Appendix I

Screening-Level Ecological Risk Assessment

Appendix I - Final
Screening-Level Ecological Risk Assessment

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

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

U.S. Army Corps of Engineers
Kansas City District

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

September 19, 2022

CDM Smith

This page intentionally left blank.

Table of Contents

List of Attachments

List of Figures

List of Tables

Acronyms and Abbreviations

%	percent
95UCL	95 percent upper confidence limit
AOU	accelerated operable unit
bgs	below ground surface
CDM Smith	CDM Federal Programs Corporation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cis-1,2-DCE	cis-1,2-dichloroethene
CLP	Contract Laboratory Program
COPEC	chemical of potential ecological concern
CSEM	conceptual site exposure model
DCE	dichloroethene
DO	dissolved oxygen
DSR	data summary report
EPA	U.S. Environmental Protection Agency
ERA	ecological risk assessment
ESS	East Side Springs
ESV	ecological screening value
ESL	ecological screening level
GW	groundwater
HRS	Hazard Ranking System
HQ	hazard quotient
HQmax	HQ based on the maximum concentration
LANL	Los Alamos National Laboratory
LOAEL	lowest-observed-adverse-effect level
MDL	method detection limit
mg/L	milligrams per liter
NOAEL	no-observed-adverse-effect level
NPL	National Priorities List
ORNL	Oak Ridge National Laboratory
ORP	oxidation reduction potential
OU	operable unit
PCE	tetrachloroethene
PQL	practical quantitation limit
RI	remedial investigation
RL	reporting limit
site	700 South 1600 East PCE Plume Superfund Site
SLC	Salt Lake City
SLCDPU	Salt Lake City Department of Public Utilities
SLERA	screening level ecological risk assessment
SVOC	semivolatile organic compounds
SVP	soil vapor probe
SW	surface water
TCE	trichloroethene
TDS	total dissolved solids
TOC	total organic carbon
UBLM	Utah Bureau of Land Management
UDEQ	Utah Department of Environmental Quality

VAMC	Veterans Affairs Medical Center
VC	vinyl chloride
VHA	Veterans Health Administration
VI	vapor intrusion
VOC	volatile organic compounds

This page intentionally left blank.

Section 1
Introduction

This screening level ecological risk assessment (SLERA) is for the 700 South 1600 East Tetrachloroethene (PCE) Plume Superfund Site located near the George E. Wahlen Veterans Affairs Medical Center (VAMC) in Salt Lake City, Utah. CDM Federal Programs Corporation (CDM Smith) developed this SLERA as directed by the U.S. Army Corps of Engineers, Kansas City District under Contract No. W912DQ-18-D-3008, Task Order No. W912DQ19F3048.

The VAMC operated a part-time dry-cleaning operation in Building 7 that used PCE over a 6-year period in the late 1970s and early 1980s. During this period, dry-cleaning residuals were likely disposed of into the sanitary sewer. PCE-contaminated groundwater is present beneath the VAMC property and in areas hydraulically downgradient, extending to the East Side Springs (ESS) neighborhood in Salt Lake City.

This SLERA is an appendix to the remedial investigation (RI) for Operable Unit 1 (OU1) of the site. As such, information presented in the RI will not be repeated, but the SLERA will summarize relevant information and cross-reference to the appropriate sections, tables, and figures within the RI for further details. The information from this SLERA, along with other relevant site information, will be used by risk managers to make decisions on whether remedial actions may be needed to protect the environment from site-related releases.

1.1 Overview of Eight-Step Ecological Risk Assessment Process

The U.S. Environmental Protection Agency (EPA) developed specific methods and procedures for completing ecological risk assessments (ERAs) at hazardous waste sites (EPA 1998, 1997, 1992). **Figure I.1-1** shows the eight-step process recommended for conducting ecological risk assessments at Superfund sites under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (EPA 1997). The eight steps shown in **Figure I.1-1** are not intended to represent a linear sequence of mandatory tasks. Rather, some tasks may proceed in parallel, some tasks may be performed in a phased or iterative fashion, and some tasks may be judged to be unnecessary at certain sites.

Steps 1 and 2 of the ERA process (**Figure I.1-1**) provide a screening-level risk evaluation to identify the contaminants, pathways, and receptors of potential concern. These steps are intentionally simplified and conservative, and usually tend to overestimate the amount of potential risk. This conservatism allows for the elimination of those factors that are not associated with risk, permitting subsequent efforts to focus on factors that are of potential concern. This document includes an initial screen to identify the chemicals of potential ecological concern (COPECs) for each receptor using the existing site data. The results of this assessment are used to quantify the screening-level risk estimates, identify the chemicals that are likely to be key risk drivers, and determine if a more refined assessment as part of a baseline ERA is necessary.

1.2 Site Setting and History

The site is in Salt Lake City, near the University of Utah and the front (west side) of the Wasatch Mountains (RI Figure 1-1). The site is in a mixed commercial and residential area, and the major streets that bound it include 500 South to the north, Michigan Avenue to the south, 1100 East to the west, and Foothill Drive to the east (RI Figure 1-2).

The VAMC was constructed in the late 1940s on property that was formerly part of the Fort Douglas (U.S. Army) military post. A dry-cleaning facility on the VAMC property was operational in Building 7 from approximately 1976 through 1984. A single "closed loop" dry-cleaning system was operated, meaning the system contained a distillation process for the recovery of PCE at the end of each cycle. The condensate from the distillation process was likely emptied into a vitrified clay drain line attached to the sanitary sewer. This method of disposal was common practice in the 1980s (EPA 2012).

Section 2.3 of the RI provides a detailed description of past sampling investigations. In brief, PCE was first detected in 1990 during sampling of the Mount Olivet Cemetery irrigation well (Utah Department of Environmental Quality [UDEQ] 2000). A follow-up site inspection, conducted by UDEQ's Division of Environmental Response and Remediation, found PCE at Salt Lake City Salt Lake City Department of Public Utilities (SLCDPU) Drinking Water Well No. 18 (SLC-18). Several springs and seeps emanate along the East Bench fault within the ESS residential neighborhood west of 1300 East Street. PCE was detected in several of the springs and seeps within the downgradient portion of the PCE plume.

As a result of these PCE detections, the site was placed in the CERCLA Information System in January 2011 (EPA 2012). A preliminary assessment/site inspection was conducted by UDEQ's Division of Environmental Response and Remediation in 2011, which determined that PCE and its breakdown products are present in spring water, and shallow groundwater posed a potential human health threat (UDEQ 2011). The Mount Olivet Cemetery, several parks, schools, businesses, and residential neighborhoods are within the site.

In September 2012, EPA released the Hazard Ranking System (HRS) site score and determined the site was eligible for National Priorities List (NPL) designation. HRS documentation identified the sewer line originating from the VAMC campus as the source of the groundwater contamination and determined there was insufficient evidence to identify additional potential sources (EPA 2012). The site was listed on the NPL on May 24, 2013, with the VAMC named as a potential responsible party (EPA 2014).

1.3 Summary of Accelerated Operable Unit 1 SLERA

Historically, the site was divided into two operable units (OUs) to investigate potential impacts to the environment and downgradient receptors. Accelerated Operable Unit 1 (AOU1) was primarily focused on the immediate public health concerns related to vapor intrusion (VI) in the ESS area, a residential area generally bounded by 500 South and Michigan Avenue (north to south) and between 1300 East and 900 East (east to west). Following the AOU1 RI, OU2 was designated for investigation and delineation of the groundwater PCE plume and source area. In 2019, the U.S. Department of Veterans Affairs (VA) determined that AOU1 and OU2 would be combined into a single OU, OU1.

The AOU1 RI (EA Engineering, Science, and Technology, Inc. [EA] 2019) provided an accelerated evaluation of VI arising from shallow groundwater contamination in the ESS area. The investigation activities associated with the AOU1 RI were completed from 2014 through 2017. This investigation included indoor air sampling, soil gas sampling, surface water sampling of ESS seeps and springs and in Red Butte Creek, installation of monitoring wells within ESS, and groundwater sampling.

A preliminary list of site-related chemicals was developed during completion of the AOU1 RI. This list included PCE and its degradation products: trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), and vinyl chloride (VC). The chemical 1,4-dioxane was also included as a preliminary chemical of interest at the request of the EPA. Other analytes were not included in the AOU1 SLERA because they were deemed as not site attributable.

A SLERA was completed as part of the AOU1 RI. The scope of AOU1 RI was primarily to assess the VI pathway for residents in the ESS neighborhood to determine the need for interim actions to mitigate exposures from VI. The AOU1 SLERA was intentionally limited, focusing only on potential ecological exposures to surface water and groundwater and the site-related chemicals of interest (i.e., PCE and its degradation products). The AOU1 SLERA concluded that exposure of aquatic organisms, plants, wildlife (bird and mammals), and domestic dogs to site-related contaminants in groundwater and surface water will not result in unacceptable risks. The AOU1 SLERA also concluded that potential ecological risks to aquatic receptors in the Jordan River, which is located several miles west of the site and could be potentially affected because of discharges to the river through the Salt Lake City storm drain system, would be significantly lower than exposures at the site.

1.4 Document Purpose and Organization

While the AOU1 SLERA provided an initial risk characterization of potential exposures at the site, this accelerated risk assessment was intentionally limited in that it was focused on a specific subarea of the site (i.e., the ESS neighborhood), one environmental medium (i.e., surface water/groundwater), those exposure pathways that were likely to be key risk drivers, and only those chemicals that were site attributable to identify where prompt action was necessary prior to completion of the final record of decision (ROD). Since the completion of the AOU1 SLERA, additional data have been collected that further inform the exposure assessment and support decisions on the need for remedial action.

This SLERA will build upon what was done as part of the AOU1 SLERA and provide a comprehensive risk characterization in support of the OU1 RI to evaluate potential ecological risks from exposures due to contaminated groundwater. This SLERA evaluates the full list of COPECs, assess the exposure scenarios that were not included in the AOU1 SLERA, and re-evaluates exposure scenarios where more recent data have been collected.

The purpose of this document is to explain how the ecological risk calculations were performed, present the risk calculations, and provide an interpretation of the risk conclusions. In addition to this introduction, this report is organized into the following sections:

- **Section 2, Screening-Level Problem Formulation**, presents the conceptual site exposure model (CSEM), identifies the ecological receptors of interest, and discusses the exposure pathways of concern. This section also presents the site management goal and the assessment and measurement endpoints evaluated in the risk characterization.
- **Section 3, Screening-Level Risk Characterization**, provides information on the basic approach used to identify COPECs, evaluate detection limit adequacy, and perform risk calculations. This section also provides an overview of the available data used in the SLERA. Each environmental medium is evaluated separately. As part of each medium-specific evaluation, there is a summary of available data, a description of how these data were used to assess exposures, a summary of the toxicity values that were used to estimate risks, and a discussion of the estimated risks. This section also provides a discussion of the uncertainties in the risk assessment and describes the impact on these uncertainties on the risk interpretation. The overall risk conclusions are presented at the end of this section.
- **Section 4, References**, provides citations for guidance documents, studies, and reports referenced in this SLERA.

All SLERA-specific tables, figures, and attachments referenced within the following sections are provided at the end of the document. The SLERA-specific tables, figures, and attachments are denoted by an "I" prefix (e.g., **Figure I.2-1**).

Section 2
Screening-Level Problem Formulation

Problem formulation is a systematic planning step that identifies the major concerns and issues considered in the SLERA and provides a description of the basic approach used to identify the potential risks that may exist (EPA 1997). Problem formulation usually begins by developing a CSEM that identifies the source(s) of contaminant released into the environment, the fate and transport of contaminants in the environment, and exposure pathways of potential concern for ecological receptors. Based on the CSEM, ecological goals (i.e., assessment endpoints and measures of effect) are identified that form the basis of the ERA.

2.1 Conceptual Site Exposure Model

Figure I.2-1 presents the screening-level ecological CSEM for the site. As indicated in the CSEM, there are several complete exposure pathways by which ecological receptors may come into contact with site-related contaminants. However, not all are likely to be of equal concern. For the purposes of this SLERA, each exposure pathway was classified into one the following categories:

- Pathway is complete and may be an important contributor to exposures. These pathways will be evaluated quantitatively in the risk assessment and are indicated by boxes containing a solid circle (●).
- Pathway is complete but is likely to be a minor contributor to exposures. These pathways will be discussed qualitatively in the risk assessment and are indicated by boxes containing an open circle (❍).
- Pathway is not complete (i.e., not thought to occur); thus, no evaluation is needed in the risk assessment. These pathways are shown by boxes containing an 'X.'

The following sections describe the source of contamination, how the contamination was transported in the environment, and the ecological receptors of interest that could be potentially exposed.

2.1.1 Primary Source of Contamination

The site is affected by PCE, which was historically disposed into the sanitary sewer in the 1980s by a dry-cleaning facility in Building 7 on the VAMC property. PCE was likely released from the sewer line into the surrounding soil via cracks in the line. It is also possible that there were spills on the ground surface in the vicinity of the building. These releases resulted in contaminated groundwater, which migrated over time from beneath the VAMC property along with the alluvial flow into downgradient areas, including the ESS neighborhood. PCE and its degradation products, including TCE, cis-1,2-DCE, and VC, are the primary contaminants of interest at the site. However, in accordance with EPA guidance (EPA 2002), the SLERA will evaluate exposures for all identified COPECs, regardless of their source, to fully characterize potential ecological risks.

2.1.2 Transport in the Environment

As illustrated in the CSEM (**Figure I.2-1**), site contaminants can migrate in the environment by several processes:

- Contaminants in groundwater can flow and migrate to downgradient and cross-gradient locations (depending upon the hydraulic gradients of the aquifer).
- Deep groundwater can be used for nonpotable uses (e.g., irrigation).
- Volatile chemicals in shallow groundwater can volatilize into the interstitial spaces between the soil particles, thus resulting in soil gas.
- Soil gas can volatilize at the ground surface and be released to outdoor air or can migrate into burrows of wildlife that reside in subterranean burrows.
- Shallow groundwater can daylight[1] in the form of seeps and springs.
- Chemicals in shallow groundwater can adsorb to shallow soil and sediment particles in seeps/springs.
- Chemicals can be taken up into tissues of ecological receptor food items (e.g., plants, invertebrates) if they are grown in contaminated soil or watered with contaminated groundwater.
- Fine-grained soil/sediment particulates can be released into air by either wind erosion and/or soil disturbances (e.g., animals digging burrows).

2.1.3 Receptors of Interest

As described in Section 1.1, the site is in Salt Lake City, in a mixed commercial and residential area, and the major streets that bound it include 500 South to the north, Michigan Avenue to the south, 1100 East to the west, and Foothill Drive to the east (RI Figure 1-2). The site is located in an urban, mostly developed area, thus, the ecological receptors of interest include plants and wildlife species that are common in urban areas, as well as residential pets. Less than about 10 percent (%) of the site is publicly owned rights of way or parkland. Future land uses are expected to be consistent with current uses.

Most terrestrial and aquatic ecosystems support a variety of ecological organisms that can be exposed to chemicals in the environment. It is not feasible to perform risk evaluations for all species potentially exposed. Such an effort would also be duplicative because of the similarity of exposure patterns among closely related species and those with similar feeding guilds. For these reasons, representative receptor groups were selected for evaluation. These receptors groups are intended to be representative of entire classes of organisms (i.e., functional groups).

The rationale for selecting each receptor group is discussed below.

---

[1] In this context, "daylight" refers to shallow groundwater discharging at ground surface.

- **Fish.** The fish community lives in constant and direct contact with surface water that may be impacted by contaminants. Exposures are also possible from incidental ingestion of sediment and via the food chain (i.e., secondary consumers). The fish community often dominates the aquatic ecosystem in terms of biomass, and fish serve as a prey base for piscivorous (fish-eating) wildlife. However, given the site surface water conditions, which is primarily present in small seeps and springs that can be used to create residential water features, robust and reproducing fish populations are not expected.

- **Amphibians.** Because of their life cycle, amphibians are often associated with ponds and transient water bodies that do not support fish, such as emergent wetlands. The early life stages of amphibians (e.g., tadpoles) are in constant and direct contact with surface water. Amphibians serve as prey for higher-trophic-level organisms. It is assumed that screening levels designed to be protective of the aquatic community would also be adequately protective of tadpoles.

- **Invertebrates.** The terrestrial and aquatic invertebrate communities live in constant and direct contact with surface soil and surface water and/or sediment, respectively, that may be impacted by contaminants. Invertebrates have vital functions within the ecosystem, including serving as a prey base for higher-trophic-level organisms and cycling of nutrients.

- **Plants.** Plant roots are in constant and direct contact with soil, sediment, and shallow groundwater that may be impacted by contaminants. At the site, aquatic plants have the potential to be more impacted than terrestrial plants, because aquatic plants could be directly exposed to water from seeps/springs. Plant communities provide food for herbivores and essential habitat for many wildlife species.

- **Birds and mammals.** Wildlife are exposed to chemicals primarily through ingestion of dietary items, ingestion of drinking water, and incidental ingestion of soil/sediment while feeding. As higher-trophic-level species, birds and mammals are susceptible to contaminants that bioaccumulate through the food chain. Individual foraging strategies and prey choices may also promote incidental soil/sediment ingestion (e.g., mammals that ingest soil invertebrates tend to have a higher incidental soil ingestion rate because of adhering soil particles on prey items). For the site, burrowing animals are of particular interest because soil vapors derived from volatiles in groundwater have the potential to impact air within burrows. Representative species of birds and mammals are considered in the screening-level assessment and are expected to be adequately protective of domestic pets.

As noted above, the site setting is primarily a suburban environment. Most of the areas of the site have been substantially developed and are no longer natural conditions. The exceptions to this are parts of Dry Gulch and streamside areas of Red Butte Creek, which are outside of the site boundary, and very small private woodland properties.

The Utah Bureau of Land Management (UBLM) maintains lists of sensitive wildlife and plant species for the state (UBLM 2018). Within Salt Lake County, there are no identified sensitive plant species. The following sensitive wildlife species have been identified within Salt Lake County;

however, as the site is significantly developed, presence of the species listed below is likely limited:

- Fish: Least chub (*Iotichthys phlegethontis*)
- Amphibians: Columbia spotted frog (*Rana luteiventris*), western (boreal) toad (*Anaxyrus boreas*)
- Reptiles: Smooth green snake (*Opheodrys vernalis*)
- Birds: American three-toed woodpecker (*Picoides dorsalis*), bald eagle (*Haliaeetus leucocephalus*), black swift (*Cypseloides niger*), bobolink (*Dolichonyx oryzivorous*), burrowing owl (*Athene cunicularia*), ferruginous hawk (*Buteo regalis*)

2.1.4 Potential Exposure Pathways of Concern

2.1.4.1 Aquatic Receptors

The aquatic receptors of primary concern for the site are aquatic organisms (i.e., fish, aquatic plants and invertebrates, and early-life-stage amphibians) that could reside in the seeps, springs, ponds, and other water features within the ESS area. Although these seeps/springs tend to be ephemeral in nature, when present, it is possible they could provide temporary habitat for aquatic invertebrates and plants, and seep/spring water could be used by wildlife and pets as a drinking water source. Indeed, because the Salt Lake City region is generally dry, terrestrial wildlife may be attracted to the daylighting seeps/springs ESS area as a drinking water source. The aquatic organisms that reside in these site waters can also be a food source for aquatic-feeding wildlife.

For fish, aquatic plants, water-column-dwelling invertebrates, and early-life-stage amphibians, the primary exposure pathway of concern is direct contact with surface water that has been impacted by site-related releases. For sediment-dwelling invertebrates, direct contact with sediment is also an exposure pathway of concern. These pathways were selected for quantitative evaluation.

For sediment-dwelling invertebrates, sediment benchmarks and toxicity studies are likely to capture exposure from both direct contact with the sediment and ingestion of detritus and sediment particles, so oral exposure of invertebrates was not considered separately from direct contact with sediment.

Another pathway of potential concern to fish and other aquatic predators is ingestion of contaminants that have been taken up into aquatic prey items such as periphyton, smaller fish, and emerging aquatic insects. The ingestion of aquatic prey items can also result in incidental ingestion of sediment while feeding. Ingestion of aquatic food web items by fish is a pathway of potential concern, but quantitative evaluation of oral exposures is limited by a lack of oral toxicity values for this class of aquatic receptors. In addition, large fish are not expected to be present in seeps/springs. Therefore, fish ingestion was not selected as an exposure pathway for quantitative evaluation.

Likewise, some aquatic receptors (mainly amphibians) may be exposed by dermal contact with contaminated sediments, but this pathway is suspected to be relatively minor compared to oral or direct contact with water exposures. Methods are not available to support reliable quantitative evaluation of the dermal contact pathway for sediment for either fish or amphibians.

In addition to ingestion of aquatic food items, aquatic wildlife may also be exposed to chemicals via ingestion of surface water and from incidental ingestion of sediment while feeding.

2.1.4.2 Terrestrial Receptors

At the site, the expectation is that, outside of the seep/spring areas, shallow soil (0 to 10 feet below ground surface [bgs]) contamination is likely to be negligible, with the possible exception of near VAMC Buildings 6 and 7 where historical spills of PCE may have occurred. Direct contact with contaminated soil is a primary exposure pathway for terrestrial receptors such as plants and soil invertebrates. Most soil exposures are likely to occur within the top 25 to 30 centimeters of the ground surface (10 to 12 inches bgs) (EPA 2015); however, some larger plants, such as bushes and trees, could have roots that extend into deeper subsurface soils. This exposure pathway was selected for quantitative evaluation for these terrestrial receptors.

For terrestrial plants, exposure may also occur because of deposition of dust on foliar (leaf) surfaces; however, this pathway is believed to be small compared to root exposures in surface soils. Given the shallow depth to groundwater (i.e., groundwater can be present at the ground surface or only a few feet bgs in some areas), it is possible that plant roots could take up shallow groundwater via root exposure. Contact with shallow groundwater is assumed to occur within the top 10 feet bgs. Thus, this exposure pathway was also selected for quantitative evaluation.

Terrestrial wildlife are primarily exposed to chemicals in the environment through the ingestion pathway. Wildlife can be exposed via ingestion of terrestrial food items such as plants, small mammals, reptiles, and soil invertebrates; ingestion of surface water as drinking water; and incidental ingestion of soil while feeding. For most wildlife, this contact occurs within the top 6 inches of soil. For some wildlife, such as burrowing mammals, burrowing owls, and reptiles, exposures to chemicals can occur deeper in soil (up to 10 feet bgs).

Additionally, terrestrial wildlife may be attracted to the daylighting seeps/springs ESS area as a drinking water source given the dryness of the region.

Direct contact (i.e., dermal exposure) of wildlife to soils may occur in some cases, and inhalation exposure to airborne dusts in air is possible for all birds and mammals, but these exposures are usually considered to be minor in comparison to exposures from ingestion (EPA 2005). However, for burrowing animals, it is possible that animals could be exposed to relatively high concentrations of volatile organic compounds (VOCs) via inhalation if concentrations accumulate inside their burrows. Thus, exposure to soil gas was also selected for quantitative evaluation.

2.2 Assessment and Measurement Endpoints

Management goals are descriptions of the basic objectives that the risk manager at a site wants to achieve. The overall management goal identified for ecological health for the site is:

- Ensure adequate protection of ecological receptors within the impacted areas of the site by protecting them from the deleterious effects of acute and chronic exposures to site-related contaminants of concern.

"Adequate protection" is generally defined as the protection of growth, reproduction, and survival of local populations and communities. An assessment population is a "group of conspecific organisms occupying an area that has been defined as relevant to an ecological risk assessment" (EPA 2003). An assessment community is composed of a "multispecies group of organisms occupying an area that has been defined as relevant to an ecological risk assessment" (EPA 2003), with the composition of species differing based on the surrounding ecosystem.

In ERAs, for most receptors, the focus is on ensuring sustainability of the collective population rather than on protection of every individual in the population or community. However, when site receptors include federally listed species or other species of special concern, adequate protection of individual organisms of listed species is also an important management goal.

2.2.1 Assessment Endpoints

An assessment endpoint is defined in *Guidelines for Ecological Risk Assessment* (EPA 1998) as "an explicit expression of the environmental value to be protected, operationally defined as an ecological entity and its attributes." Assessment endpoints identify the ecological values to be protected (e.g., abundance and diversity of aquatic receptors). Assessment endpoints are directly related to the management goals and objectives determined for a site. Appropriate assessment endpoints are developed by risk assessors and often consider guidance from relevant regulatory agencies.

Ecological risk-related remedial goals and objectives for the site include (EPA 2003):

- Protection of aquatic receptor populations, such as small fish, aquatic invertebrates, and aquatic plants, from site-related adverse exposures in ponds or water features fed by springs/seeps
- Protection of terrestrial plant and invertebrate populations from site-related adverse exposures in soils near springs/seeps and buildings where PCE releases and spills may have occurred
- Protection of wildlife populations from site-related adverse exposures to contaminated media within the PCE plume extent
- Protection of domestic pets from site-related adverse exposures to contaminated media on residential properties

Assessment endpoints differ from management goals in that they are intentionally neutral and specific. Assessment endpoints are measurable attributes that are used to evaluate a dose-response relationship. For example, taxa richness would be an appropriate assessment endpoint for evaluating effects on the community of sediment-dwelling aquatic invertebrates in a stream. **Table I.2-1** presents the selected assessment endpoints for the receptors of interest for the site.

2.2.2 Measures of Effect

Measures of effect[2] represent quantifiable ecological characteristics that can be measured, interpreted, and related to the valued ecological components chosen as the assessment endpoints (EPA 1997, 1992). In general, there are four basic categories of measures of effect that are useful in evaluating the assessment endpoints at a site:

- **Predicted risks** based on a comparison of measured concentrations of contaminants in site media to levels believed to be safe
- **Site-specific toxicity studies**, where test organisms (e.g., fish, invertebrates, plants) are exposed to site media
- **In situ measures of exposure and effects** provide direct observations of potential impacts for field receptors, such as elevated tissue burdens or visible abnormalities (e.g., lesions, deformities)
- **Site-specific community surveys** of ecological receptor density and diversity and comparison to a suitable background or reference area

In general, each of these measures of effect categories has advantages and limitations. The most reliable risk assessments use information from all four types and use a weight-of-evidence approach. However, because SLERAs typically are performed at an early stage of a site investigation, the measures of effect used in screening-level assessments are generally restricted to the predicted risks approach.

Table I.2-1 summarizes the assessment endpoints and measures of effect for aquatic and terrestrial receptors that will be used to inform the risk characterization for ecological receptors for the site. As shown, the measures of effect in the SLERA rely upon a comparison of measured chemical concentrations in surface water, groundwater, soil gas, sediment, and soil relative to literature-based ecological screening levels that are protective of broad ecological receptor groups. If predicted screening-level risk estimates show the potential for unacceptable exposures for a receptor group, additional measures of effect may be needed to inform and refine risk conclusions for that receptor group.

[2] The term "measurement endpoint" was replaced by "measures of effect" and supplemented by two other measurement categories: measures of exposure and measures of ecosystem and receptor characteristics (EPA 1998).

Section 3

Screening-Level Risk Characterization

EPA established an eight-step process (**Figure I.1-1**) for conducting ERAs at Superfund sites (EPA 1997). Per this process, the initial screen for a site represents the first two steps in the eight-step process. The purpose of the initial screen is to identify the contaminants, pathways, and receptors of potential concern. The results of this assessment are used to quantify the screening-level risk estimates, identify the chemicals that are likely to be key risk drivers, and determine if a more refined risk assessment is needed.

3.1 Basic Approach

3.1.1 Selection of Chemicals of Potential Ecological Concern

The first step in the initial screen is to compile measurements of chemical concentrations that have been collected for site media. The next step is to assemble relevant conservative ecological screening values (ESVs) for each chemical in each exposure medium that are protective of the ecological receptors of interest. Measured chemical concentrations are then compared to their respective ESV to determine if the chemical will be retained as a COPEC or excluded from further evaluation. The ESVs used in the COPEC selection were purposefully chosen to ensure the process is inherently conservative. This means a larger number of chemicals may be retained for further evaluation than are likely to pose significant ecological risks.

The COPEC selection procedure classifies each chemical into one of five categories:

- **Quant.** – COPEC for quantitative evaluation; these are chemicals with maximum detected concentrations greater than the screening level that will be assessed quantitatively in the risk assessment.
- **Qual. 1** – Chemical requires a qualitative evaluation; these are chemicals that are infrequently detected but have an inadequate detection limit and will be discussed qualitatively in the uncertainty assessment.
- **Qual. 2** – Chemical requires a qualitative evaluation; these are chemicals that are not detected, but they do not have screening levels to assess detection limit adequacy and will be discussed qualitatively in the uncertainty assessment.
- **Bkg.** – These are detected chemicals that do not have screening levels; thus, the only way to assess if they may be site-related or elevated is to make comparisons between site samples and background (or reference) locations in the uncertainty assessment.
- **No further evaluation** – These are either detected chemicals with maximum detected concentrations below the screening level or chemicals that were not detected, and the achieved method detection limit (MDL) is adequate relative to the screening level; thus, risks from these chemicals are likely to be negligible and they are not evaluated further in the SLERA.

Separate COPEC selections are performed for each environmental medium—groundwater, surface water, soil/sediment, and soil gas. In addition, separate COPEC selections are performed for ecological receptors where exposures are via direct contact (e.g., aquatic invertebrate direct contact with sediment and terrestrial plant direct contact with soil), and for wildlife receptors where the primary exposure route is ingestion. Wildlife ESVs are derived using default tissue uptake factors from environmental media. Hence, ESVs used in the selection of COPECs are protective of both ingestion of the environmental medium (e.g., incidental ingestion of soil and ingestion of drinking water) and ingestion of biota in food or prey items, and these wildlife ESVs account for potential bioaccumulation into dietary items.

