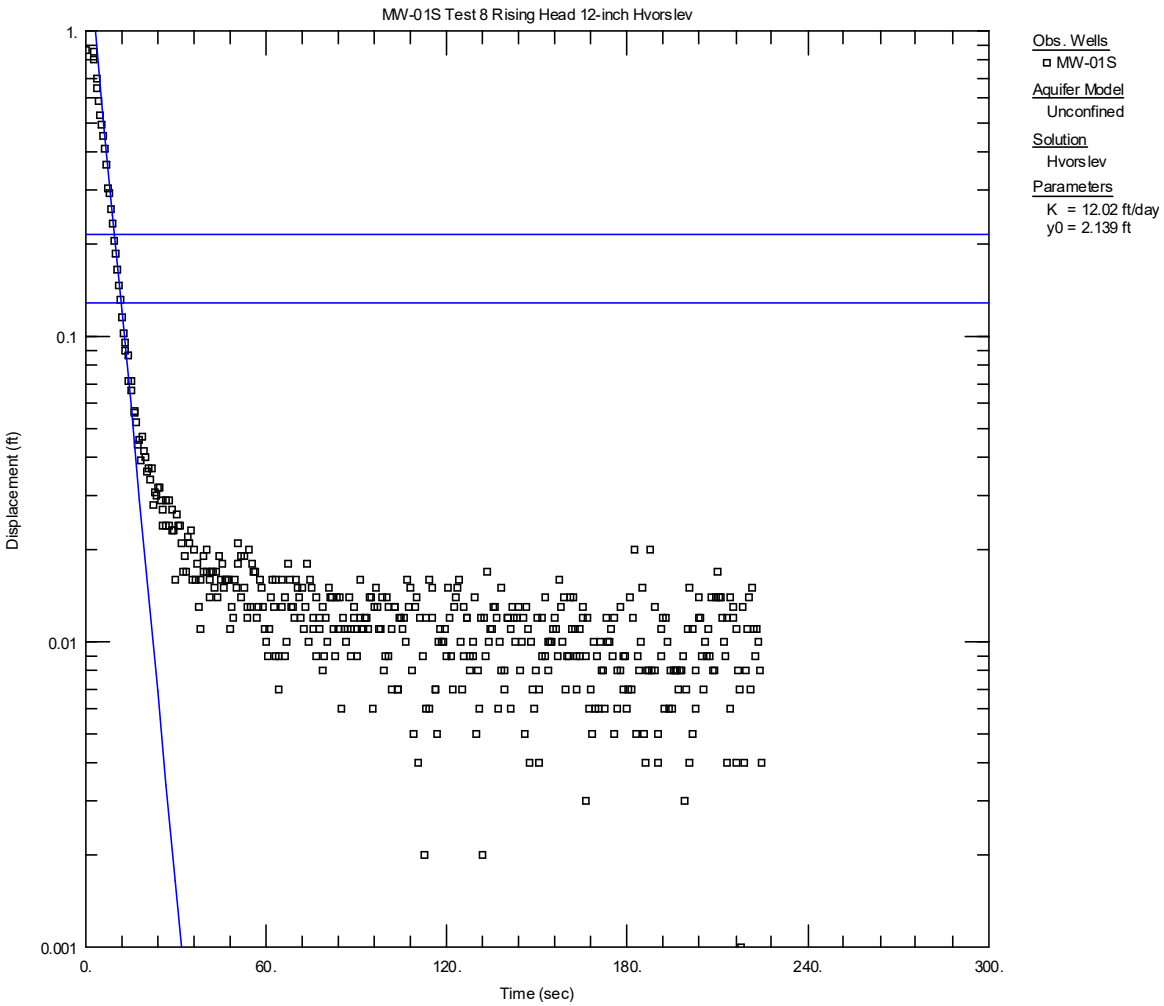

Figure 2. MW-01S Hvorslev Analysis

MW-02

- Lithology: the well is screened in gravelly sand, sandy clay, sandy, gravelly clay, sandy clayey gravel, and sand.
- Number of tests and displacement: six tests were run. Tests 1, 2, 5, and 6 were run with H(0)* = 1 foot, and tests 3 and 4 were run with H(0)* = 2 feet.
- Review of coincident plot: the plot of normalized displacement data from the tests were coincident (see plot in Attachment B).
- The well is unconfined. The well is partially penetrating because it is screened from 175.5 feet bgs to 205.5 feet bgs and the aquifer extends from 170.01 feet bgs (depth to water) to 220.6 feet bgs (bottom of the aquifer).

- Test selected for analysis: evaluated test 4, 24-inch rising head test because it had low noise, H(0) was near expected H(0)*, and recovery was greater than 99%.
- Data analysis and results: the aquifer is unconfined, and the well is screened below the water table; therefore, data analysis followed the flow chart in Figure 12.3 in Chapter 12 of Butler (2020).
    - H(0) was 2.381 feet, which is not approximately equal to the H(0)* of 2 feet, so equation 3.2 (in Butler 2020) or 3.1 (in Aqtesolv) was used for effective casing radius correction.
    - The data were analyzed using Cooper et al. S was implausibly low. This indicates a low-K skin may be present or it may be because of slug-induced vertical flow.
    - Because the well is partially penetrating, check if depth to top of screen (d)/aquifer thickness (b>)2. Because d/b<2, data were analyzed using both the unconfined and confined Kansas Geological Society (KGS) models. In both cases, S_s was not plausible for the lithology.
    - Followed the flow chart in Figure 12.2b in Butler (2020). The data were relatively noise free and the test ran to completion, therefore the data were analyzed using the Peres et al. model (Figure 3). S_s was implausibly low for the lithology. Transmissivity (T) from the model is the best estimate: T = 500 square feet per day (ft^2/day). A range of K was calculated by dividing T by aquifer thickness and by screen length: K = 10 ft/day to 19 ft/day

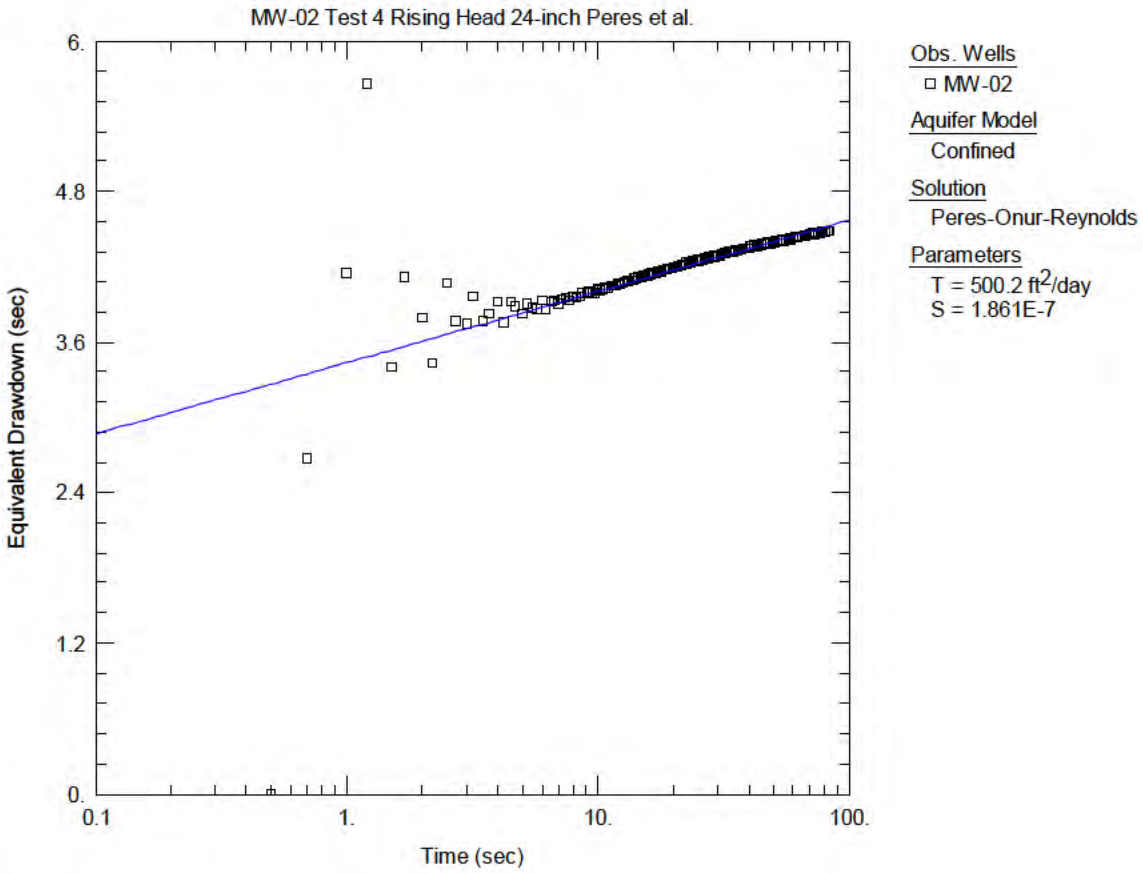

Figure 3. MW-02 Peres et al. Analysis

MW-03RA

- Lithology: the well is screened in silty gravel with sand, and clayey gravel with sand.
- Number of tests and displacement: three rising head tests were run. Tests 1 and 3 were run with H(0)* = 1 foot, and test 2 was run with H(0)* = 2 feet.
- Review of coincident plot: the plot of normalized displacement data from the tests were coincident (see plot in Attachment B).
- The well is unconfined. The well is partially penetrating because it is screened from 215 feet bgs to 220 feet bgs and the aquifer extends from 188.99 feet bgs (depth to water) to 240.8 feet bgs (bottom of the aquifer).
- Test selected for analysis: evaluated test 2, 24-inch rising head test because it had low noise, H(0) was near expected H(0)*, and recovery was greater than 99%.
- Data analysis and results: the aquifer is unconfined, and the well is screened below the water table, therefore data analysis followed the flow chart in Figure 12.3 in Chapter 12 of Butler (2020).

- H(0) was 2.091 feet, which is not equal to the H(0)* of 2 feet, so equation 3.2 (in Butler 2020) or 3.1 (in Aqtesolv) was used for effective casing radius correction.
- The data were analyzed using Cooper et al. S was implausibly low. This indicates a low-K skin may be present or it may be because of slug-induced vertical flow.
- Because the well is partially penetrating, check if d/b>2. Because d/b<2, data were analyzed using both the unconfined and confined KGS models. In both cases, S_s was not plausible for the lithology.
- Followed the flow chart in Figure 12.2b. The data were relatively noise free and the test ran to completion, therefore the data were analyzed using the Peres et al. model (Figure 4). S_s was implausibly low for the lithology. T from the model is the best estimate: T = 241 ft^2/day. A range of K was calculated by dividing T by aquifer thickness and by screen length: K = 5 ft/day to 48 ft/day.

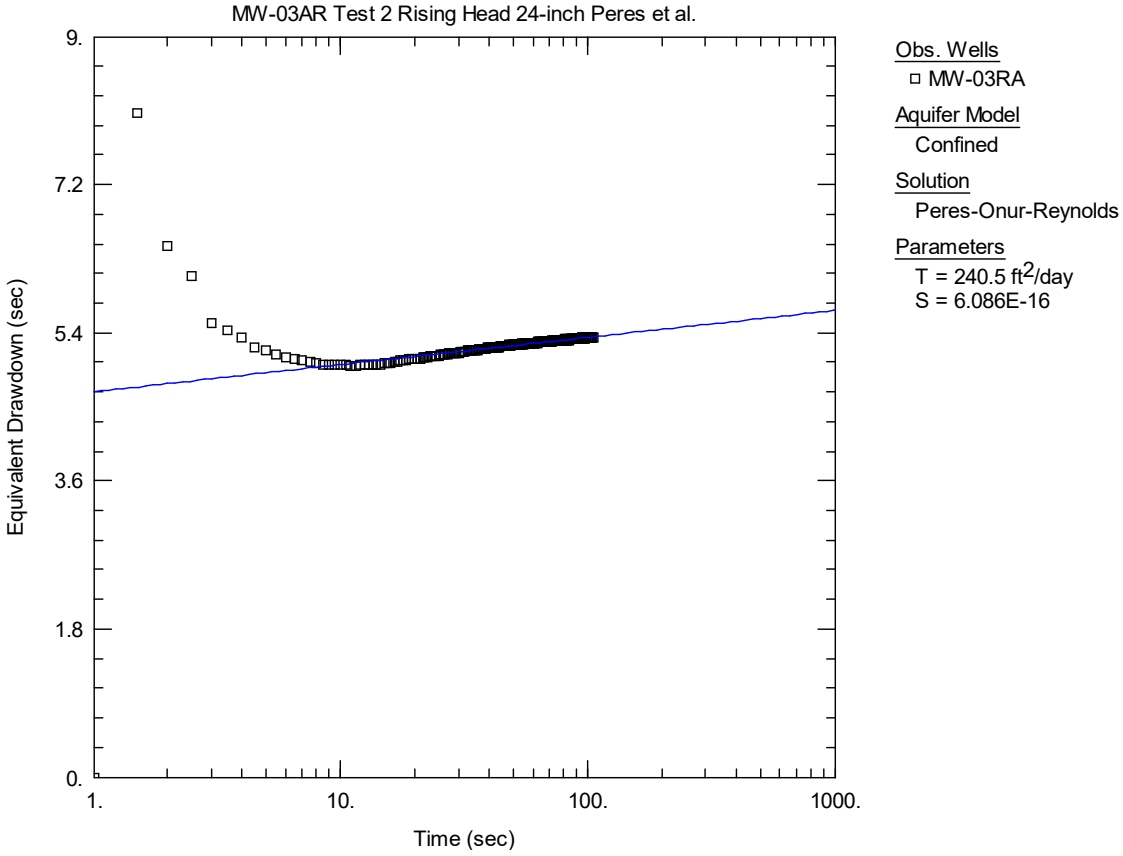

Figure 4. MW-03AR Peres et al. Analysis

MW-03RB

- Lithology: the well is screened in sandy silty clay, and silty clayey gravel with sand.

- Number of tests and displacement: three rising head tests were run. Tests 1 and 3 were run with H(0)* = 1 foot, and test 2 was run with H(0)* = 2 feet.
- Review of coincident plot: the plot of normalized displacement data from the tests were coincident (see plot in Attachment B).
- The well is semi-confined. The well is partially penetrating because it is screened from 267 feet bgs to 272 feet bgs and the aquifer extends from 253 feet bgs (top of the aquifer) to 394 feet bgs (bottom of the aquifer).
- Test selected for analysis: evaluated Test 2, 24-inch rising head test because it had low noise, H(0) was near expected H(0)*, and recovery was greater than 99%.
- Data analysis and results: the aquifer is semi-confined, the well is screened below the water table, therefore data analysis followed the flow chart in Figure 12.2a in Chapter 12 of Butler (2020).
    - H(0) was 2.025 feet, which is not equal to the H(0)* of 2 feet, so equation 3.2 (in Butler 2020) or 3.1 (in Aqtesolv) was used for effective casing radius correction.
    - The data were analyzed using Cooper et al. S was implausibly low. This indicates a low-K skin may be present or it may be because of slug-induced vertical flow.
    - The data were analyzed using the confined KGS model. S_s was not plausible for the lithology.
    - Data analysis followed the flow chart in Figure 12.2b. The data were relatively noise free and the test ran to completion, therefore the data were analyzed using the Peres et al. model (Figure 5). S_s was implausibly low for the lithology. T from model is the best estimate: T = 106 ft^2/day. A range of K was calculated by dividing T by aquifer thickness and by screen length: K = 0.75 ft/day to 21 ft/day.

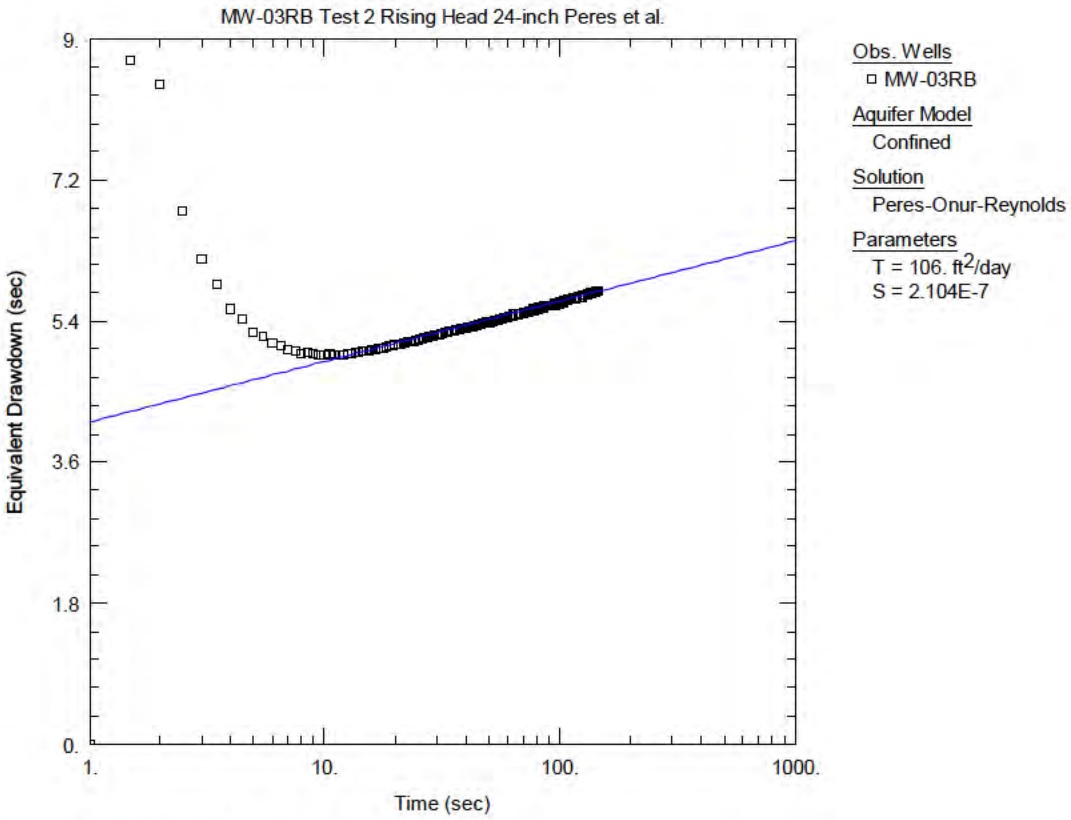

Figure 5. MW-03RB Peres et al. Analysis

MW-03RC

- Lithology: the well is screened in silty gravel with sand, and gravel with silt and sand.
- Number of tests and displacement: three rising head tests were run. Tests 1 and 3 were run with H(0)* = 1 foot, and test 2 was run with H(0)* = 2 feet.
- Review of coincident plot: the plot of normalized displacement data from the tests were coincident (see plot in Attachment B). A slight dependence on H(0)* was observed.
- The well is semi-confined. The well is partially penetrating because it is screened from 307 feet bgs to 312 feet bgs and the aquifer extends from 253 feet bgs (top of the aquifer) to 394 feet bgs (bottom of the aquifer).
- Test selected for analysis: evaluated test 1, 12-inch rising head test because it had low noise, H(0) was near expected H(0)*, and recovery was greater than 99%.
- Data analysis and results: the data showed an oscillatory or critically damped response; therefore, data analysis followed the flow chart in Figure 12.5 in Chapter 12 of Butler (2020).

- H(0) was 0.998 feet, which is not equal to the H(0)* of 1 foot, so equation 3.2 (in Butler 2020) or 3.1 (in Aqtesolv) was used for effective casing radius correction.
- The data were analyzed using Butler-Zhan (Figure 6). S_s was plausible for lithology. The estimated K from the model is 25 ft/day.

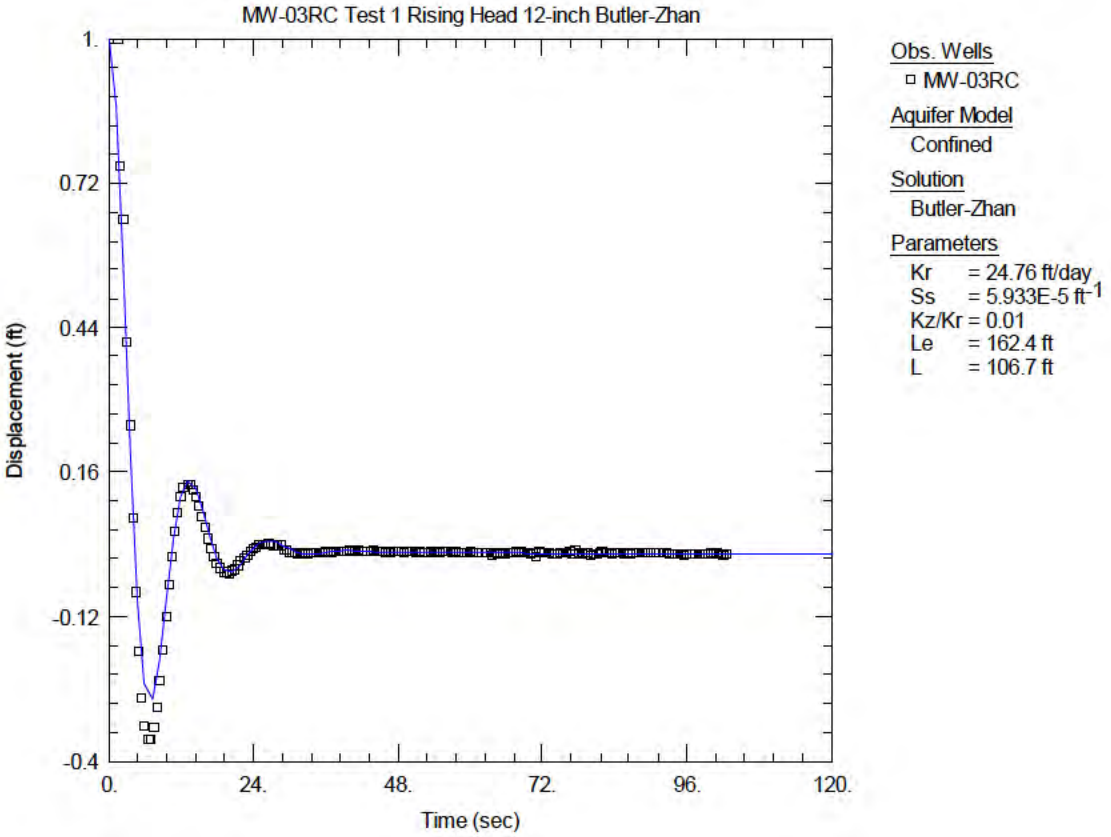

Figure 6. MW-03RC Butler-Zhan Analysis

MW-04

- Lithology: the well is screened in gravel with clay.
- Number of tests and displacement: six tests were run. Tests 1, 2, 5, and 6 were run with H(0)* = 0.92 foot (11 inches), and tests 3 and 4 were run with H(0)* = 1.42 feet (17 inches).
- Review of coincident plot: the plot of normalized displacement data from the tests were coincident (see plot in Attachment B).
- The well is unconfined. The well is partially penetrating because it is screened from 143 feet bgs to 173 feet bgs and the aquifer extends from 136.45 feet bgs (depth to water) to 204.1 feet bgs (bottom of the aquifer).

- Test selected for analysis: evaluated Test 4, 17-inch rising head test because it had low noise, H(0) was near expected H(0)*, and recovery was greater than 99%.
- Data analysis and results: the aquifer is unconfined, and the well is screened below the water table, therefore data analysis followed the flow chart in Figure 12.3 in Chapter 12 of Butler (2020).
    - H(0) was 1.168 feet, which is not equal to the H(0)* of 1.42 feet, so equation 3.2 (in Butler 2020) or 3.1 (in Aqtesolv) was used for effective casing radius correction.
    - The data were analyzed using Cooper et al. S was implausibly low. This indicates a low-K skin may be present or it may be because of slug-induced vertical flow.
    - Because the well is partially penetrating, check if d/b>2. Because d/b<2, data were analyzed data both the unconfined and confined KGS models. In both cases, S_s was not plausible for the lithology.
    - Data analysis followed the flow chart in Figure 12.2b. The data were relatively noise free and the test ran to completion, therefore the data were analyzed using the Peres et al. model (Figure 7). S_s was plausible for lithology. T from model is the best estimate: T = 415 ft^2/day. A range of K was calculated by dividing T by aquifer thickness and by screen length: K = 6 ft/day to 14.

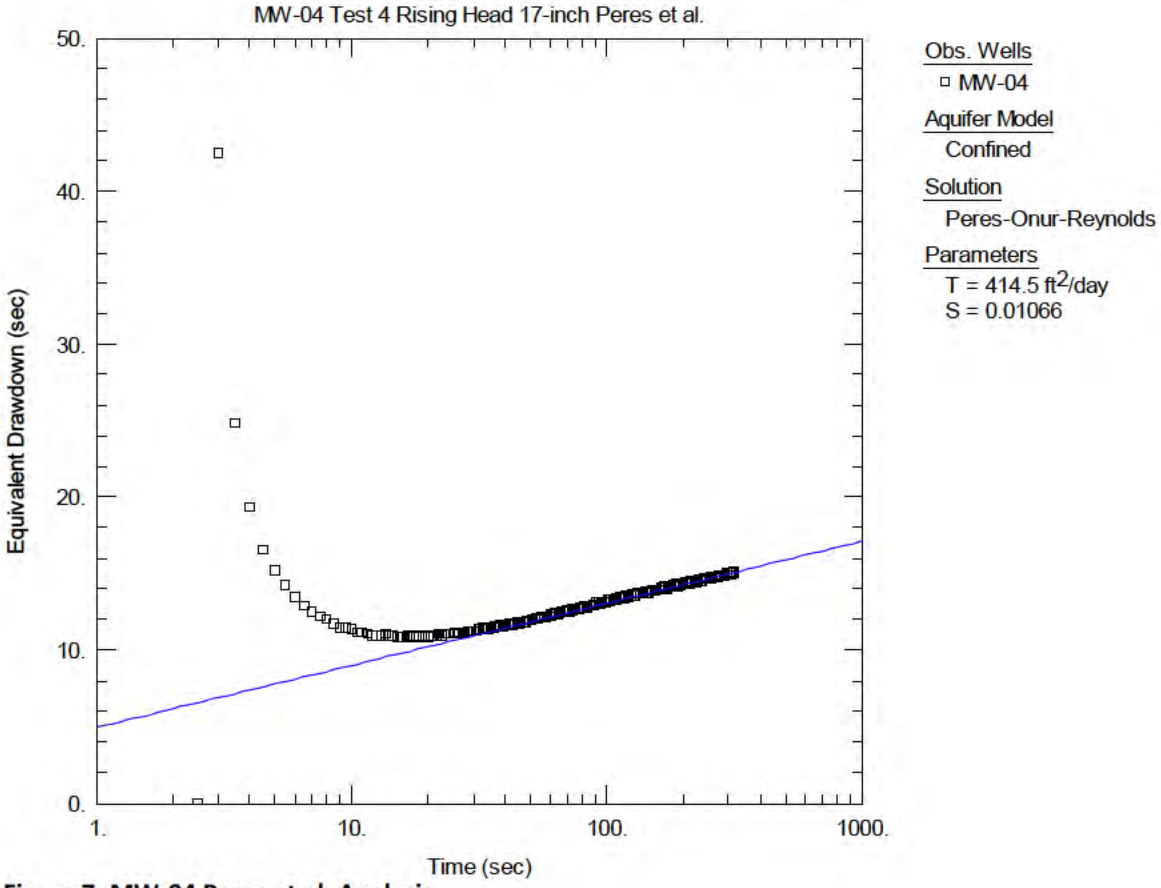

Figure 7. MW-04 Peres et al. Analysis

MW-08A

- Lithology: the well is screened in clayey gravel with sand.
- Number of tests and displacement: eight tests were run. Tests 1, 2, 3, 4, 7, and 8 were run with H(0)* = 1 foot, and tests 5 and 6 were run with H(0)* = 2 feet. Tests 1 and 2 were not used in the analysis because of interruptions in the tests.
- Review of coincident plot: the plot of normalized displacement data from the tests were not coincident (see plot in Attachment B). Some dependence on H(0)* and flow direction was observed, which may indicate a directional skin effect.
- The well is unconfined. The well is partially penetrating because it is screened from 91 feet bgs to 106 feet bgs and the aquifer extends from 60.67 feet bgs (depth to water) to 140 feet bgs (bottom of the aquifer).
- Test selected for analysis: evaluated Test 3, 12-inch rising head test because it had low noise, H(0) was near expected H(0)*, and recovery was greater than 99%.

- Data analysis and results: the data show an oscillatory or critically damped response; therefore, data analysis followed the flow chart in Figure 12.5 in Chapter 12 of Butler (2020).
    - H(0) was 0.935 feet, which is not equal to the H(0)* of 1 foot, so equation 3.2 (in Butler 2020) or 3.1 (in Aqtesolv) was used for effective casing radius correction.
    - The data were analyzed using Springer-Gelhar, an unconfined model for critically damped data (Figure 8). The estimated K from the model is 103 ft/day.

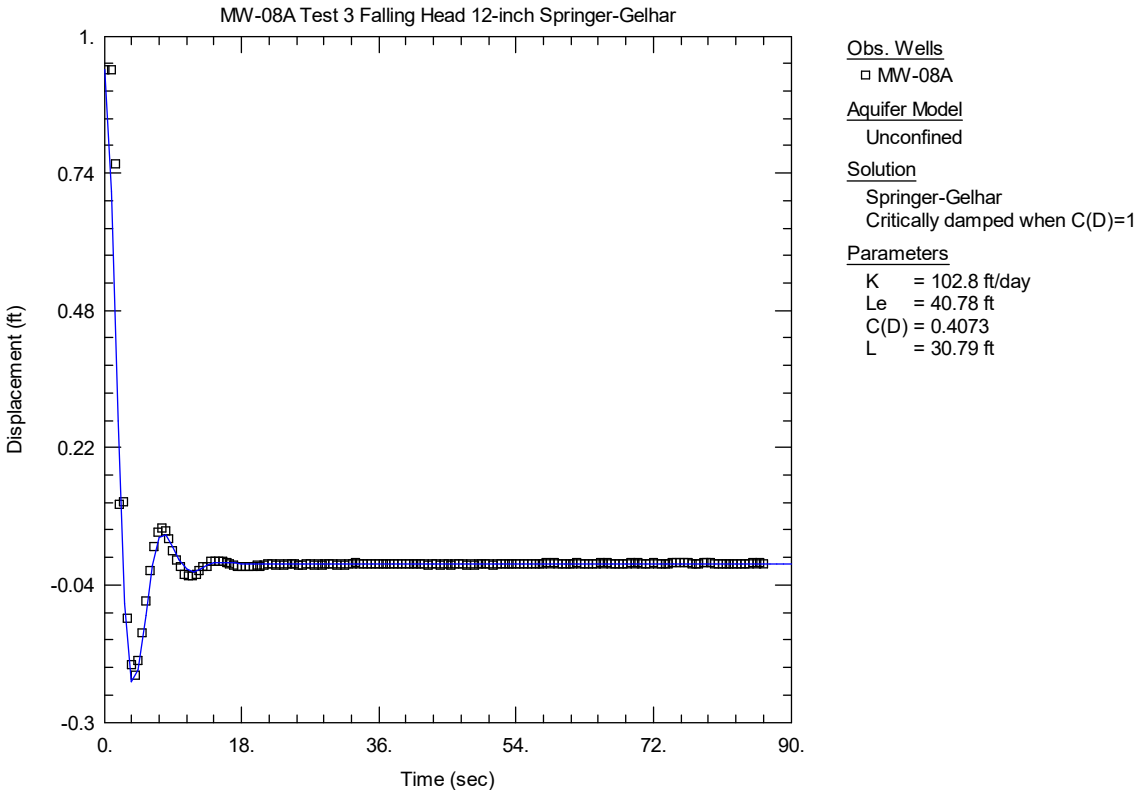

Figure 8. MW-08A Springer-Gelhar Analysis

MW-08B

- Lithology: the well is screened in clayey gravel with sand.
- Number of tests and displacement: eight tests were run. Tests 1, 2, 7, and 8 were run with H(0)* = 1 foot, and tests 3, 4, 5 and 6 were run with H(0)* = 2 feet. After tests 1 and 2, the data collection interval was decreased from 0.5 seconds to 0.25 seconds because tests were running very quickly.
- Review of coincident plot: the plot of normalized displacement data from the tests were not coincident (see plot in Attachment B). Some dependence on H(0)* and flow direction was observed, which may indicate a directional skin effect.

- The well is semi-confined. The well is partially penetrating because it is screened from 180 feet bgs to 200 feet bgs and the aquifer extends from 147.6 feet bgs (top of the aquifer) to 324.6 feet bgs (bottom of the aquifer).
- Test selected for analysis: evaluated Test 7, 12-inch falling head test because it had low noise, H(0) was near expected H(0)*, and recovery was greater than 99%.
- Data analysis and results: the data show an oscillatory or critically damped response; therefore, data analysis followed the flow chart in Figure 12.5 of Chapter 12 of Butler (2020).
  - H(0) was 0.995 feet, which is not equal to the H(0)* of 1 foot, so equation 3.2 (in Butler 2020) or 3.1 (in Aqtesolv) was used for effective casing radius correction.
  - The data were analyzed using Butler-Zhan (Figure 9). S_s is low for lithology, but K from the model is still the best estimate. The estimated K from the model is 51 ft/day.

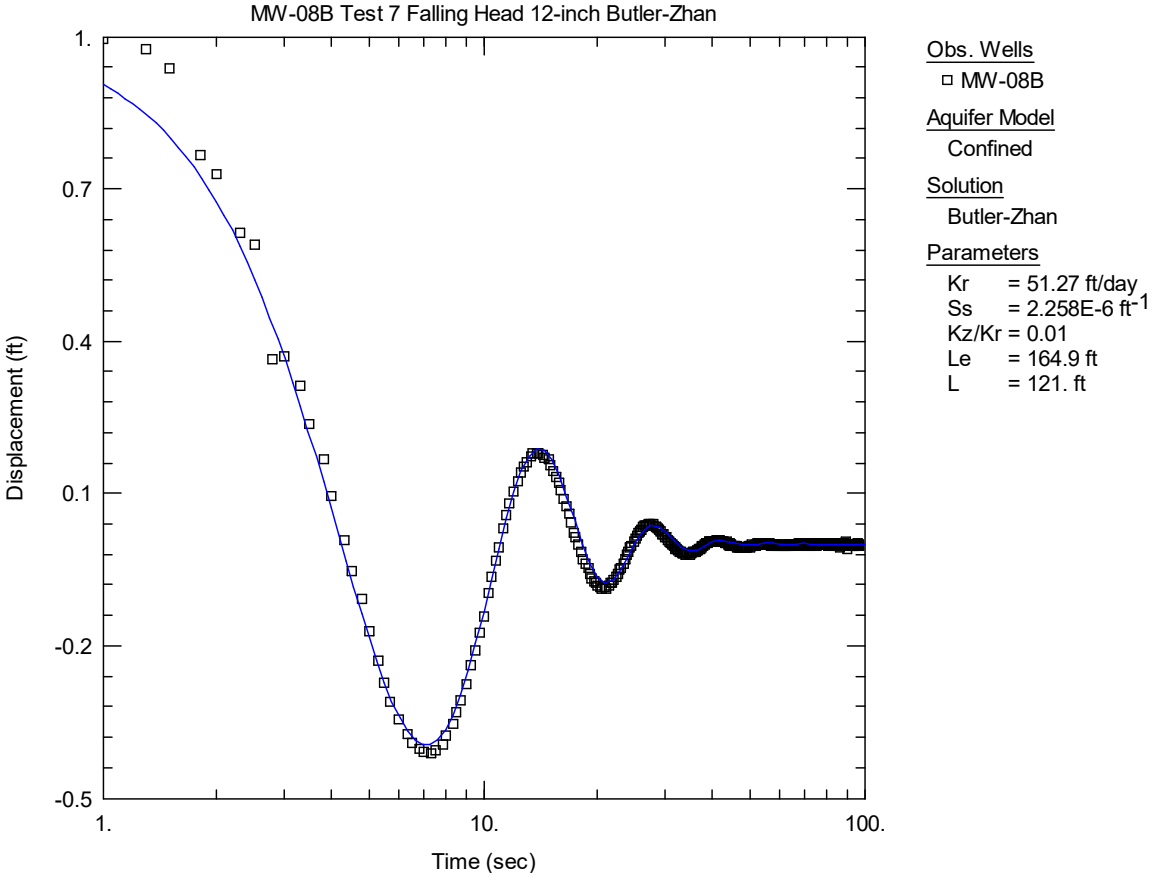

Figure 9. MW-08B Butler-Zhan Analysis

MW-08C

- Lithology: the well is screened in silty gravel with sand.
- Number of tests and displacement: three rising head tests were run. Tests 1 and 3 were run with H(0)* = 1 foot, and test 2 was run with H(0)* = 2 feet.
- Review of coincident plot: the plot of normalized displacement data from the tests were coincident (see plot in Attachment B).
- The well is semi-confined. The well is partially penetrating because it is screened from 304 feet bgs to 309 feet bgs and the aquifer extends from 147.6 feet bgs (top of the aquifer) to 324.6 feet bgs (bottom of the aquifer).
- Test selected for analysis: evaluated test 2, 24-inch rising head test because it had low noise, H(0) was near expected H(0)*, and recovery was greater than 99%.
- Data analysis and results: the aquifer is semi-confined, the well is screened below the water table; therefore, data analysis followed the flow chart in Figure 12.2a in Chapter 12 of Butler (2020).
    - H(0) was 1.884 feet, which is not equal to the H(0)* of 2 feet, so equation 3.2 (in Butler 2020) or 3.1 (in Aqtesolv) was used for effective casing radius correction.
    - The data were analyzed using Cooper et al. S was implausibly low. This indicates a low-K skin may be present or it may be because of slug-induced vertical flow.
    - The data were analyzed using the confined KGS model. S_s was not plausible for the lithology.
    - Data analysis followed the flow chart in Figure 12.2b. The data were relatively noise free and the test ran to completion, therefore the data were analyzed using the Peres et al. model (Figure 10). S_s was implausibly low for the lithology. T from model is the best estimate: T = 82 ft^2/day. A range of K was calculated by dividing T by aquifer thickness and by screen length: K = 0.5 ft/day to 16 ft/day.

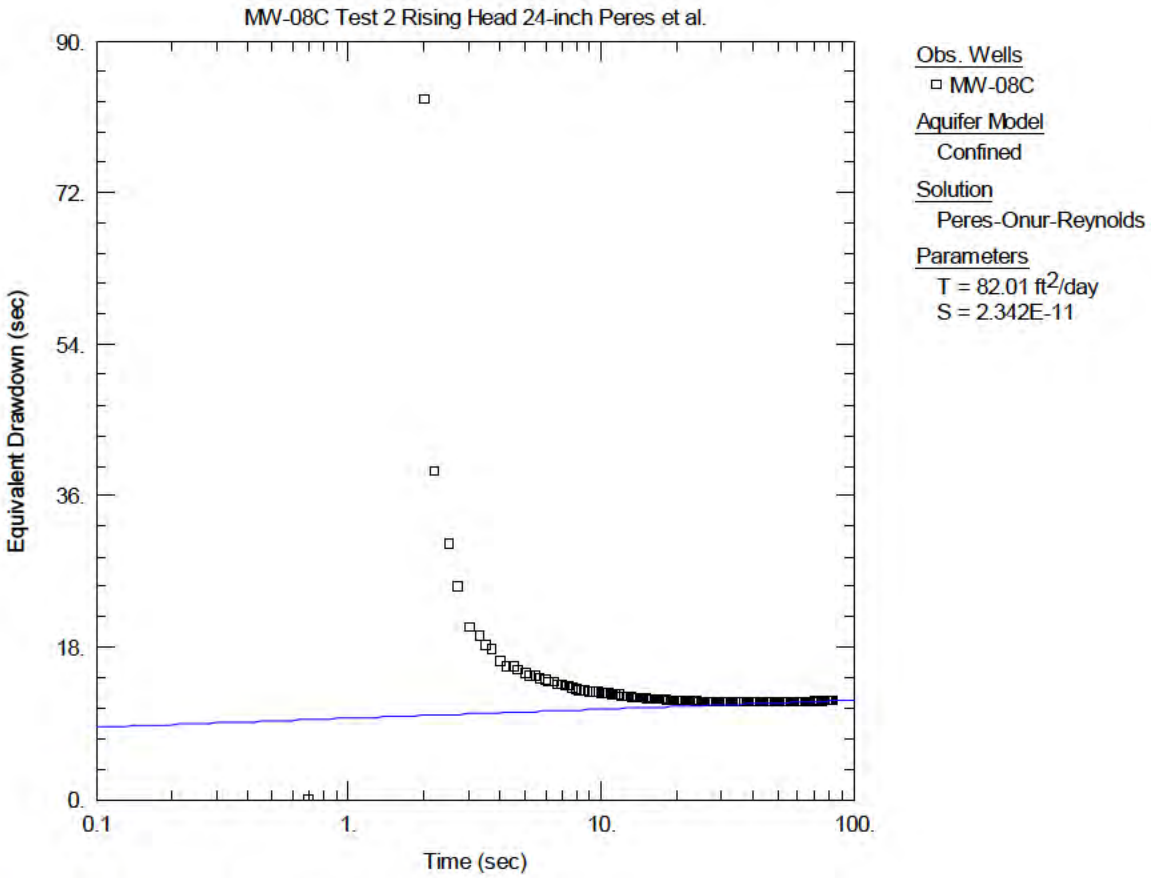

Figure 10. MW-08C Peres et al. Analysis

MW-13S

- Lithology: the well is screened in silty sand with gravel, clayey gravel with sand, sandy silt, clayey sand, and lean clay.
- Number of tests and displacement: four tests were run. Tests 1 and 3 were run with H(0)* = 1 foot, and tests 4 and 5 were run with H(0)* = 2 feet. Only four tests were run because of slow recovery. Test 2 was not used as it was interrupted during initiation.
- Review of coincident plot: the plot of normalized displacement data from the tests were coincident (see plot in Attachment B).
- The well is unconfined. The well is partially penetrating because it is screened from 15.5 feet bgs to 20.5 feet bgs and the aquifer extends from 15.14 feet bgs (depth to water) to 90.9 feet bgs (bottom of the aquifer).
- Test selected for analysis: evaluated test 3, 12-inch rising head test because it had low noise, H(0) was near expected H(0)*, and recovery was greater than 99%.

- Data analysis and results: the aquifer is unconfined, and the well is screened below the water table (however, only slightly), therefore data analysis followed the flow chart in Figure 12.3 of Chapter 12 of Butler (2020).
  - H(0) was 1.032 feet, which is not equal to the H(0)* of 1 foot, so equation 3.2 (in Butler 2020) or 3.1 (in Aqtesolv) was used for effective screen radius correction.
  - The data were analyzed using Cooper et al. S was plausible for the lithology (Figure 11). T from the model is the best estimate. K was calculated by dividing T by effective screen length. T = 0.44 ft²/day and K = 0.1 ft/day.

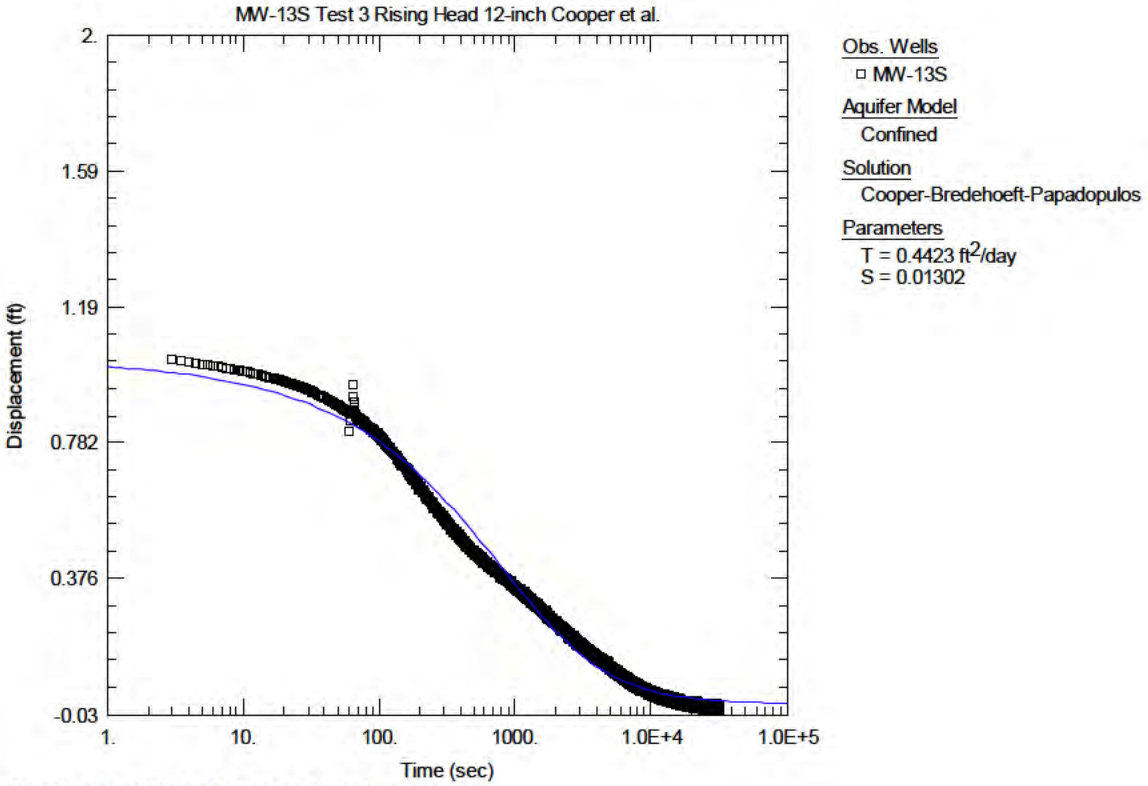

Figure 11. MW-13S Cooper et al. Analysis

MW-13D

- Lithology: the well is screened in clayey sand with gravel, sand with silt, and clayey gravel with sand.
- Number of tests and displacement: six tests were run. Tests 1, 2, 5 and 6 were run with H(0)* = 1 foot, and tests 3 and 4 were run with H(0)* = 2 feet.
- Review of coincident plot: the plot of normalized displacement data from the tests were coincident (see plot in Attachment B). Note that there was a problem during test 1, so the data were rejected.

- The well is unconfined. The well is partially penetrating because it is screened from 79 feet bgs to 84 feet bgs and the aquifer extends from 13.59 feet bgs (depth to water) to 90.7 feet bgs (bottom of the aquifer).
- Test selected for analysis: evaluated the Test 6, 12-inch rising head test because it had low noise, H(0) was near expected H(0)*, and recovery was greater than 99%.
- Data analysis and results: the aquifer is unconfined, and the well is screened below the water table, therefore data analysis followed the flow chart in Figure 12.3 in Chapter 12 of Butler (2020).
    - H(0) was 0.994 feet, which is not equal to the H(0)* of 1 foot, so equation 3.2 (in Butler 2020) or 3.1 (in Aqtesolv) was used for effective casing radius correction.
    - The data were analyzed using Cooper et al. S was implausibly low. This indicates a low-K skin may be present or it may be because of slug-induced vertical flow.
    - Because the well is partially penetrating, check if d/b>2. Because d/b<2, data were analyzed using both the unconfined and confined KGS models. In both cases, S_s was not plausible for the lithology.
    - Data analysis followed the flow chart in Figure 12.2b. The data were relatively noise free and the test ran to completion, therefore the data were analyzed using the Peres et al. model (Figure 12). S_s was still implausibly low for lithology. T from model is still the best estimate; T = 10 ft^2/day. A range of K was calculated by dividing T by aquifer thickness and by screen length: K = 0.1 ft/day to 2 ft/day. Because the water level in MW-13D was observed to recover faster than in MW-13S during slug testing and groundwater sampling, the K value of 2 ft/day is considered the best estimate for well MW-13D.

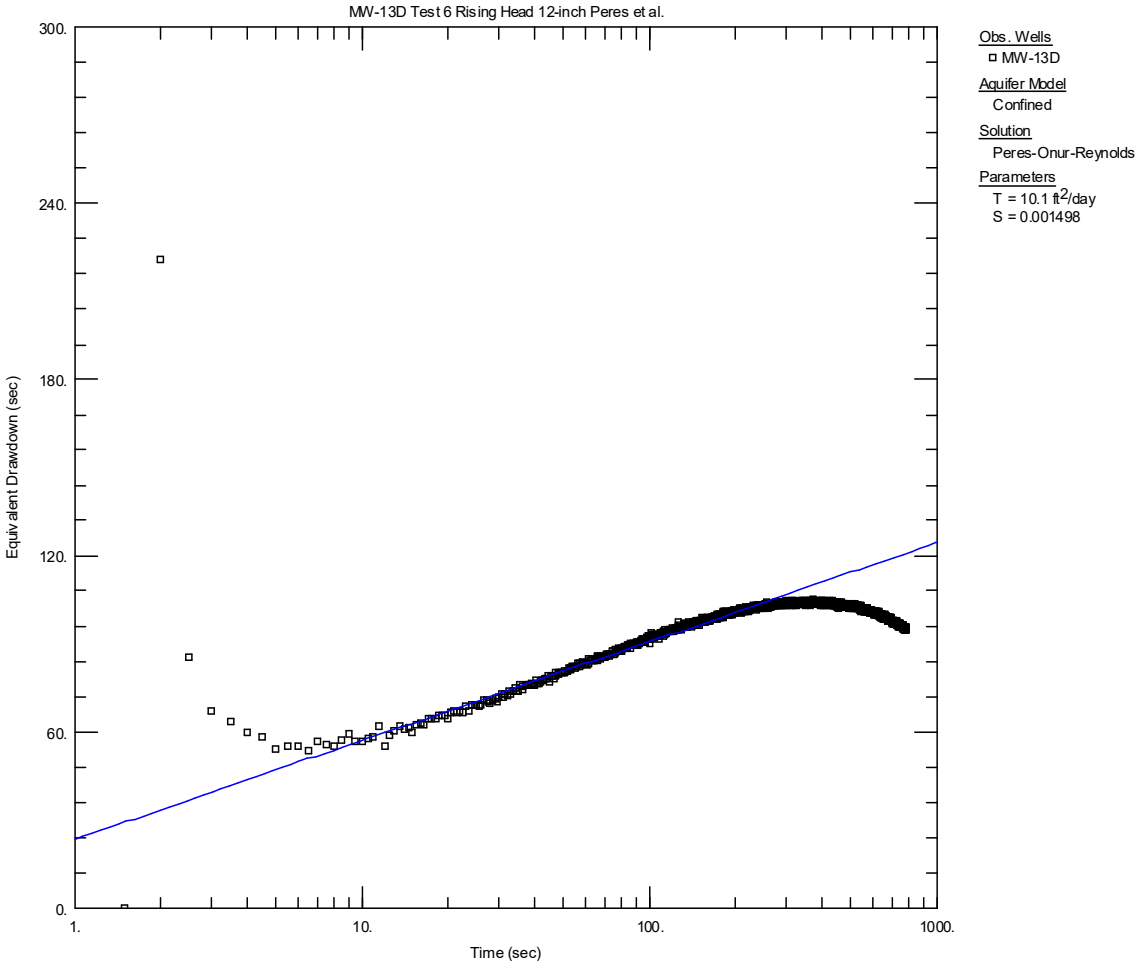

Figure 12. MW-13D Peres et al. Analysis

MW-13L

- Lithology: the well is screened in sandy silt, silt with sand, and gravel with sand and silt.
- Number of tests and displacement: six tests were run. Tests 1, 2, 5, and 6 were run with H(0)* = 1 foot, and Tests 3 and 4 were run with H(0)* = 2 feet.
- Review of coincident plot: the plot of normalized displacement data from the tests were not coincident (see plot in Attachment B). Reproducible dependence on H(0)* and flow direction were observed, which may indicate a directional skin effect, and which may also be because of inertial effects caused by the long water column.
- The well is semi-confined. The well is partially penetrating because it is screened from 150 feet bgs to 160 feet bgs and the aquifer extends from 96 feet bgs (top of the aquifer) to 301.8 feet bgs (bottom of the aquifer). At the time of analysis, MW-13L had not been surveyed. Ground surface elevation was assumed to be the same as MW-13S.

- Test selected for analysis: evaluated Test 3, 24-inch falling head test because it had low noise, H(0) was near expected H(0)*, and recovery was 99%.
- Data analysis and results: the data show an oscillatory or critically damped response; therefore, data analysis followed the flow chart in Figure 12.5 in Chapter 12 of Butler (2020).
  - H(0) was 1.972 feet, which is not equal to the H(0)* of 2 feet, so equation 3.2 (in Butler 2020) or 3.1 (in Aqtesolv) was used for effective casing radius correction.
  - The data were analyzed using Butler-Zhan (Figure 13). S_s is plausible for lithology. The estimated K from the model is 34 ft/day.

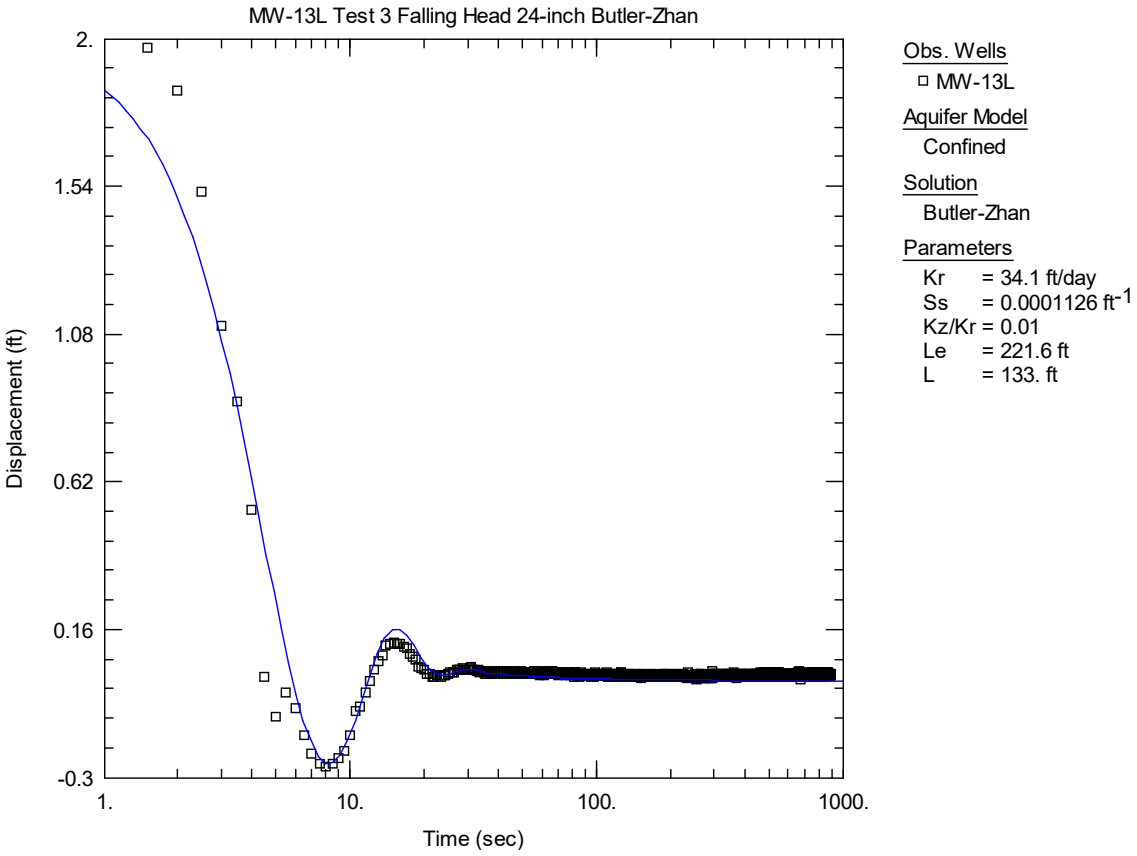

Figure 13. MW-13L Butler-Zhan Analysis

MW-15D

- Lithology: the well is screened in silty gravel with clay.
- Number of tests and displacement: eight tests were run. Tests 1, 2, 7, and 8 were run with H(0)* = 1 foot, and Tests 3, 4, 5, and 6 were run with H(0)* = 2 feet. In Test 4, the rope caught on the casing during test initiation and disrupted the data, therefore it was not used in the analysis.
- Review of coincident plot: the normalized displacement data from the tests were not coincident. No reproducible dependence on H(0)* was observed, however, reproducible dependence on flow direction was observed (see plot in Attachment B). This may indicate a directional well skin effect.
- The well is unconfined. The well is partially penetrating because it is screened from 69 feet bgs to 74 feet bgs and the aquifer thickness is assumed to be 100 feet. The actual aquifer bottom is unclear because the well is west of the fault where only a few well depths are available. An aquifer thickness of 100 feet was assumed because it was reasonable. A sensitivity analysis was performed by first setting aquifer thickness to 23.9 feet, the height of the water column in the well and therefore the minimum thickness possible, which did not change the K estimate. The aquifer thickness was also set to 200 feet, twice the value used, and this did not change the K estimate obtained with an aquifer thickness of 100 feet.
- Test selected for analysis: evaluated Test 8, 12-inch rising head test because it had low noise, H(0) was near expected H(0)*, it was quickest to run, and recovery was greater than 99%.
- Data analysis and results: data are not coincident; therefore, data analysis followed the flow chart in Figure 12.1b in Chapter 12 of Butler (2020).
    - H(0) was 1.018 feet, which is not approximately equal to the H(0)* of 1 foot, so equation 3.2 (in Butler 2020) or 3.1 (in Aqtesolv) was used for effective casing radius correction.
    - No reproducible dependence on H(0)* was observed so data were analyzed using the Hvorslev quasi-steady state model for unconfined aquifers (Figure 14). The estimated K from the model is 15 ft/day.

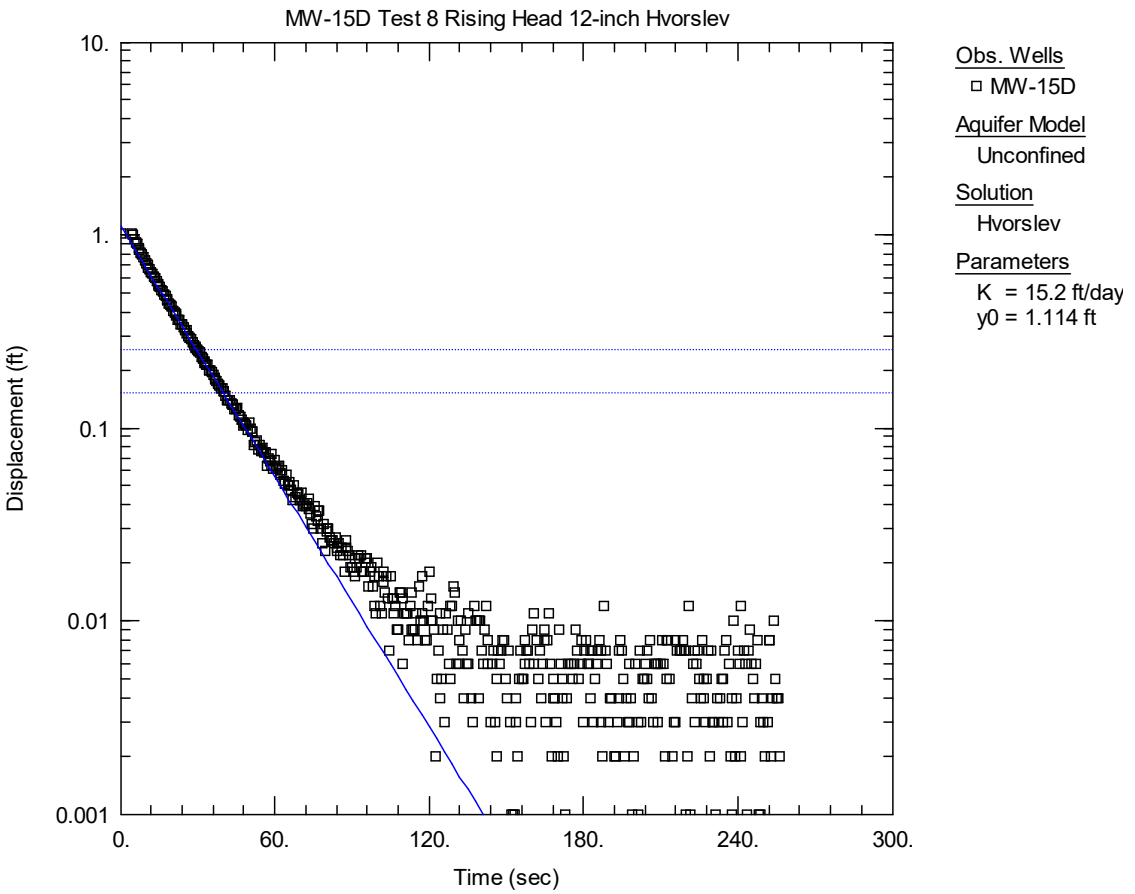

Figure 14. MW-15D Hvorslev Analysis

MW-18

- Lithology: the well is screened in silty gravel with sand, clayey gravel with sand, and clayey sand.
- Number of tests and displacement: six tests were run. Tests 1, 2, 5, and 6 were run with H(0)* = 1 foot, and tests 3 and 4 were run with H(0)* = 2 feet.
- Review of coincident plot: the normalized displacement data from the tests were not coincident. Reproducible dependence on H(0)* flow direction were observed (see plot in Attachment B). This may indicate changes in effective well screen length.
- The well is unconfined. The well is partially penetrating because it is screened from 80 feet bgs to 90 feet bgs and the aquifer extends from 81.91 feet bgs (depth to water) to 153.33 feet bgs (bottom of the aquifer). The aquifer bottom elevation was assumed to be the same as adjacent well MW-19. The well is screened across the water table.
- Test selected for analysis: evaluated Test 6, 12-inch rising head test because it had low noise, H(0) was near expected H(0)*, and recovery was greater than 99%.

- Data analysis and results: data are not coincident; therefore, data analysis followed the flow chart in Figure 12.1b in Chapter 12 of Butler (2020).
  - H(0) was 1.136 feet, which is not approximately equal to the H(0)* of 1 foot, so equation 3.2 (in Butler 2020) or 3.1 (in Aqtesolv) was used for effective casing radius correction.
  - The data were analyzed using nonlinear Dagan model (Figure 15). The estimated K from the model is 12 ft/day.

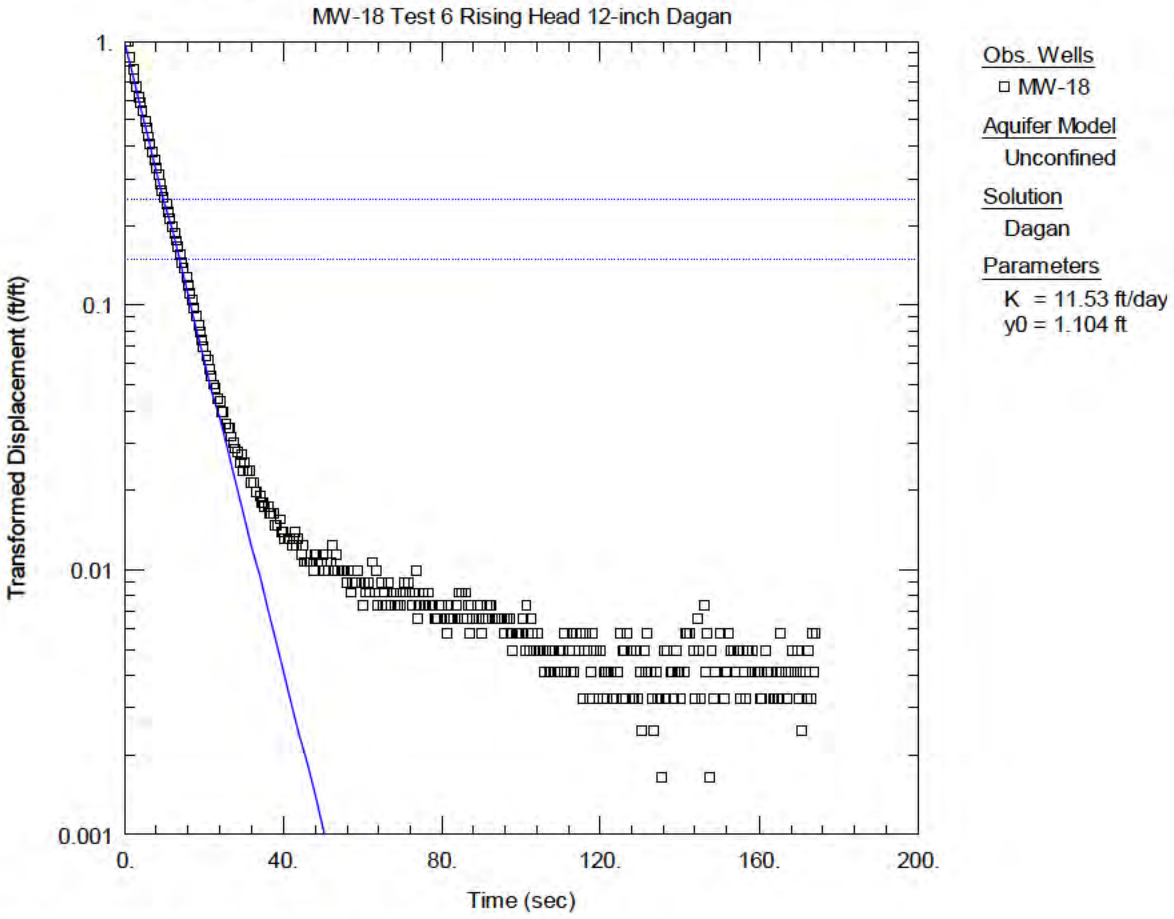

Figure 15. MW-18 Dagan Analysis

MW-19

- Lithology: the well is screened in silty gravel with sand, clayey gravel with sand, and clayey sand.
- Number of tests and displacement: six tests were run. Tests 1, 2, 5, and 6 were run with H(0)* = 1 foot, and Tests 3 and 4 were run with H(0)* = 2 feet.
- Review of coincident plot: the normalized displacement data from the tests were not coincident. A reproducible dependence on H(0)* was not observed. Possible dependence on flow direction was observed (see plot in Attachment B). This may indicate changes in effective well screen length.
- The well is unconfined. The well is partially penetrating because it is screened from 84 feet bgs to 94 feet bgs and the aquifer extends from 81.31 feet bgs (depth to water) to 152.4 feet bgs (bottom of the aquifer). The well is screened across the water table.
- Test selected for analysis: evaluated Test 2, 12-inch rising head test because it had low noise, H(0) was near expected H(0)*, it was quickest to run, and recovery was greater than 99%.
- Data analysis and results: data are not coincident; therefore, data analysis followed the flow chart in Figure 12.1b in Chapter 12 of Butler (2020).
    - H(0) was 0.947 feet, which is not approximately equal to the H(0)* of 1 foot, so equation 3.2 (in Butler 2020) or 3.1 (in Aqtesolv) was used for effective casing radius correction.
    - No reproducible dependence on H(0)* was observed so the data were analyzed using the Hvorslev quasi-steady state model for unconfined aquifers (Figure 18). The estimated K from the model is 30 ft/day.

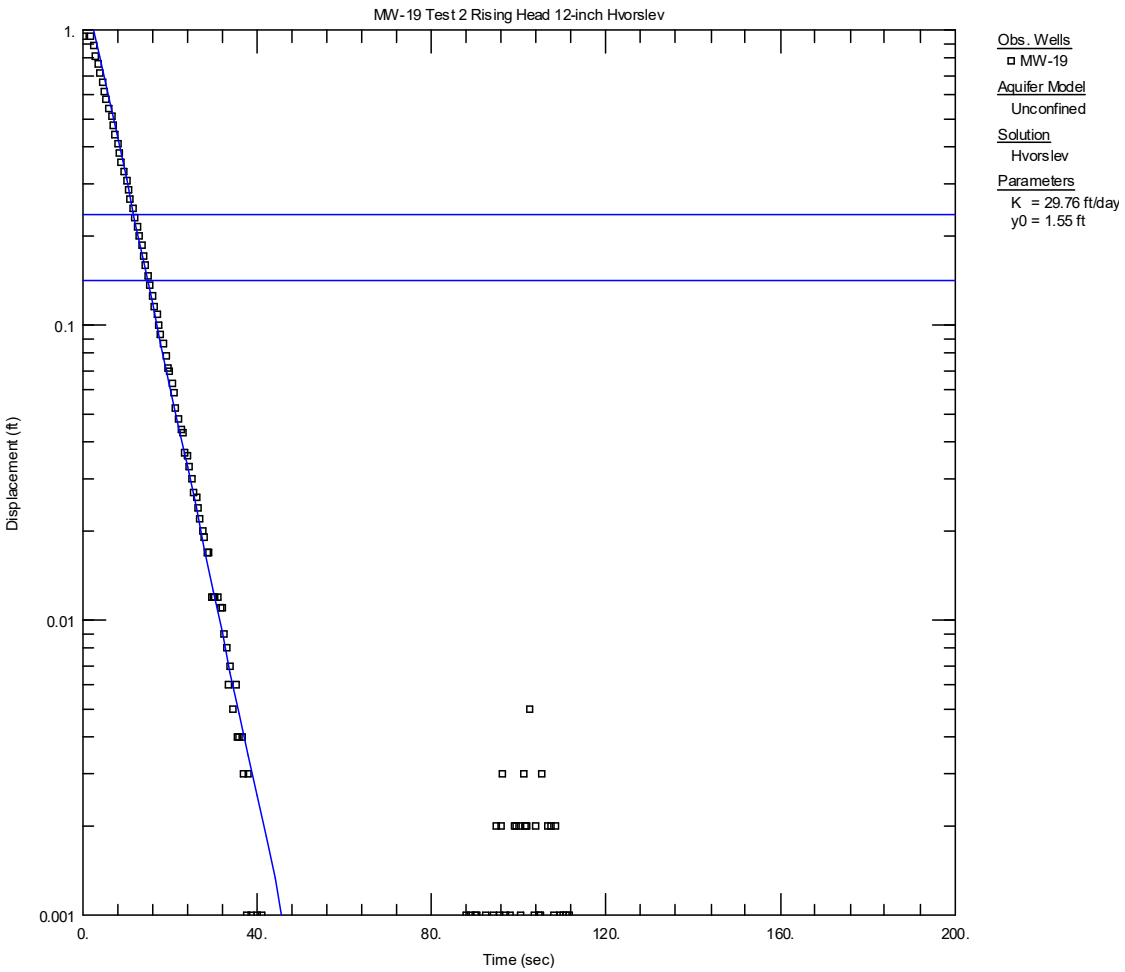

Figure 2. MW-19 Hvorslev Analysis

MW-20S

- Lithology: the well is screened in clayey gravel with sand, silty sand with gravel, silty sand, and sandy lean clay with gravel.
- Number of tests and displacement: six tests were run. Tests 1, 2, 5, and 6 were run with H(0)* = 1 foot, and tests 3 and 4 were run with H(0)* = 2 feet.
- Review of coincident plot: the normalized displacement data from the tests were not coincident. No reproducible dependence on H(0)* was observed but a dependence on flow direction was observed (see plot in Attachment B). This may indicate changes in effective well screen length or a directional skin effect.
- The well is unconfined. The well is partially penetrating because it is screened from 79.5 feet bgs to 89.5 feet bgs and the aquifer extends from 83.58 feet bgs (depth to water) to 150.8 feet bgs (bottom of the aquifer). The well is screened across the water table.

