



UNITED STATES AIR FORCE

TATALINA LONG RANGE RADAR STATION

Human Health and Ecological Risk Assessments at SS03, SS08 and SS11 Report

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UNITED STATES AIR FORCE

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LIST OF ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
µg	microgram(s)
% UCL	percent upper confidence limit
AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
AFCEE	Air Force Center for Engineering and the Environment
Air Force	U.S. Air Force
ATSDR	Agency for Toxic Substances and Disease Registry
bgs	below ground surface
BLM	U.S. Bureau of Land Management
BTEX	benzene, toluene, ethylbenzene, and xylenes
BUTL	background upper tolerance limit
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cm ²	square centimeter
COPC	chemical of potential concern
COPEC	chemical of potential ecological concern
CSF	cancer slope factor

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

CSM	conceptual site model
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethene
DDT	dichlorodiphenyltrichloroethane
DRO	diesel range organics
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
ERA	ecological risk assessment
ERBSC	ecological risk-based screening concentration
ERP	Environmental Restoration Program
FIR	food ingestion rates
GPS	global positioning system
GRO	gasoline range organics
HEAST	Health Effects Assessment Summary Tables
HHERA	human health and ecological risk assessment
HHRA	human health risk assessment
HI	hazard index
HQ	hazard quotient
IRIS	Integrated Risk Information System
IRP	Installation Restoration Program
kg	kilogram(s)
LRRS	Long Range Radar Station
m ³	cubic meter(s)
MAR	Minimally Attended Radar
mg/Kg	milligrams per kilogram
mg/L	milligrams per liter
mg	milligram(s)
MOGAS	motor vehicle gas
MRL	method reporting limit
NAWQC	National Ambient Water Quality Criteria
NFRAP	no further remedial action planned
NOAA	National Oceanic and Atmospheric Administration
NOAEL	no observable adverse effect level
ORNL	Oak Ridge National Laboratory
PAH	polynuclear aromatic hydrocarbons
PCB	polychlorinated biphenyls
PHC	petroleum hydrocarbon
POL	petroleum, oils and lubricants
ppm	part per million
PPRTV	Provisional Peer Reviewed Toxicity Values
RAPM	Risk Assessment Procedure Manual
RCRA	Resource Conservation and Recovery Act
RfD	reference dose

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

RI	remedial investigation
RME	reasonable maximum exposure
RRO	residual range organics
RSL	Regional Screening Level
SAP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act
SI	site inspection
SQuiRT	Screening Quick Reference Tables
SS	Spill Site
SVOC	semi-volatile organic compound
SW	USEPA Solid Waste Method
TEL	Threshold Effects Levels
TPH	total petroleum hydrocarbons
TRV	toxicity reference values
UF	uncertainty factor
UST	underground storage tank
VOC	volatile organic compounds
WAA	Waste Accumulation Area
WACS	White Alice Communications System

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1.0 INTRODUCTION

This Human Health and Ecological Risk Assessment Report (HHERA Report) describes the methods used in, and results of, a human health and ecological risk assessment (HHERA) for three Lower Camp sites at Tatalina Long Range Radar Station (LRRS), Alaska. This document was prepared by MWH on behalf of the Air Force Center for Engineering and the Environment (AFCEE) under Contract F41624-03-D-8608, Task Order 214.

Three sites at Lower Camp are being investigated further in accordance with the U.S. Air Force (Air Force) Environmental Restoration Program (ERP), and consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S. Code 9601, Executive Order 12580 (52 Federal Register 2923), as amended by the Superfund Amendments and Reauthorization Act (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan. However, Lower Camp is not a CERCLA site and will be remediated under Alaska Department of Environmental Conservation (ADEC) regulations (USAF, 1998b).

Lower Camp at Tatalina LRRS includes seven ERP Sites, three of which, designated as Spill Site (SS) 03, SS08, and SS11, are the subject of this HHERA Report. Site SS03 consists of eight tanks that comprised the former petroleum, oil, and lubricants (POL) Tank Farm; SS08 consists of former Waste Accumulation Area (WAA) No. 4, the old sanitary sewer system, the former sewage lagoon, and the former paint shop; and SS11 includes two co-located historical disposal areas: Hardfill No.1 and WAA No. 1. Environmental investigations were previously conducted at these sites, as documented in the following documents:

- Draft Interim Remedial Action Report (USAF, 1998a)
- Final Remedial Investigation (RI) Report (USAF, 1998b)
- Follow-on Remedial Investigation of Source Area SS-008/WAA No.4 (USAF, 2000)
- Remedial Action and Monitoring Program Annual Report (USAF, 2003)
- 2003 Final Follow-On Remedial Investigation at SS03, SS08, and SS11 Report (USAF, 2004)
- 2004 Final Follow-On Remedial Investigation at SS03, SS08, and SS11 Report (USAF, 2005)
- 2008 Draft Follow-On Remedial Investigation at SS03, SS08, and SS11, Technical Memorandum (USAF, 2008a).