3.1.2 Evaluation of Detection Limits

The COPEC selection procedure focuses on detected chemicals. Excluding chemicals that are not detected is appropriate if samples were analyzed using analytical methods with adequate detection limits (i.e., the analytical instrument would have detected the chemical if it were present at a concentration of concern). Therefore, to ensure analytical detection limits were adequate to support risk management decision-making, method-specific limits for each non-detected analyte in each medium were compared to the screening level ESVs.

Usually, there are three different types of laboratory limits identified in laboratory deliverables: an MDL, a practical quantitation limit (PQL), and a reporting limit (RL). The MDL is defined as the minimum concentration of a chemical that can be detected and reported with 99% confidence that it is present. The PQL is normally about 3 to 10 times higher than the MDL and considered the lowest concentration that can be accurately measured and quantified, as opposed to detected. The RL is set by the laboratory based on contractual requirements and is usually set equal to, or slightly higher than, the PQL.

Typically, the detect/non-detect status for a chemical is determined based on the MDL. If the chemical is not present at a level above the MDL, the result is reported as non-detect (i.e., U-qualified). When the chemical is present at a concentration between the MDL and the PQL (or RL), the result is reported as an estimated concentration (i.e., J-qualified). When the chemical is present at a concentration above the PQL (or RL), there is usually no qualifier assigned to the reported concentration, unless there are other potential data quality issues being flagged for the result. As mentioned previously, J-qualified results are acceptable for use in risk assessment. U-qualified results are also acceptable for use in risk assessment, but their utility depends upon the adequacy of the achieved MDL.

The adequacy of the MDL for each chemical was determined by comparing the maximum MDL (across all non-detect samples) to its respective ESV. For those chemicals where the maximum MDL is higher than the ESV and there is a low detection frequency (less than 10%), the MDL was deemed to be inadequate. These chemicals are discussed further as part of the uncertainty assessment (Section 3.6).

3.1.3 Risk Calculation Approach

The initial screen includes a risk prediction approach, referred to as the hazard quotient (HQ) approach. In the HQ approach, the estimated exposure from the site is compared to an ESV that may be without significant risk of unacceptable adverse effect:

HQ = Exposure / ESV

Exposure is expressed as the concentration of a contaminant in an environmental medium. In all cases, the site exposure and the ESV must be expressed in the same units of measure. For example, surface water concentrations expressed as milligrams per liter (mg/L) must be compared to ESVs expressed as mg/L. Ideally, the ESV is selected to represent the threshold for a toxicity endpoint that is relevant to the assessment endpoint of interest (e.g., mortality, growth, and reproduction effects are usually selected for population sustainability endpoints).

If the value of an HQ is less than 1, then it is assumed that the risk of unacceptable adverse effects to the receptor is acceptable. If the HQ is greater than or equal to 1, the risk of adverse effects to the receptor may be of concern. It also is assumed that the probability or severity of adverse effects increase as the value of the HQ increases.

Screening-level HQ values are predictions and subject to the uncertainties inherent in the estimates of exposure and the ESVs. Therefore, HQ values above 1 should be interpreted as indicators of potential risk and the need for further evaluation rather than definitive evidence that adverse ecological effects are occurring.

3.2 Data Summary

3.2.1 Investigation Overview

Because of the initial detection of PCE in 1990, numerous investigations have been conducted to characterize the source of contamination and the potential threats to human health and the environment. Section 2.3 of the RI provides a detailed summary of the historical investigations prior to the AOU1 and the OU2 investigations.

The OU1 RI for the site was initiated in 2015 to characterize the nature and extent of contaminants. Historically, the site was divided into two OUs to investigate potential impacts to the environment and downgradient receptors. AOU1 was designated based on the immediate public health concerns for residents of the ESS area related to indoor air inhalation exposure to PCE and its breakdown products. OU2 was designated for investigation and delineation of the groundwater PCE plume and source area. In 2019, AOU1 and OU2 were combined into OU1.

Section 3 of the RI describes the study area objectives, investigative approach, and investigative activities completed for studies performed in support of the RI. In brief, the RI investigative approach included:

- Monitoring well installation and groundwater sampling
    - Logging lithology during drilling completed at the site and the collection of geotechnical data to determine the hydrostratigraphic framework

- Installation of the monitoring well network to laterally and vertically delineate the PCE groundwater plume
- Installation of monitoring wells along plume transects for the evaluation of mass flux/discharge
- Time-discrete sampling of monitoring wells to evaluate concentration trends across the site
- Measurement of water levels at all wells, including multilevel wells, to determine groundwater flow direction, horizontal gradients, and vertical gradients
- Collection of multiple lines of evidence to evaluate natural attenuation, including concentration trends, geochemical parameters, concentrations of degradation products, compound-specific isotopic analysis, fraction of organic carbon, magnetic susceptibility, and ferrous iron minerals

- Hydrogeologic testing, specifically slug testing, to measure hydraulic conductivity and determine groundwater velocity
- Soil and soil vapor sampling in the suspected source areas to evaluate the suspected release points and determine if an ongoing source to groundwater is present
- Shallow groundwater, surface water, and soil gas sampling in the ESS area to delineate the area of the site that could be susceptible to VI
- Indoor air sampling of buildings to determine the risks to occupants due to VI

The environmental samples collected during the RI are also the basis for quantifying exposures in the SLERA and are described briefly below. In the RI, investigation activities are summarized by investigation type. Thus, the same convention is retained herein. Investigative activities completed for the former AOU1 are described first, followed by the former OU2, and then the combined OU1.

Detailed information on each investigation, including the governing plans, study designs, sampling procedures, and analytical results is presented in Section 3 of the RI. A summary of this information is presented in Sections 3.3 to 3.5, focusing on the studies and results that are used to inform exposures for the SLERA.

3.2.2 Data Usability Evaluation

All groundwater, surface water, soil gas, soil, and sediment samples collected during the RI investigations (AOU1, OU2, Phase 1 OU2, and Phase 2 OU1) were considered for use in the SLERA. These samples have been collected in accordance with approved sampling plans and the resulting data have undergone data validation. Section 3.13 of the RI discusses any deviations from the governing plans and any implications arising from these deviations. Individual data summary reports (DSRs) as well as the investigation-specific data usability evaluations and data validation reports are provided as appendices to the RI (**Appendix A** [AOU1 DSR Reports], **Appendix B**

[OU2 DSRs], **Appendix C** [Phase 1 DSRs], and **Appendix D** [Phase 2 DSRs]). All results are included in the selection of COPCs and exposure estimates, with the following exclusions:

- Results rejected by the data validator (R-qualified) were excluded. J-qualified results were retained, although it is recognized results are estimated and could be potentially biased high or low. Non-detect results (U-qualified) were also retained.
- During the AOU1 RI (EA 2019), some of the HAPSITE soil gas data collected in 2015 was qualified during data validation because field data collection was not completed in compliance with the QAPP. In addition to the data validation, a third-party QA assessment was conducted by an independent contractor to determine usability of the data due to field and laboratory documentation discrepancies. The data evaluation for usability determined these data were not usable quantitatively for the risk assessment. Section 3.5 provides specific information on these samples.
- Field quality control (QC) samples (e.g., field, trip, and equipment rinsate blanks, and field duplicates) and laboratory QC samples (e.g., matrix spikes, internal standards, and laboratory duplicates) were excluded.
- Soil gas sample results were retained for use regardless of the sampling/analysis method (i.e., HAPSITE and SUMMA).
- Results for soil samples collected at depths below 10 feet bgs were excluded as it is not expected that the ecological receptors of interest would encounter soils below this depth cutoff.

3.3 Evaluation of Groundwater and Surface Water

This section presents the screening-level evaluation of ecological exposures to chemicals in site groundwater and surface water. As described previously, several springs and seeps emanate along the East Bench fault within the ESS residential neighborhood west of 1300 East Street. PCE was detected in several of the springs and seeps within the downgradient portion of the PCE plume. Red Butte Creek also flows along the southern extent of the site.

The SLERA evaluated the following water exposure scenarios: direct contact exposures by aquatic organisms residing in the seeps, springs, ponds, and other water features within the ESS area; direct contact (root) exposures by terrestrial plants near seeps/springs; and ingestion exposures by wildlife and domestic pets that drink or feed from these water features. Ecological receptor exposures under current conditions were assessed based on surface water data. Potential future ecological exposures were assessed based on groundwater data, as this data represents groundwater that could potentially daylight in the future.

The following sections describe the surface water and groundwater datasets that were used in the SLERA, explain how these data were used to evaluate ecological exposures, identify the sources of the toxicity values used in the screen, summarize the COPECs, and discuss the screening-level risk results.

3.3.1 Data Summary for Surface Water

Surface water sampling was completed during the RI to determine the extent of VOCs in groundwater emanating from seeps and springs in the ESS area. Section 3.7 of the RI describes the surface water investigative activities, which are summarized briefly below. **Table I.3-1** presents chemical concentration summary statistics for surface water across all RI sampling activities. The surface water sample results were used to identify COPECs under current site conditions.

In 2016, surface water samples were collected from identified and accessible seeps, springs, sumps, and Red Butte Creek during the AOU1 investigation. Several of the springs discharge to the municipal stormwater system; therefore, water samples were also collected from selected Salt Lake City stormwater sewer manholes, located in and downgradient of AOU1, to determine if groundwater seepage and discharge from foundation drains is conveying VOC-impacted water to stormwater lines. Surface water and stormwater sampling locations are presented in RI Figure 3-5. Samples were analyzed for VOCs and semivolatile organic compounds (SVOCs), total metals, anions, and total dissolved solids (TDS).

In October and December 2018, during the OU2 investigation, nine surface water locations were sampled, including six locations previously sampled and three new locations (one new spring discharge location and two locations in Red Butte Creek) (see RI Figure 3-5). Samples were analyzed for VOCs, SVOCs, metals, pesticides, total organic carbon (TOC), TDS, anions, and alkalinity.

Between December 2019 and March 2020, seven surface water locations were sampled during the Phase 1 OU2 investigation activities (RI Figure 3-5). Grab samples were collected at each location and analyzed for VOCs.

In April 2021, 11 surface water locations were sampled, including eight locations previously sampled and three new locations during the Phase 2 OU1 investigation activities (RI Figure 3-5). Surface water sampling consisted of flow rate measurements, water quality field parameter measurements, and collection and shipment of samples for analytical testing. Water quality parameters included pH, specific conductivity, temperature, oxidation reduction potential (ORP), dissolved oxygen (DO), and turbidity. Analytical samples were collected for VOCs, total metals, dissolved gasses, anions, nitrate/nitrite, TOC, and alkalinity.

3.3.2 Data Summary for Groundwater

Numerous groundwater sampling activities were conducted during the RI to determine the extent of VOCs in groundwater associated with the former dry-cleaning operation on the VAMC campus. Section 3.5 of the RI describes the groundwater investigation activities that are summarized briefly below. **Table I.3-2** presents chemical concentration summary statistics for groundwater across all RI sampling activities. The groundwater sample results were used to identify COPECs for a future condition scenario (i.e., where shallow groundwater daylights in the future).

3.3.2.1 AOU1 Groundwater Sampling (2015–2016)

During the AOU1 sampling activities, temporary groundwater monitoring points (referred to as GW- prefix locations in RI Figure 3-1) were installed with a Geoprobe direct-push probe rig to assess the nature and extent of VOCs in shallow groundwater in the ESS area. Groundwater sampling was conducted at the 44 temporary well points between February and April 2016. Ten temporary monitoring points (GW-10, GW-11, GW-16, GW-20, GW-49, GW-50, GW-52, GW-53, GW-59, and GW-61) were left in place as temporary piezometers to allow future groundwater sampling. The piezometers were sampled during three additional events that occurred in July 2016, September 2016, and August 2019. Groundwater samples were submitted for analysis of VOCs, SVOCs (including 1,4-dioxane), metals (total and dissolved), TDS, anions, pH, and total alkalinity.

3.3.2.2 OU2 Groundwater Sampling (2017–2019)

During the OU2 sampling activities, groundwater samples were collected from the newly installed monitoring wells (MW- prefix well identifiers in RI Figure 3-2) in September–October and November–December 2018. Several existing wells were also sampled in November–December 2018. All existing wells were sampled again in March and April 2019. Collected groundwater samples were analyzed for VOCs, SVOCs, 1,4-dioxane, metals, mercury, pesticides, TOC, TDS, anions, and alkalinity.

3.3.2.3 Phase 1 OU2 Groundwater Sampling (2019–2020)

Phase 1 OU2 groundwater sampling activities were conducted to assist in further characterization of the hydrogeology, temporal trends, and nature and extent of contamination. Three groundwater sampling events were conducted in December 2019, June 2020, and September–October 2020. RI Figure 3-2 summarizes the groundwater sampling locations. Collected groundwater samples were submitted for analysis of VOCs, total metals (unfiltered), TOC, TDS, anions (sulfate, chloride), alkalinity, nitrate and nitrite, and dissolved gasses (methane, ethane, ethene). A subset of samples was submitted for 1,4-dioxane.

3.3.2.4 Phase 2 OU1 Groundwater Sampling (2020–2021)

Phase 2 OU1 groundwater sampling activities were conducted to assist in the further characterization of the hydrogeology, temporal trends, and nature and extent of contamination. Two groundwater sampling events were conducted under Phase 2 OU1 and were completed in December 2020 and March 2021. Collected groundwater samples were submitted for analysis of VOCs, total metals (unfiltered), TOC, anions (sulfate, chloride), alkalinity, nitrate and nitrite, and dissolved gasses (methane, ethane, ethene). A subset of samples was submitted for 1,4-dioxane.

In addition, the replaced piezometers (designated “RG-” for residential groundwater; RI Figure 3-3) were sampled in April 2021. Samples were analyzed for VOCs and water quality parameters (temperature, DO, pH, specific conductance, ORP, and turbidity) and recorded if there was sufficient volume.

3.3.3 Exposure Assessment

When performing the initial screen for ecological receptor exposures to surface water and groundwater, the exposure concentration was based on the maximum concentration of each analyte across all samples (**Tables I.3-1 and I.3-2**, respectively). The COPEC selection was performed separately for surface water and groundwater.

3.3.4 Toxicity Assessment

ESVs for the protection of aquatic receptors from direct contact exposures to chemicals in surface water have been developed by various regulatory agencies and derived from published scientific literature and experimental studies. The surface water ESVs for ecological receptors were compiled from the following sources:

- UDEQ water quality standards for state waters (UDEQ 2020)
- EPA national ambient water quality criteria for aquatic life (EPA 2020)
- Los Alamos National Laboratory (LANL) ECORISK Database ecological screening levels (ESLs) for aquatic community organisms and wildlife ingestion (LANL 2021; version 4.2)
- Oak Ridge National Laboratory (ORNL) soil solution benchmarks for plant roots (Efroymson et al. 1997)

ESVs for the protection of aquatic receptors (including fish, aquatic plants and invertebrates, and amphibians) from direct contact with chemicals in surface water are available from several sources. In general, two different types of aquatic toxicity benchmark are identified: acute and chronic. The acute toxicity benchmark is intended to protect against short-term lethality, while the chronic toxicity benchmark is intended to protect against long-term effects on growth, reproduction, and survival. In the initial screen, the selection of COPECs and initial HQ calculations used chronic toxicity benchmarks.

For many metals and metalloids, the aquatic receptor ESVs are dependent upon the hardness of the water (i.e., the precise value of the ESV is calculated from the water hardness). In the initial screen, the ESVs for hardness-dependent metals were calculated based on a hardness of 100 mg/L, which is the basis of the water quality standards reported by Utah DEQ.

The LANL ECORISK Database water ESLs include values for both aquatic community organisms (i.e., fish, aquatic invertebrates, aquatic plants) as well as wildlife. The wildlife ESLs for surface water are protective of water ingestion and ingestion of aquatic food items. LANL derives both no-effect ESLs and low-effect ESLs. In the initial screen, the no-effect water ESLs are used to identify COPECs and compute initial HQ estimates.

As illustrated in the CSEM (**Figure I.2-1**), terrestrial plants have the potential to be exposed to surface water in seeps/springs and shallow groundwater via root exposure. Limited toxicity data are available to evaluate this potential exposure scenario. ORNL provides benchmarks for a small set of chemicals to evaluate root exposures.

Table I.3-3 presents the surface water ESVs for each source. The lowest ESV across all sources was selected for use in identifying COPECs for surface water and groundwater.

3.3.5 Results

Table I.3-1 presents the initial screen for surface water exposures by ecological receptors. For each chemical analyzed in surface water, this table shows a comparison of the maximum detected concentration to the lowest ESV and summarizes the outcome of the screen. This table also presents the HQmax, which is the HQ based on the ratio of the maximum concentration to the lowest ESV.

As shown, the COPECs identified for further quantitative assessment in surface water and/or groundwater include:

- **Metals:** aluminum, arsenic, barium, beryllium, cadmium, cobalt, copper, iron, lead, manganese, nickel, selenium, silver, thallium, vanadium, and zinc
- **SVOCs:** bis(2-ethylhexyl)phthalate and dimethyl phthalate
- **VOCs:** chloroform, PCE, and toluene

Exclusion of Metals from Risk Characterization

Several metals were identified as COPECs in surface water and groundwater. Metals are naturally present in the Earth's crust and expected to be detected in water. Based on the site history, there is no expectation that elevated metal concentrations would be attributable to site-related impacts. Even so, in accordance with EPA guidance (EPA 2002), which states that COPECs that have both release-related and background-related sources should be included in the risk assessment, potential risks from exposures to metals are discussed in **Attachment I.1** to inform risk management decisions, but metals in water have not been retained for further characterization in the SLERA.

Refined Evaluation of Organic COPECs

Five organic chemicals were identified as COPECs in groundwater (bis(2-ethylhexyl)phthalate, dimethyl phthalate, chloroform, PCE, and toluene) and HQmax values ranged up to 7. Two organic chemicals were identified as COPECs in surface water (bis[2-ethylhexyl]phthalate and chloroform) and HQmax values ranged up to 4. When selecting COPECs, maximum surface water concentrations were compared to the lowest water ESLs, regardless of their basis. Therefore, a refined evaluation was performed to determine which types of ESLs were exceeded and the likelihood for potential unacceptable ecological risks.

Tables I.3-4 and I.3-5 present the refined evaluation for surface water and groundwater, respectively. In these tables, summary statistics are presented for each COPEC along with the receptor-specific ESLs. The chronic and acute ESLs are shown for aquatic community organisms (e.g., fish, aquatic invertebrates), the screening-level benchmarks are shown for terrestrial plant root exposures, and the no-effect and low-effect ESLs are shown for wildlife (i.e., representative

bird and mammal species of various feeding guilds). Maximum concentrations above the ESL are shaded.

Table I.3-4 shows that the maximum surface water concentrations of bis(2-ethylhexyl)phthalate and chloroform were above the chronic ESL for aquatic community organisms, but did not exceed the acute ESL. Maximum concentrations were also well below the no-effect ESLs for all wildlife. The following bullets discuss the chronic ESL exceedances for surface water for each COPEC:

- For bis(2-ethylhexyl)phthalate, only a single surface water sample (collected from SW47 in Red Butte Creek on October 10, 2018) was above the chronic ESL. This single exceedance appears to be anomalous because all surface water samples from this location collected prior to and since the October 2018 sampling event have been non-detect for bis(2-ethylhexyl)phthalate. Additionally, bis(2-ethylhexyl)phthalate is not expected to be associated with the PCE groundwater plume (i.e., it is not a site-related contaminant).

- For chloroform, there were 25 surface water samples above the chronic ESL, but no samples exceeded the acute ESL. Chloroform is frequently detected in site surface water (71 of 100 surface water samples reported detected concentrations of chloroform). Chloroform is a disinfection by-product commonly produced during the water chlorination process and its presence could potentially be associated with discharges of chlorinated water, such as during lawn irrigation or leaking water lines (Ivahnenko and Zogorski 2006). Inspection of the groundwater data for two wells upgradient of the site (MW-05R and MW-06) shows that chloroform was detected in all groundwater samples with concentrations ranging from 0.5 to 6.9 ug/L. The site surface water concentrations are within this range, which suggests the presence of chloroform is likely attributable to anthropogenic, but not site-related, sources.

The refined results for groundwater (**Table I.3-5**) are similar to surface water. Maximum groundwater concentrations of all COPECs, including bis(2-ethylhexyl)phthalate, chloroform, dimethyl phthalate, PCE, and toluene, were above the chronic ESL for aquatic community organisms but did not exceed the acute ESL. Maximum COPEC concentrations were well below the no-effect ESLs for all wildlife and the available screening-level benchmarks for terrestrial plant roots. With the exception of PCE, these COPECs are not expected to be associated with the PCE groundwater plume (i.e., they are not site-related contaminants and likely have other anthropogenic sources).

Inspection of the PCE data for groundwater shows the chronic ESL exceedances occurred in three wells (MW-01S, MW-02, and MW-03RB) that are screened at depths greater than 175 feet bgs and located outside the ESS neighborhood where seeps/springs daylight (RI Figure 3-2). Thus, while there is the potential PCE exposures in the future if this groundwater were to daylight as seeps/springs, it is anticipated groundwater concentrations would attenuate below the chronic ESL prior to daylighting. The assumption is supported by the fact that PCE was not identified as a COPEC for surface water (i.e., the maximum PCE concentration in surface water was below the chronic ESL).

These results support the conclusion that exposures to seeps/springs, both now and in the future, will not result in unacceptable risks to wildlife or to domestic pets that drink the water or feed on

aquatic organisms. No unacceptable risks are expected for terrestrial plants from root exposures to organic chemicals in seeps/springs.

Seep/spring water could be used to create aquatic features in residential yards (e.g., small ponds). These features are unlikely to represent pristine natural aquatic habitats (i.e., native fish communities are unlikely to be present), but could support aquatic invertebrates, emerging insects, and domestic fish (e.g., koi). Acute impacts to aquatic organisms from exposures to COPECs seep/spring water are not expected. There is the potential for aquatic organisms to have unacceptable chronic exposures; however, most of COPECs associated with these chronic exposures are not site-related contaminants. PCE concentrations in surface water did not result in unacceptable risks, and PCE concentrations in groundwater would be expected to attenuate below the chronic ESL prior to daylighting.

3.4 Evaluation of Sediment and Soil

This section presents the screening-level evaluation of ecological exposures to chemicals in site sediment and soil. In the SLERA, the term "sediment" is used when describing materials that have been collected within seep/spring features and from the bottom of creek beds. The term "soil" is used when describing all other materials (e.g., collected from boreholes).

The SLERA evaluated the following sediment and soil exposure scenarios: direct contact sediment exposures by aquatic invertebrates residing in the seeps, springs, ponds, and other water features within the ESS area, direct contact soil exposures by terrestrial plants, and ingestion exposures by wildlife and domestic pets (including both incidental ingestion of sediment and soil and ingestion of aquatic and terrestrial food items).

The following sections describe the sediment and soil datasets that were used in the SLERA, explain how these data were used to evaluate ecological exposures, identify the sources of the toxicity values used in the screen, summarize the COPECs, and discuss the screening-level risk results.

3.4.1 Data Summary

Drilling investigations at the site have been completed for grab groundwater sampling, soil sampling, monitoring well installation, and soil gas probe installation. During these investigations, soil/sediment samples were collected for the analysis of VOCs, geotechnical parameters, and geochemical parameters, and lithologic logs were completed to delineate VOC contamination and provide geologic and hydrogeologic site information.

A summary of the soil/sediment sampling efforts conducted during the RI is presented in Section 3.3 of the RI. Investigations for each medium are summarized briefly below. **Table I.3-6** presents chemical concentration summary statistics for soil/sediment. These results were used to identify COPCs in soil/sediment for further evaluation in the risk calculations.

3.4.1.1 Sediment

During the AOU1 sampling activities, three sediment samples were collected in May 2016 in conjunction with surface water sampling locations (RI Figure 3-1). Two sediment samples (SS-09

and SS-26), collocated with surface water sampling locations along Sunnyside Avenue, were collected from seeps and springs with known detections of PCE (SW-09 and SW-26). The third sediment sample (SS-01) was collocated with a surface water sample (SW-01), which was placed in a location where PCE was not detected in the shallow groundwater. Sediment samples were analyzed for VOCs, SVOCs, and metals.

3.4.1.2 Soil

The RI summarizes results for all collected soil samples. In brief, 298 soil samples have been collected from 44 locations on the VAMC campus, in Sunnyside Park, and near the Mount Olivet Cemetery, as presented in RI Figure 5-1. All soil samples were analyzed for VOCs. These soil samples were collected from depths ranging from less than 1 foot to 355 feet bgs. However, the SLERA only includes those soil samples collected from a depth interval that could potentially be encountered by the ecological receptor populations of potential concern (i.e., 0 to 10 feet bgs); the SLERA refers to samples within this depth interval as "shallow soils."

A total of 41 shallow soil samples have been collected (collocated with soil gas sampling performed in 2018 and 2019 during the OU2 sampling activities). These shallow soil samples were collected near VAMC Buildings 6 and 7 and along the sanitary sewer line, which are the areas where shallow soil contamination has the potential to be highest.

3.4.2 Exposure Assessment

When performing the initial screen for ecological receptor exposures to soil/sediment, the exposure concentration was based on the maximum concentration of each analyte across all samples (**Table I.3-6**). The COPEC selection was performed together for soil and sediment samples.

3.4.3 Toxicity Assessment

ESVs for the protection of ecological receptors from exposures to chemicals in soil and sediment have been derived from published scientific literature and experimental studies and compiled in the LANL ECORISK Database (LANL 2021). The LANL ECORISK Database includes both sediment ESLs for the protection of aquatic invertebrates and aquatic invertebrate-feeding wildlife (i.e., bats and swallows) and soil ESLs for terrestrial plants, invertebrates, and terrestrial-feeding wildlife. The wildlife ESLs are protective of incidental soil/sediment ingestion and ingestion of food items. LANL derives both no-effect ESLs and low-effect ESLs. In the initial screen, the no-effect soil/sediment ESLs are used to identify COPECs and compute initial HQ estimates.

Table I.3-7 presents the soil/sediment ESVs. The lowest ESV across both media types was selected for use in identifying COPECs for soil/sediment.

3.4.4 Results

Table I.3-6 presents the initial screen for soil/sediment exposures by ecological receptors. For each chemical analyzed in soil/sediment, this table shows a comparison of the maximum detected concentration to the lowest ESV and summarizes the outcome of the screen. This table also

presents the HQmax. As shown, the COPECs identified for further quantitative assessment in soil/sediment include:

- **Metals:** antimony, arsenic, barium, cadmium, chromium, copper, lead, manganese, mercury, nickel, selenium, silver, thallium, vanadium, and zinc
- **SVOCs:** benzo(b)fluoranthene
- **VOCs:** acetone and PCE

Exclusion of Metals from Risk Characterization

Several metals were identified as COPECs in soil/sediment. As noted above, metals are naturally present in the Earth's crust and expected to be detected in soil/sediment. Based on the site history, there is no expectation that elevated metal concentrations would be attributable to site-related impacts. Even so, in accordance with EPA guidance (EPA 2002), which states that COPECs that have both release-related and background-related sources should be included in the risk assessment, potential risks from exposures to metals are discussed in **Attachment I.2** to inform risk management decisions, but metals in soil/sediment have not been retained for further characterization in the SLERA.

Refined Evaluation of Organic COPECs

Three organic chemicals were identified as COPECs in soil/sediment (acetone, benzo[b]fluoranthene, and PCE) and HQmax values were only 1 to 2 for benzo(b)fluoranthene and acetone, respectively, and ranged up to 10 for PCE. When selecting COPECs, maximum concentrations were compared to the lowest soil/sediment ESLs, regardless of their basis. Therefore, a refined evaluation was performed to determine which types of ESLs were exceeded and the likelihood for potential unacceptable ecological risks.

Table I.3-8 presents the refined evaluation for soil/sediment. In this table, summary statistics are presented for each COPEC along with the receptor-specific no-effect and low-effect ESLs. Maximum concentrations above the ESL are shaded. **Table I.3-8** shows that the maximum soil/sediment concentrations of acetone and benzo(b)fluoranthene were above the no-effect ESL for aquatic community organisms (i.e., aquatic invertebrates), but did not exceed the low-effect ESL. Maximum concentrations were also below the no-effect ESLs for all wildlife receptors and terrestrial plants. For acetone, only a single sediment sample (A-SS-01_05042016 from seep SW-01) was detected above the no effect ESL. For benzo(b)fluoranthene, the achieved MDLs were not adequate relative to no-effect ESL; however, all three sediment samples were below the low-effect ESL. Neither acetone nor benzo(b)fluoranthene are expected to be associated with the PCE groundwater plume (i.e., they are not site-related contaminants).

For PCE, maximum concentrations were below the no-effect ESLs for all wildlife receptors. There were 37 non-detect samples with inadequate MDLs relative to the no-effect ESL for aquatic community organisms; however, all samples had adequate MDLs relative to the low-effect ESL. Only one sediment sample (A-SS-26_05032016 from seep SW-26; RI Figure 3-5) had detected PCE concentrations slightly above the low-effect ESL for aquatic community organisms. However,

given the magnitude of the exceedance (i.e., PCE sediment concentration in this seep is 0.022 mg/kg and the low-effect ESL is 0.02 mg/kg), any adverse effects would likely be minor.