- Test selected for analysis: evaluated Test 6, 12-inch rising head test because it had low noise, H(0) was near expected H(0)*, and recovery was greater than 99%.
- Data analysis and results: data are not coincident; therefore, data analysis followed the flow chart in Figure 12.1b in Chapter 12 of Butler (2020).
  - H(0) was 1.008 feet, which is not equal to the H(0)* of 1 foot, so equation 3.2 (in Butler 2020) or 3.1 (in Aqtesolv) was used for effective casing radius correction.
  - The data were analyzed using nonlinear Dagan model (Figure 19). The estimated K from the model is 10 ft/day.

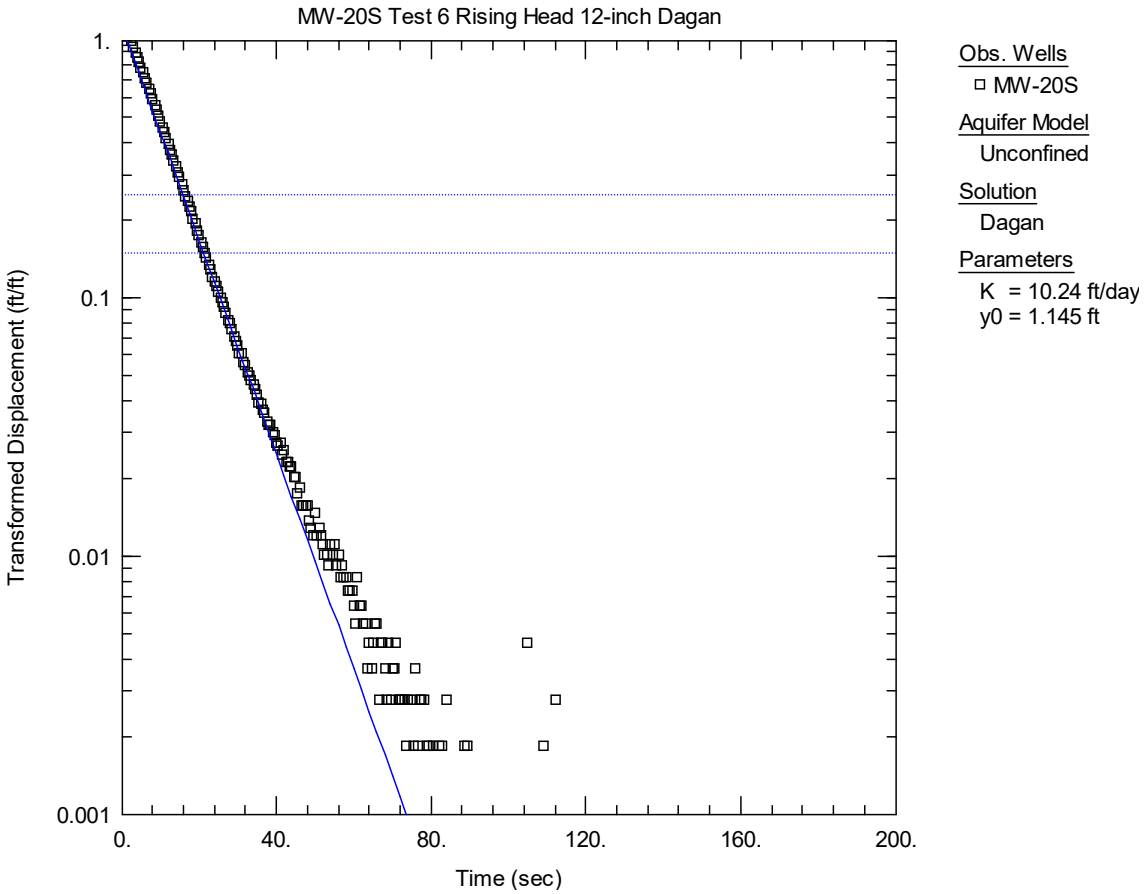

Figure 19. MW-20S Dagan Analysis

MW-20D

- Lithology: the well is screened in clayey gravel with sand.
- Number of tests and displacement: six tests were run. Tests 1, 2, 5, and 6 were run with H(0)* = 1 foot, and tests 3 and 4 were run with H (0) * = 2 feet.
- Review of coincident plot: the plot of normalized displacement data from the tests were not coincident (see plot in Attachment B). No reproducible dependence on H(0)* or flow direction were observed, which may a indicate dynamic well skin effect.
- The well is unconfined. The well is partially penetrating because it is screened from 119 feet bgs to 129 feet bgs and the aquifer extends from 83.27 feet bgs (depth to water) to 150.4 feet bgs (bottom of the aquifer).
- Test selected for analysis: evaluated test 5, 12-inch falling head test because it had low noise, H(0) was near expected H(0)*, and recovery was greater than 99%.
- Data analysis and results: the data show an oscillatory or critically damped response; therefore, data analysis followed the flow chart in Figure 12.5 in Chapter 12 of Butler (2020).
    - H(0) was 0.961 feet, which is not equal to the H(0)* of 1 foot, so equation 3.2 (in Butler 2020) or 3.1 (in Aqtesolv) was used for effective casing radius correction.
    - The data were analyzed using the Springer-Gelhar method, an unconfined model for critically damped data (Figure 20). The estimated K from the model is 165 ft/day.

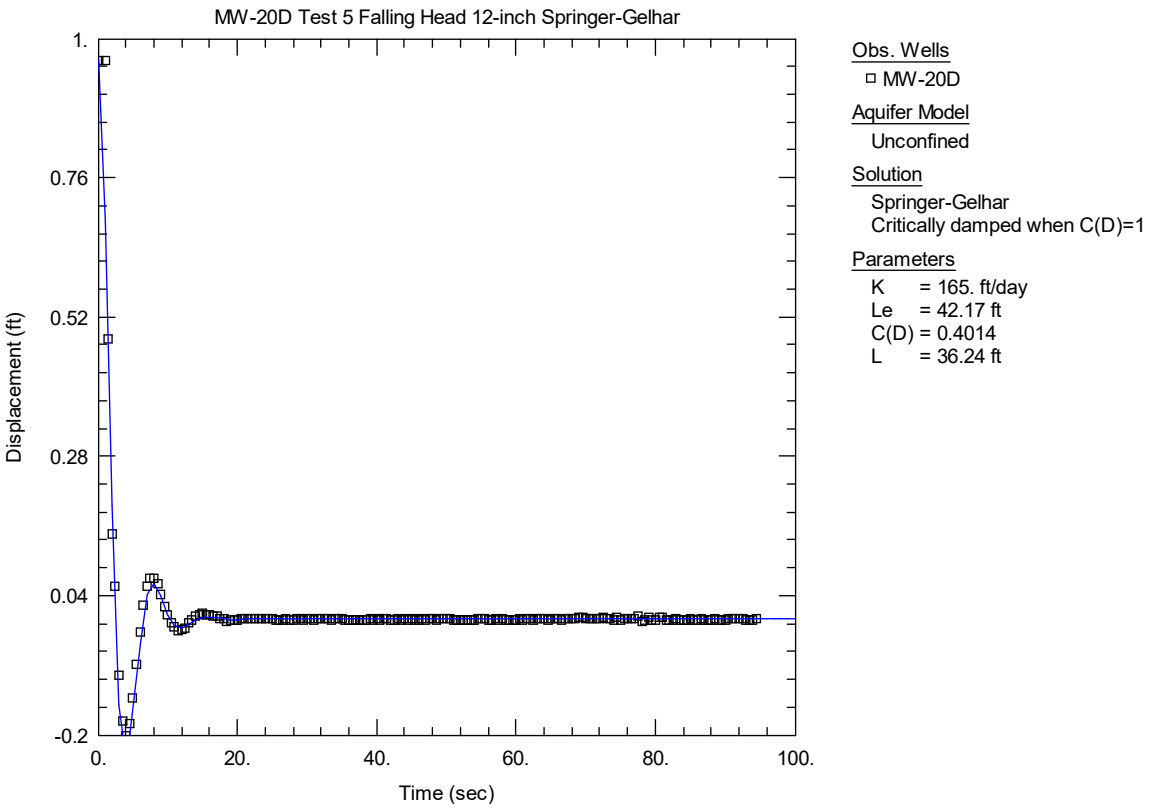

Figure 20. MW-20D Springer-Gelhar Analysis

MW-21

- Lithology: the well is screened in gravelly clay with sand, silty gravel with sand, and clayey gravel with sand.
- Number of tests and displacement: seven tests were run. Tests 1, 2, 6, and 7 were run with H(0)* = 1 foot, and tests 3, 4, and 5 were run with H(0)* = 2 feet. In test 3, the slug hit the bottom of the well. The slug was pulled up, retied to the rope, and a falling head 24-inch test was initiated after water level stabilized. Test 3 was not used in this analysis.
- Review of coincident plot: the normalized displacement data from the tests were not coincident. Reproducible dependence on flow direction was observed (see plot in Attachment B). This may indicate a directional well skin effect and/or changes in effective well screen.
- The well is unconfined. The well is partially penetrating because it is screened from 62 feet bgs to 72 feet bgs and the aquifer extends from 65.41 feet bgs (depth to water) to 142.6 feet bgs (bottom of the aquifer). The well is screened across the water table. Filter pack drainage, as evidenced by a double straight line, was not observed in the data.
- Test selected for analysis: evaluated the test 2, 12-inch rising head test because it had low noise, H(0) was near expected H(0)*, and recovery was greater than 99%.

- Data analysis and results: data are not coincident; therefore, data analysis followed the flow chart in Figure 12.1b in Chapter 12 of Butler (2020).
    - H(0) was 1.03 feet, which is not equal to the H(0)* of 1 foot, so equation 3.2 (in Butler 2020) or 3.1 (in Aqtesolv) was used for effective casing radius correction.
    - The data were analyzed using the Hvorslev quasi-steady state model for unconfined aquifers (Figure 21). The model was fit to the data in the recommended time window. The estimated K from the model is 54 ft/day.

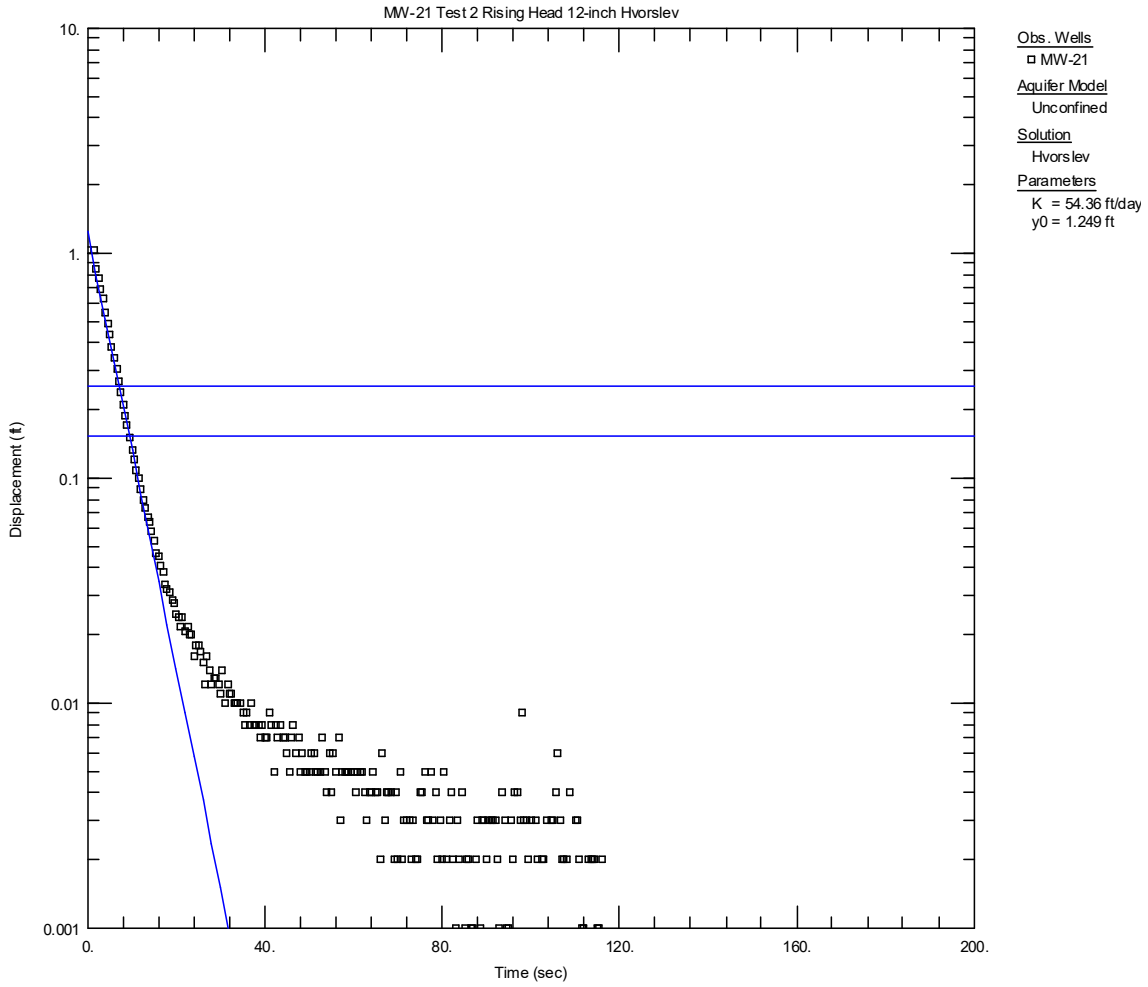

Figure 21. MW-21 Hvorslev Analysis

MW-22

- Lithology: the well is screened in gravelly clay with sand, clayey gravel with sand, and clayey sand with gravel.

- Number of tests and displacement: eight tests were run. Tests 1, 2, 5, and 6 were run with H(0)* = 1 foot, and tests 3, 4, 7, and 8 were run with H(0)* = 2 feet. The tests ran very quickly, therefore, an extra set of 24-inch tests were run.

- Review of coincident plot: the normalized displacement data from the tests were not coincident. No reproducible dependence on H(0)* or flow direction was observed (see plot in Attachment B). This may indicate a dynamic well skin effect.

- The well is unconfined. The well is partially penetrating because it is screened from 64 feet bgs to 74 feet bgs and the aquifer extends from 63.69 feet bgs (depth to water) to 131 feet bgs (bottom of the aquifer). The well is screened just below the water table. Slug test initiation brought the water levels into the screen. However, a double straight-line effect, indicating filter pack drainage, was not observed in the data plot.

- Test selected for analysis: evaluated the test 6, 12-inch rising head test because it had low noise, H(0) was near expected H(0)*, and recovery was 99%.

- Data analysis and results: data are not coincident; therefore, data analysis followed the flow chart in Figure 12.1b in Chapter 12 of Butler (2020).

    - H(0) was 0.809 feet, which is not equal to the H(0)* of 1 foot, so equation 3.2 (in Butler 2020) or 3.1 (in Aqtesolv) was used for effective casing radius correction.

    - No reproducible dependence on H(0)* was observed so the data were analyzed using the Hvorslev quasi-steady state model for unconfined aquifers (Figure 22). The estimated K from the model is 67 ft/day.

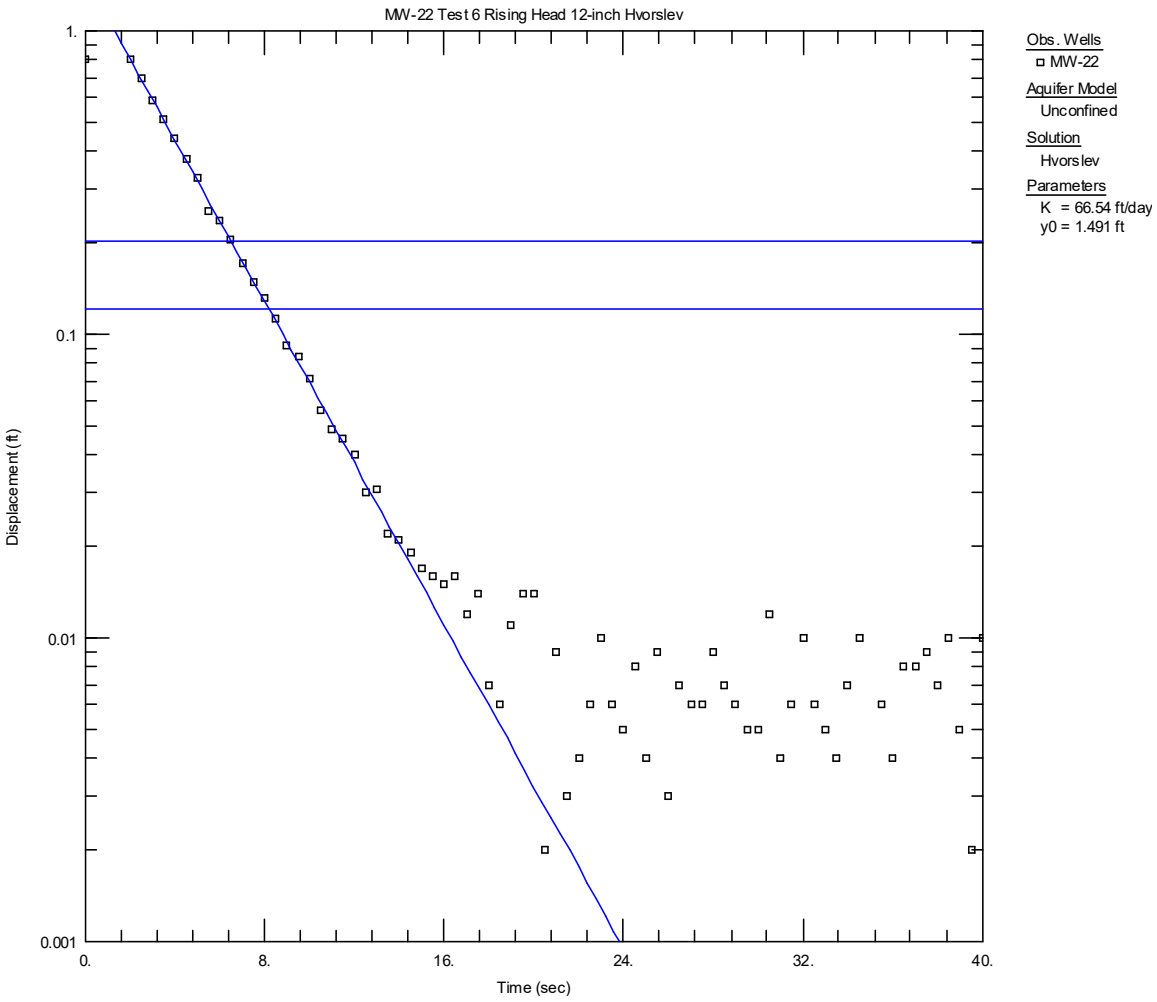

Figure 22. MW-22 Hvorslev Analysis

MW-26B

- Lithology: the well is screened in clayey gravel with sand.
- Number of tests and displacement: three tests were run. Tests 1 and 3 were run with H(0)* = 1 foot, and test 2 was run with H(0)* = 2 feet.
- Review of coincident plot: the plot of normalized displacement data from the tests were coincident, with a slight dependence on H(0)* (see plot in Attachment B).
- The well is unconfined. The well is partially penetrating because it is screened from 235 feet bgs to 245 feet bgs and the aquifer extends from 196.04 feet bgs (depth to water) to 390.4 feet bgs (bottom of the aquifer).
- Test selected for analysis: evaluated test 2, the 24-inch rising head test, because it had low noise, H(0) was near expected H(0)*, and recovery was greater than 99%.

- Data analysis and results: the data show an oscillatory or critically damped response; therefore, data analysis followed the flow chart in Figure 12.5 in Chapter 12 of Butler (2020).
    - H(0) was 1.951 feet, which is not equal to the H(0)* of 2 feet, so equation 3.2 (in Butler 2020) or 3.1 (in Aqtesolv) was used for effective casing radius correction.
    - The data were analyzed using Springer-Gelhar, an unconfined model for critically damped data (Figure 23). The estimated K from the model is 18 ft/day.

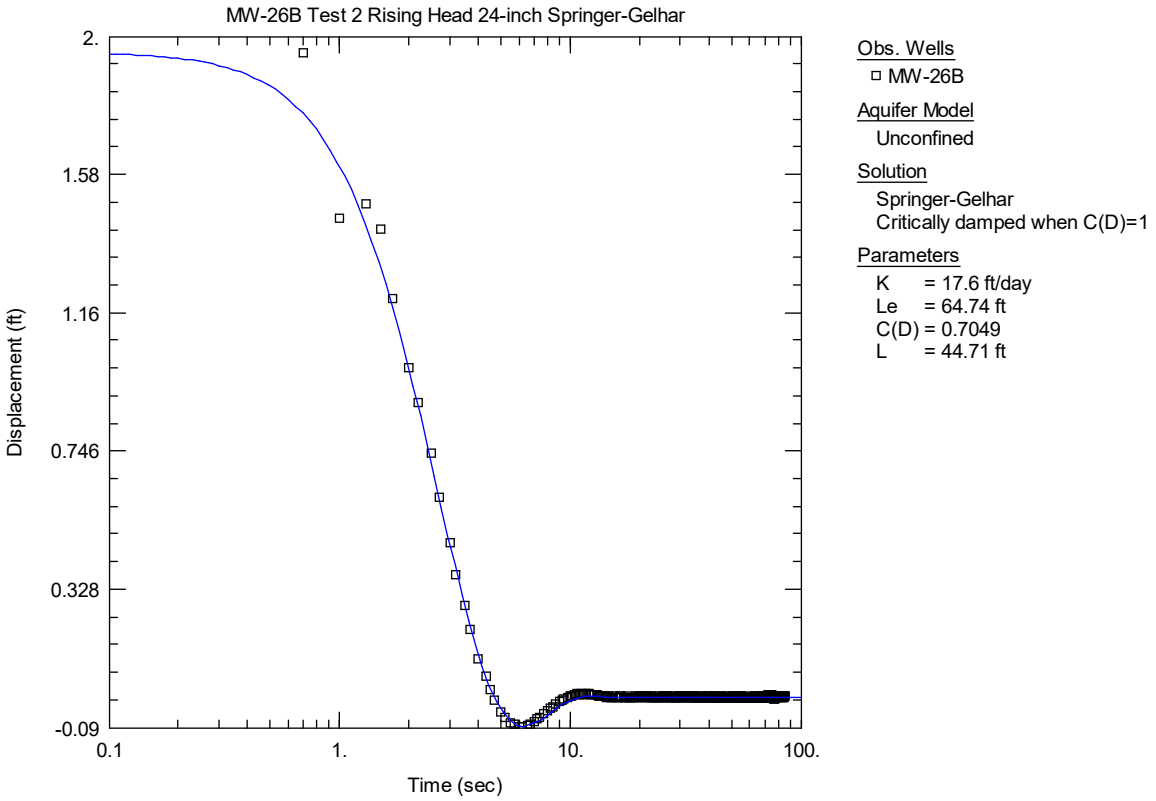

Figure 23. MW-26B Springer-Gelhar Analysis

MW-26C

- Lithology: the well is screened in sandy gravel, silty gravel, and gravelly clay.
- Number of tests and displacement: three tests were run. Tests 1 and 3 were run with H(0)* = 1 foot, and test 2 was run with H(0)* = 2 feet.
- Review of coincident plot: the plot of normalized displacement data from the tests were coincident (see plot in Attachment B).
- The well is semi-confined. The well is partially penetrating because it is screened from 315 feet bgs to 325 feet bgs and the aquifer extends from 248.6 feet bgs (top of the aquifer) to 390.4 feet bgs (bottom of the aquifer).

- Test selected for analysis: evaluated the test 2, 24-inch rising head test because it had low noise, H(0) was near expected H(0)*, and recovery was greater than 99%.
- Data analysis and results: the data show an oscillatory or critically damped response; therefore, data analysis followed the flow chart in Figure 12.5 in Chapter 12 of Butler (2020).
  - H(0) was 2.211 feet, which is not equal to the H(0)* of 2 feet, so equation 3.2 (in Butler 2020) or 3.1 (in Aqtesolv) was used for effective casing radius correction.
  - The data were analyzed using Butler-Zhan (Figure 24). The estimated K from the model is 10 ft/day. S_s is low for lithology, but K is still the best estimate.

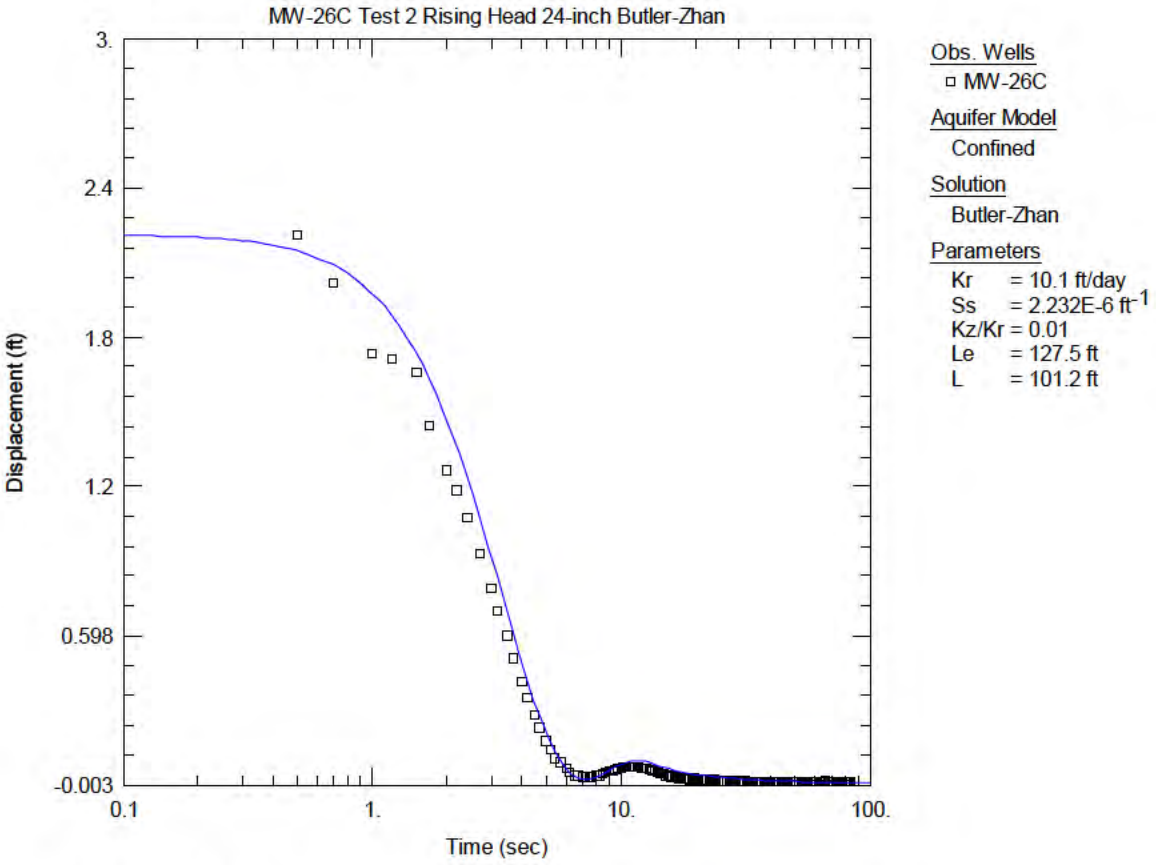

Figure 24. MW-26C Butler-Zhan Analysis

MW-26D

- Lithology: the well is screened in gravelly sand and gravelly clay.
- Number of tests and displacement: three tests were run. Tests 1 and 3 were run with H(0)* = 1 foot, and test 2 was run with H(0)* = 2 feet.

- Review of coincident plot: the plot of normalized displacement data from the tests were coincident, with a slight dependence on H(0)* (see plot in Attachment B).
- The well is semi-confined. The well is partially penetrating because it is screened from 347.75 feet bgs to 357.75 feet bgs and the aquifer extends from 248.6 feet bgs (top of the aquifer) to 390.4 feet bgs (bottom of the aquifer).
- Test selected for analysis: evaluated the test 2, 24-inch rising head test because it had low noise, H(0) was near expected H(0)*, and recovery was greater than 99%.
- Data analysis and results: the data show an oscillatory or critically damped response; therefore, data analysis followed the flow chart in Figure 12.5 in Chapter 12 of Butler (2020).
    - H(0) was 2.206 feet, which is not equal to the H(0)* of 2 feet, so equation 3.2 (in Butler 2020) or 3.1 (in Aqtesolv) was used for effective casing radius correction.
    - The data were analyzed using Butler-Zhan. The model did not fit data well in with a plausible S_s. The data were analyzed with Butler 1998 (Figure 25). The estimated K from the model is 39 ft/day.

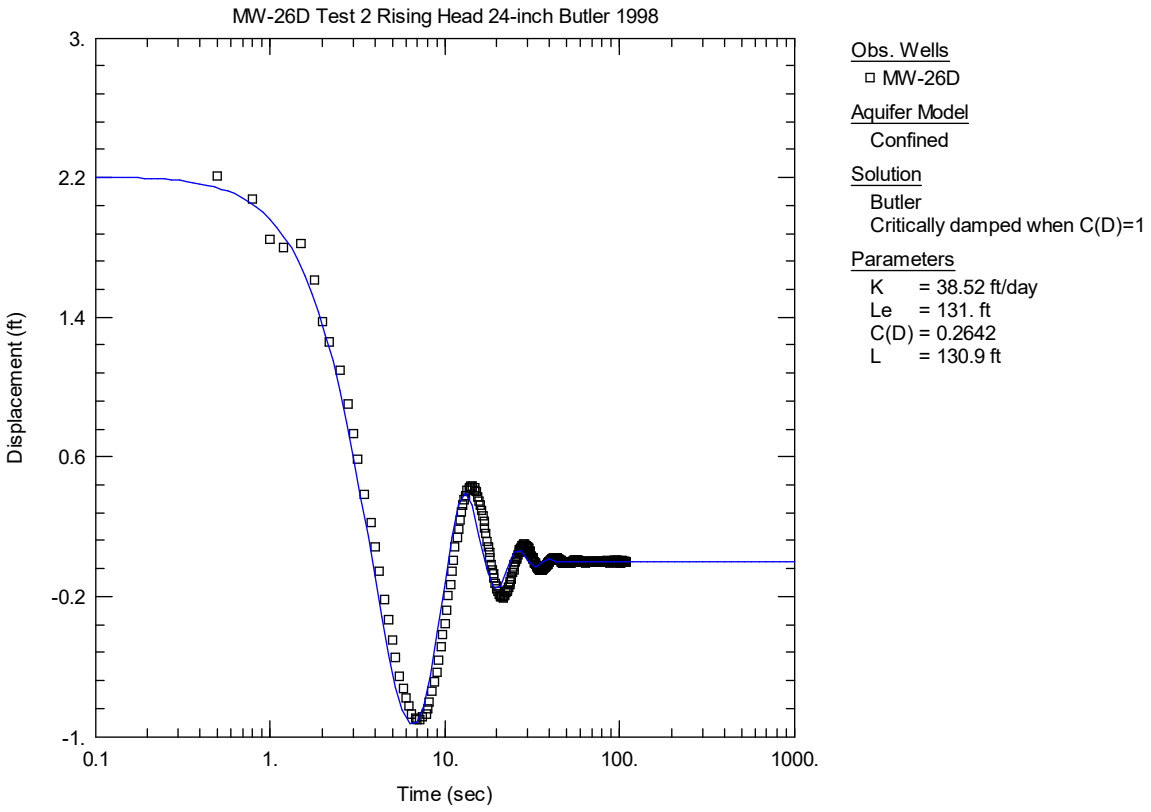

Figure 25. MW-26D Butler 1998 Analysis

MW-32A

- Lithology: the well is screened in sandy clay, clayey gravel, sand clay, and sandy gravel with clay.
- Number of tests and displacement: six tests were run. Tests 1, 2, 5, and 6 were run with H(0)* = 1 foot, and tests 3 and 4 were run with H(0)* = 2 feet.
- Review of coincident plot: the plot of normalized displacement data from the tests were not coincident. A reproducible dependence on H(0)* was not observed (see plot in Attachment B). This likely indicates a dynamic well skin effect.
- The well is unconfined. The well is partially penetrating because it is screened from 114 feet bgs to 124 feet bgs and the aquifer extends from 83.29 feet bgs (depth to water) to 154.77 feet bgs (bottom of the aquifer). The aquifer bottom was estimated based on the aquifer bottom at MW-34.
- Test selected for analysis: evaluated the test 4, 24-inch rising head test because it had low noise and recovery was greater than 99%.
- Data analysis and results: data are not coincident; therefore, data analysis followed the flow chart in Figure 12.1b in Chapter 12 of Butler (2020).
    - H(0) was 1.484 feet, which is not equal to the H(0)* of 2 feet, so equation 3.2 (in Butler 2020) or 3.1 (in Aqtesolv) was used for effective casing radius correction.
    - No reproducible dependence on H(0)* was observed so the data were analyzed using the Hvorslev quasi-steady state model for unconfined aquifers (Figure 26). The estimated K from the model is 200 ft/day.

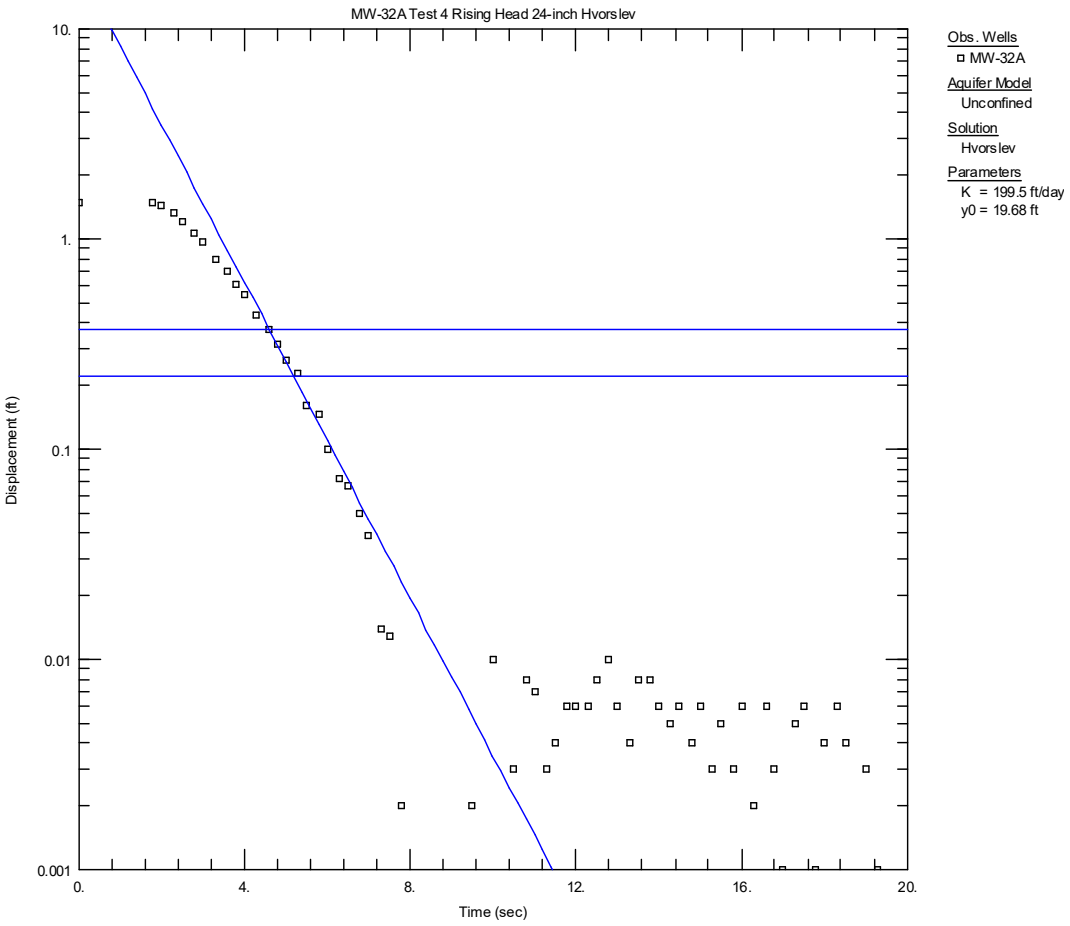

Figure 26. MW-32A Hvorslev Analysis

MW-34A

- Lithology: the well is screened in silty gravel and clayey silt.
- Number of tests and displacement: three tests were run. Tests 1 and 3 were run with H(0)* = 1 foot, and test 2 was run with H(0)* = 2 feet.
- Review of coincident plot: the plot of normalized displacement data from the tests were coincident, with a slight dependence on H(0)* (see plot in Attachment B).
- The well is unconfined. The well is partially penetrating because it is screened from 140 feet bgs to 150 feet bgs and the aquifer extends from 131.15 feet bgs (depth to water) to 196.8 feet bgs (bottom of the aquifer).
- Test selected for analysis: evaluated the test 1, 12-inch rising head test because it had low noise, H(0) was near expected H(0)*, and recovery was greater than 99%.

- Data analysis and results: the data show an oscillatory or critically damped response; therefore, data analysis followed the flow chart in Figure 12.5 in Chapter 12 of Butler (2020).
  - H(0) was 0.891 feet, which is not equal to the H(0)* of 1 foot, so equation 3.2 (in Butler 2020) or 3.1 (in Aqtesolv) was used for effective casing radius correction.
  - The data were analyzed using Springer-Gelhar, an unconfined model for critically damped data (Figure 27). The estimated K from the model is 46 ft/day.

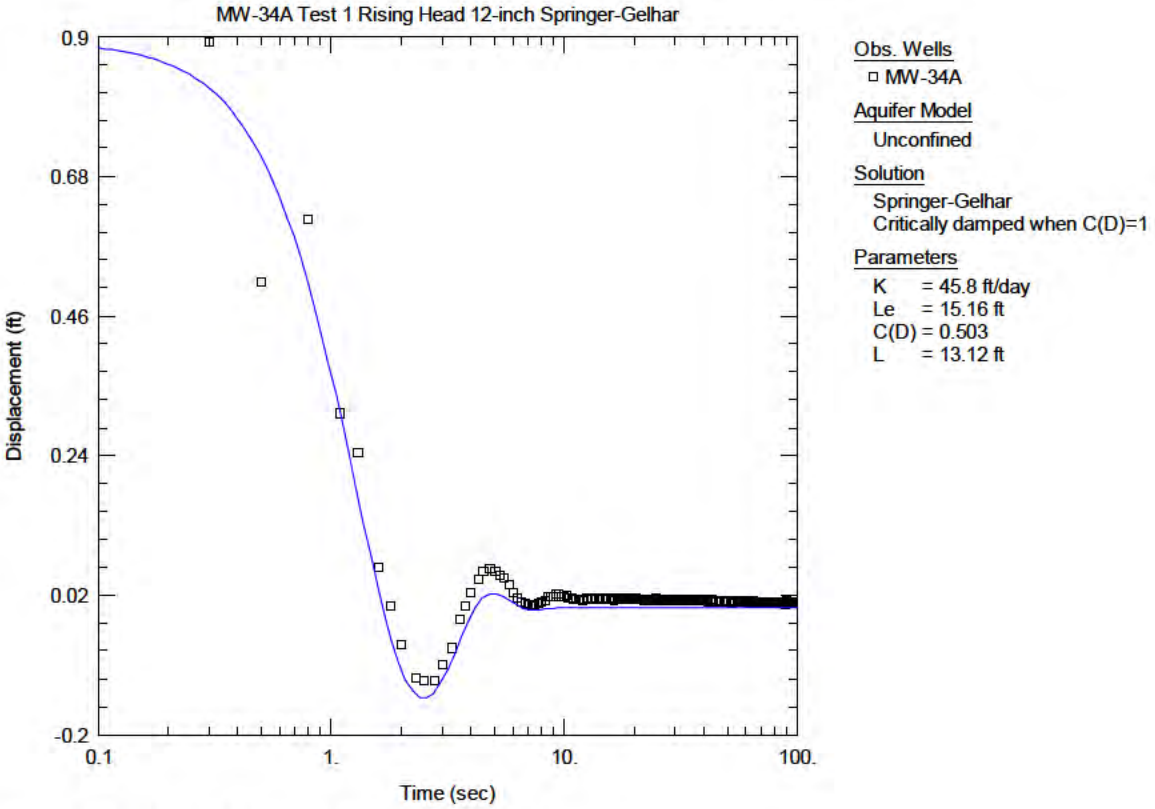

Figure 27. MW-34A Springer-Gelhar Analysis

MW-34B

- Lithology: the well is screened in silt, gravelly silt, and clay.
- Number of tests and displacement: three tests were run. Tests 1 and 3 were run with H(0)* = 1 foot, and test 2 was run with H(0)* = 2 feet.
- Review of coincident plot: the plot of normalized displacement data from the tests were coincident, with a slight dependence on H(0)* (see plot in Attachment B).

- The well is unconfined. The well is partially penetrating because it is screened from 175 feet bgs to 185 feet bgs and the aquifer extends from 131.12 feet bgs (depth to water) to 196.8 feet bgs (bottom of the aquifer).
- Test selected for analysis: evaluated the test 2, 24-inch rising head test because it had low noise, H(0) was near expected H(0)*, and recovery was greater than 99%.
- Data analysis and results: the data show an oscillatory or critically damped response; therefore, data analysis followed the flow chart in Figure 12.5 in Chapter 12 of Butler (2020).
  - H(0) was 2.362 feet, which is not equal to the H(0)* of 2 feet, so equation 3.2 (in Butler 2020) or 3.1 (in Aqtesolv) was used for effective casing radius correction.
  - The data were analyzed using Springer-Gelhar, an unconfined model for critically damped data (Figure 28). The estimated K from the model is 29 ft/day.

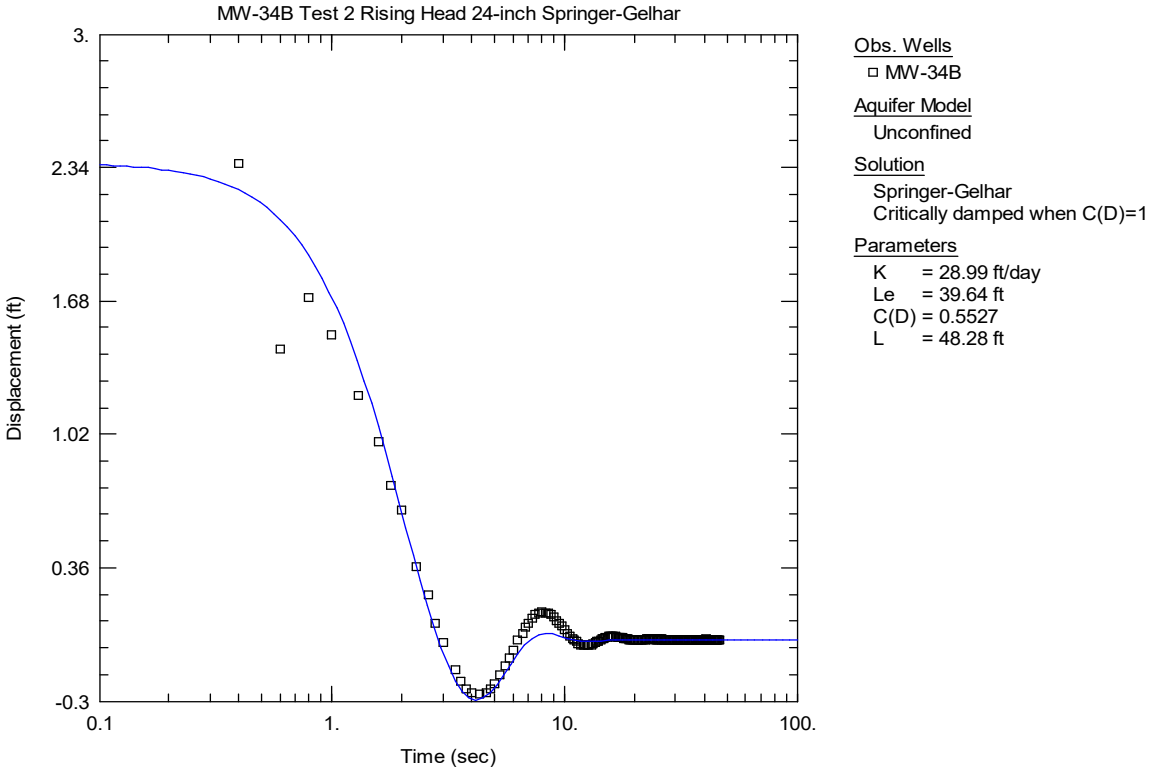

Figure 28. MW-34B Springer-Gelhar Analysis

MW-34C

- Lithology: the well is screened in silty clay, silty gravel, and silty clay.
- Number of tests and displacement: six tests were run. Tests 1, 2, 5 and 6 were run with H(0)* = 1 foot, and tests 3 and 4 were run with H(0)* = 2 feet.

- Review of coincident plot: the plot of normalized displacement data from the tests were coincident (see plot in Attachment B).
- The well is semi-confined. The well is partially penetrating because it is screened from 250 feet bgs to 260 feet bgs and the aquifer extends from 207.2 feet bgs (top of the aquifer) to 367.7 feet bgs (bottom of the aquifer).
- Test selected for analysis: evaluated the test 3, 24-inch rising head test because it had low noise, H(0) was near expected H(0)*, and recovery was greater than 99%.
- Data analysis and results: the aquifer is semi-confined, the well is screened below the water table, therefore data analysis followed the flow chart in Figure 12.3 in Chapter 12 of Butler (2020).
    - H(0) was 2.29 feet, which is not equal to the H(0)* of 2 feet, so equation 3.2 (in Butler 2020) or 3.1 (in Aqtesolv) was used for effective casing radius correction.
    - The data were analyzed using Cooper et al. S was implausibly low. This indicates a low-K skin may be present or it may be because of slug-induced vertical flow.
    - Because the well is partially penetrating, check if d/b>2. Because d/b<2, the data were analyzed using both the unconfined and semi-confined KGS models. In both cases, S_s was not plausible for the lithology.
    - Followed the flow chart in Figure 12.2b. The data were relatively noise free and the test ran to completion, therefore the data were analyzed using the Peres et al. model (Figure 29). S_s was still implausibly low for lithology. T from model is still the best estimate: T = 22 ft^2/day. A range of K was calculated by dividing T by aquifer thickness and by screen length: K = 0.14 ft/day to 2 ft/day.

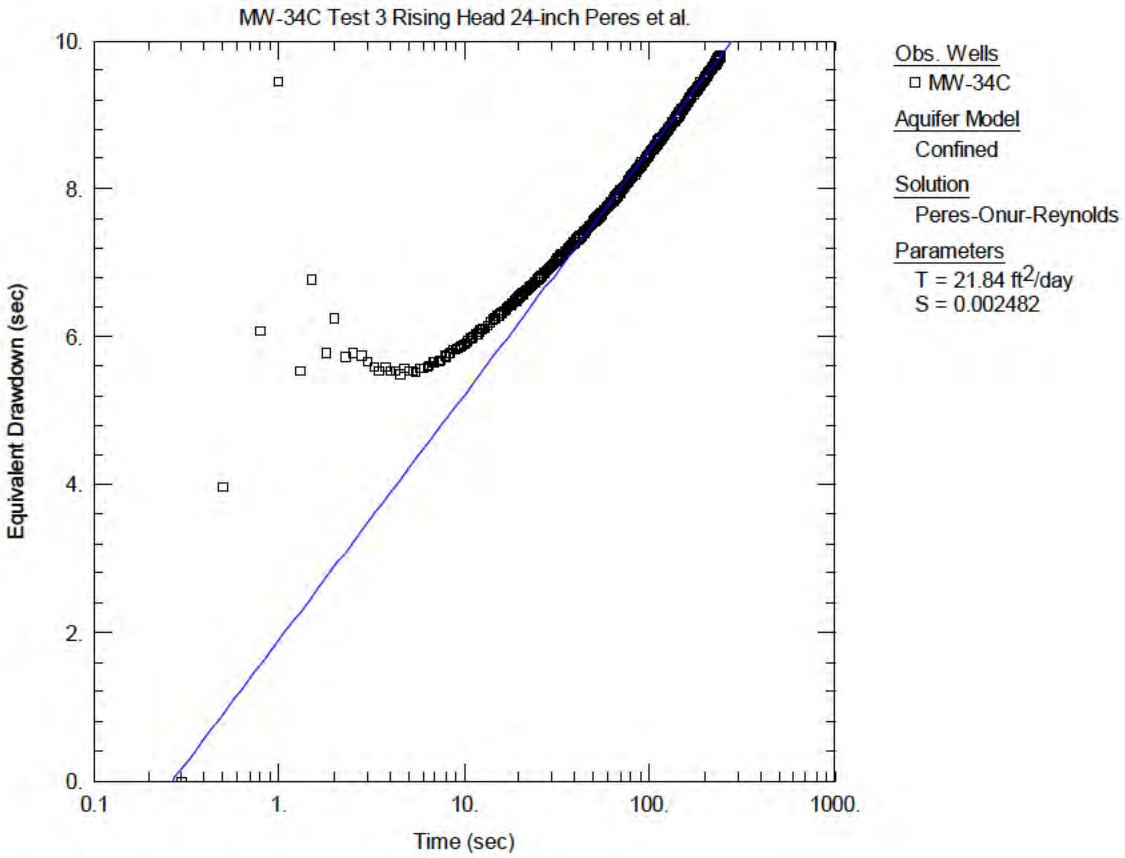

Figure 29. MW-34C Peres et al. Analysis

MW-34D

- Lithology: the well is screened in silty gravel and silty clay.
- Number of tests and displacement: six tests were run. Tests 1, 2, 5 and 6 were run with H(0)* = 1 foot, and tests 3 and 4 were run with H(0)* = 2 feet.
- Review of coincident plot: the plot of normalized displacement data from the tests were coincident, with a slight dependence on H(0)* (see plot in Attachment B).
- The well is semi-confined. The well is partially penetrating because it is screened from 315 feet bgs to 325 feet bgs and the aquifer extends from 207.2 feet bgs (top of the aquifer) to 367.7 feet bgs (bottom of the aquifer).
- Test selected for analysis: evaluated the test 4, 24-inch rising head test because it had low noise, H(0) was near expected H(0)*, and recovery was greater than 99%.
- Data analysis and results: the data show an oscillatory or critically damped response; therefore, data analysis followed the flow chart in Figure 12.5, Chapter 12 of Butler (2020).

- H(0) was 2.228 feet, which is not equal to the H(0)* of 2 feet, so equation 3.2 (in Butler 2020) or 3.1 (in Aqtesolv) was used for effective casing radius correction.
- The data were analyzed using Butler-Zhan (Figure 30). The estimated K from the model is 20 ft/day.

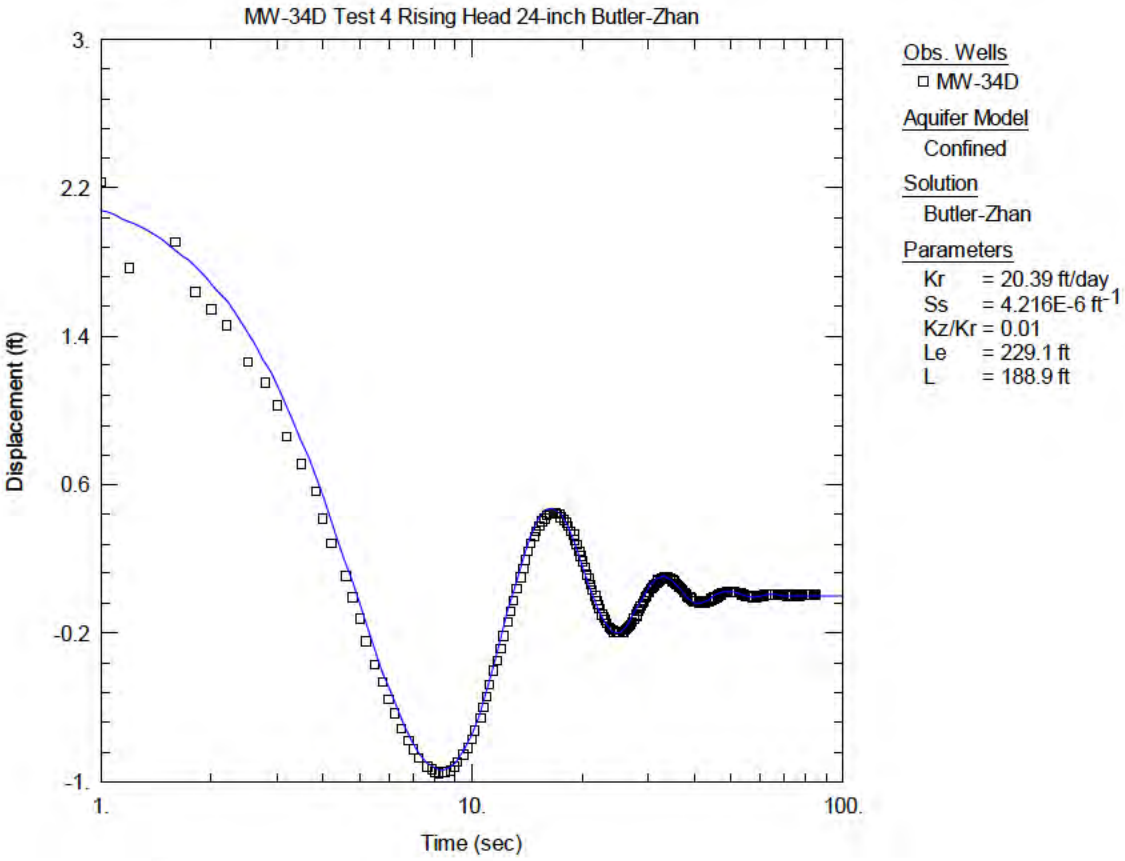

Figure 30. MW-34D Butler-Zhan Analysis

Results

The K and T values calculated from the slug test results are listed in Table 3. These results should be regarded as lower-bound estimates of K. The results of the slug tests are usable and consistent with the project DQOs as defined in the work plan.

The K values at wells completed in the 17 shallow aquifer zone wells ranged from 0.1 ft/day to 200 ft/day. Ten of the K values in these wells ranged between 5 ft/day and 50 ft/day. The K values in the nine wells completed in the deep aquifer zone ranged between 0.14 ft/day and 51 ft/day. Eight of these K values ranged between approximately 10 ft/day and 51 ft/day. The one well tested in the intermediate aquifer zone, MW-26B, had a K value of 18 ft/day, which is in the middle of the K values observed in the shallow and deep zone wells. These K values are reasonable for the lithology of the screened zones (Freeze, et al. 1979).

The T values are presented in Table 3 and were influenced by lithology and aquifer thickness and varied greatly throughout the study area. The T values were calculated either by the model or by multiplying the hydraulic conductivity, K, by the aquifer thickness or screen length. Transmissivity values in wells completed in the shallow aquifer zones ranged from 0.44 ft^2/day to 14,296 ft^2/day. Transmissivity values of the wells completed in the deep aquifer zones had a smaller range, between 22 ft^2/day and 9,028 ft^2/day. The one well tested in the intermediate aquifer zone, MW-26B, had a T value of 3,498 ft^2/day.

As part of the data analysis process, the normalized data from each test at a well were plotted together on a coincident plot (Attachment B). When a plot of normalized displacement data is coincident, this indicates the response in the well is not a function of initial displacement and that the assumptions underlying the methods used to analyze the data are valid. Data were coincident in 15 out of 27 tests evaluated, as indicated in Table 3.

- At seven of these wells (MW-02, MW-03RA, MW-03RB, MW-04, MW-08C, MW-13D, and MW-34C) a possible low-K skin was detected using the Cooper et al. analysis which was used as part of the process of evaluating the data from coincident tests.
- Data from seven other wells in this group (MW-03RC, MW-26B, MW-26C, MW-26D, MW-34A, MW-34B, and MW-34D) were coincident indicating either that skin effects are minimal or that a static skin is present. Due to the oscillatory nature of the response, data from these seven locations were not screened with the Cooper et al. method.
- Data from MW-13S were coincident, were analyzed with the Cooper et al. method, the results were accepted, and a skin effect was not observed.

At the 12 wells where the data plots were not coincident, this may be because of a dynamic skin effect (differences in responses appear random) or a directional skin effect (responses differ consistently between a rising and falling head test). Skin effects are assumed to bias the K estimates low.

- Possible dynamic skin effects were observed in the tests from four wells: MW-01S, MW-20D, MW-22, and MW-32A (Table 3).
- Possible directional skin effects were observed in the tests from eight wells: MW-08A, MW-08B, MW-13L, MW-15D, MW-18, MW-19, MW-20S, and MW-21 (Table 3).

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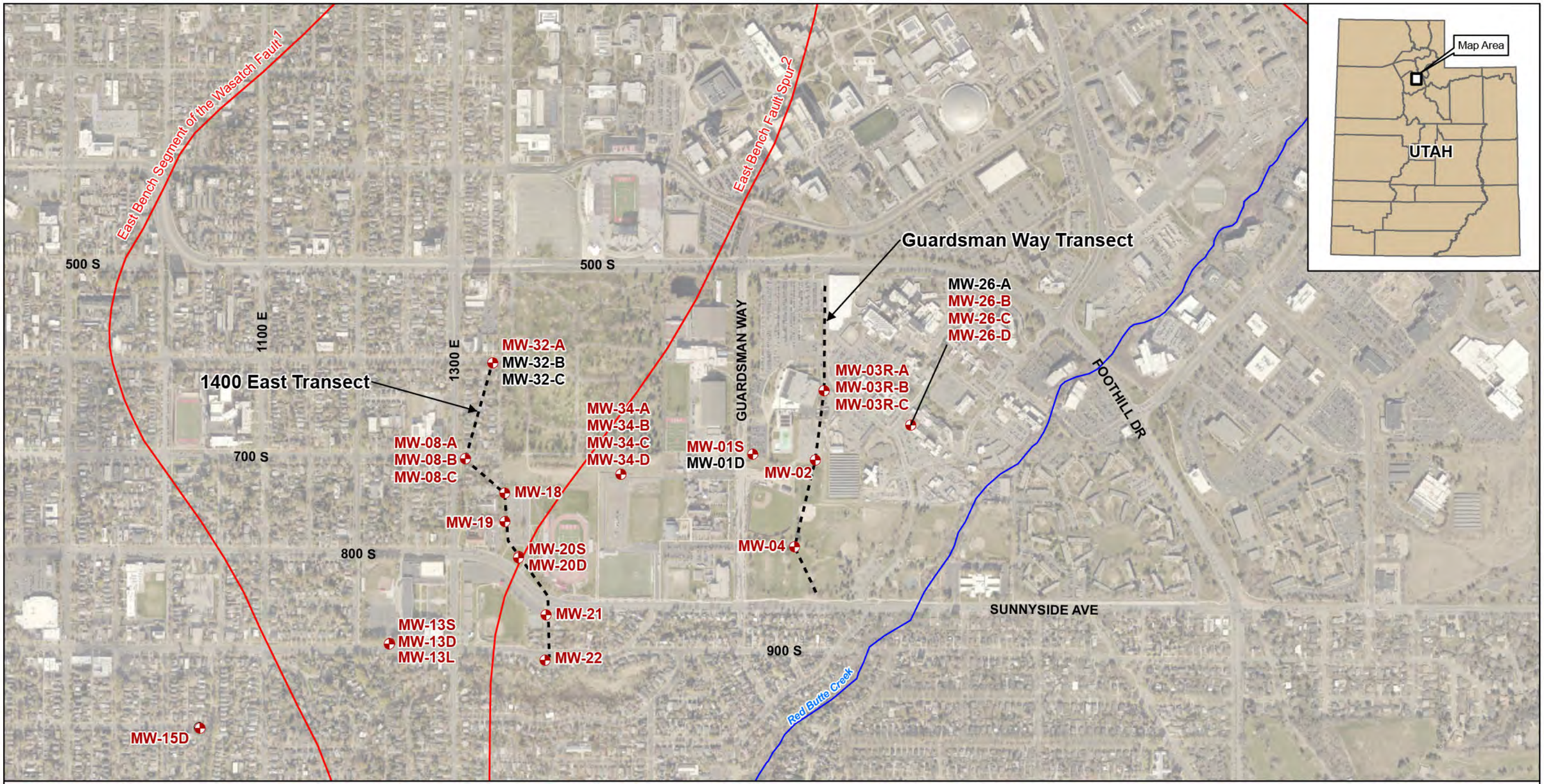
Figure 1



Legend

- Completed Slug Test Location
- Proposed Slug Test Location (unsuccessful)
- Monitoring Well Transect Line
- Red Butte Creek
- Fault Line

Notes:
OU = operable unit
PCE = tetrachloroethene

[1] Davis, F.D. 1983. Geologic Map of the Central Wasatch Front, Utah. Utah Geological and Mineral Survey. Map 54-A – Wasatch Front Series. May.
[2] Personius, S.F. and Scott, W.E. 2009. Surficial Geologic Map of the Salt Lake City Segment and Parts of Adjacent Segments of the Wasatch Fault Zone, Davis, Salt Lake, and Utah Counties, Utah

N
W E
S

0 500 1,000 Feet

1 inch = 800 feet

CDM Smith

Figure 1
Hydraulic Testing Locations

Remedial Investigation Report
OU1 700 South 1600 East PCE Plume
Salt Lake City, Utah

File Path: J:\238824_VA_Medical_Salt_Lake\MXD\Sampling_2021\RI_2021\Fig3-4_Hydraulic_Testing.mxd WAGNERA 4/21/2021

Tables

Table 1 Well Parameters
Table 2 Slug Test Data Analysis Process
Table 3 Results

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Table 1
Well Parameters

Well ID	Sample Interval	Aquifer Zone	Fully or Partially Penetrating	Aquifer Confined or Unconfined	Aquifer Bottom (ft amsl)	Aquifer Bottom (feet bgs)	Aquifer Top (if confined) (ft amsl)	Aquifer Top (if confined) (feet bgs)	Slug Test Type	Total Well Depth (ft bgs)	Total Well Depth Measured (ft bgs)	Stick-up[5] (ft)	Total Well Depth Measured (ft bTOC)	Lithology at Screened Interval	Screen Start (ft bgs)	Screen End (ft bgs)	Measured Depth to Water (ft BTOC) prior to testing	Depth to Water (ft bgs)
MW-01S	-	Shallow	Partially	Unconfined	4435.94	226.6	-	-	Mechanical	224	221.16	-0.6	220.56	Silty clay with gravel, sandy clay, silty sand, clayey silt, sandy clay with gravel	184	224	156.98	157.58
MW-02	-	Shallow	Partially	Unconfined	4457.77	220.6	-	-	Pneumatic	205.5	205.8	-0.3	205.5	Gravelly sand, sandy clay, sandy gravelly clay, sandy clayey gravel, sand	175.5	202.5	170.71	171.01
MW-03RA	A	Shallow	Partially	Unconfined	4457.92	240.8	-	-	Pneumatic	223	223.514	-0.8	222.69	Silty gravel with sand, clayey gravel with sand	215	220	188.17	188.99
MW-03RB	B	Deep	Partially	Semiconfined	4304.7	394.0	4445.7	253.0	Pneumatic	275	276.222	-0.8	275.41	Sandy silty clay, silty clayey gravel with sand	267	272	203.73	204.54
MW-03RC	C	Deep	Partially	Semiconfined	4304.7	394.0	4445.7	253.0	Pneumatic	315	316.317	-0.8	315.55	Silty gravel with sand, gravel with silt and sand	307	312	203.88	204.65
MW-04	-	Shallow	Partially	Unconfined	4450.07	204.1	-	-	Mechanical	173	173.4	-0.2	173.2	Gravel with clay	143	173	136.25	136.45
MW-08A	A	Shallow	Partially	Unconfined	4400.59	140.0	-	-	Mechanical	106	106.45	-0.6	105.87	Clayey gravel with sand	91	106	60.09	60.67
MW-08B	B	Deep	Partially	Semiconfined	4215.97	324.6	4393.0	147.6	Mechanical	200	199.851	-0.6	199.3	Clayey gravel with sand	180	200	58.32	58.87
MW-08C	C	Deep	Partially	Semiconfined	4215.97	324.6	4393.0	147.6	Pneumatic	312	308.552	-0.8	307.8	Silty gravel with sand	304	309	57.05	57.80
MW-13S	-	Shallow	Partially	Unconfined	4392.42	90.9	-	-	Mechanical	22	21.008	-0.4	20.65	Silty sand with gravel, clayey gravel with sand, sandy silt, clayey sand, lean clay	15.5	20.5	14.78	15.14
MW-13D	-	Shallow	Partially	Unconfined	4392.42	90.7	-	-	Mechanical	90	84.878	-0.4	84.5	Clayey sand with gravel, sand with silt, clayey gravel with sand	79	84	13.21	13.59
MW-13L		Deep	Partially	Semiconfined	4181.49	301.81	4387.3	96.0	Mechanical	-	160.8	-0.8	160	Sandy silt, silt with sand, gravel with sand and silt	150	160	17.02	17.82
MW-15D	-	Shallow	Partially	Unconfined	Unclear2	Unclear2	-	-	Mechanical	95	74.2	-0.2	74	Silty gravel with sand	69	74	50.10	50.30
MW-18	-	Shallow	Partially	Unconfined	4405.8	153.33	-	-	Mechanical	110	89.98	-0.2	89.75	Silty gravel with sand, clayey gravel with sand, clayey sand	80	90	81.68	81.91
MW-19	-	Shallow	Partially	Unconfined	4404.89	152.4	-	-	Mechanical	110	95.6	-0.2	95.32	Gravelly clay with sand, clayey gravel with sand	84	94	81.09	81.33
MW-20S	-	Shallow	Partially	Unconfined	4407.95	150.8	-	-	Mechanical	90.8	90.355	-0.3	90.1	Clayey gravel with sand, silty sand with gravel, silty sand, sandy lean clay with gravel	79.5	89.5	83.33	83.58
MW-20D	-	Shallow	Partially	Unconfined	4407.95	150.4	-	-	Mechanical	150	129.455	-0.2	129.25	Clayey gravel with sand	119	129	83.07	83.27
MW-21	-	Shallow	Partially	Unconfined	4420.95	142.6	-	-	Mechanical	80	71.928	-0.2	71.68	Gravelly clay with sand, silty gravel with sand, clayey gravel with sand	62	72	65.16	65.41
MW-22	-	Shallow	Partially	Unconfined	4431.91	131.0	-	-	Mechanical	120	73.246	-0.2	73	Gravelly clay with sand, clayey gravel with sand, clayey sand with gravel	64	74	63.44	63.69
MW-26B	B	Intermediate	Partially	Unconfined	4464.96	390.4	-	-	Pneumatic	247	250.75	-0.7	250.05	Silty sand with gravel	235	245	195.34	196.04
MW-26C	C	Deep	Partially	Semiconfined	4322.89	390.4	4464.6	248.6	Pneumatic	327	329.22	-0.7	328.48	Sandy gravel, silty gravel, gravelly clay	315	325	217.32	218.06
MW-26D	D	Deep	Partially	Semiconfined	4322.89	390.4	4464.6	248.6	Pneumatic	360	359.2	-0.8	358.45	Gravelly sand, gravelly clay	347.75	357.75	217.51	218.26
MW-32A	A	Shallow	Partially	Unconfined	4384.844	154.77	-	-	Mechanical	-	124.85	-0.6	124.3	Sandy clay, clayey gravel, sandy clay, sandy gravel with clay	114	124	82.74	83.29
MW-34A	A	Shallow	Partially	Unconfined	4426.84	196.8	-	-	Pneumatic	152	154.27	-0.5	153.75	Silty gravel, clayey silt	140	150	130.63	131.15
MW-34B	B	Shallow	Partially	Unconfined	4426.84	196.8	-	-	Pneumatic	187	189.4	-0.9	188.5	Silt, gravelly silt, clay	175	185	130.22	131.12
MW-34C	C	Deep	Partially	Semiconfined	4255.93	367.7	4416.4	207.2	Pneumatic	262	264.2	-1.0	263.22	Silty clay, silty gravel, silty clay	250	260	129.56	130.54
MW-34D	D	Deep	Partially	Semiconfined	4255.93	367.7	4416.4	207.2	Pneumatic	327	329.34	-1.0	328.31	Silty gravel, silty clay	315	325	129.46	130.49

NOTES

[1] For MW-13L, assumed same ground surface as MW-13S

[2] For MW-15D, aquifer bottom is unclear. Assumed an aquifer thickness of 100 feet.