Risk Assessments were previously conducted for Lower Camp sites, as documented in the Final RI Report (USAF, 1998b). Subsequent to these investigations and risk assessments, additional guidelines and regulations have been released by ADEC and the U.S. Environmental Protection Agency (EPA), and additional site characterization information has been collected at these sites. Therefore, these revised HHERAs have been prepared for SS03, SS08, and SS11, in accordance with methods and procedures described herein.

Results of these revised HHERAs for these sites were used to evaluate whether current concentrations of chemicals present in site media pose a potential risk to human or ecological receptors, as well as to establish levels of chemicals in site media that may remain on site and still be protective of human health and the environment.

1.1 SITE HISTORY

Tatalina LRRS consists of 4,968 acres located along the eastern flank of the Kuskokwim Mountains in southcentral Alaska, 10 miles southeast of Takotna (Figure 1-1). The installation is composed of four areas: Upper Camp on Takotna Mountain, Lower Camp, the Airstrip, and the Sterling Landing (barge landing) site along the Kuskokwim River (Figures 1-2 and 1-3). The installation (formerly called the Tatalina Air Force Station), was established in 1952, and is one of the many communication sites owned by the Air Force as part of a defense communication network and aircraft warning system across Alaska. The White Alice Communication System (WACS) began operations in 1957 and operated until 1979.

Operations at Tatalina LRRS have included POL transfer and storage, vehicle and electronic system maintenance, fire training, waste disposal (landfills), and road and runway oiling. Sterling Landing, located on the Kuskokwim River 16 miles east of the installation (Figure 1-2), is the off-loading location for barges delivering supplies, including fuel and other petroleum products, to Tatalina LRRS that might have impacted the environment.

Tatalina LRRS facilities have been downscaled (or eliminated) since the 1980s. Since 1985, a number of environmental investigation and cleanup projects have been conducted at Tatalina LRRS, primarily associated with cleanup of fuel spills. The relative locations of Sites SS03, SS08, and SS11, all located at Lower Camp, are shown on Figure 1-3.

As briefly described above, SS03 consists of eight tanks that comprised the former POL Tank Farm and is located near the southwestern portion of Lower Camp (Figure 1-3). This area has been used for aboveground diesel and motor vehicle gas (MOGAS) fuel storage and dispensing from the 1950s to 1997. Prior to the 1997 field investigation, the 611th Civil Engineering Squadron cleaned and removed three bulk diesel and two bulk MOGAS out-of-service storage tanks from the area. The tank removal project did not investigate or remove soil or the liner within the storage tank bermed areas. Site records indicate that the POL Tank Farm bermed area was previously drained. Water was released into the top of the drainage area that begins just below the Tank Farm pad. The drainage system might have released petroleum hydrocarbons into the drainage. Four fuel spills are cited in site records: 1,000 gallons in 1980, 500 gallons in 1981, 500 gallons in 1982, and several hundred gallons in the 1970s (USAF, 2004). Records indicate that a liner was installed in the bermed POL storage tank area in 1983.

Site SS08 consists of the former WAA No. 4, the old sanitary sewer system, the former sewage lagoon, and former paint shop. WAA No. 4 was used from the 1950s to 1984 to store waste oil drums from the former motor pool. It was located on the eastern side of a large flat gravel pad near the former garage and vehicle storage building (Figure 1-3). The former Lower Camp structures were built on this pad. These structures, including the garage and

vehicle storage building, were demolished and removed in the mid-1980s. Some debris was removed from the site, and some debris was buried on site in cells adjacent to the structures' former location. This source area also includes the old septic tank, located downhill from the POL Tank Farm area (SS03) at Lower Camp. During the years of operation, all drains from the Lower Camp facility were connected to this system.

SS11 includes two collocated historical disposal areas: Hardfill No.1 and WAA No. 1. Construction and demolition debris was disposed of in Hardfill No. 1, and approximately 150 drums were disposed of in WAA No. 1.

An ERP, formerly known as the Installation Restoration Program (IRP), was initiated at Tatalina LRRS in 1985, with the first product being the IRP Phase I: Records Search (USAF, 1985). Site evaluation and cleanup has occurred under the direction of ADEC. The EPA Region X evaluated data from the Tatalina LRRS IRP to determine the installation's Hazard Ranking, but has provided no additional input regarding restoration activities at Tatalina LRRS.

Numerous site investigation and characterization studies have been performed at the installation since 1985, including a RI that was completed in 1997 (USAF, 1998b). Subsequent to the risk assessments performed as part of the RI, methodological guidelines and regulations from ADEC and the EPA have been released and additional site characterization data have been collected, which warrants a reevaluation of the previous risk assessments for Sites SS03, SS08, and SS11 that were included in the Final RI Report (USAF, 1998b).