These results support the conclusion that exposures to soils/sediments will not result in unacceptable risks to wildlife or to domestic pets that incidentally ingest soil/sediment or feed on aquatic and terrestrial organisms. No unacceptable risks are expected for terrestrial plants from exposures to organic chemicals in soil. There is the potential for aquatic organisms to have unacceptable exposures due to PCE and other non-site-related chemicals in sediment within site seep/spring areas or aquatic features in residential yards (e.g., small ponds). While these areas could support aquatic invertebrates and emerging insects, they are unlikely to represent pristine natural aquatic habitats and effects from any site-related exposures are likely to be minor.

3.5 Evaluation of Soil Gas

3.5.1 Data Summary

The primary purpose of the site soil gas sampling efforts was to delineate VOC contamination and determine the area susceptible to vapor intrusion. However, these soil gas samples also provide information on air concentrations that could be present inside underground burrows to which burrowing wildlife (e.g., rabbits) could be exposed. Sections 3.8 and 3.9 of the RI describe the soil gas sampling activities for the ESS and source areas, respectively. Each sampling effort is summarized briefly below.

During the soil gas investigations, two types of devices have been used to sample/analyze VOCs in air. Most of the air concentrations were measured using a portable gas chromatography/mass spectrometer (Inficon HAPSITE® [HAPSITE]) equipped with a headspace sampling system. The HAPSITE is useful because it can provide real-time measurements of volatiles without having to send samples to an off-site laboratory. Use of the HAPSITE allows for a rapid assessment of air concentrations; however, the HAPSITE reports concentrations for a subset of VOCs, including PCE, TCE, and cis-1,2-DCE. SUMMA canisters are submitted to an off-site laboratory for analysis of the full list of VOCs. Both types of samples were included in the screening-level risk evaluation of soil gas results.

Table I.3-9 presents chemical concentration summary statistics for soil gas across all RI sampling activities, including both the ESS and source area sampling efforts. The soil gas results across all the RI sampling activities were used to identify COPECs for further evaluation in the risk calculations.

3.5.1.1 East Side Springs Sampling

Near-slab (collected within 5 feet of the foundation of a structure) soil gas samples in the ESS neighborhood were collected in 2015, 2016, and 2017 during the AOU1 investigation. Soil vapor probes were installed adjacent to structures where indoor air samples were collected. Soil gas sample locations are presented in RI Figure 3-6. All samples were analyzed by HAPSITE for a subset of VOCs, including PCE, TCE, and cis-1,2-DCE. Confirmation SUMMA canister samples were collected at a subset of HAPSITE sampling locations.

In 2015, open-field (collected greater than 5 feet from an occupied building foundation) soil gas samples were also collected and analyzed by HAPSITE or EPA Method TO-15/TO-15 SIM (SUMMA). These samples were collected at seeps and springs expected to be impacted by VOCs, and at locations adjacent to streets and sidewalks in AOU1. As explained in Section 3.13.1 of the RI, some of the 2015 soil gas data was determined to not be usable for risk assessment because field data collection was not completed in compliance with the QAPP and because of field and laboratory documentation discrepancies. The SLERA only includes soil gas samples with data that were deemed usable.

In December 2020, soil vapor probes (SVPs) were installed at selected monitoring wells where elevated photoionization detector readings were observed in the subsurface vadose zone, or where coarse-grained intervals were encountered. In March 2021, soil gas samples were collected at four monitoring wells with SVPs in the ESS area: MW-32, MW-34, MW-37, and MW-38 (RI Figure 3-7). In April 2021, soil gas samples were collected from seven additional SVPs installed at residential groundwater sampling locations with SVPs (designated "RG") where groundwater is present deeper than 10 feet bgs. In August 2021, soil gas samples were collected at four previously sampled SVPs installed with RG wells in the ESS area: RG-01, RG-04, RG-07, and RG-08 (RI Table 3-5 and RI Figure 3-7). Soil gas samples were collected in SUMMA canisters and analyzed for VOCs (EPA Method TO-15).

3.5.1.2 Source Area Sampling

Soil gas sampling was conducted in 2018, 2019, and 2021 on the VAMC campus and in Sunnyside Park to identify and delineate source(s) of PCE contamination. Samples were collected from previously installed and newly installed SVPs in both soil borings and monitoring well borings, and from Vapor Pins®.

In 2018 and 2019, during OU2 investigation activities, SVPs and Vapor Pin subslab sampling ports were installed in areas near VAMC Buildings 6 and 7 and within these two buildings by drilling sampling ports in the basement and ground floor (RI Figure 3-8). In addition, SVPs were also installed along the sewer line from the VAMC Buildings 6 and 7 to the Sunnyside Park area (RI Figure 3-9). Soil gas sampling was conducted using Tedlar bags analyzing with the HAPSITE for PCE, TCE, and cis-1,2-DCE. Approximately 10 percent of HAPSITE samples were confirmed with SUMMA canisters and analyzed for VOCs (EPA Method TO-15).

In March 2021, 46 soil gas samples were collected on the VAMC campus and in Sunnyside Park (RI Figures 3-10 and 3-11, respectively). Soil gas samples were collected in SUMMA canisters and analyzed for VOCs (EPA Method TO-15).

3.5.2 Exposure Assessment

When performing the initial screen for ecological receptor exposures to soil gas, the exposure concentration was based on the maximum concentration of each analyte across all samples (**Table I.3-9**).

3.5.3 Toxicity Assessment

Inhalation exposures to airborne dusts and volatiles in outdoor air is possible for all birds and mammals, but these exposures are usually considered to be minor in comparison to exposures from ingestion (EPA 2005). However, for burrowing animals, it is possible that animals could be exposed to relatively high concentrations of VOCs via inhalation if concentrations accumulate inside their burrows.

Toxicity data to assess inhalation exposures by wildlife are limited. The LANL ECORISK Database (LANL 2021) provides ecological screening level in air for a subset of VOCs. These screening levels are protective of burrowing mammal inhalation exposures and derived based on exposure assumptions for a Botta's pocket gopher. Two types of ESLs were derived: no-effect ESLs, which were developed from no-observed-adverse-effect level (NOAEL) TRVs, and low-effect ESLs, which were developed from lowest-observed-adverse-effect level (LOAEL) TRVs. **Table I.3-10** presents the no-effect ESLs for air used to identify COPECs for soil gas.

3.5.4 Results

Table I.3-9 presents the initial screen for soil gas by burrowing wildlife. For each chemical analyzed in soil gas, this table shows a comparison of the maximum detected concentration to the lowest air-based ESV and summarizes the outcome of the screen. This table also presents the HQmax. As shown, maximum soil gas concentrations of all chemicals are below their respective air-based ESVs; therefore, no COPECs were identified for further quantitative assessment in soil gas. These results show that inhalation of volatile chemicals in burrows is unlikely to result in unacceptable risks to burrowing animals.

3.6 Uncertainty Assessment

Quantitative evaluation of ecological risks is frequently limited by uncertainties in the data evaluation, exposure assessment, effects assessment, and risk characterization process. Although risk assessment follows a formal scientific approach, making assumptions or estimates based on limited available data or incorporation of professional judgment is an inherent part of the risk assessment process. The characterization of uncertainty is a key component of the ecological risk assessment process (EPA 1997). Uncertainties can lead to either an overestimation or an underestimation of risk. However, because of the inherent conservatism in the derivation of many of the exposure estimates and toxicity values, risk estimates presented in this SLERA should generally be viewed as being more likely to be high than low. Uncertainties in the risk assessment need to be evaluated and considered when making risk management decisions. This section provides a narrative discussion of the types of uncertainties that influence the SLERA results.

3.6.1 Nature and Extent of Contamination

3.6.1.1 Accuracy of Analytical Measurements

Laboratory analysis of environmental samples is subject to technical difficulties and values reported by the laboratory may not always be correct. The magnitude of analytical error is usually small compared to other sources of uncertainty, although the relative uncertainty

increases for results near the MDL. The risk assessment includes J-qualified results recognizing there is a higher degree of analytical uncertainty in these estimated values.

3.6.1.2 Data Adequacy

The data adequacy evaluation is a qualitative determination of whether the available data are representative in space and time. Section 3.2 summarizes the datasets that were used in the SLERA to select COPECs and quantify exposures and risks. The following provides a brief discussion of some of the potential data adequacy issues for the results used to support the SLERA risk conclusions.

Three sediment samples have been collected from seeps/springs (see SW- prefix locations in RI Figure 5-1). Since 2016, up to 100 surface water samples have been collected from site seeps/springs, sumps, and Red Butte Creek and analyzed for a range of contaminants, including the site-related chemicals of interest. More samples have been collected for surface water because this is the medium that is more directly affected by site releases. The surface water dataset is comprehensive and spatially representative of the ESS area (RI Figure 3-6), which is the area where surface water exposures have the highest potential to occur. However, additional data collection may be needed to better understand potential exposures to aquatic organisms exposed to PCE in sediment.

No measured shallow soil (0 to 10 feet bgs) data are available within the ESS area. Nearly all the available shallow soil data were collected from near the VAMC buildings and the sanitary sewer lines where PCE spills and releases occurred (RI Figure 5-1). As noted previously, outside of the seep/spring areas, shallow soil contamination is likely to be negligible; thus, evaluating shallow soil exposures on the VAMC campus is likely to be adequately protective of exposures within the ESS area.

Two devices have been employed to measure VOCs in air: in-field HAPSITE and SUMMA canisters. The pros and cons associated with each of these methods was discussed in Section 3.5.1. A subset of the data was collected using the HAPSITE, and results are limited to PCE, TCE, and cis-1,2-DCE. The HAPSITE results do not suggest site-related VOC concentrations approach a level of potential concern for burrowing mammals. Thus, the reliance on these data is not anticipated to change the overall risk conclusions.

3.6.2 Exposure Assessment

3.6.2.1 Exposure Pathways Not Evaluated

Exposure pathways selected for quantitative evaluation in this assessment do not include all potentially complete exposure pathways for all ecological receptors (**Figure I.2-1**). Omission of these pathways will tend to lead to an underestimation of total risk to the exposed receptors. As discussed previously, many of these exposure pathways (i.e., dermal exposures of wildlife) are likely to be minor compared to other pathways that were evaluated, and the magnitude of the underestimation is not likely to be significant in most cases.

3.6.2.2 Detection Limit Adequacy

Detection limit adequacy is determined by performing an evaluation of the achieved laboratory detection limits for each chemical in each media in cases where the samples were all non-detect to determine if the achieved detection limits were low enough to support risk management decision making. During the COPEC selection process, several analytes were not detected or were infrequently detected in site media based on the sitewide dataset. For infrequently detected chemicals, the mean of the MDL was compared to the appropriate risk-based screening level. When the MDL was higher than the screening level, the chemical was identified as a "Qual. 1" chemical, meaning a qualitative discussion of the potential implications of the inadequate detection limit would need to be discussed as part of the uncertainty assessment. The following bullets summarize the Qual. 1 chemicals for each medium.

- For groundwater and surface water, 16 infrequently detected chemicals had inadequate MDLs relative to the lowest chronic ESVs, including 4,4'-dichlorodiphenyltrichloroethane (4,4'-DDT), anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, chrysene, cis-chlordane, dibenzo(a,h)anthracene, fluoranthene, heptachlor, heptachlor epoxide, methoxychlor, naphthalene, pyrene, toxaphene, and trans-chlordane.
- For soil/sediment, there were only four chemicals identified as Qual. 1—bis(2-ethylhexyl)phthalate, dibenzo(a,h)anthracene, di-n-butylphthalate, and pentachlorophenol—based on the lowest no-effect soil/sediment ESVs.
- For soil gas, there were no chemicals identified as Qual. 1, meaning the achieved MDLs for all chemicals were adequate relative to the air-based ESVs.

This shows the MDLs achieved during the analysis of several chemicals in site media were too high to determine if they may be present at an unacceptable exposure level. There are no instances where a site-related contaminant had an inadequate MDL. Samples were collected and analyzed using the best available techniques and standard analytical methods. Because there is no expectation that the chemicals with inadequate MDLs are site-related, the lack of adequate MDLs does not preclude risk determinations for the contaminants that are likely to be attributable to site releases.

3.6.2.3 Exposure Point Concentrations

In all exposure calculations, the desired input parameter is the true mean concentration of a contaminant within a medium, averaged over the area where random exposure occurs. However, because the true mean cannot be calculated based on a limited set of measurements, EPA (1992, 1989) recommends that the exposure estimate be based on the 95% upper confidence limit (95UCL) on the mean. When data are plentiful and inter-sample variability is not large, the 95UCL may be only slightly higher than the mean of the data. However, when data are sparse or are highly variable, the 95UCL may be much higher than the mean of available data or may not be able to be calculated (e.g., a reliable calculation of the 95UCL requires at least 8 to 10 samples).

Initially, the COPEC selection and refined calculations were performed based on the maximum concentration in each exposure medium. Use of the maximum concentration is likely to overestimate potential exposures, especially when the focus is on the protection of larger ecological populations and communities.

3.6.3 Toxicity Assessment

3.6.3.1 Receptors Evaluated

Risks to wildlife were assessed for a subset of avian and mammalian species selected to represent the range of feeding guilds (i.e., insectivores, herbivores, carnivores, and piscivores) potentially present at the site. Although the wildlife receptors evaluated in the risk assessment were selected to represent species within this feeding guild, they may not represent the full range of sensitivities present. The species selected may be more or less sensitive to chemical exposure than typical species located within the site.

3.6.3.2 Selected Toxicity Values

In the SLERA, HQmax values were calculated using screening levels compiled from the literature. In general, because the resulting HQmax values are more likely to be overestimated than underestimated, when HQ values are below 1, it is possible to draw meaningful conclusions regarding potential risks despite the uncertainties in the selected toxicity values. However, when HQ values are above 1, the uncertainties in the selected toxicity values should be carefully considered in making risk management decisions.

The SLERA relies upon literature-derived ESVs for wildlife that have been back-calculated from assumed wildlife exposure parameters, default dietary uptake models, and dose-based toxicity values from the literature. This back-calculation of wildlife ESVs incorporates several conservative assumptions. For example, dose-based toxicity values also do not account for site-specific environmental attributes that may influence uptake and toxicity and it was assumed wildlife exposures were continuous and receptor home ranges were located entirely within the site. Because of the conservatism of the ESVs, HQmax values are likely to be overestimated.

3.6.3.3 Absence of Toxicity Data

Toxicity values are needed to quantify risks from exposure to chemicals detected in environmental media. Toxicity values are not available for some of the chemicals analyzed at the site (**Tables I.3-3, I.3-7, and I3-10**). In the COPEC selection, these chemicals were identified as "Qual. 2" or "Bkg." Chemicals that were not detected but are lacking screening levels to assess detection limit adequacy were identified as "Qual. 2" chemicals. Detected chemicals that are lacking screening levels were identified as "Bkg" chemicals because the only way to assess if they may be site-related or elevated is to make comparisons between site samples and background (or reference) locations.

As shown in the COPEC selection tables, there were a few examples where potentially site-related chemicals (e.g., cis- and trans-1,2-DCE and 1,4-dioxane in groundwater, surface water, and soil gas) were detected in site media, but there are no toxicity values to determine if the reported concentrations would pose a potentially unacceptable ecological risk. Inspection of the groundwater data for two wells upgradient of the site (MW-05R and MW-06) shows that cis- and trans-1,2-DCE and 1,4-dioxane were not detected, which indicates that their presence in site media may be site-related, but it is not possible to quantify potential risks.

Although no strong conclusions can be reached regarding the potential for risk from chemicals without toxicity values, it is suspected that the magnitude of the error that results from excluding

these chemicals is usually likely to be low. This is because the absence of toxicity information for a chemical is most often because toxicological concern over that chemical is low. That is, chemicals that lack toxicity values have often not been well studied because existing data suggest relatively low toxicity to humans and researchers have focused on chemicals with a higher potential for toxicity.

3.6.4 Risk Characterization

3.6.4.1 Interactions Among Chemicals

Most toxicity benchmark values are derived from studies of the adverse effects of a single contaminant. However, exposures to ecological receptors usually involve multiple contaminants, raising the possibility that synergistic or antagonistic interactions might occur. Generally, data are not adequate to permit any quantitative adjustment in toxicity values or risk calculations based on inter-chemical interactions. In accordance with EPA guidance, effects from different chemicals are not added unless reliable data are available to indicate that the two (or more) chemicals act on the same target tissue by the same mode of action (e.g., polycyclic aromatic hydrocarbons, divalent cations of heavy metals). If any of the COPECs at the site act by a similar mode of action, total risks could be higher than estimated. Conversely, if the COPECs at the site act antagonistically, total risks could be lower than estimated.

3.6.4.2 Estimation of Population-Level Impacts

Assessment endpoints for most receptors at this site (**Table I.2-1**) are based on the sustainability of exposed populations and communities (i.e., the ability of a population to maintain normal levels of diversity and density). Even if it is possible to accurately characterize the distribution of risks or effects across the members of the exposed population, estimating the impact of those effects on the population is generally difficult and uncertain. The relationship between adverse effects on individuals and effects on the population is complex and depends on the demographic and life history characteristics of the receptor being considered as well as the nature, magnitude, and frequency of the chemical stresses and associated adverse effects. Thus, the actual risks that will lead to population-level adverse effects will vary from receptor to receptor.

3.7 Screening-Level Risk Conclusions

The purpose of the screening-level risk characterization is to identify the COPECs, exposure pathways, and receptors of potential concern. The results of this assessment are used to quantify the screening-level risk estimates, identify the chemicals that are likely to be key risk drivers, and determine if a more refined risk assessment is needed.

3.7.1 Evaluation of Groundwater and Surface Water

Several springs and seeps emanate along the East Bench fault within the ESS residential neighborhood west of 1300 East Street. PCE was detected in several of the springs and seeps within the downgradient portion of the PCE plume. The SLERA evaluated the following water exposure scenarios: direct contact exposures by aquatic organisms residing in the seeps; springs, ponds, and other water features within the ESS area; direct contact (root) exposures by terrestrial plants near seeps/springs; and ingestion exposures by wildlife and domestic pets that

drink or feed from these water features. Exposures to ecological receptors under current conditions were assessed based on available surface water data. Potential future exposures to ecological receptors were assessed based on available groundwater data, as this data represents groundwater that could potentially daylight in seeps/spring as surface water in the future.

The SLERA results support the following risk conclusions:

- Exposures to seeps/springs, both now and in the future, will not result in unacceptable risks to wildlife or to domestic pets that drink the water or feed on aquatic organisms.
- No unacceptable risks are expected for terrestrial plants from exposures to organic chemicals in seeps/springs.
- Acute impacts to aquatic organisms from exposures to COPECs in seep/spring water are not expected.
- There is the potential for aquatic organisms to have unacceptable chronic exposures; however, the COPECs associated with these exposures are not site-related contaminants. PCE concentrations in surface water did not result in unacceptable aquatic receptor risks and PCE concentrations in deep groundwater would be expected to attenuate below the chronic ESL prior to daylighting.

No further evaluation of ecological exposures to site-related contaminants in surface water is necessary.

3.7.2 Evaluation of Sediment and Soil

The SLERA evaluated the following sediment and soil exposure scenarios – direct contact sediment exposures by aquatic invertebrates residing in the seeps, springs, ponds, and other water features within the ESS area, direct contact soil exposures by terrestrial plants, and ingestion exposures by wildlife and domestic pets (including both incidental ingestion of sediment and soil and ingestion of aquatic and terrestrial food items).

The SLERA results support the following risk conclusions:

- Exposures to soils/sediments will not result in unacceptable risks to wildlife or to domestic pets that incidentally ingest soil/sediment or feed on aquatic and terrestrial organisms.
- No unacceptable risks are expected for terrestrial plants from exposures to organic chemicals in soil.
- There is the potential for aquatic organisms to have unacceptable exposures due to PCE exposures in sediment within site seep/springs or aquatic features in residential yards. However, these locations are unlikely to represent pristine natural aquatic habitats and effects from any site-related exposures are likely to be minor.

No further evaluation of ecological exposures to site-related contaminants in sediment or soil is necessary.

3.7.3 Evaluation of Soil Gas

Wildlife inhalation exposures are usually considered to be minor in comparison to exposures from ingestion. However, for burrowing animals (e.g., rabbits), it is possible that animals could be exposed to relatively high concentrations of VOCs via inhalation if concentrations accumulate inside their burrows.

A comparison of maximum soil gas concentrations to air-based ESVs protective of burrowing mammals shows no COPECs were identified for further quantitative assessment in soil gas. The SLERA results indicate that inhalation of volatile chemicals in burrows is unlikely to result in unacceptable risks to burrowing animals.

No further evaluation of burrowing animal exposures to volatile chemicals is necessary for the site.

Section 4
References

Efroymson, R.A., M.E. Will, G.W. Suter II, and A.C. Wooten. 1997. *Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Terrestrial Plants: 1997 Revision.* Prepared for the U.S. Department of Energy, Office of Environmental Management by Lockheed Martin Energy Systems, Inc., managing the ORNL. Publication ES/ER/TM-85/R3. Available at: http://www.esd.ornl.gov/programs/ecorisk/documents/tm85r3.pdf.

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.

EPA. 2020. "National Recommended Water Quality Criteria." https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table.

EPA. 2015. *Determination of the Biologically Relevant Sampling Depth for Terrestrial and Aquatic Ecological Risk Assessments.* U.S. Environmental Protection Agency, Office of Research and Development. EPA/600/R-15/176.

EPA. 2014. "700 South 1600 East PCE Plume. Superfund Site." http://www2.epa.gov/region8/700-south-1600-east-pce-plume.

EPA. 2012. *Hazard Ranking System Documentation Record for 700 South 1600 East PCE Plume*. EPA ID No. UTD981548985.

EPA. 2005. *Guidance for Deriving Ecological Soil Screening Levels (EcoSSLs)*. Office of Solid Waste and Emergency Response. OSWER Directive 9285.7-55. February.

EPA. 2003. *Generic Ecological Assessment Endpoints (GEAEs) for Ecological Risk Assessment.* U.S. Environmental Protection Agency, Risk Assessment Forum. EPA/630/P-02/004F.

EPA. 2002. *Role of Background in the CERCLA Cleanup Program.* OSWER Directive 9285.6-07P.

EPA. 1998. *Guidelines for Ecological Risk Assessment*. EPA/630/R-95/002F.

EPA. 1997. *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments.* Interim Final. U.S. Environmental Protection Agency, Environmental Response Team, Edison, NJ. https://www.epa.gov/risk/ecological-risk-assessment-guidance-superfund-process-designing-and-conducting-ecological-risk.

EPA. 1992. *Supplemental Guidance to RAGS: Calculating the Concentration Term.* U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. Publication 9285.7-081.

EPA. 1989. *Risk Assessment Guidance for Superfund, Volume II Environmental Evaluation Manual, Appendix B.* https://rais.ornl.gov/documents/appb.pdf

Ivahnenko, T., and Zogorski, J.S. 2006. *Sources and occurrence of chloroform and other trihalomethanes in drinking-water supply wells in the United States, 1986–2001.* U.S. Geological Survey Scientific Investigations Report 2006–5015, 13 p. https://pubs.usgs.gov/sir/2006/5015/sir2006-5015.pdf

LANL. 2021. *ECORISK Database (Release 4.2).* Los Alamos National Laboratory, Los Alamos, New Mexico.

UBLM. 2018. *Utah Bureau of Land Management Sensitive Wildlife Species List, December 2018*, accessed May 6, 2021, https://www.blm.gov/programs/fish-and-wildlife/threatened-and-endangered/state-te-data/utah.

UDEQ. 2020. *R317-2. Standards of Quality for Waters of the State*. Last updated December 3, 2020. https://adminrules.utah.gov/public/search/317-2-1A/Current%20Rules.

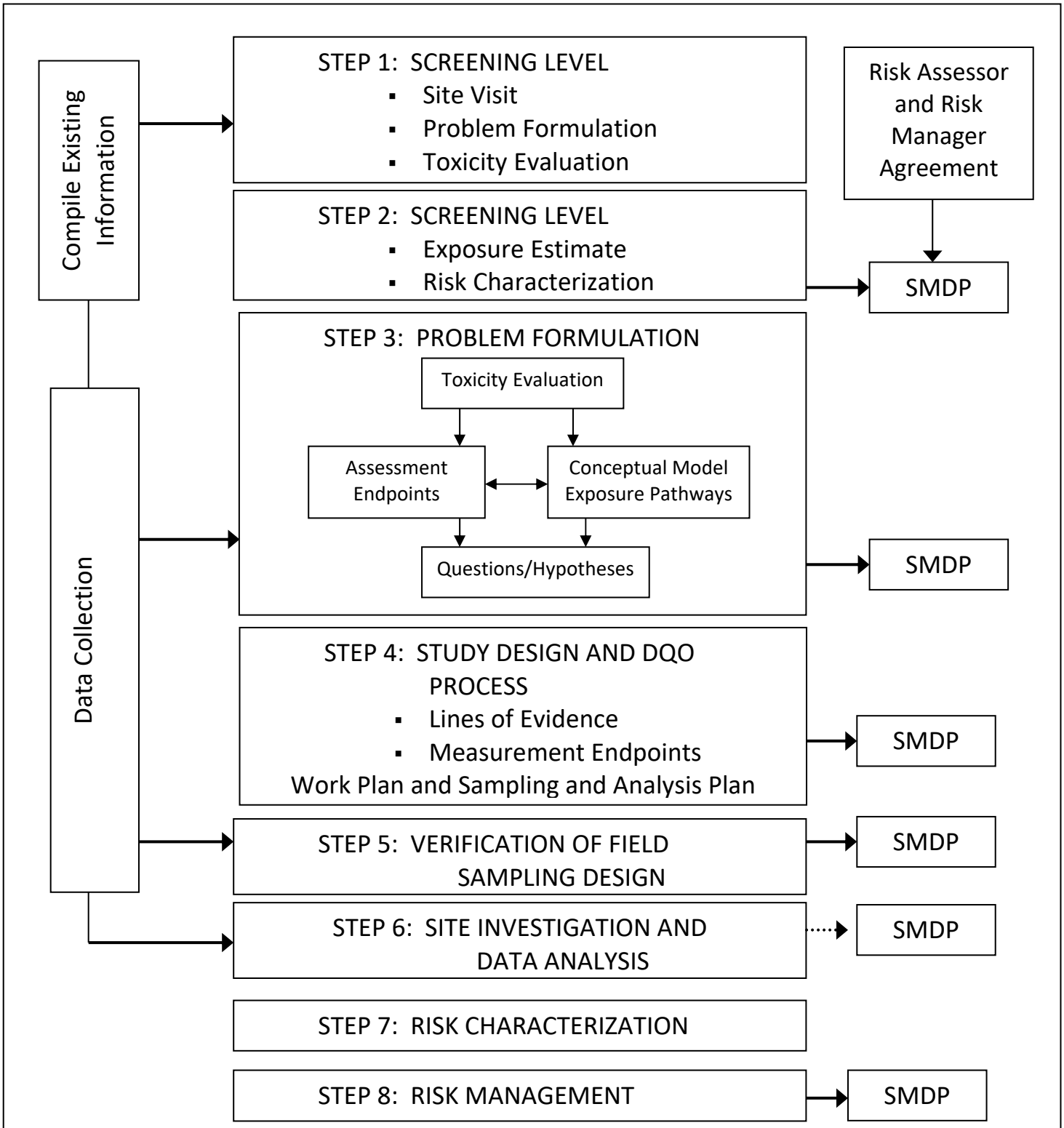
UDEQ. 2011. *Preliminary Assessment – East Side Springs, Salt Lake County, Utah*. Division of Environmental Response and Remediation.

UDEQ. 2000. *Mount Olivet Cemetery Plume Analytical Results Report, UTD981548985*. Division of Environmental Response and Remediation. August.

Figures

This page intentionally left blank.