[3] For MW-18, assumed same aquifer bottom as MW-19, accounted for 0.91 difference in elevation

[4] For MW-32A, estimated aquifer bottom based on MW-34A; average of difference between suface elevations (58 ft) and screen bottoms (26 ft) = 42 ft

[5] Stick-up is the length of casing above or below (negative number) ground surface

amsl – above mean sea level
bgs – below ground surface
btoc – below top of inside casing

Table 1
Well Parameters

Well ID	Transducer Depth (height of WC above transducer)	Static Water Column Height (feet) H	Aquifer Thickness (feet) b	Depth to Top of Screen (feet) d	d/b	d/b > 2?	Screen length (feet) L	Effective Screen Length (feet) Le	Borehole Diameter (inches)	Radius of Well (feet) R(w)	Well Diameter (inches)	Inside Radius of Casing (ft) R(c)	Radius of Equipment (ft) R(eq)	Anisotropy Ratio Kz/Kr	H(0) observed (feet)	H(0)* expected (feet)
MW-01S	8.6	63.58	69.02	26.42	0.38	N	40.00	40.00	10	0.42	2	0.083	0.01	0.01	0.855	1.00
MW-02	7.5	34.79	49.63	4.49	0.09	N	27.00	27.00	8	0.33	2	0.083	0.01	0.01	2.381	2.00
MW-03RA	7.6	34.52	51.77	26.01	0.50	N	5.00	5.00	8	0.33	1	0.042	0.01	0.01	2.091	2.00
MW-03RB	9.0	71.68	189.44	62.46	0.44	N	5.00	5.00		0.33	1	0.042	0.01	0.01	2.025	2.00
MW-03RC	9.0	111.67	189.34	102.35	0.73	N	5.00	5.00		0.33	1	0.042	0.01	0.01	0.998	1.00
MW-04	14.5	36.95	67.63	6.55	0.10	N	30.00	30.00	8	0.33	4	0.167	0.01	0.01	1.168	1.42
MW-08A	11.0	45.78	79.29	30.33	0.38	N	15.00	15.00	10	0.42	2	0.083	0.01	0.01	0.935	1.00
MW-08B	12.7	140.98	265.71	121.13	0.68	N	20.00	20.00		0.42	2	0.083	0.01	0.01	0.995	1 or 2
MW-08C	11.4	250.75	266.78	246.20	1.39	N	5.00	5.00		0.42	1	0.042	0.01	0.01	1.884	2.00
MW-13S	6.0	5.87	75.76	0.36	0.00	N	5.00	5.00	6	0.25	2	0.083	0.01	0.01	1.032	1.00
MW-13D	9.4	71.29	77.07	65.41	0.85	N	5.00	5.00	6	0.25	2	0.083	0.01	0.01	0.994	1.00
MW-13L	9.3	142.98	283.99	132.18	0.64	N	10.00	10.00	6	0.25	2	0.083	0.01	0.01	1.972	2.00
MW-15D	9.4	23.90	100.00	18.70	0.19	N	5.00	5.00	6	0.25	2	0.083	0.01	0.01	1.018	1.00
MW-18	7.7	8.07	71.42	0.00	0.00	N	10.00	8.07	6	0.25	2	0.083	0.01	0.01	1.136	1.00
MW-19	10.0	14.23	71.10	2.67	0.04	N	10.00	10.00	6	0.25	2	0.083	0.01	0.01	0.947	1.00
MW-20S	6.1	6.77	67.20	0.00	0.00	N	10.00	6.77	6	0.25	2	0.083	0.01	0.01	1.008	1.00
MW-20D	10.2	46.18	67.09	35.73	0.53	N	10.00	10.00	6	0.25	2	0.083	0.01	0.01	0.961	1.00
MW-21	5.7	6.52	77.17	0.00	0.00	N	10.00	6.52	6	0.25	2	0.083	0.01	0.01	1.030	1.00
MW-22	8.1	9.56	67.29	0.31	0.00	N	10.00	10.00	6	0.25	2	0.083	0.01	0.01	0.809	1.00
MW-26B	10.4	54.71	194.32	38.96	0.20	N	10.00	10.00	8	0.33	1	0.042	0.01	0.01	1.951	2.00
MW-26C	9.5	111.16	172.30	96.94	0.68	N	10.00	10.00		0.33	1	0.042	0.01	0.01	2.211	2.00
MW-26D	10.7	140.94	172.10	129.49	0.91	N	10.00	10.00		0.33	1	0.042	0.01	0.01	2.206	2.00
MW-32A	11.2	41.56	71.48	30.71	0.43	N	10.00	10.00	7	0.29	2	0.083	0.01	0.01	1.484	2.00
MW-34A	6.2	23.12	65.62	8.85	0.13	N	10.00	10.00	8	0.33	1	0.042	0.01	0.01	0.891	1.00
MW-34B	7.6	58.28	65.65	43.88	0.67	N	10.00	10.00		0.33	1	0.042	0.01	0.01	2.362	2.00
MW-34C	7.1	133.66	237.14	119.46	0.74	N	10.00	10.00		0.33	1	0.042	0.01	0.01	2.290	2.00
MW-34D	6.8	198.85	237.19	184.51	1.15	N	10.00	10.00		0.33	1	0.042	0.01	0.01	2.228	2.00

NOTES

[1] For MW-13L, assumed same ground surface as MW-13S

[2] For MW-15D, aquifer bottom is unclear. Assumed an aquifer thickness of 100 feet.

[3] For MW-18, assumed same aquifer bottom as MW-19, accounted for 0.91 difference in elevation

[4] For MW-32A, estimated aquifer bottom based on MW-34A; average of difference between suface elevations (58 ft) and screen bottoms (26 ft) = 42 ft

[5] Stick-up is the length of casing above or below (negative number) ground surface

amsl – above mean sea level

bgs – below ground surface

btoc – below top of inside casing

Table 2 - Slug Test Data Analysis Process - Adapted from Chapter 12 of Butler (2020)

Data are coincident Choose test with the lowest noise to analyze	Not oscillatory or critically damped	Screened across the water table	Filter pack drainage observed	Analyze with Hvorslev and Bouwer-Rice for a range of hydraulic conductivity values	
			Filter pack drainage not observed	Analyze with Cooper et al. method	
				Specific storage or storativity value implausibly low	If the well is fully penetrating, the data are mostly free from noise, and test was run to completion, analyze with Peres et al. method
					If partially penetrating, and depth to top of screen divided by aquifer thickness is greater than 2, then analyze with KGS unconfined model
					If partially penetrating, and depth to top of screen divided by aquifer thickness is not greater than 2, then analyze with KGS confined and unconfined models for a range
					If specific storage or storativity value is still implausibly low, analyze with Peres et al.
				Specific storage or storativity value acceptable	Use estimate from Cooper et al. method
		Not screened across the water table	Confined	Analyze using Cooper et al. method	
				If specific storage or storativity value is implausibly low, analyze with KGS confined model	
				If specific storage or storativity value is still implausibly low, analyze with Peres et al.	
			Unconfined	Analyze using Cooper et al. method	
				Specific storage or storativity value implausibly low	If the well is fully penetrating, the data are mostly free from noise, and test was run to completion, analyze with Peres et al method
					If partially penetrating, and depth to top of screen divided by aquifer thickness is greater than 2, then analyze with KGS unconfined model.
					If partially penetrating, and depth to top of screen divided by aquifer thickness is not greater than 2, then analyze with KGS confined and unconfined models for a range
					If specific storage or storativity value is still implausibly low, analyze with Peres et al.
				Specific storage or storativity value acceptable	Use estimate from Cooper et al. method
Oscillatory or critically damped	If the aquifer is unconfined, analyze with the Springer-Gelhar method				
	If the aquifer is confined, analyze with the Butler-Zhan method				
Data are not coincident	Reproducible dependence on H(0)*	Dependence on flow direction - analyze with non-linear Dagan model			
		No dependence on flow direction - analyze with non-linear high-K model			
	No reproducible dependence on H(0)*	Analyze with quasi-steady state model (Hvorslev)			

Notes:
H(0)* - expected initial test displacement
K - hydraulic conductivity
KGS - Kansas Geological Survey

Table 3. Slug Test Results

Well ID	Aquifer Zone	Lithology of the Screened Interval	Aquifer Thickness b, feet	Hydraulic Conductivity (K), feet/day	Transmissivity (T), $feet^2/day$	Storativity (S)	Specific Storage (S_s) ($feet^{-1}$)	Coincident?	Method	Skin Effects?
MW-01S	Shallow	Silty clay with gravel, sandy clay, silty sand, clayey silt, sandy clay with gravel	69.02	12	828			N	Hvorslev	Dynamic
MW-02	Shallow	Gravelly sand, sandy clay, sandy gravelly clay, sandy clayey gravel, sand	49.63	10 to 19	500	1.86E-07		Y	Peres et al. (screened with Cooper et al.)	Possible low-K skin
MW-03RA	Shallow	Silty gravel with sand, clayey gravel with sand	51.77	5 to 48	241	6.09E-16		Y	Peres et al. (screened with Cooper et al.)	Possible low-K skin
MW-03RB	Deep	Sandy silty clay, silty clayey gravel with sand	141.00	0.75 to 21	106	2.10E-07		Y	Peres et al. (screened with Cooper et al.)	Possible low-K skin
MW-03RC	Deep	Silty gravel with sand, gravel with silt and sand	141.00	25	3,525		5.93E-05	Y	Butler-Zhan	Not detected by coincident plot
MW-04	Shallow	Gravel with clay	67.63	6 to 14	415	1.07E-02		Y	Peres et al. (screened with Cooper et al.)	Possible low-K skin
MW-08A	Shallow	Clayey gravel with sand	79.29	103	8,167			N	Springer-Gelhar	Directional
MW-08B	Deep	Clayey gravel with sand	177.02	51	9,028		2.26E-06	N	Butler Zhan	Directional, low S_s indicates possible low K skin
MW-08C	Deep	Silty gravel with sand	177.02	0.5 to 16	82	2.34E-11		Y	Peres et al. (screened with Cooper et al.)	Possible low-K skin

Table 3. Slug Test Results

Well ID	Aquifer Zone	Lithology of the Screened Interval	Aquifer Thickness b, feet	Hydraulic Conductivity (K), feet/day	Transmissivity (T), $feet^2/day$	Storativity (S)	Specific Storage (S_s) ($feet^{-1}$)	Coincident?	Method	Skin Effects?
MW-13S	Shallow	Silty sand with gravel, clayey gravel with sand, sandy silt, clayey sand, lean clay	75.76	0.1	0.44	1.30E-02		Y	Cooper et al.	Not detected
MW-13D	Shallow	Clayey sand with gravel, sand with silt, clayey gravel with sand	77.07	2	10	1.50E-04		Y	Peres et al. (screened with Cooper et al.)	Possible low-K skin
MW-13L	Deep	Sandy silt, silt with sand, gravel with sand and silt	205.79	34	6,997		1.13E-04	N	Butler-Zhan	Directional
MW-15D	Shallow	Silty gravel with sand	100.00	15	1,500			N	Hvorslev	Directional
MW-18	Shallow	Silty gravel with sand, clayey gravel with sand, clayey sand	71.42	12	857			N	Dagan	Possible directional or change in effective screen length
MW-19	Shallow	Gravelly clay with sand, clayey gravel with sand	71.10	30	2,133			N	Hvorslev	Possible directional or change in effective screen length
MW-20S	Shallow	Clayey gravel with sand, silty sand with gravel, silty sand, sandy lean clay with gravel	67.20	10	672			N	Dagan	Possible directional or change in effective screen length
MW-20D	Shallow	Clayey gravel with sand	67.09	165	11,069			N	Springer-Gelhar	Dynamic
MW-21	Shallow	Gravelly clay with sand, silty gravel	77.17	54	4,167			N	Hvorslev	Directional

Table 3. Slug Test Results

Well ID	Aquifer Zone	Lithology of the Screened Interval	Aquifer Thickness b, feet	Hydraulic Conductivity (K), feet/day	Transmissivity (T), $feet^2/day$	Storativity (S)	Specific Storage (S_s) ($feet^{-1}$)	Coincident?	Method	Skin Effects?
		with sand, clayey gravel with sand								
MW-22	Shallow	Gravelly clay with sand, clayey gravel with sand, clayey sand with gravel	67.29	67	4,509			N	Hvorslev	Dynamic
MW-26B	Intermediate	Silty sand with gravel	194.32	18	3,498			Y	Springer-Gelhar	Not detected by coincident plot
MW-26C	Deep	Sandy gravel, silty gravel, gravelly clay	141.74	10	1,417		2.23E-06	Y	Butler-Zhan	Not detected by coincident plot, low S_s indicates possible low K skin
MW-26D	Deep	Gravelly sand, gravelly clay	141.74	39	5,528			Y	Butler	Not detected by coincident plot
MW-32A	Shallow	Sandy clay, clayey gravel, sandy clay, sandy gravel with clay	71.48	200	14,296			N	Hvorslev	Dynamic
MW-34A	Shallow	Silty gravel, clayey silt	65.62	46	3,019			Y	Springer-Gelhar	Not detected by coincident plot
MW-34B	Shallow	Silt, gravelly silt, clay	65.65	29	1,904			Y	Springer-Gelhar	Not detected by coincident plot
MW-34C	Deep	Silty clay, silty gravel, silty clay	160.44	0.14 to 2	22	2.48E-03		Y	Peres et al. (screened with Cooper et al.)	Possible low-K skin

Table 3. Slug Test Results

Well ID	Aquifer Zone	Lithology of the Screened Interval	Aquifer Thickness b, feet	Hydraulic Conductivity (K), feet/day	Transmissivity (T), $feet^2/day$	Storativity (S)	Specific Storage (S_s) ($feet^{-1}$)	Coincident?	Method	Skin Effects?
MW-34D	Deep	Silty gravel, silty clay	160.44	20	3,209		4.22E-06	Y	Butler-Zhan	Not detected by coincident plot

Attachment A
Slug Test Data Collection Forms

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Slug Test - Data Acquisition Sheet

General Information

Project Name: 700S 1600E PCE Plume	Date of Test: 2/5/21
Well Number: MW-01S	Test Performed By: W. Treadway, K. Murphy
Well Location: Aquatic Center	QC: Kevin Murphy

Well Information

Reported Well Depth from Land Surf, ft: 224	Date of Last Well Development: unknown
Measured Depth from Top of Inside Casing (TIC), ft: ~220.56	Initial Static Water Level TIC, ft.: 156.98
Stickup of TIC from land surface, ft: -0.6 (black pump dock)	Final Static Water Level TIC ft: 156.96
Well Depth, ft bgs (depth TIC – stickup): 221.16	Casing Inside Diameter, in. and Schedule: 2"
Ht. of Water Column, ft: (well depth – DTW): ~~64.18~~ 63.58	Borehole Dia., in. 10"

	Type	Serial Number	Purpose and Placement	Reading in Air
Transducer #1	LevelTroll 700	691849	data collection, test well	NA
Transducer #2				

Data Logger Type and Serial Number: USB Troll Com R35905
Logging Program: In-Situ 5 — Acquisition Rate: 500
Pressure or Pressure Head Units: PSI — Time Units: msec
Comments: (e.g. transducer diameter and cable diameter)
Cable S/N: 778443 200ft

Test Information

	Test 01	Test 02	Test 03	Test 04	Test 05
Initiation method	slug 1	slug 1	slug 2	slug 2	slug 1
Rising/falling head	falling	rising	falling	rising	falling.
Pre-test DTW	156.95 0949	156.93 0959	156.95 1026	156.94 1039	156.94 1054
Post-test DTW	156.93 0957	156.95 1012	156.94 1036	156.95 1047	156.95 1059
Expected H_0	12"	12"	24"	24"	12"

Additional comments[1]

Test 01	MW-01S_test1_falling12
Test 02	MW-01S_test2_rising12
Test 03	MW-01S_test3_falling24
Test 04	MW-01S_test4_rising24
Test 05	MW-01S_test5_falling12 NOTE: DO NOT USE *

	Test 06	Test 07	Test 08	Test 09	Test 10
Initiation method	slug 1	slug 1	slug 1		
Rising/falling head	rising	falling	rising		
Pre-test DTW	156.95 1101	156.95 1108	156.95 1115		
Post-test DTW	156.95 1106	156.94 1113	156.95 1119		
Expected H_0	12"	12"	12"		

Additional comments

Test 06	MW-01S_test6-rising12 NOTE: DO NOT USE *
Test 07	MW-01S_test7-falling12 try for larger disp.
Test 08	MW-01S_test8-rising12
Test 09	
Test 10	

File for Field Data:

[1] If pneumatic slug test is performed, record "air pressure before test initiation" under Additional Comments.

Slug length (ft): NA — MWG slugs (2-inch) known disp. at 12" + 24"
Slug diameter (in): NA
Slug Volume (ft^3) = pi ((slug diameter/2)/12)^2 * slug length = NA

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Slug Test - Data Acquisition Sheet

General Information

Project Name: 7005 1600E PCE Plume	Date of Test: 2/10/21
Well Number: MW-02	Test Performed By: W. Treadway, K. Murphy
Well Location: Ag. Center (salt pile)	QC: Kevin Murphy

Well Information

Reported Well Depth from Land Surf, ft: 205.5 *	Date of Last Well Development: unknown
Measured Depth from Top of Inside Casing (TIC), ft: NM	Initial Static Water Level TIC, ft.: 170.71 top of pump house.
Stickup of TIC from land surface, ft: NM ~0.3	Final Static Water Level TIC ft: 170.70
Well Depth, ft bgs (depth TIC – stickup): ~~205.8~~ NM	Casing Inside Diameter, in. and Schedule: 4"
Ht. of Water Column, ft: (well depth – DTW): 34.79 *	Borehole Dia., in. 8"

Note, we took pump house off to add 2-inch riser for pneumatic tests.

	Type	Serial Number	Purpose and Placement	Reading in Air
Transducer #1	LevelTrol 700	691849	data collection, test well	NA
Transducer #2				

Data Logger Type and Serial Number: Wireless Troll Com S/N: R34079
Logging Program: Vu-Sity
Acquisition Rate: 250
Pressure or Pressure Head Units: PSI
Time Units: msec
Comments: (e.g. transducer diameter and cable diameter)
Cable S/N: 702567 300ft

Test Information

	Test 01	Test 02	Test 03	Test 04	Test 05
Initiation method	pneumatic	pneumatic	pneumatic	pneumatic	pneumatic
Rising/falling head	rising	rising	rising	rising	rising
Pre-test DTW	170.71 1623	170.71 1632	170.70 1642	170.70 1649	170.70 1658
Post-test DTW	170.71 1625	170.71 1634	170.70 1643	170.70 1651	170.70 1700
Expected H_0	12"	12"	24"	24"	12"

Additional comments[1]

Test 01	MW-02_test1_rising 12 ~12" H_2O
Test 02	MW-02_test2_rising 12 ~12" H_2O
Test 03	MW-02_test3_rising 24 ~24" H_2O
Test 04	MW-02_test4_rising 24 ~24" H_2O
Test 05	MW-02_test5_rising 12 ~12" H_2O

	Test 06	Test 07	Test 08	Test 09	Test 10
Initiation method	pneumatic				
Rising/falling head	rising				
Pre-test DTW	170.70 1708				
Post-test DTW	170.70 1710				
Expected H_0	12"				

Additional comments

Test 06	MW-02_test6_rising 12 ~12" H_2O
Test 07	
Test 08	
Test 09	
Test 10	

File for Field Data:

[1] If pneumatic slug test is performed, record "air pressure before test initiation" under Additional Comments.

Slug length (ft): NA

Slug diameter (in): NA

Slug Volume (ft^3) = pi ((slug diameter/2)/12)^2 * slug length = NA

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Slug Test - Data Acquisition Sheet

General Information

Project Name: 7005 1600E PCE Plume	Date of Test: 2/6/21
Well Number: MW-03RA	Test Performed By: W. Treadway K. Murphy
Well Location: VA Campus	QC. Kevin Murphy

Well Information

Reported Well Depth from Land Surf, ft: 223	Date of Last Well Development: unknown
Measured Depth from Top of Inside Casing (TIC), ft: ~~NM~~ 222.69 WT	Initial Static Water Level TIC, ft.: 188.17 (inner well casing)
Stickup of TIC from land surface, ft: -0.8	Final Static Water Level TIC ft: 188.14 " "
Well Depth, ft bgs (depth TIC – stickup): WT ~~223.80~~ 223.49	Casing Inside Diameter, in. and Schedule: 1.5"
Ht. of Water Column, ft: (well depth – DTW): WT ~~35.03~~ 34.52	Borehole Dia., in. 8"

	Type	Serial Number	Purpose and Placement	Reading in Air
Transducer #1	LevelTrol 700	691849	data collection, test well	NA
Transducer #2				

Data Logger Type and Serial Number: Wireless Troll Com S/N R34079

Logging Program: VuSitu — Acquisition Rate: 500

Pressure or Pressure Head Units: PSI — Time Units: msec

Comments: (e.g. transducer diameter and cable diameter)
Cable S/N: 778443 200ft

Test Information

	Test 01	Test 02	Test 03	Test 04	Test 05
Initiation method	WT ~~St~~ pneumatic	pneumatic	pneumatic		
Rising/falling head	rising	rising	rising		
Pre-test DTW	188.15 1118	188.15 1132	WT ~~188.14~~ 188.14 1150		
Post-test DTW	188.15 1120	188.15 1134	188.14 1154		
Expected H_0	12"	24"	12"		
Additional comments[1]					
Test 01	MW-03RA – test1 – rising 12 12" H_2O NOTE: wrong time on trans.				
Test 02	MW-03RA – test2 – rising 24 24" H_2O				
Test 03	MW-03RA – test3 – rising 12 12" H_2O				
Test 04					
Test 05					

	Test 06	Test 07	Test 08	Test 09	Test 10
Initiation method					
Rising/falling head					
Pre-test DTW					
Post-test DTW					
Expected H_0					
Additional comments					
Test 06					
Test 07					
Test 08					
Test 09					
Test 10					

File for Field Data:

[1] If pneumatic slug test is performed, record "air pressure before test initiation" under Additional Comments.

Slug length (ft): NA

Slug diameter (in): NA

Slug Volume (ft^3) = pi ((slug diameter/2)/12)^2 * slug length = NA

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Slug Test - Data Acquisition Sheet

General Information

Project Name: 700S 1600E PCE Plume	Date of Test: 2/6/21
Well Number: MW-03RB	Test Performed By: W. Treadaway, K. Murphy
Well Location: VA Campus	QC: Kevin Murphy

Well Information

felt like sediment

Reported Well Depth from Land Surf, ft: 275 ~~275.41~~	Date of Last Well Development: unknown
Measured Depth from Top of Inside Casing (TIC), ft: ~~273.55~~ MT	Initial Static Water Level TIC, ft.: 203.73
Stickup of TIC from land surface, ft: -0.8	Final Static Water Level TIC ft: 203.66
Well Depth, ft bgs (depth TIC – stickup): 276.21	Casing Inside Diameter, in. and Schedule: 2" 1"
Ht. of Water Column, ft: (well depth – DTW): ~~72.48~~ 71.68	Borehole Dia., in. 8"

	Type	Serial Number	Purpose and Placement	Reading in Air
Transducer #1	Level Trol 700	691849	data collection, test well	NA
Transducer #2				

Data Logger Type and Serial Number: Wireless Troll Com R34079

Logging Program: In-situ — Acquisition Rate: 500

Pressure or Pressure Head Units: PSI — Time Units: msec

Comments: (e.g. transducer diameter and cable diameter)

cable S/N: 702569 300ft

Test Information

	Test 01	Test 02	Test 03	Test 04	Test 05
Initiation method	pneumatic	pneumatic	pneumatic		
Rising/falling head	rising	rising	rising		
Pre-test DTW	203.72 1249	203.72 1259	203.72 1307		
Post-test DTW	203.73 1251	203.73 1302	203.73 1310		
Expected H_0	12"	24"	12"		

Additional comments[1]	
Test 01	MW-03RB_test1_rising 12 — 12" H_2O
Test 02	MW-03RB_test2_rising 24 — 24" H_2O
Test 03	MW-03RB_test3_rising 12 — 12" H_2O
Test 04	
Test 05	

	Test 06	Test 07	Test 08	Test 09	Test 10
Initiation method					
Rising/falling head					
Pre-test DTW					
Post-test DTW					
Expected H_0					

Additional comments	
Test 06	
Test 07	
Test 08	
Test 09	
Test 10	

File for Field Data:

[1] If pneumatic slug test is performed, record "air pressure before test initiation" under Additional Comments.

Slug length (ft): NA

Slug diameter (in): NA

Slug Volume (ft^3) = pi ((slug diameter/2)/12)^2 * slug length = NA

Slug Test - Data Acquisition Sheet

General Information

Project Name: 7005 1600 E PCE Plume	Date of Test: 2/6/21
Well Number: MW-03RC	Test Performed By: W. Treadway, K. Murphy
Well Location: VA Campus	QC: Kevin Murphy

Well Information

Reported Well Depth from Land Surf, ft: 315	Date of Last Well Development: Unknown
Measured Depth from Top of Inside Casing (TIC), ft: 315.55	Initial Static Water Level TIC, ft.: 203.88
Stickup of TIC from land surface, ft: -0.8	Final Static Water Level TIC ft: 203.81
Well Depth, ft bgs (depth TIC – stickup): 316.30	Casing Inside Diameter, in. and Schedule: 1"
Ht. of Water Column, ft: (well depth – DTW): ~~112.42~~ wt 111.67	Borehole Dia., in. 8"

	Type	Serial Number	Purpose and Placement	Reading in Air
Transducer #1	LevelTroll 700	691849	data collection, test well	NA
Transducer #2				

Data Logger Type and Serial Number: Wireless Troll Com S/N: R34079
Logging Program: VuSitu Acquisition Rate: 500
Pressure or Pressure Head Units: PSI Time Units: msec
Comments: (e.g. transducer diameter and cable diameter)
Cable S/N: 702569 300 ft.

Test Information

	Test 01	Test 02	Test 03	Test 04	Test 05
Initiation method	pneumatic	pneumatic	pneumatic		
Rising/falling head	rising	rising	rising		
Pre-test DTW	203.87 1405	203.87 1417	203.88 ~~7~~ 1432		
Post-test DTW	203.87 1408	203.88 1423	203.87 1435		
Expected H_0	12"	24"	12"		

Additional comments[1]	
Test 01	MW-03RC-test1-rising12 12" H_2O
Test 02	MW-03RC-test2-rising24 24" H_2O
Test 03	MW-03RC-test3-rising12 12" H_2O
Test 04	
Test 05	

	Test 06	Test 07	Test 08	Test 09	Test 10
Initiation method					
Rising/falling head					
Pre-test DTW					
Post-test DTW					
Expected H_0					

Additional comments	
Test 06	
Test 07	
Test 08	
Test 09	
Test 10	

File for Field Data:

[1] If pneumatic slug test is performed, record "air pressure before test initiation" under Additional Comments.

Slug length (ft): NA

Slug diameter (in): NA

Slug Volume (ft^3) = pi ((slug diameter/2)/12)^2 * slug length = NA

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Slug Test - Data Acquisition Sheet

General Information

Project Name: 700S 1600E PCE Plume	Date of Test: 2/3/21
Well Number: MW-04	Test Performed By: W. Treadway, A. Fiorini
Well Location: Sunnyside Park	QC: Anna Fiorini

Well Information

Reported Well Depth from Land Surf, ft: 173	Date of Last Well Development: unknown
Measured Depth from Top of Inside Casing (TIC), ft: ~173*	Initial Static Water Level TIC, ft.: 136.25
Stickup of TIC from land surface, ft: -0.2	Final Static Water Level TIC ft: 136.14
Well Depth, ft bgs (depth TIC – stickup): 173.2	Casing Inside Diameter, in. and Schedule: 4"
Ht. of Water Column, ft: (well depth – DTW): 36.75	Borehole Dia., in. 8"

* Note: hard to tell with WL meter

	Type	Serial Number	Purpose and Placement	Reading in Air
Transducer #1	LevelTroll 700	691849	data collection, test well	NA
Transducer #2				

Data Logger Type and Serial Number: USB Troll Com S/N: 690918
Logging Program: Win-Situ 5 Acquisition Rate: 500
Pressure or Pressure Head Units: PSI Time Units: msec
Comments: (e.g. transducer diameter and cable diameter)
Cable S/N: 778443 200 ft Depth of trans: 14.5 ft below WL

Test Information

	Test 01	Test 02	Test 03	Test 04	Test 05
Initiation method	Slug 1	Slug 1	Slug 2	Slug 2	Slug 1
Rising/falling head	falling ~~12~~ 11 2/3/21	rising	falling	rising	falling
Pre-test DTW	136.23 ~~12~~ 1112	136.23	136.23 1112	136.21 1127	136.15 1150
Post-test DTW	136.225	136.22	136.22	136.20 1132	136.15 1155
Expected H_0	~~12~~ 11"	~~12~~ 11"	~~24~~ 17"	~~24~~ 17"	~~12~~ 11"
Additional comments[1]					
Test 01	MW-04_test1_falling12 changed to MW-04_test1_falling11				
Test 02	MW-04_test2_rising12 changed to MW-04_test2_~~falling11~~ rising11				
Test 03	MW-04_test3_falling24 changed to MW-04_test3_~~rising17~~ falling17				
Test 04	MW-04_test4_rising24 changed to MW-04_test4_~~fo~~ rising17				
Test 05	MW-04_test5_falling11				

	Test 06	Test 07	Test 08	Test 09	Test 10
Initiation method	Slug 1				
Rising/falling head	rising				
Pre-test DTW	136.15 1158				
Post-test DTW	136.14 1202				
Expected H_0	~~12~~ 11"				
Additional comments					
Test 06	MW-04_test6_rising11				
Test 07					
Test 08					
Test 09					
Test 10	NOTE: Slug 1 = 11" Slug 2 = 17" (Midwest GeoScience)				

File for Field Data:

[1] If pneumatic slug test is performed, record "air pressure before test initiation" under Additional Comments.

Slug length (ft): NA MWG Slugs known displacement: 11" + 17"
Slug diameter (in): NA
Slug Volume (ft^3) = pi ((slug diameter/2)/12)^2 * slug length = NA

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Slug Test - Data Acquisition Sheet

General Information

Project Name: 7005 1000E PCE Plume	Date of Test: 2/8/21
Well Number: MW-08A	Test Performed By: W. Treadway, K. Murphy
Well Location: 1300 E 700 S	QC: Kevin Murphy

Well Information

Reported Well Depth from Land Surf, ft: 106	Date of Last Well Development: unknown
Measured Depth from Top of Inside Casing (TIC), ft: 105.87	Initial Static Water Level TIC, ft.: 60.09
Stickup of TIC from land surface, ft: -0.6	Final Static Water Level TIC ft: 60.07
Well Depth, ft bgs (depth TIC – stickup): 106.47	Casing Inside Diameter, in. and Schedule: 2"
Ht. of Water Column, ft: (well depth – DTW): ~~46.38~~ 45.78	Borehole Dia., in. 10"

	Type	Serial Number	Purpose and Placement	Reading in Air
Transducer #1	Level Troll 700	691849	data collection, test well	NA
Transducer #2				

Data Logger Type and Serial Number: ~~LTA~~ Wireless Troll Com S/N: R34079
Logging Program: Vu-Situ
Acquisition Rate: 500
Pressure or Pressure Head Units: PSI
Time Units: mges
Comments: (e.g. transducer diameter and cable diameter)
Cable S/N: 702567 300ft

Test Information

	Test 01	Test 02	Test 03	Test 04	Test 05
Initiation method	Slug1	Slug1	Slug1	Slug1	Slug2
Rising/falling head	falling	rising	falling	rising	falling
Pre-test DTW	60.09 0925	60.09 0931	60.09 0943	60.09 0947	60.09 1003
Post-test DTW	60.09 0927	60.09 0933	60.09 0945	60.09 0949	60.09 1006
Expected H_0	12"	12"	12"	12"	24"
Additional comments[1]					
Test 01	MW-08A_test1_falling12 checked data ~ 0.9 ft disp.				
Test 02	MW-08A-test2-~~falling12~~ rising12 " " ~0.7 ft disp., noisy				
Test 03	MW-08A-test3_falling12				
Test 04	MW-08A_test4_rising12				
Test 05	MW-08A-test5_falling24				

	Test 06	Test 07	Test 08	Test 09	Test 10
Initiation method	Slug2	Slug1	slug1		
Rising/falling head	rising	falling	rising		
Pre-test DTW	60.09 1008	60.09 1017	60.09 1022		
Post-test DTW	60.09 1010	60.09 1019	60.09 1024		
Expected H_0	24"	12"	12"		
Additional comments					
Test 06	MW-08A-test6-rising24				
Test 07	MW-08A-test7-falling12				
Test 08	MW-08A-test8-rising12				
Test 09					
Test 10					

File for Field Data:

[1] If pneumatic slug test is performed, record "air pressure before test initiation" under Additional Comments.

Slug length (ft): NA MWG slugs known displacement (2-inch) = 12" + 24"
Slug diameter (in): NA
Slug Volume (ft^3) = pi ((slug diameter/2)/12)^2 * slug length = NA

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Slug Test - Data Acquisition Sheet

General Information

Project Name: 7005 1000E PCE Plume	Date of Test: 2/8/21
Well Number: MW-08B	Test Performed By: W. Treadway, K. Murphy
Well Location: 1300 E 700S	QC: Kevin Murphy

Well Information

Reported Well Depth from Land Surf, ft: 200	Date of Last Well Development:
Measured Depth from Top of Inside Casing (TIC), ft: 199.30	Initial Static Water Level TIC, ft.: 58.32
Stickup of TIC from land surface, ft: -0.6	Final Static Water Level TIC ft: 58.31
Well Depth, ft bgs (depth TIC – stickup): 199.90	Casing Inside Diameter, in. and Schedule: 2"
Ht. of Water Column, ft: (well depth – DTW): ~~141.58~~ wt 140.98	Borehole Dia., in. 10"

	Type	Serial Number	Purpose and Placement	Reading in Air
Transducer #1	LevelTroll 700	691849	data collection, test well	NA
Transducer #2				

Data Logger Type and Serial Number: Wireless Troll Comm S/N: 234079
Logging Program: VU-Site
Acquisition Rate: test 1 + 2, 500msec, tests 3-8 250msec
Pressure or Pressure Head Units: PSI
Time Units:
Comments: (e.g. transducer diameter and cable diameter)
Cable S/N: 702567 300ft

Test Information

	Test 01	Test 02	Test 03	Test 04	Test 05
Initiation method	Slug 1	Slug 1	Slug 2	Slug 2	Slug 2
Rising/falling head	falling	rising	falling	rising	falling
Pre-test DTW	58.32 1125	58.31 1130	58.30 1143	58.28 1149	58.28 1154
Post-test DTW	58.31 1128	58.31 1132	58.29 1146	58.28 1151	58.27 1156
Expected H_0	12"	12"	24"	24"	24"

Additional comments[1]	
Test 01	MW-08B_test1_falling 12
Test 02	MW-08B_test2_rising 12
Test 03	MW-08B_test3_falling 24
Test 04	MW-08B_test4_rising 24
Test 05	MW-08B_test5_Falling 24

	Test 06	Test 07	Test 08	Test 09	Test 10
Initiation method	Slug 2	Slug 1	Slug 1		
Rising/falling head	rising	falling	rising		
Pre-test DTW	58.26 1158	58.26 1208	58.26 1213		
Post-test DTW	58.27 1200	58.26 1211	58.26 1215		
Expected H_0	24"	12"	12"		

Additional comments	
Test 06	MW-08B_test6_rising 24 missing "B" in name
Test 07	MW-08B_test7_falling 12
Test 08	MW-08B_test8_rising 12
Test 09	
Test 10	

File for Field Data:

[1] If pneumatic slug test is performed, record "air pressure before test initiation" under Additional Comments.

Slug length (ft): NA
Slug diameter (in): NA
MW6 slugs (2-inch) w/ known disp.: 12" + 24"
Slug Volume (ft^3) = pi ((slug diameter/2)/12)^2 * slug length = NA

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Slug Test - Data Acquisition Sheet

General Information

Project Name: 700S 1600E PCE Plume	Date of Test: 2/8/21
Well Number: MW-08C	Test Performed By: W. Treadway, K. Murphy
Well Location: ~~NW~~ 700S 1300E	QC: Kevin Murphy

Well Information

Reported Well Depth from Land Surf, ft: 312	Date of Last Well Development: unknown
Measured Depth from Top of Inside Casing (TIC), ft: 309.80	Initial Static Water Level TIC, ft.: 57.05
Stickup of TIC from land surface, ft: -0.8	Final Static Water Level TIC ft: 56.59
Well Depth, ft bgs (depth TIC – stickup): 308.60	Casing Inside Diameter, in. and Schedule: 1"
Ht. of Water Column, ft: (well depth – DTW): ~~251.55~~ 250.75	Borehole Dia., in. 10"

may be some sediment.

	Type	Serial Number	Purpose and Placement	Reading in Air
Transducer #1	LevelTroll 700	691849	data collection, test well	NA
Transducer #2				

Data Logger Type and Serial Number: Wireless Troll Com S/N: R34079

Logging Program: VuSitu — Acquisition Rate: ~~500~~ 250

Pressure or Pressure Head Units: PSI — Time Units: msec

Comments: (e.g. transducer diameter and cable diameter)
Cable S/N: 702567 300ft

Test Information

	Test 01	Test 02	Test 03	Test 04	Test 05
Initiation method	pneumatic	pneumatic	pneumatic		
Rising/falling head	rising	rising	rising		
Pre-test DTW	57.04 1313	57.03 ~~1319~~ 1324	57.02 1333		
Post-test DTW	57.04 1315	57.03 1330	57.03 1336		
Expected H_0	12"	24"	12"		

Additional comments[1]

Test 01	MW-08C - test1 - rising 12
Test 02	MW-08C - test2 - rising 24
Test 03	MW-08C - test3 - rising 12
Test 04	
Test 05	

	Test 06	Test 07	Test 08	Test 09	Test 10
Initiation method					
Rising/falling head					
Pre-test DTW					
Post-test DTW					
Expected H_0					

Additional comments

Test 06	
Test 07	
Test 08	
Test 09	
Test 10	

File for Field Data:

[1] If pneumatic slug test is performed, record "air pressure before test initiation" under Additional Comments.

Slug length (ft): NA

Slug diameter (in): NA

Slug Volume (ft^3) = pi ((slug diameter/2)/12)^2 * slug length = NA

Slug Test - Data Acquisition Sheet

General Information

Project Name: 700S 1600E PCE Plume	Date of Test: 2/2/21, 2/6/21-2/7/21
Well Number: MW-13S	Test Performed By: W. Treadway, A. Fiorini, K. Murphy.
Well Location: E900S - East High	QC: Kevin Murphy

Well Information

Reported Well Depth from Land Surf, ft: 22	Date of Last Well Development:
* Measured Depth from Top of Inside Casing (TIC), ft: 20.65	* Initial Static Water Level TIC, ft.: 14.78 BTOC UT
Stickup of TIC from land surface, ft: -0.4	Final Static Water Level TIC ft: ~~13.97~~ UT 14.02 on 2/8/21
Well Depth, ft bgs (depth TIC – stickup): 21.05	Casing Inside Diameter, in. and Schedule: 2"
Ht. of Water Column, ft: (well depth – DTW): 5.87 *	Borehole Dia., in. 6"

	Type	Serial Number	Purpose and Placement	Reading in Air
Transducer #1	LevelTroll 700	691849	data collection, test well	NA
Transducer #2	LevelTroll 700	694177	data collection, test well	NA

Data Logger Type and Serial Number: Wireless Trail Com S/N: 696348

Logging Program: Win-Situ 5 + Vu-Situ

Acquisition Rate: 500 ~~msec~~ UT 2/2/21

Pressure or Pressure Head Units: PSI

Time Units: msec

Comments: (e.g. transducer diameter and cable diameter)

Cable S/N: 778443 200 ft, cable S/N: 696348 50ft (for Tests 3-5)

Test Information

2/5/21 WL: 13.85 2/6/21 WL: 18.90 2/6-2/7 2/7

	Test 01	Test 02	Test 03	Test 04	Test 05
Initiation method	~~fast~~ ~~falling head~~ UT 2/2/21 Slug 1	Slug 1	Slug 1	Slug 2	Slug 2
Rising/falling head	falling	~~falling~~	rising	falling	rising
Pre-test DTW	14.26 0930		13.90 (0753)	2/6 13.81 1852	~~2/4~~ 13.78 1035
Post-test DTW	UT ~~13.96~~ 13.97 1032		13.89 (804)	2/7 13.78 0936	13.81 1932
Expected H_0	12"	12"	12"	24	UT ~~12~~ 24

Additional comments[1]

Test 01	~~test~~ was stable @ 13.98 - 13.97 from ~1130 to 1630. Transducer fine off.
Test 02	MW-13S_test2_falling12 ~~set to run over night, no overwrite.~~ UT
Test 03	→ DO NOT use MW-13S_test3_rising12 (2/6)
Test 04	MW-13S_test4_falling24 (overnight) (2/6-2/7)
Test 05	MW-13S_test5_rising24 (2/7)

	Test 06	Test 07	Test 08	Test 09	Test 10
Initiation method					
Rising/falling head					
Pre-test DTW					
Post-test DTW					
Expected H_0					

Additional comments

Test 06	
Test 07	
Test 08	
Test 09	
Test ~~10~~ 1	MW-13S_Test1_falling12

File for Field Data:

[1] If pneumatic slug test is performed, record "air pressure before test initiation" under Additional Comments.

Slug length (ft): NA used Midwest Geo. 12" disp. 2 inch slug. & 24" disp. 2-inch slug.

Slug diameter (in): NA

Slug Volume (ft^3) = pi ((slug diameter/2)/12)^2 * slug length = NA

Slug Test - Data Acquisition Sheet

General Information

Project Name: 700S 1600E PCE Plume	Date of Test: 2/4/2021
Well Number: MW-13D	Test Performed By: W. Treadway, A. Fiorini
Well Location: ~~Suna~~ UT East High School 900S	QC: Anna Fiorini

Well Information

Reported Well Depth from Land Surf, ft: 90	Date of Last Well Development: unknown
Measured Depth from Top of Inside Casing (TIC), ft: ~84.5	Initial Static Water Level TIC, ft.: 13.21
Stickup of TIC from land surface, ft: ~0.4	Final Static Water Level TIC ft: 13.21
Well Depth, ft bgs (depth TIC – stickup): 84.9	Casing Inside Diameter, in. and Schedule: 2"
Ht. of Water Column, ft: (well depth – DTW): ~~71.89~~ 71.29	Borehole Dia., in. 6"

	Type	Serial Number	Purpose and Placement	Reading in Air
Transducer #1	LevelTroll 700	691849	data collection, test well	NA
Transducer #2				

Data Logger Type and Serial Number: USB TrollCom S/N: 690918
Logging Program: In-Situ S — Acquisition Rate: 500
Pressure or Pressure Head Units: PSI — Time Units: MSec
Comments: (e.g. transducer diameter and cable diameter)
Cable S/N: 778443 200ft

Test Information

	Test 01	Test 02	Test 03	Test 04	Test 05
Initiation method	Slug 1	Slug 1	Slug 2	Slug 2	Slug 1
Rising/falling head	falling	rising	falling	rising	falling
Pre-test DTW	13.21	13.20 0934	13.21 0957	13.19 1028	13.21 1101
Post-test DTW	13.20 0932	13.21 0951	13.19 1025	13.21 1045	13.19 1114
Expected H_0	12"	12"	24"	24"	12"

Additional comments[1]

Test 01	MW-13D- test1- falling 12 NOTE: Slug got stuck, not smooth, data will be very noisy.
Test 02	MW-13D- test2- rising 12
Test 03	MW-13D- test3- falling 24
Test 04	MW-13D- test4- rising 24
Test 05	MW-13D test5- falling 12 NOTE: Same as test 1

	Test 06	Test 07	Test 08	Test 09	Test 10
Initiation method	Slug 1				
Rising/falling head	rising				
Pre-test DTW	13.20 1115				
Post-test DTW	13.21 1129				
Expected H_0	12"				

Additional comments

Test 06	~~test~~ MW-13D- test6- rising 12
Test 07	
Test 08	
Test 09	
Test 10	

File for Field Data:

[1] If pneumatic slug test is performed, record "air pressure before test initiation" under Additional Comments.

Slug length (ft): NA — MW6 slugs known displacement 12" + 24"
Slug diameter (in): NA
Slug Volume (ft^3) = pi ((slug diameter/2)/12)^2 * slug length = NA

Slug Test - Data Acquisition Sheet

General Information

Project Name: 700S 1600E PCE Plume	Date of Test: 2/4/21
Well Number: MW-13L	Test Performed By: W. Treadway, A. Fiorini
Well Location: East High School 900S	QC Kevin Murphy

Well Information

Reported Well Depth from Land Surf, ft: 1100	Date of Last Well Development: 2/3/21
Measured Depth from Top of Inside Casing (TIC), ft: 1160	Initial Static Water Level TIC, ft.: 17.02
Stickup of TIC from land surface, ft: −0.8	Final Static Water Level TIC ft: 16.98
Well Depth, ft bgs (depth TIC – stickup): ~~1100~~	Casing Inside Diameter, in. and Schedule: 2"
Ht. of Water Column, ft: (well depth – DTW): 142.98	Borehole Dia., in. 6"

	Type	Serial Number	Purpose and Placement	Reading in Air
Transducer #1	LevelTroll 700	691849	data collection, test well	NA
Transducer #2				

Data Logger Type and Serial Number: USB Troll Com S/N: 690918
Logging Program: Win-Situ 5 Acquisition Rate: 500
Pressure or Pressure Head Units: PSI Time Units: msec
Comments: (e.g. transducer diameter and cable diameter)
cable S/N: 778443 200ft

Test Information

	Test 01	Test 02	Test 03	Test 04	Test 05
Initiation method	Slug 1	Slug 1	Slug 2	Slug 2	Slug 1
Rising/falling head	falling	rising	falling	rising	falling
Pre-test DTW	17.02 1247	17.01 1259	17.01 1311	16.98 1328	17.00 1337
Post-test DTW	17.01 1257	17.01 1302	16.99 1327	16.99 1332	16.99 1345
Expected H_0	12"	12"	24"	24"	12"

Additional comments[1]	
Test 01	MW-13L - test 1 - falling 12 * didn't see full 12"
Test 02	MW-13L - test 2 - rising 12 * Very quick
Test 03	MW-13L - test 3 - falling 24
Test 04	MW-13L - test 4 - rising 24
Test 05	MW-13L - test 5 - falling 12

	Test 06	Test 07	Test 08	Test 09	Test 10
Initiation method	Slug 1				
Rising/falling head	rising				
Pre-test DTW	16.98 1347				
Post-test DTW	16.98 1351				
Expected H_0	12"				

Additional comments	
Test 06	MW-13L - test 6 - rising 12
Test 07	
Test 08	
Test 09	NOTE: maybe lag time? Because of large water column
Test 10	NOTE: Potential to return w/ pneumatic?
File for Field Data:	

[1] If pneumatic slug test is performed, record "air pressure before test initiation" under Additional Comments.

Slug length (ft): NA MW G Slugs w/ known displacement: 12" and 24"
Slug diameter (in): NA
Slug Volume (ft^3) = pi ((slug diameter/2)/12)^2 * slug length = NA

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Slug Test - Data Acquisition Sheet

General Information

Project Name: 7005 16000E PCE Plume	Date of Test: 2/3/21
Well Number: MW-15D	Test Performed By: W. Treadway, A. Fiorini
Well Location: McClelland + Belmont.	QC: Anna Fiorini

Well Information

Reported Well Depth from Land Surf, ft: 95 ft.	Date of Last Well Development: unknown
Measured Depth from Top of Inside Casing (TIC), ft: 74 ft	Initial Static Water Level TIC, ft.: 50.10
Stickup of TIC from land surface, ft: -0.2	Final Static Water Level TIC ft: 50.09
Well Depth, ft bgs (depth TIC – stickup): 73.98	Casing Inside Diameter, in. and Schedule: 2"
Ht. of Water Column, ft: (well depth – DTW): ~~73.98~~ ~~23.88~~ WT 23.90	Borehole Dia., in. 6"

	Type	Serial Number	Purpose and Placement	Reading in Air
Transducer #1	Level Troll 700	691849	~~data~~ collection, test well	NA
Transducer #2				

Data Logger Type and Serial Number: USB-TrollCom S/N: 690918
Logging Program: Win-Situ 5 — Acquisition Rate: 500
Pressure or Pressure Head Units: PSI — Time Units: msec
Comments: (e.g. transducer diameter and cable diameter)
Cable S/N: 778443 200ft

Test Information

WT 2/3/21 ~~rope stuck, will try another.~~

	Test 01	Test 02	Test 03	Test 04	Test 05
Initiation method	Slug 1	Slug 1	Slug 2	Slug 2 *	Slug 2
Rising/falling head	falling	rising.	falling	rising	falling
Pre-test DTW	50.10 1417	50.10	50.10 1443	50.10 1450	50.10 1457
Post-test DTW	50.10 1421	50.10 1430	50.10 1447	50.10 1452	50.10 1501
Expected H_0	12"	12"	24"	24"	24"

Additional comments[1]

Test 01	MW-15D-test1-falling 12
Test 02	MW-15D-test2-rising 12
Test 03	MW-15D-test3-falling 24
Test 04	MW-15D-test4-rising 24 * rope caught, may have disrupted data
Test 05	MW-15D-test5-falling 24

	Test 06	Test 07	Test 08	Test 09	Test 10
Initiation method	Slug 2	Slug 1	Slug 1		
Rising/falling head	rising	falling	rising		
Pre-test DTW	50.10	50.10 1525	50.09 1531		
Post-test DTW	50.10	50.10 1530	50.09 1536		
Expected H_0	24"	12"	12"		

Additional comments

Test 06	MW-15D-test6-rising 24
Test 07	MW-15D-test7-falling 12
Test 08	MW-15D-test8-rising 12
Test 09	
Test 10	

File for Field Data:

[1] If pneumatic slug test is performed, record "air pressure before test initiation" under Additional Comments.

Slug length (ft): NA — using MW6 2-inch slugs
Slug diameter (in): NA — known displacement: 12" + 24"
Slug Volume (ft^3) = pi ((slug diameter/2)/12)^2 * slug length = NA

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Modified by CDM Smith

Slug Test - Data Acquisition Sheet

General Information

Project Name: 7005 1600E PCE Plume	Date of Test: 2/11/21
Well Number: MW-18	Test Performed By: W. Treadway, K. Murphy
Well Location: E. High School	QC: Kevin Murphy

Well Information

NOTE: Screen bottom @ 90ft

Reported Well Depth from Land Surf, ft: 110	Date of Last Well Development: unknown
Measured Depth from Top of Inside Casing (TIC), ft: 89.75	Initial Static Water Level TIC, ft.: 81.68
Stickup of TIC from land surface, ft: -0.23	Final Static Water Level TIC ft: 81.68 @1520
Well Depth, ft bgs (depth TIC – stickup): 89.98	Casing Inside Diameter, in. and Schedule: 2"
Ht. of Water Column, ft: (well depth – DTW): 8.07	Borehole Dia., in. 6"

	Type	Serial Number	Purpose and Placement	Reading in Air
Transducer #1	levelTrau 700	691849	data collection, testware	NA
Transducer #2				

Data Logger Type and Serial Number: Wireless Trau Com S/N: R34079
Logging Program: Vu-Situ
Acquisition Rate: 500
Pressure or Pressure Head Units: PSI
Time Units: msec
Comments: (e.g. transducer diameter and cable diameter)
Cable S/N: 702567 300ft

Test Information

	Test 01	Test 02	Test 03	Test 04	Test 05
Initiation method	Slug1	Slug1	Slug2	Slug2	Slug1
Rising/falling head	falling	rising	falling	rising	falling
Pre-test DTW	81.69 1418	81.69 1422	81.69 1432	81.69 1440	81.70 1451
Post-test DTW	81.69 1420	81.69 1425	81.69 1436	81.70 1444	81.69 1456
Expected H_0	12"	12"	24"	24"	12"

	Additional comments[1]
Test 01	MW-18_test1_falling12
Test 02	MW-18_test2_rising12
Test 03	MW-18_test3_falling24
Test 04	MW-18_test4_rising24
Test 05	MW-18_test5_falling12

	Test 06	Test 07	Test 08	Test 09	Test 10
Initiation method	Slug1				
Rising/falling head	rising				
Pre-test DTW	81.69 1502				
Post-test DTW	81.69 1505				
Expected H_0	12"				

	Additional comments
Test 06	MW-18_test6_rising12
Test 07	
Test 08	
Test 09	
Test 10	

File for Field Data:

[1] If pneumatic slug test is performed, record "air pressure before test initiation" under Additional Comments.

Slug length (ft): NA
Slug diameter (in): NA
MW6 slugs w known displacement (2-inch): 12" + 24"
Slug Volume (ft^3) = pi ((slug diameter/2)/12)^2 * slug length = NA

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Slug Test - Data Acquisition Sheet

General Information

Project Name: 7005 16000E PCE Plume	Date of Test: 2/11/21
Well Number: MW-19	Test Performed By: W. Treadway, K. Murphy
Well Location: E. High School	QC: Kevin Murphy

Well Information

NOTE: Screen bottom @ 94

Reported Well Depth from Land Surf, ft: 110	Date of Last Well Development:
Measured Depth from Top of Inside Casing (TIC), ft: 95.32	Initial Static Water Level TIC, ft.: 81.09
Stickup of TIC from land surface, ft: -0.20	Final Static Water Level TIC ft: 81.09 @ 1315
Well Depth, ft bgs (depth TIC – stickup): 95.52	Casing Inside Diameter, in. and Schedule: 2"
Ht. of Water Column, ft: (well depth – DTW): 14.23	Borehole Dia., in. 6"

	Type	Serial Number	Purpose and Placement	Reading in Air
Transducer #1	LevelTroll 700	691849	data collection, testwell	NA
Transducer #2				

Data Logger Type and Serial Number: Wireless Troll Com: S/N: R34079
Logging Program: Vu-Situ
Acquisition Rate: 500
Pressure or Pressure Head Units: PSI
Time Units: msec
Comments: (e.g. transducer diameter and cable diameter)
Cable S/N: 702567 30017

Test Information

	Test 01	Test 02	Test 03	Test 04	Test 05
Initiation method	slug1	slug1	slug2	slug2	slug1
Rising/falling head	falling	rising	falling	rising	falling
Pre-test DTW	81.09 1221	81.09 1225	81.08 1235	81.08 1241	81.08 1253
Post-test DTW	81.09 1223	81.09 1227	81.08 1238	81.08 1243	81.08 1256
Expected H_0	12"	12"	24"	24"	12"

Additional comments[1]	
Test 01	MW-19_test1_falling12
Test 02	MW-19_test2_rising12
Test 03	MW-19_test3_falling24
Test 04	MW-19_test4_~~faut~~ rising24
Test 05	MW-19_test5_falling12

	Test 06	Test 07	Test 08	Test 09	Test 10
Initiation method	slug1				
Rising/falling head	rising				
Pre-test DTW	81.08 1301				
Post-test DTW	81.08 1303				
Expected H_0	12"				

Additional comments	
Test 06	MW-19_test6_rising12
Test 07	
Test 08	
Test 09	
Test 10	

File for Field Data:

[1] If pneumatic slug test is performed, record "air pressure before test initiation" under Additional Comments.

Slug length (ft): NA
Slug diameter (in): NA
MW6 slugs of known displacement: (2-inch): 12" + 24"
Slug Volume (ft^3) = pi ((slug diameter/2)/12)^2 * slug length = NA

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Slug Test - Data Acquisition Sheet

General Information

Project Name: 700S 1600E PCE Plume	Date of Test: 2/11/21
Well Number: MW-20S	Test Performed By: W. Treadway, K. Murphy
Well Location: E. High School	QC: Kevin Murphy

Well Information

Reported Well Depth from Land Surf, ft: 90.8	Date of Last Well Development: unknown
Measured Depth from Top of Inside Casing (TIC), ft: 90.10	Initial Static Water Level TIC, ft.: 83.33
Stickup of TIC from land surface, ft: -0.3	Final Static Water Level TIC ft: 83.34
Well Depth, ft bgs (depth TIC – stickup): 90.40	Casing Inside Diameter, in. and Schedule: 2"
Ht. of Water Column, ft: (well depth – DTW): 6.77	Borehole Dia., in. 6"

	Type	Serial Number	Purpose and Placement	Reading in Air
Transducer #1	Level Troll 700	691849	data collection + testwell	NA
Transducer #2				

Data Logger Type and Serial Number: Wireless Trac com S/N: R34079
Logging Program: In-Situ — Acquisition Rate: 500
Pressure or Pressure Head Units: PSI — Time Units: msec
Comments: (e.g. transducer diameter and cable diameter)
Cable S/N: 702567 300ft.

Test Information

	Test 01	Test 02	Test 03	Test 04	Test 05
Initiation method	slug 1	slug 1	slug 2	slug 2	slug 1
Rising/falling head	falling	rising	falling	rising	falling
Pre-test DTW	83.33 0844	83.32 0849	83.31 0859	83.29 0913	83.29 0922
Post-test DTW	83.32 0848	83.32 0851	83.29 0908	83.29 0918	83.28 0926
Expected H_0	12"	12"	24"	24"	12"

Additional comments[1]	
Test 01	MW-20S_ test1_ falling 12
Test 02	MW-20S_ test2_ rising 12
Test 03	MW-20S_ test3_ falling 24
Test 04	MW-20S_ test4_ rising 24
Test 05	MW-20S_ test5_ falling 12

	Test 06	Test 07	Test 08	Test 09	Test 10
Initiation method	slug 1				
Rising/falling head	rising				
Pre-test DTW	83.28 0928				
Post-test DTW	83.28 0930				
Expected H_0	12"				

Additional comments	
Test 06	MW-20S_ test6_ rising 12
Test 07	
Test 08	
Test 09	
Test 10	

File for Field Data:

[1] If pneumatic slug test is performed, record "air pressure before test initiation" under Additional Comments.

Slug length (ft): NA — MW GI slugs of known displacement (2-inch): 12" + 24"
Slug diameter (in): NA
Slug Volume (ft^3) = pi ((slug diameter/2)/12)^2 * slug length = NA

Slug Test - Data Acquisition Sheet

General Information

Project Name: 7003 1000 E PCE Plume	Date of Test: 2/11/21
Well Number: MW-20D	Test Performed By: W. Treadway, K. Murphy
Well Location: E. High School	QC: Kevin Murphy

Well Information

NOTE: Bottom of screen is 129 ft bgs.

Reported Well Depth from Land Surf, ft: 150	Date of Last Well Development: unknown
Measured Depth from Top of Inside Casing (TIC), ft: 129.25	Initial Static Water Level TIC, ft.: 83.07
Stickup of TIC from land surface, ft: -0.2	Final Static Water Level TIC ft: 83.04 @1115
Well Depth, ft bgs (depth TIC – stickup): 129.45	Casing Inside Diameter, in. and Schedule: 2"
Ht. of Water Column, ft: (well depth – DTW): 46.18	Borehole Dia., in. 10"

	Type	Serial Number	Purpose and Placement	Reading in Air
Transducer #1	Level Troll 700	691849	data collection test well	NA
Transducer #2				

Data Logger Type and Serial Number: Wireless Troll Com S/N: R34079
Logging Program: Vu-Situ
Acquisition Rate: 500
Pressure or Pressure Head Units: PSI
Time Units: msec

Comments: (e.g. transducer diameter and cable diameter)
cable S/N: 702567 300 ft

Test Information

	Test 01	Test 02	Test 03	Test 04	Test 05
Initiation method	slug 1	slug 1	slug 2	slug 2	slug 1
Rising/falling head	falling	rising	falling	rising	falling
Pre-test DTW	83.05 @1028	83.05 @1033	83.05 @1041	83.04 @1046	83.04 @1055
Post-test DTW	83.05 @1030	83.05 @1035	83.04 @1044	83.04 @1048	83.04 @1057
Expected H_0	12"	12"	24"	24"	12"

	Additional comments[1]
Test 01	MW-20D - test 1 - falling 12"
Test 02	MW-20D - test 2 - rising 12"
Test 03	MW-20D - test 3 - falling 24"
Test 04	MW-20D - test 4 - rising 24"
Test 05	MW-20D - test 5 - falling 12"

	Test 06	Test 07	Test 08	Test 09	Test 10
Initiation method	slug 1				
Rising/falling head	rising				
Pre-test DTW	83.04 @1101				
Post-test DTW	83.04 @1104				
Expected H_0	12"				

	Additional comments
Test 06	MW-20D - test 6 - rising 12"
Test 07	
Test 08	
Test 09	
Test 10	

File for Field Data:

[1] If pneumatic slug test is performed, record "air pressure before test initiation" under Additional Comments.

Slug length (ft): NA
Slug diameter (in): NA
Slug Volume (ft^3) = pi ((slug diameter/2)/12)^2 * slug length = NA

MW6 slugs w/ known displacement (2-inch): 12" + 24"

Slug Test - Data Acquisition Sheet

General Information

Project Name: 700S 1600E PCE Plume	Date of Test: 2/9/21
Well Number: MW-21	Test Performed By: W. Treadway, K. Murphy
Well Location: 800S	QC: Kevin Murphy

Well Information

Reported Well Depth from Land Surf, ft: 80 (72 b.of SC)	Date of Last Well Development: unknown
Measured Depth from Top of Inside Casing (TIC), ft: 71.68	Initial Static Water Level TIC, ft.: 65.16
Stickup of TIC from land surface, ft: -0.2	Final Static Water Level TIC ft: 65.15
Well Depth, ft bgs (depth TIC – stickup): 71.88	Casing Inside Diameter, in. and Schedule: 2"
Ht. of Water Column, ft: (well depth – DTW): 6.52	Borehole Dia., in. 6"

	Type	Serial Number	Purpose and Placement	Reading in Air
Transducer #1	LevelTroll 700	691849	data collection, test well	NA
Transducer #2				

Data Logger Type and Serial Number: Wireless Trou com R34079 250 for test 1
Logging Program: VuSitu Acquisition Rate: 500 for test 2–67
Pressure or Pressure Head Units: PSI Time Units: msec

Comments: (e.g. transducer diameter and cable diameter)
Cable S/N: 7025687 300ft

Test Information

	Test 01	Test 02	Test 03	Test 04	Test 05
Initiation method	slug 1	slug 1	slug 2	slug 2	slug 2
Rising/falling head	falling	rising	falling	~~rising~~ falling	rising
Pre-test DTW	65.16 1310	65.15 1323	65.15 1336	65.16 1357	65.15 1403
Post-test DTW	65.15 1320	65.15 1325	65.12 1343	65.15 1401	65.15 1406
Expected H_0	12"	12"	24"	24"	24"

Additional comments[1]

Test 01	MW-21_test1_falling 12
Test 02	MW-21_test2_rising 12
Test 03	MW-21_test3_falling 24 Slug hit bottom. adjust, try falling again, after stabilization
Test 04	MW-21_test4_falling 24
Test 05	MW-21_test5_rising 24

	Test 06	Test 07	Test 08	Test 09	Test 10
Initiation method	slug 1	slug 1			
Rising/falling head	falling	rising			
Pre-test DTW	65.15 1418	65.15 1425			
Post-test DTW	65.15 1421	65.15 1427			
Expected H_0	12"	12"			

Additional comments

Test 06	MW-21_test6_falling 12
Test 07	MW-21_test7_rising 12
Test 08	
Test 09	
Test 10	

File for Field Data:

[1] If pneumatic slug test is performed, record "air pressure before test initiation" under Additional Comments.

Slug length (ft): NA
Slug diameter (in): NA
MW6 slugs of known disp. (2-inch) (12" + 24")
Slug Volume (ft^3) = pi ((slug diameter/2)/12)^2 * slug length = NA

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Slug Test - Data Acquisition Sheet

General Information

Project Name: 700S 1600E PCE Plume	Date of Test: 2/4/21
Well Number: MW-22	Test Performed By: W. Treadway, A. Fiorini
Well Location: 900S + S 14th E	QC: Kevin Murphy

Well Information

Reported Well Depth from Land Surf, ft: 120	Date of Last Well Development: unknown
Measured Depth from Top of Inside Casing (TIC), ft: ~73	Initial Static Water Level TIC, ft.: 63.44
Stickup of TIC from land surface, ft: -0.2	Final Static Water Level TIC ft: ~~63.57~~ 63.42
Well Depth, ft bgs (depth TIC – stickup): 73.20	Casing Inside Diameter, in. and Schedule: 2"
Ht. of Water Column, ft: (well depth – DTW): ~~9.76~~ 9.56	Borehole Dia., in. 6"

	Type	Serial Number	Purpose and Placement	Reading in Air
Transducer #1	LevelTrau 700	691849	data collection, test well	NA
Transducer #2				

Data Logger Type and Serial Number: USB TruCom S/N: 690918
Logging Program: Win-Situ5 Acquisition Rate: 500
Pressure or Pressure Head Units: PSI Time Units: Sec

Comments: (e.g. transducer diameter and cable diameter)
Cable S/N: 778443 200ft

Test Information

	Test 01	Test 02	Test 03	Test 04	Test 05
Initiation method	Slug 1	Slug 1	Slug 2	Slug 2	Slug 1
Rising/falling head	falling	rising	falling	rising	falling
Pre-test DTW	63.43 1504	63.43 1511	63.43 1523	63.42 1532	63.42 1542
Post-test DTW	63.43 1509	63.43 1516	63.43 1530	63.42 1535	63.42 1544
Expected H_0	12"	12"	24"	24"	12"

Additional comments[1]

Test 01	MW-22_test1_falling12 very quick, only noticing 1/2 exp. disp.
Test 02	MW-22_test2_rising12
Test 03	MW-22_test3_falling24
Test 04	MW-22_test4_rising24
Test 05	MW-22_test5_falling12

	Test 06	Test 07	Test 08	Test 09	Test 10
Initiation method	Slug 1	Slug 2	Slug 2		
Rising/falling head	rising	falling	rising		
Pre-test DTW	63.42 1546	63.41 1554	63.41 1558		
Post-test DTW	63.42 1549	63.41 1557	63.41 1602		
Expected H_0	12"	24"	24"		

Additional comments

Test 06	MW-22_test6_rising12
Test 07	
Test 08	
Test 09	
Test 10	

File for Field Data:

[1] If pneumatic slug test is performed, record "air pressure before test initiation" under Additional Comments.

Slug length (ft): NA MW6 Slugs w/ known displacement = 12" + 24"
Slug diameter (in): NA
Slug Volume (ft^3) = pi ((slug diameter/2)/12)^2 * slug length = NA

Slug Test - Data Acquisition Sheet

General Information

Project Name: 7005 1600E PCE Plume	Date of Test: 2/8/21
Well Number: MW-26B	Test Performed By: W. Treadway, K. Murphy
Well Location: VA Campus	QC: Kevin Murphy

Well Information

Reported Well Depth from Land Surf, ft: 247	Date of Last Well Development: unknown
Measured Depth from Top of Inside Casing (TIC), ft: 250.05	Initial Static Water Level TIC, ft.: 195.34
Stickup of TIC from land surface, ft: -0.7	Final Static Water Level TIC ft: 195.34 @1557
Well Depth, ft bgs (depth TIC – stickup): 250.75	Casing Inside Diameter, in. and Schedule: 1"
Ht. of Water Column, ft: (well depth – DTW): ~~55.41~~ 54.71	Borehole Dia., in. 8"

	Type	Serial Number	Purpose and Placement	Reading in Air
Transducer #1	LevelTroll 700	691849	data collection, test well	NA
Transducer #2				

Data Logger Type and Serial Number: Wireless Trans Con S/N: R 34079
Logging Program: In-Situ
Acquisition Rate: 250
Pressure or Pressure Head Units: PSI
Time Units: msec
Comments: (e.g. transducer diameter and cable diameter)
Cable S/N: 702567 300ft

Test Information

	Test 01	Test 02	Test 03	Test 04	Test 05
Initiation method	pneumatic	pneumatic	pneumatic		
Rising/falling head	rising	rising	rising		
Pre-test DTW	195.33 1533	195.33 1540	195.33 1546		
Post-test DTW	195.33 1535	195.33 1542	195.33 1548		
Expected H_0	12"	24"	12"		

Additional comments[1]

Test 01	MW-26B-test1-rising12 ~12.5" H_2O
Test 02	MW-26B-test2-rising24 ~24.5" H_2O
Test 03	MW-26B-test3-rising12 ~12.5" H_2O
Test 04	
Test 05	

	Test 06	Test 07	Test 08	Test 09	Test 10
Initiation method					
Rising/falling head					
Pre-test DTW					
Post-test DTW					
Expected H_0					

Additional comments

Test 06	
Test 07	
Test 08	
Test 09	
Test 10	

File for Field Data:

[1] If pneumatic slug test is performed, record "air pressure before test initiation" under Additional Comments.

Slug length (ft): NA
Slug diameter (in): NA
Slug Volume (ft^3) = pi ((slug diameter/2)/12)^2 * slug length = NA

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Slug Test - Data Acquisition Sheet

General Information

Project Name: 7005 16000E PCE Plume	Date of Test: 2/8/21
Well Number: MW-26C	Test Performed By: W. Treadway, K. Murphy
Well Location: VA Campus	QC: Kevin Murphy

Well Information

Reported Well Depth from Land Surf, ft: 327	Date of Last Well Development: 1/20/21
Measured Depth from Top of Inside Casing (TIC), ft: 328.48	Initial Static Water Level TIC, ft.: 217.32
Stickup of TIC from land surface, ft: -0.7	Final Static Water Level TIC ft: 217.35 @1714
Well Depth, ft bgs (depth TIC – stickup): 329.18	Casing Inside Diameter, in. and Schedule: 1"
Ht. of Water Column, ft: (well depth – DTW): 111.16	Borehole Dia., in. 8"

	Type	Serial Number	Purpose and Placement	Reading in Air
Transducer #1	LevelTroll 700	691849	data collection, test well	NA
Transducer #2				

Data Logger Type and Serial Number: Wireless Troll Com S/N: R34079
Logging Program: VuSitu
Acquisition Rate: 250
Pressure or Pressure Head Units: PSI
Time Units: msec

Comments: (e.g. transducer diameter and cable diameter)
cable S/N: 702567 300ft

Test Information

	Test 01	Test 02	Test 03	Test 04	Test 05
Initiation method	pneumatic	pneumatic	pneumatic		
Rising/falling head	rising	rising	rising		
Pre-test DTW	217.32 1640	217.32 1645	217.32 1656		
Post-test DTW	217.32 1642	217.32 1647	217.32 1658		
Expected H_0	12"	24"	12"		

Additional comments[1]	
Test 01	MW-26C-test1-rising12 ~12" H2O
Test 02	MW-26C-test2-rising24 ~24.5" H2O
Test 03	MW-26C-test3-rising12 ~12" H2O
Test 04	
Test 05	

	Test 06	Test 07	Test 08	Test 09	Test 10
Initiation method					
Rising/falling head					
Pre-test DTW					
Post-test DTW					
Expected H_0					

Additional comments	
Test 06	
Test 07	
Test 08	
Test 09	
Test 10	

File for Field Data:

[1] If pneumatic slug test is performed, record "air pressure before test initiation" under Additional Comments.

Slug length (ft): NA

Slug diameter (in): NA

Slug Volume (ft^3) = pi ((slug diameter/2)/12)^2 * slug length = NA

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Slug Test - Data Acquisition Sheet

General Information

Project Name: 7000 1600E PCE Plume	Date of Test: 2/9/21
Well Number: MW-26~~A~~D	Test Performed By: W. Treadway, K. Murphy
Well Location: VA campus	QC: Kevin Murphy

Well Information

Reported Well Depth from Land Surf, ft: 360	Date of Last Well Development: ~~DAT~~ 1/18/21
Measured Depth from Top of Inside Casing (TIC), ft: 358.45	Initial Static Water Level TIC, ft.: 217.51
Stickup of TIC from land surface, ft: -0.8	Final Static Water Level TIC ft: 217.52 0170
Well Depth, ft bgs (depth TIC – stickup): 359.25	Casing Inside Diameter, in. and Schedule: 1"
Ht. of Water Column, ft: (well depth – DTW): 140.94	Borehole Dia., in. 8"

	Type	Serial Number	Purpose and Placement	Reading in Air
Transducer #1	LevelTroll 700	691894	data collection, test well	NA
Transducer #2				

Data Logger Type and Serial Number: Wireless Trol com: S/N R34079
Logging Program: VuSitu — Acquisition Rate: 250
Pressure or Pressure Head Units: PSI — Time Units: msec
Comments: (e.g. transducer diameter and cable diameter)
Cable S/N: 702567 300 ft

Test Information

	Test 01	Test 02	Test 03	Test 04	Test 05
Initiation method	pneumatic	pneumatic	pneumatic		
Rising/falling head	rising	rising	rising		
Pre-test DTW	217.50 1630	217.50 1636	217.50 1644		
Post-test DTW	217.50 1633	217.50 1639	217.50 1646		
Expected H_0	12" (13")	24"	12" (13)		

Additional comments[1]	
Test 01	MW-26D_test1_rising12 ~13" H_2O
Test 02	MW-26D_test2_rising24 ~24.5" H_2O
Test 03	MW-26D_test3_rising12 ~13" H_2O
Test 04	
Test 05	

	Test 06	Test 07	Test 08	Test 09	Test 10
Initiation method					
Rising/falling head					
Pre-test DTW					
Post-test DTW					
Expected H_0					

Additional comments	
Test 06	
Test 07	
Test 08	
Test 09	
Test 10	

File for Field Data:

[1] If pneumatic slug test is performed, record "air pressure before test initiation" under Additional Comments.