1.2 PURPOSE AND SCOPE

The goal of this HHERA is to evaluate potential risks to human health and the environment from chemical contaminants present in media (i.e., soil, sediment, sludge, water, air, and biota [e.g., plants and animals]) associated with SS03, SS08, and SS11. A health risk assessment is a scientific procedure used to estimate the potential for current and future adverse effects on human health and the environment from exposure to physical, chemical, and/or radiological hazards. At a contaminated site, a baseline risk assessment is used to evaluate potential risks to human and ecological receptors posed from contamination in the absence of remediation or institutional controls. The baseline risk assessment for SS03, SS08, and SS11 was used to evaluate risks to human and ecological receptors posed by contaminant releases from these sites, in the absence of remediation or institutional controls. The one exception to this is a residential pathway which is deemed to be incomplete. The Air Force plans to remain in control of Tatalina LRRS for the foreseeable future and has no intention of disposing of the property or ever allowing permanent residents to occupy the Site. If, under unforeseen circumstances the land use should change to include residential receptors, the Risk Assessment results should be reevaluated. If results of the baseline risk assessment suggest that adverse effects to human or ecological receptors are likely, the baseline risk assessment will support future development of alternative, risk-based cleanup levels for site contaminants.

Consistent with the stated goal of this HHERA, the purpose of this HHERA Report is to present the methods that were used to evaluate risks to human health and the environment from potential exposures to chemicals present in, or released from, contaminated media associated with SS03, SS08, and SS11 and the results of this evaluation. In addition, this HHERA Report outlines the technical approach (i.e., data evaluation, exposure assessment, toxicity assessment, risk characterization, and uncertainty analysis) and general assumptions that were used to complete the HHERA.

As described above, environmental investigations and risk assessments were previously conducted for SS03, SS08, and SS11, as documented in the Final RI Report (USAF, 1998b). Subsequent to these investigations and risk assessments, additional site characterization information has been collected (refer to Section 3.0). This HHERA Report incorporates results of all follow-on investigations conducted for Sites SS03, SS08 and SS11.

This HHERA is based on data collected between 1997 and 2007, and a limited number of samples for each medium. Data validation was performed during the RI, as described in Section 4.2.3 of the Final RI Report (USAF, 1998b). Data usability for risk assessment was also evaluated during the RI, as described in Appendix B, Section 2.0 of the Final RI Report (USAF, 1998b). Data were evaluated according to ADEC's and EPA's risk assessment guidance (ADEC, 1997; USEPA, 1989a and 1992b).

Post-RI activities included follow-on investigations at SS03, SS08, and SS11 (USAF, 2000; 2003; 2004; 2005; 2008); underground storage tank (UST) closures at SS08 in 1999 (USAF, 1999a, b, c, and d); removal of the liner beneath Tank Pit 1 and Tank Pit 2/3 at the former SS03 tank farm and excavation of test pits to collect subsurface soil samples beneath the liner (USAF, 2005); and removal of six drums from a hillside west of SS11 and collection of surface soil samples beneath the drums (USAF, 2005). All post-RI sampling results were analyzed in accordance with EPA Methods, including *Test Methods for Evaluating Solid Waste, SW-846, Third Edition* (USEPA, 1986). Data verification and data review were conducted in accordance with the approved *Remedial Investigation/Feasibility Study Sampling and Analysis Plan* (SAP) (USAF, 1997) and SAP Addendum (USAF, 1999e). Data review included an evaluation of precision, accuracy, representativeness, comparability, and completeness in accordance with the EPA's *Data Quality Objectives Process for Superfund, Interim Final Guidance* (USEPA, 1993a) and the AFCEE *Quality Assurance Program Plan* (AFCEE, 1997). These data were deemed to meet usability criteria for risk assessment.

1.3 ORGANIZATION

This HHERA Report consists of eight sections and eight appendices, as described below.

Section 1.0 Introduction – Describes the purpose, scope, and organization of this HHERA Report.

Section 2.0 Environmental Setting – Provides brief descriptions of Lower and Upper Camp areas, and the environmental and human settings (climate, geology, hydrology, hydrogeology, demography and land use, and ecology).

Section 3.0 Sampling Investigation History – Summarizes contaminant characterization investigations conducted at SS03, SS08, and SS11.

Section 4.0 Site Conceptual Model – Presents a description of contaminant transport and migration pathways at SS03, SS08, and SS11, and relates these pathways to potential human and ecological receptor exposures.

Section 5.0 Human Health Risk Assessment – Describes the approach, methods, and general assumptions used during preparation of the human health risk assessment (HHRA) for SS03, SS08, and SS11 and reports results of the risk assessment.