FIGURE I.1-1
EIGHT-STEP PROCESS RECOMMENDED IN ECOLOGICAL RISK ASSESSMENT GUIDANCE FOR SUPERFUND PROCESS DIAGRAM
700 S 1600 E PCE Plume Superfund Site, Salt Lake City, Utah

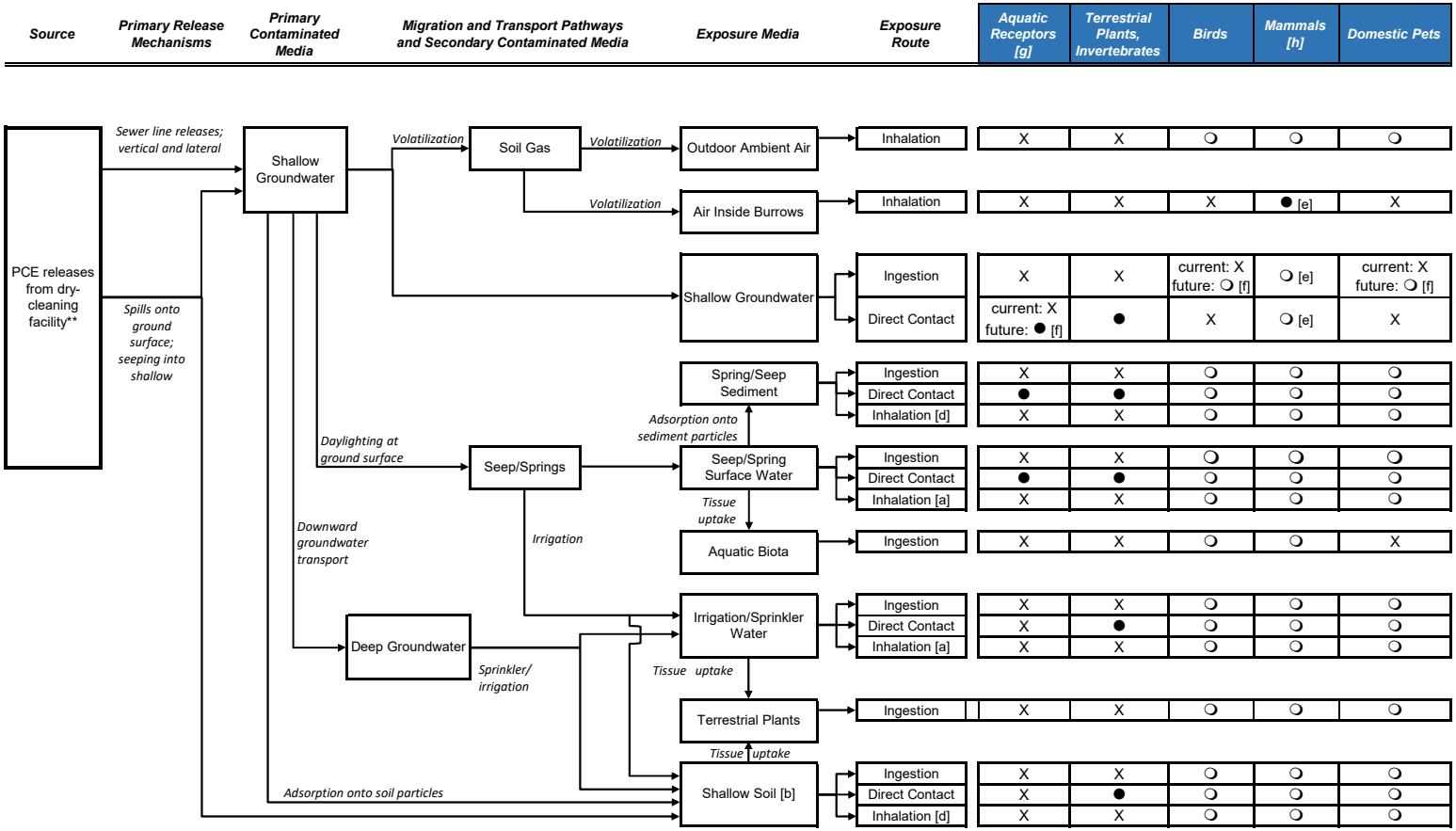


Steps 1 and 2 – Tier 1 (Screening-Level Assessment)
Steps 3 to 7 – Tier 2 (Baseline Assessment)

Source: EPA (1997)

SMDP = Scientific/Management Decision Point
DQO = data quality objective

FIGURE I.2-1
CONCEPTUAL SITE EXPOSURE MODEL FOR ECOLOGICAL RECEPTORS
700 South 1600 East PCE Plume, Salt Lake City, Utah



LEGEND

X	Pathway is not complete; no evaluation required
❍	Pathway is or might be complete, but is likely to be minor
●	Pathway is or might be complete

NOTES

**These releases likely occurred as disposal of PCE into the sanitary sewer line and releases from the sewer line into the surrounding soil because of line cracks and possibly from spills on the ground surface.

[a] Resulting from volatilization from spring/seep surface water and irrigation/sprinkler water

[b] The expectation is that, outside of the seep/spring areas, shallow soil (0–10 feet bgs) contamination is likely to be negligible, with the possible exception of near Buildings 6 and 7 where historical spills may have occurred.

[c] There is no potable groundwater use under current conditions, but hypothetical future use will be evaluated.

[d] Inhalation of airborne particulates and volatiles derived from shallow soil or spring/seep sediment

[e] Restricted to burrowing animal exposures only (e.g., rabbits)

[f] Incomplete scenario under current conditions, but a screening-level evaluation of groundwater will be performed to address potential for daylighting under future site conditions.

[g] Aquatic receptors can include small fish (e.g., in ponds or water features fed by springs/seeps), aquatic invertebrates, and aquatic plants.

[h] Includes burrowing mammals (e.g., rabbits)

[i] Use of deep groundwater for irrigation is only expected in limited areas (e.g., University of Utah, Mount Olivet Cemetery); no residential use of deep groundwater is anticipated.

[j] Use of springs/seeps for irrigation is only expected for a subset of residential properties where springs/seeps are present.

Tables

This page intentionally left blank.

TABLE I.2-1
SCREENING-LEVEL ASSESSMENT AND MEASURES OF EFFECT FOR THE ECOLOGICAL RECEPTOR GROUPS OF INTEREST
700 S 1600 E PCE Plume Superfund Site, Salt Lake City, Utah

Receptor Groups	Exposure Pathway	Assessment Endpoint	Measures of Effect
Aquatic Receptors			
Fish, Water Column-Dwelling Invertebrates, Aquatic Plants, and Amphibians	Direct Contact with Surface Water	Sustainability (survival, growth, reproduction) of local aquatic receptor populations in site seeps/springs and water features	Comparison of measured surface water concentrations of chemicals to acute and chronic toxicity benchmarks protective of a broad range of aquatic receptors
			Comparison of measured surface water concentrations of chemicals to receptor group and/or species-specific acute and chronic toxicity benchmarks
			Evaluation of survival rates and growth for water-column dwelling invertebrates exposed to site surface water versus control water in laboratory toxicity tests
Sediment-Dwelling Invertebrates	Direct Contact with Sediment	Sustainability (survival, growth, reproduction) of local aquatic invertebrate populations in site seeps/springs and water features	Comparison of measured bulk sediment concentrations of chemicals to toxicity benchmarks protective of a broad range of sediment-dwelling aquatic invertebrate species
			Comparison of measured sediment porewater concentrations of chemicals to toxicity benchmarks protective of a broad range of aquatic receptors
			Evaluation of survival rates and growth for sediment-dwelling invertebrates exposed to site sediment versus control sediments in laboratory toxicity tests
Terrestrial Receptors			
Terrestrial Plants and Soil Organisms	Direct Contact with Surface Soil	Sustainability (survival, growth, reproduction) of local terrestrial plant and soil invertebrate populations near VAMC buildings*	Comparison of measured surface soil concentrations of chemicals to toxicity benchmarks protective of a broad range of terrestrial receptors
			Comparison of measured surface soil concentrations of chemicals to receptor group and/or species-specific toxicity benchmarks
			Evaluation of survival rates and growth for terrestrial plants exposed to site surface soil versus control soil in laboratory toxicity tests
			Evaluation of survival rates and growth for soil invertebrates exposed to site surface soil versus control soil in laboratory toxicity tests
Wildlife Receptors			
Herbivorous, Insectivorous, Carnivorous, and Piscivorous Birds and Mammals	Ingestion of Water and Food Items and Incidential Ingestion of Soil and Sediment	Sustainability (survival, growth, reproduction) of local wildlife populations near VAMC buildings* and seeps/springs in the ESS area	Comparison of measured surface soil concentrations of chemicals to toxicity benchmarks protective of a broad range of terrestrial wildlife
			Comparison of measured surface water concentrations of chemicals to toxicity benchmarks protective of a broad range of piscivorous wildlife
			Comparison of measured sediment concentrations of chemicals to toxicity benchmarks protective of a broad range of aquatic-feeding insectivorous wildlife
			Comparison of measured soil gas concentrations of volatiles to toxicity benchmarks protective of a broad range of burrowing wildlife
			Evaluation of site exposure estimates from food chain models for feeding guild-specific groups to dose-based toxicity thresholds for birds and mammals

Notes

This endpoint is evaluated quantitatively in the SLERA

* Outside of seeps/springs, which are evaluated as sediment, surface soil contamination is expected only near the VAMC campus buildings where PCE was used because of potential spills and releases from the sanitary sewer lines.

Abbreviations

VAMC - Veterans Affairs Medical Center

ESS - East Side Springs

TABLE I.3-1
SURFACE WATER COPEC SELECTION FOR ECOLOGICAL RECEPTORS
700 S 1600 E PCE Plume Superfund Site, Salt Lake City, Utah

Chemical	CASRN	Summary Statistics							Water Lowest ESV (µg/L)	COPEC Selection						HQmax
		No. of Samples	No. Detected	Detection Frequency	Range of DLs (µg/L)	Mean DL (µg/L)	Min. Conc. (µg/L)	Max. Conc. (µg/L)		Is Max. Det. Conc. > SL?	Is Mean DL > SL?	Chemical Detected, No SL?	Chemical ND, No SL?	Is Chemical a COPEC?	Type of Evaluation	
1,1,1-TRICHLOROETHANE	71-55-6	100	47	47%	0.057-0.17	0.09	0.09	1.1	11	N	--	N	--	N	--	1E-01
1,1,2,2-TETRACHLOROETHANE	79-34-5	100	0	0%	0.097-0.19	0.11	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,1,2-TRICHLOROETHANE	79-00-5	100	0	0%	0.085-0.14	0.10	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,1,2-TRICHLOROTRIFLUOROETHANE	76-13-1	100	0	0%	0.11-0.34	0.15	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,1'-BIPHENYL	92-52-4	38	0	0%	0.32-5.4	2.34	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,1-DICHLOROETHANE	75-34-3	100	2	2%	0.06-0.13	0.08	0.11	0.13	47	N	N	N	--	N	--	3E-03
1,1-DICHLOROETHENE	75-35-4	100	5	5%	0.081-0.21	0.10	0.12	0.27	25	N	N	N	--	N	--	1E-02
1,2,3-TRICHLOROBENZENE	87-61-6	100	0	0%	0.076-0.23	0.13	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,2,4,5-TETRACHLOROBENZENE	95-94-3	38	0	0%	0.27-5.4	2.31	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,2,4-TRICHLOROBENZENE	120-82-1	100	0	0%	0.059-0.23	0.12	ND	ND	24	--	N	--	N	N	--	--
1,2,4-TRIMETHYLBENZENE	95-63-6	45	0	0%	0.11-0.11	0.11	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	100	0	0%	0.1-0.38	0.18	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,2-DIBROMOETHANE	106-93-4	100	0	0%	0.047-0.21	0.08	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,2-DICHLOROBENZENE	95-50-1	100	0	0%	0.036-0.23	0.08	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,2-DICHLOROETHANE	107-06-2	100	0	0%	0.07-0.11	0.09	ND	ND	100	--	N	--	N	N	--	--
1,2-DICHLOROPROPANE	78-87-5	100	0	0%	0.054-0.18	0.08	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,3,5-TRIMETHYLBENZENE	108-67-8	45	0	0%	0.12-0.12	0.12	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,3-DICHLOROBENZENE	541-73-1	100	0	0%	0.057-0.15	0.09	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,3-DICHLOROPROPYLENE	542-75-6	27	0	0%	0.1-0.1	0.10	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,4-DICHLOROBENZENE	106-46-7	100	0	0%	0.066-0.13	0.09	ND	ND	15	--	N	--	N	N	--	--
1,4-DIOXANE	123-91-1	38	4	11%	0.15-0.99	0.39	0.2	0.35	NA	--	--	Y	--	Y	Bkg.	--
2,3,4,6-TETRACHLOROPHENOL	58-90-2	38	0	0%	0.33-5.4	2.32	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
2,4,5-TRICHLOROPHENOL	95-95-4	38	0	0%	0.33-5.4	2.30	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
2,4,6-TRICHLOROPHENOL	88-06-2	38	0	0%	0.32-5.4	2.31	ND	ND	10,000	--	N	--	N	N	--	--
2,4-DICHLOROPHENOL	120-83-2	38	0	0%	0.4-5.4	2.32	ND	ND	20,000	--	N	--	N	N	--	--
2,4-DIMETHYLPHENOL	105-67-9	38	0	0%	0.37-5.6	2.43	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
2,4-DINITROPHENOL	51-28-5	38	0	0%	0.88-5.4	2.33	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
2,4-DINITROTOLUENE	121-14-2	38	0	0%	0.29-5.4	2.31	ND	ND	65	--	N	--	N	N	--	--
2,6-DINITROTOLUENE	606-20-2	38	0	0%	0.35-5.4	2.34	ND	ND	230	--	N	--	N	N	--	--
2-BUTANONE (MEK)	78-93-3	100	0	0%	0.84-2.5	1.61	ND	ND	7,200	--	N	--	N	N	--	--
2-CHLORONAPHTHALENE	91-58-7	38	0	0%	0.28-5.4	2.32	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
2-CHLOROPHENOL	95-57-8	38	0	0%	0.38-5.4	2.29	ND	ND	490	--	N	--	N	N	--	--
2-HEXANONE	591-78-6	100	0	0%	0.58-2.5	1.45	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
2-METHYLNAPHTHALENE	91-57-6	38	0	0%	0.35-5.4	2.29	ND	ND	330	--	N	--	N	N	--	--
2-METHYLPHENOL	95-48-7	38	0	0%	0.36-5.4	2.31	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
2-NITROANILINE	88-74-4	38	0	0%	0.33-5.4	2.27	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
2-NITROPHENOL	88-75-5	38	0	0%	0.36-5.4	2.34	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
3,3'-DICHLOROBENZIDINE	91-94-1	38	0	0%	0.83-5.4	2.29	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
3-NITROANILINE	99-09-2	38	0	0%	0.91-5.4	2.31	ND	ND	70,000	--	N	--	N	N	--	--
4,4'-DDD	72-54-8	27	0	0%	0.0049-0.0061	0.01	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
4,4'-DDE	72-55-9	27	0	0%	0.0049-0.0061	0.01	ND	ND	100	--	N	--	N	N	--	--
4,4'-DDT	50-29-3	27	0	0%	0.0049-0.0061	0.01	ND	ND	0.001	--	Y	--	N	Y	Qual.1	--
4,6-DINITRO-2-METHYLPHENOL	534-52-1	38	0	0%	0.58-5.4	2.32	ND	ND	NA	--	N	--	Y	Y	Qual.2	--

TABLE I.3-1
SURFACE WATER COPEC SELECTION FOR ECOLOGICAL RECEPTORS
700 S 1600 E PCE Plume Superfund Site, Salt Lake City, Utah

Chemical	CASRN	Summary Statistics							Water Lowest ESV (µg/L)	COPEC Selection						HQmax
		No. of Samples	No. Detected	Detection Frequency	Range of DLs (µg/L)	Mean DL (µg/L)	Min. Conc. (µg/L)	Max. Conc. (µg/L)		Is Max. Det. Conc. > SL?	Is Mean DL > SL?	Chemical Detected, No SL?	Chemical ND, No SL?	Is Chemical a COPEC?	Type of Evaluation	
4-BROMOPHENYL PHENYL ETHER	101-55-3	38	0	0%	0.37-5.4	2.34	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
4-CHLORO-3-METHYLPHENOL	59-50-7	38	0	0%	0.43-5.4	2.30	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
4-CHLOROANILINE	106-47-8	38	0	0%	0.24-9.1	3.74	ND	ND	40,000	--	N	--	N	N	--	--
4-CHLOROPHENYL PHENYL ETHER	7005-72-3	38	0	0%	0.38-5.4	2.32	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
4-METHYL-2-PENTANONE (MIBK)	108-10-1	100	0	0%	0.46-2.5	1.32	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
4-METHYLPHENOL	106-44-5	38	0	0%	0.42-5.4	2.27	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
4-NITROANILINE	100-01-6	38	0	0%	0.48-5.4	2.23	ND	ND	40,000	--	N	--	N	N	--	--
4-NITROPHENOL	100-02-7	38	0	0%	0.63-5.4	2.32	ND	ND	10,000	--	N	--	N	N	--	--
ACENAPHTHENE	83-32-9	38	0	0%	0.36-5.4	2.34	ND	ND	5.8	--	N	--	N	N	--	--
ACENAPHTHYLENE	208-96-8	38	0	0%	0.34-5.4	2.30	ND	ND	4,800	--	N	--	N	N	--	--
ACETONE	67-64-1	100	14	14%	0.31-2.6	1.40	2.8	18	1,500	N	--	N	--	N	--	1E-02
ACETOPHENONE	98-86-2	38	0	0%	0.44-5.4	2.31	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
ALDRIN	309-00-2	27	0	0%	0.0049-0.0061	0.01	ND	ND	0.3	--	N	--	N	N	--	--
ALPHA-BHC	319-84-6	27	0	0%	0.0049-0.0061	0.01	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
ALUMINUM	7429-90-5	47	27	57%	1.2-25	11.32	18.4	8,230	87	Y	--	N	--	Y	Quant.	9E+01
ANTHRACENE	120-12-7	38	0	0%	0.38-5.4	2.32	ND	ND	0.73	--	Y	--	N	Y	Qual.1	--
ANTIMONY	7440-36-0	47	17	36%	0.051-0.25	0.21	0.252	3	30	N	--	N	--	N	--	1E-01
ARSENIC	7440-38-2	47	47	100%	0.1-0.125	0.11	0.408	66	1	Y	--	N	--	Y	Quant.	7E+01
ATRAZINE	1912-24-9	38	0	0%	0.83-5.4	2.29	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
BARIUM	7440-39-3	47	47	100%	0.21-0.25	0.24	24.2	206	3.9	Y	--	N	--	Y	Quant.	5E+01
BENZALDEHYDE	100-52-7	38	0	0%	0.41-11	4.28	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
BENZENE	71-43-2	100	4	4%	0.083-0.12	0.10	0.13	0.50	46	N	N	N	--	N	--	1E-02
BENZO(A)ANTHRACENE	56-55-3	38	0	0%	0.17-5.4	2.30	ND	ND	0.027	--	Y	--	N	Y	Qual.1	--
BENZO(A)PYRENE	50-32-8	38	0	0%	0.19-5.4	2.73	ND	ND	0.014	--	Y	--	N	Y	Qual.1	--
BENZO(B)FLUORANTHENE	205-99-2	38	0	0%	0.17-5.6	2.97	ND	ND	9	--	N	--	N	N	--	--
BENZO(G,H,I)PERYLENE	191-24-2	38	0	0%	0.35-5.4	2.82	ND	ND	7.6	--	N	--	N	N	--	--
BENZO(K)FLUORANTHENE	207-08-9	38	0	0%	0.23-5.4	3.00	ND	ND	0.0041	--	Y	--	N	Y	Qual.1	--
BENZYL BUTYL PHTHALATE	85-68-7	38	0	0%	0.24-5.4	2.28	ND	ND	19	--	N	--	N	N	--	--
BERYLLIUM	7440-41-7	47	1	2%	0.05-0.1	0.06	1.9	1.9	0.66	Y	N	N	--	Y	Quant.	3E+00
BETA-BHC	319-85-7	27	0	0%	0.0068-0.0085	0.01	ND	ND	2.2	--	N	--	N	N	--	--
BIS(2-CHLOROETHOXY)METHANE	111-91-1	38	0	0%	0.42-5.4	2.31	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
BIS(2-CHLOROETHYL) ETHER	111-44-4	38	0	0%	0.39-5.4	2.31	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
BIS(2-ETHYLHEXYL)PHTHALATE	117-81-7	38	3	8%	0.47-5.4	2.31	3.6	84	32	Y	N	N	--	Y	Quant.	3E+00
BIS-CHLOROISOPROPYL ETHER	39638-32-9	38	0	0%	0.46-5.4	2.32	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
BROMOCHLOROMETHANE	74-97-5	100	0	0%	0.059-0.26	0.10	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
BROMODICHLOROMETHANE	75-27-4	100	25	25%	0.068-0.13	0.09	0.09	0.68	NA	--	--	Y	--	Y	Bkg.	--
BROMOFORM	75-25-2	100	0	0%	0.06-0.15	0.13	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
BROMOMETHANE	74-83-9	100	0	0%	0.092-0.19	0.17	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
CADMIUM	7440-43-9	47	4	9%	0.054-0.1	0.09	0.06	2.5	0.28	Y	N	N	--	Y	Quant.	9E+00
CALCIUM	7440-70-2	47	47	100%	5.5-250	105	27,900	232,000	NA	--	--	Y	--	Y	Bkg.	--
CAPROLACTAM	105-60-2	38	0	0%	0.38-11	4.30	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
CARBAZOLE	86-74-8	38	0	0%	0.18-5.4	2.26	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
CARBON DISULFIDE	75-15-0	100	2	2%	0.07-0.25	0.16	0.07	0.19	NA	--	N	Y	--	Y	Bkg.	--
CARBON TETRACHLORIDE	56-23-5	100	0	0%	0.059-0.22	0.10	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
CHLORIDE	16887-00-6	47	47	100%	500-25000	5,519	35,200	473,000	NA	--	--	Y	--	Y	Bkg.	--
CHLOROBENZENE	108-90-7	100	0	0%	0.05-0.18	0.08	ND	ND	130	--	N	--	N	N	--	--

TABLE I.3-1
SURFACE WATER COPEC SELECTION FOR ECOLOGICAL RECEPTORS
700 S 1600 E PCE Plume Superfund Site, Salt Lake City, Utah

Chemical	CASRN	Summary Statistics							Water Lowest ESV (µg/L)	COPEC Selection						HQmax
		No. of Samples	No. Detected	Detection Frequency	Range of DLs (µg/L)	Mean DL (µg/L)	Min. Conc. (µg/L)	Max. Conc. (µg/L)		Is Max. Det. Conc. > SL?	Is Mean DL > SL?	Chemical Detected, No SL?	Chemical ND, No SL?	Is Chemical a COPEC?	Type of Evaluation	
CHLOROETHANE	75-00-3	100	0	0%	0.08-0.27	0.18	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
CHLOROFORM	67-66-3	100	71	71%	0.1-0.15	0.11	0.11	6.3	1.8	Y	--	N	--	Y	Quant.	4E+00
CHLOROMETHANE	74-87-3	100	0	0%	0.088-0.15	0.13	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
CHROMIUM	16065-83-1	47	40	85%	0.07-0.1	0.09	0.222	55	11	Y	--	N	--	Y	Quant.	5E+00
CHRYSENE	218-01-9	38	0	0%	0.16-5.4	2.34	ND	ND	0.0018	--	Y	--	N	Y	Qual.1	--
CIS-1,2-DICHLOROETHENE	156-59-2	100	42	42%	0.076-0.11	0.09	0.11	1.3	NA	--	--	Y	--	Y	Bkg.	--
CIS-1,3-DICHLOROPROPENE	542-75-6	100	0	0%	0.065-0.2	0.12	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
CIS-CHLORDANE	5103-71-9	27	0	0%	0.0049-0.0061	0.01	ND	ND	0.0043	--	Y	--	N	Y	Qual.1	--
COBALT	7440-48-4	47	40	85%	0.056-0.1	0.09	0.06	16	3	Y	--	N	--	Y	Quant.	5E+00
COPPER	7440-50-8	47	37	79%	0.054-0.5	0.26	0.31	102	1.6	Y	--	N	--	Y	Quant.	6E+01
CYCLOHEXANE	110-82-7	55	1	2%	0.09-0.27	0.15	0.11	0.11	NA	--	N	Y	--	Y	Bkg.	--
DELTA-BHC	319-86-8	27	0	0%	0.0068-0.0085	0.0075	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
DIBENZO(A,H)ANTHRACENE	53-70-3	38	0	0%	0.29-5.4	3.0	ND	ND	0.0034	--	Y	--	N	Y	Qual.1	--
DIBENZOFURAN	132-64-9	38	0	0%	0.35-5.4	2.31	ND	ND	3.7	--	N	--	N	N	--	--
DIBROMOCHLOROMETHANE	124-48-1	100	0	0%	0.057-0.21	0.09	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
DICHLORODIFLUOROMETHANE	75-71-8	100	0	0%	0.11-0.38	0.15	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
DIELDRIN	60-57-1	27	0	0%	0.0049-0.0061	0.0054	ND	ND	0.056	--	N	--	N	N	--	--
DIETHYL PHTHALATE	84-66-2	38	1	3%	0.23-5.4	2.28	43	43	20,000	N	N	N	--	N	--	2E-03
DIMETHYL PHTHALATE	131-11-3	38	0	0%	0.35-5.4	2.3	ND	ND	3	--	N	--	N	N	--	--
DI-N-BUTYLPHTHALATE	84-74-2	38	0	0%	0.23-5.4	2.31	ND	ND	19	--	N	--	N	N	--	--
DI-N-OCTYLPHTHALATE	117-84-0	38	0	0%	0.29-5.4	2.76	ND	ND	3	--	N	--	N	N	--	--
ENDOSULFAN I	959-98-8	27	0	0%	0.0078-0.0098	0.0086	ND	ND	0.056	--	N	--	N	N	--	--
ENDOSULFAN II	33213-65-9	27	0	0%	0.0049-0.0061	0.0054	ND	ND	0.056	--	N	--	N	N	--	--
ENDOSULFAN SULFATE	1031-07-8	27	0	0%	0.0049-0.0061	0.01	ND	ND	0.056	--	N	--	N	N	--	--
ENDRIN	72-20-8	27	0	0%	0.0078-0.0098	0.01	ND	ND	0.036	--	N	--	N	N	--	--
ENDRIN ALDEHYDE	7421-93-4	27	0	0%	0.0049-0.0061	0.0054	ND	ND	0.036	--	N	--	N	N	--	--
ENDRIN KETONE	53494-70-5	27	0	0%	0.0049-0.0061	0.0054	ND	ND	0.036	--	N	--	N	N	--	--
ETHANE	74-84-0	10	0	0%	0.32-0.32	0.32	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
ETHENE	74-85-1	10	0	0%	0.3-0.3	0.30	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
ETHYLBENZENE	100-41-4	100	3	3%	0.031-0.13	0.07	0.08	0.15	NA	--	N	Y	--	Y	Bkg.	--
FLUORANTHENE	206-44-0	38	0	0%	0.19-5.4	2.27	ND	ND	0.04	--	Y	--	N	Y	Qual.1	--
FLUORENE	86-73-7	38	0	0%	0.37-5.4	2.32	ND	ND	3.9	--	N	--	N	N	--	--
GAMMA-BHC (LINDANE)	58-89-9	27	1	4%	0.0049-0.0061	0.01	0.0065	0.0065	0.095	N	N	N	--	N	--	7E-02
HEPTACHLOR	76-44-8	27	0	0%	0.0068-0.0085	0.0075	ND	ND	0.0038	--	Y	--	N	Y	Qual.1	--
HEPTACHLOR EPOXIDE	1024-57-3	27	0	0%	0.0049-0.0061	0.0054	ND	ND	0.0038	--	Y	--	N	Y	Qual.1	--
HEXACHLORO-1,3-BUTADIENE	87-68-3	38	0	0%	0.33-5.4	2.3	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
HEXACHLOROBENZENE	118-74-1	38	0	0%	0.36-5.4	2.3	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
HEXACHLOROCYCLOPENTADIENE	77-47-4	38	0	0%	1.1-5.4	2.4	ND	ND	100	--	N	--	N	N	--	--
HEXACHLOROETHANE	67-72-1	38	0	0%	0.28-5.4	2.3	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
INDENO(1,2,3-CD)PYRENE	193-39-5	38	0	0%	0.26-5.4	2.9	ND	ND	4.3	--	N	--	N	N	--	--
IRON	7439-89-6	47	34	72%	4.1-25	9.06	5.42	13,200	1,000	Y	--	N	--	Y	Quant.	1E+01
ISOPHORONE	78-59-1	38	0	0%	0.44-5.4	2.29	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
ISOPROPYLBENZENE	98-82-8	100	0	0%	0.056-0.16	0.08	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
LEAD	7439-92-1	47	35	74%	0.05-0.061	0.05	0.0761	127	1	Y	--	N	--	Y	Quant.	1E+02
M,P-XYLENE	108-38-3	90	6	7%	0.048-0.21	0.12	0.1	0.74	100,000	N	N	N	--	N	--	7E-06
M+P-XYLENES	108-38-3	10	0	0%	0.21-0.21	0.21	ND	ND	100,000	--	N	--	N	N	--	--

TABLE I.3-1
SURFACE WATER COPEC SELECTION FOR ECOLOGICAL RECEPTORS
700 S 1600 E PCE Plume Superfund Site, Salt Lake City, Utah