Slug length (ft): NA

Slug diameter (in): NA

Slug Volume (ft^3) = pi ((slug diameter/2)/12)^2 * slug length = NA

Slug Test - Data Acquisition Sheet

General Information

Project Name: 7005 1000E	Date of Test: 2/9/21
Well Number: MW-32A	Test Performed By: W. Treadway, K. Murphy
Well Location: 6005 Mt. Olivet Cemetary	QC. Kevin Murphy

Well Information

Reported Well Depth from Land Surf, ft: 124 (bot. of screen)	Date of Last Well Development: unknown
Measured Depth from Top of Inside Casing (TIC), ft: 124.30	Initial Static Water Level TIC, ft.: 82.74
Stickup of TIC from land surface, ft: -0.6	Final Static Water Level TIC ft: 82.77
Well Depth, ft bgs (depth TIC – stickup): 124.90	Casing Inside Diameter, in. and Schedule: 2"
Ht. of Water Column, ft: (well depth – DTW): ~~42.16~~ wt 41.56	Borehole Dia., in. 7"

	Type	Serial Number	Purpose and Placement	Reading in Air
Transducer #1	LevelTroll 700	691849	data collection, test well	NA
Transducer #2				

Data Logger Type and Serial Number: Wireless Troll Com S/N: R340779
Logging Program: VuSitu — Acquisition Rate: 250
Pressure or Pressure Head Units: PSI — Time Units: msec
Comments: (e.g. transducer diameter and cable diameter)
cable s/n: 702567 300ft

Test Information (500 msec) (250 msec →)

	Test 01	Test 02	Test ~~03~~ 01	Test ~~04~~ 02	Test ~~05~~ 03
Initiation method	slug1	slug1 wt	slug1	slug1	slug 2
Rising/falling head	wt falling	rising	falling	rising	falling
Pre-test DTW	82.70 0853	82.70 0857	82.70 0905	82.70 0908	82.70 0929
Post-test DTW	82.70 0855	82.70 0859	82.70 0907	82.70 0910	82.70 0922
Expected H_0	12"	12"	12"	12"	24"

Additional comments[1]

Test 01	MW-32A_test1_falling12 ~~transducer may have moved wt~~
Test 02	MW-32A_test2_rising12
Test 03	MW-32A_test3_falling24
Test 04	MW-32A_test4_rising24
Test 05	MW-32A_test5_falling12

	Test ~~06~~ 04	Test ~~07~~ 05	Test ~~08~~ 06	Test ~~09~~ 07	Test ~~10~~ 08
Initiation method	slug 2	slug1	slug1		
Rising/falling head	rising	falling	rising		
Pre-test DTW	82.70 0924	82.70 0934	82.70 0939		
Post-test DTW	82.70 0926	82.70 0937	82.70 0941		
Expected H_0	24"	12"	12"		

Additional comments

Test 06	MW-32A_test6_rising12
Test 07	
Test 08	
Test 09	
Test 10	

File for Field Data:

[1] If pneumatic slug test is performed, record "air pressure before test initiation" under Additional Comments.

Slug length (ft): NA — MW6 slugs of known disp. (12" + 24")
Slug diameter (in): NA
Slug Volume (ft^3) = pi ((slug diameter/2)/12)^2 * slug length = NA

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Slug Test - Data Acquisition Sheet

General Information

Project Name: 700S 1600E PCE Plume	Date of Test: 2/10/21
Well Number: MW-34A	Test Performed By: W. Treadway, K. Murphy
Well Location: Rowland Hall	QC: Kevin Murphy

Well Information

Reported Well Depth from Land Surf, ft: 152	Date of Last Well Development: unknown
Measured Depth from Top of Inside Casing (TIC), ft: 153.75	Initial Static Water Level TIC, ft.: 130.63
Stickup of TIC from land surface, ft: -0.5	Final Static Water Level TIC ft: 130.64
Well Depth, ft bgs (depth TIC – stickup): 154.25	Casing Inside Diameter, in. and Schedule: 1"
Ht. of Water Column, ft: (well depth – DTW): 23.62	Borehole Dia., in. 8"

	Type	Serial Number	Purpose and Placement	Reading in Air
Transducer #1	LevelTroll 700	691849	data collection, testwell	NA
Transducer #2				

Data Logger Type and Serial Number: Wireless Troll Com S/N: R34079
Logging Program: Vu-Situ — Acquisition Rate: 250
Pressure or Pressure Head Units: PSI — Time Units: msec
Comments: (e.g. transducer diameter and cable diameter)
cable S/N: 702567. 300 ft.

Test Information

	Test 01	Test 02	Test 03	Test 04	Test 05
Initiation method	pneumatic	pneumatic	pneumatic		
Rising/falling head	rising	rising	rising		
Pre-test DTW	130.58 0822	130.59 0828	130.59 0834		
Post-test DTW	130.59 0824	130.60 0830	130.60 0835		
Expected H_0	12"	24"	12"		

	Additional comments[1]
Test 01	MW-34A_test1_rising12 ~12.5" H_2O
Test 02	MW-34A_test2_rising24 ~24.5" H_2O – misnamed "34B" **
Test 03	MW-34A_test3_rising12 ~12" H_2O
Test 04	
Test 05	

	Test 06	Test 07	Test 08	Test 09	Test 10
Initiation method					
Rising/falling head					
Pre-test DTW					
Post-test DTW					
Expected H_0					

	Additional comments
Test 06	
Test 07	
Test 08	
Test 09	
Test 10	

File for Field Data:

[1] If pneumatic slug test is performed, record "air pressure before test initiation" under Additional Comments.

Slug length (ft): NA

Slug diameter (in): NA

Slug Volume (ft^3) = pi ((slug diameter/2)/12)^2 * slug length = NA

Slug Test - Data Acquisition Sheet

General Information

Project Name: 7005 Wood PCE Plume	Date of Test: 2/10/21
Well Number: MW-34B	Test Performed By: W. Treadway, K. Murphy
Well Location: Rowland Hall	QC: Kevin Murphy

Well Information

Reported Well Depth from Land Surf, ft: 187	Date of Last Well Development: 1/19/21 - 1/21/21
Measured Depth from Top of Inside Casing (TIC), ft: 188.50	Initial Static Water Level TIC, ft.: 130.22
Stickup of TIC from land surface, ft: -0.9	Final Static Water Level TIC ft: 130.21
Well Depth, ft bgs (depth TIC – stickup): 189.40	Casing Inside Diameter, in. and Schedule: 1"
Ht. of Water Column, ft: (well depth – DTW): 58.28	Borehole Dia., in. 8"

	Type	Serial Number	Purpose and Placement	Reading in Air
Transducer #1	LevelTroll 700	691849	data collection, test well	NA
Transducer #2				

Data Logger Type and Serial Number: Wireless Tranducer S/N: R34079
Logging Program: Vu-Stm Acquisition Rate: 250
Pressure or Pressure Head Units: PSI Time Units: msec
Comments: (e.g. transducer diameter and cable diameter)
Cable S/N: 702567 300ft.

Test Information

	Test 01	Test 02	Test 03	Test 04	Test 05
Initiation method	pneumatic	pneumatic	pneumatic		
Rising/falling head	rising	rising	rising		
Pre-test DTW	130.19 0938	130.18 0943	130.18 0949		
Post-test DTW	130.19 0940	130.18 0944	130.18 0951		
Expected H_0	12"	24"	12"		

Additional comments[1]	
Test 01	MW-34B_test1_rising12 ~13" H_2O
Test 02	MW-34B_test2_rising24 ~24.5" H_2O
Test 03	MW-34B_test3_rising12 ~12" H_2O
Test 04	
Test 05	

	Test 06	Test 07	Test 08	Test 09	Test 10
Initiation method					
Rising/falling head					
Pre-test DTW					
Post-test DTW					
Expected H_0					

Additional comments	
Test 06	
Test 07	
Test 08	
Test 09	
Test 10	

File for Field Data:

[1] If pneumatic slug test is performed, record "air pressure before test initiation" under Additional Comments.

Slug length (ft): NA

Slug diameter (in): NA

Slug Volume (ft^3) = pi ((slug diameter/2)/12)^2 * slug length = NA

Slug Test - Data Acquisition Sheet

General Information

Project Name: 700S 1000E PCE plume	Date of Test: 2/10/21
Well Number: ~~MW-28C~~ MW-34C	Test Performed By: W. Treadway, K. Murphy
Well Location: Rowland Hall	QC: Kevin Murphy

Well Information

Reported Well Depth from Land Surf, ft: 262	Date of Last Well Development: 1/19/21
Measured Depth from Top of Inside Casing (TIC), ft: 263.22	Initial Static Water Level TIC, ft.: 129.56
Stickup of TIC from land surface, ft: -1.0	Final Static Water Level TIC ft: 129.46
Well Depth, ft bgs (depth TIC – stickup): 264.22	Casing Inside Diameter, in. and Schedule: 1"
Ht. of Water Column, ft: (well depth – DTW): 139.66	Borehole Dia., in. 8"

	Type	Serial Number	Purpose and Placement	Reading in Air
Transducer #1	Level Troll 700	691849	data collection, test well	NA
Transducer #2				

Data Logger Type and Serial Number: Wireless Trellcom S/N: R34079
Logging Program: VU-Sitty
Acquisition Rate: 250
Pressure or Pressure Head Units: PSI
Time Units: msec
Comments: (e.g. transducer diameter and cable diameter)
cable S/N: 702567 300ft

Test Information

	Test 01	Test 02	Test 03	Test 04	Test 05
Initiation method	pneumatic	pneumatic	pneumatic	pneumatic	pneumatic
Rising/falling head	rising	rising	rising	rising	rising
Pre-test DTW	129.55 1133	129.54 1142	129.52 1150	129.52 1208	129.52 1222
Post-test DTW	129.56 1136	129.55 1145	129.54 1201	129.54 1212	129.54 1225
Expected H_0	12"	12"	24"	24"	12"

Additional comments[1]

Test 01	MW-34C_test1_rising 12	~12" H_2O	NOTE: Slightly slower recovery than other pneumatic tested wells
Test 02	MW-34C_test2_rising 12	~12" H_2O	
Test 03	MW-34C_test3_rising 24	~24" H_2O	→ Noticed leak at well casing, tightened and ok.
Test 04	MW-34C_test4_rising 24	~24" H_2O	
Test 05	MW-34C_test5_rising 12	~12" H_2O	

	Test 06	Test 07	Test 08	Test 09	Test 10
Initiation method	pneumatic				
Rising/falling head	rising				
Pre-test DTW	129.51 1235				
Post-test DTW	129.53 1237				
Expected H_0	12"				

Additional comments

Test 06	MW-34C_test6_rising 12 ~12" H_2O
Test 07	
Test 08	
Test 09	
Test 10	

File for Field Data:

[1] If pneumatic slug test is performed, record "air pressure before test initiation" under Additional Comments.

Slug length (ft): NA

Slug diameter (in): NA

Slug Volume (ft^3) = pi ((slug diameter/2)/12)^2 * slug length = NA

Slug Test - Data Acquisition Sheet

General Information

Project Name: 7005 11000E PCE Plume	Date of Test: 2/10/21
Well Number: MW-34D	Test Performed By: W. Treadway, K. Murphy
Well Location: Rowland Hall	QC. Kevin Murphy

Well Information

Reported Well Depth from Land Surf, ft: 327	Date of Last Well Development: unknown
Measured Depth from Top of Inside Casing (TIC), ft: 328.31	Initial Static Water Level TIC, ft.: 129.46
Stickup of TIC from land surface, ft: -1.0	Final Static Water Level TIC ft: 129.45 0 1430
Well Depth, ft bgs (depth TIC – stickup): 329.31	Casing Inside Diameter, in. and Schedule: 1"
Ht. of Water Column, ft: (well depth – DTW): 198.85	Borehole Dia., in. 8"

	Type	Serial Number	Purpose and Placement	Reading in Air
Transducer #1	LevelTroll 700	691849	data collection, test well	NA
Transducer #2				

Data Logger Type and Serial Number: Wireless Troll Com S/N: R34079
Logging Program: VuSitu — Acquisition Rate: 250
Pressure or Pressure Head Units: PSI — Time Units: msec
Comments: (e.g. transducer diameter and cable diameter)
cable S/N: 702567 300 ft.

Test Information

	Test 01	Test 02	Test 03	Test 04	Test 05
Initiation method	pneumatic	pneumatic	pneumatic	pneumatic	pneumatic
Rising/falling head	rising	rising	rising	rising	rising
Pre-test DTW	129.46 1349	129.46 1355	129.46 1401	129.46 1406	129.45 1411
Post-test DTW	129.46 1351	129.46 1357	129.46 1402	129.46 1408	129.45 1414
Expected H_0	12"	12"	24"	24"	12"

Additional comments[1]	
Test 01	MW-34D_test1_rising 12 ~12" H_2O
Test 02	MW-34D_test2_rising 12 ~12" H_2O
Test 03	MW-34D_test3_rising 24 ~24" H_2O
Test 04	MW-34D_test4_rising 24 ~24" H_2O
Test 05	MW-34D_test5_rising 12 ~12" H_2O

	Test 06	Test 07	Test 08	Test 09	Test 10
Initiation method	pneumatic				
Rising/falling head	rising				
Pre-test DTW	129.45 1418				
Post-test DTW	129.45 1420				
Expected H_0	12"				

Additional comments	
Test 06	MW-34D_test6_rising 12 ~12" H_2O misnamed "345"
Test 07	
Test 08	
Test 09	
Test 10	

File for Field Data:

[1] If pneumatic slug test is performed, record "air pressure before test initiation" under Additional Comments.

Slug length (ft): NA
Slug diameter (in): NA
Slug Volume (ft^3) = pi ((slug diameter/2)/12)^2 * slug length = NA

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Attachment B
Coincident Plots

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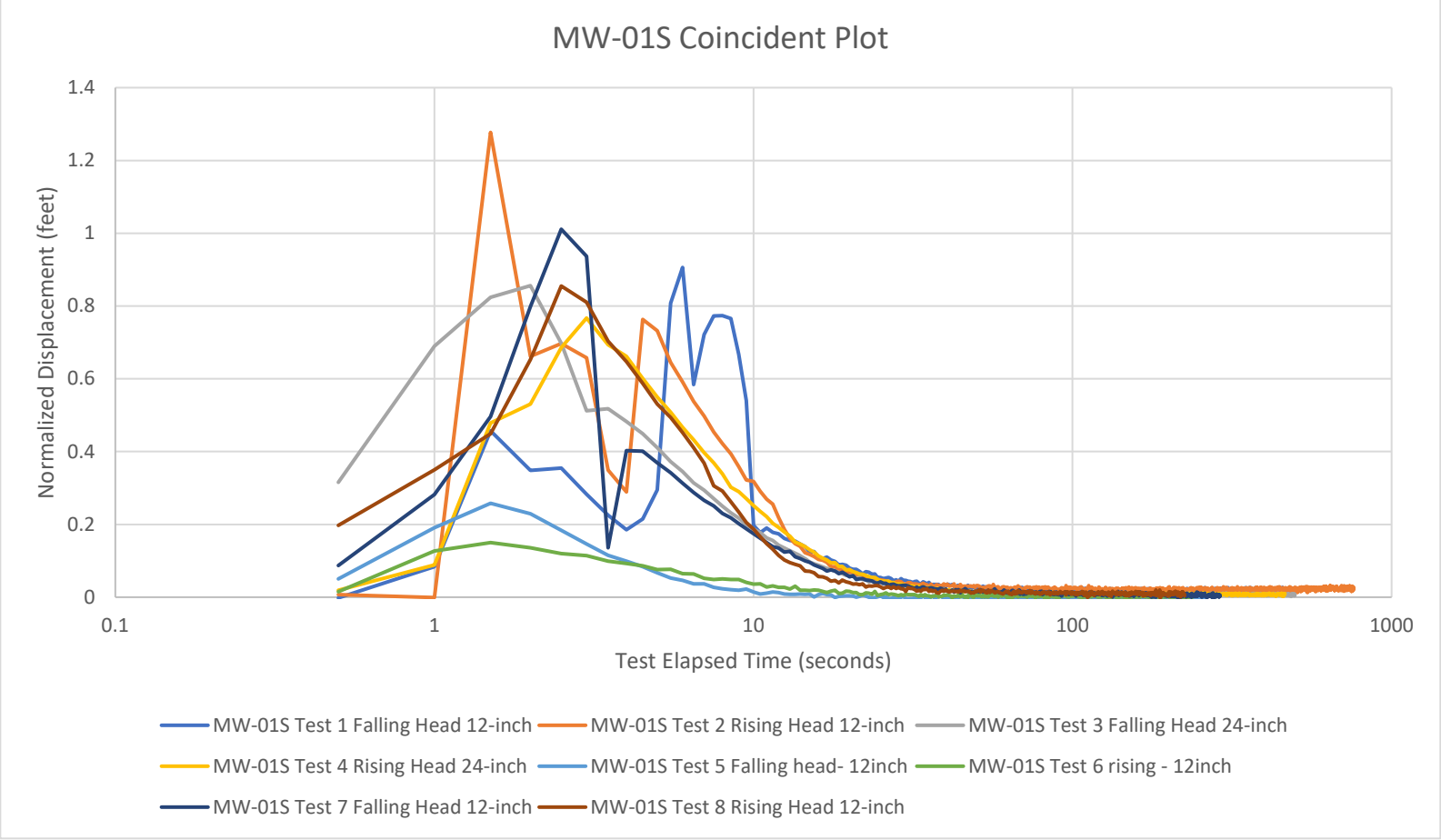
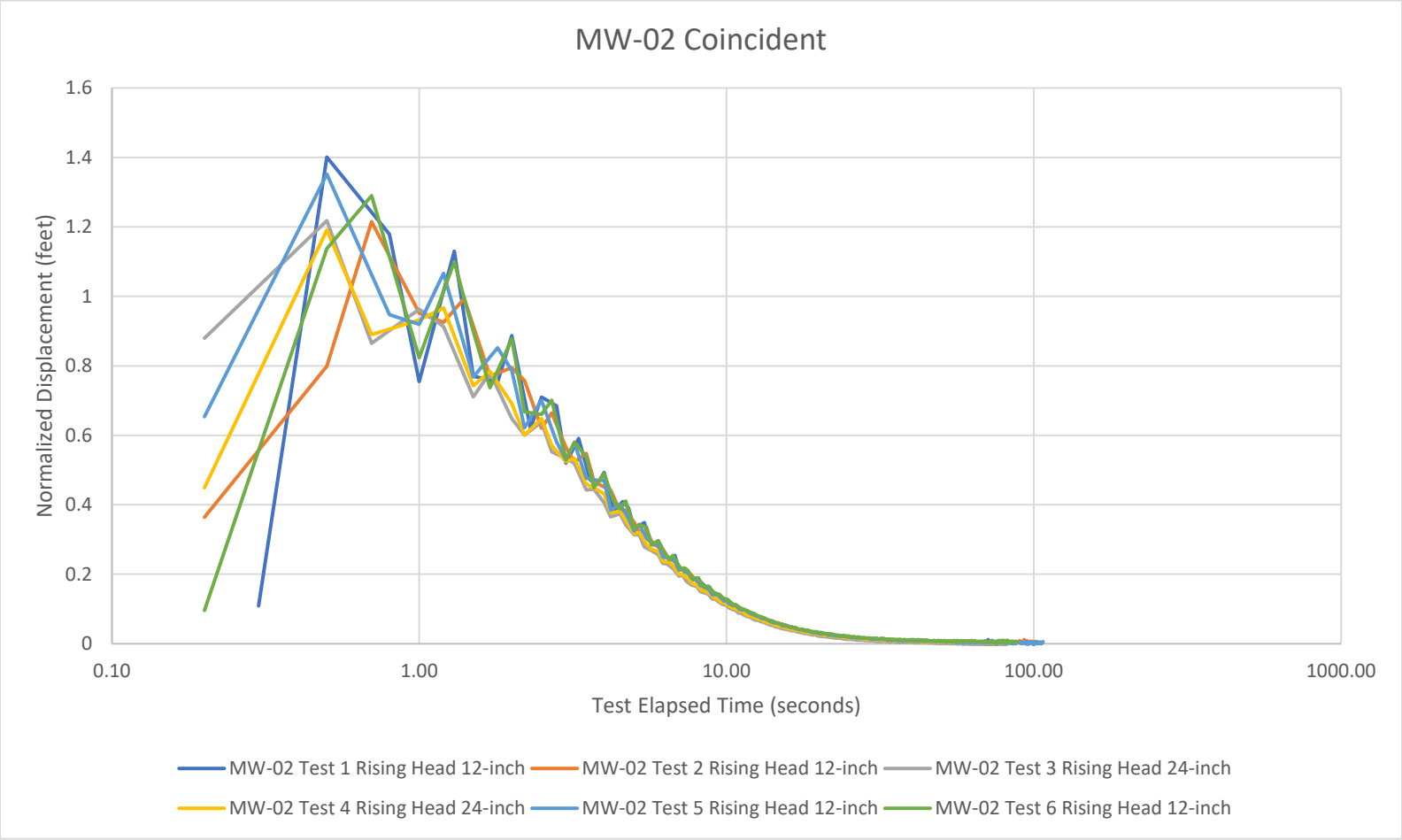
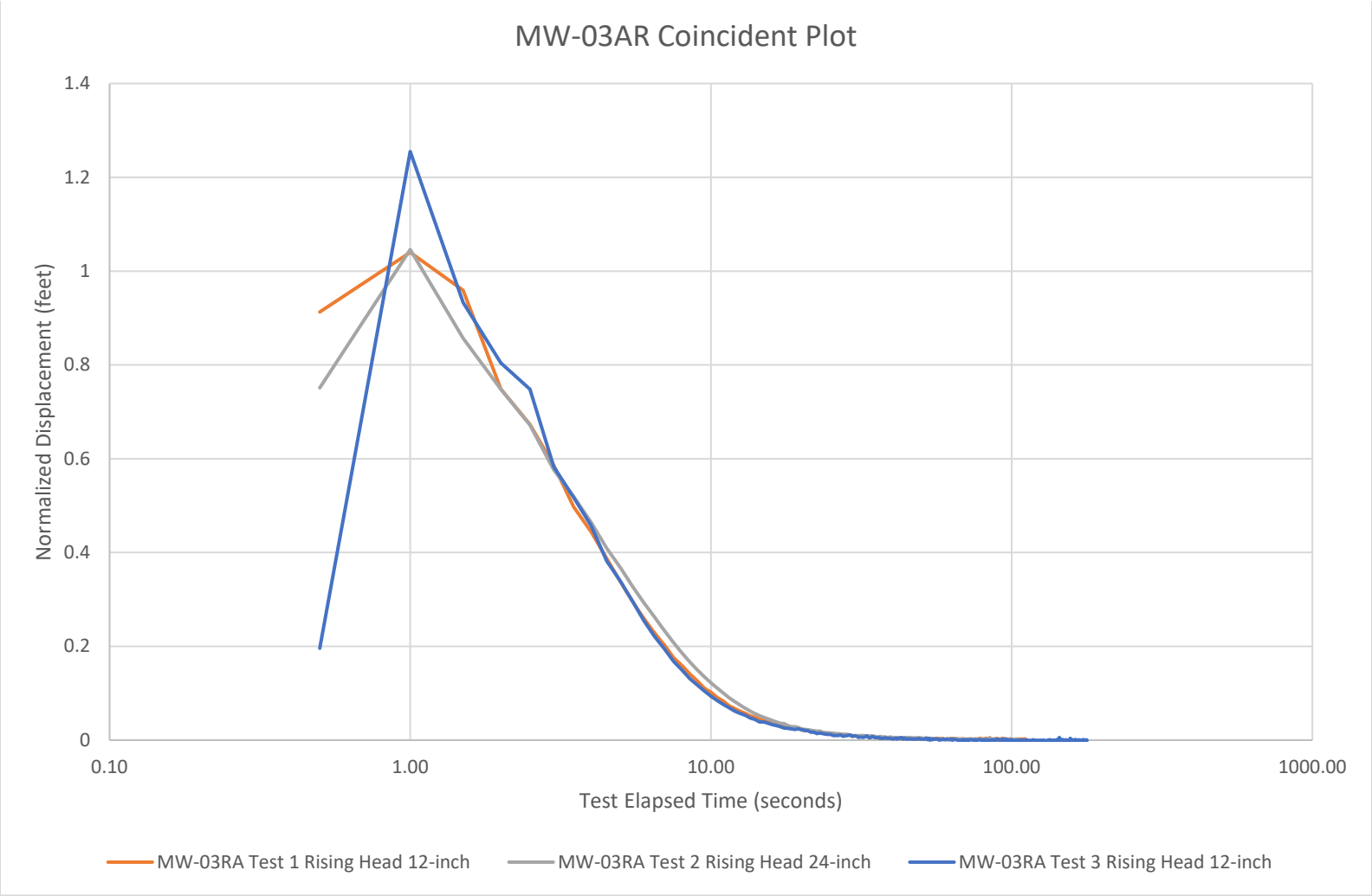


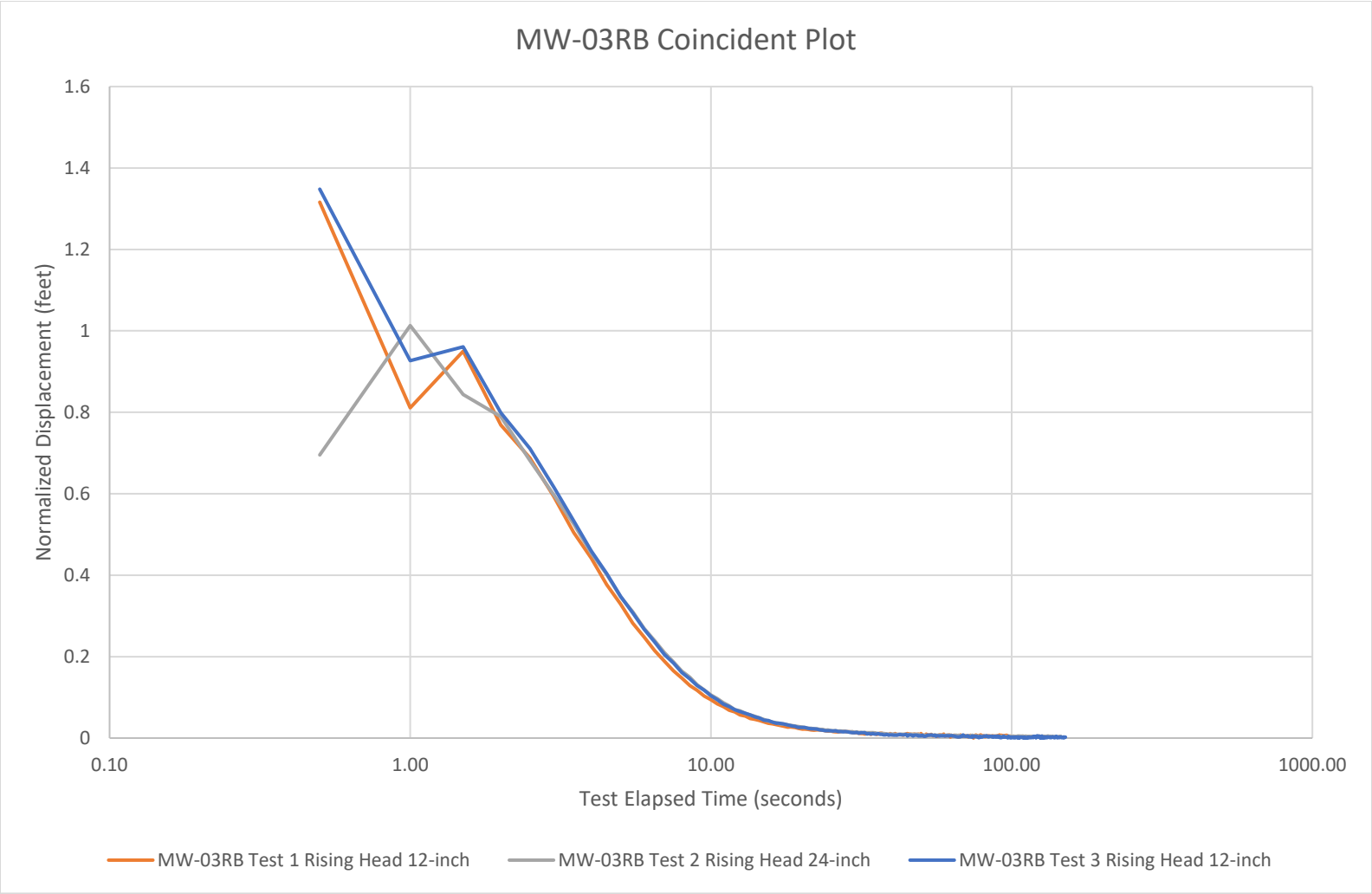
MW-01S Coincident Plot



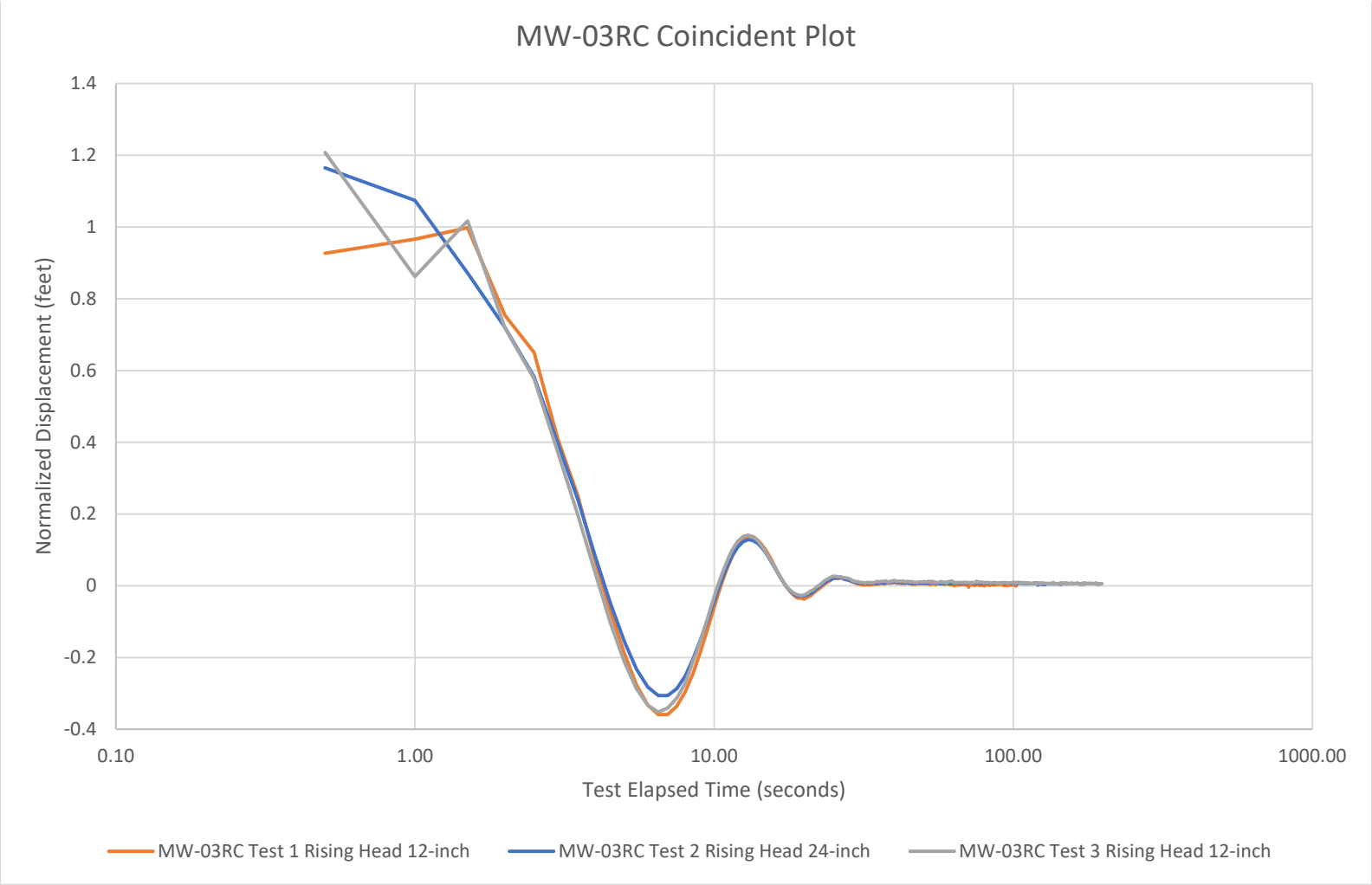
MW-02 Coincident Plot



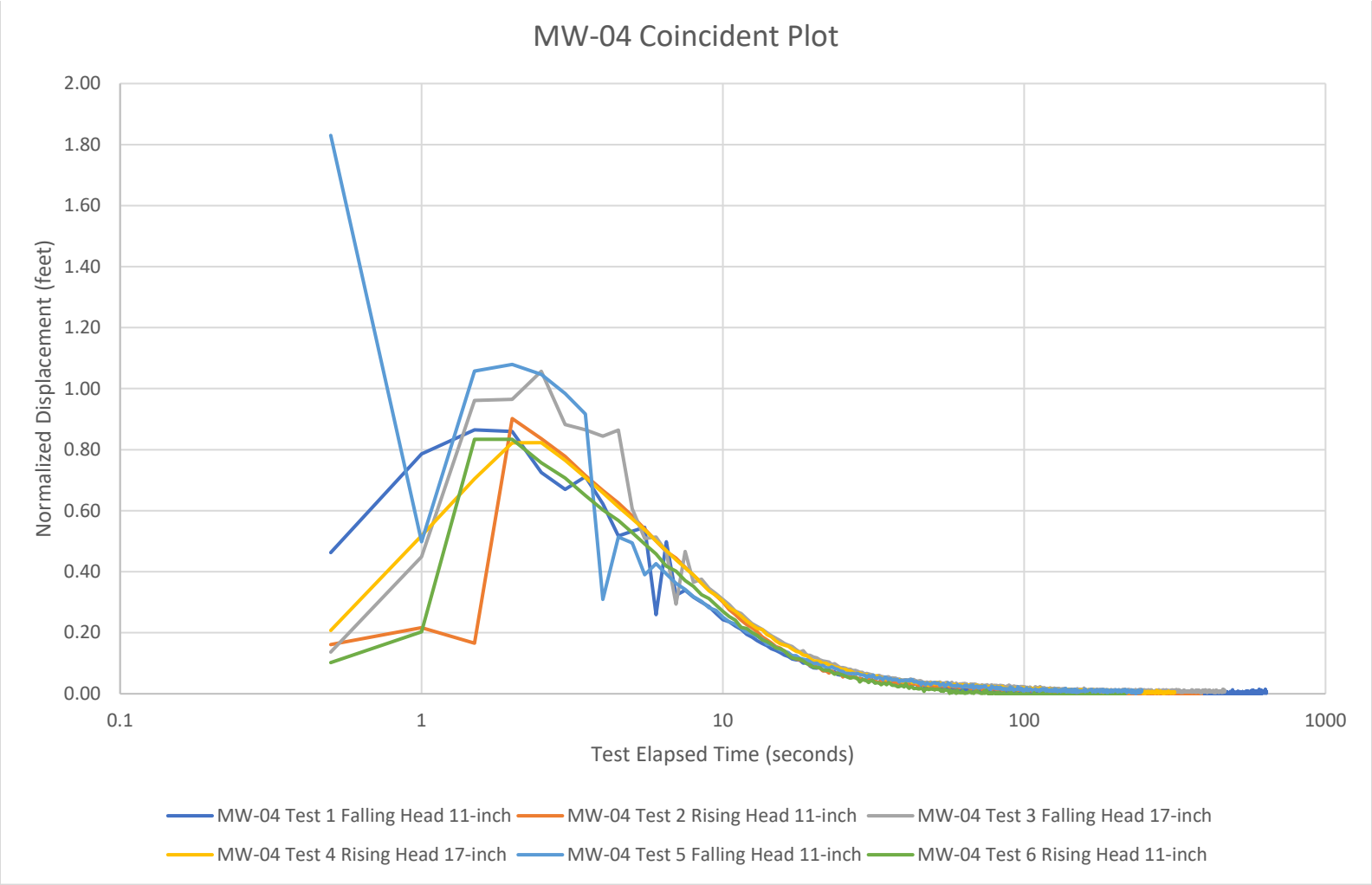
MW-03RA Coincident Plot



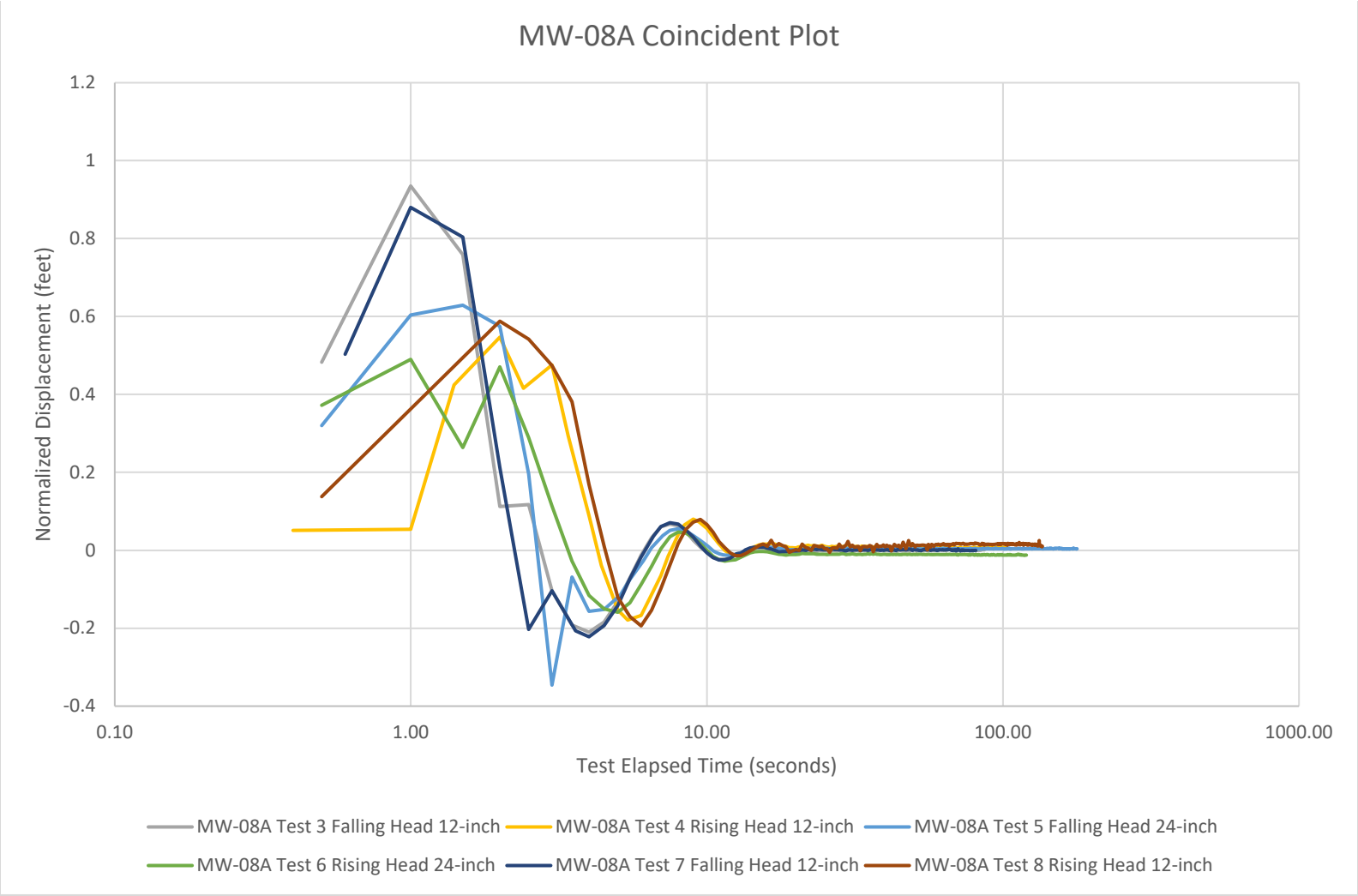
MW-03RB Coincident Plot



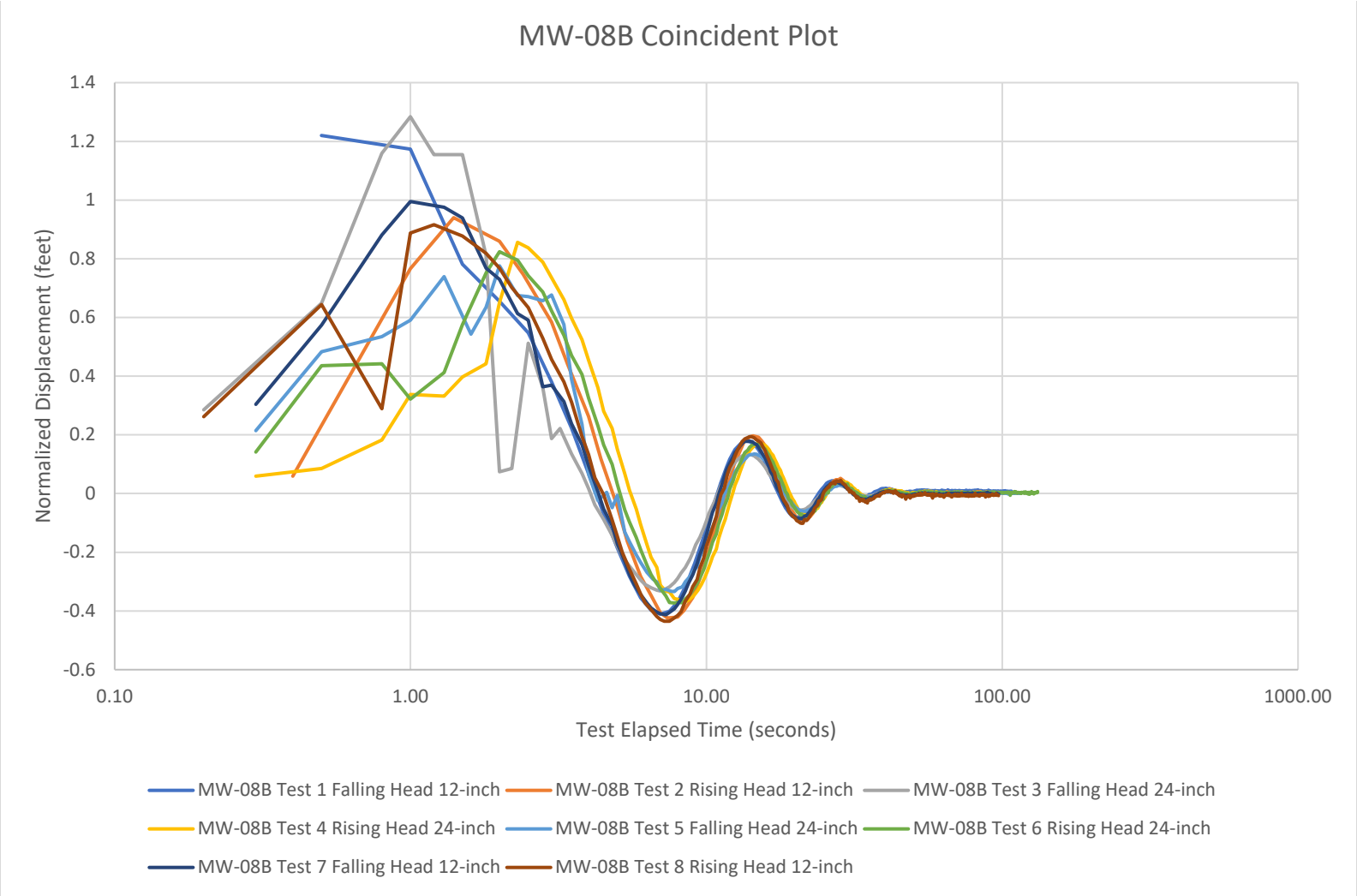
MW-03RC Coincident Plot



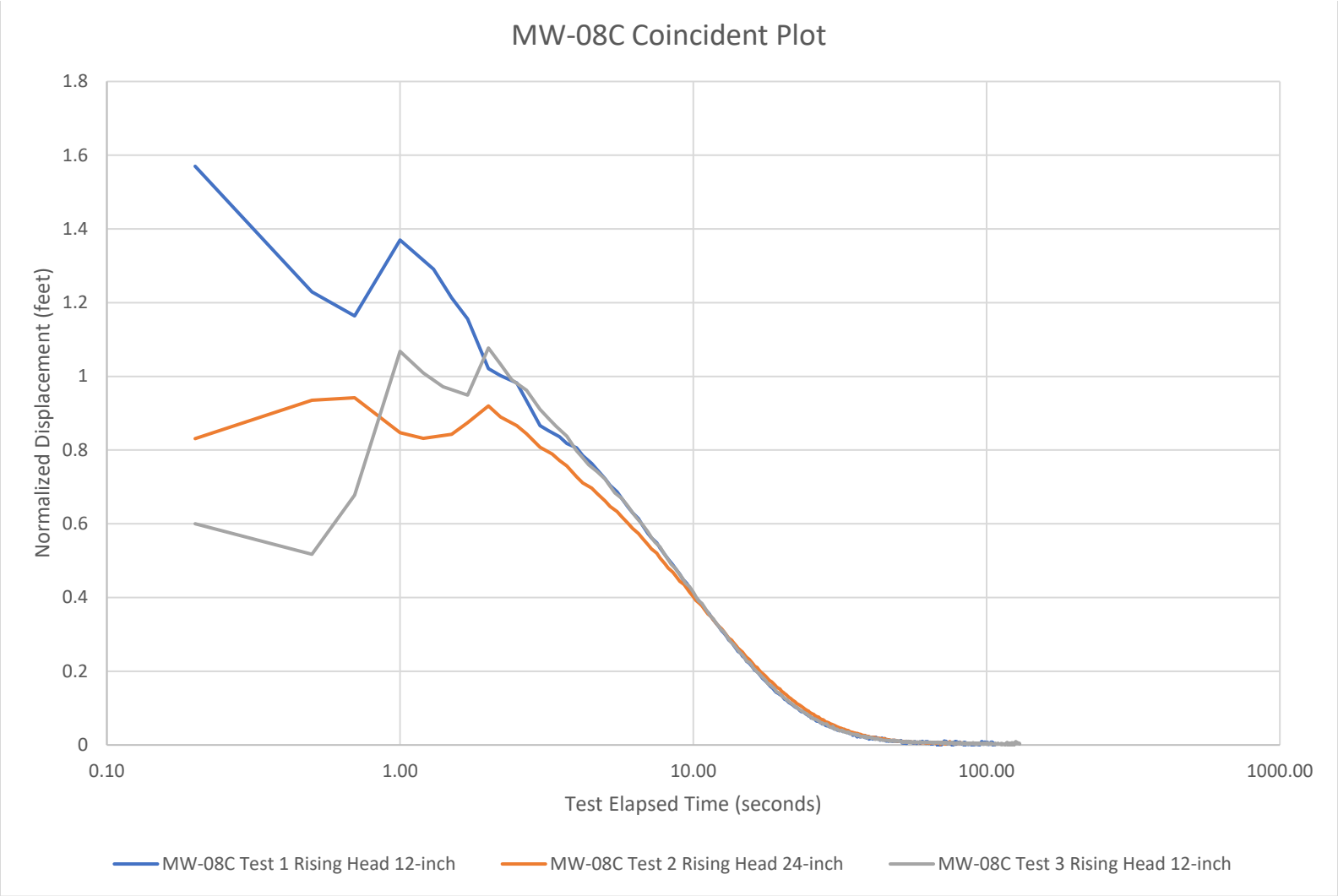
MW-04 Coincident Plot



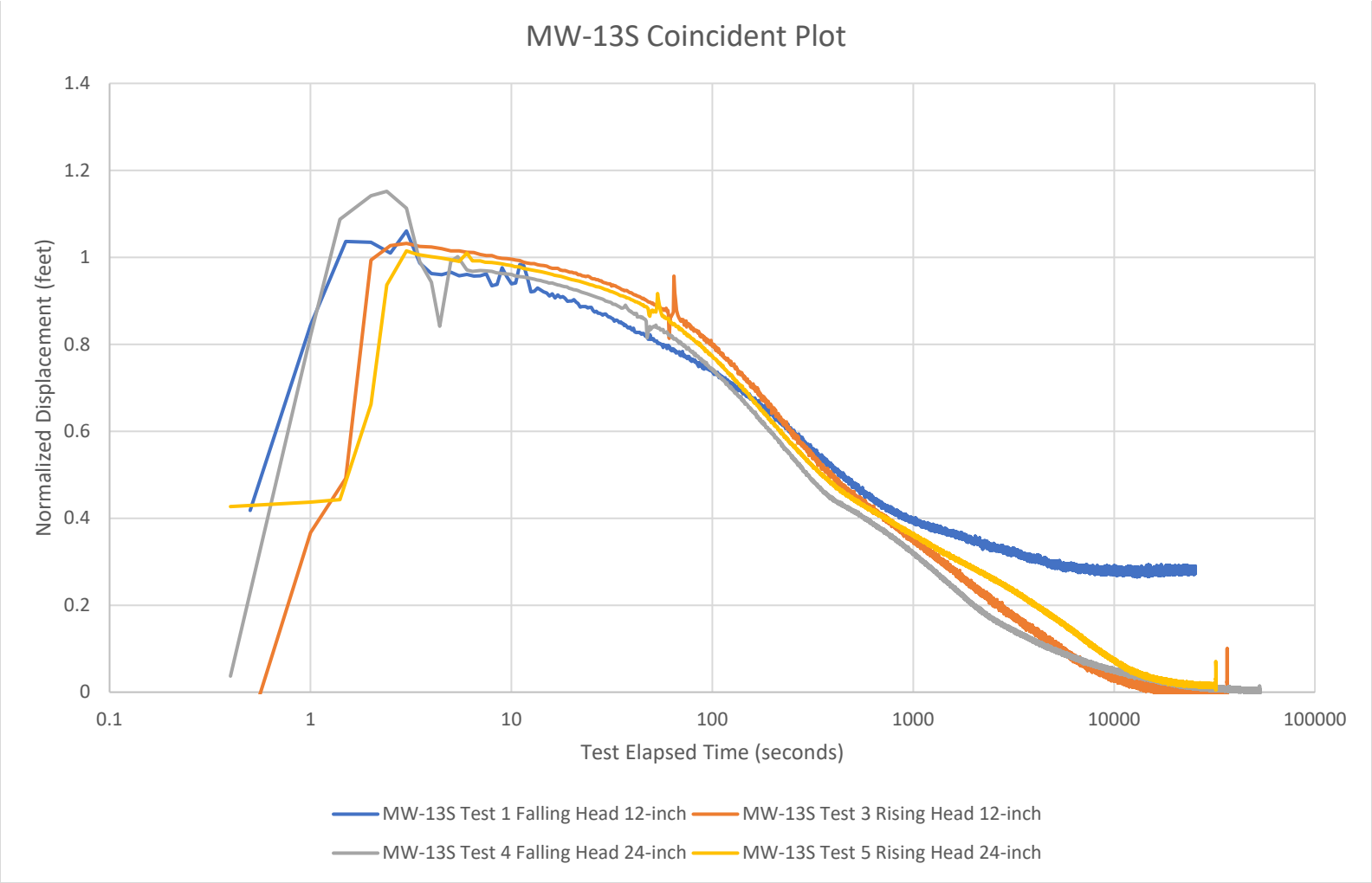
MW-08A Coincident Plot



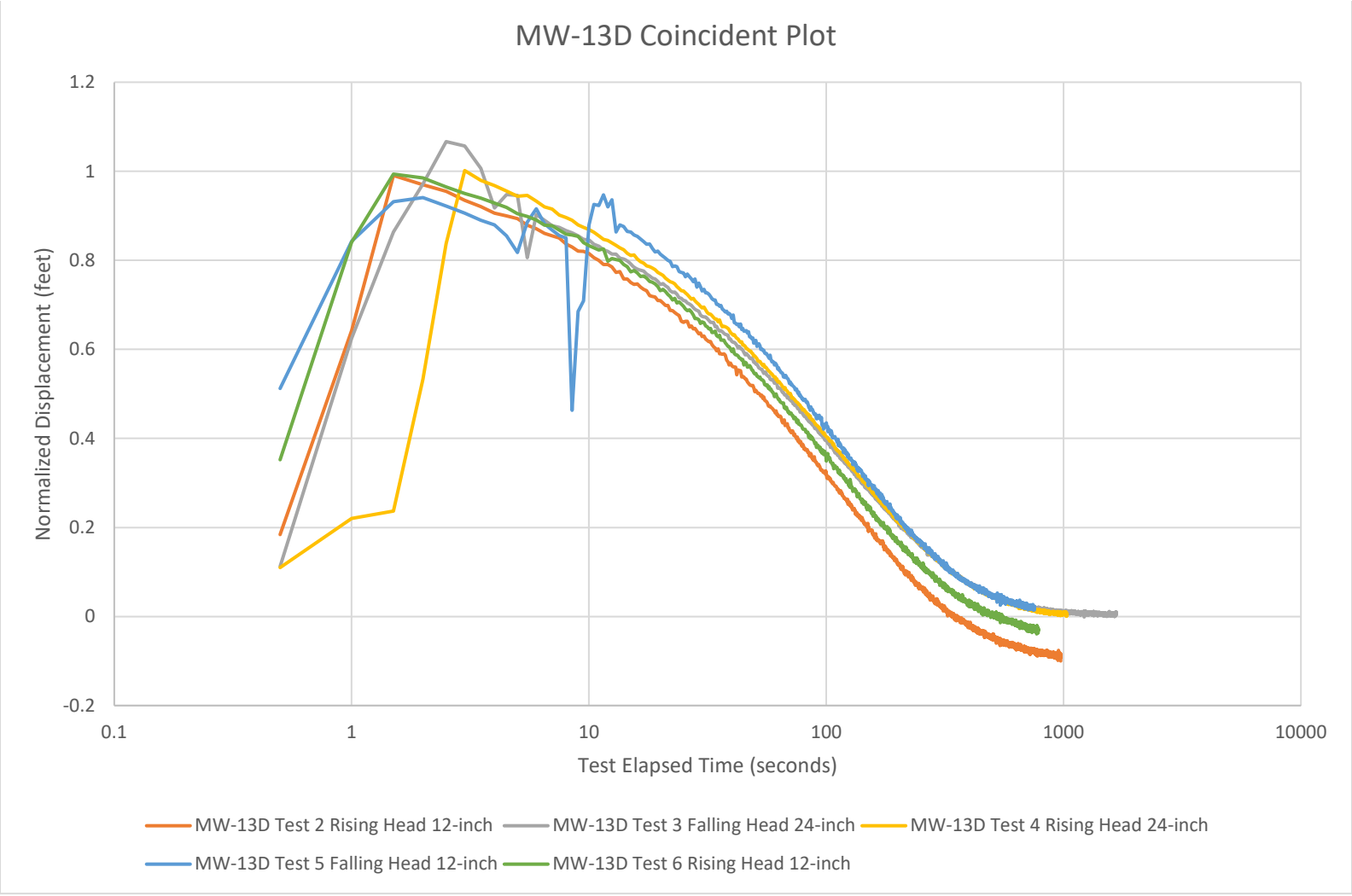
MW-08B Coincident Plot



MW-08C Coincident Plot



MW-13S Coincident Plot



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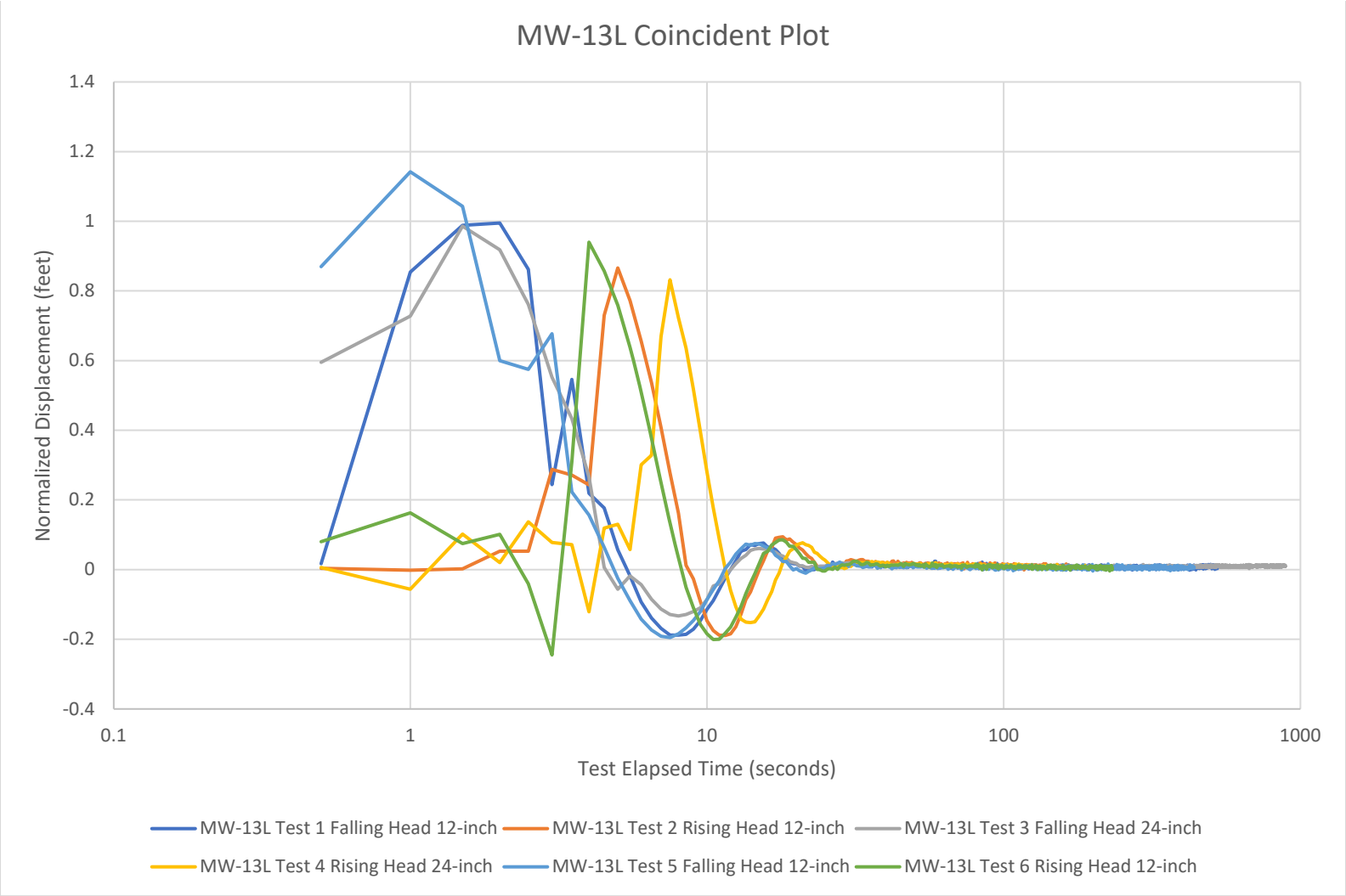

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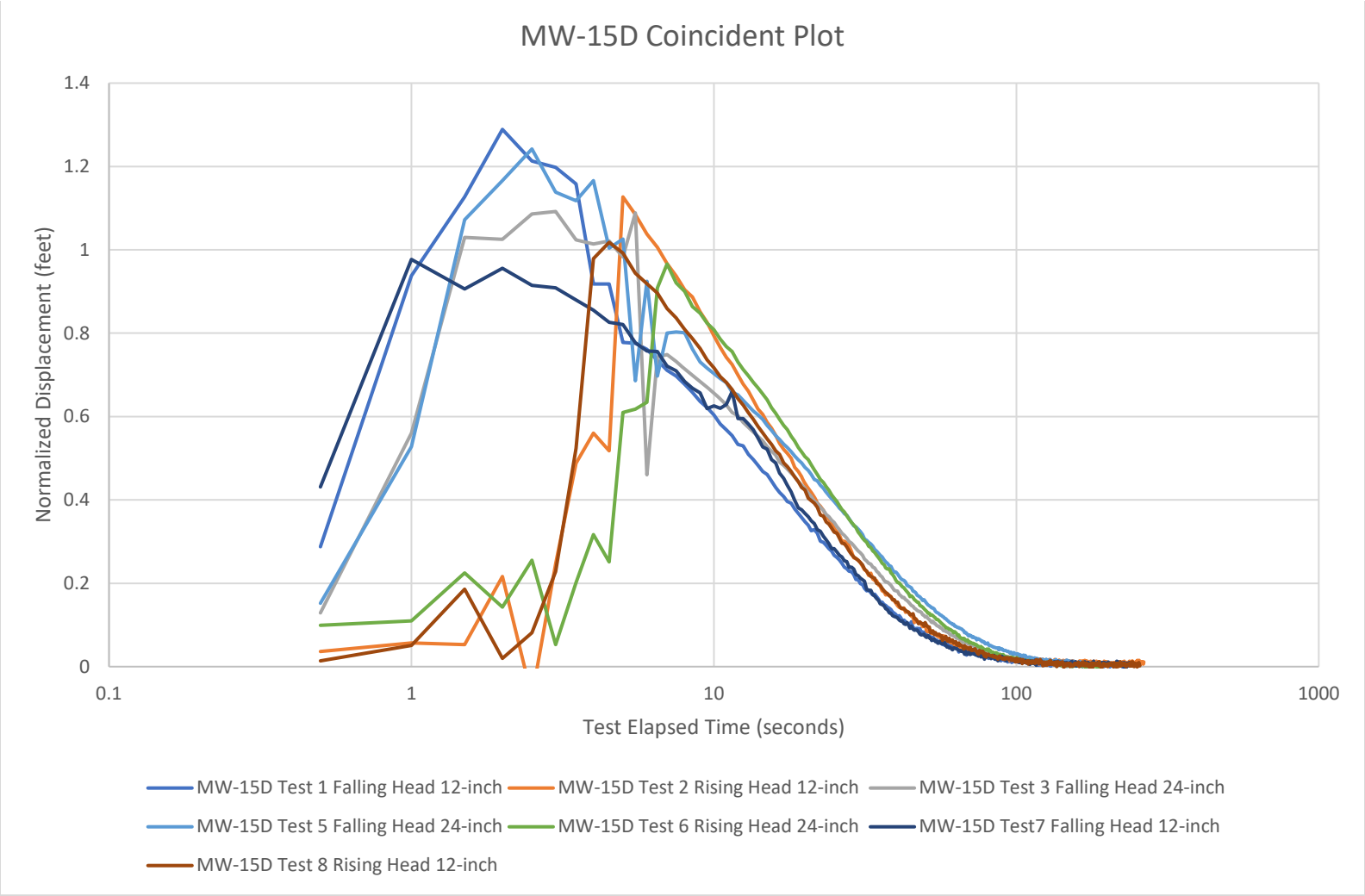
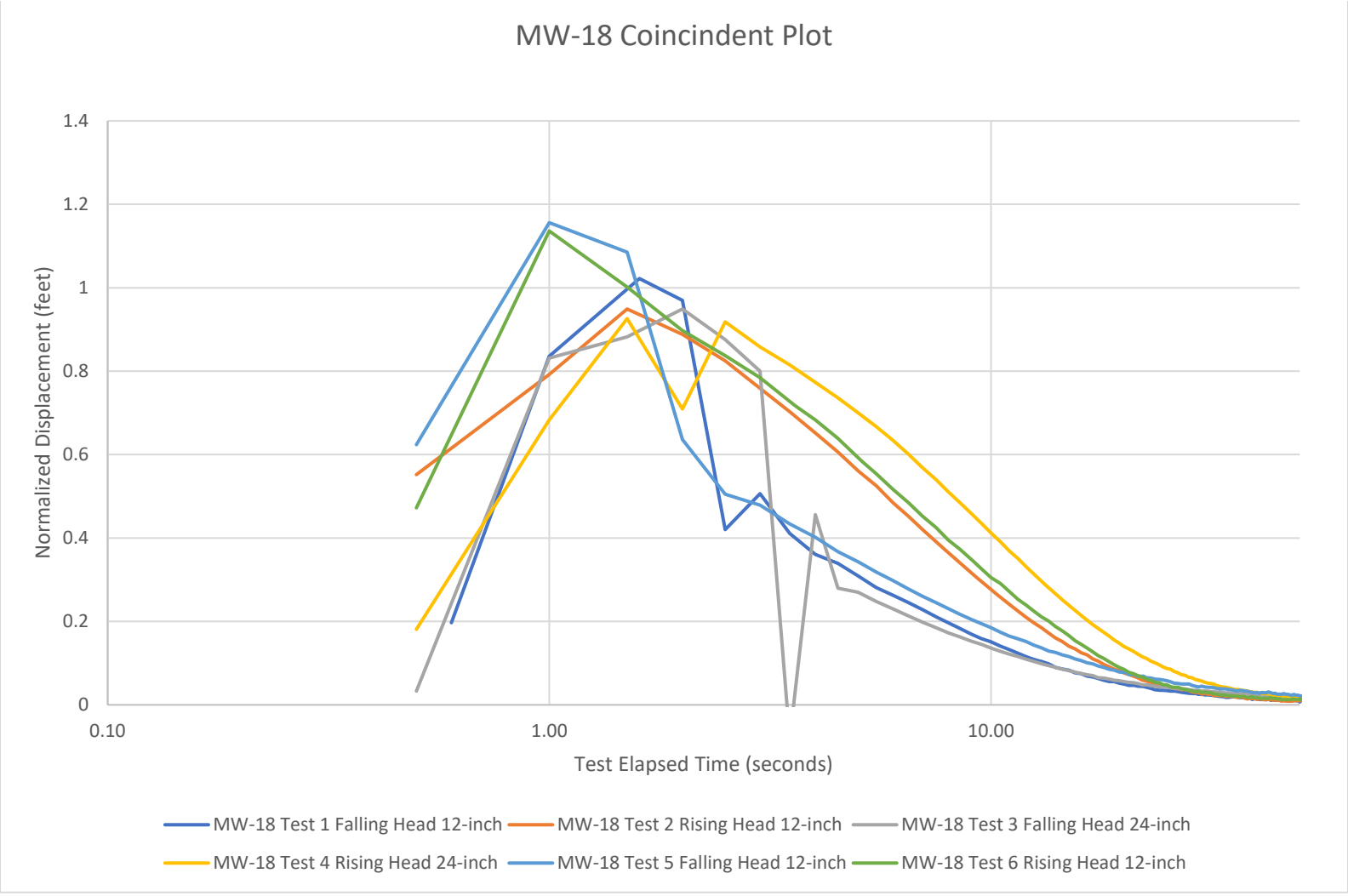
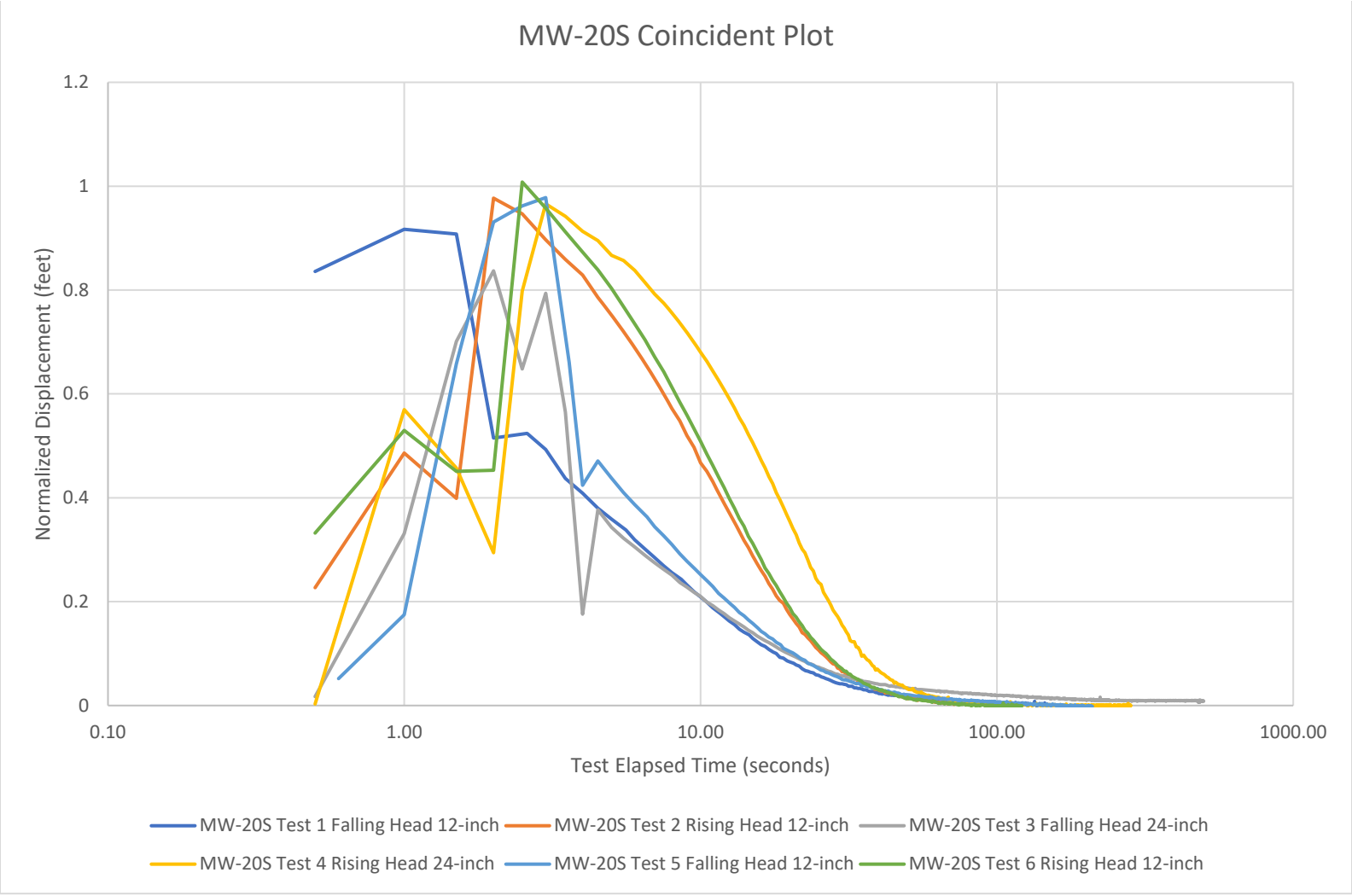