Chemical	CASRN	Summary Statistics							Water Lowest ESV (µg/L)	COPEC Selection						HQmax
		No. of Samples	No. Detected	Detection Frequency	Range of DLs (µg/L)	Mean DL (µg/L)	Min. Conc. (µg/L)	Max. Conc. (µg/L)		Is Max. Det. Conc. > SL?	Is Mean DL > SL?	Chemical Detected, No SL?	Chemical ND, No SL?	Is Chemical a COPEC?	Type of Evaluation	
MAGNESIUM	7439-95-4	47	47	100%	5-250	65	5,960	79,700	NA	--	--	Y	--	Y	Bkg.	--
MANGANESE	7439-96-5	47	45	96%	0.06-0.25	0.12	0.166	351	1,300	N	--	N	--	N	--	3E-01
MERCURY	7487-94-7	47	2	4%	0.043-0.1	0.06	0.092	0.86	0.012	Y	Y	N	--	Y	Quant.	7E+01
METHANE	74-82-8	10	8	80%	0.17-0.17	0.17	0.18	1.1	NA	--	--	Y	--	Y	Bkg.	--
METHOXYCHLOR	72-43-5	27	0	0%	0.049-0.061	0.05	ND	ND	0.03	--	Y	--	N	Y	Qual.1	--
METHYL ACETATE	79-20-9	100	0	0%	0.11-0.25	0.21	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
METHYL TERT-BUTYL ETHER	1634-04-4	100	0	0%	0.067-0.18	0.10	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
METHYLCYLOHEXANE	108-87-2	55	0	0%	0.11-0.3	0.14	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
METHYLENE CHLORIDE	75-09-2	100	0	0%	0.14-0.5	0.35	ND	ND	210	--	N	--	N	N	--	--
NAPHTHALENE	91-20-3	38	0	0%	0.39-5.4	2.30	ND	ND	1.1	--	Y	--	N	Y	Qual.1	--
NICKEL	7440-02-0	47	37	79%	0.06-0.25	0.12	0.166	26	29	N	--	N	--	N	--	9E-01
NITRATE [AS N]	14797-55-8	10	10	100%	100-200	190	300	3,500	4	Y	--	N	--	Y	Quant.	9E+02
NITROBENZENE	98-95-3	38	0	0%	0.38-5.4	2.3	ND	ND	550	--	N	--	N	N	--	--
N-NITROSO-DI-N-PROPYLAMINE	621-64-7	38	0	0%	0.47-5.4	2.3	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
N-NITROSODIPHENYLAMINE	86-30-6	38	0	0%	0.37-5.4	2.29	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
O-XYLENE	95-47-6	100	2	2%	0.061-0.12	0.08	0.1	0.24	1,000	N	N	N	--	N	--	2E-04
PENTACHLOROPHENOL	87-86-5	38	0	0%	0.25-5.4	2.2	ND	ND	15	--	N	--	N	N	--	--
PHENANTHRENE	85-01-8	38	0	0%	0.32-5.4	2.3	ND	ND	6.3	--	N	--	N	N	--	--
PHENOL	108-95-2	38	0	0%	0.38-5.4	2.28	ND	ND	320	--	N	--	N	N	--	--
POTASSIUM	7440-09-7	47	47	100%	8.1-25	13	1,290	7,030	NA	--	--	Y	--	Y	Bkg.	--
PYRENE	129-00-0	38	0	0%	0.15-5.4	2.36	ND	ND	0.025	--	Y	--	N	Y	Qual.1	--
SELENIUM	7782-49-2	47	46	98%	0.15-1.4	0.42	0.249	4.2	1.5	Y	--	N	--	Y	Quant.	3E+00
SILVER	7440-22-4	47	9	19%	0.036-0.1	0.09	0.08	3	0.1	Y	--	N	--	Y	Quant.	3E+01
SODIUM	7440-23-5	47	47	100%	10.4-250	130	22,300	233,000	NA	--	--	Y	--	Y	Bkg.	--
STYRENE	100-42-5	100	0	0%	0.044-0.25	0.15	ND	ND	10,000	--	N	--	N	N	--	--
SULFATE	14808-79-8	47	47	100%	130-26000	3,597	19,500	341,000	NA	--	--	Y	--	Y	Bkg.	--
TETRACHLOROETHENE	127-18-4	100	78	78%	0.077-0.75	0.13	0.13	82	98	N	--	N	--	N	--	8E-01
THALLIUM	7440-28-0	47	1	2%	0.054-0.1	0.09	1.5	1.5	0.03	Y	Y	N	--	Y	Quant.	5E+01
TOLUENE	108-88-3	100	14	14%	0.048-0.13	0.08	0.1	1.7	9.8	N	--	N	--	N	--	2E-01
TOXAPHENE	8001-35-2	27	0	0%	0.24-0.3	0.27	ND	ND	0.0002	--	Y	--	N	Y	Qual.1	--
TRANS-1,2-DICHLOROETHENE	156-60-5	100	0	0%	0.075-0.16	0.11	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
TRANS-1,3-DICHLOROPROPENE	542-75-6	100	0	0%	0.049-0.2	0.11	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
TRANS-CHLORDANE	5103-74-2	27	0	0%	0.0049-0.0061	0.01	ND	ND	0.0043	--	Y	--	N	Y	Qual.1	--
TRICHLOROETHENE	79-01-6	100	58	58%	0.07-0.1	0.084	0.09	4.6	21	N	--	N	--	N	--	2E-01
TRICHLOROFLUOROMETHANE	75-69-4	100	0	0%	0.074-0.29	0.12	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
VANADIUM	7440-62-2	47	46	98%	0.026-0.25	0.20	1.14	32.4	19	Y	--	N	--	Y	Quant.	2E+00
VINYL ACETATE	108-05-4	45	0	0%	0.25-0.25	0.25	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
VINYL CHLORIDE	75-01-4	100	0	0%	0.081-0.22	0.14	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
ZINC	7440-66-6	47	18	38%	0.13-5	4.0	4.3	757	65	Y	--	N	--	Y	Quant.	1E+01

Abbreviations

% - percent
> - greater than
µg/L - micrograms per liter
Bkg. - Background analysis for detected analytes with no screening levels
CASRN - Chemical Abstracts Service Registry Number
Conc. - Concentration
COPEC - Chemical of Potential Ecological Concern
Det. - detect
DL - Detection Limit
ESV - Ecological Screening Value
HQ - Hazard Quotient
Max. - Maximum
Min. - Minimum
N - No
NA - Not Available
ND - Non-Detect
No. - Number
Qual.1 - Qualitative analysis for infrequently detected analytes with insufficient detection limits
Qual.2 - Qualitative analysis for non-detected analytes with no screening levels
Quant. - Quantitative
SL - Screening Level
Y - Yes

TABLE I.3-2
GROUNDWATER COPEC SELECTION FOR ECOLOGICAL RECEPTORS
700 S 1600 E PCE Plume Superfund Site, Salt Lake City, Utah

Chemical	CAS Number	Summary Statistics							Water Lowest ESV (µg/L)	COPEC Selection						HQmax
		No. of Samples	No. Detected	Detection Frequency	Range of DLs (µg/L)	Mean DL (µg/L)	Min. Conc. (µg/L)	Max. Conc. (µg/L)		Is Max. Det. Conc. > SL?	Is Mean DL > SL?	Chemical Detected, No SL?	Chemical ND, No SL?	Is Chemical a COPEC?	Type of Evaluation	
1,1,1-TRICHLOROETHANE	71-55-6	479	115	24%	0.057-0.5	0.09	0.09	0.99	11	N	--	N	--	N	--	9E-02
1,1,2,2-TETRACHLOROETHANE	79-34-5	479	0	0%	0.09-0.55	0.11	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,1,2-TRICHLOROETHANE	79-00-5	479	0	0%	0.071-0.51	0.10	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,1,2-TRICHLOROTRIFLUOROETHANE	76-13-1	479	0	0%	0.061-0.75	0.15	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,1'-BIPHENYL	92-52-4	124	0	0%	0.64-4.5	2.20	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,1-DICHLOROETHANE	75-34-3	479	13	3%	0.053-0.5	0.09	0.1	0.19	47	N	N	N	--	N	--	4E-03
1,1-DICHLOROETHENE	75-35-4	479	55	11%	0.081-0.5	0.10	0.11	0.29	25	N	--	N	--	N	--	1E-02
1,2,3-TRICHLOROBENZENE	87-61-6	479	0	0%	0.076-0.75	0.14	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,2,4,5-TETRACHLOROBENZENE	95-94-3	124	0	0%	0.83-4.2	2.21	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,2,4-TRICHLOROBENZENE	120-82-1	479	0	0%	0.059-0.76	0.14	ND	ND	24	--	N	--	N	N	--	--
1,2,4-TRIMETHYLBENZENE	95-63-6	396	15	4%	0.11-0.54	0.11	0.12	1.2	NA	--	N	Y	--	Y	Bkg.	--
1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	479	0	0%	0.1-1.2	0.24	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,2-DIBROMOETHANE	106-93-4	479	0	0%	0.047-0.52	0.09	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,2-DICHLOROBENZENE	95-50-1	479	0	0%	0.036-0.5	0.09	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,2-DICHLOROETHANE	107-06-2	479	0	0%	0.057-0.5	0.10	ND	ND	100	--	N	--	N	N	--	--
1,2-DICHLOROPROPANE	78-87-5	479	0	0%	0.054-0.5	0.10	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,3,5-TRIMETHYLBENZENE	108-67-8	396	4	1%	0.12-0.62	0.12	0.17	0.25	NA	--	N	Y	--	Y	Bkg.	--
1,3-DICHLOROBENZENE	95-50-1	479	0	0%	0.051-0.54	0.10	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,3-DICHLOROPROPYLENE	542-75-6	83	0	0%	0.1-0.1	0.10	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,4-DICHLOROBENZENE	106-46-7	479	0	0%	0.047-0.5	0.10	ND	ND	15	--	N	--	N	N	--	--
1,4-DIOXANE	123-91-1	218	8	4%	0.15-7.1	0.36	0.18	2.7	NA	--	N	Y	--	Y	Bkg.	--
2,3,4,6-TETRACHLOROPHENOL	58-90-2	124	0	0%	0.65-5.3	2.22	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
2,4,5-TRICHLOROPHENOL	95-95-4	124	0	0%	0.75-6.7	2.26	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
2,4,6-TRICHLOROPHENOL	88-06-2	124	0	0%	0.62-5.3	2.21	ND	ND	10,000	--	N	--	N	N	--	--
2,4-DICHLOROPHENOL	120-83-2	124	0	0%	0.71-4.1	2.19	ND	ND	20,000	--	N	--	N	N	--	--
2,4-DIMETHYLPHENOL	105-67-9	124	0	0%	0.62-3.4	2.25	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
2,4-DINITROPHENOL	51-28-5	124	0	0%	0.73-4.1	2.13	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
2,4-DINITROTOLUENE	121-14-2	124	0	0%	0.53-5.4	2.22	ND	ND	65	--	N	--	N	N	--	--
2,6-DINITROTOLUENE	606-20-2	124	0	0%	0.74-5.2	2.20	ND	ND	230	--	N	--	N	N	--	--
2-BUTANONE (MEK)	78-93-3	479	24	5%	0.76-12	2.15	1.9	54	7,200	N	N	N	--	N	--	8E-03
2-CHLORONAPHTHALENE	91-58-7	124	0	0%	0.65-4.5	2.20	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
2-CHLOROPHENOL	95-57-8	124	0	0%	0.76-4.7	2.19	ND	ND	490	--	N	--	N	N	--	--
2-HEXANONE	591-78-6	479	13	3%	0.58-12	2.20	2.8	12	NA	--	N	Y	--	Y	Bkg.	--
2-METHYLNAPHTHALENE	91-57-6	124	0	0%	0.76-4.6	2.20	ND	ND	330	--	N	--	N	N	--	--
2-METHYLPHENOL	95-48-7	124	0	0%	0.6-4.4	2.19	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
2-NITROANILINE	88-74-4	124	0	0%	0.54-5.3	2.18	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
2-NITROPHENOL	88-75-5	124	0	0%	0.85-5.7	2.25	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
3,3'-DICHLOROBENZIDINE	91-94-1	124	0	0%	0.4-6.5	2.21	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
3-NITROANILINE	99-09-2	124	0	0%	0.81-5.7	2.20	ND	ND	70,000	--	N	--	N	N	--	--
4,4'-DDD	72-54-8	77	0	0%	0.0047-0.0063	0.01	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
4,4'-DDE	72-55-9	77	0	0%	0.0047-0.0063	0.01	ND	ND	100	--	N	--	N	N	--	--
4,4'-DDT	50-29-3	77	0	0%	0.0047-0.0063	0.01	ND	ND	0.001	--	Y	--	N	Y	Qual.1	--
4,6-DINITRO-2-METHYLPHENOL	534-52-1	124	0	0%	0.74-6.9	2.26	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
4-BROMOPHENYL PHENYL ETHER	101-55-3	124	0	0%	0.7-5.8	2.24	ND	ND	NA	--	N	--	Y	Y	Qual.2	--

TABLE I.3-2
GROUNDWATER COPEC SELECTION FOR ECOLOGICAL RECEPTORS
700 S 1600 E PCE Plume Superfund Site, Salt Lake City, Utah

Chemical	CAS Number	Summary Statistics							Water Lowest ESV (µg/L)	COPEC Selection						HQmax
		No. of Samples	No. Detected	Detection Frequency	Range of DLs (µg/L)	Mean DL (µg/L)	Min. Conc. (µg/L)	Max. Conc. (µg/L)		Is Max. Det. Conc. > SL?	Is Mean DL > SL?	Chemical Detected, No SL?	Chemical ND, No SL?	Is Chemical a COPEC?	Type of Evaluation	
4-CHLORO-3-METHYLPHENOL	59-50-7	124	0	0%	0.92-5.4	2.23	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
4-CHLOROANILINE	106-47-8	124	0	0%	0.7-6.8	3.52	ND	ND	40,000	--	N	--	N	N	--	--
4-CHLOROPHENYL PHENYL ETHER	7005-72-3	124	0	0%	0.53-3.6	2.18	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
4-METHYL-2-PENTANONE (MIBK)	108-10-1	479	0	0%	0.46-12	2.15	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
4-METHYLPHENOL	106-44-5	124	0	0%	0.56-3.9	2.16	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
4-NITROANILINE	100-01-6	124	0	0%	0.67-6.7	2.24	ND	ND	40,000	--	N	--	N	N	--	--
4-NITROPHENOL	100-02-7	124	0	0%	0.59-7.3	2.30	ND	ND	10,000	--	N	--	N	N	--	--
ACENAPHTHENE	83-32-9	124	0	0%	0.7-3.5	2.18	ND	ND	5.8	--	N	--	N	N	--	--
ACENAPHTHYLENE	208-96-8	124	0	0%	0.58-4.5	2.21	ND	ND	4,800	--	N	--	N	N	--	--
ACETONE	67-64-1	479	91	19%	0.31-12	2.26	1.1	55	1,500	N	--	N	--	N	--	4E-02
ACETOPHENONE	98-86-2	124	0	0%	0.62-4.2	2.20	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
ALDRIN	309-00-2	77	0	0%	0.0047-0.0063	0.01	ND	ND	0.3	--	N	--	N	N	--	--
ALPHA-BHC	319-84-6	77	0	0%	0.0047-0.0063	0.01	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
ALUMINUM	7429-90-5	385	206	54%	1.1-100	18.61	1.6	65,600	87	Y	--	N	--	Y	Quant.	8E+02
ANTHRACENE	120-12-7	124	0	0%	0.66-4.9	2.21	ND	ND	0.73	--	Y	--	N	Y	Qual.1	--
ANTIMONY	7440-36-0	385	5	1%	0.045-1.25	0.27	0.27	1.4	30	N	N	N	--	N	--	5E-02
ARSENIC	7440-38-2	385	334	87%	0.075-0.58	0.15	0.16	14	1	Y	--	N	--	Y	Quant.	1E+01
ATRAZINE	1912-24-9	124	0	0%	0.53-3.3	2.10	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
BARIUM	7440-39-3	385	384	100%	0.024-2.8	0.41	21	641	3.9	Y	--	N	--	Y	Quant.	2E+02
BENZALDEHYDE	100-52-7	124	0	0%	0.66-6.6	4.07	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
BENZENE	71-43-2	479	72	15%	0.054-0.5	0.10	0.11	20	46	N	--	N	--	N	--	4E-01
BENZO(A)ANTHRACENE	56-55-3	124	0	0%	0.76-5.2	2.20	ND	ND	0.027	--	Y	--	N	Y	Qual.1	--
BENZO(A)PYRENE	50-32-8	124	0	0%	0.66-3.3	2.30	ND	ND	0.014	--	Y	--	N	Y	Qual.1	--
BENZO(B)FLUORANTHENE	205-99-2	124	0	0%	0.74-4	2.43	ND	ND	9	--	N	--	N	N	--	--
BENZO(G,H,I)PERYLENE	191-24-2	124	0	0%	0.72-4.4	2.35	ND	ND	7.6	--	N	--	N	N	--	--
BENZO(K)FLUORANTHENE	207-08-9	124	0	0%	0.83-4.1	2.40	ND	ND	0.0041	--	Y	--	N	Y	Qual.1	--
BENZYL BUTYL PHTHALATE	85-68-7	124	1	1%	0.53-6.9	2.21	1.8	1.8	19	N	N	N	--	N	--	9E-02
BERYLLIUM	7440-41-7	385	15	4%	0.027-0.32	0.10	0.055	4.8	0.66	Y	N	N	--	Y	Quant.	7E+00
BETA-BHC	319-85-7	77	0	0%	0.0065-0.0089	0.01	ND	ND	2.2	--	N	--	N	N	--	--
BIS(2-CHLOROETHOXY)METHANE	111-91-1	124	0	0%	0.72-4.4	2.19	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
BIS(2-CHLOROETHYL) ETHER	111-44-4	124	0	0%	0.76-3.9	2.21	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
BIS(2-ETHYLHEXYL)PHTHALATE	117-81-7	124	8	6%	0.78-6.4	2.28	4.2	150	32	Y	N	N	--	Y	Quant.	5E+00
BIS-CHLOROISOPROPYL ETHER	39638-32-9	124	0	0%	0.72-5.8	2.25	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
BROMOCHLOROMETHANE	74-97-5	479	0	0%	0.059-0.57	0.11	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
BROMODICHLOROMETHANE	75-27-4	479	258	54%	0.049-0.5	0.10	0.10	6	NA	--	--	Y	--	Y	Bkg.	--
BROMOFORM	75-25-2	479	3	1%	0.06-0.75	0.14	0.24	0.58	NA	--	N	Y	--	Y	Bkg.	--
BROMOMETHANE	74-83-9	479	0	0%	0.079-0.82	0.15	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
CADMIUM	7440-43-9	385	13	3%	0.026-0.5	0.12	0.060	0.86	0.28	Y	N	N	--	Y	Quant.	3E+00
CALCIUM	7440-70-2	385	385	100%	5.5-735	203.61	86,700	940,000	NA	--	--	Y	--	Y	Bkg.	--
CAPROLACTAM	105-60-2	124	0	0%	0.54-7.7	4.02	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
CARBAZOLE	86-74-8	124	0	0%	0.65-5.2	2.20	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
CARBON DISULFIDE	75-15-0	479	11	2%	0.049-1.2	0.22	0.07	0.35	NA	--	N	Y	--	Y	Bkg.	--
CARBON TETRACHLORIDE	56-23-5	479	4	1%	0.057-0.5	0.10	0.08	0.12	NA	--	N	Y	--	Y	Bkg.	--
CHLORIDE	16887-00-6	315	315	100%	500-25000	5,046.35	26,000	1,280,000	NA	--	--	Y	--	Y	Bkg.	--
CHLOROBENZENE	108-90-7	479	0	0%	0.05-0.5	0.10	ND	ND	130	--	N	--	N	N	--	--
CHLOROETHANE	75-00-3	479	0	0%	0.078-1.3	0.24	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
CHLOROFORM	67-66-3	479	423	88%	0.096-0.5	0.10	0.13	13	1.8	Y	--	N	--	Y	Quant.	7E+00

TABLE I.3-2
GROUNDWATER COPEC SELECTION FOR ECOLOGICAL RECEPTORS
700 S 1600 E PCE Plume Superfund Site, Salt Lake City, Utah

Chemical	CAS Number	Summary Statistics							Water Lowest ESV (µg/L)	COPEC Selection						HQmax
		No. of Samples	No. Detected	Detection Frequency	Range of DLs (µg/L)	Mean DL (µg/L)	Min. Conc. (µg/L)	Max. Conc. (µg/L)		Is Max. Det. Conc. > SL?	Is Mean DL > SL?	Chemical Detected, No SL?	Chemical ND, No SL?	Is Chemical a COPEC?	Type of Evaluation	
CHLOROMETHANE	74-87-3	479	23	5%	0.057-0.75	0.14	0.15	2	NA	--	N	Y	--	Y	Bkg.	--
CHROMIUM	16065-83-1	385	346	90%	0.043-0.62	0.13	0.10	130	11	Y	--	N	--	Y	Quant.	1E+01
CHRYSENE	218-01-9	124	0	0%	0.78-3.9	2.18	ND	ND	0.0018	--	Y	--	N	Y	Qual.1	--
CIS-1,2-DICHLOROETHENE	156-59-2	505	137	27%	0-0.5	0.09	0.10	3.9	NA	--	--	Y	--	Y	Bkg.	--
CIS-1,3-DICHLOROPROPENE	542-75-6	479	0	0%	0.065-0.5	0.11	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
CIS-CHLORDANE	5103-71-9	77	0	0%	0.0047-0.0063	0.01	ND	ND	0.0043	--	Y	--	N	Y	Qual.1	--
COBALT	7440-48-4	385	335	87%	0.011-0.5	0.11	0.060	39	3	Y	--	N	--	Y	Quant.	1E+01
COPPER	7440-50-8	385	166	43%	0.054-1.25	0.40	0.25	116	1.6	Y	--	N	--	Y	Quant.	7E+01
CYCLOHEXANE	110-82-7	83	0	0%	0.038-0.14	0.10	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
DELTA-BHC	319-86-8	77	0	0%	0.0065-0.0089	0.01	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
DIBENZO(A,H)ANTHRACENE	53-70-3	124	0	0%	0.49-4.2	2.39	ND	ND	0.0034	--	Y	--	N	Y	Qual.1	--
DIBENZOFURAN	132-64-9	124	0	0%	0.66-3.7	2.18	ND	ND	3.7	--	N	--	N	N	--	--
DIBROMOCHLOROMETHANE	124-48-1	479	4	1%	0.051-0.5	0.09	0.16	2.4	NA	--	N	Y	--	Y	Bkg.	--
DICHLORODIFLUOROMETHANE	75-71-8	479	4	1%	0.061-0.75	0.14	0.17	0.25	NA	--	N	Y	--	Y	Bkg.	--
DIELDRIN	60-57-1	77	0	0%	0.0047-0.0063	0.01	ND	ND	0.056	--	N	--	N	N	--	--
DIETHYL PHTHALATE	84-66-2	124	0	0%	0.53-3.7	2.16	ND	ND	20,000	--	N	--	N	N	--	--
DIMETHYL PHTHALATE	131-11-3	124	4	3%	0.54-4.3	2.20	1.7	19	3	Y	N	N	--	Y	Quant.	6E+00
DI-N-BUTYLPHTHALATE	84-74-2	124	5	4%	0.71-5.2	2.18	1.1	1.9	19	N	N	N	--	N	--	1E-01
DI-N-OCTYLPHTHALATE	117-84-0	124	0	0%	0.91-6.3	2.39	ND	ND	3	--	N	--	N	N	--	--
ENDOSULFAN I	959-98-8	77	0	0%	0.0074-0.01	0.01	ND	ND	0.056	--	N	--	N	N	--	--
ENDOSULFAN II	33213-65-9	77	0	0%	0.0047-0.0063	0.01	ND	ND	0.056	--	N	--	N	N	--	--
ENDOSULFAN SULFATE	1031-07-8	77	0	0%	0.0047-0.0063	0.01	ND	ND	0.056	--	N	--	N	N	--	--
ENDRIN	72-20-8	77	0	0%	0.0074-0.01	0.01	ND	ND	0.036	--	N	--	N	N	--	--
ENDRIN ALDEHYDE	7421-93-4	77	0	0%	0.0047-0.0063	0.01	ND	ND	0.036	--	N	--	N	N	--	--
ENDRIN KETONE	53494-70-5	77	0	0%	0.0047-0.0063	0.01	ND	ND	0.036	--	N	--	N	N	--	--
ETHANE	74-84-0	211	16	8%	0.32-0.32	0.32	0.33	8.8	NA	--	N	Y	--	Y	Bkg.	--
ETHENE	74-85-1	211	27	13%	0.3-0.3	0.30	0.31	14	NA	--	--	Y	--	Y	Bkg.	--
ETHYLBENZENE	100-41-4	479	30	6%	0.031-0.5	0.10	0.10	3.3	NA	--	N	Y	--	Y	Bkg.	--
FLUORANTHENE	206-44-0	124	0	0%	0.72-4.8	2.21	ND	ND	0.04	--	Y	--	N	Y	Qual.1	--
FLUORENE	86-73-7	124	0	0%	0.67-3.9	2.19	ND	ND	3.9	--	N	--	N	N	--	--
GAMMA-BHC (LINDANE)	58-89-9	77	1	1%	0.0047-0.0063	0.01	0.012	0.012	0.095	N	N	N	--	N	--	1E-01
HEPTACHLOR	76-44-8	77	0	0%	0.0065-0.0089	0.01	ND	ND	0.0038	--	Y	--	N	Y	Qual.1	--
HEPTACHLOR EPOXIDE	1024-57-3	77	0	0%	0.0047-0.0063	0.01	ND	ND	0.0038	--	Y	--	N	Y	Qual.1	--
HEXACHLORO-1,3-BUTADIENE	87-68-3	124	0	0%	0.69-3.4	2.18	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
HEXACHLOROBENZENE	118-74-1	124	0	0%	0.97-4.8	2.22	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
HEXACHLOROCYCLOPENTADIENE	77-47-4	124	0	0%	0.77-3.9	2.15	ND	ND	100	--	N	--	N	N	--	--
HEXACHLOROETHANE	67-72-1	124	0	0%	0.59-4.4	2.23	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
INDENO(1,2,3-CD)PYRENE	193-39-5	124	0	0%	0.62-4.1	2.36	ND	ND	4.3	--	N	--	N	N	--	--
IRON	7439-89-6	385	278	72%	3.8-47.6	19.29	5.7	57,500	1,000	Y	--	N	--	Y	Quant.	6E+01
ISOPHORONE	78-59-1	124	0	0%	0.63-4.3	2.18	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
ISOPROPYLBENZENE	98-82-8	479	3	1%	0.035-0.5	0.09	0.1	0.13	NA	--	N	Y	--	Y	Bkg.	--
LEAD	7439-92-1	385	120	31%	0.013-0.36	0.07	0.050	91	1	Y	--	N	--	Y	Quant.	9E+01
M,P-XYLENE	108-38-3	479	35	7%	0.048-1.1	0.19	0.11	4.7	100,000	N	N	N	--	N	--	5E-05
MAGNESIUM	7439-95-4	385	385	100%	0.41-677	111.73	29,300	124,000	NA	--	--	Y	--	Y	Bkg.	--
MANGANESE	7439-96-5	385	360	94%	0.021-1.4	0.20	0.21	2,770	1,300	Y	--	N	--	Y	Quant.	2E+00
MERCURY	7487-94-7	385	11	3%	0.014-0.54	0.07	0.034	0.88	0.012	Y	Y	N	--	Y	Quant.	7E+01
METHANE	74-82-8	211	104	49%	0.17-0.17	0.17	0.17	15	NA	--	--	Y	--	Y	Bkg.	--

TABLE I.3-2
GROUNDWATER COPEC SELECTION FOR ECOLOGICAL RECEPTORS
700 S 1600 E PCE Plume Superfund Site, Salt Lake City, Utah

Chemical	CAS Number	Summary Statistics							Water Lowest ESV (µg/L)	COPEC Selection						HQmax
		No. of Samples	No. Detected	Detection Frequency	Range of DLs (µg/L)	Mean DL (µg/L)	Min. Conc. (µg/L)	Max. Conc. (µg/L)		Is Max. Det. Conc. > SL?	Is Mean DL > SL?	Chemical Detected, No SL?	Chemical ND, No SL?	Is Chemical a COPEC?	Type of Evaluation	
METHOXYCHLOR	72-43-5	77	0	0%	0.047-0.063	0.05	ND	ND	0.03	--	Y	--	N	Y	Qual.1	--
METHYL ACETATE	79-20-9	479	0	0%	0.09-1.2	0.23	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
METHYL TERT-BUTYL ETHER	1634-04-4	479	0	0%	0.056-0.66	0.12	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
METHYLCYLOHEXANE	108-87-2	83	4	5%	0.035-0.12	0.09	0.1	0.2	NA	--	N	Y	--	Y	Bkg.	--
METHYLENE CHLORIDE	75-09-2	479	10	2%	0.062-2.5	0.44	0.11	0.44	210	N	N	N	--	N	--	2E-03
NAPHTHALENE	91-20-3	124	0	0%	0.64-3.8	2.19	ND	ND	1.1	--	Y	--	N	Y	Qual.1	--
NICKEL	7440-02-0	385	355	92%	0.06-0.5	0.21	0.18	239	29	Y	--	N	--	Y	Quant.	8E+00
NITRATE [AS N]	14797-55-8	21	17	81%	100-500	209.52	1,100	4,800	4	Y	--	N	--	Y	Quant.	1E+03
NITROBENZENE	98-95-3	124	0	0%	0.64-4.1	2.19	ND	ND	550	--	N	--	N	N	--	--
N-NITROSO-DI-N-PROPYLAMINE	621-64-7	124	0	0%	0.68-4.9	2.18	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
N-NITROSODIPHENYLAMINE	86-30-6	124	0	0%	0.69-5.3	2.22	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
O-XYLENE	95-47-6	479	27	6%	0.043-0.5	0.10	0.1	3.4	1,000	N	N	N	--	N	--	3E-03
PENTACHLOROPHENOL	87-86-5	124	0	0%	0.73-6	2.21	ND	ND	15	--	N	--	N	N	--	--
PHENANTHRENE	85-01-8	124	0	0%	0.69-4.1	2.19	ND	ND	6.3	--	N	--	N	N	--	--
PHENOL	108-95-2	124	0	0%	0.56-3.6	2.15	ND	ND	320	--	N	--	N	N	--	--
POTASSIUM	7440-09-7	385	385	100%	5.4-151	28.02	1,510	12,300	NA	--	--	Y	--	Y	Bkg.	--
PYRENE	129-00-0	124	0	0%	0.85-4.2	2.20	ND	ND	0.025	--	Y	--	N	Y	Qual.1	--
SELENIUM	7782-49-2	385	315	82%	0.15-2.8	0.37	0.153	5.1	1.5	Y	--	N	--	Y	Quant.	3E+00
SILVER	7440-22-4	385	39	10%	0.011-0.5	0.11	0.05	1.1	0.1	Y	--	N	--	Y	Quant.	1E+01
SODIUM	7440-23-5	385	385	100%	8.3-1250	167.33	23,900	792,000	NA	--	--	Y	--	Y	Bkg.	--
STYRENE	100-42-5	479	7	1%	0.031-1.2	0.22	0.24	1.1	10,000	N	N	N	--	N	--	1E-04
SULFATE	14808-79-8	315	315	100%	650-26000	2,805.40	49,300	232,000	NA	--	--	Y	--	Y	Bkg.	--
TETRACHLOROETHENE	127-18-4	505	336	67%	0-3.8	0.20	0.13	230	98	Y	--	N	--	Y	Quant.	2E+00
THALLIUM	7440-28-0	385	7	2%	0.054-0.5	0.14	0.080	0.35	0.03	Y	Y	N	--	Y	Quant.	1E+01
TOLUENE	108-88-3	479	80	17%	0.048-0.5	0.10	0.090	18	9.8	Y	--	N	--	Y	Quant.	2E+00
TOXAPHENE	8001-35-2	77	0	0%	0.23-0.32	0.27	ND	ND	0.0002	--	Y	--	N	Y	Qual.1	--
TRANS-1,2-DICHLOROETHENE	156-60-5	479	2	0%	0.062-0.5	0.10	0.1	0.2	NA	--	N	Y	--	Y	Bkg.	--
TRANS-1,3-DICHLOROPROPENE	542-75-6	479	0	0%	0.049-0.57	0.12	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
TRANS-CHLORDANE	5103-74-2	77	0	0%	0.0047-0.0063	0.01	ND	ND	0.0043	--	Y	--	N	Y	Qual.1	--
TRICHLOROETHENE	79-01-6	505	210	42%	0-0.5	0.09	0.1	12	21	N	--	N	--	N	--	6E-01
TRICHLOROFLUOROMETHANE	75-69-4	479	9	2%	0.038-0.75	0.14	0.17	0.28	NA	--	N	Y	--	Y	Bkg.	--
VANADIUM	7440-62-2	385	346	90%	0.026-1.8	0.36	0.26	78	19	Y	--	N	--	Y	Quant.	4E+00
VINYL ACETATE	108-05-4	396	0	0%	0.25-1.2	0.25	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
VINYL CHLORIDE	75-01-4	479	0	0%	0.054-0.58	0.12	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
ZINC	7440-66-6	385	168	44%	0.13-25	4.75	0.96	1,350	65	Y	--	N	--	Y	Quant.	2E+01

Abbreviations

% - percent
> - greater than
µg/L - micrograms per liter
Bkg. - Background analysis for detected analytes with no screening levels
CASRN - Chemical Abstracts Service Registry Number
Conc. - Concentration
COPEC - Chemical of Potential Ecological Concern
Det. - detect
DL - Detection Limit
ESV - Ecological Screening Value
HQ - Hazard Quotient
Max. - Maximum
Min. - Minimum
N - No
NA - Not Available
ND - Non-Detect
No. - Number
Qual.1 - Qualitative analysis for infrequently detected analytes with insufficient detection limits
Qual.2 - Qualitative analysis for non-detected analytes with no screening levels
Quant. - Quantitative
SL - Screening Level
Y - Yes

TABLE I.3-3
SURFACE WATER SCREENING LEVELS FOR ECOLOGICAL RECEPTORS
700 S 1600 E PCE Plume Superfund Site, Salt Lake City, Utah

Chemical	CASRN	Notes	UDEQ WQC Chronic (µg/L)	EPA NRWQC Chronic (µg/L)	LANL Water No-Effect ESL (µg/L)	ORNL Plant Soil Solution SL (µg/L)	Lowest ESV (µg/L)
1,1,1-TRICHLOROETHANE	71-55-6		NA	NA	11	NA	11
1,1,2,2-TETRACHLOROETHANE	79-34-5		NA	NA	NA	NA	NA
1,1,2-TRICHLOROETHANE	79-00-5		NA	NA	NA	NA	NA
1,1,2-TRICHLOROTRIFLUOROETHANE	76-13-1		NA	NA	NA	NA	NA
1,1'-BIPHENYL	92-52-4		NA	NA	NA	NA	NA
1,1-DICHLOROETHANE	75-34-3		NA	NA	47	NA	47
1,1-DICHLOROETHENE	75-35-4		NA	NA	25	NA	25
1,2,3-TRICHLOROBENZENE	87-61-6		NA	NA	NA	NA	NA
1,2,4,5-TETRACHLOROBENZENE	95-94-3		NA	NA	NA	NA	NA
1,2,4-TRICHLOROBENZENE	120-82-1		NA	NA	24	NA	24
1,2,4-TRIMETHYLBENZENE	95-63-6		NA	NA	NA	NA	NA
1,2-DIBROMO-3-CHLOROPROPANE	96-12-8		NA	NA	NA	NA	NA
1,2-DIBROMOETHANE	106-93-4		NA	NA	NA	NA	NA
1,2-DICHLOROBENZENE	95-50-1		NA	NA	NA	NA	NA
1,2-DICHLOROETHANE	107-06-2		NA	NA	100	NA	100
1,2-DICHLOROPROPANE	78-87-5		NA	NA	NA	NA	NA
1,3,5-TRIMETHYLBENZENE	108-67-8		NA	NA	NA	NA	NA
1,3-DICHLOROBENZENE	541-73-1		NA	NA	NA	NA	NA
1,3-DICHLOROPROPYLENE	542-75-6		NA	NA	NA	NA	NA
1,4-DICHLOROBENZENE	106-46-7		NA	NA	15	NA	15
1,4-DIOXANE	123-91-1		NA	NA	NA	NA	NA
2,3,4,6-TETRACHLOROPHENOL	58-90-2		NA	NA	NA	NA	NA
2,4,5-TRICHLOROPHENOL	95-95-4		NA	NA	NA	NA	NA
2,4,6-TRICHLOROPHENOL	88-06-2		NA	NA	NA	10,000	10,000
2,4-DICHLOROPHENOL	120-83-2		NA	NA	NA	20,000	20,000
2,4-DIMETHYLPHENOL	105-67-9		NA	NA	NA	NA	NA
2,4-DINITROPHENOL	51-28-5		NA	NA	NA	NA	NA
2,4-DINITROTOLUENE	121-14-2		NA	NA	65	NA	65
2,6-DINITROTOLUENE	606-20-2		NA	NA	230	NA	230
2-BUTANONE (MEK)	78-93-3		NA	NA	7,200	NA	7,200
2-CHLORONAPHTHALENE	91-58-7		NA	NA	NA	NA	NA
2-CHLOROPHENOL	95-57-8		NA	NA	490	60,000	490
2-HEXANONE	591-78-6		NA	NA	NA	NA	NA
2-METHYLNAPHTHALENE	91-57-6		NA	NA	330	NA	330
2-METHYLPHENOL	95-48-7		NA	NA	NA	NA	NA
2-NITROANILINE	88-74-4		NA	NA	NA	NA	NA
2-NITROPHENOL	88-75-5		NA	NA	NA	NA	NA
3,3'-DICHLOROBENZIDINE	91-94-1		NA	NA	NA	NA	NA
3-NITROANILINE	99-09-2		NA	NA	NA	70,000	70,000
4,4'-DDD	72-54-8		NA	NA	NA	NA	NA
4,4'-DDE	72-55-9		NA	NA	100	NA	100
4,4'-DDT	50-29-3		NA	0.001	0.001	NA	0.001
4,6-DINITRO-2-METHYLPHENOL	534-52-1		NA	NA	NA	NA	NA
4-BROMOPHENYL PHENYL ETHER	101-55-3		NA	NA	NA	NA	NA
4-CHLORO-3-METHYLPHENOL	59-50-7		NA	NA	NA	NA	NA

TABLE I.3-3
SURFACE WATER SCREENING LEVELS FOR ECOLOGICAL RECEPTORS
700 S 1600 E PCE Plume Superfund Site, Salt Lake City, Utah

Chemical	CASRN	Notes	UDEQ WQC Chronic (µg/L)	EPA NRWQC Chronic (µg/L)	LANL Water No-Effect ESL (µg/L)	ORNL Plant Soil Solution SL (µg/L)	Lowest ESV (µg/L)
4-CHLOROANILINE	106-47-8		NA	NA	NA	40,000	40,000
4-CHLOROPHENYL PHENYL ETHER	7005-72-3		NA	NA	NA	NA	NA
4-METHYL-2-PENTANONE (MIBK)	108-10-1		NA	NA	NA	NA	NA
4-METHYLPHENOL	106-44-5		NA	NA	NA	NA	NA
4-NITROANILINE	100-01-6		NA	NA	NA	40,000	40,000
4-NITROPHENOL	100-02-7		NA	NA	NA	10,000	10,000
ACENAPHTHENE	83-32-9		NA	NA	5.8	100	5.8
ACENAPHTHYLENE	208-96-8		NA	NA	4,800	NA	4,800
ACETONE	67-64-1		NA	NA	1,500	NA	1,500
ACETOPHENONE	98-86-2		NA	NA	NA	NA	NA
ALDRIN	309-00-2	5	1.5	0.3	NA	NA	0.3
ALPHA-BHC	319-84-6		NA	NA	NA	NA	NA
ALUMINUM	7429-90-5		NA	87	530	300	87
ANTHRACENE	120-12-7		NA	NA	0.73	NA	0.73
ANTIMONY	7440-36-0		NA	NA	30	NA	30
ARSENIC	7440-38-2		150	150	150	1	1
ATRAZINE	1912-24-9		NA	NA	NA	NA	NA
BARIUM	7440-39-3		NA	NA	3.9	NA	3.9
BENZALDEHYDE	100-52-7		NA	NA	NA	NA	NA
BENZENE	71-43-2		NA	NA	46	NA	46
BENZO(A)ANTHRACENE	56-55-3		NA	NA	0.027	NA	0.027
BENZO(A)PYRENE	50-32-8		NA	NA	0.014	NA	0.014
BENZO(B)FLUORANTHENE	205-99-2		NA	NA	9	NA	9
BENZO(G,H,I)PERYLENE	191-24-2		NA	NA	7.6	NA	7.6
BENZO(K)FLUORANTHENE	207-08-9		NA	NA	0.0041	NA	0.0041
BENZYL BUTYL PHTHALATE	85-68-7		NA	NA	19	NA	19
BERYLLIUM	7440-41-7		NA	NA	0.66	500	0.66
BETA-BHC	319-85-7		NA	NA	2.2	NA	2.2
BIS(2-CHLOROETHOXY)METHANE	111-91-1		NA	NA	NA	NA	NA
BIS(2-CHLOROETHYL) ETHER	111-44-4		NA	NA	NA	NA	NA
BIS(2-ETHYLHEXYL)PHTHALATE	117-81-7		NA	NA	32	NA	32
BIS-CHLOROISOPROPYL ETHER	39638-32-9		NA	NA	NA	NA	NA
BROMOCHLOROMETHANE	74-97-5		NA	NA	NA	NA	NA
BROMODICHLOROMETHANE	75-27-4		NA	NA	NA	NA	NA
BROMOFORM	75-25-2		NA	NA	NA	NA	NA
BROMOMETHANE	74-83-9		NA	NA	NA	NA	NA
CADMIUM	7440-43-9	7	0.72	0.72	0.28	100	0.28
CALCIUM	7440-70-2		NA	NA	NA	NA	NA
CAPROLACTAM	105-60-2		NA	NA	NA	NA	NA
CARBAZOLE	86-74-8		NA	NA	NA	NA	NA
CARBON DISULFIDE	75-15-0		NA	NA	NA	NA	NA
CARBON TETRACHLORIDE	56-23-5		NA	NA	NA	NA	NA
CHLORIDE	16887-00-6		NA	NA	NA	NA	NA
CHLOROBENZENE	108-90-7		NA	NA	130	NA	130
CHLOROETHANE	75-00-3		NA	NA	NA	NA	NA

TABLE I.3-3
SURFACE WATER SCREENING LEVELS FOR ECOLOGICAL RECEPTORS
700 S 1600 E PCE Plume Superfund Site, Salt Lake City, Utah

Chemical	CASRN	Notes	UDEQ WQC Chronic (µg/L)	EPA NRWQC Chronic (µg/L)	LANL Water No-Effect ESL (µg/L)	ORNL Plant Soil Solution SL (µg/L)	Lowest ESV (µg/L)
CHLOROFORM	67-66-3		NA	NA	1.8	NA	1.8
CHLOROMETHANE	74-87-3		NA	NA	NA	NA	NA
CHROMIUM	16065-83-1	1, 7	11	11	11	NA	11
CHRYSENE	218-01-9		NA	NA	0.0018	NA	0.0018
CIS-1,2-DICHLOROETHENE	156-59-2		NA	NA	NA	NA	NA
CIS-1,3-DICHLOROPROPENE	542-75-6		NA	NA	NA	NA	NA
CIS-CHLORDANE	5103-71-9		NA	0.0043	0.0043	NA	0.0043
COBALT	7440-48-4		NA	NA	3	60	3
COPPER	7440-50-8	6	9	1.6	5	60	1.6
CYCLOHEXANE	110-82-7		NA	NA	NA	NA	NA
DELTA-BHC	319-86-8		NA	NA	NA	NA	NA
DIBENZO(A,H)ANTHRACENE	53-70-3		NA	NA	0.0034	NA	0.0034
DIBENZOFURAN	132-64-9		NA	NA	3.7	NA	3.7
DIBROMOCHLOROMETHANE	124-48-1		NA	NA	NA	NA	NA
DICHLORODIFLUOROMETHANE	75-71-8		NA	NA	NA	NA	NA
DIELDRIN	60-57-1		0.056	0.056	0.056	NA	0.056
DIETHYL PHTHALATE	84-66-2		NA	NA	NA	20,000	20,000
DIMETHYL PHTHALATE	131-11-3		NA	NA	3	NA	3
DI-N-BUTYLPHTHALATE	84-74-2		NA	NA	19	NA	19
DI-N-OCTYLPHTHALATE	117-84-0		NA	NA	3	NA	3
ENDOSULFAN I	959-98-8	4	0.056	0.056	NA	NA	0.056
ENDOSULFAN II	33213-65-9	4	NA	0.056	NA	NA	0.056
ENDOSULFAN SULFATE	1031-07-8		NA	0.056	NA	NA	0.056
ENDRIN	72-20-8		0.036	0.036	0.036	NA	0.036
ENDRIN ALDEHYDE	7421-93-4		NA	0.036	NA	NA	0.036
ENDRIN KETONE	53494-70-5		NA	0.036	NA	NA	0.036
ETHANE	74-84-0		NA	NA	NA	NA	NA
ETHENE	74-85-1		NA	NA	NA	NA	NA
ETHYLBENZENE	100-41-4		NA	NA	NA	NA	NA
FLUORANTHENE	206-44-0		NA	NA	0.04	NA	0.04
FLUORENE	86-73-7		NA	NA	3.9	NA	3.9
GAMMA-BHC (LINDANE)	58-89-9		NA	0.095	0.095	NA	0.095
HEPTACHLOR	76-44-8		0.0038	0.0038	0.0038	NA	0.0038
HEPTACHLOR EPOXIDE	1024-57-3		0.0038	0.0038	NA	NA	0.0038
HEXACHLORO-1,3-BUTADIENE	87-68-3		NA	NA	NA	NA	NA
HEXACHLOROBENZENE	118-74-1		NA	NA	NA	NA	NA
HEXACHLOROCYCLOPENTADIENE	77-47-4		NA	NA	NA	100	100
HEXACHLOROETHANE	67-72-1		NA	NA	NA	NA	NA
INDENO(1,2,3-CD)PYRENE	193-39-5		NA	NA	4.3	NA	4.3
IRON	7439-89-6		NA	1,000	1,000	NA	1,000
ISOPHORONE	78-59-1		NA	NA	NA	NA	NA
ISOPROPYLBENZENE	98-82-8		NA	NA	NA	NA	NA
LEAD	7439-92-1	7	2.5	2.52	1	20	1
M,P-XYLENE	108-38-3	3	NA	NA	NA	100,000	100,000
MAGNESIUM	7439-95-4		NA	NA	NA	NA	NA

TABLE I.3-3
SURFACE WATER SCREENING LEVELS FOR ECOLOGICAL RECEPTORS
700 S 1600 E PCE Plume Superfund Site, Salt Lake City, Utah

Chemical	CASRN	Notes	UDEQ WQC Chronic (µg/L)	EPA NRWQC Chronic (µg/L)	LANL Water No-Effect ESL (µg/L)	ORNL Plant Soil Solution SL (µg/L)	Lowest ESV (µg/L)
MANGANESE	7439-96-5		NA	NA	1300	4000	1300
MERCURY	7487-94-7	2, 7	0.012	0.65	0.77	5	0.012
METHANE	74-82-8		NA	NA	NA	NA	NA
METHOXYCHLOR	72-43-5		0.03	0.03	0.03	NA	0.03
METHYL ACETATE	79-20-9		NA	NA	NA	NA	NA
METHYL TERT-BUTYL ETHER	1634-04-4		NA	NA	NA	NA	NA
METHYLCYLOHEXANE	108-87-2		NA	NA	NA	NA	NA
METHYLENE CHLORIDE	75-09-2		NA	NA	210	NA	210
NAPHTHALENE	91-20-3		NA	NA	1.1	10,000	1.1
NICKEL	7440-02-0	7	52	52	29	500	29
NITRATE [AS N]	14797-55-8		4	NA	NA	NA	4
NITROBENZENE	98-95-3		NA	NA	550	8,000	550
N-NITROSO-DI-N-PROPYLAMINE	621-64-7		NA	NA	NA	NA	NA
N-NITROSODIPHENYLAMINE	86-30-6		NA	NA	NA	NA	NA
O-XYLENE	95-47-6		NA	NA	NA	1,000	1,000
PENTACHLOROPHENOL	87-86-5		15	15	15	30	15
PHENANTHRENE	85-01-8		NA	NA	6.3	NA	6.3
PHENOL	108-95-2		NA	NA	320	10,000	320
POTASSIUM	7440-09-7		NA	NA	NA	NA	NA
PYRENE	129-00-0		NA	NA	0.025	NA	0.025
SELENIUM	7782-49-2		4.6	1.5	5.0	700	1.5
SILVER	7440-22-4	5,7	3.2	0.322	0.1	100	0.1
SODIUM	7440-23-5		NA	NA	NA	NA	NA
STYRENE	100-42-5		NA	NA	NA	10,000	10,000
SULFATE	14808-79-8		NA	NA	NA	NA	NA
TETRACHLOROETHENE	127-18-4		NA	NA	98	10,000	98
THALLIUM	7440-28-0		NA	NA	0.03	50	0.03
TOLUENE	108-88-3		NA	NA	9.8	10,000	9.8
TOXAPHENE	8001-35-2		0.0002	0.0002	0.0002	NA	0.0002
TRANS-1,2-DICHLOROETHENE	156-60-5		NA	NA	NA	NA	NA
TRANS-1,3-DICHLOROPROPENE	542-75-6		NA	NA	NA	NA	NA
TRANS-CHLORDANE	5103-74-2		NA	0.0043	0.0043	NA	0.0043
TRICHLOROETHENE	79-01-6		NA	NA	21	100,000	21
TRICHLOROFLUOROMETHANE	75-69-4		NA	NA	NA	NA	NA
VANADIUM	7440-62-2		NA	NA	19	200	19
VINYL ACETATE	108-05-4		NA	NA	NA	NA	NA
VINYL CHLORIDE	75-01-4		NA	NA	NA	NA	NA
ZINC	7440-66-6	7	120	118	65	400	65

Sources

UDEQ WQC - Utah Department of Environmental Quality R317-2, Standard of Quality for Waters of the State

EPA NRWQC - National Recommended Water Quality Criteria for Aquatic Life

LANL - Los Alamos National Laboratory, EcoRisk Database, version 4.2

ORNL - Oak Ridge National Laboratory, ES/ER/TM-85/R3

TABLE I.3-3
SURFACE WATER SCREENING LEVELS FOR ECOLOGICAL RECEPTORS
700 S 1600 E PCE Plume Superfund Site, Salt Lake City, Utah

Chemical	CASRN	Notes	UDEQ WQC Chronic (µg/L)	EPA NRWQC Chronic (µg/L)	LANL Water No-Effect ESL (µg/L)	ORNL Plant Soil Solution SL (µg/L)	Lowest ESV (µg/L)

Notes

1 - As Chromium VI

2 - As inorganic mercury

3 - Based on total xylenes

4 - ESVs for the alpha and beta are presented

5 - No chronic NRWQC available; value is assumed to be 10 times lower than the acute criterion.

6 - Chronic NRWQC presented in this table is based on minimum value presented in Appendix G of EPA (2007); pH = 6.5, Hardness = 40 mg/L $CaCO_3$, DOC = 2 mg/L.

7 - Metal toxicity is hardness-dependent; values shown are calculated based on a hardness of 100 mg/L.

Abbreviations

µg/L - micrograms per liter

CASRN - Chemical Abstracts Service Registry Number

ESL - Ecological Screening Level

ESV - Ecological Screening Value

mg/L - milligrams per liter

NA - Not Available

NRWQC - National Recommended Water Quality Criteria

SL - Screening Level

WQC - Water Quality Criteria

TABLE I.3-4
REFINED ORGANIC COPEC EVALUATION FOR SURFACE WATER
700 S 1600 E PCE Plume Superfund Site, Salt Lake City, Utah

Surface Water COPEC	Surface Water Summary Statistics					Water ESL		
	No. of Samples	No. Detected	Detection Frequency	Min. Conc. (µg/L)	Max. Conc. (µg/L)	Receptor	Aquatic Chronic or Wildlife No-Effect ESL (µg/L)	Aquatic Acute or Low-Effect ESL (µg/L)
BIS(2-ETHYLHEXYL)PHTHALATE	38	3	8%	3.6	84	Aquatic community organisms	32	320
						Terrestrial plants (roots)	NA	NA
						Violet-green swallow	4,500	45,000
						American robin	7,800	78,000
						American kestrel	9,100	91,000
						Montane shrew	82,000	820,000
						Deer mouse	96,000	960,000
						Occult little brown myotis bat	110,000	1,100,000
						Mountain cottontail	180,000	1,800,000
						Gray fox	210,000	2,100,000
CHLOROFORM	100	71	71%	0.11	6.3	Aquatic community organisms	1.8	18
						Terrestrial plants (roots)	NA	NA
						Montane shrew	67,000	180,000
						Deer mouse	78,000	210,000
						Occult little brown myotis bat	94,000	250,000
						Mountain cottontail	150,000	420,000
						Gray fox	170,000	470,000

ESL Source

LANL - Los Alamos National Laboratory, ECORISK Database, version 4.2

Notes

Shaded cells indicate the maximum concentration exceeds the ESL

Abbreviations

% - percent
µg/L - micrograms per liter
CAS - Chemical Abstracts Service
Conc. - Concentration
COPEC - Chemical of Potential Ecological Concern
ESL - ecological screening level
Max. - Maximum
Min. - Minimum
NA - not available
No. - Number

TABLE I.3-5
REFINED ORGANIC COPEC EVALUATION FOR GROUNDWATER
700 S 1600 E PCE Plume Superfund Site, Salt Lake City, Utah

Groundwater COPEC	Groundwater Summary Statistics					Water ESL		
	No. of Samples	No. Detected	Detection Frequency	Min. Conc. (µg/L)	Max. Conc. (µg/L)	Receptor	Aquatic Chronic or Wildlife No-Effect ESL (µg/L)	Aquatic Acute or Low-Effect ESL (µg/L)
BIS(2-ETHYLHEXYL)PHTHALATE	124	8	6%	4.2	150	Aquatic community organisms	32	320
						Terrestrial plants (roots)	NA	NA
						Violet-green swallow	4,500	45,000
						American robin	7,800	78,000
						American kestrel	9,100	91,000
						Montane shrew	82,000	820,000
						Deer mouse	96,000	960,000
						Occult little brown myotis bat	110,000	1,100,000
						Mountain cottontail	180,000	1,800,000
						Gray fox	210,000	2,100,000
CHLOROFORM	479	423	88%	0.13	13	Aquatic community organisms	1.8	18
						Terrestrial plants (roots)	NA	NA
						Montane shrew	67,000	180,000
						Deer mouse	78,000	210,000
						Occult little brown myotis bat	94,000	250,000
						Mountain cottontail	150,000	420,000
						Gray fox	170,000	470,000
DIMETHYL PHTHALATE	124	4	3%	1.7	19	Aquatic community organisms	3.0	30
						Terrestrial plants (roots)	NA	NA
						Montane shrew	300,000	3,000,000
						Deer mouse	350,000	3,500,000
						Occult little brown myotis bat	420,000	4,200,000
						Mountain cottontail	700,000	7,000,000
						Gray fox	790,000	7,900,000
TETRACHLOROETHENE	505	336	67%	0.13	230	Aquatic community organisms	98	830
						Terrestrial plants (roots)	10,000	NA
						Montane shrew	8,900	44,000
						Deer mouse	10,000	52,000
						Occult little brown myotis bat	12,000	62,000
						Mountain cottontail	20,000	100,000
						Gray fox	23,000	110,000
TOLUENE	479	80	17%	0.09	18	Aquatic community organisms	9.8	98
						Terrestrial plants (roots)	10,000	NA
						Montane shrew	110,000	1,100,000
						Deer mouse	130,000	1,300,000
						Occult little brown myotis bat	160,000	1,600,000
						Mountain cottontail	260,000	2,600,000
						Gray fox	300,000	3,000,000

ESL Source
LANL - Los Alamos National Laboratory, ECORISK Database, version 4.2

Notes
Shaded cells indicate the maximum concentration exceeds the ESL

Abbreviations
% - percent
µg/L - micrograms per liter
CAS - Chemical Abstracts Service
Conc. - Concentration
COPEC - Chemical of Potential Ecological Concern
ESL - ecological screening level
Max. - Maximum
Min. - Minimum
NA - not available
No. - Number

TABLE I.3-6
SOIL/SEDIMENT COPEC SELECTION FOR ECOLOGICAL RECEPTORS
700 S 1600 E PCE Plume Superfund Site, Salt Lake City, Utah

Chemical	CAS Number	Summary Statistics							Soil/ Sediment No-Effect ESV (mg/kg)	COPEC Selection						HQmax
		No. of Samples	No. Detected	Detection Frequency	Mean DL (mg/kg)	Range of DLs (mg/kg)	Min. Conc. (mg/kg)	Max. Conc. (mg/kg)		Is Max. Det. Conc. > SL?	Is Mean DL > SL?	Chemical Detected, No SL?	Chemical ND, No SL?	Is Chemical a COPEC?	Type of Evaluation	
1,1,1-TRICHLOROETHANE	71-55-6	44	0	0%	0.0005	0.00043-0.00061	ND	ND	0.07	--	N	--	N	N	--	--
1,1,2,2-TETRACHLOROETHANE	79-34-5	44	0	0%	0.0005	0.00043-0.00061	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,1,2-TRICHLOROETHANE	79-00-5	44	0	0%	0.0005	0.00043-0.00069	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,1,2-TRICHLOROTRIFLUOROETHANE	76-13-1	44	0	0%	0.0010	0.00053-0.0012	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,1'-BIPHENYL	92-52-4	3	0	0%	0.041	0.035-0.047	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,1-DICHLOROETHANE	75-34-3	44	0	0%	0.0005	0.00039-0.00061	ND	ND	0.02	--	N	--	N	N	--	--
1,1-DICHLOROETHENE	75-35-4	44	0	0%	0.0005	0.00043-0.00065	ND	ND	0.1	--	N	--	N	N	--	--
1,2,3-TRICHLOROBENZENE	87-61-6	44	0	0%	0.0010	0.0008-0.0012	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,2,4,5-TETRACHLOROBENZENE	95-94-3	3	0	0%	0.041	0.035-0.047	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,2,4-TRICHLOROBENZENE	120-82-1	44	0	0%	0.0010	0.00086-0.0012	ND	ND	0.011	--	N	--	N	N	--	--
1,2,4-TRIMETHYLBENZENE	95-63-6	40	0	0%	0.0006	0.00048-0.00067	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	44	0	0%	0.0010	0.00043-0.0012	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,2-DIBROMOETHANE	106-93-4	44	0	0%	0.0005	0.00036-0.00061	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,2-DICHLOROBENZENE	95-50-1	44	0	0%	0.0005	0.00043-0.0007	ND	ND	0.92	--	N	--	N	N	--	--
1,2-DICHLOROETHANE	107-06-2	44	0	0%	0.0005	0.00043-0.00061	ND	ND	0.85	--	N	--	N	N	--	--
1,2-DICHLOROPROPANE	78-87-5	44	0	0%	0.0005	0.00039-0.00061	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,3,5-TRIMETHYLBENZENE	108-67-8	40	0	0%	0.0006	0.00051-0.00072	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,3-DICHLOROBENZENE	541-73-1	44	0	0%	0.0005	0.00045-0.00076	ND	ND	0.74	--	N	--	N	N	--	--
1,3-DICHLOROPROPYLENE	542-75-6	40	0	0%	0.0010	0.00087-0.0012	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,4-DICHLOROBENZENE	106-46-7	44	0	0%	0.0005	0.00043-0.00062	ND	ND	0.03	--	N	--	N	N	--	--
1,4-DIOXANE	123-91-1	3	0	0%	0.039	0.033-0.045	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
2,3,4,6-TETRACHLOROPHENOL	58-90-2	3	0	0%	0.043	0.037-0.05	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
2,4,5-TRICHLOROPHENOL	95-95-4	3	0	0%	0.038	0.033-0.043	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
2,4,6-TRICHLOROPHENOL	88-06-2	3	0	0%	0.043	0.037-0.049	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
2,4-DICHLOROPHENOL	120-83-2	3	0	0%	0.038	0.033-0.044	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
2,4-DIMETHYLPHENOL	105-67-9	3	0	0%	0.039	0.034-0.045	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
2,4-DINITROPHENOL	51-28-5	3	0	0%	0.032	0.028-0.037	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
2,4-DINITROTOLUENE	121-14-2	3	0	0%	0.044	0.038-0.051	ND	ND	0.29	--	N	--	N	N	--	--
2,6-DINITROTOLUENE	606-20-2	3	0	0%	0.039	0.034-0.045	ND	ND	4	--	N	--	N	N	--	--
2-BUTANONE (MEK)	78-93-3	44	0	0%	0.0025	0.0022-0.003	ND	ND	350	--	N	--	N	N	--	--
2-CHLORONAPHTHALENE	91-58-7	3	0	0%	0.039	0.034-0.045	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
2-CHLOROPHENOL	95-57-8	3	0	0%	0.040	0.035-0.047	ND	ND	0.055	--	N	--	N	N	--	--
2-HEXANONE	591-78-6	44	0	0%	0.0028	0.0021-0.0035	ND	ND	0.36	--	N	--	N	N	--	--
2-METHYLNAPHTHALENE	91-57-6	3	0	0%	0.041	0.035-0.047	ND	ND	0.076	--	N	--	N	N	--	--
2-METHYLPHENOL	95-48-7	3	0	0%	0.042	0.036-0.048	ND	ND	0.67	--	N	--	N	N	--	--
2-NITROANILINE	88-74-4	3	0	0%	0.041	0.035-0.047	ND	ND	5.3	--	N	--	N	N	--	--
2-NITROPHENOL	88-75-5	3	0	0%	0.044	0.038-0.051	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
3,3'-DICHLOROBENZIDINE	91-94-1	3	0	0%	0.040	0.035-0.046	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
3-NITROANILINE	99-09-2	3	0	0%	0.043	0.037-0.049	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
4,6-DINITRO-2-METHYLPHENOL	534-52-1	3	0	0%	0.038	0.033-0.044	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
4-BROMOPHENYL PHENYL ETHER	101-55-3	3	0	0%	0.042	0.036-0.048	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
4-CHLORO-3-METHYLPHENOL	59-50-7	3	0	0%	0.038	0.033-0.043	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
4-CHLOROANILINE	106-47-8	3	0	0%	0.043	0.037-0.05	ND	ND	1	--	N	--	N	N	--	--
4-CHLOROPHENYL PHENYL ETHER	7005-72-3	3	0	0%	0.042	0.036-0.049	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
4-METHYL-2-PENTANONE (MIBK)	108-10-1	44	0	0%	0.0027	0.0012-0.0034	ND	ND	9.7	--	N	--	N	N	--	--
4-METHYLPHENOL	106-44-5	3	0	0%	0.043	0.037-0.05	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
4-NITROANILINE	100-01-6	3	0	0%	0.047	0.04-0.054	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
4-NITROPHENOL	100-02-7	3	0	0%	0.045	0.039-0.052	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
ACENAPHTHENE	83-32-9	3	0	0%	0.042	0.036-0.048	ND	ND	0.076	--	N	--	N	N	--	--
ACENAPHTHYLENE	208-96-8	3	0	0%	0.040	0.035-0.046	ND	ND	0.076	--	N	--	N	N	--	--
ACETONE	67-64-1	44	10	23%	0.0030	0.0014-0.0038	0.0051	0.13	0.065	Y	--	N	--	Y	Quant.	2E+00
ACETOPHENONE	98-86-2	3	0	0%	0.041	0.036-0.048	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
ANTHRACENE	120-12-7	3	0	0%	0.042	0.036-0.049	ND	ND	0.057	--	N	--	N	N	--	--