MW-15D Coincident Plot

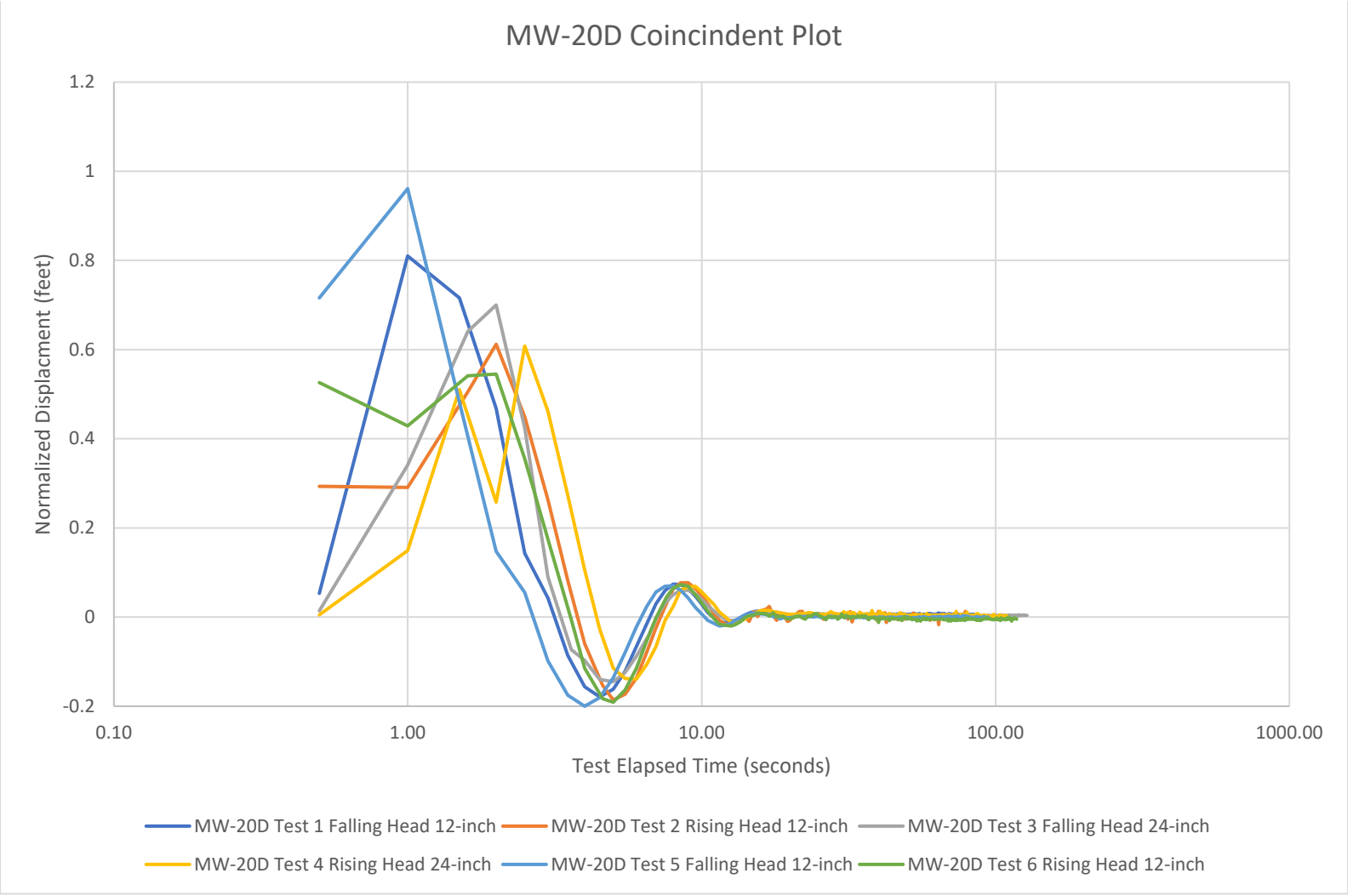


MW-18 Coincident Plot

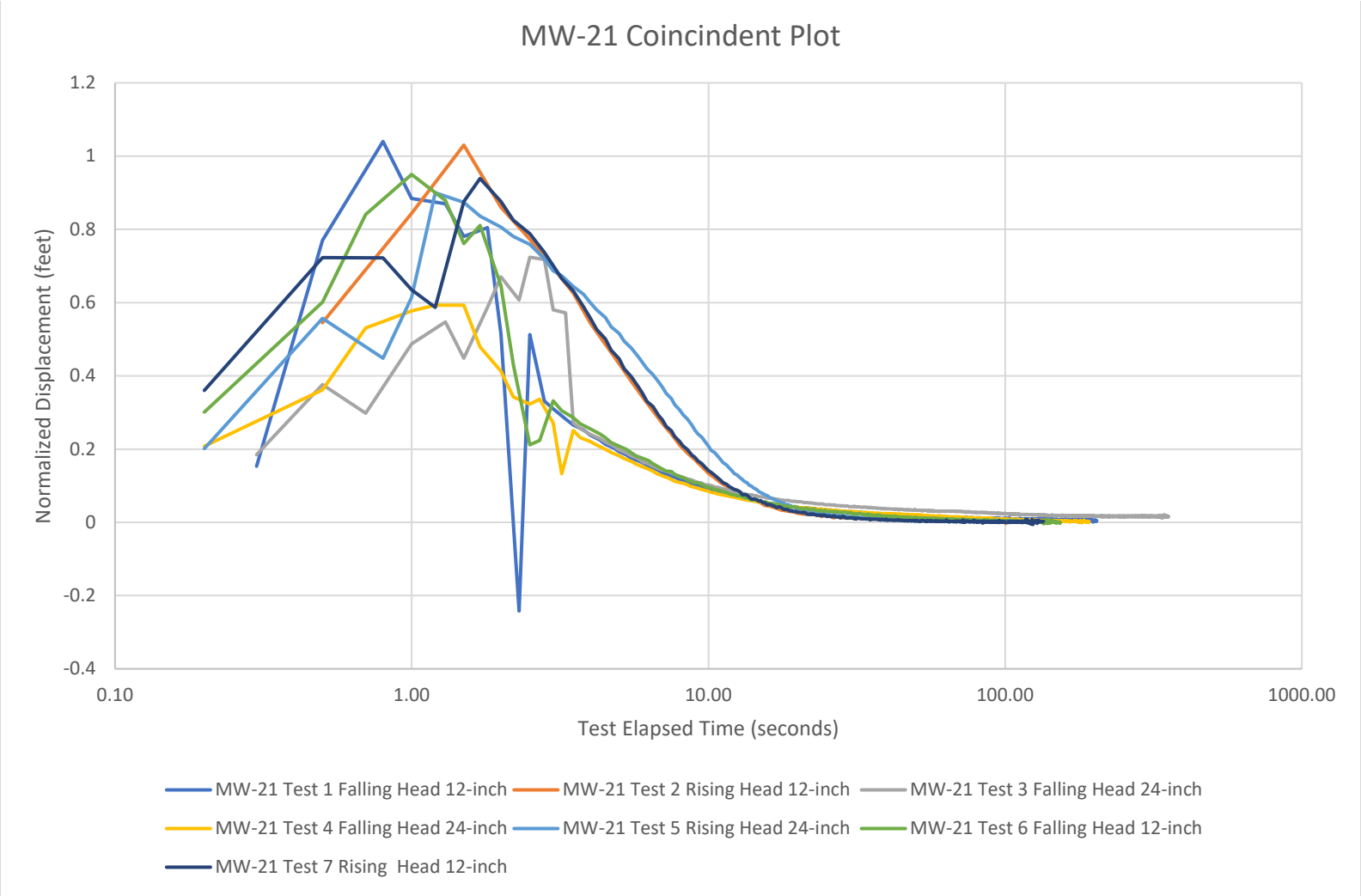
MW-19 Coincident Plot



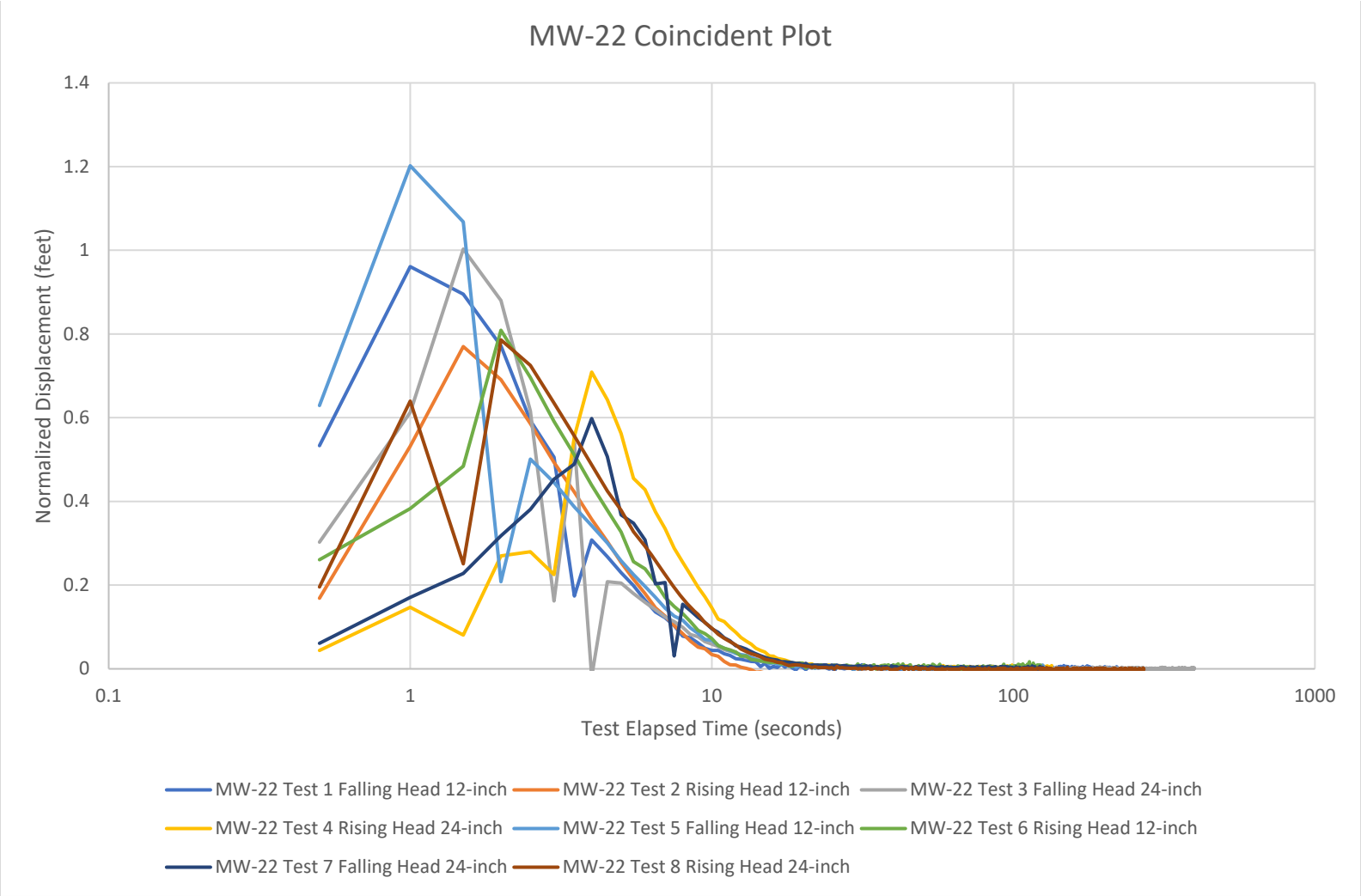
MW-20S Coincident Plot



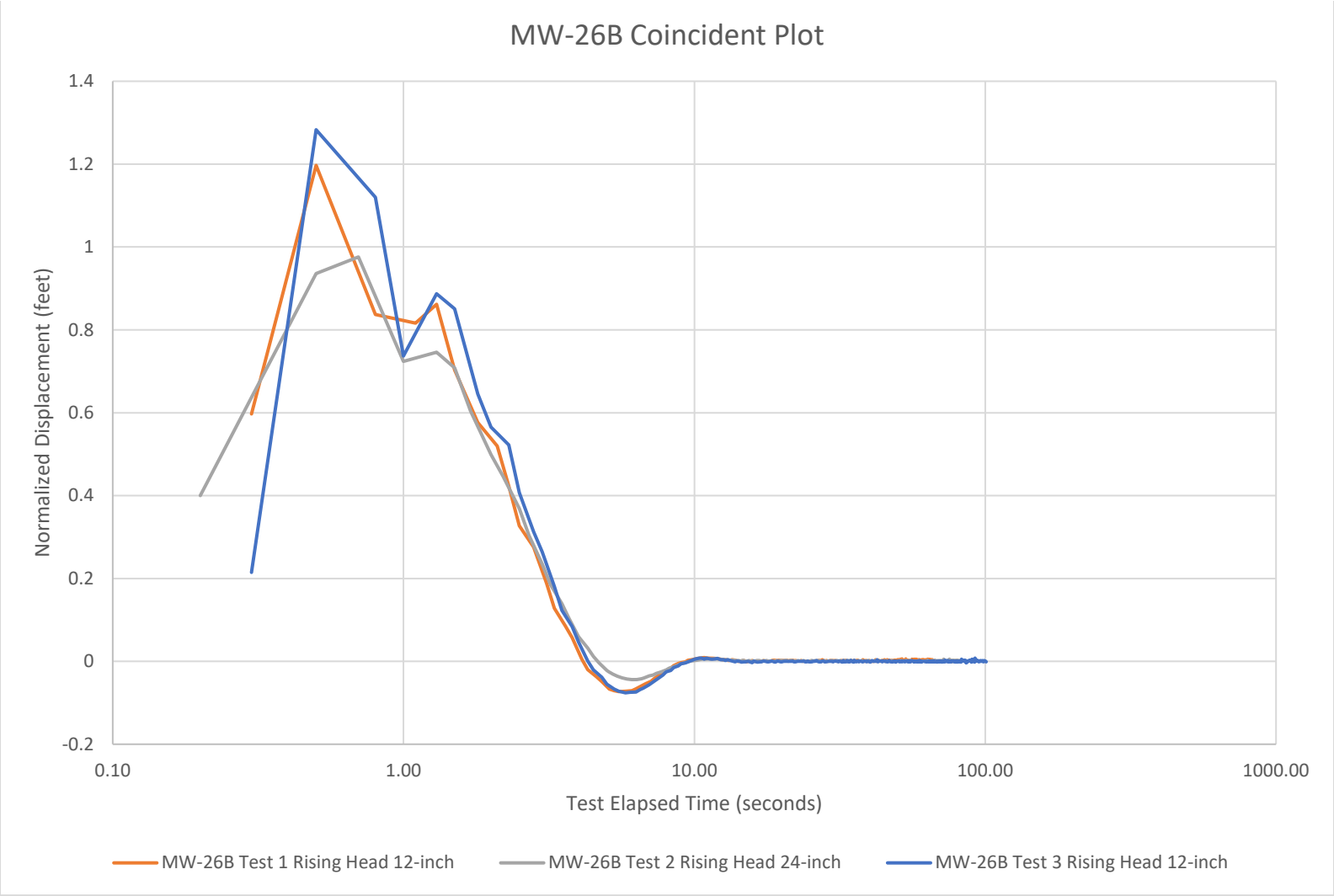
MW-20D Coincident Plot



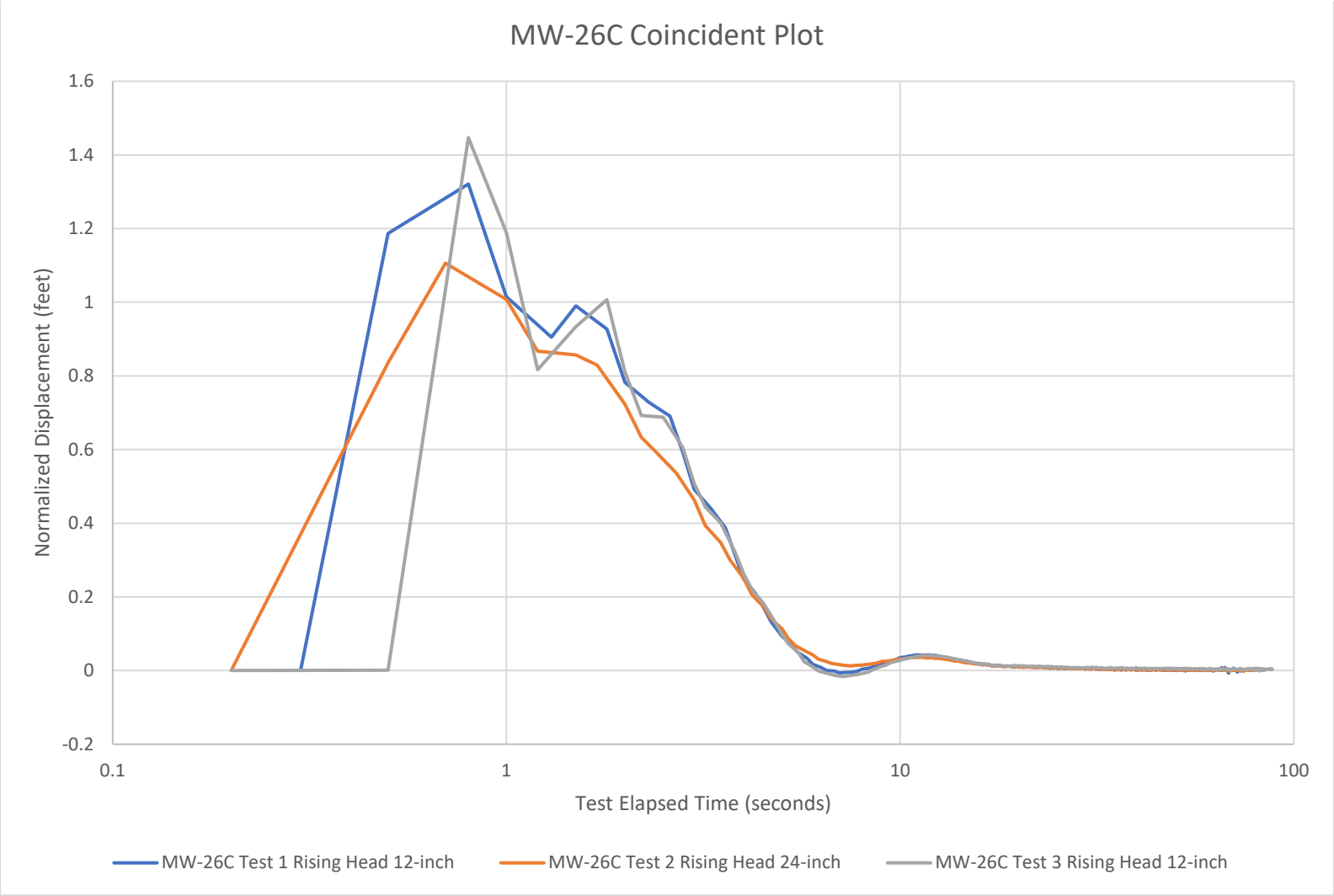
MW-21 Coincident Plot



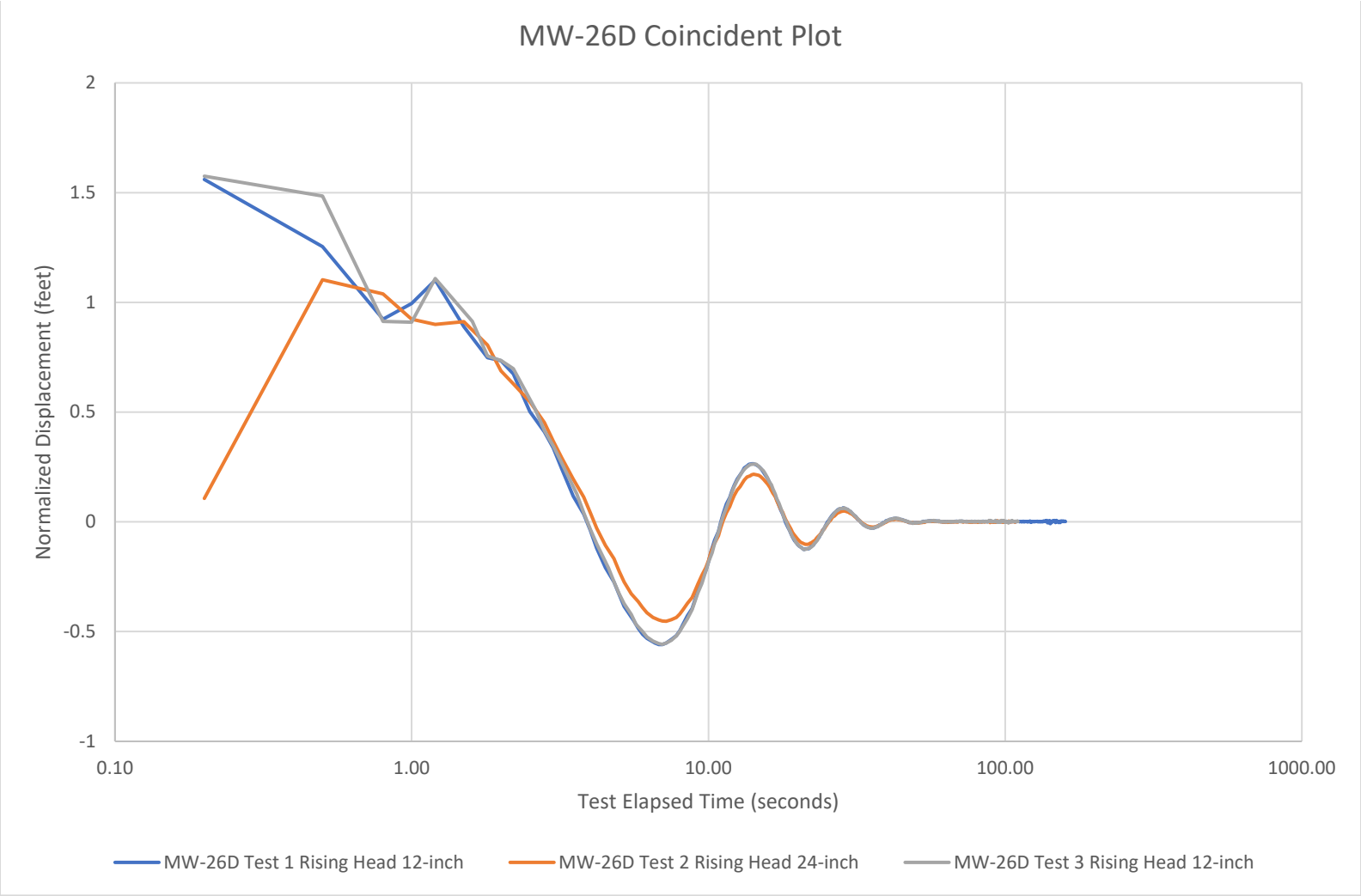
MW-22 Coincident Plot



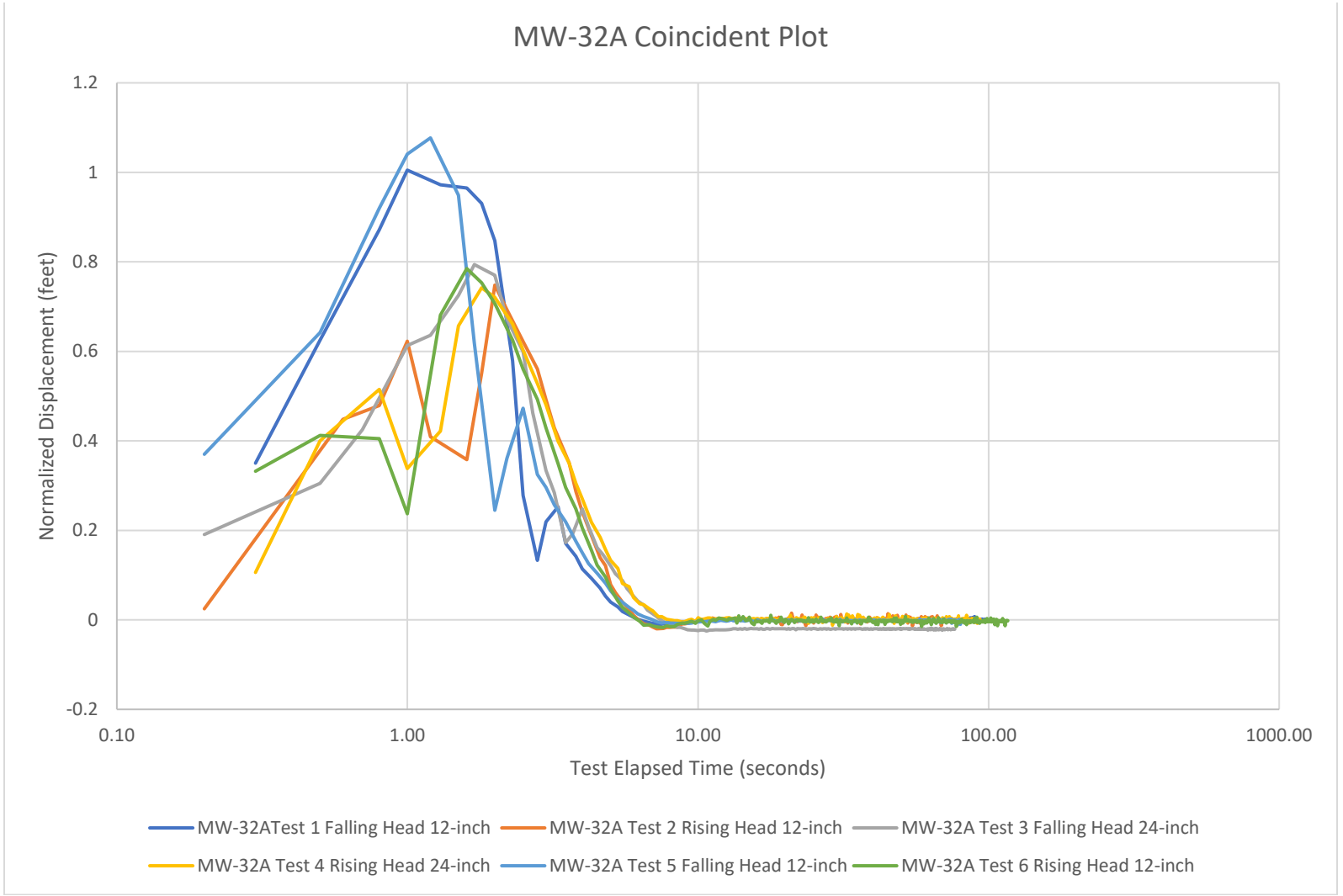
MW-26B Coincident Plot



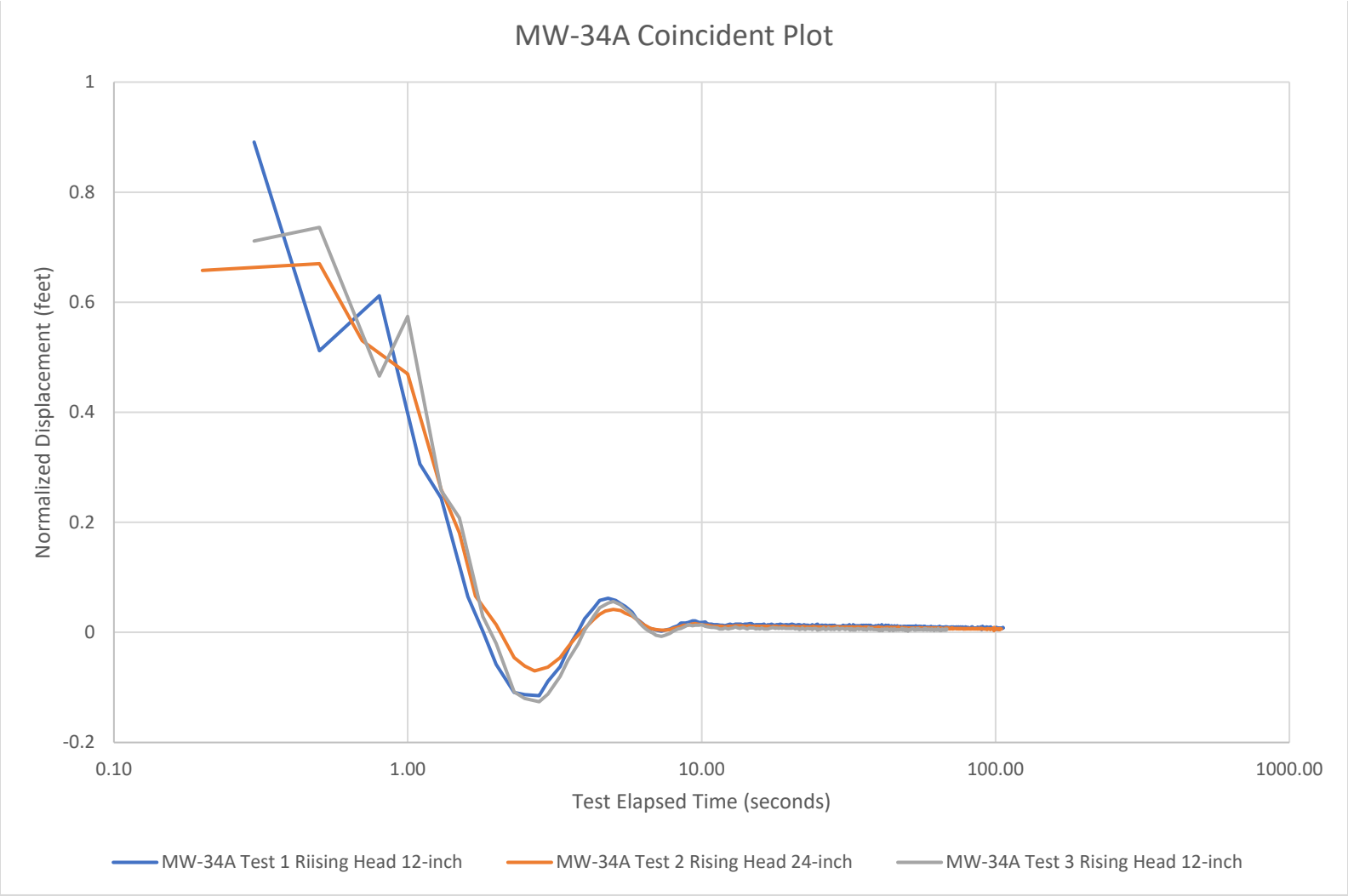
MW-26C Coincident Plot



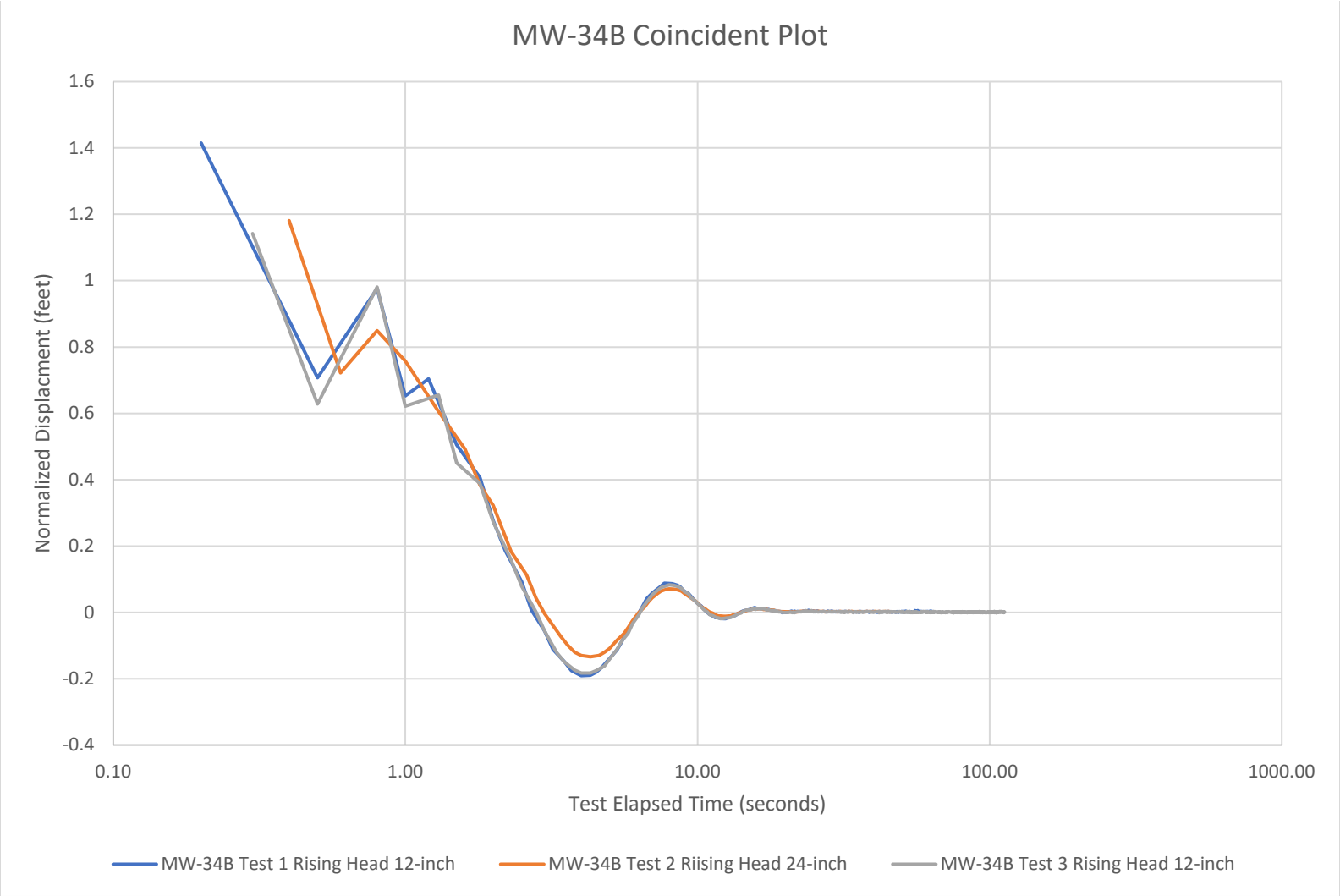
MW-26D Coincident Plot



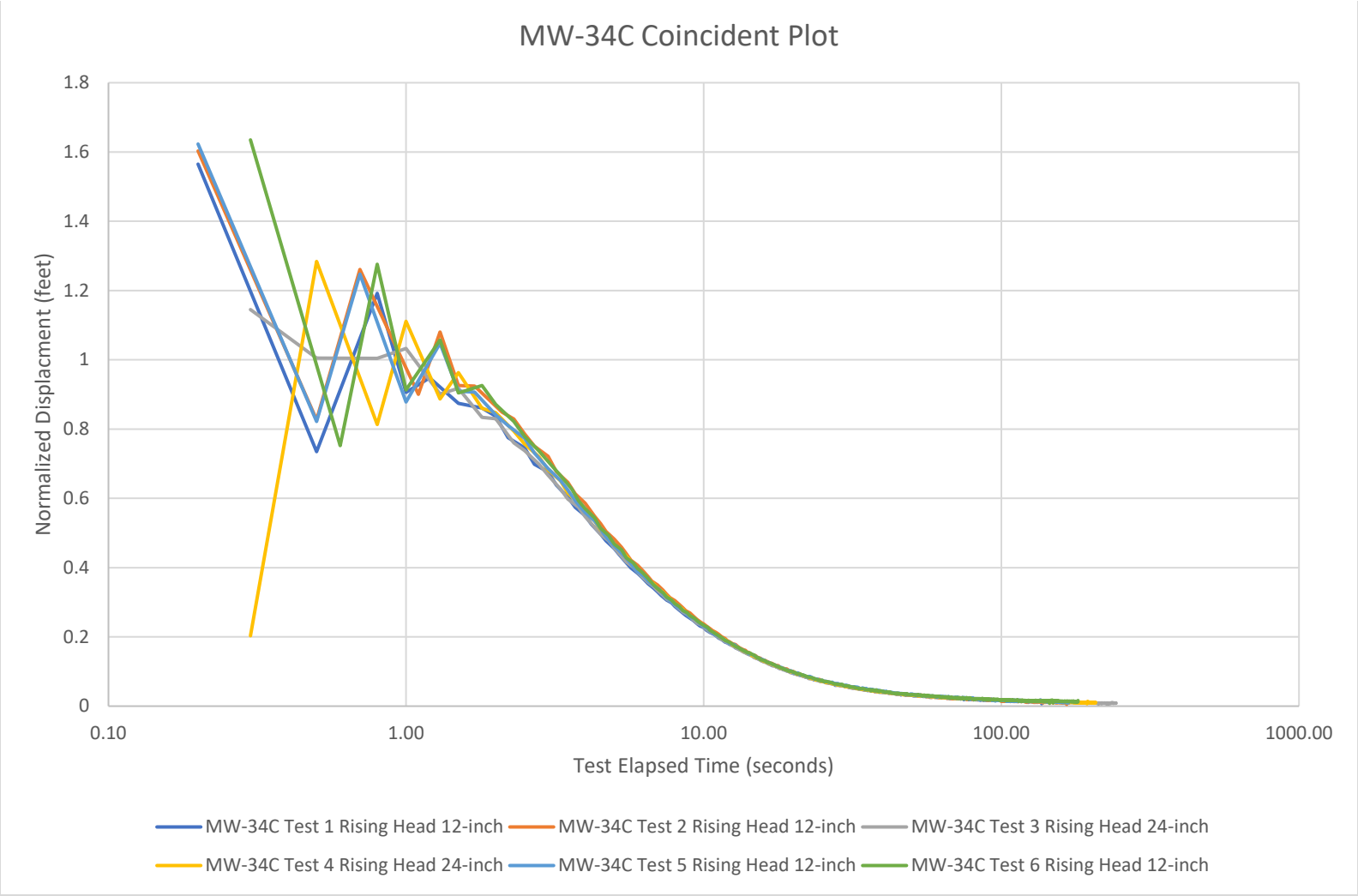
MW-32A Coincident Plot



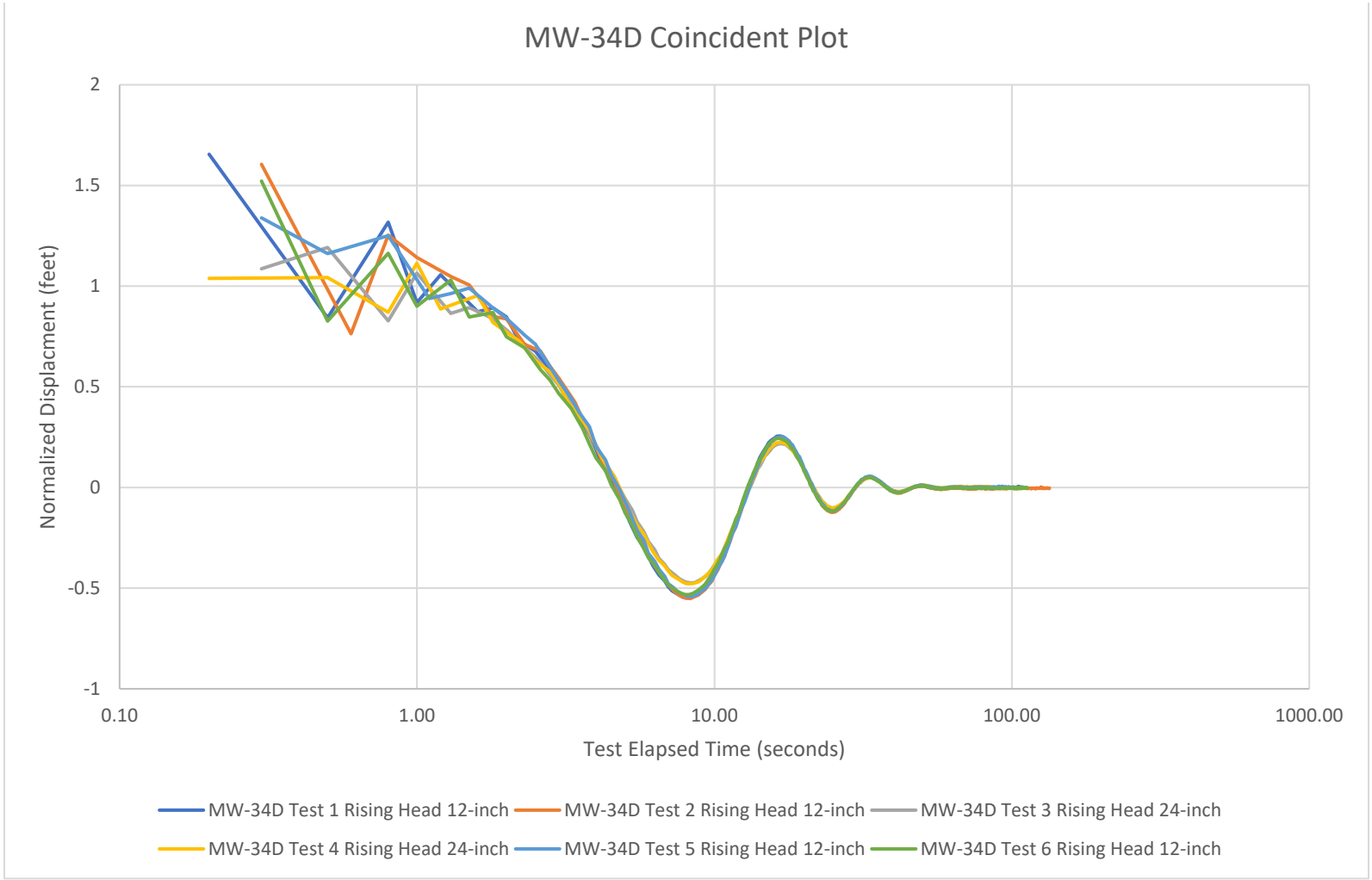
MW-34A Coincident Plot



MW-34B Coincident Plot



MW-34C Coincident Plot



MW-34D Coincident Plot

Quality Control Summary Report

Summer 2021 Air Sampling Event

Operable Unit 1 Remedial Investigation
700 South 1600 East PCE Plume,
Salt Lake City, Utah

November 2021

CDM Smith

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Attachment 1 Data Validation Reports
Attachment 2 Data Package Completeness Review Checklists
Attachment 3 Analytical Data Packages

Abbreviations

%	percent
%D	percent difference
%R	percent recovery
CDM Smith	CDM Federal Programs Corporation
COC	chain of custody
DQI	data quality indicator
DQO	data quality objective
EPA	U.S. Environmental Protection Agency
Eurofins	Eurofins Air Toxics
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
MDL	method detection limit
MRL	method reporting limit
PARCCS	precision, accuracy, representativeness, comparability, completeness, and sensitivity
PCE	tetrachloroethene
QA	quality assurance
QAPP	*Phase 2 Quality Assurance Project Plan, Operable Unit 1, 700 South 1600 East PCE Plume Site*
QC	quality control
QCSR	quality control summary report
RIWP	*Phase 2 Remedial Investigation Work Plan, Operable Unit 1, 700 South 1600 East PCE Plume Site*
RPD	relative percent difference
RSD	relative standard deviation
SDG	sample delivery group
SIM	selective ion monitoring
Site	700 South 1600 East Tetrachloroethene Plume Superfund Site
USACE	U.S. Army Corps of Engineers
VOC	volatile organic compound

Section 1

Data Usability and Assessment Review

Under the U.S. Army Corps of Engineers (USACE) Kansas City District, Contract No. W912DQ-18-D-3008, Task Order No. W912DQ19F3048, CDM Federal Programs Corporation (CDM Smith) was directed to perform a remedial investigation for Operable Unit 1 of the 700 South 1600 East Tetrachloroethene (PCE) Plume Superfund Site (Site) in Salt Lake City, Utah. To assist in the ongoing remedial investigation at the Site, indoor air, ambient air, and soil gas samples were collected August 24, 2021 to August 31, 2021. Samples were shipped to Eurofins Air Toxics (Eurofins) in Folsom, California, for analysis.

This quality control summary report (QCSR) summarizes the data validation performed and determines whether sample results meet the data quality objectives (DQOs) outlined in the *Phase 2 Quality Assurance Project Plan, Operable Unit 1, 700 South 1600 East PCE Plume Site* (QAPP; CDM Smith 2020a).

1.1 Usability Summary

Data collected and validated during this field investigation are usable as reported. Applicable data validation qualifiers were added if required. No sample results were rejected. Specific details are provided in the data validation reports summarized in Section 5 and presented in **Attachment 1** of this report.

Section 2
Quality Assurance Objectives

Quality assurance (QA) objectives for measurement data are expressed in terms of precision, accuracy, representativeness, comparability, completeness, and sensitivity (PARCCS). The PARCCS parameters characterize the quality of the data and, as such, are called data quality indicators (DQIs). The DQIs provide a mechanism for ongoing quality control (QC), and measuring and evaluating data quality throughout the project.

A review of the collected data is necessary to determine if data measurement objectives established in the QAPP (CDM Smith 2020a) were met. In general, the following data measurement objectives were considered:

- Achievement of analytical method and reporting limit requirements
- Adherence to and achievement of appropriate laboratory analytical and field QC requirements
- Achievement of required measurement performance criteria for DQIs (the PARCCS parameters)
- Adherence to sampling and sample handling procedures
- Adherence to the sampling design and deviations documented on field change notifications, if required

The data validation review of the DQIs and other QA objectives determines if the data are of sufficient quality and quantity to support their intended use.

Section 3
Field and Laboratory Quality Assurance Activities

Wasatch Environmental, on behalf of CDM Smith completed field sampling activities between August 24 and August 31, 2021. The QAPP (CDM Smith 2020a) defined the procedures to be followed and the data quality requirements for the field sampling events and associated analytical work.

All samples were received intact with proper chain-of-custody (COC) documentation at Eurofins. Sample identification was accurately documented by the laboratory. Sample preparation and analyses were conducted within the method-specified holding times.

Table 3-1 lists the samples collected and analyses performed. **Attachment 2** presents the completeness review checklists for the data packages. **Attachment 3** includes the analytical data packages.

3.1 Deviations from Field Procedures/Laboratory Procedures

All samples were collected as planned during the sampling event. There were no deviations from field procedures.

One laboratory deviation occurred during this sampling round. Specific analytes for sample RG08-SG083021 were not able to be analyzed by selective ion monitoring (SIM) low level analysis because of high levels of target compounds. All analytes were instead analyzed by Modified U.S. Environmental Protection Agency (EPA) Method TO-15. This deviation does not impact DQOs.

3.2 Field Quality Assurance/Quality Control

Three field duplicates (two for ambient air and one for soil gas) were analyzed for the 18 environmental air samples collected. The QC sample collection frequency requirements in the QAPP (CDM Smith 2020a) of 10 percent for field duplicates was met.

Field QA/QC objectives were accomplished through the use of appropriate sampling techniques and collection of QC samples at the specified frequency.

3.3 Laboratory Quality Assurance/Quality Control

Analytical QA/QC was assessed by laboratory QC checks, method blanks, sample custody tracking, sample preservation, adherence to holding times, laboratory control samples (LCSs), calibration verifications, surrogates, internal standards, duplicate results, and other applicable QC parameters. As presented in the data validation reports in **Attachment 1** of this report, laboratory QC samples met project criteria requirements with the appropriate qualifiers applied. All data are considered usable.

3.3.1 Laboratory Methods

Samples were analyzed using the following methods:

- Modified EPA Method TO-15 for volatile organic compounds (VOCs)
- Modified EPA Method TO-15 SIM for VOCs by SIM

The methods used met project objectives.

Table 3-1
Sample List and Analysis
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

Field Sample ID	Matrix	Sample Date	Lab SDG	Method
0003H-IA01SC-082421	AI	8/24/2021	2109043	TO-15, TO-15 SIM
0011H-AA02SC-082521	AA	8/25/2021	2109043	TO-15, TO-15 SIM
0011H-IA01SC-082521	AI	8/25/2021	2109043	TO-15, TO-15 SIM
0018H-IA01SC-082421	AI	8/24/2021	2109043	TO-15, TO-15 SIM
0026H-IA01SC-082521	AI	8/25/2021	2109043	TO-15, TO-15 SIM
0037H-IA02SC-082721	AI	8/27/2021	2109043	TO-15, TO-15 SIM
0051H-AA02SC-082421	AA	8/24/2021	2109043	TO-15, TO-15 SIM
0051H-IA01SC-082421	AI	8/24/2021	2109043	TO-15, TO-15 SIM
0059H-IA02SC-082521	AI	8/25/2021	2109043	TO-15, TO-15 SIM
0091H-AA01SC-083121	AA	8/31/2021	2109046	TO-15, TO-15 SIM
0091H-IA04SC-083121	AI	8/31/2021	2109046	TO-15, TO-15 SIM
0102H-AA01SC-082421	AA	8/24/2021	2109043	TO-15, TO-15 SIM
0102H-IA01SC-082421	AI	8/24/2021	2109043	TO-15, TO-15 SIM
0166H-IA02SC-082421	AI	8/24/2021	2109043	TO-15, TO-15 SIM
FD01-IA082721	AI	8/27/2021	2109046	TO-15, TO-15 SIM
FD01-SG082721	GS	8/27/2021	2109046	TO-15, TO-15 SIM
FD02-IA083121	AI	8/31/2021	2109046	TO-15, TO-15 SIM
RG01-SG082721	GS	8/27/2021	2109046	TO-15, TO-15 SIM
RG04-SG082721	GS	8/27/2021	2109046	TO-15, TO-15 SIM
RG07-SG082721	GS	8/27/2021	2109046	TO-15, TO-15 SIM
RG08-SG083021	GS	8/30/2021	2109046	TO15

Acronyms:
AA - ambient air
AI - indoor air
EPA - United States Environmental Protection Agency
GS - soil gas
ID - identification
SDG - sample delivery group
TO-15 - Modified EPA Method TO-15 for volatile organic compounds
TO-15 SIM - Modified EPA Method TO-15 for volatile organic compounds by selective ion monitoring (SIM)

Section 4
Data Validation Procedures

For this QCSR, two laboratory sample delivery groups (SDGs) were evaluated. Qualified CDM Smith data validators not associated with project sampling activities validated the data reported in both SDGs. Data validation was performed in accordance with specified analytical methods and performance criteria outlined in the QAPP (CDM Smith 2020a), EPA's *National Functional Guidelines for Organic Superfund Methods Data Review* (EPA 2017), and EPA's *Analysis of Volatile Organic Compounds (VOCs) in Air Contained in Canisters by Method TO-15* (EPA 2014). Validation reports were prepared and are presented in **Attachment 1**. The following data packages were validated:

- SDG 2109043
- SDG 2109046

Table 4-1 presents the results that were qualified and the reasons for the qualifications. Qualifiers applied are defined as follows:

- J – The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- U – The analyte was analyzed for but was not detected above the level of the sample method reporting limit (MRL).
- UJ – The analyte was analyzed for but was not detected above the level of the sample MRL. The MRL is approximate.

Table 4-1
Qualification Summary
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

Field Sample ID	Lab SDG	Method	Analyte	CAS #	Final Result	Unit	Validation Qualifier	Interpreted Qualifier	Qualifier Reason
0003H-IA01SC-082421	2109043	TO15SIM	1,1,1-Trichloroethane	71-55-6	0.18	µg/m^3	U-RL	U	LB
0011H-IA01SC-082521	2109043	TO15	Tetrahydrofuran	109-99-9	2.5	µg/m^3	U-RL	U	LB
0011H-IA01SC-082521	2109043	TO15SIM	1,1,1-Trichloroethane	71-55-6	0.18	µg/m^3	U-RL	U	LB
0011H-IA01SC-082521	2109043	TO15SIM	Trichloroethene	79-01-6	0.18	µg/m^3	U-RL	U	LB
0018H-IA01SC-082421	2109043	TO15SIM	1,1,1-Trichloroethane	71-55-6	0.18	µg/m^3	U-RL	U	LB
0026H-IA01SC-082521	2109043	TO15	Carbon Disulfide	75-15-0	2.5	µg/m^3	U-RL	U	LB
0026H-IA01SC-082521	2109043	TO15SIM	Trichloroethene	79-01-6	0.17	µg/m^3	U-RL	U	LB
0037H-IA02SC-082721	2109043	TO15	1,4-Dioxane	123-91-1	1.7	µg/m^3	J	J	FD
0037H-IA02SC-082721	2109043	TO15	Carbon Disulfide	75-15-0	2.4	µg/m^3	U-RL	U	LB
0037H-IA02SC-082721	2109043	TO15SIM	1,1,1-Trichloroethane	71-55-6	0.17	µg/m^3	U-RL	U	LB
0037H-IA02SC-082721	2109043	TO15SIM	Trichloroethene	79-01-6	0.17	µg/m^3	U-RL	U	LB
0051H-AA02SC-082421	2109043	TO15SIM	1,1,1-Trichloroethane	71-55-6	0.19	µg/m^3	U-RL	U	LB
0051H-AA02SC-082421	2109043	TO15SIM	Trichloroethene	79-01-6	0.18	µg/m^3	U-RL	U	LB
0051H-IA01SC-082421	2109043	TO15	Carbon Disulfide	75-15-0	3	µg/m^3	U-RL	U	LB
0051H-IA01SC-082421	2109043	TO15SIM	1,1,1-Trichloroethane	71-55-6	0.21	µg/m^3	U-RL	U	LB
0051H-IA01SC-082421	2109043	TO15SIM	Trichloroethene	79-01-6	0.2	µg/m^3	U-RL	U	LB
0059H-IA02SC-082521	2109043	TO15SIM	1,2-Dichloroethane	107-06-2	0.14	µg/m^3	U-RL	U	LB
0059H-IA02SC-082521	2109043	TO15SIM	Tetrachloroethene	127-18-4	0.23	µg/m^3	U-RL	U	LB
0059H-IA02SC-082521	2109043	TO15SIM	Vinyl Chloride	75-01-4	0.086	µg/m^3	U-RL	U	LB
0102H-AA01SC-082421	2109043	TO15SIM	1,2-Dichloroethane	107-06-2	0.14	µg/m^3	U-RL	U	LB
0102H-AA01SC-082421	2109043	TO15SIM	Ethylbenzene	100-41-4	0.14	µg/m^3	U-RL	U	LB
0102H-AA01SC-082421	2109043	TO15SIM	o-Xylene	95-47-6	0.14	µg/m^3	U-RL	U	LB
0102H-AA01SC-082421	2109043	TO15SIM	Tetrachloroethene	127-18-4	0.23	µg/m^3	U-RL	U	LB
0102H-IA01SC-082421	2109043	TO15SIM	1,4-Dichlorobenzene	106-46-7	0.51	µg/m^3	U-RL	U	LB
0166H-IA02SC-082421	2109043	TO15SIM	1,2-Dichloroethane	107-06-2	0.14	µg/m^3	U-RL	U	LB
0166H-IA02SC-082421	2109043	TO15SIM	Ethylbenzene	100-41-4	0.15	µg/m^3	U-RL	U	LB
0166H-IA02SC-082421	2109043	TO15SIM	o-Xylene	95-47-6	0.15	µg/m^3	U-RL	U	LB
0166H-IA02SC-082421	2109043	TO15SIM	Tetrachloroethene	127-18-4	0.24	µg/m^3	U-RL	U	LB
0091H-AA01SC-083121	2109046	TO15	Carbon Disulfide	75-15-0	2.7	µg/m^3	U-RL	U	LB
0091H-AA01SC-083121	2109046	TO15	Tetrahydrofuran	109-99-9	2.6	µg/m^3	U-RL	U	LB
0091H-AA01SC-083121	2109046	TO15SIM	1,1,1-Trichloroethane	71-55-6	0.19	µg/m^3	U-RL	U	LB
0091H-AA01SC-083121	2109046	TO15SIM	Trichloroethene	79-01-6	0.19	µg/m^3	U-RL	U	LB

Table 4-1
Qualification Summary
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

Field Sample ID	Lab SDG	Method	Analyte	CAS #	Final Result	Unit	Validation Qualifier	Interpreted Qualifier	Qualifier Reason
0091H-IA04SC-083121	2109046	TO15	Carbon Disulfide	75-15-0	2.5	µg/m^3	U-RL	U	LB
0091H-IA04SC-083121	2109046	TO15SIM	1,1,1-Trichloroethane	71-55-6	0.18	µg/m^3	U-RL	U	LB
FD01-IA082721	2109046	TO15	1,4-Dioxane	123-91-1	0.25	µg/m^3	J	J	FD
FD01-SG082721	2109046	TO15SIM	Benzene	71-43-2	0.67	µg/m^3	U-RL	U	LB
FD01-SG082721	2109046	TO15SIM	m,p-Xylene	179601-23-1	0.73	µg/m^3	U-RL	U	LB
FD01-SG082721	2109046	TO15SIM	Toluene	108-88-3	0.8	µg/m^3	U-RL	U	LB
FD02-IA083121	2109046	TO15	Carbon Disulfide	75-15-0	2.1	µg/m^3	U-RL	U	LB
RG01-SG082721	2109046	TO15SIM	Benzene	71-43-2	0.7	µg/m^3	U-RL	U	LB
RG01-SG082721	2109046	TO15SIM	m,p-Xylene	179601-23-1	0.76	µg/m^3	U-RL	U	LB
RG01-SG082721	2109046	TO15SIM	Toluene	108-88-3	0.83	µg/m^3	U-RL	U	LB
RG04-SG082721	2109046	TO15SIM	Benzene	71-43-2	0.25	µg/m^3	U-RL	U	LB
RG04-SG082721	2109046	TO15SIM	m,p-Xylene	179601-23-1	0.27	µg/m^3	U-RL	U	LB
RG04-SG082721	2109046	TO15SIM	O-Xylene	95-47-6	0.14	µg/m^3	U-RL	U	LB
RG04-SG082721	2109046	TO15SIM	Toluene	108-88-3	0.3	µg/m^3	U-RL	U	LB
RG07-SG082721	2109046	TO15	Tetrahydrofuran	109-99-9	2.6	µg/m^3	U-RL	U	LB
RG07-SG082721	2109046	TO15SIM	Benzene	71-43-2	0.28	µg/m^3	U-RL	U	LB
RG07-SG082721	2109046	TO15SIM	Toluene	108-88-3	0.32	µg/m^3	U-RL	U	LB
RG07-SG082721	2109046	TO15SIM	Trichloroethene	79-01-6	0.18	µg/m^3	U-RL	U	LB
RG08-SG083021	2109046	TO15	1,3-Butadiene	106-99-0	5.3	µg/m^3	UJ	UJ	ICV
RG08-SG083021	2109046	TO15	Acetone	67-64-1	57	µg/m^3	U-RL	U	LB
RG08-SG083021	2109046	TO15	Toluene	108-88-3	9	µg/m^3	U-RL	U	LB

Acronyms:

µg/m^3 - micrograms per cubic meter
CAS - Chemical Abstract Service
EPA - U.S. Environmental Protection Agency
FD - field duplicate criteria
ICV - initial calibration verification criteria
ID - identification
LB - laboratory blank criteria
J - estimated
SDG - sample delivery group
TO-15 - Modified EPA Method TO-15 for volatile organic compounds
TO-15 SIM - Modified EPA Method TO-15 for volatile organic compounds by selective ion monitoring (SIM)
U - nondetect
UJ - estimated nondetect
U-RL - nondetect at the reporting limit value

Section 5
Data Quality Indicators

This section summarizes the validation performed and the overall quality of the data. The validation reports are provided in **Attachment 1**.

Achievement of the DQO regarding data usability was determined by the use of DQIs, expressed in terms of PARCCS. The DQIs provide a mechanism to measure and evaluate data quality throughout the project. These criteria are defined in **Table 5-1** and in the following subsections.

5.1 Precision

Precision is a quantitative term that estimates the reproducibility of a set of replicate measurements under a given set of conditions. It is defined as a measurement of mutual agreement between measurements of the same property and is expressed in terms of relative percent difference (RPD) between duplicate determinations.

RPD is calculated as follows:

$$\mathbf{RPD = absolute\ value\ [(C1 - C2)/\{(C1 + C2)/2)\}] \times 100\%}$$

Where:

C1 = concentration of primary sample
C2 = concentration of duplicate sample

Field and analytical precision were determined from review of the field duplicate results, LCS/laboratory control sample duplicates (LCSDs), and laboratory duplicates. The duplicate sample results were compared after calculating their RPDs. Field duplicate samples were collected in the same manner as the normal field samples but collected in separate individual containers, given separate sample identifiers, and treated as unique samples by the laboratory.

Table 5-2 presents the field duplicate sample results for the air data. A control limit of 40 percent (%) RPD was used for both the soil gas and indoor air field duplicate samples when both sample concentrations were greater than five times the MRL. If the sample concentrations were below five times the MRL, the absolute difference between the sample results was calculated, and if that value was below the MRL, no qualification was required. Laboratory RPDs are specific to the QC parameter. RPD results are summarized below:

- Field duplicate RPDs or absolute criteria results were within control limits except for 1,4-dioxane in field duplicate pair 0037H-IA02SC-082721/FD01-IA082721. The 1,4-dioxane results for these samples were qualified as estimated "J."
- LCS/LCSD RPDs were within control limits.
- Laboratory duplicate RPDs or absolute criteria were within control limits.

No field or laboratory issues were identified from the RPD results outside criteria; the exceedances are reasonable for this type of sampling activity.

5.2 Accuracy

Accuracy is the degree of agreement of a measurement with an accepted reference or true value and is a measure of the bias in a system. Two different metrics are evaluated to assess result accuracy: calculation of percent recovery (%R) for spiked analytes with known concentrations, and review of blank results for cross-contamination.

5.2.1 Percent Recovery

Accuracy of the data was assessed by comparing recoveries of LCSs, calibration standards, surrogates, and internal standards. Accuracy is expressed as %R, which is calculated as:

$$\text{Percent Recovery} = \frac{([\text{Total Analyte Found}] - [\text{Analyte Originally Present}]) \times 100}{[\text{Analyte Added}]}$$

Analytical accuracy for the entire data collection activity is difficult to measure because several sources of error exist. Errors can be introduced by any of the following:

- Sampling procedure and duration of sampling
- Field contamination
- Sample preservation and handling
- Sample matrix
- Sample preparation
- Analytical techniques

Accuracy is maintained by adhering to the laboratory methods and approved field and analytical standard operating procedures.

The following is a summary of the accuracy parameters reviewed and the resulting qualifications for the data collected:

LCS/LCSD %Rs

- LCS/LCSD %Rs were within criteria.

Calibration %Rs, Percent Differences, and Relative Standard Deviations

The following SDG had one or more calibration %Rs, percent differences (%Ds), and or relative standard deviations (RSDs) outside of criteria. The associated analytes were qualified as estimated:

- SDG 2109046: 1,3-butadiene (69.91 %R) – associated results qualified as estimated "J/UJ"

Surrogates, Tunes, Internal Standards

- Surrogate results were within criteria
- Tune results were within criteria
- Internal standard results were within criteria

Sample preservation, sample handling, holding times, canister pressure, and canister certification are additional measures of accuracy of the data. All sample handling information, holding times, canister pressure readings, and canister certification results were acceptable for the indoor, ambient air, and soil gas air samples.

5.2.2 Blank Contamination

Blanks are used to determine the level of laboratory and field contamination introduced into the samples, independent of the level of target analytes found in the sample source. Sources of sample contamination can include the containers and equipment used to collect the sample, preservatives added to the sample, laboratory sample storage refrigerators, standards and solutions used to calibrate instruments, glassware and reagents used to process samples, airborne contamination in the laboratory preparation area, and the analytical instrument sample introduction equipment. Each analyte group has its own particular suite of common laboratory contaminants. Active measures must be performed to continually measure the ambient contamination level, and steps must be taken to discover the source of the contamination to eliminate or minimize the levels. Random spot contamination can also occur from analytes that are not common laboratory problems but arise as a problem for a specific project or over a short period. Field blanks, equipment blanks, trip blanks, and laboratory method blanks are analyzed to identify possible sources of contamination. No field blanks or trip blanks were required to be collected during the August 2021 sampling event per the QAPP (CDM Smith 2020a); laboratory blanks were collected as specified.

Validation actions were required as a result of laboratory blank contamination for the following (associated sample results were qualified as nondetect "U" at the MRL):

- SDG 2109043 – 1,1,1-trichloroethane, tetrahydrofuran, trichloroethene, carbon disulfide, 1,2-dichloroethane, tetrachloroethene, vinyl chloride, ethylbenzene, o-xylene, and 1,4-dichlorobenzene
- SDG 2109046 – carbon disulfide, tetrahydrofuran, 1,1,1-trichloroethane, trichloroethene, benzene, m,p-xylene, toluene, o-xylene, and acetone

Blank samples are used to determine the validity of the analytical results by determining the existence and magnitude of contamination resulting from laboratory (or field) activities or baseline drift during analysis. Ideally, no contaminants should be found in blank samples; however, the analytes detected in laboratory blanks are common in laboratory analyses and are almost unavoidable.

For this sampling event, analytes were detected in some of the laboratory blank samples at concentrations below the MRLs for all detected blank results.

Associated sample results for the laboratory blanks were therefore qualified following the appropriate guidelines. The resulting sample qualifications as nondetect or "U" do not falsely diminish the identification of Site-related contaminants (i.e., do not affect DQOs).

5.3 Representativeness

Representativeness is a qualitative term that expresses the degree to which the sample data accurately and precisely represent the environmental conditions corresponding to the location and/or depth interval of sample collection. Requirements and procedures for sample collection were designed to maximize sample representativeness.

Representativeness can be monitored by reviewing field documentation and/or performing field audits. For this report, a detailed review was performed on the COC and field data collection forms. Appropriate laboratory QA/QC requirements were described in the QAPP (CDM Smith 2020a) and laboratory statement of work to confirm laboratory analytical results are representative of true field conditions.

Field sampling representativeness was attained through strict adherence to the sampling design (CDM Smith 2020b, 2021) and the approved QAPP (CDM Smith 2020a) procedures and by using EPA-approved analytical methods for sample analyses. As a result, the data represents as near as possible the actual field conditions at the time of sampling.

Representativeness, as defined above, was met for the fieldwork and laboratory analyses. The data collected are suitable for project use.

5.4 Comparability

Comparability is a qualitative term that expresses the confidence with which a data set can be compared with another. Strict adherence to standard sample collection procedures and analytical methods with analytical detection limits specified is necessary so that data from similar samples and sample conditions are comparable. This comparability is independent of laboratory personnel, data reviewers, or sampling personnel. Comparability criteria are met for the project if, based on data review, the sample collection and analytical procedures used are similar and are determined to have been followed.

To achieve comparability of data generated for the Site, Wasatch Environmental, on behalf of CDM Smith followed the standard sample collection procedures and Eurofins followed the EPA-approved analytical methods and required reporting units. Using such procedures and methods enables the current data to be comparable to future data sets generated with similar methods and units.

5.5 Completeness

Completeness of the field program is defined as the percentage of samples planned for collection, as listed in the *Phase 2 Remedial Investigation Work Plan, Operable Unit 1, 700 South 1600 East PCE Plume Site* (RIWP; CDM Smith 2020b) and planning memorandum (CDM Smith 2021) versus the actual number of samples collected during the field program (see equation A).

Completeness for acceptable data is defined as the percentage of acceptable data obtained judged to be valid versus the total quantity of data generated (see equation B). Acceptable data include both data that pass all the QC criteria (unqualified data) and data that may not pass all the QC criteria but had appropriate corrective actions taken (qualified but usable data).

A. $$\%\text{Completeness} = Cx\frac{100}{n}$$

Where:

C = actual number of samples collected
n = total number of samples planned

B. $$\%\text{Completeness} = Vx\frac{100}{n'}$$

Where:

V = number of measurements judged valid
n' = total number of measurements made

The overall completeness goal for this sampling event of 90 percent (%) was met:

- All samples outlined in the RIWP (CDM Smith 2020b) and planning memorandum (CDM Smith 2021) were collected and analyzed as planned to meet specific sampling activity objectives.
- The locations that were sampled are adequate for evaluating the extent of subsurface VOC impacts at the Site to meet DQOs.
- The number of samples planned to be collected versus the number of samples collected was 100% which meets the DQO of 90%.
- The number of measurements judged to be valid versus the total number of measurements made was over 98% which meets the DQO of 90%.
- Of the data validated and reported, 100% are suitable for their intended use for site characterization with the appropriate qualifiers applied. No results were rejected and all data collected met the overall project objective for data usability.

The data usability DQO was achieved; the data reported are suitable for their intended use as stated in the QAPP (CDM Smith 2020a) and RIWP (CDM Smith 2020b). The achievement of the completeness goals provides sufficient data for project decisions.

5.6 Sensitivity

Sensitivity is related to the ability to compare analytical results with project-specific levels of interest such as delineation levels or action levels. Analytical quantitation limits for the various sample analytes should be below the level of interest to allow an effective comparison.

The MDL study attempts to answer the question, “What is the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte

concentration is greater than zero?" The study is based upon repetitive analysis of an interference-free sample spiked with a known amount of the target analyte. The MDL is a measure of the ability of the test procedure to generate a positive response for the target analyte in the absence of any other interferences from the sample.

The MRL is generally defined as the lowest concentration at which an analyte can be confidently reported in a sample and its concentration reported with a reasonable degree of accuracy and precision. For samples that do not pose a particular matrix problem, the MRL is typically about three to five times higher than the MDL.

Laboratory results are reported according to rules that provide established certainty of detection. The result for an analyte is flagged with a "U" if that analyte was not detected and reported at the MRL value or qualified with a "J" flag if associated QC results fall outside the appropriate QC criteria. Additionally, if an analyte is present at a concentration between the MDL and the MRL, the analytical result is flagged with a "J," indicating an estimated quantity. Qualifying the result as an estimated concentration reflects uncertainty in the reported value.

When required, dilutions were performed and accounted for in the reported MRLs. Because of these required dilutions, some nondetect MRL values exceeded the soil gas risk-based screening levels for a few of the soil gas samples. These included 1,1,2,2-tetrachloroethane, 1,2-dibromoethane, and bromodichloromethane.

For some of the indoor air samples, nondetect results were greater than the indoor air risk-based screening levels, which included 1,2-dibromoethane, and bromodichloromethane. However, these analytes are not known constituents of potential concern for the Site. All MRLs were below the Indoor Air Tier 1 and Tier 2 Removal Action Levels.

In the situation where the MRL was above a screening level, the MDL was below the screening value for almost all analytes (based on dilutions), and as detected results are qualified as estimated between the MDL and MRL, no exceedances of the screening levels occurred for the majority of these results. For the remaining analytes, laboratory MRLs were low enough to compare with the project criteria stated in the laboratory statement of work and the QAPP (CDM Smith 2020a).