TABLE I.3-6
SOIL/SEDIMENT COPEC SELECTION FOR ECOLOGICAL RECEPTORS
700 S 1600 E PCE Plume Superfund Site, Salt Lake City, Utah

Chemical	CAS Number	Summary Statistics							Soil/ Sediment No-Effect ESV (mg/kg)	COPEC Selection						HQmax
		No. of Samples	No. Detected	Detection Frequency	Mean DL (mg/kg)	Range of DLs (mg/kg)	Min. Conc. (mg/kg)	Max. Conc. (mg/kg)		Is Max. Det. Conc. > SL?	Is Mean DL > SL?	Chemical Detected, No SL?	Chemical ND, No SL?	Is Chemical a COPEC?	Type of Evaluation	
ANTIMONY	7440-36-0	3	3	100%	0.021	0.017-0.028	1.2	2.7	2.3	Y	--	N	--	Y	Quant.	1E+00
ARSENIC	7440-38-2	3	3	100%	0.073	0.059-0.1	6.1	24	6.8	Y	--	N	--	Y	Quant.	4E+00
ATRAZINE	1912-24-9	3	0	0%	0.043	0.037-0.049	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
BARIUM	7440-39-3	3	3	100%	0.12	0.093-0.16	122	224	110	Y	--	N	--	Y	Quant.	2E+00
BENZALDEHYDE	100-52-7	3	0	0%	0.043	0.037-0.05	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
BENZENE	71-43-2	44	0	0%	0.0005	0.00043-0.00061	ND	ND	0.01	--	N	--	N	N	--	--
BENZO(A)ANTHRACENE	56-55-3	3	0	0%	0.047	0.04-0.054	ND	ND	0.1	--	N	--	N	N	--	--
BENZO(A)PYRENE	50-32-8	3	1	33%	0.044	0.038-0.05	0.085	0.085	0.15	N	--	N	--	N	--	6E-01
BENZO(B)FLUORANTHENE	205-99-2	3	1	33%	0.042	0.036-0.048	0.21	0.21	0.19	Y	--	N	--	Y	Quant.	1E+00
BENZO(G,H,I)PERYLENE	191-24-2	3	1	33%	0.041	0.036-0.047	0.064	0.064	0.17	N	--	N	--	N	--	4E-01
BENZO(K)FLUORANTHENE	207-08-9	3	0	0%	0.046	0.04-0.053	ND	ND	0.24	--	N	--	N	N	--	--
BENZYL BUTYL PHTHALATE	85-68-7	3	0	0%	0.046	0.04-0.053	ND	ND	0.1	--	N	--	N	N	--	--
BERYLLIUM	7440-41-7	3	3	100%	0.070	0.057-0.097	0.31	0.40	2.5	N	--	N	--	N	--	2E-01
BIS(2-CHLOROETHOXY)METHANE	111-91-1	3	0	0%	0.043	0.037-0.049	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
BIS(2-CHLOROETHYL) ETHER	111-44-4	3	0	0%	0.044	0.038-0.05	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
BIS(2-ETHYLHEXYL)PHTHALATE	117-81-7	3	0	0%	0.047	0.041-0.054	ND	ND	0.02	--	Y	--	N	Y	Qual.1	--
BIS-CHLOROISOPROPYL ETHER	108-60-1	3	0	0%	0.039	0.034-0.045	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
BROMOCHLOROMETHANE	74-97-5	44	0	0%	0.0005	0.00043-0.0007	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
BROMODICHLOROMETHANE	75-27-4	44	0	0%	0.0005	0.00043-0.00063	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
BROMOFORM	75-25-2	44	0	0%	0.0010	0.00038-0.0012	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
BROMOMETHANE	74-83-9	44	0	0%	0.0017	0.00032-0.0022	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
CADMIUM	7440-43-9	3	3	100%	0.037	0.03-0.051	1.1	1.8	0.27	Y	--	N	--	Y	Quant.	7E+00
CAPROLACTAM	105-60-2	3	0	0%	0.046	0.04-0.053	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
CARBAZOLE	86-74-8	3	0	0%	0.044	0.038-0.051	ND	ND	79	--	N	--	N	N	--	--
CARBON DISULFIDE	75-15-0	44	0	0%	0.0005	0.00038-0.00061	ND	ND	0.81	--	N	--	N	N	--	--
CARBON TETRACHLORIDE	56-23-5	44	0	0%	0.0005	0.00039-0.00066	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
CHLOROBENZENE	108-90-7	44	0	0%	0.0005	0.00043-0.00061	ND	ND	0.03	--	N	--	N	N	--	--
CHLOROETHANE	75-00-3	44	0	0%	0.0012	0.00054-0.0016	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
CHLOROFORM	67-66-3	44	0	0%	0.0005	0.00039-0.00061	ND	ND	8	--	N	--	N	N	--	--
CHLOROMETHANE	74-87-3	44	0	0%	0.0009	0.00036-0.0012	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
CHROMIUM	7440-47-3	3	3	100%	0.048	0.039-0.066	9.7	14	0.34	Y	--	N	--	Y	Quant.	4E+01
CHRYSENE	218-01-9	3	1	33%	0.046	0.04-0.053	0.12	0.12	0.16	N	--	N	--	N	--	8E-01
CIS-1,2-DICHLOROETHENE	156-59-2	44	0	0%	0.0005	0.00043-0.00061	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
CIS-1,3-DICHLOROPROPENE	542-75-6	44	0	0%	0.0010	0.00043-0.0012	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
COBALT	7440-48-4	3	3	100%	0.027	0.022-0.038	4.5	5.2	13	N	--	N	--	N	--	4E-01
COPPER	7440-50-8	3	3	100%	0.036	0.029-0.049	36.5	68	14	Y	--	N	--	Y	Quant.	5E+00
CYCLOHEXANE	110-82-7	4	0	0%	0.0005	0.00047-0.00056	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
DIBENZO(A,H)ANTHRACENE	53-70-3	3	0	0%	0.042	0.036-0.049	ND	ND	0.033	--	Y	--	N	Y	Qual.1	--
DIBENZOFURAN	132-64-9	3	0	0%	0.041	0.036-0.047	ND	ND	0.51	--	N	--	N	N	--	--
DIBROMOCHLOROMETHANE	124-48-1	44	0	0%	0.0005	0.00043-0.00061	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
DICHLORODIFLUOROMETHANE	75-71-8	44	0	0%	0.0011	0.00042-0.0015	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
DIETHYL PHTHALATE	84-66-2	3	0	0%	0.042	0.037-0.049	ND	ND	100	--	N	--	N	N	--	--
DIMETHYL PHTHALATE	131-11-3	3	3	100%	0.042	0.037-0.049	0.37	0.40	10	N	--	N	--	N	--	4E-02
DI-N-BUTYLPHTHALATE	84-74-2	3	0	0%	0.046	0.04-0.053	ND	ND	0.011	--	Y	--	N	Y	Qual.1	--
DI-N-OCTYLPHTHALATE	117-84-0	3	0	0%	0.043	0.037-0.05	ND	ND	0.91	--	N	--	N	N	--	--
ETHYLBENZENE	100-41-4	44	0	0%	0.0005	0.00035-0.00061	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
FLUORANTHENE	206-44-0	3	1	33%	0.046	0.04-0.053	0.078	0.078	0.42	N	--	N	--	N	--	2E-01
FLUORENE	86-73-7	3	0	0%	0.040	0.035-0.046	ND	ND	0.077	--	N	--	N	N	--	--
HEXACHLORO-1,3-BUTADIENE	87-68-3	3	0	0%	0.039	0.034-0.045	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
HEXACHLOROBENZENE	118-74-1	3	0	0%	0.042	0.036-0.048	ND	ND	0.079	--	N	--	N	N	--	--
HEXACHLOROCYCLOPENTADIENE	77-47-4	3	0	0%	0.039	0.034-0.045	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
HEXACHLOROETHANE	67-72-1	3	0	0%	0.045	0.039-0.051	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
INDENO(1,2,3-CD)PYRENE	193-39-5	3	1	33%	0.042	0.036-0.048	0.062	0.062	0.2	N	--	N	--	N	--	3E-01
ISOPHORONE	78-59-1	3	0	0%	0.040	0.035-0.047	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
ISOPROPYLBENZENE	98-82-8	44	0	0%	0.0006	0.00052-0.00078	ND	ND	NA	--	N	--	Y	Y	Qual.2	--

TABLE I.3-6
SOIL/SEDIMENT COPEC SELECTION FOR ECOLOGICAL RECEPTORS
700 S 1600 E PCE Plume Superfund Site, Salt Lake City, Utah

Chemical	CAS Number	Summary Statistics							Soil/ Sediment No-Effect ESV (mg/kg)	COPEC Selection						HQmax
		No. of Samples	No. Detected	Detection Frequency	Mean DL (mg/kg)	Range of DLs (mg/kg)	Min. Conc. (mg/kg)	Max. Conc. (mg/kg)		Is Max. Det. Conc. > SL?	Is Mean DL > SL?	Chemical Detected, No SL?	Chemical ND, No SL?	Is Chemical a COPEC?	Type of Evaluation	
LEAD	7439-92-1	3	3	100%	0.040	0.032-0.055	130	301	11	Y	--	N	--	Y	Quant.	3E+01
M,P-XYLENE	179601-23-1	44	0	0%	0.0010	0.00048-0.0012	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
MANGANESE	7439-96-5	3	3	100%	0.070	0.057-0.097	288	583	220	Y	--	N	--	Y	Quant.	3E+00
MERCURY	7439-97-6	3	3	100%	0.016	0.013-0.023	0.087	0.21	0.013	Y	--	N	--	Y	Quant.	2E+01
METHYL ACETATE	79-20-9	44	0	0%	0.0014	0.00069-0.0018	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
METHYL TERT-BUTYL ETHER	1634-04-4	44	0	0%	0.0005	0.00041-0.00061	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
METHYLCYLOHEXANE	108-87-2	4	0	0%	0.0004	0.00038-0.00045	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
METHYLENE CHLORIDE	75-09-2	44	7	16%	0.0010	0.00087-0.0013	0.0012	0.0031	0.018	N	--	N	--	N	--	2E-01
NAPHTHALENE	91-20-3	3	0	0%	0.039	0.033-0.045	ND	ND	0.17	--	N	--	N	N	--	--
NICKEL	7440-02-0	3	3	100%	0.036	0.029-0.049	10.2	11.4	10	Y	--	N	--	Y	Quant.	1E+00
NITROBENZENE	98-95-3	3	0	0%	0.041	0.035-0.047	ND	ND	2.2	--	N	--	N	N	--	--
N-NITROSO-DI-N-PROPYLAMINE	621-64-7	3	0	0%	0.041	0.036-0.047	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
N-NITROSODIPHENYLAMINE	86-30-6	3	0	0%	0.044	0.038-0.05	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
O-XYLENE	95-47-6	44	0	0%	0.0005	0.00042-0.00061	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
PENTACHLOROPHENOL	87-86-5	3	0	0%	0.035	0.03-0.041	ND	ND	0.01	--	Y	--	N	Y	Qual.1	--
PHENANTHRENE	85-01-8	3	0	0%	0.044	0.038-0.051	ND	ND	0.2	--	N	--	N	N	--	--
PHENOL	108-95-2	3	0	0%	0.038	0.033-0.044	ND	ND	0.79	--	N	--	N	N	--	--
PYRENE	129-00-0	3	1	33%	0.050	0.043-0.058	0.093	0.093	0.19	N	--	N	--	N	--	5E-01
SELENIUM	7782-49-2	3	3	100%	0.633	0.51-0.87	1.1	1.8	0.52	Y	--	N	--	Y	Quant.	3E+00
SILVER	7440-22-4	3	3	100%	0.021	0.017-0.028	0.31	0.71	0.5	Y	--	N	--	Y	Quant.	1E+00
STYRENE	100-42-5	44	0	0%	0.0005	0.00043-0.00061	ND	ND	1.2	--	N	--	N	N	--	--
TETRACHLOROETHENE	127-18-4	44	7	16%	0.0005	0.00037-0.00061	0.00062	0.022	0.002	Y	--	N	--	Y	Quant.	1E+01
THALLIUM	7440-28-0	3	3	100%	0.049	0.04-0.068	0.18	0.28	0.05	Y	--	N	--	Y	Quant.	6E+00
TOLUENE	108-88-3	44	0	0%	0.0005	0.00039-0.00061	ND	ND	0.01	--	N	--	N	N	--	--
TRANS-1,2-DICHLOROETHENE	156-60-5	44	0	0%	0.0005	0.00043-0.00061	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
TRANS-1,3-DICHLOROPROPENE	542-75-6	44	0	0%	0.0010	0.00046-0.0012	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
TRICHLOROETHENE	79-01-6	44	0	0%	0.0005	0.00043-0.00061	ND	ND	0.078	--	N	--	N	N	--	--
TRICHLOROFLUOROMETHANE	75-69-4	44	0	0%	0.0011	0.00045-0.0013	ND	ND	52	--	N	--	N	N	--	--
VANADIUM	7440-62-2	3	3	100%	0.033	0.027-0.046	14.3	14.8	4.7	Y	--	N	--	Y	Quant.	3E+00
VINYL ACETATE	108-05-4	39	0	0%	0.0013	0.0011-0.0016	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
VINYL CHLORIDE	75-01-4	44	0	0%	0.0013	0.00037-0.0017	ND	ND	0.12	--	N	--	N	N	--	--
ZINC	7440-66-6	3	3	100%	0.115	0.00	153	348	47	Y	--	N	--	Y	Quant.	7E+00

Abbreviations

% - percent
> - greater than
Bkg. - Background analysis for detected analytes with no screening levels
CASRN - Chemical Abstracts Service Registry Number
Conc. - Concentration
COPEC - Chemical of Potential Ecological Concern
Det. - detect
DL - Detection Limit
ESV - Ecological Screening Value
HQ - Hazard Quotient
Max. - Maximum
mg/kg - milligrams per kilogram
Min. - Minimum
N - No
NA - Not Available
ND - Non-Detect
No. - Number
Qual.1 - Qualitative analysis for infrequently detected analytes with insufficient detection limits
Qual.2 - Qualitative analysis for non-detected analytes with no screening levels
Quant. - Quantitative
SL - Screening Level
Y - Yes

TABLE I.3-7
SOIL/SEDIMENT SCREENING LEVELS FOR ECOLOGICAL RECEPTORS
700 S 1600 E PCE Plume Superfund Site, Salt Lake City, Utah

Chemical	CASRN	Notes	LANL Soil No-Effect ESL (mg/kg)	LANL Sediment No-Effect ESL (mg/kg)	Lowest No-Effect ESV (mg/kg)
1,1,1,2-TETRACHLOROETHANE	630-20-6		NA	NA	NA
1,1,1-TRICHLOROETHANE	71-55-6		260	0.07	0.07
1,1,2,2-TETRACHLOROETHANE	79-34-5		NA	NA	NA
1,1,2-TRICHLOROETHANE	79-00-5		NA	NA	NA
1,1,2-TRICHLOROTRIFLUOROETHANE	76-13-1		NA	NA	NA
1,1'-BIPHENYL	92-52-4		NA	NA	NA
1,1-DICHLOROETHANE	75-34-3		210	0.02	0.02
1,1-DICHLOROETHENE	75-35-4		11	0.1	0.1
1,1-DICHLOROPROPENE	563-58-6		NA	NA	NA
1,2,3-TRICHLOROBENZENE	87-61-6		NA	NA	NA
1,2,3-TRICHLOROPROPANE	96-18-4		NA	NA	NA
1,2,4,5-TETRACHLOROBENZENE	95-94-3		NA	NA	NA
1,2,4-TRICHLOROBENZENE	120-82-1		0.27	0.011	0.011
1,2,4-TRIMETHYLBENZENE	95-63-6		NA	NA	NA
1,2-DIBROMO-3-CHLOROPROPANE	96-12-8		NA	NA	NA
1,2-DIBROMOETHANE	106-93-4		NA	NA	NA
1,2-DICHLOROBENZENE	95-50-1		0.92	1	0.92
1,2-DICHLOROETHANE	107-06-2		0.85	6.1	0.85
1,2-DICHLOROPROPANE	78-87-5		NA	NA	NA
1,3,5-TRIMETHYLBENZENE	108-67-8		NA	NA	NA
1,3-DICHLOROBENZENE	541-73-1		0.74	0.82	0.74
1,3-DICHLOROPROPANE	142-28-9		NA	NA	NA
1,3-DICHLOROPROPYLENE	542-75-6		NA	NA	NA
1,4-DICHLOROBENZENE	106-46-7		0.89	0.03	0.03
1,4-DIOXANE	123-91-1		NA	NA	NA
1-CHLOROHEXANE	544-10-5		NA	NA	NA
2,2-DICHLOROPROPANE	594-20-7		NA	NA	NA
2,3,4,6-TETRACHLOROPHENOL	58-90-2		NA	NA	NA
2,4,5-TRICHLOROPHENOL	95-95-4		NA	NA	NA
2,4,6-TRICHLOROPHENOL	88-06-2		NA	NA	NA
2,4-DICHLOROPHENOL	120-83-2		NA	NA	NA
2,4-DIMETHYLPHENOL	105-67-9		NA	NA	NA
2,4-DINITROPHENOL	51-28-5		NA	NA	NA
2,4-DINITROTOLUENE	121-14-2		6	0.29	0.29
2,6-DINITROTOLUENE	606-20-2		4	8.6	4
2-BUTANONE (MEK)	78-93-3		350	3000	350
2-CHLORONAPHTHALENE	91-58-7		NA	NA	NA
2-CHLOROPHENOL	95-57-8		0.39	0.055	0.055
2-CHLOROTOLUENE	95-49-8		NA	NA	NA

TABLE I.3-7
SOIL/SEDIMENT SCREENING LEVELS FOR ECOLOGICAL RECEPTORS
700 S 1600 E PCE Plume Superfund Site, Salt Lake City, Utah

Chemical	CASRN	Notes	LANL Soil No-Effect ESL (mg/kg)	LANL Sediment No-Effect ESL (mg/kg)	Lowest No-Effect ESV (mg/kg)
2-HEXANONE	591-78-6		0.36	0.47	0.36
2-METHYLNAPHTHALENE	91-57-6		16	0.076	0.076
2-METHYLPHENOL	95-48-7		0.67	1700	0.67
2-NITROANILINE	88-74-4		5.3	7.3	5.3
2-NITROPHENOL	88-75-5		NA	NA	NA
2-PHENYLBUTANE	135-98-8		NA	NA	NA
3,3'-DICHLOROBENZIDINE	91-94-1		NA	NA	NA
3-NITROANILINE	99-09-2		NA	NA	NA
4,6-DINITRO-2-METHYLPHENOL	534-52-1		NA	NA	NA
4-BROMOPHENYL PHENYL ETHER	101-55-3		NA	NA	NA
4-CHLORO-3-METHYLPHENOL	59-50-7		NA	NA	NA
4-CHLOROANILINE	106-47-8		1	NA	1
4-CHLOROPHENYL PHENYL ETHER	7005-72-3		NA	NA	NA
4-CHLOROTOLUENE	106-43-4		NA	NA	NA
4-METHYL-2-PENTANONE (MIBK)	108-10-1		9.7	17	9.7
4-METHYLPHENOL	106-44-5		NA	NA	NA
4-NITROANILINE	100-01-6		NA	NA	NA
4-NITROPHENOL	100-02-7		NA	NA	NA
ACENAPHTHENE	83-32-9		0.25	0.076	0.076
ACENAPHTHYLENE	208-96-8		120	0.076	0.076
ACETONE	67-64-1		1.2	0.065	0.065
ACETOPHENONE	98-86-2		NA	NA	NA
ALLYL CHLORIDE	107-05-1		NA	NA	NA
ANTHRACENE	120-12-7		6.8	0.057	0.057
ANTIMONY	7440-36-0		2.3	45	2.3
ARSENIC	7440-38-2		6.8	9.7	6.8
ATRAZINE	1912-24-9		NA	NA	NA
BARIUM	7440-39-3		110	150	110
BENZALDEHYDE	100-52-7		NA	NA	NA
BENZENE	71-43-2		24	0.01	0.01
BENZO(A)ANTHRACENE	56-55-3		0.73	0.1	0.1
BENZO(A)PYRENE	50-32-8		62	0.15	0.15
BENZO(B)FLUORANTHENE	205-99-2		18	0.19	0.19
BENZO(G,H,I)PERYLENE	191-24-2		25	0.17	0.17
BENZO(K)FLUORANTHENE	207-08-9		71	0.24	0.24
BENZYL BUTYL PHTHALATE	85-68-7		90	0.1	0.1
BERYLLIUM	7440-41-7		2.5	66	2.5
BIS(2-CHLOROETHOXY)METHANE	111-91-1		NA	NA	NA
BIS(2-CHLOROETHYL) ETHER	111-44-4		NA	NA	NA

TABLE I.3-7
SOIL/SEDIMENT SCREENING LEVELS FOR ECOLOGICAL RECEPTORS
700 S 1600 E PCE Plume Superfund Site, Salt Lake City, Utah

Chemical	CASRN	Notes	LANL Soil No-Effect ESL (mg/kg)	LANL Sediment No-Effect ESL (mg/kg)	Lowest No-Effect ESV (mg/kg)
BIS(2-ETHYLHEXYL)PHTHALATE	117-81-7		0.02	0.026	0.02
BIS-CHLOROISOPROPYL ETHER	108-60-1		NA	NA	NA
BROMOBENZENE	108-86-1		NA	NA	NA
BROMOCHLOROMETHANE	74-97-5		NA	NA	NA
BROMODICHLOROMETHANE	75-27-4		NA	NA	NA
BROMOFORM	75-25-2		NA	NA	NA
BROMOMETHANE	74-83-9		NA	NA	NA
CADMIUM	7440-43-9		0.27	0.3	0.27
CAPROLACTAM	105-60-2		NA	NA	NA
CARBAZOLE	86-74-8		79	130	79
CARBON DISULFIDE	75-15-0		0.81	1.3	0.81
CARBON TETRACHLORIDE	56-23-5		NA	NA	NA
CHLOROBENZENE	108-90-7		2.4	0.03	0.03
CHLOROETHANE	75-00-3		NA	NA	NA
CHLOROFORM	67-66-3		8	9.2	8
CHLOROMETHANE	74-87-3		NA	NA	NA
CHROMIUM	7440-47-3	1	0.34	660	0.34
CHRYSENE	218-01-9		3.1	0.16	0.16
CIS-1,2-DICHLOROETHENE	156-59-2		NA	NA	NA
CIS-1,3-DICHLOROPROPENE	542-75-6		NA	NA	NA
COBALT	7440-48-4		13	220	13
COPPER	7440-50-8		14	23	14
CYCLOHEXANE	110-82-7		NA	NA	NA
CYMENE	99-87-6		NA	NA	NA
DIBENZO(A,H)ANTHRACENE	53-70-3		14	0.033	0.033
DIBENZOFURAN	132-64-9		6.1	0.51	0.51
DIBROMOCHLOROMETHANE	124-48-1		NA	NA	NA
DIBROMOMETHANE	74-95-3		NA	NA	NA
DICHLORODIFLUOROMETHANE	75-71-8		NA	NA	NA
DICHLOROMONOFLUOROMETHANE	75-43-4		NA	NA	NA
DIETHYL PHTHALATE	84-66-2		100	4000	100
DIMETHYL PHTHALATE	131-11-3		10	90	10
DI-N-BUTYLPHTHALATE	84-74-2		0.011	0.011	0.011
DI-N-OCTYLPHTHALATE	117-84-0		0.91	1	0.91
ETHYL ACETATE	141-78-6		NA	NA	NA
ETHYL ETHER	60-29-7		NA	NA	NA
ETHYL METHACRYLATE	97-63-2		NA	NA	NA
ETHYLBENZENE	100-41-4		NA	NA	NA
FLUORANTHENE	206-44-0		10	0.42	0.42

TABLE I.3-7
SOIL/SEDIMENT SCREENING LEVELS FOR ECOLOGICAL RECEPTORS
700 S 1600 E PCE Plume Superfund Site, Salt Lake City, Utah

Chemical	CASRN	Notes	LANL Soil No-Effect ESL (mg/kg)	LANL Sediment No-Effect ESL (mg/kg)	Lowest No-Effect ESV (mg/kg)
FLUORENE	86-73-7		3.7	0.077	0.077
HEXACHLORO-1,3-BUTADIENE	87-68-3		NA	NA	NA
HEXACHLOROBENZENE	118-74-1		0.079	0.1	0.079
HEXACHLOROCYCLOPENTADIENE	77-47-4		NA	NA	NA
HEXACHLOROETHANE	67-72-1		NA	NA	NA
INDENO(1,2,3-CD)PYRENE	193-39-5		71	0.2	0.2
ISOPHORONE	78-59-1		NA	NA	NA
ISOPROPYLBENZENE	98-82-8		NA	NA	NA
LEAD	7439-92-1		11	26	11
M,P-XYLENE	179601-23-1		NA	NA	NA
MANGANESE	7439-96-5		220	460	220
MERCURY	7439-97-6	2	0.013	0.017	0.013
METHYL ACETATE	79-20-9		NA	NA	NA
METHYL IODIDE	74-88-4		0.038	0.081	0.038
METHYL TERT-BUTYL ETHER	1634-04-4		NA	NA	NA
METHYLCYLOHEXANE	108-87-2		NA	NA	NA
METHYLENE CHLORIDE	75-09-2		2.6	0.018	0.018
NAPHTHALENE	91-20-3		1	0.17	0.17
N-BUTYLBENZENE	104-51-8		NA	NA	NA
NICKEL	7440-02-0		10	12	10
NITROBENZENE	98-95-3		2.2	24	2.2
N-NITROSO-DI-N-PROPYLAMINE	621-64-7		NA	NA	NA
N-NITROSODIPHENYLAMINE	86-30-6		NA	NA	NA
N-PROPYLBENZENE	103-65-1		NA	NA	NA
O-XYLENE	95-47-6		NA	NA	NA
PENTACHLOROETHANE	76-01-7		NA	NA	NA
PENTACHLOROPHENOL	87-86-5		0.36	0.01	0.01
PHENANTHRENE	85-01-8		5.5	0.2	0.2
PHENOL	108-95-2		0.79	750	0.79
PYRENE	129-00-0		10	0.19	0.19
SELENIUM	7782-49-2		0.52	0.72	0.52
SILVER	7440-22-4		2.6	0.5	0.5
STYRENE	100-42-5		1.2	NA	1.2
TERT-BUTYLBENZENE	98-06-6		NA	NA	NA
TETRACHLOROETHENE	127-18-4		0.18	0.002	0.002
TETRAHYDROFURAN	109-99-9		NA	NA	NA
THALLIUM	7440-28-0		0.05	0.73	0.05
TOLUENE	108-88-3		23	0.01	0.01
TRANS-1,2-DICHLOROETHENE	156-60-5		NA	NA	NA

TABLE I.3-7
SOIL/SEDIMENT SCREENING LEVELS FOR ECOLOGICAL RECEPTORS
700 S 1600 E PCE Plume Superfund Site, Salt Lake City, Utah

Chemical	CASRN	Notes	LANL Soil No-Effect ESL (mg/kg)	LANL Sediment No-Effect ESL (mg/kg)	Lowest No-Effect ESV (mg/kg)
TRANS-1,3-DICHLOROPROPENE	542-75-6		NA	NA	NA
TRANS-1,4-DICHLOROBUTENE	110-57-6		NA	NA	NA
TRICHLOROETHENE	79-01-6		42	0.078	0.078
TRICHLOROFLUOROMETHANE	75-69-4		52	58	52
VANADIUM	7440-62-2		4.7	29	4.7
VINYL ACETATE	108-05-4		NA	NA	NA
VINYL CHLORIDE	75-01-4		0.12	0.14	0.12
ZINC	7440-66-6		47	63	47

Source

LANL - Los Alamos National Laboratory, ECORISK Database, version 4.2

Notes

1 - As Chromium VI

2 - As inorganic mercury

Abbreviations

CASRN - Chemical Abstracts Service Registry Number

ESL - Ecological Screening Level

ESV - Ecological Screening Value

mg/kg - milligrams per liter

NA - Not Available

TABLE I.3-8
REFINED ORGANIC COPEC EVALUATION FOR SOIL AND SEDIMENT
700 S 1600 E PCE Plume Superfund Site, Salt Lake City, Utah

Soil/Sediment COPEC	Soil/Sediment Summary Statistics					Soil/Sediment ESL		
	No. of Samples	No. Detected	Detection Frequency	Min. Conc. (mg/kg)	Max. Conc. (mg/kg)	Receptor	No-Effect ESL (mg/kg)	Low-Effect ESL (mg/kg)
ACETONE	44	10	23%	0.0051	0.13	Aquatic community organisms	0.065	0.65
						Deer mouse (Mammalian omnivore)	1.2	6.3
						Mountain cottontail (Mammalian herbivore)	1.6	8.0
						American robin (Avian herbivore)	7.5	75
						American robin (Avian omnivore)	14	140
						Montane shrew (Mammalian insectivore)	15	79
						Occult little brown myotis bat (Mammalian aerial insectivore)	17	88
						American robin (Avian insectivore)	170	1,700
						Violet-green swallow (Avian aerial insectivore)	230	2,300
						American kestrel (insectivore / carnivore)	840	8,400
						Gray fox (Mammalian top carnivore)	7,800	39,000
						American kestrel (Avian top carnivore)	66,000	660,000
BENZO(B)FLUORANTHENE	3	1	33%	0.21	0.21	Aquatic community organisms	0.19	1.9
						Generic plant (Terrestrial autotroph - producer)	18	180
						Montane shrew (Mammalian insectivore)	44	440
						Deer mouse (Mammalian omnivore)	51	510
						Occult little brown myotis bat (Mammalian aerial insectivore)	53	530
						Mountain cottontail (Mammalian herbivore)	130	1,300
						Gray fox (Mammalian top carnivore)	2,400	24,000
TETRACHLOROETHENE	44	7	16%	0.00062	0.022	Aquatic community organisms	0.002	0.02
						Generic plant (Terrestrial autotroph - producer)	10	100
						Montane shrew (Mammalian insectivore)	0.18	0.94
						Occult little brown myotis bat (Mammalian aerial insectivore)	0.2	1.0
						Deer mouse (Mammalian omnivore)	0.35	1.7
						Mountain cottontail (Mammalian herbivore)	9.5	47
						Gray fox (Mammalian top carnivore)	120	630

ESL Source

LANL - Los Alamos National Laboratory, ECORISK Database, version 4.2

Notes

Shaded cells indicate the maximum concentration exceeds the ESL

Abbreviations

% - percent
CAS - Chemical Abstracts Service
Conc. - Concentration
COPEC - Chemical of Potential Ecological Concern
ESL - ecological screening level
Max. - Maximum
mg/kg - milligrams per kilogram
Min. - Minimum
No. - Number

TABLE I.3-9
SOIL GAS COPEC SELECTION FOR ECOLOGICAL RECEPTORS
700 S 1600 E PCE Plume Superfund Site, Salt Lake City, Utah

Chemical	CASRN	Summary Statistics							Air No-Effect ESL ($\mu g/m^3$)	COPEC Selection						HQmax
		No. of Samples	No. Detected	Detection Frequency	Range of DLs (µg/m3)	Mean DL ($\mu g/m^3$)	Min. Conc. ($\mu g/m^3$)	Max. Conc. ($\mu g/m^3$)		Is Max. Det. Conc. > SL?	Is Mean DL > SL?	Chemical Detected, No SL?	Chemical ND, No SL?	Is Chemical a COPEC?	Type of Evaluation	
1,1,1-TRICHLOROETHANE	71-55-6	110	57	52%	0.0047-24	1.0	0.032	40	240,000	N	--	N	--	N	--	2E-04
1,1,2,2-TETRACHLOROETHANE	79-34-5	110	0	0%	0.027-26	1.4	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,1,2-TRICHLOROETHANE	79-00-5	110	1	1%	0.016-19	1.1	0.62	0.62	NA	--	N	Y	--	Y	Bkg.	--
1,1,2-TRICHLOROTRIFLUOROETHANE	76-13-1	110	81	74%	0.11-27	1.5	0.32	15	NA	--	--	Y	--	Y	Bkg.	--
1,1-DICHLOROETHANE	75-34-3	110	3	3%	0.015-28	1.1	0.15	1.6	5,600,000	N	N	N	--	N	--	3E-07
1,1-DICHLOROETHENE	75-35-4	110	6	5%	0.0033-26	1.1	0.069	3.7	5,700	N	N	N	--	N	--	6E-04
1,2,4-TRICHLOROBENZENE	120-82-1	72	0	0%	0.7-130	10	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,2,4-TRIMETHYLBENZENE	95-63-6	110	73	66%	0.047-26	1.3	0.07	9.2	NA	--	--	Y	--	Y	Bkg.	--
1,2-DIBROMOETHANE	106-93-4	110	0	0%	0.016-22	1.3	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,2-DICHLOROBENZENE	95-50-1	110	0	0%	0.079-28	1.8	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
1,2-DICHLOROETHANE	107-06-2	110	10	9%	0.0066-21	1.0	0.026	0.51	41,000	N	N	N	--	N	--	1E-05
1,2-DICHLOROPROPANE	78-87-5	110	1	1%	0.036-24	1.4	3.3	3.3	NA	--	N	Y	--	Y	Bkg.	--
1,2-DICHLOROTETRAFLUOROETHANE;FL	76-14-2	110	48	44%	0.012-30	1.6	0.1	1.3	NA	--	--	Y	--	Y	Bkg.	--
1,3,5-TRIMETHYLBENZENE	108-67-8	110	35	32%	0.047-28	1.6	0.066	4.2	NA	--	--	Y	--	Y	Bkg.	--
1,3-BUTADIENE	106-99-0	110	14	13%	0.017-32	1.2	0.40	55	NA	--	--	Y	--	Y	Bkg.	--
1,3-DICHLOROBENZENE	541-73-1	110	17	15%	0.059-29	1.5	0.36	36	NA	--	--	Y	--	Y	Bkg.	--
1,4-DICHLOROBENZENE	106-46-7	110	1	1%	0.062-29	1.6	0.56	0.56	NA	--	N	Y	--	Y	Bkg.	--
1,4-DIOXANE	123-91-1	100	17	17%	0.035-23	1.8	0.066	4.9	NA	--	--	Y	--	Y	Bkg.	--
2-BUTANONE (MEK)	78-93-3	108	74	69%	0.14-39	2.4	0.21	93	NA	--	--	Y	--	Y	Bkg.	--
2-HEXANONE	591-78-6	110	22	20%	0.18-27	1.7	0.24	24	NA	--	--	Y	--	Y	Bkg.	--
4-ETHYLTOLUENE	622-96-8	110	46	42%	0.035-30	1.4	0.063	3.3	NA	--	--	Y	--	Y	Bkg.	--
4-METHYL-2-PENTANONE (MIBK)	108-10-1	110	30	27%	0.054-26	1.4	0.11	71	NA	--	--	Y	--	Y	Bkg.	--
ACETONE	67-64-1	106	75	71%	0.43-430	14	3.7	390	530,000	N	--	N	--	N	--	7E-04
BENZENE	71-43-2	110	78	71%	0.014-28	0.95	0.034	39	25,000	N	--	N	--	N	--	2E-03
BENZYL CHLORIDE	100-44-7	72	0	0%	0.13-9	1.2	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
BROMODICHLOROMETHANE	75-27-4	110	26	24%	0.029-28	1.5	0.12	81	NA	--	--	Y	--	Y	Bkg.	--
BROMOFORM	75-25-2	110	0	0%	0.093-39	1.9	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
BROMOMETHANE	74-83-9	110	3	3%	0.29-26	3.2	2.5	3.1	NA	--	N	Y	--	Y	Bkg.	--
CARBON DISULFIDE	75-15-0	110	60	55%	0.18-57	2.7	0.26	82	NA	--	--	Y	--	Y	Bkg.	--
CARBON TETRACHLORIDE	56-23-5	110	42	38%	0.0099-26	1.3	0.03	3.9	5,700	N	--	N	--	N	--	7E-04
CHLOROBENZENE	108-90-7	110	1	1%	0.02-25	1.0	14	14	NA	--	N	Y	--	Y	Bkg.	--
CHLOROETHANE	75-00-3	110	24	22%	0.0066-24	1.2	0.05	0.96	NA	--	--	Y	--	Y	Bkg.	--
CHLOROFORM	67-66-3	110	92	84%	0.012-25	1.0	0.048	1,200	20,000	N	--	N	--	N	--	6E-02
CHLOROMETHANE	74-87-3	110	38	35%	0.019-31	1.5	0.02	21	21,000	N	--	N	--	N	--	1E-03
CIS-1,2-DICHLOROETHENE	156-59-2	344	41	12%	0.0075-27	0.65	0.026	11.3	NA	--	--	Y	--	Y	Bkg.	--
CIS-1,3-DICHLOROPROPENE	542-75-6	110	0	0%	0.03-30	1.3	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
CYCLOHEXANE	110-82-7	110	33	30%	0.14-54	2.3	0.55	54	NA	--	--	Y	--	Y	Bkg.	--
DIBROMOCHLOROMETHANE	124-48-1	110	6	5%	0.077-25	1.6	0.33	4	NA	--	N	Y	--	Y	Bkg.	--
DICHLORODIFLUOROMETHANE	75-71-8	110	101	92%	0.0057-31	1.4	1.9	12	2,600,000	N	--	N	--	N	--	5E-06
ETHYL ACETATE	141-78-6	48	20	42%	0.54-100	5.8	1.1	280	NA	--	--	Y	--	Y	Bkg.	--
ETHYLBENZENE	100-41-4	110	78	71%	0.005-27	1.1	0.025	26	NA	--	--	Y	--	Y	Bkg.	--
HEXACHLORO-1,3-BUTADIENE	87-68-3	72	0	0%	1-150	11	ND	ND	NA	--	N	--	Y	Y	Qual.2	--

TABLE I.3-9
SOIL GAS COPEC SELECTION FOR ECOLOGICAL RECEPTORS
700 S 1600 E PCE Plume Superfund Site, Salt Lake City, Utah

Chemical	CASRN	Summary Statistics							Air No-Effect ESL ($\mu g/m^3$)	COPEC Selection						HQmax
		No. of Samples	No. Detected	Detection Frequency	Range of DLs (µg/m3)	Mean DL ($\mu g/m^3$)	Min. Conc. ($\mu g/m^3$)	Max. Conc. ($\mu g/m^3$)		Is Max. Det. Conc. > SL?	Is Mean DL > SL?	Chemical Detected, No SL?	Chemical ND, No SL?	Is Chemical a COPEC?	Type of Evaluation	
HEXANE	110-54-3	110	45	41%	0.16-39	1.7	0.35	140	NA	--	--	Y	--	Y	Bkg.	--
M,P-XYLENE	108-38-3	110	84	76%	0.0083-50	1.6	0.028	120	NA	--	--	Y	--	Y	Bkg.	--
METHYL TERT-BUTYL ETHER	1634-04-4	110	0	0%	0.01-23	1.0	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
METHYLENE CHLORIDE	75-09-2	110	25	23%	0.25-54	2.7	0.54	6.7	1,300,000	N	--	N	--	N	--	5E-06
N-HEPTANE	142-82-5	110	35	32%	0.098-30	1.5	0.36	57	NA	--	--	Y	--	Y	Bkg.	--
O-XYLENE	95-47-6	110	79	72%	0.0078-28	1.1	0.027	74	NA	--	--	Y	--	Y	Bkg.	--
STYRENE	100-42-5	110	31	28%	0.024-31	1.2	0.025	3.3	NA	--	--	Y	--	Y	Bkg.	--
TETRACHLOROETHENE	127-18-4	404	313	77%	0.0076-25	0.97	0.20	46,000	73,000	N	--	N	--	N	--	6E-01
TETRAHYDROFURAN	109-99-9	110	36	33%	0.21-24	1.5	0.54	24	NA	--	--	Y	--	Y	Bkg.	--
TOLUENE	108-88-3	110	92	84%	0.011-23	0.86	0.026	71	60,000	N	--	N	--	N	--	1E-03
TRANS-1,2-DICHLOROETHENE	156-60-5	110	3	3%	0.0065-26	1.3	0.025	0.064	NA	--	N	Y	--	Y	Bkg.	--
TRANS-1,3-DICHLOROPROPENE	542-75-6	110	0	0%	0.039-39	1.6	ND	ND	NA	--	N	--	Y	Y	Qual.2	--
TRICHLOROETHENE	79-01-6	405	97	24%	0.015-26	0.72	0.017	180	19,000	N	--	N	--	N	--	9E-03
TRICHLOROFLUOROMETHANE	75-69-4	110	107	97%	0.033-29	1.5	0.8	170	820,000	N	--	N	--	N	--	2E-04
VINYL ACETATE	108-05-4	48	7	15%	0.53-430	24	6.4	14.1	NA	--	--	Y	--	Y	Bkg.	--
VINYL CHLORIDE	75-01-4	110	13	12%	0.0028-20	0.91	0.013	0.23	NA	--	--	Y	--	Y	Bkg.	--

Notes:

% - percent
> - greater than
°C - degrees Celsius
$\mu g/m^3$ - micrograms per cubic meter
atm - atmosphere
Bkg. Background analysis for detected analytes with no screening levels
CASRN - Chemical Abstracts Service Registry Number
Conc. - Concentration
COPEC - Chemical of Potential Ecological Concern
Det. - Detect
DL - Detection Limit
HQ - Hazard Quotient
Max. - Maximum
Min. - Minimum
N - No
NA - Not Available
ND - Non-Detect
No. - Number
Note - parts per billion results converted to $\mu g/m^3$ based upon 25°C and 1 atm
Qual.1 - qualitative analysis for infrequently detected analytes with insufficient detection limits
Qual.2 - qualitative analysis for non-detected analytes with no screening levels
Quant. - quantitative
SL - screening level
Y - Yes

TABLE I.3-10
AIR SCREENING LEVELS FOR ECOLOGICAL RECEPTORS
700 S 1600 E PCE Plume Superfund Site, Salt Lake City, Utah

Chemical	CASRN	LANL Air No-Effect ESL ($\mu g/m^3$)
1,1,1-TRICHLOROETHANE	71-55-6	240,000
1,1-DICHLOROETHANE	75-34-3	5,600,000
1,1-DICHLOROETHENE	75-35-4	5,700
1,2-DICHLOROETHANE	107-06-2	41,000
ACETONE	67-64-1	530,000
BENZENE	71-43-2	25,000
CARBON TETRACHLORIDE	56-23-5	5,700
CHLOROFORM	67-66-3	20,000
CHLOROMETHANE	74-87-3	21,000
DICHLORODIFLUOROMETHANE	75-71-8	2,600,000
METHYLENE CHLORIDE	75-09-2	1,300,000
TETRACHLOROETHENE	127-18-4	73,000
TOLUENE	108-88-3	60,000
TRICHLOROETHENE	79-01-6	19,000
TRICHLOROFLUOROMETHANE	75-69-4	820,000

Source

LANL - Los Alamos National Laboratory, ECORISK Database, version 4.2

Abbreviations

$\mu g/m^3$ - micrograms per cubic meter

CASRN - Chemical Abstracts Service Registry Number

ESL - Ecological Screening Level

Attachments

This page intentionally left blank.

ATTACHMENT I.1
SCREENING-LEVEL RISK EVALUATION FOR METAL COPECs IN SURFACE WATER AND GROUNDWATER
700 S 1600 E PCE Plume Superfund Site, Salt Lake City, Utah

Panel A: Based on Chronic/No-Effect Ecological Screening Levels

Surface Water/ Groundwater COPEC	Surface Water Max. Conc. (µg/L)	Ground-water Max. Conc. (µg/L)	UDEQ WQC Chronic (µg/L)	EPA NRWQC Chronic (µg/L)	LANL Water No-Effect ESLs (µg/L)									ORNL Plant Soil Solution Benchmark (µg/L)
					Aquatic community organisms - water	American kestrel (water)	American robin (water)	Deer mouse (water)	Gray fox (water)	Montane shrew (water)	Mountain cottontail (water)	Occult little brown myotis bat (water)	Violet-green Swallow (water)	
ALUMINUM	8,230	65,600	NA	NA	530	910,000	780,000	10,000	22,000	8,600	19,000	12,000	450,000	87
ARSENIC	24.2	13.8	150	150	150	42,000	36,000	660	1,400	560	1,200	790	21,000	150
BARIUM	224	641	NA	NA	3.9	760,000	650,000	7,200	16,000	6,100	14,000	8,600	380,000	NA
BERYLLIUM	0.4	4.8	NA	NA	0.66	NA	NA	3,400	7,600	2,900	6,800	4,100	NA	NA
CADMIUM	1.8	0.86	0.72	0.72	0.28	12,000	10,000	5,600	12,000	4,800	11,000	6,700	5,900	0.72
COBALT	5.2	39.1	NA	NA	3	160	140	100	230	89	200	120	82	NA
COPPER	67.8	116	9	9	5	25,000	21,000	26,000	59,000	22,000	52,000	32,000	12,000	1.6
IRON	ND	57,500	NA	NA	1,000	NA	NA	NA	NA	NA	NA	NA	NA	1,000
LEAD	301	91.2	2.5	2.5	1	130,000	110,000	5,100	11,000	4,300	10,000	6,100	64,000	2.52
MANGANESE	583	2770	NA	NA	1,300	4,800,000	4,100,000	230,000	510,000	190,000	450,000	270,000	2,400,000	NA
NICKEL	11.4	239	52	52	29	230,000	200,000	360	800	300	710	430	110,000	52
SELENIUM	1.8	5.1	4.6	4.6	5	3,600	3,100	1,000	2,300	890	2,000	1,200	1,800	1.5
SILVER	0.71	1.1	3.2	3.2	0.1	45,000	38,000	100,000	220,000	85,000	190,000	110,000	22,000	0.322
THALLIUM	0.28	0.35	NA	NA	0.03	2,900	2,500	37	82	31	73	44	1,400	NA
VANADIUM	14.8	78	NA	NA	19	9,100	7,800	11,000	24,000	9,400	21,000	13,000	4,500	NA
ZINC	348	1350	120	120	65	1,000,000	850,000	660,000	1,400,000	560,000	1,200,000	790,000	490,000	118

Panel B: Based on Low-Effect Ecological Screening Levels

Surface Water/ Groundwater COPEC	Surface Water Max. Conc. (µg/L)	Ground-water Max. Conc. (µg/L)	LANL Water Low-Effect ESLs (µg/L)								
			Aquatic community organisms - water	American kestrel (water)	American robin (water)	Deer mouse (water)	Gray fox (water)	Montane shrew (water)	Mountain cottontail (water)	Occult little brown myotis bat (water)	Violet-green Swallow (water)
ALUMINUM	8,230	65,600	1,300	9,100,000	7,800,000	100,000	220,000	86,000	190,000	120,000	4,500,000
ARSENIC	24.2	13.8	340	100,000	91,000	6,600	14,000	5,600	12,000	7,900	52,000
BARIUM	224	641	39	1,500,000	1,300,000	10,000	23,000	8,800	20,000	12,000	760,000
BERYLLIUM	0.4	4.8	6.6	NA	NA	34,000	76,000	29,000	68,000	41,000	NA
CADMIUM	1.8	0.86	0.91	160,000	140,000	20,000	45,000	17,000	40,000	24,000	82,000
COBALT	5.2	39.1	30	4,100	3,500	2,600	5,800	2,200	5,100	3,100	2,000
COPPER	67.8	116	7	260,000	220,000	39,000	86,000	33,000	76,000	46,000	130,000
IRON	ND	57,500	10,000	NA	NA	NA	NA	NA	NA	NA	NA
LEAD	301	91.2	10	1,300,000	1,100,000	19,000	43,000	16,000	38,000	23,000	640,000
MANGANESE	583	2770	2300	48,000,000	41,000,000	830,000	1,800,000	700,000	1,600,000	990,000	24,000,000
NICKEL	11.4	239	260	320,000	270,000	3,600	8,000	3,000	7,100	4,300	160,000
SELENIUM	1.8	5.1	20	12,000	10,000	1,700	3,800	1,400	3,400	2,000	6,100
SILVER	0.71	1.1	1.0	450,000	380,000	1,000,000	2,200,000	850,000	1,900,000	1,100,000	220,000
THALLIUM	0.28	0.35	0.3	29,000	25,000	370	820	310	730	440	14,000
VANADIUM	14.8	78	190	91,000	78,000	22,000	48,000	18,000	43,000	26,000	45,000
ZINC	348	1350	85	10,000,000	8,500,000	6,600,000	14,000,000	5,600,000	12,000,000	7,900,000	4,900,000

ATTACHMENT I.2
SCREENING-LEVEL RISK EVALUATION FOR METAL COPECs IN SOIL AND SEDIMENT
700 S 1600 E PCE Plume Superfund Site, Salt Lake City, Utah

Panel A: Based on No-Effect Ecological Screening Levels

Soil/Sediment COPEC	Sediment Max. Conc.* (mg/kg)	USGS Utah Bkg Soil		LANL Soil No-Effect ESLs (mg/kg)											LANL Sediment No Effect ESLs (mg/kg)		
		Mean (mg/kg)	Range (mg/kg)	Generic plant (terrestrial autotroph - producer)	Earthworm (soil-dwelling invertebrate)	American kestrel (avian top carnivore)	American kestrel (insectivore / carnivore)	American robin (avian herbivore)	American robin (avian insectivore)	American robin (avian omnivore)	Deer mouse (mammalian omnivore)	Gray fox (mammalian top carnivore)	Montane shrew (mammalian insectivore)	Mountain cottontail (mammalian herbivore)	Aquatic community organisms - sediment	Occult little brown myotis bat (mammalian aerial insectivore)	Violet-green swallow (avian aerial insectivore)
ANTIMONY	2.7	0.59	0.12 - 2.61	11	78	NA	NA	NA	NA	NA	2.3	46	7.9	2.7	NA	45	NA
ARSENIC	24.2	5.8	1.3 - 24.9	18	6.8	740	100	34	15	21	32	820	19	110	9.7	24	34
BARIUM	224	569	44 - 2630	110	330	24,000	7,500	720	820	770	1800	41,000	2,100	2,900	150	3,100	2,900
CADMIUM	1.8	0.37	0.1 - 3	32	140	430	1.3	4.3	0.29	0.54	0.5	550	0.27	10	0.99	0.3	0.37
CHROMIUM	14	30	3 - 155	0.35	0.34	3,600	1400	210	140	160	850	7,200	510	1,600	NA	860	660
COPPER	67.8	14	1.4 - 75.2	70	80	1,100	80	34	14	20	63	4,000	42	260	31	49	23
LEAD	301	19	0.9 - 133	120	1700	540	83	18	11	14	120	3,700	93	310	35	110	26
MANGANESE	583	457	26 - 1460	220	450	60,000	24,000	1,300	2,200	1,600	1,400	40,000	2,800	2,000	460	4,700	10,000
MERCURY	0.21	0.019	0.01 - 0.05	34	0.05	0.32	0.058	0.067	0.013	0.022	3	76	1.7	23	0.18	2	0.017
NICKEL	11.4	12	1 - 78.5	38	280	2,000	110	120	20	35	20	1,200	10	270	22	12	31
SELENIUM	1.8	0.38	0.2 - 2.3	0.52	4.1	74	3.7	0.98	0.71	0.83	0.82	92	0.7	2.2	0.72	0.8	1
SILVER	0.71	all <1		560	NA	600	13	10	2.6	4.1	24	4,400	14	150	0.5	16	3.6
THALLIUM	0.28	0.45	0.1 - 1.5	0.05	NA	100	48	6.9	4.5	5.5	0.72	5	0.42	1.2	NA	0.73	23
VANADIUM	14.8	54	3 - 189	60	NA	110	56	6.8	4.7	5.5	470	3,200	290	740	NA	550	29
ZINC	348	50	3 - 107	160	120	2600	220	330	47	83	170	9,600	99	1,800	120	110	63

Panel B: Based on Low-Effect Ecological Screening Levels

Soil/Sediment COPEC	Sediment Max. Conc.* (mg/kg)	USGS Utah Bkg Soil		LANL Soil Low-Effect ESLs (mg/kg)											LANL Sediment Low Effect ESLs (mg/kg)		
		Mean (mg/kg)	Range (mg/kg)	Generic plant (terrestrial autotroph - producer)	Earthworm (soil-dwelling invertebrate)	American kestrel (avian top carnivore)	American kestrel (insectivore / carnivore)	American robin (avian herbivore)	American robin (avian insectivore)	American robin (avian omnivore)	Deer mouse (mammalian omnivore)	Gray fox (mammalian top carnivore)	Montane shrew (mammalian insectivore)	Mountain cottontail (mammalian herbivore)	Aquatic community organisms - sediment	Occult little brown myotis bat (mammalian aerial insectivore)	Violet-green swallow (avian aerial insectivore)
ANTIMONY	2.7	0.59	0.12 - 2.61	58	780	NA	NA	NA	NA	NA	23	460	79	27	NA	450	NA
ARSENIC	24.2	5.8	1.3 - 24.9	91	68	7,400	1,000	340	150	210	51	1,300	31	180	33	39	340
BARIUM	224	569	44 - 2630	260	3,200	44,000	13,000	1,200	1,400	1,300	8,700	190,000	10,000	14,000	300	31,000	5,200
CADMIUM	1.8	0.37	0.1 - 3	160	760	2,300	7.7	23	1.6	3	6.8	7,400	3.6	140	4.9	3	3.7
CHROMIUM	14	30	3 - 155	4	3.4	36,000	14,000	2,100	1,400	1,600	5,500	46,000	3,300	10,000	NA	8,600	6,600
COPPER	67.8	14	1.4 - 75.2	490	530	3,500	240	100	43	60	100	6,700	70	430	140	81	69
LEAD	301	19	0.9 - 133	570	8,400	1,000	160	36	23	28	230	7,000	170	600	120	220	52
MANGANESE	583	457	26 - 1460	1,100	4,500	120,000	50,000	2,700	4,700	3,500	5,400	150,000	10,000	7,500	1,100	47,000	100,000
MERCURY	0.21	0.019	0.01 - 0.05	64	0.5	3.2	0.58	0.67	0.13	0.22	30	760	17	230	1	20	0.17
NICKEL	11.4	12	1 - 78.5	270	1,300	8,100	440	500	81	130	40	2,500	21	540	48	24	310
SELENIUM	1.8	0.38	0.2 - 2.3	3	41	140	7.5	1.9	1.4	1.6	1.2	130	1	3.4	2.9	1.2	2.1
SILVER	0.71	all <1		2,800	NA	6,000	130	100	26	41	240	44,000	140	1,500	5	160	36
THALLIUM	0.28	0.45	0.1 - 1.5	0.5	NA	1,000	480	69	45	55	7.2	50	4.2	12	NA	7.3	230
VANADIUM	14.8	54	3 - 189	80	NA	230	110	13	9.5	11	1,000	6,900	610	1,500	NA	1,100	59
ZINC	348	50	3 - 107	810	930	7,000	590	120	120	220	1,700	94,000	980	18,000	450	1,100	630

Sources
LANL - Los Alamos National Laboratory, EcoRisk Database, version 4.2
USGS - United States Geological Survey

Abbreviations
Conc. - Concentration
COPEC - Chemical of Potential Ecological Concern
ESL - Ecological Screening Level
Max. - Maximum
NA - Not Applicable
mg/kg - milligrams per kilogram
Bkg - Background

Notes
Maximum concentration exceeds the ESL

*Only three sediment samples, collected from site seep areas, have been analyzed for metals. No surface soil have been analyzed for metals. This evaluation assumes surficial soil would be similar to measured sediment concentrations.