Table 5-1 DQIs and Corresponding QC Parameters

Data Quality Indicator	QC Parameter Evaluation in Data Review/Validation
Precision	RPD values of: 1) Laboratory duplicates 2) Field duplicates 3) LCS/LCSDs RSD values of: 1) Initial calibration verifications
Accuracy/Bias	%R or %D values of: 1) LCS/LCSD %R 2) Initial calibration verification/continuing calibration verification %R 3) Tune check 4) Surrogates 5) Internal standards Results of: 1) Instrument and calibration blanks 2) Method (preparation) blanks 3) Field blanks
Representativeness	Results of all blanks Adherence to field standard operating procedures Sample integrity (COC and sample receipt forms) Holding times
Comparability	Similar reporting limits and units Similar sample collection methods Similar laboratory analytical methods
Completeness	Data qualifiers Laboratory deliverables Requested/reported valid results Field sample collection (primary and QC samples) Contract compliance (i.e., method and instrument QC within limits)
Sensitivity	Sample method reporting limits meet QAPP criteria Adequacy of sample dilution

Table 5-2
Summary of Field Duplicate Sampling Results
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

		Location	0037H		0037H		RPD/Abs	0091H		0091H		RPD/Abs
		Sample Name	0037H-IA02SC-082721		FD01-IA082721			0091H-IA04SC-083121		FD02-IA083121		
		Sample Date	8/27/2021		8/27/2021			8/31/2021		8/31/2021		
		Sample Type	N		FD			N		FD		
Method	Analyte	Unit	Result	Qualifier	Result	Qualifier	RPD	Result	Qualifier	Result	Qualifier	RPD
TO-15	1,1,2-Trichlorotrifluoroethane	µg/m^3	0.46	J	0.41	J	Abs Criteria	0.43	J	0.48	J	Abs Criteria
TO-15	1,2,4-Trichlorobenzene	µg/m^3	5.8	U	6	U	NC	6	U	5	U	NC
TO-15	1,2,4-Trimethylbenzene	µg/m^3	5.4		5.2		3.77	0.51	J	0.49	J	Abs Criteria
TO-15	1,2-Dichlorobenzene	µg/m^3	0.94	U	0.98	U	NC	0.98	U	0.82	U	NC
TO-15	1,2-Dichloropropane	µg/m^3	0.72	U	0.084	J	Abs Criteria	0.11	J	0.12	J	Abs Criteria
TO-15	1,3,5-Trimethylbenzene	µg/m^3	1.2		1.3		Abs Criteria	0.8	U	0.67	U	NC
TO-15	1,3-Butadiene	µg/m^3	0.12	J	0.12	J	Abs Criteria	0.36	U	0.3	U	NC
TO-15	1,3-Dichlorobenzene	µg/m^3	0.94	U	0.98	U	NC	0.98	U	0.82	U	NC
TO-15	1,4-Dioxane	µg/m^3	1.7	J	0.25	J	Abs Criteria	0.28	J	0.25	J	Abs Criteria
TO-15	2,2,4-Trimethylpentane	µg/m^3	40		40		0.00	0.58	J	0.63	J	Abs Criteria
TO-15	2-Butanone (MEK)	µg/m^3	3.9		4.3		Abs Criteria	14		14		0.00
TO-15	2-Hexanone	µg/m^3	3.2	U	0.42	J	Abs Criteria	3.3	U	2.8	U	NC
TO-15	4-Ethyltoluene	µg/m^3	3.7		3.9		Abs Criteria	0.32	J	0.33	J	Abs Criteria
TO-15	4-Methyl-2-Pentanone (MIBK)	µg/m^3	1.6		1.6		Abs Criteria	0.93		0.96		Abs Criteria
TO-15	Acetone	µg/m^3	78		83		6.21	88		77		13.33
TO-15	Allyl Chloride	µg/m^3	2.4	U	2.6	U	NC	2.6	U	2.1	U	NC
TO-15	Benzyl Chloride	µg/m^3	0.81	U	0.84	U	NC	0.84	U	0.7	U	NC
TO-15	Bromodichloromethane	µg/m^3	0.57	J	0.59	J	Abs Criteria	0.68	J	0.7	J	Abs Criteria
TO-15	Bromoform	µg/m^3	1.6	U	1.7	U	NC	1.7	U	1.4	U	NC
TO-15	Bromomethane	µg/m^3	3	U	3.2	U	NC	3.2	U	2.6	U	NC
TO-15	Carbon Disulfide	µg/m^3	2.4	U	0.78	J	Abs Criteria	2.5	U	2.1	U	NC
TO-15	Chlorobenzene	µg/m^3	0.72	U	0.75	U	NC	0.75	U	0.63	U	NC
TO-15	cis-1,3-Dichloropropene	µg/m^3	0.71	U	0.74	U	NC	0.74	U	0.62	U	NC
TO-15	Cyclohexane	µg/m^3	2.5	J	2.4	J	Abs Criteria	0.32	J	0.32	J	Abs Criteria
TO-15	Dibromochloromethane	µg/m^3	1.3	U	1.4	U	NC	0.18	J	0.2	J	Abs Criteria
TO-15	Ethanol	µg/m^3	350	J	350	J	0.00	630	J	600	J	4.88
TO-15	Hexachloro-1,3-Butadiene	µg/m^3	8.4	U	8.7	U	NC	8.7	U	7.2	U	NC
TO-15	Hexane	µg/m^3	8.6		8.5		Abs Criteria	0.89	J	0.86	J	Abs Criteria
TO-15	Isopropyl Alcohol (Manufacturing-Strong Acid)	µg/m^3	75		71		5.48	23		20		13.95
TO-15	Isopropylbenzene	µg/m^3	0.41	J	0.39	J	Abs Criteria	0.8	U	0.67	U	NC

Table 5-2
Summary of Field Duplicate Sampling Results
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

		Location	0037H		0037H		RPD/Abs	0091H		0091H		RPD/Abs
		Sample Name	0037H-IA02SC-082721		FD01-IA082721			0091H-IA04SC-083121		FD02-IA083121		
		Sample Date	8/27/2021		8/27/2021			8/31/2021		8/31/2021		
		Sample Type	N		FD			N		FD		
TO-15	Methylene Chloride	µg/m³	2.7	U	2.8	U	NC	1.1	J	0.8	J	Abs Criteria
TO-15	N-Heptane	µg/m³	6.5		6.5		Abs Criteria	0.73	J	0.77	J	Abs Criteria
TO-15	N-Propylbenzene	µg/m³	0.83		0.87		Abs Criteria	0.8	U	0.67	U	NC
TO-15	Styrene	µg/m³	1.5		1.5		Abs Criteria	1.1		1.3		Abs Criteria
TO-15	Tetrahydrofuran	µg/m³	2.3	U	0.34	J	Abs Criteria	15		14		6.90
TO-15	Trans-1,3-Dichloropropene	µg/m³	0.71	U	0.74	U	NC	0.74	U	0.62	U	NC
TO-15	Trichlorofluoromethane	µg/m³	1.2		1.3		Abs Criteria	1.4		1.4		Abs Criteria
TO-15 SIM	1,1,1-Trichloroethane	µg/m³	0.17	U	0.082	J	Abs Criteria	0.18	U	0.15		Abs Criteria
TO-15 SIM	1,1,2,2-Tetrachloroethane	µg/m³	0.22	U	0.22	U	NC	0.22	U	0.19	U	NC
TO-15 SIM	1,1,2-Trichloroethane	µg/m³	0.17	U	0.18	U	NC	0.18	U	0.15	U	NC
TO-15 SIM	1,1-Dichloroethane	µg/m³	0.14		0.14		Abs Criteria	0.13	U	0.11	U	NC
TO-15 SIM	1,1-Dichloroethene	µg/m³	0.062	U	0.065	U	NC	0.065	U	0.054	U	NC
TO-15 SIM	1,2-Dibromoethane	µg/m³	0.6	U	0.63	U	NC	0.63	U	0.52	U	NC
TO-15 SIM	1,2-Dichloroethane	µg/m³	7		7.2		2.82	0.4		0.4		Abs Criteria
TO-15 SIM	1,2-Dichlorotetrafluoroethane;Fluorocarbon 114	µg/m³	0.11	J	0.11	J	Abs Criteria	0.1	J	0.11	J	Abs Criteria
TO-15 SIM	1,4-Dichlorobenzene	µg/m³	0.47	U	0.49	U	NC	0.13	J	0.12	J	Abs Criteria
TO-15 SIM	Benzene	µg/m³	3.7		3.7		0.00	0.83		0.8		Abs Criteria
TO-15 SIM	Carbon Tetrachloride	µg/m³	0.55		0.59		Abs Criteria	0.77		0.76		Abs Criteria
TO-15 SIM	Chloroethane	µg/m³	0.074	J	0.061	J	Abs Criteria	0.062	J	0.056	J	Abs Criteria
TO-15 SIM	Chloroform	µg/m³	3.2		3.3		3.08	3.8		3.8		0.00
TO-15 SIM	Chloromethane	µg/m³	1.3	J	1.3	J	Abs Criteria	1.2	J	1.2	J	Abs Criteria
TO-15 SIM	Cis-1,2-Dichloroethene	µg/m³	0.12	U	0.13	U	NC	0.13	U	0.11	U	NC
TO-15 SIM	Dichlorodifluoromethane	µg/m³	2.2		2.3		4.44	2.3		2.2		4.44
TO-15 SIM	Ethylbenzene	µg/m³	3.8		3.9		2.60	0.66		0.76		Abs Criteria
TO-15 SIM	m,p-Xylene	µg/m³	16		17		6.06	1.9		2.3		19.05
TO-15 SIM	Methyl Tert-Butyl Ether	µg/m³	0.026	J	0.59	U	NC	0.59	U	0.49	U	NC

Table 5-2
Summary of Field Duplicate Sampling Results
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

		Location	0037H		0037H		RPD/Abs	0091H		0091H		RPD/Abs
		Sample Name	0037H-IA02SC-082721		FD01-IA082721			0091H-IA04SC-083121		FD02-IA083121		
		Sample Date	8/27/2021		8/27/2021			8/31/2021		8/31/2021		
		Sample Type	N		FD			N		FD		
TO-15 SIM	o-Xylene	µg/m^3	5.6		5.7		1.77	0.72		0.88		20.00
TO-15 SIM	Tetrachloroethene	µg/m^3	4.2		4.2		0.00	16		17		6.06
TO-15 SIM	Toluene	µg/m^3	33		33		0.00	3.7		3.8		2.67
TO-15 SIM	Trans-1,2-Dichloroethene	µg/m^3	0.024	J	0.054	J	Abs Criteria	0.072	J	0.033	J	Abs Criteria
TO-15 SIM	Trichloroethene	µg/m^3	0.17	U	0.052	J	Abs Criteria	0.38		0.39		Abs Criteria
TO-15 SIM	Vinyl Chloride	µg/m^3	0.08	U	0.083	U	NC	0.083	U	0.07	U	NC

Acronyms

µg/m^3 - microgram per cubic meter
EPA - United States Environmental Protection Agency
FD - field duplicate
J - estimated
N - normal sample
NC - not calculated
RPD - relative percent difference
U - nondetect
UJ - estimated nondetect result
Abs Criteria - Sample concentrations less than 5x the method reporting limit; absolute difference (Abs) between the normal result and field duplicate result less than the method reporting limit

Yellow Highlighting - Sample results greater than 5x the method reporting limit. Abs difference between the normal sample and field duplicate sample is greater than the method reporting limit

TO-15 - Modified EPA Method TO-15 for volatile organic compounds
TO-15 SIM - Modified EPA Method TO-15 for volatile organic compounds by selective

Table 5-2
Summary of Field Duplicate Sampling Results
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

		Location	RG-01		RG-01		RPD/Abs
		Sample Name	RG01-SG082721		FD01-SG082721		
		Sample Date	8/27/2021		8/27/2021		
		Sample Type	N		FD		
Method	Analyte	Unit	Result	Qualifier	Result	Qualifier	RPD
TO-15	1,1,2-Trichlorotrifluoroethane	µg/m^3	0.47	J	0.47	J	Abs Criteria
TO-15	1,2,4-Trichlorobenzene	µg/m^3	16	U	16	U	NC
TO-15	1,2,4-Trimethylbenzene	µg/m^3	2.2	U	2.1	U	NC
TO-15	1,2-Dichlorobenzene	µg/m^3	2.6	U	2.5	U	NC
TO-15	1,2-Dichloropropane	µg/m^3	2	U	2	U	NC
TO-15	1,3,5-Trimethylbenzene	µg/m^3	2.2	U	2.1	U	NC
TO-15	1,3-Butadiene	µg/m^3	0.97	U	0.93	U	NC
TO-15	1,3-Dichlorobenzene	µg/m^3	2.6	U	2.5	U	NC
TO-15	1,4-Dioxane	µg/m^3	1.6	U	1.5	U	NC
TO-15	2,2,4-Trimethylpentane	µg/m^3	10	U	9.8	U	NC
TO-15	2-Butanone (MEK)	µg/m^3	12		12		0.00
TO-15	2-Hexanone	µg/m^3	2.2	J	2.2	J	Abs Criteria
TO-15	4-Ethyltoluene	µg/m^3	2.2	U	2.1	U	NC
TO-15	4-Methyl-2-Pentanone (MIBK)	µg/m^3	0.93	J	1.3	J	Abs Criteria
TO-15	Acetone	µg/m^3	60		74		20.90
TO-15	Allyl Chloride	µg/m^3	6.9	U	6.6	U	NC
TO-15	Benzyl Chloride	µg/m^3	2.3	U	2.2	U	NC
TO-15	Bromodichloromethane	µg/m^3	2.9	U	2.8	U	NC
TO-15	Bromoform	µg/m^3	4.5	U	4.4	U	NC
TO-15	Bromomethane	µg/m^3	8.5	U	8.2	U	NC
TO-15	Carbon Disulfide	µg/m^3	5.1	J	4.7	J	Abs Criteria
TO-15	Chlorobenzene	µg/m^3	2	U	1.9	U	NC
TO-15	cis-1,3-Dichloropropene	µg/m^3	2	U	1.9	U	NC
TO-15	Cyclohexane	µg/m^3	7.6	U	7.3	U	NC
TO-15	Dibromochloromethane	µg/m^3	3.7	U	3.6	U	NC
TO-15	Ethanol	µg/m^3	6.5	J	3.6	J	Abs Criteria
TO-15	Hexachloro-1,3-Butadiene	µg/m^3	23	U	22	U	NC
TO-15	Hexane	µg/m^3	7.8	U	7.4	U	NC
TO-15	Isopropyl Alcohol (Manufacturing-Strong Acid)	µg/m^3	5.3	J	5.2		Abs Criteria
TO-15	Isopropylbenzene	µg/m^3	2.2	U	2.1	U	NC

Table 5-2
Summary of Field Duplicate Sampling Results
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

		Location	RG-01		RG-01		RPD/Abs
		Sample Name	RG01-SG082721		FD01-SG082721		
		Sample Date	8/27/2021		8/27/2021		
		Sample Type	N		FD		
TO-15	Methylene Chloride	µg/m^3	7.6	U	7.3	U	NC
TO-15	N-Heptane	µg/m^3	9	U	8.6	U	NC
TO-15	N-Propylbenzene	µg/m^3	2.2	U	2.1	U	NC
TO-15	Styrene	µg/m^3	1.9	U	1.8	U	NC
TO-15	Tetrahydrofuran	µg/m^3	6.5	U	6.2	U	NC
TO-15	Trans-1,3-Dichloropropene	µg/m^3	2	U	1.9	U	NC
TO-15	Trichlorofluoromethane	µg/m^3	3		2.9		Abs Criteria
TO-15 SIM	1,1,1-Trichloroethane	µg/m^3	3.3		3.2		3.08
TO-15 SIM	1,1,2,2-Tetrachloroethane	µg/m^3	0.6	U	0.58	U	NC
TO-15 SIM	1,1,2-Trichloroethane	µg/m^3	0.48	U	0.46	U	NC
TO-15 SIM	1,1-Dichloroethane	µg/m^3	0.36	U	0.34	U	NC
TO-15 SIM	1,1-Dichloroethene	µg/m^3	0.17	U	0.17	U	NC
TO-15 SIM	1,2-Dibromoethane	µg/m^3	1.7	U	1.6	U	NC
TO-15 SIM	1,2-Dichloroethane	µg/m^3	0.36	U	0.34	U	NC
TO-15 SIM	1,2-Dichlorotetrafluoroethane;Fluorocarbon 114	µg/m^3	0.16	J	0.15	J	Abs Criteria
TO-15 SIM	1,4-Dichlorobenzene	µg/m^3	1.3	U	1.3	U	NC
TO-15 SIM	Benzene	µg/m^3	0.7	U	0.67	U	NC
TO-15 SIM	Carbon Tetrachloride	µg/m^3	0.27	J	0.27	J	Abs Criteria
TO-15 SIM	Chloroethane	µg/m^3	0.21	J	0.21	J	Abs Criteria
TO-15 SIM	Chloroform	µg/m^3	6.9		6.8		1.46
TO-15 SIM	Chloromethane	µg/m^3	4.5	U	4.4	U	NC
TO-15 SIM	Cis-1,2-Dichloroethene	µg/m^3	0.35	U	0.33	U	NC
TO-15 SIM	Dichlorodifluoromethane	µg/m^3	12		12		0.00
TO-15 SIM	Ethylbenzene	µg/m^3	0.38	U	0.37	U	NC
TO-15 SIM	m,p-Xylene	µg/m^3	0.76	U	0.73	U	NC
TO-15 SIM	Methyl Tert-Butyl Ether	µg/m^3	1.6	U	1.5	U	NC

Table 5-2
Summary of Field Duplicate Sampling Results
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

		Location	RG-01		RG-01		RPD/Abs
		Sample Name	RG01-SG082721		FD01-SG082721		
		Sample Date	8/27/2021		8/27/2021		
		Sample Type	N		FD		
TO-15 SIM	o-Xylene	µg/m^3	0.38	U	0.37	U	NC
TO-15 SIM	Tetrachloroethene	µg/m^3	320		310		3.17
TO-15 SIM	Toluene	µg/m^3	0.83	U	0.8	U	NC
TO-15 SIM	Trans-1,2-Dichloroethene	µg/m^3	1.7	U	1.7	U	NC
TO-15 SIM	Trichloroethene	µg/m^3	0.84		0.83		Abs Criteria
TO-15 SIM	Vinyl Chloride	µg/m^3	0.22	U	0.22	U	NC

Acronyms

µg/m^3 - microgram per cubic meter
EPA - United States Environmental Protection Agency
FD - field duplicate
J - estimated
N - normal sample
NC - not calculated
RPD - relative percent difference
U - nondetect
UJ - estimated nondetect result
Abs Criteria - Sample concentrations less than 5x the method reporting limit; absolute difference (Abs) between the normal result and field duplicate result less than the method reporting limit

Yellow Highlighting - Sample results greater than 5x the method reporting limit. Abs difference between the normal sample and field duplicate sample is greater than the method reporting limit

TO-15 - Modified EPA Method TO-15 for volatile organic compounds
TO-15 SIM - Modified EPA Method TO-15 for volatile organic compounds by selective

Section 6

Data Usability Assessment

One hundred percent of the data reported and validated in this QCSR are suitable for their intended use as stated in the QAPP (CDM Smith 2020a). Sample results that were qualified as estimated are usable for project decisions. No sample results were rejected.

The achievement of the completeness goals for the number of samples collected and the number of sample results acceptable for use provides sufficient quality data to support project decisions.

Section 7
References

CDM Smith. 2020a. *Phase 2 Quality Assurance Project Plan, Operable Unit 1, 700 South 1600 East PCE Plume Site, Salt Lake City, Utah.* Prepared for the U.S. Army Corps of Engineers Kansas City District.

CDM Smith. 2020b. *Phase 2 Remedial Investigation Work Plan, Operable Unit 1, 700 South 1600 East PCE Plume Site, Salt Lake City, Utah*. Prepared for the U.S. Army Corps of Engineers Kansas City District.

CDM Smith. 2021. *Plan for Soil Vapor Probe Sampling and Indoor Air Sampling at Buildings 6 and 7, 700 South 1600 East PCE Plume Site, Salt Lake City, Utah*. Memorandum prepared for the U.S. Army Corps of Engineers Kansas City District.

EPA. 2017. *National Functional Guidelines for Organic Superfund Methods Data Review*. EPA-540-R-2017-002.

EPA. 2014. EPA's *Analysis of Volatile Organic Compounds (VOCs) in Air Contained in Canisters by Method TO-15*.

Attachment 1

Data Validation Reports

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number:	2109043
Laboratory:	Eurofins Air Toxics
Matrix:	Air
Collection date:	8/24/2021 8/25/2021 8/27/2021
Analysis/Methods:	Volatile Organic Compounds - EPA Method TO-15 Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number	Sample Number	Laboratory Number
0051H-AA02SC-082421	2109043-01 A/B	0102H-AA01SC-082421	2109043-07B
0051H-IA01SC-082421	2109043-02B	0059H-IA02SC-082521	2109043-08B
0018H-IA01SC-082421	2109043-03B	0011H-IA01SC-082521	2109043-09B
0003H-IA01SC-082421	2109043-04B	0011H-AA02SC-082521	2109043-10B
0166H-IA02SC-082421	2109043-05B	0026H-IA01SC-082521	2109043-11B
0102H-IA01SC-082421	2109043-06B	0037H-IA02SC-082721	2109043-12B

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:

	Yes	No	N/A
Are the field duplicate relative percent differences (RPDs) ≤40%?		**No**	
Laboratory Control Spike Duplicate RPDs within limits?	**Yes**		
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Were the Laboratory Duplicate RPDs within limits?	**Yes**		

Comments (note deviations):

Field Duplicates	**TO-15 / SIM**	**Sample (ug/m3)**	**Duplicate (ug/m3)**	**%RPD**	**Qualifiers**	**Associated Samples**
		0037H-IA02SC-082721 (2109043-12)	FD01-IA082721** (2109046-04)	NC	**J**	**2109046-04 & 2109043-12**
	1,4-Dioxane	1.7 J	0.25 J			

**Results reported in SDG 2109046

LCS/LCSD	**TO-15 / SIM**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
2109043-15A / 15AA		Acceptable			
2109043-15B / 15BB		Acceptable			
2109043-15C / 15CC		Acceptable			
2109043-15D / 15DD (SIM)		Acceptable			

MS/MSD	**TO-15 / SIM**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
N/A					

Laboratory Duplicate	**Sample (ug/m^3)**	**Duplicate (ug/m^3)**	**RL**	**%RPD**	**Qualifiers**	**Associated Samples**
2109043-8AA				Acceptable		
2109043-8BB (SIM)				Acceptable		

Accuracy:	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?			**Yes**
Were the Laboratory Method Blank results all < RL?			**No**
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)			**Yes**
Was the CCV criteria met? (30%)			**Yes**
Was the Tuning criteria met?			**Yes**
Were the Surrogate % recoveries within laboratory determined control limits?			**Yes**
Were the Internal Standard areas within ± 60 - 140%?			**Yes**
Was canister certification criteria met?			**Yes**
Were sample results able to be recalculated from the laboratory raw data and were they accurate?			**Yes**
Was target compound identification correctly performed by the laboratory?			**Yes**
Were chromatograms representative of the sample results?			**Yes**

Comments (note deviations):

Blanks	**TO-15 / SIM**	**Concentration (ug/m^3)**	**MDL / RL (ug/m^3)**	**Qualifiers**	**Associated Samples**
Lab Blank					
2109043-13A	2-Propanol	0.59 J	0.11 / 1.2	None	Sample results > RL
	Acetone	0.98 J	0.39 / 2.4	None	Sample results > RL
	Carbon Disulfide	0.34 J	0.28 / 1.6	**U-RL**	**2109043-02A, 2109043-11A, 2109043-12A**
	Tetrahydrofuran	0.18 J	0.14 / 1.5	**U-RL**	**2109043-09A**
2109043-13B (SIM)	1,1,1-Trichloroethane	0.0065 J	0.0030 / 0.11	**U-RL**	**2109043-01B, 2109043-02B, 2109043-03B, 2109043-04B, 2109043-09B, 2109043-12B**
	1,2-Dibromomethane	0.010 J	0.01 / 0.38	None	Sample results nondetect
	Benzene	0.013 J	0.0091 / 0.16	None	Sample results > RL
	Toluene	0.0098 J	0.0069 / 0.19	None	Sample results > RL
	Trichloroethene	0.014 J	0.01 / 0.11	**U-RL**	**2109043-01B, 2109043-02B, 2109043-09B, 2109043-11B, 2109043-12B**
2109043-13C	1,2-Dichlorobenzene	0.11 J	0.08 / 0.6	None	Sample results nondetect
	1,3-Dichlorobenzene	0.085 J	0.061 / 0.6	None	Sample results nondetect
	Acetone	0.77 J	0.39 / 2.4	None	Sample results > RL
	alpha-Chlorotoluene	0.10 J	0.084 / 0.52	None	Sample results nondetect
2109043-13D (SIM)	1,1,2,2-Tetrachloroethane	0.065 J	0.017 / 0.14	None	Sample results nondetect
	1,1,2-Trichloroethane	0.016 J	0.01 / 0.11	None	Sample results nondetect
	1,2-Dibromoethane	0.032 J	0.01 / 0.38	None	Sample results nondetect
	1,2-Dichloroethane	0.011 J	0.0042 / 0.081	**U-RL**	**2109043-05B, 2109043-07B, 2109043-08B**
	1,4-Dichlorobenzene	0.10 J	0.04 / 0.30	**U-RL**	**2109043-06B**
	Benzene	0.015 J	0.009 / 0.16	None	Sample results > RL
	Chloroform	0.015 J	0.0077 / 0.098	None	Sample results > RL
	Ethylbenzene	0.013 J	0.0032 / 0.087	**U-RL**	**2109043-05B, 2109043-07B**
	Freon 12	0.023 J	0.0036 / 0.25	None	Sample results > RL
	m,p-xylene	0.029 J	0.0053 / 0.17	None	Sample results > RL
	o-xylene	0.020 J	0.005 / 0.087	**U-RL**	**2109043-05B, 2109043-07B**
	Tetrachloroethene	0.011 J	0.007 / 0.14	**U-RL**	**2109043-05B, 2109043-07B, 2109043-08B**
	Toluene	0.023 J	0.0069 / 0.19	None	Sample results > RL
	Vinyl Chloride	0.014 J	0.0032 / 0.05	**U-RL**	**2109043-08B**

Field Blank	**TO-15 / SIM**	**Concentration**	**MDL / RL**	**Qualifiers**	**Associated Samples**
N/A					

Surrogates	**TO-15 / SIM**	**%R**	**Limit**	**Qualifiers**	**Associated Samples**
		Acceptable			

MS/MSD	**TO-15 SIM**	**%R**	**Limits (%)**	**Qualifiers**	**Associated Samples**
N/A					

LCS/LCSD	TO-15 / SIM	%R	Limits	Qualifiers	Associated Samples
2109043-15A / 15AA		Acceptable			
2109043-15B / 15BB		Acceptable			
2109043-15C / 15CC		Acceptable			
2109043-15D / 15DD (SIM)		Acceptable			

ICV/CCV	TO-15 / SIM	%R	Qualifiers	Associated Samples
		Acceptable		

ICAL	TO-15 / SIM	RRF	%RSD	Qualifiers	Associated Samples
9/3/2021 17:38		Acceptable	Acceptable		
9/3/2021 15:49 (SIM)		Acceptable	Acceptable		

CCV	TO-15 / SIM	RRF	%D	Qualifiers	Associated Samples
9/7/2021 11:23		Acceptable	Acceptable		
9/8/2021 07:25		Acceptable	Acceptable		
9/7/2021 11:23 (SIM)		Acceptable	Acceptable		
9/8/2021 07:25 (SIM)		Acceptable	Acceptable		
9/8/2021 08:53		Acceptable	Acceptable		
9/8/2021 22:08		Acceptable	Acceptable		
9/8/2021 08:53 (SIM)		Acceptable	Acceptable		
9/8/2021 22:08 (SIM)		Acceptable	Acceptable		

Tune	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Internal Standards	TO-15 / SIM	Area %	Area % Criteria	Qualifiers	Associated Samples
	All Internal Standards	Acceptable			

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review	TO-15 / SIM	Results
Recalculated Sample Result		Acceptable

Sample #	Laboratory Reported Result (ug/m^3)	Recalculated Sample Result (ug/m^3)
TO-15		**RRF / Concentration**
2109043-04A	2-Propanol: 26	2.9265 / 26.542
2109043-04A	Freon 11: 2.4	4.28328 / 2.395
TO-15-SIM		
2109043-04B	Chloroethane: 0.037	0.7374 / 0.037
2109043-04B	Freon 12: 2.2	5.0639 / 2.173

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc. = (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification	Acceptable
Chromatogram review	Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	Yes		
Were holding times met?	Yes		
Was preservation criteria met? (0° - 6° C)			N/A
Were Chain-of-Custody records complete and provided in data package?	Yes		

Comments (note deviations):

Holding Time / Canister Pressure Criteria	**Days to Analysis**	**Criteria**	**Associated Samples**
Holding Time	Acceptable		

Initial and Final Canister Pressure Results

Canister Pressure Criteria	Acceptable

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	Yes		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	Yes		

Comments (note deviations):

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	Yes		
Do the reporting limits meet project requirements?	Yes		

Comments (note deviations):

Overall Comments: Data are usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 10/6/2021

Data Reviewer: Cherie Zakowski Date: 10/7/2021

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number: 2109046
Laboratory: Eurofins Air Toxics
Matrix: Air
Collection date: 8/27/2021 8/30/2021 8/31/2021
Analysis/Methods:

Volatile Organic Compounds - EPA Method TO-15
Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number	Sample Number	Laboratory Number
RG01-SG082721	2109046-01 A/B	0091H-IA04SC-083121	2109046-06 A/B
RG04-SG082721	2109046-02 A/B	0091H-AA01SC-083121	2109046-07 A/B
FD01-SG082721	2109046-03 A/B	FD02-IA083121	2109046-08 A/B
FD01-IA082721	2109046-04 A/B	RG08-SG083021	2109046-09A
RG07-SG082721	2109046-05 A/B		

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:

	Yes	No	N/A
Are the field duplicate relative percent differences (RPDs) ≤40%?	**Yes**		
Laboratory Control Spike Duplicate RPDs within limits?	**Yes**		
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Were the Laboratory Duplicate RPDs within limits?	**Yes**		

Comments (note deviations):

Field Duplicates	TO-15 / SIM	Sample (ug/m3)	Duplicate (ug/m3)	%RPD	Qualifiers	Associated Samples
		RG01-SG082721 (2109046-01)	FD01-SG082721 (2109046-03)	Acceptable		
		0091H-IA04SC-083121 (2109046-06)	FD02-IA083121 (2109046-08)	Acceptable		
		0037H-IA02SC-082721** (2109043-12)	FD01-IA082721 (2109046-04)	NC	**J**	**2109046-04 & 2109043-12**
	1,4-Dioxane	1.7 J	0.25 J			

** Results reported in SDG 2109043

LCS/LCSD	TO-15 / SIM	%RPD	Limits	Qualifiers	Associated Samples
2109046-12A / 12AA		Acceptable			
2109046-12B / 12BB (SIM)		Acceptable			
2109046-12C / 12CC		Acceptable			
2109046-12D / 12DD (SIM)		Acceptable			
2109046-12E / 12EE		Acceptable			

MS/MSD	TO-15 / SIM	%RPD	Limit	Qualifiers	Associated Samples
N/A					

Laboratory Duplicate	Sample (ug/m^3)	Duplicate (ug/m^3)	RL	%RPD	Qualifiers	Associated Samples
2109046-5AA				Acceptable		
2109046-5BB (SIM)				Acceptable		
2109046-9AA				Acceptable		

Accuracy:	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?			**Yes**
Were the Laboratory Method Blank results all < RL?			**No**
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)			**Yes**
Was the CCV criteria met? (30%)			**Yes**
Was the Tuning criteria met?			**Yes**
Were the Surrogate % recoveries within laboratory determined control limits?			**Yes**
Were the Internal Standard areas within ± 60 - 140%?			**Yes**
Was canister certification criteria met?			**Yes**
Were sample results able to be recalculated from the laboratory raw data and were they accurate?			**Yes**
Was target compound identification correctly performed by the laboratory?			**Yes**
Were chromatograms representative of the sample results?			**Yes**

Comments (note deviations):

Blanks	**TO-15 / SIM**	**Concentration (ug/m^3)**	**MDL / RL (ug/m^3)**	**Qualifiers**	**Associated Samples**
Lab Blank					
2109046-10A	2-Propanol	0.59 J	0.11 / 1.2	None	Sample results > RL
	Acetone	0.98 J	0.39 / 2.4	None	Sample results > RL
	Carbon Disulfide	0.34 J	0.28 / 1.6	**U-RL**	**2109046-06A, 2109046-07A, 2109046-08A**
	Tetrahydrofuran	0.18 J	0.14 / 1.5	**U-RL**	**2109046-05A, 2109046-07A**
2109046-10B (SIM)	1,1,1-Trichloroethane	0.0065 J	0.0030 / 0.11	**U-RL**	**2109046-06B, 2109046-07B**
	1,2-Dibromoethane	0.010 J	0.01 / 0.38	None	Sample results nondetect
	Benzene	0.013 J	0.0091 / 0.16	**U-RL**	**2109046-05B**
	Toluene	0.0098 J	0.0069 / 0.19	**U-RL**	**2109046-05B**
	Trichloroethene	0.014 J	0.01 / 0.11	**U-RL**	**2109046-05B, 2109046-07B**
2109046-10C	1,2-Dichlorobenzene	0.11 J	0.08 / 0.6	None	Sample results nondetect
	1,3-Dichlorobenzene	0.085 J	0.061 / 0.6	None	Sample results nondetect
	Acetone	0.77 J	0.39 / 2.4	None	Sample results > RL
	alpha-Chlorotoluene	0.10 J	0.084 / 0.52	None	Sample results nondetect
2109046-10D (SIM)	1,1,2,2-Tetrachloroethane	0.065 J	0.017 / 0.14	None	Sample results nondetect
	1,1,2-Trichloroethane	0.016 J	0.01 / 0.11	None	Sample results nondetect
	1,2-Dibromoethane	0.032 J	0.01 / 0.38	None	Sample results nondetect
	1,2-Dichloroethane	0.011 J	0.0042 / 0.081	None	Sample results nondetect or > RL
	1,4-Dichlorobenzene	0.10 J	0.04 / 0.30	None	Sample results nondetect
	Benzene	0.015 J	0.009 / 0.16	**U-RL**	**2109046-01B, 2109046-02B, 2109046-03B**
	Chloroform	0.015 J	0.0077 / 0.098	None	Sample results > RL
	Ethylbenzene	0.013 J	0.0032 / 0.087	None	Sample results nondetect or > RL
	Freon 12	0.023 J	0.0036 / 0.25	None	Sample results > RL
	m,p-xylene	0.029 J	0.0053 / 0.17	**U-RL**	**2109046-01B, 2109046-02B, 2109046-03B**
	o-xylene	0.020 J	0.005 / 0.087	**U-RL**	**2109046-02B**
	Tetrachloroethene	0.011 J	0.007 / 0.14	None	Sample results > RL
	Toluene	0.023 J	0.0069 / 0.19	**U-RL**	**2109046-01B, 2109046-02B, 2109046-03B**
	Vinyl Chloride	0.014 J	0.0032 / 0.05	None	Sample results nondetect
2109046-10E	1,2,4-Trimethylbenzene	0.11 J	0.24 / 9.8	None	Sample results nondetect
	Acetone	1.1 J	0.67 / 12	**U-RL**	**2109046-09A**
	Toluene	0.17 J	0.12 / 1.9	**U-RL**	**2109046-09A**

Field Blank	**TO-15 / SIM**	**Concentration**	**MDL / RL**	**Qualifiers**	**Associated Samples**
N/A					

Surrogates	**TO-15 / SIM**	**%R**	**Limit**	**Qualifiers**	**Associated Samples**
		Acceptable			

MS/MSD	TO-15 SIM	%R	Limits (%)	Qualifiers	Associated Samples
N/A					

LCS/LCSD	TO-15 / SIM	%R	Limits	Qualifiers	Associated Samples
2109046-12A / 12AA		Acceptable			
2109046-12B / 12BB (SIM)		Acceptable			
2109046-12C / 12CC		Acceptable			
2109046-12D / 12DD (SIM)		Acceptable			
2109046-12E / 12EE		Acceptable			

ICV/CCV	TO-15 / SIM	%R	Qualifiers	Associated Samples
	1,3-Butadiene	69.91	J / UJ	2109046-09A

ICAL	TO-15 / SIM	RRF	%RSD	Qualifiers	Associated Samples
9/3/2021 17:38		Acceptable	Acceptable		
9/3/2021 15:49 (SIM)		Acceptable	Acceptable		
6/28/2021 11:42		Acceptable	Acceptable		

CCV	TO-15 / SIM	RRF	%D	Qualifiers	Associated Samples
9/7/2021 11:23		Acceptable	Acceptable		
9/8/2021 07:25		Acceptable	Acceptable		
9/7/2021 11:23 (SIM)		Acceptable	Acceptable		
9/8/2021 07:25 (SIM)		Acceptable	Acceptable		
9/8/2021 08:53		Acceptable	Acceptable		
9/8/2021 22:08		Acceptable	Acceptable		
9/8/2021 08:53 (SIM)		Acceptable	Acceptable		
9/8/2021 22:08 (SIM)		Acceptable	Acceptable		
9/13/2021 09:32		Acceptable	Acceptable		
9/13/2021 08:16		Acceptable	Acceptable		

Tune	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Internal Standards	TO-15 / SIM	Area %	Area % Criteria	Qualifiers	Associated Samples
	All Internal Standards	Acceptable			

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review	TO-15 / SIM	Results
Recalculated Sample Result		Acceptable

Sample #	Laboratory Reported Result (ug/m^3)	Recalculated Sample Result (ug/m^3)
TO-15		**RRF / Concentration**
2109046-06A	2-Propanol: 23	2.9265 / 23.039
2109046-06A	Freon 11: 1.4	4.28330 / 1.397
TO-15-SIM		
2109046-06B	Chloroethane: 0.06	0.7369 / 0.062
2109046-06B	Freon 12: 2.30	5.0638 / 2.27

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc.= (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification	Acceptable
Chromatogram review	Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	**Yes**		
Were holding times met?	**Yes**		
Was preservation criteria met? (0° - 6° C)			**N/A**
Were Chain-of-Custody records complete and provided in data package?	**Yes**		

Comments (note deviations):

Holding Time / Canister Pressure Criteria	Days to Analysis	Criteria	Associated Samples
Holding Time	Acceptable		

Initial and Final Canister Pressure Results

Canister Pressure Criteria	Acceptable

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	**Yes**		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	**Yes**		

Comments (note deviations):

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	**Yes**		
Do the reporting limits meet project requirements?	**Yes**		

Comments (note deviations):

Overall Comments: Data are usable with appropriate qualifiers applied.

Data Validator: *Kristine Molloy* Date: *10/7/2021*

Data Reviewer: *Cherie Zakowski* Date: *10/10/2021*

Attachment 2

Data Package Completeness Review Checklists

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 2109043

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		None
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	X		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation Cherie Zakowski Date: 9/20/2021

Signature

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 2109046

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		None
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	X		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation Cherie Zakowski Date: 9/20/2021

Signature

Attachment 3

Analytical Data Packages

Note: Laboratory Data Reports removed from report and provided separately.

Quality Control Summary Report

Winter 2022 Air Sampling Event

Operable Unit 1 Remedial Investigation
700 South 1600 East PCE Plume
Salt Lake City, Utah

July 2022

CDM Smith

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Attachments

Attachment 1 Data Validation Reports
Attachment 2 Data Package Completeness Review Checklists
Attachment 3 Analytical Data Packages

Abbreviations

%	percent
%D	percent difference
%R	percent recovery
CDM Smith	CDM Federal Programs Corporation
COC	chain of custody
DQI	data quality indicator
DQO	data quality objective
EPA	U.S. Environmental Protection Agency
Eurofins	Eurofins Air Toxics Laboratory
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
MDL	method detection limit
MRL	method reporting limit
Pace	Pace Analytical Laboratory
PARCCS	precision, accuracy, representativeness, comparability, completeness, and sensitivity
PCE	tetrachloroethene
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
QCSR	quality control summary report
RIWP	remedial investigation work plan
RPD	relative percent difference
RSD	relative standard deviation
SDG	sample delivery group
SIM	selective ion monitoring
VOC	volatile organic compound

Section 1

Data Usability and Assessment Review

Under the U.S. Army Corps of Engineers Kansas City District, Contract No. W912DQ-18-D-3008, Task Order No. W912DQ19F3048, CDM Federal Programs Corporation (CDM Smith) has been directed to perform a remedial investigation for Operable Unit 1 of the 700 South 1600 East Tetrachloroethene (PCE) Plume Superfund Site in Salt Lake City, Utah. As part of the ongoing remedial investigation, indoor and ambient air samples were collected from March 8 to 18, 2022, and on April 29, 2022. Samples were shipped to Eurofins Air Toxics Laboratory (Eurofins) in Folsom, California, and Pace Analytical Laboratory (Pace) in Mt. Juliet, Tennessee, for analysis.

This quality control summary report (QCSR) summarizes the data validation performed and determines whether sample results meet the data quality objectives (DQOs) outlined in the *Phase 2 Quality Assurance Project Plan* (QAPP)*, Operable Unit 1, 700 South 1600 East PCE Plume Site* (CDM Smith 2020a)*.*

1.1 Usability Summary

Data collected and validated during this field investigation are usable as reported. Applicable data validation qualifiers were added if required. No sample results were rejected. Specific details are provided in the data validation reports summarized in Section 5 and presented in **Attachment 1** of this report.

Section 2
Quality Assurance Objectives

Quality assurance (QA) objectives for measurement data are expressed in terms of precision, accuracy, representativeness, comparability, completeness, and sensitivity (PARCCS). The PARCCS parameters characterize the quality of the data and, as such, are called data quality indicators (DQIs). The DQIs provide a mechanism for ongoing quality control (QC) and measuring and evaluating data quality throughout the project.

A review of the collected data is necessary to determine whether data measurement objectives established in the QAPP (CDM Smith 2020a) were met. In general, the following data measurement objectives were considered:

- Achievement of analytical method and reporting limit requirements
- Adherence to and achievement of appropriate laboratory analytical and field QC requirements
- Achievement of required measurement performance criteria for DQIs (the PARCCS parameters)
- Adherence to sampling and sample handling procedures
- Adherence to the sampling design and deviations documented on field change notifications, if required

Data validation review of the DQIs and other QA objectives determines whether the data are of sufficient quality and quantity to support their intended use.

Section 3
Field and Laboratory Quality Assurance Activities

CDM Smith and subcontractor Wasatch Environmental completed field sampling activities from March 8 to 18, 2022, and on April 29, 2022. The QAPP (CDM Smith 2020a) defined the procedures to be followed and the data quality requirements for the field sampling events and associated analytical work.

Samples were received intact with proper chain-of-custody (COC) documentation at Eurofins and Pace with the exception of sample 0273H-IA015C-031222 reported in sample delivery group (SDG) 2203546 (see Section 5.2.1 for further information). Sample identification was accurately documented by the laboratory after clarification with the field team. Sample preparation and analyses were conducted within the method-specified holding times.

Table 3-1 lists the samples collected and analyses performed. **Attachment 2** presents the completeness review checklists for the data packages. **Attachment 3** includes the analytical data packages.

3.1 Deviations from Field Procedures/Laboratory Procedures

While the following deviations occurred during the winter 2022 indoor/ambient air sampling event, all samples were collected as planned during the sampling event and the deviations do not impact data quality or the DQOs:

- The initial 24-hour SUMMA canister deployed at 0029-H did not collect adequate sample volume for analysis. The sample was recollected at a later date and analyzed.
- Sample identification discrepancies occurred for some samples. The sample identification discrepancies were corrected.
- One COC form was not completed using impermeable ink, however, an unalterable copy of the COC form was included in the analytical laboratory data package. The entries on the form were reviewed for accuracy, and the field team was notified about the requirement to use impermeable ink for project documentation.

3.2 Field Quality Assurance/Quality Control

Five field duplicates were analyzed for the 54 environmental air samples collected. The QC sample collection frequency requirements in the QAPP (CDM Smith 2020a) of 10% for field duplicates was met.

Field QA/QC objectives were accomplished through the use of appropriate sampling techniques and collection of QC samples at the specified frequency.

3.3 Laboratory Quality Assurance/Quality Control

Analytical QA/QC was assessed by laboratory QC checks, method blanks, sample custody tracking, sample preservation, adherence to holding times, laboratory control samples (LCSs), calibration verifications, surrogates, internal standards, duplicate results, and other applicable QC parameters. As presented in the data validation reports in **Attachment 1** of this report, laboratory QC sample results met project criteria requirements and sample results were qualified if required. All data are considered usable.

3.3.1 Laboratory Methods

Samples were analyzed using the following methods:

- Modified U.S. Environmental Protection Agency (EPA) Method TO-15 for volatile organic compounds (VOCs)
- Modified EPA Method TO-15 selective ion monitoring (SIM) for VOCs by SIM

The methods used met project objectives.

Table 3-1
Sample List and Analysis
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

Field Sample ID	Matrix	Sample Date	Lab SDG	Method
0013H-IA01SC-030822	AI	3/8/2022	2203385	TO-15, TO-15 SIM
0029H-IA01SC-031822	AI	3/18/2022	2203674	TO-15, TO-15 SIM
0040H-IA01SC-031522	AI	3/15/2022	L1472579	TO-15, TO-15 SIM
0040H-IA02SC-031522	AI	3/15/2022	L1472579	TO-15, TO-15 SIM
0041H-IA01SC-031222	AI	3/12/2022	2203547	TO-15, TO-15 SIM
0062H-IA01SC-031222	AI	3/12/2022	2203550	TO-15, TO-15 SIM
0064H-AA01SC-030822	AA	3/8/2022	2203386	TO-15, TO-15 SIM
0064H-IA01SC-030822	AI	3/8/2022	2203386	TO-15, TO-15 SIM
0072H-IA01SC-030822	AI	3/8/2022	2203385	TO-15, TO-15 SIM
0145H-IA01SC-031222	AI	3/12/2022	2203547	TO-15, TO-15 SIM
0146H-IA01SC-031122	AI	3/11/2022	2203552	TO-15, TO-15 SIM
0172H-IA01SC-030822	AI	3/8/2022	2203386	TO-15, TO-15 SIM
0180H-IA01SC-030822	AI	3/8/2022	2203385	TO-15, TO-15 SIM
0189H-IA01SC-031122	AI	3/11/2022	2203552	TO-15, TO-15 SIM
0192H-IA01SC-031122	AI	3/11/2022	2203546	TO-15, TO-15 SIM
0193H-IA01SC-031022	AI	3/10/2022	L1470817	TO-15, TO-15 SIM
0194H-IA01SC-030922	AI	3/9/2022	L1470815	TO-15, TO-15 SIM
0195H-IA01SC-031022	AI	3/10/2022	L1470817	TO-15, TO-15 SIM
0197H-IA01SC-030822	AI	3/8/2022	2203385	TO-15, TO-15 SIM
0197H-IA01SC-042922	AI	4/29/2022	2205002	TO-15, TO-15 SIM
0197H-IA02SC-042922	AI	4/29/2022	2205002	TO-15, TO-15 SIM
0197H-IA03SC-042922	AI	4/29/2022	2205002	TO-15, TO-15 SIM
0197H-IA04SC-042922	AI	4/29/2022	2205002	TO-15, TO-15 SIM
0225H-IA01SC-030922	AI	3/9/2022	L1470815	TO-15, TO-15 SIM
0230H-IA01SC-031222	AI	3/12/2022	2203550	TO-15, TO-15 SIM
0255H-IA01SC-031022	AI	3/10/2022	L1470817	TO-15, TO-15 SIM
0256H-IA01SC-030922	AI	3/9/2022	L1470815	TO-15, TO-15 SIM
0263H-IA01SC-031022	AI	3/10/2022	L1470823	TO-15, TO-15 SIM
0273H-IA01SC-031222	AI	3/12/2022	2203546	TO-15, TO-15 SIM
0274H-IA01SC-030822	AI	3/8/2022	2203384	TO-15, TO-15 SIM
0277H-IA01SC-031222	AI	3/12/2022	2203547	TO-15, TO-15 SIM
0302H-AA01SC-031222	AA	3/12/2022	2203550	TO-15, TO-15 SIM
0302H-IA01SC-031222	AI	3/12/2022	2203550	TO-15, TO-15 SIM
0315H-IA01SC-031222	AI	3/12/2022	2203596	TO-15, TO-15 SIM
0329H-IA01SC-030822	AI	3/8/2022	2203384	TO-15, TO-15 SIM
0334H-AA01SC-031022	AA	3/10/2022	L1470823	TO-15, TO-15 SIM
0334H-IA01SC-031022	AI	3/10/2022	L1470823	TO-15, TO-15 SIM
0336H-IA01SC-030822	AI	3/8/2022	2203386	TO-15, TO-15 SIM
0347H-IA01SC-030922	AI	3/9/2022	2203384	TO-15, TO-15 SIM
0366C-IA01SC-031022	AI	3/10/2022	L1470822	TO-15, TO-15 SIM
0366C-IA02SC-031022	AI	3/10/2022	L1470822	TO-15, TO-15 SIM
0366C-IA03SC-031022	AI	3/10/2022	L1470822	TO-15, TO-15 SIM
0381H-AA01SC-031122	AA	3/11/2022	2203552	TO-15, TO-15 SIM
0381H-IA01SC-031122	AI	3/11/2022	2203552	TO-15, TO-15 SIM
0392H-IA01SC-031222	AI	3/12/2022	2203546	TO-15, TO-15 SIM
0395H-IA01SC-031022	AI	3/10/2022	L1470817	TO-15, TO-15 SIM
0365S-AA01SC-031822	AA	3/18/2022	2203675	TO-15, TO-15 SIM
0365S-IA01SC-031822	AI	3/18/2022	2203675	TO-15, TO-15 SIM
0365S-IA02SC-031822	AI	3/18/2022	2203675	TO-15, TO-15 SIM
0365S-IA03SC-031822	AI	3/18/2022	2203675	TO-15, TO-15 SIM
B20-IA01SC-031522	AI	3/15/2022	2203674	TO-15, TO-15 SIM

Table 3-1
Sample List and Analysis
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

Field Sample ID	Matrix	Sample Date	Lab SDG	Method
B20-IA02SC-031522	AI	3/15/2022	2203674	TO-15, TO-15 SIM
B32-AA01SC-031522	AA	3/15/2022	2203596	TO-15, TO-15 SIM
B32-IA01SC-031522	AI	3/15/2022	2203596	TO-15, TO-15 SIM
FD01-IA030822	AI	3/8/2022	2203384	TO-15, TO-15 SIM
FD02-IA031022	AI	3/10/2022	L1470822	TO-15, TO-15 SIM
FD03-IA031222	AI	3/12/2022	2203546	TO-15, TO-15 SIM
FD04-IA031222	AI	3/12/2022	2203547	TO-15, TO-15 SIM
FD05-IA031522	AI	3/15/2022	2203674	TO-15, TO-15 SIM

Acronyms:
AA - ambient air
AI - indoor air
EPA - United States Environmental Protection Agency
ID - identification
SDG - sample delivery group
TO-15 - Modified EPA Method TO-15 for volatile organic compounds
TO-15 SIM - Modified EPA Method TO-15 for volatile organic compounds by selective ion monitoring (SIM)

Section 4
Data Validation Procedures

For this QCSR, 16 laboratory SDGs were evaluated. Qualified CDM Smith data validators not associated with project sampling activities validated the data reported in each of the SDGs. Data validation was performed in accordance with specified analytical methods and performance criteria outlined in the QAPP (CDM Smith 2020a), EPA's *National Functional Guidelines for Organic Superfund Methods Data Review* (EPA 2020), and EPA's *Analysis of Volatile Organic Compounds (VOCs) in Air Contained in Canisters by Method TO-15* (EPA 2014). Validation reports are provided in **Attachment 1**. The following data packages were validated:

- SDG 2203384
- SDG 2203385
- SDG 2203386
- SDG 2203546
- SDG 2203547
- SDG 2203550
- SDG 2203552
- SDG 2203596
- SDG 2203674
- SDG 2203675
- SDG 2205002
- SDG L1470815
- SDG L1470817
- SDG L1470822
- SDG L1470823
- SDG L1472579

Table 4-1 presents the results that were qualified and the reasons for the qualifications. Qualifiers applied are defined as follows:

- J – The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

- J+ – The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample; the result may be biased high.
- U – The analyte was analyzed for but was not detected above the level of the sample method reporting limit (MRL).
- UJ – The analyte was analyzed for but was not detected above the level of the sample MRL. The MRL is approximate.

Table 4-1
Qualification Summary
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

Field Sample ID	Lab SDG	Method	Analyte	CAS #	Final Result	Unit	Validation Qualifier	Interpreted Qualifier	Qualifier Reason
0029H-IA01SC-031822	2203674	TO15	Bromomethane	74-83-9	3.1	µg/m^3	UJ	UJ	ICV
0029H-IA01SC-031822	2203674	TO15	Ethanol	64-17-5	120	µg/m^3	J	J	CAL
0040H-IA01SC-031522	L1472579	TO15	Benzyl Chloride	100-44-7	1.04	µg/m^3	UJ	UJ	CCV
0040H-IA02SC-031522	L1472579	TO15	Benzyl Chloride	100-44-7	1.04	µg/m^3	UJ	UJ	CCV
0041H-IA01SC-031222	2203547	TO15	Allyl Chloride	107-05-1	2.4	µg/m^3	UJ	UJ	CCV
0041H-IA01SC-031222	2203547	TO15	Bromomethane	74-83-9	3	µg/m^3	UJ	UJ	ICV
0041H-IA01SC-031222	2203547	TO15	Ethanol	64-17-5	550	µg/m^3	J	J	CAL
0041H-IA01SC-031222	2203547	TO15	Methylene Chloride	75-09-2	2.7	µg/m^3	U-RL	U	LB
0062H-IA01SC-031222	2203550	TO15	Bromomethane	74-83-9	3	µg/m^3	UJ	UJ	ICV
0062H-IA01SC-031222	2203550	TO15	Methylene Chloride	75-09-2	2.7	µg/m^3	U-RL	U	LB
0072H-IA01SC-030822	2203385	TO15	Ethanol	64-17-5	240	µg/m^3	J	J	CAL
0145H-IA01SC-031222	2203547	TO15	Allyl Chloride	107-05-1	2.4	µg/m^3	UJ	UJ	CCV
0145H-IA01SC-031222	2203547	TO15	Bromomethane	74-83-9	3	µg/m^3	UJ	UJ	ICV
0145H-IA01SC-031222	2203547	TO15SIM	Carbon Tetrachloride	56-23-5	0.76	µg/m^3	J+	J+	IN
0146H-IA01SC-031122	2203552	TO15	Allyl Chloride	107-05-1	5	µg/m^3	UJ	UJ	CCV
0146H-IA01SC-031122	2203552	TO15	Bromomethane	74-83-9	6.2	µg/m^3	UJ	UJ	ICV
0146H-IA01SC-031122	2203552	TO15	Ethanol	64-17-5	2400	µg/m^3	J	J	CAL
0172H-IA01SC-030822	2203386	TO15	Ethanol	64-17-5	210	µg/m^3	J	J	CAL
0189H-IA01SC-031122	2203552	TO15	Allyl Chloride	107-05-1	2.4	µg/m^3	UJ	UJ	CCV
0189H-IA01SC-031122	2203552	TO15	Bromomethane	74-83-9	3	µg/m^3	UJ	UJ	ICV
0189H-IA01SC-031122	2203552	TO15	Ethanol	64-17-5	340	µg/m^3	J	J	CAL
0189H-IA01SC-031122	2203552	TO15	Isopropyl Alcohol	67-63-0	240	µg/m^3	J	J	CAL
0189H-IA01SC-031122	2203552	TO15	Methylene Chloride	75-09-2	2.7	µg/m^3	U-RL	U	LB
0192H-IA01SC-031122	2203546	TO15	Allyl Chloride	107-05-1	2.6	µg/m^3	UJ	UJ	CCV
0192H-IA01SC-031122	2203546	TO15	Bromomethane	74-83-9	3.2	µg/m^3	UJ	UJ	ICV
0192H-IA01SC-031122	2203546	TO15	Ethanol	64-17-5	190	µg/m^3	J	J	CAL

Table 4-1
Qualification Summary
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

Field Sample ID	Lab SDG	Method	Analyte	CAS #	Final Result	Unit	Validation Qualifier	Interpreted Qualifier	Qualifier Reason
0192H-IA01SC-031122	2203546	TO15	Methylene Chloride	75-09-2	2.8	µg/m^3	U-RL	U	LB
0193H-IA01SC-031022	L1470817	TO15	Benzyl Chloride	100-44-7	1.04	µg/m^3	UJ	UJ	CCV
0193H-IA01SC-031022	L1470817	TO15	Ethanol	64-17-5	458	µg/m^3	J	J	CCV
0194H-IA01SC-030922	L1470815	TO15	Benzyl Chloride	100-44-7	1.04	µg/m^3	UJ	UJ	CCV
0194H-IA01SC-030922	L1470815	TO15	Ethanol	64-17-5	349	µg/m^3	J	J	CCV
0195H-IA01SC-031022	L1470817	TO15	Benzyl Chloride	100-44-7	1.04	µg/m^3	UJ	UJ	CCV
0195H-IA01SC-031022	L1470817	TO15	Ethanol	64-17-5	146	µg/m^3	J	J	CCV
0225H-IA01SC-030922	L1470815	TO15	Benzyl Chloride	100-44-7	1.04	µg/m^3	UJ	UJ	CCV
0225H-IA01SC-030922	L1470815	TO15	Ethanol	64-17-5	458	µg/m^3	J	J	CCV
0230H-IA01SC-031222	2203550	TO15	Bromomethane	74-83-9	3	µg/m^3	UJ	UJ	ICV
0230H-IA01SC-031222	2203550	TO15	Ethanol	64-17-5	680	µg/m^3	J	J	CAL
0230H-IA01SC-031222	2203550	TO15	Methylene Chloride	75-09-2	2.7	µg/m^3	U-RL	U	LB
0255H-IA01SC-031022	L1470817	TO15	Benzyl Chloride	100-44-7	1.04	µg/m^3	UJ	UJ	CCV
0255H-IA01SC-031022	L1470817	TO15	Ethanol	64-17-5	19.8	µg/m^3	J	J	CCV
0256H-IA01SC-030922	L1470815	TO15	Benzyl Chloride	100-44-7	1.04	µg/m^3	UJ	UJ	CCV
0256H-IA01SC-030922	L1470815	TO15	Ethanol	64-17-5	47.7	µg/m^3	J	J	CCV
0263H-IA01SC-031022	L1470823	TO15	Benzyl Chloride	100-44-7	1.04	µg/m^3	UJ	UJ	CCV
0273H-IA01SC-031222	2203546	TO15	Allyl Chloride	107-05-1	2.6	µg/m^3	UJ	UJ	CCV
0273H-IA01SC-031222	2203546	TO15	Bromomethane	74-83-9	3.2	µg/m^3	UJ	UJ	ICV
0273H-IA01SC-031222	2203546	TO15	Ethanol	64-17-5	240	µg/m^3	J	J	CAL
0273H-IA01SC-031222	2203546	TO15	Methylene Chloride	75-09-2	2.9	µg/m^3	U-RL	U	LB
0274H-IA01SC-030822	2203384	TO15	Ethanol	64-17-5	180	µg/m^3	J	J	CAL
0277H-IA01SC-031222	2203547	TO15	Allyl Chloride	107-05-1	2.6	µg/m^3	UJ	UJ	CCV
0277H-IA01SC-031222	2203547	TO15	Bromomethane	74-83-9	3.2	µg/m^3	UJ	UJ	ICV
0302H-AA01SC-031222	2203550	TO15	Bromomethane	74-83-9	2.9	µg/m^3	UJ	UJ	ICV
0302H-AA01SC-031222	2203550	TO15	Methylene Chloride	75-09-2	2.6	µg/m^3	U-RL	U	LB

Table 4-1
Qualification Summary
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

Field Sample ID	Lab SDG	Method	Analyte	CAS #	Final Result	Unit	Validation Qualifier	Interpreted Qualifier	Qualifier Reason
0302H-IA01SC-031222	2203550	TO15	Bromomethane	74-83-9	2.8	µg/m^3	UJ	UJ	ICV
0302H-IA01SC-031222	2203550	TO15	Methylene Chloride	75-09-2	2.5	µg/m^3	U-RL	U	LB
0315H-IA01SC-031222	2203596	TO15	Bromomethane	74-83-9	3.1	µg/m^3	UJ	UJ	ICV
0315H-IA01SC-031222	2203596	TO15	Ethanol	64-17-5	480	µg/m^3	J	J	CAL
0315H-IA01SC-031222	2203596	TO15	Isopropyl Alcohol	67-63-0	17	µg/m^3	J	J	FD
0315H-IA01SC-031222	2203596	TO15	Methylene Chloride	75-09-2	2.8	µg/m^3	U-RL	U	LB
0334H-AA01SC-031022	L1470823	TO15	Benzyl Chloride	100-44-7	1.04	µg/m^3	UJ	UJ	CCV
0334H-IA01SC-031022	L1470823	TO15	Benzyl Chloride	100-44-7	1.04	µg/m^3	UJ	UJ	CCV
0336H-IA01SC-030822	2203386	TO15	Ethanol	64-17-5	200	µg/m^3	J	J	CAL
0347H-IA01SC-030922	2203384	TO15	Ethanol	64-17-5	1700	µg/m^3	J	J	CAL
0366C-IA01SC-031022	L1470822	TO15	Acetone	67-64-1	101	µg/m^3	J	J	FD
0366C-IA01SC-031022	L1470822	TO15	Benzyl Chloride	100-44-7	1.04	µg/m^3	UJ	UJ	CCV
0366C-IA01SC-031022	L1470822	TO15	Chloroform	67-66-3	0.604	µg/m^3	J	J	FD
0366C-IA01SC-031022	L1470822	TO15	Ethanol	64-17-5	535	µg/m^3	J	J	FD,CCV
0366C-IA01SC-031022	L1470822	TO15	Ethylbenzene	100-41-4	4.9	µg/m^3	J	J	FD
0366C-IA01SC-031022	L1470822	TO15	m,p-Xylene	179601-23-1	12.2	µg/m^3	J	J	FD
0366C-IA01SC-031022	L1470822	TO15	o-Xylene	95-47-6	2.42	µg/m^3	J	J	FD
0366C-IA01SC-031022	L1470822	TO15	Toluene	108-88-3	16.5	µg/m^3	J	J	FD
0366C-IA01SC-031022	L1470822	TO15SIM	1,2-Dichloroethane	107-06-2	0.184	µg/m^3	J	J	FD
0366C-IA01SC-031022	L1470822	TO15SIM	Tetrachloroethene	127-18-4	1.07	µg/m^3	J	J	FD
0366C-IA02SC-031022	L1470822	TO15	Benzyl Chloride	100-44-7	1.04	µg/m^3	UJ	UJ	CCV
0366C-IA02SC-031022	L1470822	TO15	Ethanol	64-17-5	51.9	µg/m^3	J	J	CCV
0366C-IA03SC-031022	L1470822	TO15	Benzyl Chloride	100-44-7	1.04	µg/m^3	UJ	UJ	CCV
0366C-IA03SC-031022	L1470822	TO15	Ethanol	64-17-5	270	µg/m^3	J	J	CCV
0381H-AA01SC-031122	2203552	TO15	Allyl Chloride	107-05-1	2.3	µg/m^3	UJ	UJ	CCV
0381H-AA01SC-031122	2203552	TO15	Bromomethane	74-83-9	2.9	µg/m^3	UJ	UJ	ICV

Table 4-1
Qualification Summary
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

Field Sample ID	Lab SDG	Method	Analyte	CAS #	Final Result	Unit	Validation Qualifier	Interpreted Qualifier	Qualifier Reason
0381H-AA01SC-031122	2203552	TO15	Methylene Chloride	75-09-2	2.6	µg/m^3	U-RL	U	LB
0381H-IA01SC-031122	2203552	TO15	Allyl Chloride	107-05-1	2.7	µg/m^3	UJ	UJ	CCV
0381H-IA01SC-031122	2203552	TO15	Bromomethane	74-83-9	3.3	µg/m^3	UJ	UJ	ICV
0381H-IA01SC-031122	2203552	TO15	Methylene Chloride	75-09-2	3	µg/m^3	U-RL	U	LB
0392H-IA01SC-031222	2203546	TO15	2-Butanone (MEK)	78-93-3	1.5	µg/m^3	J	J	FD
0392H-IA01SC-031222	2203546	TO15	Allyl Chloride	107-05-1	5.2	µg/m^3	UJ	UJ	CCV
0392H-IA01SC-031222	2203546	TO15	Bromomethane	74-83-9	6.5	µg/m^3	UJ	UJ	ICV
0392H-IA01SC-031222	2203546	TO15	Ethanol	64-17-5	2500	µg/m^3	J	J	CAL
0392H-IA01SC-031222	2203546	TO15	Isopropyl Alcohol	67-63-0	26	µg/m^3	J	J	FD
0392H-IA01SC-031222	2203546	TO15SIM	m,p-Xylene	179601-23-1	1.2	µg/m^3	J	J	FD
0392H-IA01SC-031222	2203546	TO15SIM	o-Xylene	95-47-6	0.52	µg/m^3	J	J	FD
0395H-IA01SC-031022	L1470817	TO15	Benzyl Chloride	100-44-7	1.04	µg/m^3	UJ	UJ	CCV
0395H-IA01SC-031022	L1470817	TO15	Ethanol	64-17-5	290	µg/m^3	J	J	CCV
365S-AA01SC-031822	2203675	TO15	Bromomethane	74-83-9	3.4	µg/m^3	UJ	UJ	ICV
365S-IA01SC-031822	2203675	TO15	Bromomethane	74-83-9	3.1	µg/m^3	UJ	UJ	ICV
365S-IA01SC-031822	2203675	TO15	Ethanol	64-17-5	960	µg/m^3	J	J	CAL
365S-IA02SC-031822	2203675	TO15	Bromomethane	74-83-9	3.6	µg/m^3	UJ	UJ	ICV
365S-IA02SC-031822	2203675	TO15	Ethanol	64-17-5	190	µg/m^3	J	J	CAL
365S-IA03SC-031822	2203675	TO15	Bromomethane	74-83-9	3.7	µg/m^3	UJ	UJ	ICV
365S-IA03SC-031822	2203675	TO15	Ethanol	64-17-5	280	µg/m^3	J	J	CAL
B20-IA01SC-031522	2203674	TO15	Bromomethane	74-83-9	3.1	µg/m^3	UJ	UJ	ICV
B20-IA01SC-031522	2203674	TO15	Isopropyl Alcohol	67-63-0	9.5	µg/m^3	J	J	FD
B20-IA01SC-031522	2203674	TO15	Methylene Chloride	75-09-2	2.8	µg/m^3	U-RL	U	LB
B20-IA02SC-031522	2203674	TO15	Bromomethane	74-83-9	3.1	µg/m^3	UJ	UJ	ICV
B20-IA02SC-031522	2203674	TO15	Ethanol	64-17-5	130	µg/m^3	J	J	CAL
B20-IA02SC-031522	2203674	TO15	Methylene Chloride	75-09-2	2.8	µg/m^3	U-RL	U	LB

Table 4-1
Qualification Summary
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

Field Sample ID	Lab SDG	Method	Analyte	CAS #	Final Result	Unit	Validation Qualifier	Interpreted Qualifier	Qualifier Reason
B32-AA01SC-031522	2203596	TO15	Bromomethane	74-83-9	2.9	µg/m^3	UJ	UJ	ICV
B32-AA01SC-031522	2203596	TO15	Methylene Chloride	75-09-2	2.6	µg/m^3	U-RL	U	LB
B32-IA01SC-031522	2203596	TO15	Bromomethane	74-83-9	3.4	µg/m^3	UJ	UJ	ICV
B32-IA01SC-031522	2203596	TO15	Ethanol	64-17-5	700	µg/m^3	J	J	CAL
B32-IA01SC-031522	2203596	TO15	Methylene Chloride	75-09-2	3.1	µg/m^3	U-RL	U	LB
FD01-IA030822	2203384	TO15	Ethanol	64-17-5	210	µg/m^3	J	J	CAL
FD02-IA031022	L1470822	TO15	Acetone	67-64-1	34.9	µg/m^3	J	J	FD
FD02-IA031022	L1470822	TO15	Benzyl Chloride	100-44-7	1.04	µg/m^3	UJ	UJ	CCV
FD02-IA031022	L1470822	TO15	Ethanol	64-17-5	61.1	µg/m^3	J	J	FD,CCV
FD02-IA031022	L1470822	TO15	Ethylbenzene	100-41-4	1.74	µg/m^3	J	J	FD
FD02-IA031022	L1470822	TO15	m,p-Xylene	179601-23-1	4.6	µg/m^3	J	J	FD
FD02-IA031022	L1470822	TO15	o-Xylene	95-47-6	0.958	µg/m^3	J	J	FD
FD02-IA031022	L1470822	TO15	Toluene	108-88-3	6.37	µg/m^3	J	J	FD
FD02-IA031022	L1470822	TO15SIM	1,2-Dichloroethane	107-06-2	0.102	µg/m^3	J	J	FD
FD02-IA031022	L1470822	TO15SIM	Chloroform	67-66-3	0.0973	µg/m^3	UJ	UJ	FD
FD02-IA031022	L1470822	TO15SIM	Tetrachloroethene	127-18-4	0.0957	µg/m^3	J	J	FD
FD03-IA031222	2203546	TO15	2-Butanone (MEK)	78-93-3	5.4	µg/m^3	J	J	FD
FD03-IA031222	2203546	TO15	Allyl Chloride	107-05-1	2.6	µg/m^3	UJ	UJ	CCV
FD03-IA031222	2203546	TO15	Bromomethane	74-83-9	3.2	µg/m^3	UJ	UJ	ICV
FD03-IA031222	2203546	TO15	Ethanol	64-17-5	2400	µg/m^3	J	J	CAL
FD03-IA031222	2203546	TO15	Isopropyl Alcohol	67-63-0	13	µg/m^3	J	J	FD
FD03-IA031222	2203546	TO15	Methylene Chloride	75-09-2	2.8	µg/m^3	U-RL	U	LB
FD03-IA031222	2203546	TO15SIM	m,p-Xylene	179601-23-1	0.82	µg/m^3	J	J	FD
FD03-IA031222	2203546	TO15SIM	o-Xylene	95-47-6	0.26	µg/m^3	J	J	FD
FD04-IA031222	2203547	TO15	Allyl Chloride	107-05-1	2.4	µg/m^3	UJ	UJ	CCV
FD04-IA031222	2203547	TO15	Bromomethane	74-83-9	3	µg/m^3	UJ	UJ	ICV

Table 4-1
Qualification Summary
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

Field Sample ID	Lab SDG	Method	Analyte	CAS #	Final Result	Unit	Validation Qualifier	Interpreted Qualifier	Qualifier Reason
FD04-IA031222	2203547	TO15	Ethanol	64-17-5	460	µg/m^3	J	J	CAL
FD04-IA031222	2203547	TO15	Isopropyl Alcohol	67-63-0	26	µg/m^3	J	J	FD
FD04-IA031222	2203547	TO15	Methylene Chloride	75-09-2	2.7	µg/m^3	U-RL	U	LB
FD05-IA031522	2203674	TO15	Bromomethane	74-83-9	3.1	µg/m^3	UJ	UJ	ICV
FD05-IA031522	2203674	TO15	Isopropyl Alcohol	67-63-0	16	µg/m^3	J	J	FD
FD05-IA031522	2203674	TO15	Methylene Chloride	75-09-2	2.8	µg/m^3	U-RL	U	LB

Acronyms:

µg/m^3 - microgram per cubic meter
SDG - sample delivery group
CAS - chemical abstract service
EPA - United States Environmental Protection Agency
FD - field duplicate criteria
ICV - initial calibration verification
ID - identification
CAL - calibration
CCV - continued calibration verification
IN - presence of closely eluting non-target peak caused interference with the quantitation mass ion
LB - laboratory blank criteria
J - estimated
J+ - estimated; biased high
U - nondetect
UJ - estimated nondetect result
U-RL - result is qualified as nondetect at the reporting limit value
TO-15 - Modified EPA Method TO-15 for volatile organic compounds
TO-15 SIM - Modified EPA Method TO-15 for volatile organic compounds by selective ion monitoring (SIM)

Section 5
Data Quality Indicators

This section summarizes the validation performed and the overall quality of the data. The validation reports are provided in **Attachment 1**.

Achievement of the DQO regarding data usability was determined by the use of DQIs, expressed in terms of PARCCS. The DQIs provide a mechanism to measure and evaluate data quality throughout the project. These criteria are defined in **Table 5-1** and in the following subsections.

5.1 Precision

Precision is a quantitative term that estimates the reproducibility of a set of replicate measurements under a given set of conditions. It is defined as a measurement of mutual agreement between measurements of the same property and is expressed in terms of relative percent difference (RPD) between duplicate determinations.

RPD is calculated as follows:

$$\mathbf{RPD = absolute\ value\ [(C1 - C2)/\{(C1 + C2)/2)\}] \times 100}$$

Where:

C1 = concentration of primary sample
C2 = concentration of duplicate sample

Field and analytical precision were determined from review of the field duplicate results, LCS/laboratory control sample duplicates (LCSDs), and laboratory duplicates. The duplicate sample results were compared after calculating their RPDs. Field duplicate samples were collected in the same manner as the normal field samples but collected in separate individual containers, given separate sample identifiers, and treated as unique samples by the laboratory.

Table 5-2 presents the field duplicate sample results for the air data. A control limit of 40% RPD was used for the indoor air field duplicate samples when both sample concentrations were greater than five times the MRL. If the sample concentrations were below five times the MRL, the absolute difference between the sample results was calculated, and if that value was below the MRL, no qualification was required. Laboratory RPDs are specific to the QC parameter. RPD and absolute difference results are summarized below:

- SDGs 2203596, 2203547, and 2203674: Field duplicate RPDs or absolute criteria results were outside control limits for the TO-15 results for isopropyl alcohol/2-propanol. The isopropyl alcohol/2-propanol results for the field duplicate and parent sample in each of the SDGs were qualified as estimated "J."
- SDG 2203546: Field duplicate RPDs or absolute criteria results were outside control limits for the TO-15 isopropyl alcohol/2-propanol and 2-butanone results, and the TO-15 SIM

m/p-xylenes and o-xylenes results. The TO-15 isopropyl alcohol/2-propoanol and 2-butanone results and the TO-15 SIM m/p-xylenes and o-xylenes results were qualified as estimated "J" in the field duplicate and parent samples.

- SDG L1470822: Field duplicate RPDs or absolute criteria results were outside control limits for the TO-15 ethylbenzene, toluene, m/p-xylene, acetone, chloroform, o-xylene, and ethanol results, and the TO-15 SIM 1,2-dichloroethane, chloroform and tetrachloroethene results. The associated TO-15 and TO-15 SIM results were qualified as estimated "J/UJ" in the field duplicate and parent samples.
- LCS/LCSD RPDs were within control limits.
- Laboratory duplicate RPDs or absolute criteria were within control limits.

No field or laboratory issues were identified from the RPD results outside criteria; the exceedances are reasonable for this type of sampling activity.

5.2 Accuracy

Accuracy is the degree of agreement of a measurement with an accepted reference or true value and is a measure of the bias in a system. Two different metrics are evaluated to assess result accuracy: calculation of percent recovery (%R) for spiked analytes with known concentrations; and review of blank results for cross-contamination.

5.2.1 Percent Recovery

Accuracy of the data was assessed by comparing recoveries of LCSs, calibration standards, surrogates, and internal standards. Accuracy is expressed as %R, which is calculated as:

$$\%R = \frac{[\text{Total Analyte Found}] - [\text{Analyte Originally Present}]) \times 100}{[\text{Analyte Added}]}$$

Analytical accuracy for the entire data collection activity is difficult to measure because several sources of error exist. Errors can be introduced by any of the following:

- Sampling procedure and duration of sampling
- Field contamination
- Sample preservation and handling
- Sample matrix
- Sample preparation
- Analytical techniques

Accuracy is maintained by adhering to the laboratory methods and approved field and analytical standard operating procedures.

The following is a summary of the accuracy parameters reviewed and the resulting qualifications for the data collected:

Laboratory Control Sample/Laboratory Control Sample Duplicate Percent Recoveries

For the SDGs reviewed, LCS/LCSD %Rs were within criteria.

Calibration Percent Recoveries, Percent Differences, and Relative Standard Deviations

The following SDGs had one or more calibration %Rs, percent differences (%Ds), and or relative standard deviations (RSDs) outside of criteria. The associated results were qualified as estimated "J/UJ" for the following SDGs and analytes:

- SDGs 2203546, 2203547, 2203552: bromomethane, 3-chloropropene
- SDGs 2203550, 2203596, 2203674, 2203675: bromomethane
- SDGs L1470815, L1470817, L1470822: benzyl chloride, ethanol
- SDGs L1470823, L1472579: benzyl chloride

As stated in the laboratory case narratives, ethanol exceeded the instrument's calibration range in SDGs 2203385, 2203674, 2203547, 2203552, 2203386, 2203546, 2203550, 2203384, 2203596, and 2203675, and isopropyl alcohol/2-propoanol exceeded the instrument's calibration range in SDG 2203552. The associated results were qualified as estimated "J/UJ" for these analytes.

Surrogates, Tunes, and Internal Standards

For the SDGs reviewed, surrogate, tune, and internal standard results were within criteria.

As stated in the laboratory case narrative for SDG 2203547, the presence of a closely eluting nontarget peak in sample 0145H-IA01SC-031222 interfered with the quantitation mass ion for carbon tetrachloride, indicating a potential high bias because of matrix contribution. Carbon tetrachloride results were flagged by the laboratory and subsequently qualified by the validator as estimated " J+."

Sample preservation, sample handling, holding times, canister pressure, and canister certification are additional measures of accuracy of the data. Sample handling information, holding times, canister pressure readings, and canister certification results were acceptable for the indoor and ambient air, except for the following:

- SDG 2203546: Sample information provided on the COC for sample 0273H-IA015C-031222 did not match the information provided with the canister barcode. The laboratory notified CDM Smith, who provided the laboratory with the correct information.

- SDG L1470815: Sample 0029H-IA01SC-030822 in SDG L1470815 was not analyzed because of an unacceptable final pressure reading. The sample was recollected and analyzed.

5.2.2 Blank Contamination

Blanks are used to determine the level of laboratory and field contamination introduced into the samples, independent of the level of target analytes found in the sample source. Sources of sample contamination can include the containers and equipment used to collect the sample, preservatives added to the sample, laboratory sample storage refrigerators, standards and solutions used to calibrate instruments, glassware and reagents used to process samples, airborne contamination in the laboratory preparation area, and the analytical instrument sample introduction equipment. Each analyte group has its own particular suite of common laboratory contaminants. Active measures must be performed to continually measure the ambient contamination level, and steps must be taken to discover the source of the contamination to eliminate or minimize the levels. Random spot contamination can also occur from analytes that are not common laboratory problems but arise as a problem for a specific project or over a short period. Field blanks, equipment blanks, trip blanks, and laboratory method blanks are analyzed to identify possible sources of contamination. No field blanks or trip blanks were required to be collected during the March and April 2022 sampling events per the QAPP (CDM Smith 2020a); laboratory blanks were analyzed as specified.

Sample result qualifications were required as a result of laboratory blank contamination for applicable samples in the following SDGs, where associated sample results were qualified as nondetect “U” at the MRL:

- SDGs 2203546, 2203547, 2203550, 2203552, 2203596, 2203674 – methylene chloride

Blank samples are used to determine the validity of the analytical results by determining the existence and magnitude of contamination resulting from laboratory (or field) activities or baseline drift during analysis. Ideally, no contaminants should be found in blank samples; however, the analytes detected in laboratory blanks are common in laboratory analyses and are almost unavoidable.

For this sampling event, methylene chloride was detected in some of the laboratory blank samples at concentrations below the MRLs.

Associated sample results for the laboratory blanks were therefore qualified following the specified guidelines. The resulting sample qualifications as nondetect "U” do not falsely diminish the identification of site-related contaminants and do not affect DQOs.

5.3 Representativeness

Representativeness is a qualitative term that expresses the degree to which the sample data accurately and precisely represent the environmental conditions corresponding to the location of sample collection. Requirements and procedures for sample collection were designed to maximize sample representativeness.

Representativeness can be monitored by reviewing field documentation and/or performing field audits. For this report, a detailed review was performed on the COC forms and field data collection forms. Appropriate laboratory QA/QC requirements were described in the QAPP (CDM Smith 2020a) and laboratory statement of work to support laboratory analytical results being representative of true field conditions.

Field sampling representativeness was attained through adherence to the sampling design in the remedial investigation work plan (RIWP; CDM Smith 2020b) and QAPP (CDM Smith 2020a) procedures, and by using EPA-approved analytical methods for sample analyses. As a result, the data represents as near as possible the actual field conditions at the time of sampling.

Representativeness, as defined above, was met for the fieldwork and laboratory analyses. The data collected are suitable for project use.

5.4 Comparability

Comparability is a qualitative term that expresses the confidence with which a data set can be compared with another. Strict adherence to standard sample collection procedures and analytical methods with analytical detection limits specified is necessary so that data from similar samples and sample conditions are comparable. This comparability is independent of laboratory personnel, data reviewers, or sampling personnel. Comparability criteria are met for the project if, based on data review, the sample collection and analytical procedures used are similar and are determined to have been followed.

To achieve comparability of data generated for the site, CDM Smith and Wasatch Environmental followed the standard sample collection procedures, and Eurofins and Pace followed the EPA-approved analytical methods and used the required reporting units. Using such procedures and methods enables the current data to be comparable to historical and future data sets generated with similar methods and units.

5.5 Completeness

Completeness of the field program is defined as the percentage of samples planned for collection, as listed in the RIWP (CDM Smith 2020b) versus the actual number of samples collected during the field program (see equation A).

Completeness for acceptable data is defined as the percentage of acceptable data obtained judged to be valid versus the total quantity of data generated (see equation B). Acceptable data include both data that pass all the QC criteria (unqualified data) and data that may not pass all the QC criteria but had appropriate corrective actions taken (qualified but usable data).

A. $$\%\text{Completeness} = C_x \frac{100}{n}$$

Where:

C = actual number of samples collected
n = total number of samples planned

B. $$\%Completeness = Vx\frac{100}{n'}$$

Where:

V = number of measurements judged valid
n' = total number of measurements made

The overall completeness goal for this sampling event of 90% was met, based on the following:

- All samples outlined in the RIWP (CDM Smith 2020b) were collected and analyzed as planned to meet specific sampling activity objectives.
- The locations that were sampled are adequate for evaluating the extent of VOC indoor air impacts at the site to meet DQOs.
- The number of samples planned to be collected versus the number of samples collected was 100%, which meets the DQO of 90%. As discussed previously, one sample had to be recollected and was subsequently analyzed.
- The number of measurements judged to be valid versus the total number of measurements made was 100%, which meets the DQO of 90%.
- Of the data validated and reported, 100% are suitable for their intended use for site characterization with the appropriate qualifiers applied. No results were rejected and all data collected met the overall project objective for data usability.

The data usability DQO was achieved; the data reported are suitable for their intended use as stated in the QAPP (CDM Smith 2020a) and RIWP (CDM Smith 2020b). The achievement of the completeness goals provides sufficient data for project decisions.

5.6 Sensitivity

Sensitivity is related to the ability to compare analytical results with project-specific levels of interest, such as delineation levels or action levels. Analytical quantitation limits for the various sample analytes should be below the level of interest to allow an effective comparison.

The method detection limit (MDL) study attempts to answer the question, “What is the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero?” The study is based upon repetitive analysis of an interference-free sample spiked with a known amount of the target analyte. The MDL is a measure of the ability of the test procedure to generate a positive response for the target analyte in the absence of any other interferences from the sample.

The MRL is generally defined as the lowest concentration at which an analyte can be confidently reported in a sample and its concentration reported with a reasonable degree of accuracy and precision. For samples that do not pose a particular matrix problem, the MRL is typically about three to five times higher than the MDL.

Laboratory results are reported according to rules that provide established certainty of detection. The result for an analyte is flagged with a "U" if that analyte was not detected and reported at the MRL value, or qualified with a "J" flag if associated QC results fall outside the appropriate QC criteria. Additionally, if an analyte is present at a concentration between the MDL and the MRL, the analytical result is flagged with a "J," indicating an estimated quantity. Qualifying the result as an estimated concentration reflects uncertainty in the reported value.

When required, dilutions were performed and accounted for in the reported MRLs. For some of the indoor air samples, nondetect results were greater than the indoor air risk-based screening levels, which included 1,1,2,2-tetrachloroethane, 1,2,4-trichlorobenzene, 1,2-dibromoethane, 1,3-butadiene, 1,4-dichlorobenzene, 1,4-dioxane, allyl chloride/3-chloropropene, benzyl chloride, bromodichloromethane, bromoethene, bromoform, hexachloro-1,3-butadiene, and naphthalene. A few MRLs for 1,1,2-trichloroethane, 1,2-dichlorpropane, cis-1,3-dichloropropene, and trans-1,3-dichlororpropene were slightly above the screening levels, but the majority of the results were within criteria. The elevated MRLs were related to sample-specific parameters.

These analytes with elevated MRLs are not known constituents of potential concern for the site. All MRLs were below the indoor air Tier 1 and Tier 2 removal action levels.

In the situation where the MRL was above a screening level, the MDL was below the screening level for almost all analytes (based on dilutions), and as detected results are qualified as estimated between the MDL and MRL, no exceedances of the screening levels occurred for most of these results. For the remaining analytes, laboratory MRLs were low enough to compare with the project criteria stated in the laboratory statement of work and the QAPP (CDM Smith 2020a).

Table 5-1 DQIs and Corresponding QC Parameters

Data Quality Indicator	QC Parameter Evaluation in Data Review/Validation
Precision	RPD values of: 1) Laboratory duplicates 2) Field duplicates 3) LCS/LCSDs RSD values of: 1) Initial calibration verifications
Accuracy/Bias	%R or %D values of: 1) LCS/LCSD %R 2) Initial calibration verification/continuing calibration verification %R 3) Tune check 4) Surrogates 5) Internal standards Results of: 1) Instrument and calibration blanks 2) Method (preparation) blanks
Representativeness	Results of all blanks Adherence to field standard operating procedures Sample integrity (COC and sample receipt forms) Holding times
Comparability	Similar reporting limits and units Similar sample collection methods Similar laboratory analytical methods
Completeness	Data qualifiers Laboratory deliverables Requested/reported valid results Field sample collection (primary and QC samples) Contract compliance (i.e., method and instrument QC within limits)
Sensitivity	Sample method reporting limits meet QAPP criteria Adequacy of sample dilution

Table 5-2
Summary of Field Duplicate Sampling Results
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

		Location	0172H		0172H		RPD	0315H		0315H		RPD	0366C		0366C		RPD
		Sample Name	0172H-IA01SC-030822		FD01-IA030822			0315H-IA01SC-031222		FD04-IA031222			0366C-IA01SC-031022		FD02-IA031022		
		Parent Sample Name			0172H-IA01SC-030822					0315H-IA01SC-031222					0366C-IA01SC-031022		
		Sample Date	3/8/2022		3/8/2022			3/12/2022		3/12/2022			3/10/2022		3/10/2022		
		Sample Type	N		FD			N		FD			N		FD		
Method	Analyte	Unit	Result	Q	Result	Q		Result	Q	Result	Q		Result	Q	Result	Q	
TO15SIM	1,1,1-Trichloroethane	µg/m^3	0.042	J	0.042	J	Abs Criteria	0.3		0.29		Abs Criteria	0.0383	J	0.109	U	NC
TO15SIM	1,1,2,2-Tetrachloroethane	µg/m^3	0.21	U	0.22	U	NC	0.22	U	0.22	U	NC	0.137	U	0.137	U	NC
TO15SIM	1,1,2-Trichloroethane	µg/m^3	0.16	U	0.18	U	NC	0.18	U	0.17	U	NC	0.163	U	0.163	U	NC
TO15	1,1,2-Trichlorotrifluoroethane	µg/m^3	0.51	J	0.53	J	Abs Criteria	0.46	J	0.5	J	Abs Criteria	1.53	U	1.53	U	NC
TO15SIM	1,1-Dichloroethane	µg/m^3	0.12	U	0.13	U	NC	0.01	J	0.011	J	Abs Criteria	0.0802	U	0.0802	U	NC
TO15SIM	1,1-Dichloroethene	µg/m^3	0.06	U	0.065	U	NC	0.064	U	0.062	U	NC	0.0793	U	0.0793	U	NC
TO15	1,2,4-Trichlorobenzene	µg/m^3	5.6	U	6	U	NC	6	U	5.8	U	NC	4.66	U	4.66	U	NC
TO15	1,2,4-Trimethylbenzene	µg/m^3	0.52	J	0.56	J	Abs Criteria	0.79	U	0.77	U	NC	0.982	U	0.982	U	NC
TO15SIM	1,2-Dibromoethane	µg/m^3	0.58	U	0.63	U	NC	0.62	U	0.6	U	NC	0.154	U	0.154	U	NC
TO15	1,2-Dichlorobenzene	µg/m^3	0.91	U	0.98	U	NC	0.97	U	0.94	U	NC	1.2	U	1.2	U	NC
TO15SIM	1,2-Dichloroethane	µg/m^3	0.073	J	0.069	J	Abs Criteria	0.13		0.14		Abs Criteria	0.184	J	0.102	J	Abs Criteria
TO15	1,2-Dichloropropane	µg/m^3	0.7	U	0.75	U	NC	0.74	U	0.72	U	NC	----	----	----	----	----
TO15SIM	1,2-Dichloropropane	µg/m^3	----	----	----	----	----	----	----	----	----	----	0.139	U	0.139	U	NC
TO15	1,2-Dichlorotetrafluoroethane	µg/m^3	----	----	----	----	----	----	----	----	----	----	1.4	U	1.4	U	NC
TO15SIM	1,2-Dichlorotetrafluoroethane	µg/m^3	0.1	J	0.098	J	Abs Criteria	0.12	J	0.11	J	Abs Criteria	----	----	----	----	----
TO15	1,3,5-Trimethylbenzene	µg/m^3	0.16	J	0.8	U	----	0.79	U	0.77	U	NC	0.982	U	0.982	U	NC
TO15	1,3-Butadiene	µg/m^3	0.34	U	0.36	U	NC	0.36	U	0.35	U	NC	4.43	U	4.43	U	NC
TO15	1,3-Dichlorobenzene	µg/m^3	0.91	U	0.98	U	NC	0.97	U	0.94	U	NC	1.2	U	1.2	U	NC
TO15SIM	1,4-Dichlorobenzene	µg/m^3	0.46	U	0.49	U	NC	0.48	U	0.92		Abs Criteria	0.18		0.12	U	NC
TO15	1,4-Dioxane	µg/m^3	0.55	U	0.59	U	NC	0.58	U	0.56	U	NC	0.721	U	0.721	U	NC
TO15	2,2,4-Trimethylpentane	µg/m^3	3.6	U	3.8	U	NC	3.8	U	3.7	U	NC	0.934	U	0.934	U	NC
TO15	2-Butanone (MEK)	µg/m^3	3		2.9		Abs Criteria	0.78	J	0.78	J	Abs Criteria	1.81	J	1.36	J	Abs Criteria
TO15	2-Chlorotoluene	µg/m^3	----	----	----	----	----	----	----	----	----	----	1.03	U	1.03	U	NC
TO15	2-Hexanone	µg/m^3	3.1	U	3.3	U	NC	3.3	U	3.2	U	NC	5.11	U	5.11	U	NC
TO15	4-Ethyltoluene	µg/m^3	0.45	J	0.52	J	Abs Criteria	0.79	U	0.77	U	NC	0.982	U	0.982	U	NC
TO15	4-Methyl-2-Pentanone (MIBK)	µg/m^3	0.5	J	0.48	J	Abs Criteria	0.66	U	0.64	U	NC	5.12	U	5.12	U	NC
TO15	Acetone	µg/m^3	27		32		17%	21		26		21%	101	J	34.9	J	**97%**
TO15	Allyl Chloride	µg/m^3	2.4	U	2.6	U	NC	2.5	U	2.4	UJ	NC	0.626	U	0.626	U	NC
TO15	Benzene	µg/m^3	----	----	----	----	----	----	----	----	----	----	----	----	0.482	J	Abs Criteria**
TO15SIM	Benzene	µg/m^3	0.34		0.34		Abs Criteria	0.43		0.42		Abs Criteria	0.47	J	----	----	----
TO15	Benzyl Chloride	µg/m^3	0.79	U	0.84	U	NC	0.83	U	0.81	U	NC	1.04	UJ	1.04	UJ	NC
TO15	Bromodichloromethane	µg/m^3	1	U	1.1	U	NC	1.1	U	1	U	NC	1.34	U	1.34	U	NC
TO15	Bromoethene	µg/m^3	----	----	----	----	----	----	----	----	----	----	0.875	U	0.875	U	NC
TO15	Bromoform	µg/m^3	1.6	U	1.7	U	NC	1.7	U	1.6	U	NC	6.21	U	6.21	U	NC
TO15	Bromomethane	µg/m^3	3	U	3.2	U	NC	3.1	UJ	3	UJ	NC	0.776	U	0.776	U	NC

Table 5-2
Summary of Field Duplicate Sampling Results
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

		Location	0172H		0172H		RPD	0315H		0315H		RPD	0366C		0366C		RPD
		Sample Name	0172H-IA01SC-030822		FD01-IA030822			0315H-IA01SC-031222		FD04-IA031222			0366C-IA01SC-031022		FD02-IA031022		
		Parent Sample Name			0172H-IA01SC-030822					0315H-IA01SC-031222					0366C-IA01SC-031022		
		Sample Date	3/8/2022		3/8/2022			3/12/2022		3/12/2022			3/10/2022		3/10/2022		
		Sample Type	N		FD			N		FD			N		FD		
TO15	Carbon Disulfide	µg/m^3	2.4	U	2.5	U	NC	2.5	U	2.4	U	NC	0.607	J	0.622	U	NC
TO15	Carbon Tetrachloride	µg/m^3	----	----	----	----	----	----	----	----	----	----	0.503	J	----	----	Abs Criteria**
TO15SIM	Carbon Tetrachloride	µg/m^3	0.41		0.42		Abs Criteria	0.4		0.41		Abs Criteria	----	----	0.44		----
TO15	Chlorobenzene	µg/m^3	0.7	U	0.75	U	NC	0.74	U	0.72	U	NC	0.924	U	0.924	U	NC
TO15SIM	Chloroethane	µg/m^3	0.2	U	0.22	U	NC	0.21	U	0.21	U	NC	0.106	U	0.106	U	NC
TO15	Chloroform	µg/m^3	----	----	----	----	----	----	----	----	----	----	0.604	J	----	----	Abs Criteria**
TO15SIM	Chloroform	µg/m^3	0.14	J	0.14	J	Abs Criteria	0.39		0.38		Abs Criteria	----	----	0.0973	UJ	
TO15	Chloromethane	µg/m^3	----	----	----	----	----	----	----	----	----	----	1.34		1.31		Abs Criteria
TO15SIM	Chloromethane	µg/m^3	0.74	J	0.72	J	Abs Criteria	1	J	1	J	Abs Criteria	----	----	----	----	----
TO15SIM	cis-1,2-Dichloroethene	µg/m^3	0.12	U	0.13	U	NC	0.051	J	0.05	J	Abs Criteria	0.0793	U	0.0793	U	NC
TO15	cis-1,3-Dichloropropene	µg/m^3	0.69	U	0.74	U	NC	0.73	U	0.71	U	NC	----	----	----	----	----
TO15SIM	cis-1,3-Dichloropropene	µg/m^3	----	----	----	----	----	----	----	----	----	----	0.0908	U	0.0908	U	NC
TO15	Cyclohexane	µg/m^3	2.6	U	2.8	U	NC	2.8	U	2.7	U	NC	0.689	U	0.689	U	NC
TO15	Dibromochloromethane	µg/m^3	1.3	U	1.4	U	NC	1.4	U	1.3	U	NC	1.7	U	1.7	U	NC
TO15	Dichlorodifluoromethane	µg/m^3	----	----	----	----	----	----	----	----	----	----	2.57		2.75		Abs Criteria
TO15SIM	Dichlorodifluoromethane	µg/m^3	1.9		2		5%	2.8		2.8		0%	----	----	----	----	----
TO15	Ethanol	µg/m^3	210	J	210	J	0%	480	J	460	J	4%	535	J	61.1	J	**159%**
TO15	Ethylbenzene	µg/m^3	----	----	----	----	----	----	----	----	----	----	4.9	J	1.74	J	Abs Criteria
TO15SIM	Ethylbenzene	µg/m^3	0.098	J	0.1	J	Abs Criteria	0.14	J	0.12	J	Abs Criteria	----	----	----	----	----
TO15	Hexachloro-1,3-Butadiene	µg/m^3	8.1	U	8.7	U	NC	8.6	U	8.4	U	NC	6.73	U	6.73	U	NC
TO15	Hexane	µg/m^3	2.7	U	2.9	U	NC	2.8	U	0.27	J	Abs Criteria	2.22	U	2.22	U	NC
TO15	Isopropyl Alcohol	µg/m^3	12		16		Abs Criteria	17	J	26	J	Abs Criteria	12.7		9.83		Abs Criteria
TO15	Isopropylbenzene	µg/m^3	0.75	U	0.8	U	NC	0.79	U	0.77	U	NC	0.983	U	0.983	U	NC
TO15	m,p-Xylene	µg/m^3	----	----	----	----	----	----	----	----	----	----	12.2	J	4.6	J	Abs Criteria
TO15SIM	m,p-Xylene	µg/m^3	0.33		0.35		Abs Criteria	0.44		0.42		Abs Criteria	----	----	----	----	----
TO15	Methyl Methacrylate	µg/m^3	----	----	----	----	----	----	----	----	----	----	0.819	U	0.819	U	NC
TO15	Methyl Tert-Butyl Ether	µg/m^3	----	----	----	----	----	----	----	----	----	----	0.721	U	0.721	U	NC
TO15SIM	Methyl Tert-Butyl Ether	µg/m^3	0.55	U	0.59	U	NC	0.58	U	0.57	U	NC	----	----	----	----	----
TO15	Methylene Chloride	µg/m^3	0.54	J	0.47	J	Abs Criteria	2.8	U	2.7	U	NC	0.622	J	0.722		Abs Criteria
TO15	Naphthalene	µg/m^3	----	----	----	----	----	----	----	----	----	----	3.3	U	3.3	U	NC
TO15	n-Heptane	µg/m^3	3.1	U	3.3	U	NC	0.43	J	3.2	U	Abs Criteria	0.585	J	0.818	U	NC
TO15	n-Propylbenzene	µg/m^3	0.75	U	0.8	U	NC	0.79	U	0.77	U	NC	----	----	----	----	----
TO15	o-Xylene	µg/m^3	----	----	----	----	----	----	----	----	----	----	2.42	J	0.958	J	Abs Criteria
TO15SIM	o-Xylene	µg/m^3	0.12	J	0.12	J	Abs Criteria	0.14		0.13	J	Abs Criteria	----	----	----	----	----
TO15	Propylene (Propene)	µg/m^3	----	----	----	----	----	----	----	----	----	----	2.15	U	2.15	U	NC
TO15	Styrene	µg/m^3	0.094	J	0.69	U	Abs Criteria	0.68	U	0.67	U	NC	0.851	U	0.851	U	NC

Table 5-2
Summary of Field Duplicate Sampling Results
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

		Location	0172H		0172H		RPD	0315H		0315H		RPD	0366C		0366C		RPD
		Sample Name	0172H-IA01SC-030822		FD01-IA030822			0315H-IA01SC-031222		FD04-IA031222			0366C-IA01SC-031022		FD02-IA031022		
		Parent Sample Name			0172H-IA01SC-030822					0315H-IA01SC-031222					0366C-IA01SC-031022		
		Sample Date	3/8/2022		3/8/2022			3/12/2022		3/12/2022			3/10/2022		3/10/2022		
		Sample Type	N		FD			N		FD			N		FD		
TO15SIM	Tetrachloroethene	µg/m^3	4.3		4.5		5%	2.3		2.2		4%	1.07	J	0.0957	J	Abs Criteria
TO15	Tetrahydrofuran	µg/m^3	2.2		2.2	J	Abs Criteria	1.2	J	1.2	J	Abs Criteria	0.59	U	0.59	U	NC
TO15	Toluene	µg/m^3	----	----	----	----	----	----	----	----	----	----	16.5	J	6.37	J	Abs Criteria
TO15SIM	Toluene	µg/m^3	0.7		0.7		Abs Criteria	2		1.8		11%	----	----	----	----	----
TO15SIM	trans-1,2-Dichloroethene	µg/m^3	0.6	U	0.65	U	NC	0.029	J	0.034	J	Abs Criteria	0.0793	U	0.0793	U	NC
TO15	trans-1,3-Dichloropropene	µg/m^3	0.69	U	0.74	U	NC	0.73	U	0.71	U	NC	----	----	----	----	----
TO15SIM	trans-1,3-Dichloropropene	µg/m^3	----	----	----	----	----	----	----	----	----	----	0.136	U	0.136	U	NC
TO15SIM	Trichloroethene	µg/m^3	0.028	J	0.03	J	Abs Criteria	0.29		0.3		Abs Criteria	0.0659	J	0.14		Abs Criteria
TO15	Trichlorofluoromethane	µg/m^3	1.2		1.2		Abs Criteria	1.2		1.3		Abs Criteria	1.39		1.32		Abs Criteria
TO15SIM	Vinyl Acetate	µg/m^3	----	----	----	----	----	----	----	----	----	----	0.0704	U	0.0704	U	NC
TO15SIM	Vinyl Chloride	µg/m^3	0.078	U	0.083	U	NC	0.082	U	0.08	U	NC	0.0511	U	0.0511	U	NC

Notes:
µg/m^3 - microgram per meter cubed
EPA - United States Environmental Protection Agency
FD - field duplicate
---- : Not analyzed
N - normal sample
Q: Qualifier
RPD - relative percent difference
NC: Not Calculated
ABS Criteria = Sample concentrations less than 5x the reporting limit - absolute difference (ABS) between the two results less than the reporting limit
Abs Criteria** : The absolute difference calculated using the TO-15 result and the TO-15 SIM result.
U - nondetect
J - estimated result
UJ - estimated nondetect result
TO-15 - Modified EPA Method TO-15 for VOCs
TO-15 SIM - Modified EPA Method TO-15 for VOCs by selective ion monitoring (SIM)
Yellow highlighting - RPD value is outside of 40% criteria or the Abs Criteria is outside of control limits

Table 5-2
Summary of Field Duplicate Sampling Results
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

		Location	0392H		0392H		RPD	B20		B20		RPD
		Sample Name	0392H-IA01SC-031222		FD03-IA031222			B20-IA01SC-031522		FD05-IA031522		
		Parent Sample Name			0392H-IA01SC-031222					B20-IA01SC-031522		
		Sample Date	3/12/2022		3/12/2022			3/15/2022		3/15/2022		
		Sample Type	N		FD			N		FD		
Method	Analyte	Unit	Result	Q	Result	Q		Result	Q	Result	Q	
TO15SIM	1,1,1-Trichloroethane	µg/m^3	0.37	U	0.18	U	NC	0.17	U	0.17	U	NC
TO15SIM	1,1,2,2-Tetrachloroethane	µg/m^3	0.46	U	0.22	U	NC	0.22	U	0.22	U	NC
TO15SIM	1,1,2-Trichloroethane	µg/m^3	0.37	U	0.18	U	NC	0.17	U	0.17	U	NC
TO15	1,1,2-Trichlorotrifluoroethane	µg/m^3	0.5	J	0.46	J	Abs Criteria	0.5	J	0.45	J	Abs Criteria
TO15SIM	1,1-Dichloroethane	µg/m^3	0.27	U	0.13	U	NC	0.13	U	0.13	U	NC
TO15SIM	1,1-Dichloroethene	µg/m^3	0.13	U	0.065	U	NC	0.063	U	0.063	U	NC
TO15	1,2,4-Trichlorobenzene	µg/m^3	12	U	6	U	NC	5.9	U	5.9	U	NC
TO15	1,2,4-Trimethylbenzene	µg/m^3	0.46	J	0.24	J	Abs Criteria	0.78	U	0.78	U	NC
TO15SIM	1,2-Dibromoethane	µg/m^3	1.3	U	0.63	U	NC	0.61	U	0.61	U	NC
TO15	1,2-Dichlorobenzene	µg/m^3	2	U	0.98	U	NC	0.96	U	0.96	U	NC
TO15SIM	1,2-Dichloroethane	µg/m^3	0.084	J	0.079	J	Abs Criteria	0.094	J	0.1	J	Abs Criteria
TO15	1,2-Dichloropropane	µg/m^3	1.6	U	0.75	U	NC	0.73	U	0.73	U	NC
TO15SIM	1,2-Dichloropropane	µg/m^3	----	----	----	----	----	----	----	----	----	----
TO15	1,2-Dichlorotetrafluoroethane	µg/m^3	----	----	----	----	----	----	----	----	----	----
TO15SIM	1,2-Dichlorotetrafluoroethane	µg/m^3	0.11	J	0.1	J	Abs Criteria	0.11	J	0.11	J	Abs Criteria
TO15	1,3,5-Trimethylbenzene	µg/m^3	1.6	U	0.8	U	NC	0.78	U	0.78	U	NC
TO15	1,3-Butadiene	µg/m^3	0.74	U	0.36	U	NC	0.35	U	0.35	U	NC
TO15	1,3-Dichlorobenzene	µg/m^3	2	U	0.98	U	NC	0.96	U	0.96	U	NC
TO15SIM	1,4-Dichlorobenzene	µg/m^3	1	U	0.49	U	NC	0.48	U	0.48	U	NC
TO15	1,4-Dioxane	µg/m^3	1.2	U	0.59	U	NC	0.57	U	0.57	U	NC
TO15	2,2,4-Trimethylpentane	µg/m^3	7.8	U	3.8	U	NC	3.7	U	3.7	U	NC
TO15	2-Butanone (MEK)	µg/m^3	1.5	J	5.4	J	Abs Criteria	0.64	J	2.3	U	NC
TO15	2-Chlorotoluene	µg/m^3	----	----	----	----	----	----	----	----	----	----
TO15	2-Hexanone	µg/m^3	6.9	U	0.97	J	Abs Criteria	3.2	U	3.2	U	NC
TO15	4-Ethyltoluene	µg/m^3	1.6	U	0.8	U	NC	0.78	U	0.78	U	NC
TO15	4-Methyl-2-Pentanone (MIBK)	µg/m^3	1.4	U	1.1		Abs Criteria	0.65	U	0.65	U	NC
TO15	Acetone	µg/m^3	50		63		23%	14		15		Abs Criteria
TO15	Allyl Chloride	µg/m^3	5.2	UJ	2.6	UJ	NC	2.5	U	2.5	U	NC
TO15	Benzene	µg/m^3	----	----	----	----	----	----	----	----	----	----
TO15SIM	Benzene	µg/m^3	0.63		0.58		Abs Criteria	0.35		0.38		Abs Criteria
TO15	Benzyl Chloride	µg/m^3	1.7	U	0.84	U	NC	0.82	U	0.82	U	NC
TO15	Bromodichloromethane	µg/m^3	2.2	U	1.1	U	NC	1.1	U	1.1	U	NC
TO15	Bromoethene	µg/m^3	----	----	----	----	----	----	----	----	----	----
TO15	Bromoform	µg/m^3	3.5	U	1.7	U	NC	1.6	U	1.6	U	NC
TO15	Bromomethane	µg/m^3	6.5	UJ	3.2	UJ	NC	3.1	UJ	3.1	UJ	NC

Table 5-2
Summary of Field Duplicate Sampling Results
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

		Location	0392H		0392H		RPD	B20		B20		RPD
		Sample Name	0392H-IA01SC-031222		FD03-IA031222			B20-IA01SC-031522		FD05-IA031522		
		Parent Sample Name			0392H-IA01SC-031222					B20-IA01SC-031522		
		Sample Date	3/12/2022		3/12/2022			3/15/2022		3/15/2022		
		Sample Type	N		FD			N		FD		
TO15	Carbon Disulfide	µg/m^3	5.2	U	2.5	U	NC	2.5	U	2.5	U	NC
TO15	Carbon Tetrachloride	µg/m^3	----	----	----	----	----	----	----	----	----	----
TO15SIM	Carbon Tetrachloride	µg/m^3	0.38	J	0.38		Abs Criteria	0.39		0.41		Abs Criteria
TO15	Chlorobenzene	µg/m^3	1.5	U	0.75	U	NC	0.73	U	0.73	U	NC
TO15SIM	Chloroethane	µg/m^3	0.44	U	0.1	J	Abs Criteria	0.21	U	0.21	U	NC
TO15	Chloroform	µg/m^3	----	----	----	----	----	----	----	----	----	----
TO15SIM	Chloroform	µg/m^3	0.27	J	0.26		Abs Criteria	0.1	J	0.1	J	Abs Criteria
TO15	Chloromethane	µg/m^3	----	----	----	----	----	----	----	----	----	----
TO15SIM	Chloromethane	µg/m^3	1.2	J	1.1	J	Abs Criteria	1	J	1.1	J	Abs Criteria
TO15SIM	cis-1,2-Dichloroethene	µg/m^3	0.27	U	0.13	U	NC	0.13	U	0.13	U	NC
TO15	cis-1,3-Dichloropropene	µg/m^3	1.5	U	0.74	U	NC	0.72	U	0.72	U	NC
TO15SIM	cis-1,3-Dichloropropene	µg/m^3	----	----	----	----	----	----	----	----	----	----
TO15	Cyclohexane	µg/m^3	5.8	U	2.8	U	NC	2.7	U	2.7	U	NC
TO15	Dibromochloromethane	µg/m^3	2.9	U	1.4	U	NC	1.4	U	1.4	U	NC
TO15	Dichlorodifluoromethane	µg/m^3	----	----	----	----	----	----	----	----	----	----
TO15SIM	Dichlorodifluoromethane	µg/m^3	2.1		2.1		Abs Criteria	2.2		2.2		0%
TO15	Ethanol	µg/m^3	2500	J	2400	J	4%	18		20		11%
TO15	Ethylbenzene	µg/m^3	----	----	----	----	----	----	----	----	----	----
TO15SIM	Ethylbenzene	µg/m^3	0.3		0.23		Abs Criteria	0.083	J	0.082	J	Abs Criteria
TO15	Hexachloro-1,3-Butadiene	µg/m^3	18	U	8.7	U	NC	8.5	U	8.5	U	NC
TO15	Hexane	µg/m^3	0.65	J	0.56	J	Abs Criteria	2.8	U	2.8	U	NC
TO15	Isopropyl Alcohol	µg/m^3	26	J	13	J	Abs Criteria	9.5	J	16	J	Abs Criteria
TO15	Isopropylbenzene	µg/m^3	1.6	U	0.8	U	NC	0.78	U	0.78	U	NC
TO15	m,p-Xylene	µg/m^3	----	----	----	----	----	----	----	----	----	----
TO15SIM	m,p-Xylene	µg/m^3	1.2	J	0.82	J	Abs Criteria	0.27	J	0.28		Abs Criteria
TO15	Methyl Methacrylate	µg/m^3	----	----	----	----	----	----	----	----	----	----
TO15	Methyl Tert-Butyl Ether	µg/m^3	----	----	----	----	----	----	----	----	----	----
TO15SIM	Methyl Tert-Butyl Ether	µg/m^3	1.2	U	0.016	J	Abs Criteria	0.57	U	0.57	U	NC
TO15	Methylene Chloride	µg/m^3	5.8	U	2.8	U	NC	2.8	U	2.8	U	NC
TO15	Naphthalene	µg/m^3	----	----	----	----	----	----	----	----	----	----
TO15	n-Heptane	µg/m^3	6.9	U	3.3	U	NC	3.2	U	3.2	U	NC
TO15	n-Propylbenzene	µg/m^3	1.6	U	0.8	U	NC	0.78	U	0.78	U	NC
TO15	o-Xylene	µg/m^3	----	----	----	----	----	----	----	----	----	----
TO15SIM	o-Xylene	µg/m^3	0.52	J	0.26	J	Abs Criteria	0.091	J	0.087	J	Abs Criteria
TO15	Propylene (Propene)	µg/m^3	----	----	----	----	----	----	----	----	----	----
TO15	Styrene	µg/m^3	1.4	U	0.69	U	NC	0.68	U	0.68	U	NC

Table 5-2
Summary of Field Duplicate Sampling Results
700 South 1600 East PCE Plume Site
Salt Lake City, Utah

		Location	0392H		0392H		RPD	B20		B20		RPD
		Sample Name	0392H-IA01SC-031222		FD03-IA031222			B20-IA01SC-031522		FD05-IA031522		
		Parent Sample Name			0392H-IA01SC-031222					B20-IA01SC-031522		
		Sample Date	3/12/2022		3/12/2022			3/15/2022		3/15/2022		
		Sample Type	N		FD			N		FD		
TO15SIM	Tetrachloroethene	µg/m^3	0.074	J	0.062	J	Abs Criteria	0.069	J	0.069	J	Abs Criteria
TO15	Tetrahydrofuran	µg/m^3	5	U	2.4	U	NC	2.3	U	2.3	U	NC
TO15	Toluene	µg/m^3	----	----	----	----	----	----	----	----	----	----
TO15SIM	Toluene	µg/m^3	1.2		1.1		Abs Criteria	0.59		0.6		Abs Criteria
TO15SIM	trans-1,2-Dichloroethene	µg/m^3	1.3	U	0.022	J	Abs Criteria	0.03	J	0.038	J	Abs Criteria
TO15	trans-1,3-Dichloropropene	µg/m^3	1.5	U	0.74	U	NC	0.72	U	0.72	U	NC
TO15SIM	trans-1,3-Dichloropropene	µg/m^3	----	----	----	----	----	----	----	----	----	----
TO15SIM	Trichloroethene	µg/m^3	0.36	U	0.18	U	NC	0.17	U	0.17	U	NC
TO15	Trichlorofluoromethane	µg/m^3	1.3	J	1.2		Abs Criteria	1.3		1.3		Abs Criteria
TO15SIM	Vinyl Acetate	µg/m^3	----	----	----	----	----	----	----	----	----	----
TO15SIM	Vinyl Chloride	µg/m^3	0.17	U	0.083	U	NC	0.081	U	0.081	U	NC

Notes:
µg/m^3 - microgram per meter cubed
EPA - United States Environmental Protection Agency
FD - field duplicate
---- : Not analyzed
N - normal sample
Q: Qualifier
RPD - relative percent difference
NC: Not Calculated
ABS Criteria = Sample concentrations less than 5x the reporting limit - absolute difference (ABS) between the two results less than the reporting limit
Abs Criteria** : The absolute difference calculated using the TO-15 result and the TO-15 SIM result.
U - nondetect
J - estimated result
UJ - estimated nondetect result
TO-15 - Modified EPA Method TO-15 for VOCs
TO-15 SIM - Modified EPA Method TO-15 for VOCs by selective ion monitoring (SIM)
Yellow highlighting - RPD value is outside of 40% criteria or the Abs Criteria is outside of control limits

Section 6

Data Usability Assessment

One hundred percent of the data reported and validated in this QCSR are suitable for their intended use as stated in the QAPP (CDM Smith 2020a). Sample results that were qualified as estimated are usable for project decisions. No sample results were rejected.

The achievement of the completeness goals for the number of samples collected and the number of sample results acceptable for use provides sufficient quality data to support project decisions.

Section 7
References

CDM Smith. 2020a. *Phase 2 Quality Assurance Project Plan, Operable Unit 1, 700 South 1600 East PCE Plume Site, Salt Lake City, Utah.* Prepared for the U.S. Army Corps of Engineers Kansas City District.

CDM Smith. 2020b. *Phase 2 Remedial Investigation Work Plan, Operable Unit 1, 700 South 1600 East PCE Plume Site, Salt Lake City, Utah*. Prepared for the U.S. Army Corps of Engineers Kansas City District.

EPA. 2020. *National Functional Guidelines for Organic Superfund Methods Data Review*. EPA-540-R-20-005.

EPA. 2014. *Analysis of Volatile Organic Compounds (VOCs) in Air Contained in Canisters by Method TO-15*. EPA Hazardous Waste Support Section Standard Operating Procedure No. HW-31.

Attachment 1

Data Validation Reports

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number:	2203384
Laboratory:	Eurofins Air Toxics
Matrix:	Air
Collection date:	3/8/2022 3/9/2022
Analysis/Methods:	
	Volatile Organic Compounds - EPA Method TO-15
	Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number
FD01-IA030822	2203384-01A / B
0274H-IA01SC-030822	2203384-02A / B
0329H-IA01SC-030822	2203384-03A / B
0347H-IA01SC-030922	2203384-04A / B

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPDs) ≤40%?			**Yes**
Laboratory Control Spike Duplicate RPDs within limits?			**Yes**
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Were the Laboratory Duplicate RPDs within limits?			**Yes**

Comments (note deviations):

Field Duplicates	**TO-15 / SIM**	**Sample (ug/m3)**	**Duplicate (ug/m3)**	**%RPD**	**Qualifiers**	**Associated Samples**
		0172H-IA01SC-030822**	**FD01-IA030822**			
TO-15				Acceptable		
SIM				Acceptable		

**Results reported in SDG 2203386

LCS/LCSD	**TO-15 / SIM**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
2203384-07A / 7AA		Acceptable			
2203384-07B / 07BB (SIM)		Acceptable			

MS/MSD	**TO-15 / SIM**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
N/A					

Laboratory Duplicate	**Sample (ug/m3)**	**Duplicate (ug/m3)**	**RL**	**%RPD**	**Qualifiers**	**Associated Samples**
2203384-01A / 01AA				Acceptable		
2203384-01B / 01BB				Acceptable		

Accuracy:	**Yes**	**No**	**N/A**
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?			**Yes**
Were the Laboratory Method Blank results all < RL?			**No**
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)			**Yes**
Was the CCV criteria met? (30%)			**Yes**
Was the Tuning criteria met?			**Yes**
Were the Surrogate % recoveries within laboratory determined control limits?			**Yes**
Were the Internal Standard areas within ± 60 - 140%?			**Yes**
Was canister certification criteria met?			**Yes**
Were sample results able to be recalculated from the laboratory raw data and were they accurate?			**Yes**
Was target compound identification correctly performed by the laboratory?			**Yes**
Were chromatograms representative of the sample results?			**Yes**

Comments (note deviations):

Blanks	TO-15 / SIM	Concentration (ug/m^3)	MDL / RL (ug/m^3)	Qualifiers	Associated Samples
Lab Blank					
2203384-05A		Nondetect			
2203384-05B (SIM)	Benzene	0.019 J	0.016 / 0.16	None	Sample results > RL

Field Blank	TO-15 / SIM	Concentration	MDL / RL	Qualifiers	Associated Samples
N/A					

Surrogates	TO-15 / SIM	%R	Limit	Qualifiers	Associated Samples
		Acceptable			

MS/MSD	TO-15 SIM	%R	Limits (%)	Qualifiers	Associated Samples
N/A					

LCS/LCSD	TO-15 / SIM	%R	Limits	Qualifiers	Associated Samples
2203384-07A / 7AA		Acceptable			
2203384-07B / 07BB (SIM)		Acceptable			

ICV/CCV	TO-15 / SIM	%R	Qualifiers	Associated Samples
3/4/2022 19:00		Acceptable		
ICV				

ICAL	TO-15 / SIM	RRF	%RSD	Qualifiers	Associated Samples
3/04/2022 11:20		Acceptable	Acceptable		
3/04/2022 (9:04 (SIM)		Acceptable	Acceptable		

CCV	TO-15 / SIM	RRF	%D	Limit	Qualifiers	Associated Samples
3/18/2022 7:54		Acceptable	Acceptable			
3/18/2022 10:10		Acceptable	Acceptable			
3/18/2022 7:54 (SIM)		Acceptable	Acceptable			
3/18/2022 10:10 (SIM)		Acceptable	Acceptable			

Tune	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Internal Standards	TO-15 / SIM	Area %	Area % Criteria	Qualifiers	Associated Samples
	All Internal Standards	Acceptable			

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review	TO-15 / SIM	Results
Recalculated Sample Result		Acceptable

Sample #	Laboratory Reported Result (ug/m3)	Recalculated Sample Result (ug/m3)
TO-15		**RRF / Concentration**
2203384-03A	2-Propanol: 11	0.6833 / 11.499
2203384-03A	Acetone: 15	0.32487/ 15.452
TO-15 - SIM		
2203384-03B	Benzene: 0.38	0.7758 / 0.385
2203384-03B	Toluene: 0.62	0.9428 / 0.623

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc. = (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification	Acceptable
Chromatogram review	Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	**Yes**		
Were holding times met?	**Yes**		
Was preservation criteria met? (0° - 6° C)			**N/A**
Were Chain-of-Custody records complete and provided in data package?	**Yes**		

Comments (note

Holding Time / Canister Pressure Criteria	Days to Analysis	Criteria	Qualifiers	Associated Samples
Holding Time	Acceptable			

	Initial and Final Canister Pressure Results
Canister Pressure Criteria	Acceptable

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	**Yes**		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	**Yes**		

Comments (note

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	**Yes**		
Do the reporting limits meet project requirements?	**Yes**		

Comments (note deviations):

As stated in the case narrative, ethanol exceeded the instrument's calibration range for samples FD01-IA030822, FD01-IA030822-LR, 0274H-IA01SC-030822 and 0347H-IA01SC-030922.
Ethanol results were qualified as estimated "J".

Overall Comments: Data are usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 4/6/2022

Data Reviewer: Cherie Zakowski Date: 4/10/2022

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number:	2203385
Laboratory:	Eurofins Air Toxics
Matrix:	Air
Collection date:	03/08/22
Analysis/Methods:	Volatile Organic Compounds - EPA Method TO-15 Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number
0072H-IA01SC-030822	2203385-01A / B
0180H-IA01SC-030822	2203385-02A / B
0197H-IA01SC-030822	2203385-03A / B
0013H-IA01SC-030822	2203385-04A / B

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPDs) ≤40%?			**N/A**
Laboratory Control Spike Duplicate RPDs within limits?			**Yes**
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Were the Laboratory Duplicate RPDs within limits?			**N/A**

Comments (note deviations):

Field Duplicates	**TO-15 / SIM**	**Sample (ug/m3)**	**Duplicate (ug/m3)**	**%RPD**	**Qualifiers**	**Associated Samples**
N/A						

LCS/LCSD	**TO-15 / SIM**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
2203385-07A / 7AA		Acceptable			
2203385-07B / 7BB (SIM)		Acceptable			

MS/MSD	**TO-15 / SIM**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
N/A					

Laboratory Duplicate	**Sample (ug/m3)**	**Duplicate (ug/m3)**	**RL**	**%RPD**	**Qualifiers**	**Associated Samples**
N/A						

Accuracy:	**Yes**	**No**	**N/A**
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?			**Yes**
Were the Laboratory Method Blank results all < RL?			**Yes**
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)			**Yes**
Was the CCV criteria met? (30%)			**Yes**
Was the Tuning criteria met?			**Yes**
Were the Surrogate % recoveries within laboratory determined control limits?			**Yes**
Were the Internal Standard areas within ± 60 - 140%?			**Yes**
Was canister certification criteria met?			**Yes**
Were sample results able to be recalculated from the laboratory raw data and were they accurate?			**Yes**
Was target compound identification correctly performed by the laboratory?			**Yes**
Were chromatograms representative of the sample results?			**Yes**

Comments (note deviations):

Blanks	TO-15 / SIM	Concentration (ug/m^3)	MDL / RL (ug/m^3)	Qualifiers	Associated Samples
Lab Blank					
2203385-05A		Nondetect			
2203385-05B (SIM)		Nondetect			

Field Blank	TO-15 / SIM	Concentration	MDL / RL	Qualifiers	Associated Samples
N/A					

Surrogates	TO-15 / SIM	%R	Limit	Qualifiers	Associated Samples
		Acceptable			

MS/MSD	TO-15 SIM	%R	Limits (%)	Qualifiers	Associated Samples
N/A					

LCS/LCSD	TO-15 / SIM	%R	Limits	Qualifiers	Associated Samples
2203385-07A / 7AA		Acceptable			
2203385-07B / 7BB (SIM)		Acceptable			

ICV/CCV	TO-15 / SIM	%R	Qualifiers	Associated Samples
3/4/2022 19:00		Acceptable		
ICV				

ICAL	TO-15 / SIM	RRF	%RSD	Qualifiers	Associated Samples
3/4/2022 11:20		Acceptable	Acceptable		
3/4/2022 9:04 (SIM)		Acceptable	Acceptable		

CCV	TO-15 / SIM	RRF	%D	Qualifiers	Associated Samples
3/21/2022 7:51		Acceptable	Acceptable		
3/21/2022 9:58		Acceptable	Acceptable		
3/21/2022 7:51 (SIM)		Acceptable	Acceptable		

Tune	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Internal Standards	TO-15 / SIM	Area %	Area % Criteria	Qualifiers	Associated Samples
	All Internal Standards	Acceptable			

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review **TO-15 / SIM** **Results**

Recalculated Sample Result Acceptable

Sample #	Laboratory Reported Result (ug/m3)	Recalculated Sample Result (ug/m3)
TO-15		**RRF / Concentration**
2203385-01A	Freon 11: 1.2	1.472/ 1.198
TO-15 - SIM		
2203385-01B	Carbon Tetrachloride: 0.38	1.5080 / 0.384
2203385-01B	Freon 12: 2.0	1.7869 / 1.963

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc.= (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification Acceptable
Chromatogram review Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	Yes		
Were holding times met?	Yes		
Was preservation criteria met? (0° - 6° C)			N/A
Were Chain-of-Custody records complete and provided in data package?	Yes		

Comments (note

Holding Time / Canister Pressure Criteria	Days to Analysis	Criteria	Qualifiers	Associated Samples
Holding Time	Acceptable			

	Initial and Final Canister Pressure Results
Canister Pressure Criteria	Acceptable

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	Yes		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	Yes		

Comments (note

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	Yes		
Do the reporting limits meet project requirements?	Yes		

Comments (note deviations):

As stated in the case narrative, ethanol exceeded the instrument's calibration range for sample 0072H-IA01SC-030822. The ethanol result was qualified as estimated "J".

Overall Comments: Data are usable as reported.

Data Validator: Kristine Molloy Date: 4/9/2022

Data Reviewer: Cherie Zakowski Date: 4/10/2022

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number:	2203386
Laboratory:	Eurofins Air Toxics
Matrix:	Air
Collection date:	03/08/22
Analysis/Methods:	
	Volatile Organic Compounds - EPA Method TO-15
	Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number
0064H-AA01SC-030822	2203386-01A / B
0064H-IA01SC-030822	2203386-02A / B
0336H-IA01SC-030822	2203386-03A / B
0172H-IA01SC-030822	2203386-04A / B

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPDs) ≤40%?	**Yes**		
Laboratory Control Spike Duplicate RPDs within limits?	**Yes**		
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Were the Laboratory Duplicate RPDs within limits?	**Yes**		

Comments (note deviations):

Field Duplicates	**TO-15 / SIM**	**Sample (ug/m3) 0172H-IA01SC-030822**	**Duplicate (ug/m3) FD01-IA030822****	**%RPD**	**Qualifiers**	**Associated Samples**
TO-15				Acceptable		
SIM				Acceptable		

**Results reported in SDG 2203384

LCS/LCSD	**TO-15 / SIM**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
2203386-07A / 7AA		Acceptable			
2203386-07B / 7BB (SIM)		Acceptable			

MS/MSD	**TO-15 / SIM**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
N/A					

Laboratory Duplicate	**Sample (ug/m^3)**	**Duplicate (ug/m^3)**	**RL**	**%RPD**	**Qualifiers**	**Associated Samples**
2203386-01A / 01AA						
Ethanol	6.3	ND		NC	None	Sample results < 5xs RL; ABS Diff. < RL
Hexane	0.2 J	ND		NC	None	Sample results < 5xs RL; ABS Diff. < RL
2203386-01B / 01BB				Acceptable		

Accuracy:	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?	**Yes**		
Were the Laboratory Method Blank results all < RL?	**Yes**		
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)	**Yes**		
Was the CCV criteria met? (30%)	**Yes**		
Was the Tuning criteria met?	**Yes**		
Were the Surrogate % recoveries within laboratory determined control limits?	**Yes**		
Were the Internal Standard areas within ± 60 - 140%?	**Yes**		
Was canister certification criteria met?	**Yes**		
Were sample results able to be recalculated from the laboratory raw data and were they accurate?	**Yes**		
Was target compound identification correctly performed by the laboratory?	**Yes**		
Were chromatograms representative of the sample results?	**Yes**		

Comments (note deviations):

Blanks	**TO-15 / SIM**	**Concentration (ug/m^3)**	**MDL / RL (ug/m^3)**	**Qualifiers**	**Associated Samples**
Lab Blank					
2203386-05A		Nondetect			
2203386-05B (SIM)		Nondetect			

Field Blank	**TO-15 / SIM**	**Concentration**	**MDL / RL**	**Qualifiers**	**Associated Samples**
N/A					

Surrogates	**TO-15 / SIM**	**%R**	**Limit**	**Qualifiers**	**Associated Samples**
		Acceptable			

MS/MSD	**TO-15 SIM**	**%R**	**Limits (%)**	**Qualifiers**	**Associated Samples**
N/A					

LCS/LCSD	**TO-15 / SIM**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
2203386-07A / 7AA		Acceptable			
2203386-07B / 7BB (SIM)		Acceptable			

ICV/CCV	**TO-15 / SIM**		**%R**	**Qualifiers**	**Associated Samples**
3/4/2022 19:00			Acceptable		
ICV					

ICAL	**TO-15 / SIM**	**RRF**	**%RSD**	**Qualifiers**	**Associated Samples**
3/4/2022 11:20		Acceptable	Acceptable		
3/4/2022 9:04 (SIM)		Acceptable	Acceptable		

CCV	**TO-15 / SIM**	**RRF**	**%D**	**Qualifiers**	**Associated Samples**
3/21/2022 7:51		Acceptable	Acceptable		
3/21/2022 9:58		Acceptable	Acceptable		
3/21/2022 7:51 (SIM)		Acceptable	Acceptable		

Tune	**TO-15 / SIM**	**Qualifiers**	**Associated Samples**
	Acceptable		

Internal Standards	**TO-15 / SIM**	**Area %**	**Area % Criteria**	**Qualifiers**	**Associated Samples**
	All Internal Standards	Acceptable			

Canister Certification	**TO-15 / SIM**	**Qualifiers**	**Associated Samples**
	Acceptable		

Raw Data Review	TO-15 / SIM	Results
Recalculated Sample Result		Acceptable

Sample #	Laboratory Reported Result (ug/m3)	Recalculated Sample Result (ug/m3)
TO-15		**RRF / Concentration**
2203386-04A	Ethanol: 210	0.0623 / 211.1
2203386-04A	Freon 11: 1.2	1.4723 / 1.193
TO-15 - SIM		
2203386-04B	1,2-Dichloroethane: 0.073	0.2196 / 0.073
2203386-04B	Tetrachloroethene: 4.3	0.8326/ 4.323

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc.= (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification	Acceptable
Chromatogram review	Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	**Yes**		
Were holding times met?	**Yes**		
Was preservation criteria met? (0° - 6° C)			**N/A**
Were Chain-of-Custody records complete and provided in data package?	**Yes**		

Comments (note

Holding Time / Canister Pressure Criteria	Days to Analysis	Criteria	Qualifiers	Associated Samples
Holding Time	Acceptable			

	Initial and Final Canister Pressure Results
Canister Pressure Criteria	Acceptable

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	**Yes**		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	**Yes**		

Comments (note

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	**Yes**		
Do the reporting limits meet project requirements?	**Yes**		

Comments (note deviations):

As stated in the case narrative, ethanol exceeded the instrument's calibration range for samples 0336H-IA01SC-030822 and 0172H-IA01SC-030822.

Ethanol results were qualified as estimated "J".

Overall Comments: Data are usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 4/11/2022

Data Reviewer: Cherie Zakowski Date: 4/15/2022

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number: 2203546
Laboratory: Eurofins Air Toxics
Matrix: Air
Collection date: 3/11/2022 & 3/12/2022
Analysis/Methods:

Volatile Organic Compounds - EPA Method TO-15
Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number
0392H-IA01SC-031222	2203546-01A / B
FD03-IA031222	2203546-02A / B
0273H-IA01SC-031222	2203546-03A / B
0192H-IA01SC-031122	2203546-04A / B

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPDs) ≤40%?		**No**	
Laboratory Control Spike Duplicate RPDs within limits?		**No**	
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Were the Laboratory Duplicate RPDs within limits?	**Yes**		

Comments (note deviations):

Field Duplicates	**TO-15 / SIM**	**Sample (ug/m^3) 0392H-IA01SC-031222**	**Duplicate (ug/m3) FD03-IA031222**	**%RPD**	**Qualifiers**	**Associated Samples**
TO-15	2-Propanol	26	13	NC	**J****	**2203546-01A & 2203546-02A**
	2-Butanone	1.5 J	5.4	NC	**J****	**2203546-01A & 2203546-02A**
SIM	m/p-Xylene (SIM)	1.2 J	0.82 J	NC	**J****	**2203546-01A & 2203546-02A**
	o-Xylene (SIM)	0.52	0.26	NC	**J****	**2203546-01A & 2203546-02A**

** ABS Diff. > RL

LCS/LCSD	**TO-15 / SIM**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
2203546-07A / 7AA		Acceptable			
2203546-07B / 7BB (SIM)		Acceptable			

MS/MSD	**TO-15 / SIM**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
N/A					

Laboratory Duplicate	**Sample (ug/m^3)**	**Duplicate (ug/m^3)**	**RL**	**%RPD**	**Qualifiers**	**Associated Samples**
2203546-02A / 2AA						
1,2,4-Trimethylbenzene	0. 24 J	ND		NC	None	
2-Hexanone	0.97 J	ND		NC	None	Sample results < 5xs RL; ABS Diff. < RL
4-Methyl-2-pentanone	1.1J	ND		NC	None	
Methylene Chloride	0.47 J	ND		NC	None	
2203546-02B / 2BB						
Methyl-tert-butyl ether	0.26	ND		NC	None	Sample results < 5xs RL; ABS Diff. < RL
trans-1,2-Dichlorothene	0.002 J	ND		NC	None	

Accuracy:	**Yes**	**No**	**N/A**
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?			**Yes**
Were the Laboratory Method Blank results all < RL?			**No**
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)			**Yes**
Was the CCV criteria met? (30%)			**No**
Was the Tuning criteria met?			**Yes**
Were the Surrogate % recoveries within laboratory determined control limits?			**Yes**
Were the Internal Standard areas within ± 60 - 140%?			**Yes**
Was canister certification criteria met?			**Yes**
Were sample results able to be recalculated from the laboratory raw data and were they accurate?			**Yes**
Was target compound identification correctly performed by the laboratory?			**Yes**
Were chromatograms representative of the sample results?			**Yes**

Comments (note deviations):

Blanks	**TO-15 / SIM**	**Concentration (ug/m^3)**	**MDL / RL (ug/m^3)**	**Qualifiers**	**Associated Samples**
Lab Blank					
2203546-05A	Acetone	0.64 J	0.24 / 2.4	None	Sample results > RL
	2-Propanol	1.2 J	0.13 / 2.4	None	Sample results > RL
	Methylene Chloride	0.20 J	0.18 / 1.7	**U-RL**	**2203546-02A, 2203546-03A, 2203546-04A,**
2203546-05B (SIM)	1,1,2,2-Tetrachloroethane	0.039 J	0.014 / 0.14	None	Sample results nondetect

Field Blank	**TO-15 / SIM**	**Concentration**	**MDL / RL**	**Qualifiers**	**Associated Samples**
N/A					

Surrogates	**TO-15 / SIM**	**%R**	**Limit**	**Qualifiers**	**Associated Samples**
		Acceptable			

MS/MSD	**TO-15 SIM**	**%R**	**Limits (%)**	**Qualifiers**	**Associated Samples**
N/A					

LCS/LCSD	**TO-15 / SIM**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
2203546-07A / 7AA		Acceptable			
2203546-07B / 7BB		Acceptable			

ICV/CCV	**TO-15 / SIM**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
3/4/2022 19:00	Bromomethane	67.6	70-130	**J / UJ**	**All samples**
ICV					

ICAL	**TO-15 / SIM**	**RRF**	**%RSD**	**Qualifiers**	**Associated Samples**
12/3/2022 13:37		Acceptable	Acceptable		
12/3/2022 11:34 (SIM)		Acceptable	Acceptable		

CCV	**TO-15 / SIM**	**RRF**	**%D**	**Qualifiers**	**Associated Samples**
3/27/2022 10:27	3-Chloropropene	Acceptable	-32.599	**J / UJ**	**All samples**
3/27/2022 10:04		Acceptable	Acceptable		
3/27/2022 10:27 (SIM)		Acceptable	Acceptable		
3/27/2022 10:04 (SIM)		Acceptable	Acceptable		

Tune	**TO-15 / SIM**	**Qualifiers**	**Associated Samples**
	Acceptable		

Internal Standards	**TO-15 / SIM**	**Area %**	**Area % Criteria**	**Qualifiers**	**Associated Samples**
	All Internal Standards	Acceptable			

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review	TO-15 / SIM	Results
Recalculated Sample Result		Acceptable

Sample #	Laboratory Reported Result (ug/m3)	Recalculated Sample Result (ug/m3)
TO-15		**RRF / Concentration**
2203546-03A	Acetone: 28	0.6011 / 28.253
2203546-03A	Ethanol: 240	0.13247 / 242.858
TO-15 - SIM		
2203546-03B	1,2-Dichloroethane: 0.160	0.5462 / 0.155
2203546-03B	Benzene: 0.450	1.0938 / 0.452

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc. = (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification	Acceptable
Chromatogram review	Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	Yes		
Were holding times met?	Yes		
Was preservation criteria met? (0° - 6° C)			N/A
Were Chain-of-Custody records complete and provided in data package?	Yes		

Comments (note

Holding Time / Canister Pressure Criteria	Days to Analysis	Criteria	Qualifiers	Associated Samples
Holding Time	Acceptable			

	Initial and Final Canister Pressure Results
Canister Pressure Criteria	Acceptable

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	Yes		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	Yes		

Comments (note

Sensitivity:

	Yes	No	N/A
Are MDLs present and reported?	Yes		
Do the reporting limits meet project requirements?	Yes		

Comments (note deviations):

As stated in the case narrative, ethanol exceeded the instrument's calibration range for samples 0392H-IA01SC-031222,FD03-IA031222, 0273H-IA01SC-031222, and 0192H-IA01SC-031122.

Ethanol results were qualified as estimated "J".

As stated in the case narrative, the Chain of Custody (COC) information for sample 0273H-IA015C-031222 did not match the information on the canister with regard to canister barcode. The sample labeled 6L1436 on the COC is labeled as 6L1439 on the canister. The client was notified of the discrepancy and the information on the canister was used to process and report the sample.

Overall Comments: Data are usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 4/13/2022

Data Reviewer: Cherie Zakowski Date: 4/15/2022

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number:	2203547
Laboratory:	Eurofins Air Toxics
Matrix:	Air
Collection date:	03/12/22
Analysis/Methods:	Volatile Organic Compounds - EPA Method TO-15 Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number
FD04-IA031222	2203547-01A / B
0277H-IA01SC-031222	2203547-02A / B
0041H-IA01SC-031222	2203547-03A/ B
0145H-IA01SC-031222	2203547-04A / B

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPDs) ≤40%?		**No**	
Laboratory Control Spike Duplicate RPDs within limits?		**Yes**	
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Were the Laboratory Duplicate RPDs within limits?		**No**	

Comments (note deviations):

Field Duplicates	**TO-15 / SIM**	**Sample (ug/m^3) 03I5H-IA01SC-031222****	**Duplicate (ug/m3) FD04-IA031222**	**%RPD**	**Qualifiers**	**Associated Samples**
	2-Propanol	17 J	26 J	NC	**J^{axx}**	**03I5H-IA01SC-031222 & FD04-IA031222**

xx: ABS Diff. > RL

** Sample results reported in SDG 2203596

LCS/LCSD	**TO-15 / SIM**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
2203547-07A / 7AA		Acceptable			
2203547-07B / 7BB		Acceptable			

MS/MSD	**TO-15 / SIM**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
N/A					

Laboratory Duplicate	**Sample (ug/m^3)**	**Duplicate (ug/m^3)**	**RL**	**%RPD**	**Qualifiers**	**Associated Samples**
2203547-01A / 1AA						
Hexane	0. 27 J	ND		NC	None	Sample results < 5xs RL; ABS Diff. < RL
2203547-01B / 1BB						
1,1-Dichloroethane	0.011 J	ND		NC	None	Sample results < 5xs RL; ABS Diff. < RL

Accuracy:	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?			**Yes**
Were the Laboratory Method Blank results all < RL?			**No**
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)			**Yes**
Was the CCV criteria met? (30%)			**No**
Was the Tuning criteria met?			**Yes**
Were the Surrogate % recoveries within laboratory determined control limits?			**Yes**
Were the Internal Standard areas within ± 60 - 140%?			**Yes**
Was canister certification criteria met?			**Yes**
Were sample results able to be recalculated from the laboratory raw data and were they accurate?			**Yes**
Was target compound identification correctly performed by the laboratory?			**Yes**
Were chromatograms representative of the sample results?			**Yes**

Comments (note deviations):

Blanks	**TO-15 / SIM**	**Concentration (ug/m^3)**	**MDL / RL (ug/m^3)**	**Qualifiers**	**Associated Samples**
Lab Blank					
2203547-05A	Acetone	0.40 J	0.24 / 2.4	None	Sample results > RL
	2-Propanol	0.84 J	0.13 / 2.4	None	Sample results > RL
	Methylene Chloride	0.38 J	0.18 / 1.7	**U-RL**	**2203547-01A, 2203547-03A**
2203547-05B (SIM)	1,1,2,2-Tetrachloroethane	0.035 J	0.014 / 0.14	None	Sample results nondetect
	1,1,2-Trichloroethane	0.0091 J	0.009 / 0.11	None	Sample results nondetect

Field Blank	**TO-15 / SIM**	**Concentration**	**MDL / RL**	**Qualifiers**	**Associated Samples**
N/A					

Surrogates	**TO-15 / SIM**	**%R**	**Limit**	**Qualifiers**	**Associated Samples**
		Acceptable			

MS/MSD	**TO-15 SIM**	**%R**	**Limits (%)**	**Qualifiers**	**Associated Samples**
N/A					

LCS/LCSD	**TO-15 / SIM**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
2203547-07A / 7AA		Acceptable			
2203547-07B / 7BB		Acceptable			

ICV/CCV	**TO-15 / SIM**	**%R**	**Qualifiers**	**Associated Samples**
12/3/2021 22:15				
ICV	Bromomethane	67.6	**J / UJ**	**All samples**

ICAL	**TO-15 / SIM**	**RRF**	**%RSD**	**Qualifiers**	**Associated Samples**
12/3/2022 13:37		Acceptable	Acceptable		
12/3/2022 11:34 (SIM)		Acceptable	Acceptable		

CCV	**TO-15 / SIM**	**RRF**	**%D**	**Qualifiers**	**Associated Samples**
3/25/2022 7:13	3-Chloropropene	Acceptable	-31.489	**J / UJ**	**All samples**
3/25/2022 10:45		Acceptable	Acceptable		
3/25/2022 7:13 (SIM)		Acceptable	Acceptable		
3/25/2022 10:45 (SIM)		Acceptable	Acceptable		

Tune	**TO-15 / SIM**	**Qualifiers**	**Associated Samples**
	Acceptable		

Internal Standards	**TO-15 / SIM**	**Area %**	**Area % Criteria**	**Qualifiers**	**Associated Samples**
	All Internal Standards	Acceptable			

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review	TO-15 / SIM	Results
Recalculated Sample Result		Acceptable

Sample #	Laboratory Reported Result (ug/m3)	Recalculated Sample Result (ug/m3)
TO-15		**RRF / Concentration**
2203547-02A	4-Methyl-2-pentanone: 0.34	0.0887 / 0.336
2203547-02A	Freon 11: 1.4	3.30271 / 1.455
TO-15 - SIM		
2203547-02B	Carbon Tetrachloride: 0.40	3.6389 / 0.398
2203547-02B	Freon 12: 2.5	3.4358 / 2.464

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc. = (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification	Acceptable
Chromatogram review	Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	Yes		
Were holding times met?	Yes		
Was preservation criteria met? (0° - 6° C)			N/A
Were Chain-of-Custody records complete and provided in data package?	Yes		

Comments (note

Holding Time / Canister Pressure Criteria	Days to Analysis	Criteria	Qualifiers	Associated Samples
Holding Time	Acceptable			

	Initial and Final Canister Pressure Results
Canister Pressure Criteria	Acceptable

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	Yes		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	Yes		

Comments (note

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	Yes		
Do the reporting limits meet project requirements?	Yes		

Comments (note deviations):

As stated in the case narrative, ethanol exceeded the instrument's calibration range for samples FD04-IA031222 and 0041H-IA01SC-031222. Ethanol results were qualified as estimated "J".

As stated in the case narrative, the presence of a closely eluting non-target peak in sample 0145H-IA01SC-031222 is interfering with the quantitation mass ion for Carbon Tetrachloride. The reported Carbon Tetrachloride concentration is flagged with a "CN" flag to indicate a high bias due to matrix contribution.

Overall Comments: Data are usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 4/13/2022

Data Reviewer: Cherie Zakowski Date: 4/15/2022

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number: 2203550
Laboratory: Eurofins Air Toxics
Matrix: Air
Collection date: 03/12/22
Analysis/Methods:

Volatile Organic Compounds - EPA Method TO-15
Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number
0302H-AA01SC-031222	2203550-01A / B
0302H-IA01SC-031222	2203550-02A /B
0062H-IA01SC-031222	2203550-03A / B
0230H-IA01SC-031222	2203550-04A / B

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:	Yes	No	N/A
Are the field duplicate relative percent differences (RPDs) ≤40%?			N/A
Laboratory Control Spike Duplicate RPDs within limits?			Yes
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			N/A
Were the Laboratory Duplicate RPDs within limits?			No

Comments (note deviations):

Field Duplicates	TO-15 / SIM	Sample (ug/m^3)	Duplicate (ug/m3)	%RPD	Qualifiers	Associated Samples
N/A						

LCS/LCSD	TO-15 / SIM	%RPD	Limits	Qualifiers	Associated Samples
2203550-07A / 7AA		Acceptable			
2203550-07B / 7BB		Acceptable			

MS/MSD	TO-15 / SIM	%RPD	Limit	Qualifiers	Associated Samples
N/A					

Laboratory Duplicate	Sample (ug/m^3)	Duplicate (ug/m^3)	RL	%RPD	Qualifiers	Associated Samples
2203550-01A / 1AA						
Tetrahydrofuran	1.4 J	ND		NC	None	Sample results < 5xs RL; ABS Diff. < RL
2203550-01B / 1BB				Acceptable		

Accuracy:	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			N/A
Laboratory Control Sample criteria met?			Yes
Were the Laboratory Method Blank results all < RL?			No
Were the Field Blanks results all < RL?			N/A
Was the ICAL criteria met? (30%)			Yes
Was the CCV criteria met? (30%)			Yes
Was the Tuning criteria met?			Yes
Were the Surrogate % recoveries within laboratory determined control limits?			Yes
Were the Internal Standard areas within ± 60 - 140%?			Yes
Was canister certification criteria met?			Yes
Were sample results able to be recalculated from the laboratory raw data and were they accurate?			Yes
Was target compound identification correctly performed by the laboratory?			Yes
Were chromatograms representative of the sample results?			Yes

Comments (note deviations):

Blanks	TO-15 / SIM	Concentration (ug/m^3)	MDL / RL (ug/m^3)	Qualifiers	Associated Samples
Lab Blank					
2203550-05A	2-Propanol	1.2 J	0.13 / 2.4	None	Sample results > RL
	Acetone	0.70 J	0.24 / 2.4	None	Sample results > RL
	Methylene Chloride	0.20 J	0.18 / 1.7	**U-RL**	**All samples**
2203550-05B (SIM)	1,1,2,2-Tetrachloroethane	0.029 J	0.014 / 0.14	None	Sample results nondetect

Field Blank	TO-15 / SIM	Concentration	MDL / RL	Qualifiers	Associated Samples
N/A					

Surrogates	TO-15 / SIM	%R	Limit	Qualifiers	Associated Samples
		Acceptable			

MS/MSD	TO-15 SIM	%R	Limits (%)	Qualifiers	Associated Samples
N/A					

LCS/LCSD	TO-15 / SIM	%R	Limits	Qualifiers	Associated Samples
2203550-07A / 7AA		Acceptable			
2203550-07B / 7BB		Acceptable			

ICV/CCV	TO-15 / SIM		%R	Qualifiers	Associated Samples
12/3/2021 22:15					
ICV	Bromomethane		67.6	**J / UJ**	**All samples**

ICAL	TO-15 / SIM	RRF	%RSD	Qualifiers	Associated Samples
12/3/2022 13:37		Acceptable	Acceptable		
12/3/2022 11:34 (SIM)		Acceptable	Acceptable		

CCV	TO-15 / SIM	RRF	%D	Qualifiers	Associated Samples
3/28/2022 6:49		Acceptable	Acceptable		
3/28/2022 11:53		Acceptable	Acceptable		
3/28/2022 6:49 (SIM)		Acceptable	Acceptable		
3/25/2022 10:45 (SIM)		Acceptable	Acceptable		

Tune	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Internal Standards	TO-15 / SIM	Area %	Area % Criteria	Qualifiers	Associated Samples
	All Internal Standards	Acceptable			

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review	TO-15 / SIM	Results
Recalculated Sample Result		Acceptable

Sample #	Laboratory Reported Result (ug/m3)	Recalculated Sample Result (ug/m3)
TO-15		**RRF / Concentration**
2203550-03A	Hexane: 2.2	2.02 / 0.6368
2203550-03A	Freon 113: 0.52	2.69102 / 0.0682
TO-15 - SIM		
2203550-03B	1,2-Dichloroethane: 0.17	0.5461 / 0.0411
2203550-03B	Toluene: 2.6	1.4243 / 0.6920

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc.= (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification	Acceptable
Chromatogram review	Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	**Yes**		
Were holding times met?	**Yes**		
Was preservation criteria met? (0° - 6° C)			**N/A**
Were Chain-of-Custody records complete and provided in data package?	**Yes**		

Comments (note

Holding Time / Canister Pressure Criteria	Days to Analysis	Criteria	Qualifiers	Associated Samples
Holding Time	Acceptable			

	Initial and Final Canister Pressure Results
Canister Pressure Criteria	Acceptable

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	**Yes**		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	**Yes**		

Comments (note

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	**Yes**		
Do the reporting limits meet project requirements?	**Yes**		

Comments (note deviations):

As stated in the case narrative, ethanol exceeded the instrument's calibration range for sample 0230H-IA01SC-031222. Ethanol results were qualified as estimated "J".

Overall Comments: Data are usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 4/15/2022

Data Reviewer: Cherie Zakowski Date: 4/20/2022

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number:	2203552
Laboratory:	Eurofins Air Toxics
Matrix:	Air
Collection date:	03/11/22
Analysis/Methods:	Volatile Organic Compounds - EPA Method TO-15 Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number
0381H-AA01SC-031122	2203552-01A / 1B
0189H-IA01SC-031122	2203552-02A / 2B
0381H-IA01SC-031122	2203552-03A / 3B
0146H-IA01SC-031122	2203552-04A / 4B

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPDs) ≤40%?			**N/A**
Laboratory Control Spike Duplicate RPDs within limits?			**Yes**
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Were the Laboratory Duplicate RPDs within limits?			**N/A**

Comments (note deviations):

Field Duplicates	**TO-15 / SIM**	**Sample (ug/m^3)**	**Duplicate (ug/m3)**	**%RPD**	**Qualifiers**	**Associated Samples**
N/A						

LCS/LCSD	**TO-15 / SIM**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
2203552-07A / 7AA		Acceptable			
2203552-07B / 7BB		Acceptable			

MS/MSD	**TO-15 / SIM**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
N/A					

Laboratory Duplicate	**Sample (ug/m^3)**	**Duplicate (ug/m^3)**	**RL**	**%RPD**	**Qualifiers**	**Associated Samples**
N/A						

Accuracy:	**Yes**	**No**	**N/A**
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?			**Yes**
Were the Laboratory Method Blank results all < RL?			**No**
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)			**Yes**
Was the CCV criteria met? (30%)			**No**
Was the Tuning criteria met?			**Yes**
Were the Surrogate % recoveries within laboratory determined control limits?			**Yes**
Were the Internal Standard areas within ± 60 - 140%?			**Yes**
Was canister certification criteria met?			**Yes**
Were sample results able to be recalculated from the laboratory raw data and were they accurate?			**Yes**
Was target compound identification correctly performed by the laboratory?			**Yes**
Were chromatograms representative of the sample results?			**Yes**

Comments (note deviations):

Blanks	TO-15 / SIM	Concentration (ug/m^3)	MDL / RL (ug/m^3)	Qualifiers	Associated Samples
Lab Blank					
2203552-05A	Acetone	0.64 J	0.24 / 2.4	None	Sample results > RL
	2-Propanol	1.2 J	0.13 / 2.4	None	Sample results > RL
	Methylene Chloride	0.20 J	0.18 / 1.7	**U-RL**	**2203552-01A, 2203552-02A, 2203552-03A**
2203552-05B (SIM)	1,1,2,2-Tetrachloroethane	0.039 J	0.014 / 0.14	None	Sample results nondetect

Field Blank	TO-15 / SIM	Concentration	MDL / RL	Qualifiers	Associated Samples
N/A					

Surrogates	TO-15 / SIM	%R	Limit	Qualifiers	Associated Samples
		Acceptable			

MS/MSD	TO-15 SIM	%R	Limits (%)	Qualifiers	Associated Samples
N/A					

LCS/LCSD	TO-15 / SIM	%R	Limits	Qualifiers	Associated Samples
2203552-07A / 7AA		Acceptable			
2203552-07B / 7BB		Acceptable			

ICV/CCV	TO-15 / SIM		%R	Qualifiers	Associated Samples
12/3/2021 22:15					
ICV	Bromomethane		67.6	**J / UJ**	**All samples**

ICAL	TO-15 / SIM	RRF	%RSD	Qualifiers	Associated Samples
12/3/2022 13:37		Acceptable	Acceptable		
12/3/2022 11:34 (SIM)		Acceptable	Acceptable		

CCV	TO-15 / SIM	RRF	%D	Qualifiers	Associated Samples
3/27/2022 10:27	3-Chloropropene	Acceptable	-32.59	**J / UJ**	**All samples**
3/27/2022 10:04		Acceptable	Acceptable		
3/27/2022 10:27 (SIM)		Acceptable	Acceptable		
3/25/2022 10:45 (SIM)		Acceptable	Acceptable		

Tune	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Internal Standards	TO-15 / SIM	Area %	Area % Criteria	Qualifiers	Associated Samples
	All Internal Standards	Acceptable			

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review	TO-15 / SIM	Results
Recalculated Sample Result		Acceptable

Sample #	Laboratory Reported Result (ug/m3)	Recalculated Sample Result (ug/m3)
TO-15		**RRF / Concentration**
2203552-01A	Acetone: 18	0.6011 / 17.921
2203552-01A	Freon 11: 1.1	3.30274 / 1.133
TO-15 - SIM		
2203552-01B	Carbon Tetrachloride: 0.37	3.6384 / 0.371
2203552-01B	Tetrachloroethene: 0.190	0.9711 / 0.190

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc.= (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification	Acceptable
Chromatogram review	Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	**Yes**		
Were holding times met?	**Yes**		
Was preservation criteria met? (0° - 6° C)			**N/A**
Were Chain-of-Custody records complete and provided in data package?	**Yes**		

Comments (note

Holding Time / Canister Pressure Criteria	Days to Analysis	Criteria	Qualifiers	Associated Samples
Holding Time	Acceptable			

	Initial and Final Canister Pressure Results
Canister Pressure Criteria	Acceptable

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	**Yes**		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	**Yes**		

Comments (note

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	**Yes**		
Do the reporting limits meet project requirements?	**Yes**		

Comments (note deviations):

As stated in the case narrative, ethanol exceeded the instrument's calibration range for sample 0189H-IA01SC-031122 and 0146H-IA01SC-031122. Ethanol results were qualified as estimated "J".

As stated in the case narrative, 2-propanol exceeded the instrument's calibration range for sample 0189H-IA01SC-031122. 2-Propanol results were qualified as estimated "J".

Overall Comments: Data are usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 4/16/2022

Data Reviewer: Cherie Zakowski Date: 4/20/2022

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number: 2203596
Laboratory: Eurofins Air Toxics
Matrix: Air
Collection date: 3/12/2022 & 3/15/2022
Analysis/Methods:

Volatile Organic Compounds - EPA Method TO-15
Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number
03I5H-IA01SC-031222	2203596-01A / 1B
B32-IA01SC-031522	2203596-02A / 2B
B32-AA01SC-031522	2203596-03A / 3B

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:

	Yes	No	N/A
Are the field duplicate relative percent differences (RPDs) ≤40%?			**Yes**
Laboratory Control Spike Duplicate RPDs within limits?			**No**
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Were the Laboratory Duplicate RPDs within limits?			**N/A**

Comments (note deviations):

Field Duplicates

TO-15 / SIM	Sample (ug/m^3) 03I5H-IA01SC-031222	Duplicate (ug/m3) FD04-IA031222**	%RPD	Qualifiers	Associated Samples
2-Propanol	17 J	26 J	NC	**J^{xx}**	**03I5H-IA01SC-031222 & FD04-IA031222**

xx: ABS Diff. > RL
** Sample results reported in SDG 2203547

LCS/LCSD

	TO-15 / SIM	%RPD	Limits	Qualifiers	Associated Samples
2203596-06A / 6AA		Acceptable			
2203596-06B / 6BB		Acceptable			

MS/MSD

TO-15 / SIM	%RPD	Limit	Qualifiers	Associated Samples
N/A				

Laboratory Duplicate

Sample (ug/m^3)	Duplicate (ug/m^3)	RL	%RPD	Qualifiers	Associated Samples
N/A					

Accuracy:

	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?			**Yes**
Were the Laboratory Method Blank results all < RL?			**No**
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)			**Yes**
Was the CCV criteria met? (30%)			**Yes**
Was the Tuning criteria met?			**Yes**
Were the Surrogate % recoveries within laboratory determined control limits?			**Yes**
Were the Internal Standard areas within ± 60 - 140%?			**Yes**
Was canister certification criteria met?			**Yes**
Were sample results able to be recalculated from the laboratory raw data and were they accurate?			**Yes**
Was target compound identification correctly performed by the laboratory?			**Yes**
Were chromatograms representative of the sample results?			**Yes**

Comments (note deviations):

Blanks	TO-15 / SIM	Concentration (ug/m^3)	MDL / RL (ug/m^3)	Qualifiers	Associated Samples
Lab Blank					
2203596-04A	Acetone	0.70 J	0.24 / 2.4	None	Sample results > RL
	2-Propanol	1.2 J	0.13 / 2.4	None	Sample results > RL
	Methylene Chloride	0.20 J	0.18 / 1.7	**U-RL**	**All samples**
2203596-04B (SIM)	1,1,2,2-Tetrachloroethane	0.029 J	0.014 / 0.14	None	Sample results nondetect

Field Blank	TO-15 / SIM	Concentration	MDL / RL	Qualifiers	Associated Samples
N/A					

Surrogates	TO-15 / SIM	%R	Limit	Qualifiers	Associated Samples
		Acceptable			

MS/MSD	TO-15 SIM	%R	Limits (%)	Qualifiers	Associated Samples
N/A					

LCS/LCSD	TO-15 / SIM	%R	Limits	Qualifiers	Associated Samples
2203596-06A / 6AA		Acceptable			
2203596-06B / 6BB		Acceptable			

ICV/CCV	TO-15 / SIM		%R	Qualifiers	Associated Samples
12/3/2021 22:15					
ICV	Bromomethane		67.6	**J / UJ**	**All samples**

ICAL	TO-15 / SIM	RRF	%RSD	Qualifiers	Associated Samples
12/3/2022 13:37		Acceptable	Acceptable		
12/3/2022 11:34 (SIM)		Acceptable	Acceptable		

CCV	TO-15 / SIM	RRF	%D	Qualifiers	Associated Samples
3/28/2022 6:49		Acceptable	Acceptable		
3/28/2022 11:53		Acceptable	Acceptable		
3/28/2022 6:49 (SIM)		Acceptable	Acceptable		
3/28/2022 11:53 (SIM)		Acceptable	Acceptable		

Tune	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Internal Standards	TO-15 / SIM	Area %	Area % Criteria	Qualifiers	Associated Samples
	All Internal Standards	Acceptable			

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review **TO-15 / SIM** **Results**

Recalculated Sample Result Acceptable

Sample #	Laboratory Reported Result (ug/m3)	Recalculated Sample Result (ug/m3)
TO-15		**RRF / Concentration**
2203596-02A	2-Butanone: 3.7	0.6386 / 3.687
2203596-02A	Methylene Chloride: 0.72	1.21155 / 0.721
TO-15 - SIM		
2203596-02B	Carbon Tetrachloride: 0.40	3.6380 / 0.402
2203596-02B	Freon 12: 2.2	3.4357 / 2.173

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc.= (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification Acceptable
Chromatogram review Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	**Yes**		
Were holding times met?	**Yes**		
Was preservation criteria met? (0° - 6° C)			**N/A**
Were Chain-of-Custody records complete and provided in data package?	**Yes**		

Comments (note

Holding Time / Canister Pressure Criteria	Days to Analysis	Criteria	Qualifiers	Associated Samples
Holding Time	Acceptable			

	Initial and Final Canister Pressure Results
Canister Pressure Criteria	Acceptable

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	**Yes**		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	**Yes**		

Comments (note

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	**Yes**		
Do the reporting limits meet project requirements?	**Yes**		

Comments (note deviations):

As stated in the case narrative, ethanol exceeded the instrument's calibration range for sample 03I5H-IA01SC-031222 and B32-IA01SC-031522. Ethanol results were qualified as estimated "J".

Overall Comments: Data are usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 4/19/2022

Data Reviewer: Cherie Zakowski Date: 4/20/2022

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number: 2203674
Laboratory: Eurofins Air Toxics
Matrix: Air
Collection date: 3/15/2022 & 3/18/2022
Analysis/Methods:

Volatile Organic Compounds - EPA Method TO-15
Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number
B20-IA01SC-031522	2203674-01A / 1B
B20-IA02SC-031522	2203674-02A / 2B
FD05-IA031522	2203674-03A / 3B
0029H-IA01SC-031822	2203674-04A / 4B

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:

	Yes	No	N/A
Are the field duplicate relative percent differences (RPDs) ≤40%?		**No**	
Laboratory Control Spike Duplicate RPDs within limits?	**Yes**		
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Were the Laboratory Duplicate RPDs within limits?			**N/A**

Comments (note deviations):

Field Duplicates	TO-15 / SIM	Sample (ug/m^3) B20-IA01SC-031522	Duplicate (ug/m3) FD05-IA031522	%RPD	Qualifiers	Associated Samples
	2-Propanol	9.5	16	NC	**J****	**B20-IA01SC-031522 & FD05-IA031522**

** ABS Diff. > RL

LCS/LCSD	TO-15 / SIM	%RPD	Limits	Qualifiers	Associated Samples
2203674-05A / 5AA		Acceptable			
2203674-05B / 5BB		Acceptable			

MS/MSD	TO-15 / SIM	%RPD	Limit	Qualifiers	Associated Samples
N/A					

Laboratory Duplicate	Sample (ug/m^3)	Duplicate (ug/m^3)	RL	%RPD	Qualifiers	Associated Samples
N/A						

Accuracy:

	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?	**Yes**		
Were the Laboratory Method Blank results all < RL?		**No**	
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)	**Yes**		
Was the CCV criteria met? (30%)	**Yes**		
Was the Tuning criteria met?	**Yes**		
Were the Surrogate % recoveries within laboratory determined control limits?	**Yes**		
Were the Internal Standard areas within ± 60 - 140%?	**Yes**		
Was canister certification criteria met?	**Yes**		
Were sample results able to be recalculated from the laboratory raw data and were they accurate?	**Yes**		
Was target compound identification correctly performed by the laboratory?	**Yes**		
Were chromatograms representative of the sample results?	**Yes**		

Comments (note deviations):

Blanks	TO-15 / SIM	Concentration (ug/m^3)	MDL / RL (ug/m^3)	Qualifiers	Associated Samples
Lab Blank					
2203674-05A	Acetone	0.70 J	0.24 / 2.4	None	Sample results > RL
	2-Propanol	1.2 J	0.13 / 2.4	None	Sample results > RL
	Methylene Chloride	0.20 J	0.18 / 1.7	**U-RL**	**2203674-01A, 2203674-02A, 2203674-03A**
2203674-05B (SIM)	1,1,2,2-Tetrachloroethane	0.029 J	0.014 / 0.14	None	Sample results nondetect

Field Blank	TO-15 / SIM	Concentration	MDL / RL	Qualifiers	Associated Samples
N/A					

Surrogates	TO-15 / SIM	%R	Limit	Qualifiers	Associated Samples
		Acceptable			

MS/MSD	TO-15 SIM	%R	Limits (%)	Qualifiers	Associated Samples
N/A					

LCS/LCSD	TO-15 / SIM	%R	Limits	Qualifiers	Associated Samples
2203674-05A / 5AA		Acceptable			
2203674-05B / 5BB		Acceptable			

ICV/CCV	TO-15 / SIM		%R	Qualifiers	Associated Samples
12/3/2021 22:15					
ICV	Bromomethane		67.6	**J / UJ**	**All samples**

ICAL	TO-15 / SIM	RRF	%RSD	Qualifiers	Associated Samples
12/3/2022 13:37		Acceptable	Acceptable		
12/3/2022 11:34 (SIM)		Acceptable	Acceptable		

CCV	TO-15 / SIM	RRF	%D	Qualifiers	Associated Samples
3/28/2022 6:49		Acceptable	Acceptable		
3/28/2022 11:53		Acceptable	Acceptable		
3/28/2022 6:49 (SIM)		Acceptable	Acceptable		
3/28/2022 11:53 (SIM)		Acceptable	Acceptable		

Tune	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Internal Standards	TO-15 / SIM	Area %	Area % Criteria	Qualifiers	Associated Samples
	All Internal Standards	Acceptable			

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review	TO-15 / SIM	Results
Recalculated Sample Result		Acceptable

Sample #	Laboratory Reported Result (ug/m3)	Recalculated Sample Result (ug/m3)
TO-15		**RRF / Concentration**
2203674-01A	2-Propanol: 16	2.21 / 15.768
2203674-01A	Freon 113: 0.45	2.69108 / 0.451
TO-15 - SIM		
2203674-01B	Carbon Tetrachloride: 0.41	3.6381 / 0.408
2203674-01B	Toluene: 0.60	1.4244 / 0.598

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc. = (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification	Acceptable
Chromatogram review	Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	**Yes**		
Were holding times met?	**Yes**		
Was preservation criteria met? (0° - 6° C)			**N/A**
Were Chain-of-Custody records complete and provided in data package?	**Yes**		

Comments (note

Holding Time / Canister Pressure Criteria	Days to Analysis	Criteria	Qualifiers	Associated Samples
Holding Time	Acceptable			

	Initial and Final Canister Pressure Results
Canister Pressure Criteria	Acceptable

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	**Yes**		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	**Yes**		

Comments (note

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	**Yes**		
Do the reporting limits meet project requirements?	**Yes**		

Comments (note deviations):

As stated in the case narrative, ethanol exceeded the instrument's calibration range for sample B20-IA02SC-031522 and 0029H-IA01SC-031822. Ethanol results were qualified as estimated "J".

Overall Comments: Data are usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 4/29/2022

Data Reviewer: Cherie Zakowski Date: 5/5/2022

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number:	2203675
Laboratory:	Eurofins Air Toxics
Matrix:	Air
Collection date:	03/18/22
Analysis/Methods:	Volatile Organic Compounds - EPA Method TO-15 Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number
365S-IA01SC-031822	2203675-01A / 1B
365S-IA02SC-031822	2203675-02A / 2B
365S-IA03SC-031822	2203675-03A / 3B
365S-AA01SC-031822	2203675-04A / 4B

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPDs) ≤40%?			**N/A**
Laboratory Control Spike Duplicate RPDs within limits?	**Yes**		
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Were the Laboratory Duplicate RPDs within limits?	**Yes**		

Comments (note deviations):

Field Duplicates	**TO-15 / SIM**	**Sample (ug/m^3)**	**Duplicate (ug/m3)**	**%RPD**	**Qualifiers**	**Associated Samples**
N/A						

LCS/LCSD	**TO-15 / SIM**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
2203675-07A / 7AA		Acceptable			
2203675-07B / 7BB		Acceptable			

MS/MSD	**TO-15 / SIM**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
N/A					

Laboratory Duplicate	**Sample (ug/m^3)**	**Duplicate (ug/m^3)**	**RL**	**%RPD**	**Qualifiers**	**Associated Samples**
2203675-01A / 1AA				Acceptable		
2203675-01B / 1BB				Acceptable		

Accuracy:	**Yes**	**No**	**N/A**
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?	**Yes**		
Were the Laboratory Method Blank results all < RL?		**No**	
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)	**Yes**		
Was the CCV criteria met? (30%)	**Yes**		
Was the Tuning criteria met?	**Yes**		
Were the Surrogate % recoveries within laboratory determined control limits?	**Yes**		
Were the Internal Standard areas within ± 60 - 140%?	**Yes**		
Was canister certification criteria met?	**Yes**		
Were sample results able to be recalculated from the laboratory raw data and were they accurate?	**Yes**		
Was target compound identification correctly performed by the laboratory?	**Yes**		
Were chromatograms representative of the sample results?	**Yes**		

Comments (note deviations):

Blanks	TO-15 / SIM	Concentration (ug/m^3)	MDL / RL (ug/m^3)	Qualifiers	Associated Samples
Lab Blank					
2203675-05A	Acetone	0.70 J	0.24 / 2.4	None	Sample results > RL
	2-Propanol	1.2 J	0.13 / 2.4	None	Sample results > RL
2203675-05B (SIM)	1,1,2,2-Tetrachloroethane	0.036 J	0.014 / 0.14	None	Sample results nondetect
	1,1,2-Trichloroethane	0.011 J	0.009 / 0.11	None	Sample results nondetect

Field Blank	TO-15 / SIM	Concentration	MDL / RL	Qualifiers	Associated Samples
N/A					

Surrogates	TO-15 / SIM	%R	Limit	Qualifiers	Associated Samples
		Acceptable			

MS/MSD	TO-15 SIM	%R	Limits (%)	Qualifiers	Associated Samples
N/A					

LCS/LCSD	TO-15 / SIM	%R	Limits	Qualifiers	Associated Samples
2203675-07A / 7AA		Acceptable			
2203675-07B / 7BB		Acceptable			

ICV/CCV	TO-15 / SIM		%R	Qualifiers	Associated Samples
12/3/2021 22:15					
ICV	Bromomethane		67.6	**J / UJ**	**All samples**

ICAL	TO-15 / SIM	RRF	%RSD	Qualifiers	Associated Samples
12/3/2022 13:37		Acceptable	Acceptable		
12/3/2022 11:34 (SIM)		Acceptable	Acceptable		

CCV	TO-15 / SIM	RRF	%D	Qualifiers	Associated Samples
3/29/2022 6:33		Acceptable	Acceptable		
3/30/2022 12:05		Acceptable	Acceptable		
3/29/2022 6:33 (SIM)		Acceptable	Acceptable		
3/30/2022 12:05 (SIM)		Acceptable	Acceptable		

Tune	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Internal Standards	TO-15 / SIM	Area %	Area % Criteria	Qualifiers	Associated Samples
	All Internal Standards	Acceptable			

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review **TO-15 / SIM** **Results**

Recalculated Sample Result Acceptable

Sample #	Laboratory Reported Result (ug/m3)	Recalculated Sample Result (ug/m3)
TO-15		**RRF / Concentration**
2203675-01A	2-Propanol: 69	2.2183 / 69.066
2203675-01A	Acetone: 30	0.60110 / 30.506
TO-15 - SIM		
2203675-01B	Benzene: 0.45	1.0939 / 0.451
2203675-01B	o-Xylene 12: 0.20	0.7388 / 0.201

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc. = (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification Acceptable
Chromatogram review Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	**Yes**		
Were holding times met?	**Yes**		
Was preservation criteria met? (0° - 6° C)			**N/A**
Were Chain-of-Custody records complete and provided in data package?	**Yes**		

Comments (note

Holding Time / Canister Pressure Criteria	**Days to Analysis**	**Criteria**	**Qualifiers**	**Associated Samples**
Holding Time	Acceptable			

	Initial and Final Canister Pressure Results
Canister Pressure Criteria	Acceptable

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	**Yes**		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	**Yes**		

Comments (note

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	**Yes**		
Do the reporting limits meet project requirements?	**Yes**		

Comments (note deviations):

As stated in the case narrative, ethanol exceeded the instrument's calibration range for samples 3655-IA01SC-031822, 3655-IA02SC-031822 and 3655-IA03SC-031822. Ethanol results were qualified as estimated "J".

Overall Comments: Data are usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 4/26/2022

Data Reviewer: Cherie Zakowski Date: 5/5/2022

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number: 2205002
Laboratory: Eurofins Air Toxics
Matrix: Air
Collection date: 04/29/22
Analysis/Methods:

Volatile Organic Compounds - EPA Method TO-15
Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number
0197H-IA01SC-042922	2205002-01A / B
0197H-IA02SC-042922	2205002-02A / B
0197H-IA03SC-042922	2205002-03A / B
0197H-IA04SC-042922	2205002-04A / B

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPDs) ≤40%?			**N/A**
Laboratory Control Spike Duplicate RPDs within limits?			**Yes**
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Were the Laboratory Duplicate RPDs within limits?			**Yes**

Comments (note deviations):

Field Duplicates	**TO-15 / SIM**	**Sample (ug/m^3)**	**Duplicate (ug/m3)**	**%RPD**	**Qualifiers**	**Associated Samples**
N/A						

LCS/LCSD	**TO-15 / SIM**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
2205002-07A / 7AA		Acceptable			
2205002-07B / 7BB		Acceptable			

MS/MSD	**TO-15 / SIM**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
N/A					

Laboratory Duplicate	**Sample (ug/m^3)**	**Duplicate (ug/m^3)**	**RL**	**%RPD**	**Qualifiers**	**Associated Samples**
2205002-01A / 1AA				Acceptable		
2205002-01B / 1BB				Acceptable		

Accuracy:	**Yes**	**No**	**N/A**
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?			**Yes**
Were the Laboratory Method Blank results all < RL?			**No**
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)			**Yes**
Was the CCV criteria met? (30%)			**Yes**
Was the Tuning criteria met?			**Yes**
Were the Surrogate % recoveries within laboratory determined control limits?			**Yes**
Were the Internal Standard areas within ± 60 - 140%?			**Yes**
Was canister certification criteria met?			**Yes**
Were sample results able to be recalculated from the laboratory raw data and were they accurate?			**Yes**
Was target compound identification correctly performed by the laboratory?			**Yes**
Were chromatograms representative of the sample results?			**Yes**

Comments (note deviations):

Blanks	TO-15 / SIM	Concentration (ug/m^3)	MDL / RL (ug/m^3)	Qualifiers	Associated Samples
Lab Blank					
2205002-05A	2-Propanol	0.29 J	0.13 / 2.4	None	Sample results > RL
	Acetone	0.63 J	0.24 / 2.4	None	Sample results > RL
2205002-05B (SIM)	1,1,1-Trichloroethane	0.012 J	0.007 / 0.11	None	Sample results > RL
	1,1,2,2-Tetrachloroethane	0.016 J	0.014 / 0.14	None	Sample results nondetect

Field Blank	TO-15 / SIM	Concentration	MDL / RL	Qualifiers	Associated Samples
N/A					

Surrogates	TO-15 / SIM	%R	Limit	Qualifiers	Associated Samples
		Acceptable			

MS/MSD	TO-15 SIM	%R	Limits (%)	Qualifiers	Associated Samples
N/A					

LCS/LCSD	TO-15 / SIM	%R	Limits	Qualifiers	Associated Samples
2205002-07A / AA		Acceptable			
2205002-07B / BB		Acceptable			

ICV/CCV	TO-15 / SIM	%R	Qualifiers	Associated Samples
4/27/2022 17:27		Acceptable		
ICV				

ICAL	TO-15 / SIM	RRF	%RSD	Qualifiers	Associated Samples
4/26/2022 22:22		Acceptable	Acceptable		
4/26/2022 21:42 (SIM)		Acceptable	Acceptable		

CCV	TO-15 / SIM	RRF	%D	Qualifiers	Associated Samples
5/6/2022 8:02		Acceptable	Acceptable		
5/6/2022 11:23		Acceptable	Acceptable		
5/6/2022 8:02 (SIM)		Acceptable	Acceptable		
5/6/2022 11:23 (SIM)		Acceptable	Acceptable		

Tune	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Internal Standards	TO-15 / SIM	Area %	Area % Criteria	Qualifiers	Associated Samples
	All Internal Standards	Acceptable			

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review **TO-15 / SIM** **Results**

Recalculated Sample Result Acceptable

Sample #	Laboratory Reported Result (ug/m3)	Recalculated Sample Result (ug/m3)
TO-15		**RRF / Concentration**
2205002-02A	2-Propanol: 26	2.390 / 25.932
2205002-02A	Acetone: 45	0.671 / 45.405
TO-15 - SIM		
2205002-02B	o-xylene: 0.31	0.780 / 0.310
2205002-02B	Trichloroethene: 5.8	0.644 / 5.814

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc.= (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification Acceptable
Chromatogram review Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	**Yes**		
Were holding times met?	**Yes**		
Was preservation criteria met? (0° - 6° C)			**N/A**
Were Chain-of-Custody records complete and provided in data package?	**Yes**		

Comments (note deviations):

Holding Time / Canister Pressure Criteria	**Days to Analysis**	**Criteria**	**Qualifiers**	**Associated Samples**
Holding Time	Acceptable			

	Initial and Final Canister Pressure Results
Canister Pressure Criteria	Acceptable

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	**Yes**		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	**Yes**		

Comments (note deviations):

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	**Yes**		
Do the reporting limits meet project requirements?	**Yes**		

Comments (note deviations):

Overall Comments: Data are usable as reported.

Data Validator: *Kristine Molloy* Date: *5/12/2022*

Data Reviewer: *Cherie Zakowski* Date: *5/12/2022*

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number:	L1470815
Laboratory:	Pace Analytical
Matrix:	Air
Collection date:	03/09/22
Analysis/Methods:	Volatile Organic Compounds - EPA Method TO-15 Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number
0256H-IA01SC-030922	L1470815-02
0225H-IA01SC-030922	L1470815-03
0194H-IA01SC-030922	L1470815-04

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPDs) ≤40%?			**N/A**
Laboratory Control Spike Duplicate RPDs within limits?			**Yes**
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Were the Laboratory Duplicate RPDs within limits?			**N/A**

Comments (note deviations):

Field Duplicates	**TO-15 / SIM**	**Sample (ug/m^3)**	**Duplicate (ug/m3)**	**%RPD**	**Qualifiers**	**Associated Samples**
N/A						

LCS/LCSD	**TO-15 / SIM**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
R3771705-1 / 2		Acceptable			
R3769329-1 / 2		Acceptable			

MS/MSD	**TO-15 / SIM**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
N/A					

Laboratory Duplicate	**Sample (ug/m^3)**	**Duplicate (ug/m^3)**	**RL**	**%RPD**	**Qualifiers**	**Associated Samples**
N/A						

Accuracy:	**Yes**	**No**	**N/A**
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?			**Yes**
Were the Laboratory Method Blank results all < RL?			**No**
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)			**Yes**
Was the CCV criteria met? (30%)			**No**
Was the Tuning criteria met?			**Yes**
Were the Surrogate % recoveries within laboratory determined control limits?			**Yes**
Were the Internal Standard areas within ± 60 - 140%?			**Yes**
Was canister certification criteria met?			**Yes**
Were sample results able to be recalculated from the laboratory raw data and were they accurate?			**Yes**
Was target compound identification correctly performed by the laboratory?			**Yes**
Were chromatograms representative of the sample results?			**Yes**

Comments (note deviations):

Blanks	TO-15 / SIM	Concentration (ug/m^3)	MDL / RL (ug/m^3)	Qualifiers	Associated Samples
Lab Blank					
R3771705-3		Nondetect			
R3771982-2	Propene	0.394 J	0.16 / 2.15	None	Sample results nondetect
R3772368-3 (Ethanol)		Nondetect			
R3769329-3	Benzene	0.0444	0.0358 / 0.0639	None	Sample results > RL

Field Blank	TO-15 / SIM	Concentration	MDL / RL	Qualifiers	Associated Samples
N/A					

Surrogates	TO-15 / SIM	%R	Limit	Qualifiers	Associated Samples
TO-15		Acceptable			
TO-15 SIM		Acceptable			

MS/MSD	TO-15 SIM	%R	Limits (%)	Qualifiers	Associated Samples
N/A					

LCS/LCSD	TO-15 / SIM	%R	Limits	Qualifiers	Associated Samples
R3771705-1 / 2		Acceptable			
R3771982-1 / 3		Acceptable			
R3772368-1 / 2 (Ethanol)		Acceptable			
R3769329-1 / 2		Acceptable			

ICV/CCV	TO-15 / SIM	%R	Limits	Qualifiers	Associated Samples
ICV					
3/19/2022 9:22		Acceptable			
3/21/2022 8:23:00 AM (Ethanol)					
	1,2-Dichlorotetrafluorethane	44.2	70-130	None	No results associated with this ICV
3/18/2022 9:02		Acceptable			
3/13/2022 8:49 (SIM)		Acceptable			

ICAL	TO-15 / SIM	RRF	%RSD	Qualifiers	Associated Samples
3/16/22 3/17/22		Acceptable	Acceptable		
3/9/2022 (Ethanol)		Acceptable	Acceptable		
3/10/2022		Acceptable	Acceptable		
3/8/2022 SIM		Acceptable	Acceptable		

CCV	TO-15 / SIM	RRF	%D	Qualifiers	Associated Samples
3/17/2022 6:10	Benzyl Chloride	Acceptable	48.8	**J / UJ**	**All samples**
	Vinyl Acetate	Acceptable	45.7	**J / UJ**	**All samples****
3/9/2022 23:56 (Ethanol only)					
	Ethanol	Acceptable	75.1	**J / UJ**	**All samples**
3/10/2022 18:14	Benzyl Chloride	Acceptable	55	**J / UJ**	**All samples**
	Vinyl Acetate	Acceptable	44.4	**J / UJ**	**All samples****
3/13/2022 8:49 (SIM)		Acceptable	Acceptable		

**Applies to TO-15 results - reportable results are from the TO1-5 SIM analysis - no qualification required for the SIM results

Tune	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Internal Standards	TO-15 / SIM	Area %	Area % Criteria	Qualifiers	Associated Samples
	All Internal Standards	Acceptable			

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review	TO-15 / SIM	Results
Recalculated Sample Result		Acceptable

Sample #	Laboratory Reported Result (ug/m3)	Recalculated Sample Result (ug/m3)
TO-15		**RRF / Concentration**
L1470815-02	Acetone: 6.99	0.3553 / 6.991
L1470815-02	Carbon Tetrachloride: 0.47	0.55762 / 0.468
TO-15 - SIM		
L1470815-02	Chloroform: 0.349	1.5781 / 0.351
L1470815-02	Ethylbenzene: 0.168	1.1731 / 0.168

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc. = (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification	Acceptable
Chromatogram review	Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	Yes		
Were holding times met?	Yes		
Was preservation criteria met? (0° - 6° C)			N/A
Were Chain-of-Custody records complete and provided in data package?	Yes		

Comments (note

Holding Time / Canister Pressure Criteria	Days to Analysis	Criteria	Qualifiers	Associated Samples
Holding Time	Acceptable			

	Initial and Final Canister Pressure Results
Canister Pressure Criteria	Acceptable**

**The final pressure reading for the canister associated with sample 0029H-IA01SC-030822 was 20" Hg. Analysis was not performed due to final pressure reading.

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	Yes		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	Yes		

Comments (note

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	Yes		
Do the reporting limits meet project requirements?	Yes		

Comments (note deviations):

The final pressure reading for the canister associated with sample 0029H-IA01SC-030822 was 20" Hg. Analysis was not performed due to final pressure reading.

Overall Comments: Data are usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 4/29/2022

Data Reviewer: Cherie Zakowski Date: 5/1/2022

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number: L1470817
Laboratory: Pace Analytical
Matrix: Air
Collection date: 03/10/22
Analysis/Methods:

Volatile Organic Compounds - EPA Method TO-15
Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number
0193H-IA01SC-031022	L1470817-01
0395H-IA01SC-031022	L1470817-02
0255H-IA01SC-031022	L1470817-03
0195H-IA01SC-031022	L1470817-04

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPDs) ≤40%?			**N/A**
Laboratory Control Spike Duplicate RPDs within limits?			**Yes**
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Were the Laboratory Duplicate RPDs within limits?			**N/A**

Comments (note deviations):

Field Duplicates	**TO-15 / SIM**	**Sample (ug/m^3)**	**Duplicate (ug/m3)**	**%RPD**	**Qualifiers**	**Associated Samples**
N/A						

LCS/LCSD	**TO-15 / SIM**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
R3771705-1 / 2		Acceptable			
R3772368-1 / 2 (Ethanol)		Acceptable			
R3769329-1 / 2		Acceptable			

MS/MSD	**TO-15 / SIM**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
N/A					

Laboratory Duplicate	**Sample (ug/m^3)**	**Duplicate (ug/m^3)**	**RL**	**%RPD**	**Qualifiers**	**Associated Samples**
N/A						

Accuracy:	**Yes**	**No**	**N/A**
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?			**Yes**
Were the Laboratory Method Blank results all < RL?			**Yes**
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)			**Yes**
Was the CCV criteria met? (30%)			**No**
Was the Tuning criteria met?			**Yes**
Were the Surrogate % recoveries within laboratory determined control limits?			**Yes**
Were the Internal Standard areas within ± 60 - 140%?			**Yes**
Was canister certification criteria met?			**Yes**
Were sample results able to be recalculated from the laboratory raw data and were they accurate?			**Yes**
Was target compound identification correctly performed by the laboratory?			**Yes**
Were chromatograms representative of the sample results?			**Yes**

Comments (note deviations):

Blanks	TO-15 / SIM	Concentration (ug/m^3)	MDL / RL (ug/m^3)	Qualifiers	Associated Samples
Lab Blank					
R3771705-3		Nondetect			
R3772368-3 (Ethanol)		Nondetect			
R3769329-3	Benzene	0.0444	0.0358 / 0.0639	None	Sample results > RL

Field Blank	TO-15 / SIM	Concentration	MDL / RL	Qualifiers	Associated Samples
N/A					

Surrogates	TO-15 / SIM	%R	Limit	Qualifiers	Associated Samples
TO-15		Acceptable			
TO-15 SIM		Acceptable			

MS/MSD	TO-15 SIM	%R	Limits (%)	Qualifiers	Associated Samples
N/A					

LCS/LCSD	TO-15 / SIM	%R	Limits	Qualifiers	Associated Samples
R3771705-1 / 2		Acceptable			
R3772368-1 / 2 (Ethanol)		Acceptable			
R3769329-1 / 2		Acceptable			

ICV/CCV	TO-15 / SIM	%R	Limits	Qualifiers	Associated Samples
ICV					
3/21/2022 8:23:00 AM (Ethanol)					
	1,2-Dichlorotetrafluorethane	55.8	30	None	No results associated with this ICV
3/18/2022 9:02		Acceptable			
3/13/2022 8:49 (SIM)		Acceptable			

ICAL	TO-15 / SIM	RRF	%RSD	Qualifiers	Associated Samples
3/9/2022 (Ethanol)		Acceptable	Acceptable		
3/10/2022		Acceptable	Acceptable		
3/8/2022 SIM		Acceptable	Acceptable		

CCV	TO-15 / SIM	RRF	%D	Limit	Qualifiers	Associated Samples
3/9/2022 23:56 (Ethanol only)						
	Ethanol	Acceptable	75.1	30	**J / UJ**	**All samples**
3/10/2022 18:14	Benzyl Chloride	Acceptable	55	30	**J / UJ**	**All samples**
	Vinyl Acetate	Acceptable	44.4	30	**J / UJ**	**All samples****
3/08/2022 20:54 (SIM)		Acceptable	Acceptable			

**Applies to TO-15 results - reportable results are from the TO1-5 SIM analysis - no qualification required for the SIM results

Tune	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Internal Standards	TO-15 / SIM	Area %	Area % Criteria	Qualifiers	Associated Samples
	All Internal Standards	Acceptable			

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review	TO-15 / SIM	Results
Recalculated Sample Result		Acceptable

Sample #	Laboratory Reported Result (ug/m3)	Recalculated Sample Result (ug/m3)
TO-15		**RRF / Concentration**
L1470817-03	Chloroform: 1.47	0.7837 / 1.478
L1470817-03	Ethanol: 19.80	0.20840 / 19.797
TO-15 - SIM		
L1470817-03	Benzene: 0.585	0.7509 / 0.583
L1470817-03	1,1,1-Trichloroethane: 0.734	1.5233 / 0.734

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc. = (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification	Acceptable
Chromatogram review	Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	**Yes**		
Were holding times met?	**Yes**		
Was preservation criteria met? (0° - 6° C)			**N/A**
Were Chain-of-Custody records complete and provided in data package?	**Yes**		

Comments (note deviations):

Holding Time / Canister Pressure Criteria	Days to Analysis	Criteria	Qualifiers	Associated Samples
Holding Time	Acceptable			

	Initial and Final Canister Pressure Results
Canister Pressure Criteria	Acceptable

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	**Yes**		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	**Yes**		

Comments (note deviations):

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	**Yes**		
Do the reporting limits meet project requirements?	**Yes**		

Comments (note deviations):

Overall Comments: Data are usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 4/29/2022

Data Reviewer: Cherie Zakowski Date: 5/1/2022

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number:	L1470822
Laboratory:	Pace Analytical
Matrix:	Air
Collection date:	03/10/22
Analysis/Methods:	Volatile Organic Compounds - EPA Method TO-15 Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number
0366C-IA01SC-031022	L1470822-01
FD02-IA031022	L1470822-02
0366C-IA02SC-031022	L1470822-03
0366C-IA03SC-031022	L1470822-04

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPDs) ≤40%?			**N/A**
Laboratory Control Spike Duplicate RPDs within limits?	**Yes**		
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Were the Laboratory Duplicate RPDs within limits?			**N/A**

Comments (note deviations):

Field Duplicates	**TO-15 / SIM**	**Sample (ug/m^3) 0366C-IA01SC-031022**	**Duplicate (ug/m3) FD02-IA031022**	**%RPD**	**Qualifiers**	**Associated Samples**
	Acetone	101	34.9	97%	**J**	**0366C-IA01SC-031022 & FD02-IA031022**
	Ethanol	535	61.1	159%	**J**	
	Ethylbenzene	4.9	1.74	NC	**J****	
	M&P-Xylene	12.2	4.6	NC	**J****	
	O-Xylene	2.42	0.958	NC	**J****	
	Toluene	16.5	6.37	NC	**J****	
	1,2-Dichloroethane (SIM)	0.184	0.102	NC	**J****	
	Chloroform (TO-15 / SIM)	0.604	0.0973 U	NC	**J****	
	Tetrachloroethene (SIM)	1.07	0.0957 J	NC	**J****	

**ABS Diff. > RL

LCS/LCSD	**TO-15 / SIM**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
R3771705-1 / 2		Acceptable			
R3772368-1 / 2 (Ethanol)		Acceptable			
R3769329-1 / 2		Acceptable			

MS/MSD	**TO-15 / SIM**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
N/A					

Laboratory Duplicate	**Sample (ug/m^3)**	**Duplicate (ug/m^3)**	**RL**	**%RPD**	**Qualifiers**	**Associated Samples**
N/A						

Accuracy:	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?			**Yes**
Were the Laboratory Method Blank results all < RL?			**Yes**
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)			**Yes**
Was the CCV criteria met? (30%)			**No**
Was the Tuning criteria met?			**Yes**
Were the Surrogate % recoveries within laboratory determined control limits?			**Yes**
Were the Internal Standard areas within ± 60 - 140%?			**Yes**
Was canister certification criteria met?			**Yes**
Were sample results able to be recalculated from the laboratory raw data and were they accurate?			**Yes**
Was target compound identification correctly performed by the laboratory?			**Yes**
Were chromatograms representative of the sample results?			**Yes**

Comments (note deviations):

Blanks	**TO-15 / SIM**	**Concentration (ug/m^3)**	**MDL / RL (ug/m^3)**	**Qualifiers**	**Associated Samples**
Lab Blank					
R3771705-3		Nondetect			
R3772368-3 (Ethanol)		Nondetect			
R3769329-3 (SIM)	Benzene	0.0444 J	0.0358 / 0.0639	None	Sample results > RL

Field Blank	**TO-15 / SIM**	**Concentration**	**MDL / RL**	**Qualifiers**	**Associated Samples**
N/A					

Surrogates	**TO-15 / SIM**	**%R**	**Limit**	**Qualifiers**	**Associated Samples**
TO-15		Acceptable			
TO-15 SIM		Acceptable			

MS/MSD	**TO-15 SIM**	**%R**	**Limits (%)**	**Qualifiers**	**Associated Samples**
N/A					

LCS/LCSD	**TO-15 / SIM**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
R3771705-1 / 2		Acceptable			
R3772368-1 / 2 (Ethanol)		Acceptable			
R3769329-1 / 2		Acceptable			

ICV/CCV	**TO-15 / SIM**	**%R**	**Limits**	**Qualifiers**	**Associated Samples**
ICV					
3/21/2022 8:23:00 AM (Ethanol)					
	1,2-Dichlorotetrafluorethane	44.2	70-130	None	No results associated with this ICV
3/18/2022 9:02		Acceptable			
3/13/2022 8:49 (SIM)		Acceptable			

ICAL	**TO-15 / SIM**	**RRF**	**%RSD**	**Qualifiers**	**Associated Samples**
3/9/2022 (Ethanol)		Acceptable	Acceptable		
3/10/2022		Acceptable	Acceptable		
3/8/2022 SIM		Acceptable	Acceptable		

CCV	**TO-15 / SIM**	**RRF**	**%D**	**Limit**	**Qualifiers**	**Associated Samples**
3/9/2022 23:56 (Ethanol only)						
	Ethanol	Acceptable	75.1	30	**J / UJ**	**All samples**
3/10/2022 18:14	Benzyl Chloride	Acceptable	55	30	**J / UJ**	**All samples**
	Vinyl Acetate	Acceptable	44.4	30	**J / UJ**	**All samples****
3/08/2022 20:54 (SIM)		Acceptable	Acceptable			

**Applies to TO-15 results - reportable results are from the TO1-5 SIM analysis - no qualification required for the SIM results

Tune	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Internal Standards	TO-15 / SIM	Area %	Area % Criteria	Qualifiers	Associated Samples
	All Internal Standards	Acceptable			

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review **TO-15 / SIM** **Results**

Recalculated Sample Result Acceptable

Sample #	Laboratory Reported Result (ug/m3)	Recalculated Sample Result (ug/m3)
TO-15		**RRF / Concentration**
L1470822-04	Acetone: 63.20	0.7462 / 63.277
L1470822-04	Cyclohexane: 0.87	0.3671 / 0.870
TO-15 - SIM		
L1470822-04	Chloromethane: 1.11	0.4573 / 1.107
L1470822-04	Trichloroethylene: 0.044	0.3326 / 0.044

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc. = (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification Acceptable

Chromatogram review Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	Yes		
Were holding times met?	Yes		
Was preservation criteria met? (0° - 6° C)			N/A
Were Chain-of-Custody records complete and provided in data package?	Yes		

Comments (note

Holding Time / Canister Pressure Criteria	Days to Analysis	Criteria	Qualifiers	Associated Samples
Holding Time	Acceptable			

	Initial and Final Canister Pressure Results
Canister Pressure Criteria	Acceptable

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	Yes		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	Yes		

Comments (note

Sensitivity:

	Yes	No	N/A
Are MDLs present and reported?	Yes		
Do the reporting limits meet project requirements?	Yes		

Comments (note deviations):

Overall Comments: Data are usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 4/30/2022

Data Reviewer: Cherie Zakowski Date: 5/1/2022

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number: L1470823
Laboratory: Pace Analytical
Matrix: Air
Collection date: 03/10/22
Analysis/Methods:

Volatile Organic Compounds - EPA Method TO-15
Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number
0334H-IA01SC-031022	L1470823-01
0334H-AA01SC-031022	L1470823-02
0263H-IA01SC-031022	L1470823-03

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:	**Yes**	**No**	**N/A**
Are the field duplicate relative percent differences (RPDs) ≤40%?			**N/A**
Laboratory Control Spike Duplicate RPDs within limits?			**Yes**
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Were the Laboratory Duplicate RPDs within limits?			**N/A**

Comments (note deviations):

Field Duplicates	**TO-15 / SIM**	**Sample (ug/m^3)**	**Duplicate (ug/m3)**	**%RPD**	**Qualifiers**	**Associated Samples**
N/A						

LCS/LCSD	**TO-15 / SIM**	**%RPD**	**Limits**	**Qualifiers**	**Associated Samples**
R3771705-1 / 2		Acceptable			
R3772729-1 / 2 (re-extract)		Acceptable			
R3769329-1 / 2		Acceptable			

MS/MSD	**TO-15 / SIM**	**%RPD**	**Limit**	**Qualifiers**	**Associated Samples**
N/A					

Laboratory Duplicate	**Sample (ug/m^3)**	**Duplicate (ug/m^3)**	**RL**	**%RPD**	**Qualifiers**	**Associated Samples**
N/A						

Accuracy:	**Yes**	**No**	**N/A**
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?			**Yes**
Were the Laboratory Method Blank results all < RL?			**No**
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)			**Yes**
Was the CCV criteria met? (30%)			**No**
Was the Tuning criteria met?			**Yes**
Were the Surrogate % recoveries within laboratory determined control limits?			**Yes**
Were the Internal Standard areas within ± 60 - 140%?			**Yes**
Was canister certification criteria met?			**Yes**
Were sample results able to be recalculated from the laboratory raw data and were they accurate?			**Yes**
Was target compound identification correctly performed by the laboratory?			**Yes**
Were chromatograms representative of the sample results?			**Yes**

Comments (note deviations):

Blanks	TO-15 / SIM	Concentration (ug/m^3)	MDL / RL (ug/m^3)	Qualifiers	Associated Samples
Lab Blank					
R3771705-3		Nondetect			
R3772729-3 (re-extract)	Propene	0.244 J	0.16 / 2.15	None	Sample results nondetect
R3769329-3	Benzene	0.0444 J	0.0358 / 0.0639	None	Sample results > RL

Field Blank	TO-15 / SIM	Concentration	MDL / RL	Qualifiers	Associated Samples
N/A					

Surrogates	TO-15 / SIM	%R	Limit	Qualifiers	Associated Samples
TO-15		Acceptable			
TO-15 SIM		Acceptable			

MS/MSD	TO-15 SIM	%R	Limits (%)	Qualifiers	Associated Samples
N/A					

LCS/LCSD	TO-15 / SIM	%R	Limits	Qualifiers	Associated Samples
R3771705-1 / 2		Acceptable			
R3772729-1 / 2 (re-extract)		Acceptable			
R3769329-1 / 2		Acceptable			

ICV/CCV	TO-15 / SIM	%R	Limits	Qualifiers	Associated Samples
ICV					
3/22/2022 11:25 (re-extract)		Acceptable			
3/18/2022 9:02		Acceptable			
3/13/2022 8:49 (SIM)		Acceptable			

ICAL	TO-15 / SIM	RRF	%RSD	Qualifiers	Associated Samples
3/10/2022 12:29		Acceptable	Acceptable		
3/10/2022 17:05 (re-extract)		Acceptable	Acceptable		
3/8/2022 SIM		Acceptable	Acceptable		

CCV	TO-15 / SIM	RRF	%D	Limit	Qualifiers	Associated Samples
3/11/2022 00:51 (re-extract)		Acceptable	Acceptable			
3/10/2022 18:14	Benzyl Chloride	Acceptable	55	30	**J / UJ**	**All samples**
	Vinyl Acetate	Acceptable	44.4	30	**J / UJ**	**All samples****
3/08/2022 20:54 (SIM)		Acceptable	Acceptable			

**Applies to TO-15 results - reportable results are from the TO1-5 SIM analysis - no qualification required for the SIM results

Tune	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Internal Standards	TO-15 / SIM	Area %	Area % Criteria	Qualifiers	Associated Samples
	Chlorobenzene-d5	196,150	207,465/484,085	None**	L1470823-03

**IS associated with re-extraction - no associated reportable results - no qualification required

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review	TO-15 / SIM	Results
Recalculated Sample Result		Acceptable

Sample #	Laboratory Reported Result (ug/m3)	Recalculated Sample Result (ug/m3)
TO-15		**RRF / Concentration**
L1470823-01	Chloromethane: 1.21	0.3686 / 1.206
L1470823-01	Carbon Tetrachloride: 0.54	0.78413 / 0.539
TO-15 - SIM		
L1470823-01	1,4-Dichlorobenzene: 0.084	0.8470 / 0.084
L1470823-01	Tetrachloroethene: 0.096	0.5172 / 0.096

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc.= (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification	Acceptable
Chromatogram review	Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	**Yes**		
Were holding times met?	**Yes**		
Was preservation criteria met? (0° - 6° C)			**N/A**
Were Chain-of-Custody records complete and provided in data package?	**Yes**		

Comments (note

Holding Time / Canister Pressure Criteria	Days to Analysis	Criteria	Qualifiers	Associated Samples
Holding Time	Acceptable			

	Initial and Final Canister Pressure Results
Canister Pressure Criteria	Acceptable

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	**Yes**		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	**Yes**		

Comments (note

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	**Yes**		
Do the reporting limits meet project requirements?	**Yes**		

Comments (note deviations):

Overall Comments: Data are usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 4/30/2022

Data Reviewer: Cherie Zakowski Date: 5/5/2022

700 South 1600 East PCE Plume Site
Salt Lake City, Utah
Air Samples
Data Validation Report

Sample Delivery Group (SDG) Number:	L1472579
Laboratory:	Pace Analytical
Matrix:	Air
Collection date:	03/15/22
Analysis/Methods:	Volatile Organic Compounds - EPA Method TO-15 Volatile Organic Compounds - EPA Method TO-15 SIM

Samples in SDG:

Sample Number	Laboratory Number
0040H-IA01SC-031522	L1472579-01
0040H-IA02SC-031522	L1472579-02

Data validation was performed in accordance with the specific analytical methods and the U.S. EPA Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15 (June 2014) and the project specific QAPP, 700 South 1600 East PCE Plume, Salt Lake City, Utah, Department of Veterans Affairs, Veterans Health Administration, Salt Lake City Health Care System, November, 2019.

Volatile Organic Compounds TO-15 / TO-15 SIM

Precision:	Yes	No	N/A
Are the field duplicate relative percent differences (RPDs) ≤40%?			**N/A**
Laboratory Control Spike Duplicate RPDs within limits?			**Yes**
Were the Matrix Spike Duplicate RPDs ≤ 20%? (Or lab defined limits)			**N/A**
Were the Laboratory Duplicate RPDs within limits?			**N/A**

Comments (note deviations):

Field Duplicates	TO-15 / SIM	Sample (ug/m^3)	Duplicate (ug/m3)	%RPD	Qualifiers	Associated Samples
N/A						

LCS/LCSD	TO-15 / SIM	%RPD	Limits	Qualifiers	Associated Samples
R3772480-1 / 3		Acceptable			
R3773476-1 / 2 (SIM)		Acceptable			
R3773480-1 / 2 (SIM) (Tetrachloroethene)		Acceptable			

MS/MSD	TO-15 / SIM	%RPD	Limit	Qualifiers	Associated Samples
N/A					

Laboratory Duplicate	Sample (ug/m^3)	Duplicate (ug/m^3)	RL	%RPD	Qualifiers	Associated Samples
N/A						

Accuracy:	Yes	No	N/A
Was the Matrix Spike/Matrix Spike Duplicate criteria met? (frequency ≥ 5% and laboratory determined control limits)			**N/A**
Laboratory Control Sample criteria met?			**Yes**
Were the Laboratory Method Blank results all < RL?			**No**
Were the Field Blanks results all < RL?			**N/A**
Was the ICAL criteria met? (30%)			**Yes**
Was the CCV criteria met? (30%)			**No**
Was the Tuning criteria met?			**Yes**
Were the Surrogate % recoveries within laboratory determined control limits?			**Yes**
Were the Internal Standard areas within ± 60 - 140%?			**Yes**
Was canister certification criteria met?			**Yes**
Were sample results able to be recalculated from the laboratory raw data and were they accurate?			**Yes**
Was target compound identification correctly performed by the laboratory?			**Yes**
Were chromatograms representative of the sample results?			**Yes**

Comments (note deviations):

Blanks	TO-15 / SIM	Concentration (ug/m^3)	MDL / RL (ug/m^3)	Qualifiers	Associated Samples
Lab Blank					
R3772480-2		Nondetect			
R3773476-3 (SIM)	Benzene	0.0390 J	0.0358 / 0.0639	None	Sample results > RL
R3773480-3 (SIM) (Tetrachloroethene)		Nondetect			

Field Blank	TO-15 / SIM	Concentration	MDL / RL	Qualifiers	Associated Samples
N/A					

Surrogates	TO-15 / SIM	%R	Limit	Qualifiers	Associated Samples
TO-15		Acceptable			
TO-15 SIM		Acceptable			

MS/MSD	TO-15 SIM	%R	Limits (%)	Qualifiers	Associated Samples
N/A					

LCS/LCSD	TO-15 / SIM	%R	Limits	Qualifiers	Associated Samples
R3772480-1 / 3		Acceptable			
R3773476-1 / 2 (SIM)		Acceptable			
R3773480-1 / 2 (SIM) (Tetrachloroethene)		Acceptable			

ICV/CCV	TO-15 / SIM	%R	Limits	Qualifiers	Associated Samples
ICV					
3/21/2022 8:52		Acceptable			
3/23/2022 8:40 (SIM)		Acceptable			

ICAL	TO-15 / SIM	RRF	%RSD	Qualifiers	Associated Samples
3/10/2022 12:29		Acceptable	Acceptable		
3/8/2022 SIM		Acceptable	Acceptable		

CCV	TO-15 / SIM	RRF	%D	Limit	Qualifiers	Associated Samples
3/10/2022 18:14	Benzyl Chloride	Acceptable	55	30	**J / UJ**	**All samples**
	Vinyl Acetate	Acceptable	44.4	30	**J / UJ**	**All samples****
3/08/2022 20:54 (SIM)		Acceptable	Acceptable			

**Applies to TO-15 results - reportable results are from the TO1-5 SIM analysis - no qualification required for the SIM results

Tune	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Internal Standards	TO-15 / SIM	Area %	Area % Criteria	Qualifiers	Associated Samples
	All Internal Standards	Acceptable			

Canister Certification	TO-15 / SIM	Qualifiers	Associated Samples
	Acceptable		

Raw Data Review	TO-15 / SIM	Results
Recalculated Sample Result		Acceptable

Sample #	Laboratory Reported Result (ug/m3)	Recalculated Sample Result (ug/m3)
TO-15		**RRF / Concentration**
L1472579-02	4-Ethyltoluene: 0.44	0.5540 / 0.440
L1472579-02	Methylene Chloride: 57.30	0.57188 / 57.34
TO-15 - SIM		
L1472579-02	Chloromethane: 1.11	0.4573 /1.104
L1472579-02	Ethylbenzene: 1.11	1.1731 / 1.11

$$RRF = (A_x C_{is})/(A_{is} C_x)$$

(OR)

$$RRF = (PCE\ Response * ISTD\ Conc.)/(ISTD\ Response * PCE\ Conc.)$$

$$C_x = [(A_x)(I_s)(Df)]/[(A_{is})(RRF)]$$

(OR)

$$PCE\ Conc. = (PCE\ Response * ISTD\ Spike * Dilution)/(ISTD\ Response * RRF)$$

Target Compound Identification	Acceptable
Chromatogram review	Acceptable

Representativeness:	Yes	No	N/A
Were sampling procedures and design criteria met?	**Yes**		
Were holding times met?	**Yes**		
Was preservation criteria met? (0° - 6° C)			**N/A**
Were Chain-of-Custody records complete and provided in data package?	**Yes**		

Comments (note

Holding Time / Canister Pressure Criteria	Days to Analysis	Criteria	Qualifiers	Associated Samples
Holding Time	Acceptable			

	Initial and Final Canister Pressure Results
Canister Pressure Criteria	Acceptable

Comparability:	Yes	No	N/A
Were analytical procedures and methods followed as defined in the QAPP or field change documentation?	**Yes**		

Comments (note deviations):

Completeness (90%):	Yes	No	N/A
Are all data in this SDG usable?	**Yes**		

Comments (note

Sensitivity:	Yes	No	N/A
Are MDLs present and reported?	**Yes**		
Do the reporting limits meet project requirements?	**Yes**		

Comments (note deviations):

Overall Comments: Data are usable with appropriate qualifiers applied.

Data Validator: Kristine Molloy Date: 4/29/2022

Data Reviewer: Cherie Zakowski Date: 5/1/2022

Attachment 2

Data Package Completeness Review Checklists

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 2203384

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	x		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		LCSs only
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation

Kristine Molloy

Signature

Date: 03/27/2022

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 2203385

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	x		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		LCSs only
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation

Kristine Molloy

Signature

Date: 03/27/2022

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 2203386

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	x		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		LCSs only
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation

Kristine Molloy

Signature

Date: 03/27/2022

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 2203546

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		COC / sample / canister label discrepancies noted in the case narrative / Situation resolved
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	x		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		LCSs only
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation

Kristine Molloy

Signature

Date: 04/03/2022

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 2203547

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	x		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		LCSs only
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation

Kristine Molloy

Signature

Date: 04/03/2022

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 2203550

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	x		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		LCSs only
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation

Kristine Molloy

Signature

Date: 4/03/2022

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 2203552

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		Dilutions were identified in case narrative
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	x		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		LCSs only
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation

Kristine Molloy

Signature

Date: 04/03/2022

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 2203596

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		Revised COC with corrections was provided on 3/25/22
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	x		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		LCSs only
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		Revised COC was provided and executed with corrections
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation

Kristine Molloy

Signature

Date: 04/04/2022

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 2203674

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		Revised COC with corrections was provided on 3/29/22
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	x		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		LCSs only
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		Revised COC was provided and executed with corrections
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation

Kristine Molloy

Signature

Date: 04/08/2022

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 2203675

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	x		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		LCSs only
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation

Kristine Molloy

Signature

Date: 04/08/2022

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: 2205002

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	x		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		LCSs only
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		COC was not filled out with proper writing utensil
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation

Kristine Molloy

Signature

Date: 05/11/2022

VA SLC OU-1

Data Package Completeness Review Checklist

SDG: L1470815

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	x		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		LCSs only
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation

Kristine Molloy

Signature

Date: 03/30/2022

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: L1470817

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	x		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		LCSs only
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation

Kristine Molloy

Signature

Date: 03/30/2022

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: L1470822

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	x		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		LCSs only
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation

Kristine Molloy

Signature

Date: 03/30/2022

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: L1470823

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	x		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		LCSs only
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation Kristine Molloy Date: 03/30/2022

Signature

VA SLC OU-1
Data Package Completeness Review Checklist

SDG: L1472579

Required Documentation	Yes	No	Comments
1. Cover letter complete with the following information:	X		
▪ Title of report and laboratory unique report identification (sample delivery group number)	X		
▪ Project name, site location	X		
▪ Name and location of laboratory and second-site or subcontracted laboratory	X		
▪ Client name and address	X		
▪ Statement of authenticity and official signature and title of person authorizing report release	X		
2. Summary of samples received that correlates field sample IDs with the laboratory IDs	X		
3. Laboratory qualifier flags and definitions	X		
4. Preparation and/or analytical methods	X		
5. Sample results for each analyte (dry weight basis for soils)			
▪ Date received	X		
▪ Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)	X		
▪ Percent solids results for soil samples			Not Applicable
▪ Dilution factor (provide both diluted and undiluted results when available)	X		
▪ Sample-specific reporting limit adjusted for sample size, dilution/concentration	X		
▪ Sample-specific MDL adjusted for sample size, dilution/concentration	X		
▪ Units	X		
6. Case Narrative that addresses the following information at a minimum:	X		
▪ Sample receipt discrepancies	X		
▪ Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes and the corrective action taken in each occurrence	X		
▪ Identification and justification for sample dilution	X		
▪ Sample cooler temperature at time of receipt			Not Applicable
▪ Final residual vacuum of each sample canister immediately prior to analysis, or upon receipt (Air analyses only)	x		
7. Surrogate percent recoveries (surrogate result, target concentration, percent recovery)	X		

Required Documentation	Yes	No	Comments
8. MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results (associated QC limits must also be provided)	X		LCSs only
9. Method blank results	X		
10. Analytical batch reference number that cross references samples to QC sample analyses	X		
11. Executed COC and sample receipt checklist	X		No analysis listed on COC – clarification provided – COC executed
12. Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses	X		
13. Calibration blank results for inorganic analyses (required in hardcopy format only)			Not Applicable
14. Inductively coupled plasma (ICP) interference check sample for inorganic analyses, true and measured concentrations and percent recoveries (required in hardcopy format only)			Not Applicable
15. Reporting Limit Check Standard for metals analyses, true and measured concentrations and percent recoveries (if applicable, required in hardcopy format only)			Not Applicable
16. Post-digestion spike recoveries for metals analyses, (if applicable; required in hardcopy format only)			Not Applicable
17. Internal Standard recovery and retention time information, as applicable	X		
18. Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)	X		
19. Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)	X		
20. Instrument tuning and mass calibration information for ICP /mass spectrometry analyses	X		
21. All associated instrument printouts for all samples, standards, and QC samples (e.g., raw data) necessary to re-calculate results as well as all manual integrations (if performed)	X		
22. Sample preparation logs that include the following information	X		
▪ Preparation start and end times (as applicable)	X		
▪ Beginning and ending temperatures of water baths and digestion blocks			Not Applicable

Data package complete and ready for Validation

Kristine Molloy

Signature

Date: 03/27/2022

Attachment 3

Analytical Data Packages