Section 6.0 Ecological Risk Assessment – Describes the approach, methods and general assumptions used during the evaluation of potential risks to ecological receptors and reports results of the ecological risk assessment.

Section 7.0 Uncertainty Analysis – Presents an evaluation of the uncertainties in the available information and methods presented in this HHRA Report.

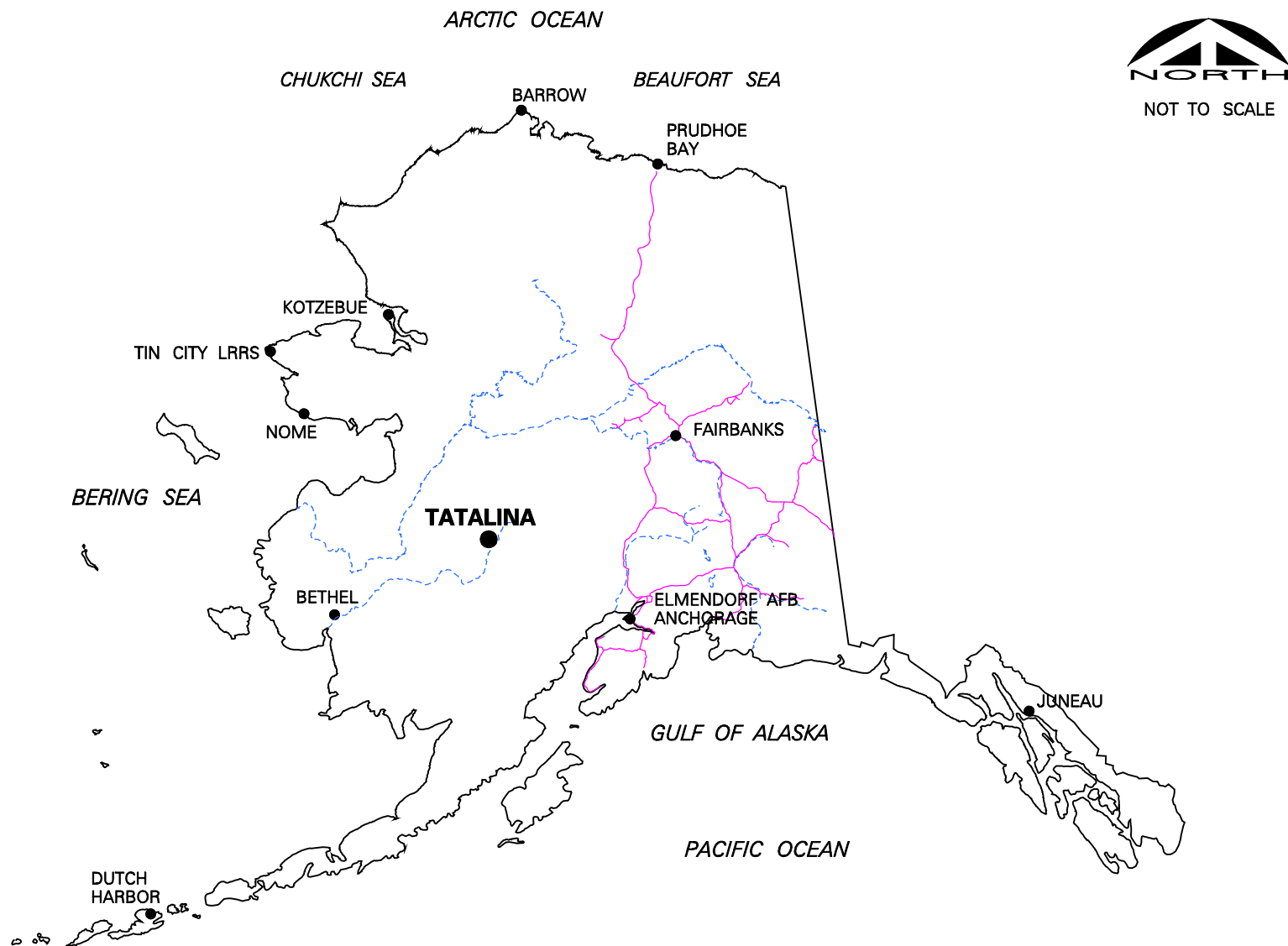
Section 8.0 References – Lists the reference documents cited in this HHRA Report.

Appendices include:

- A Remedial Investigation Data Summary Tables
- B Selection of Chemicals of Potential Concern and Chemicals of Potential Ecological Concern
- C Ecological Checklist
- D Summary Statistics and 95% UCL Calculations
- E Human Health Exposure Dose Equations and Sample Risk Calculations
- F Human Health Risk and Hazard Calculations
- G Ecological Exposure Dose Equations and Sample Hazard Calculations
- H Ecological Hazard Calculations

Tables and Figures are presented at the end of each section in which they are introduced.

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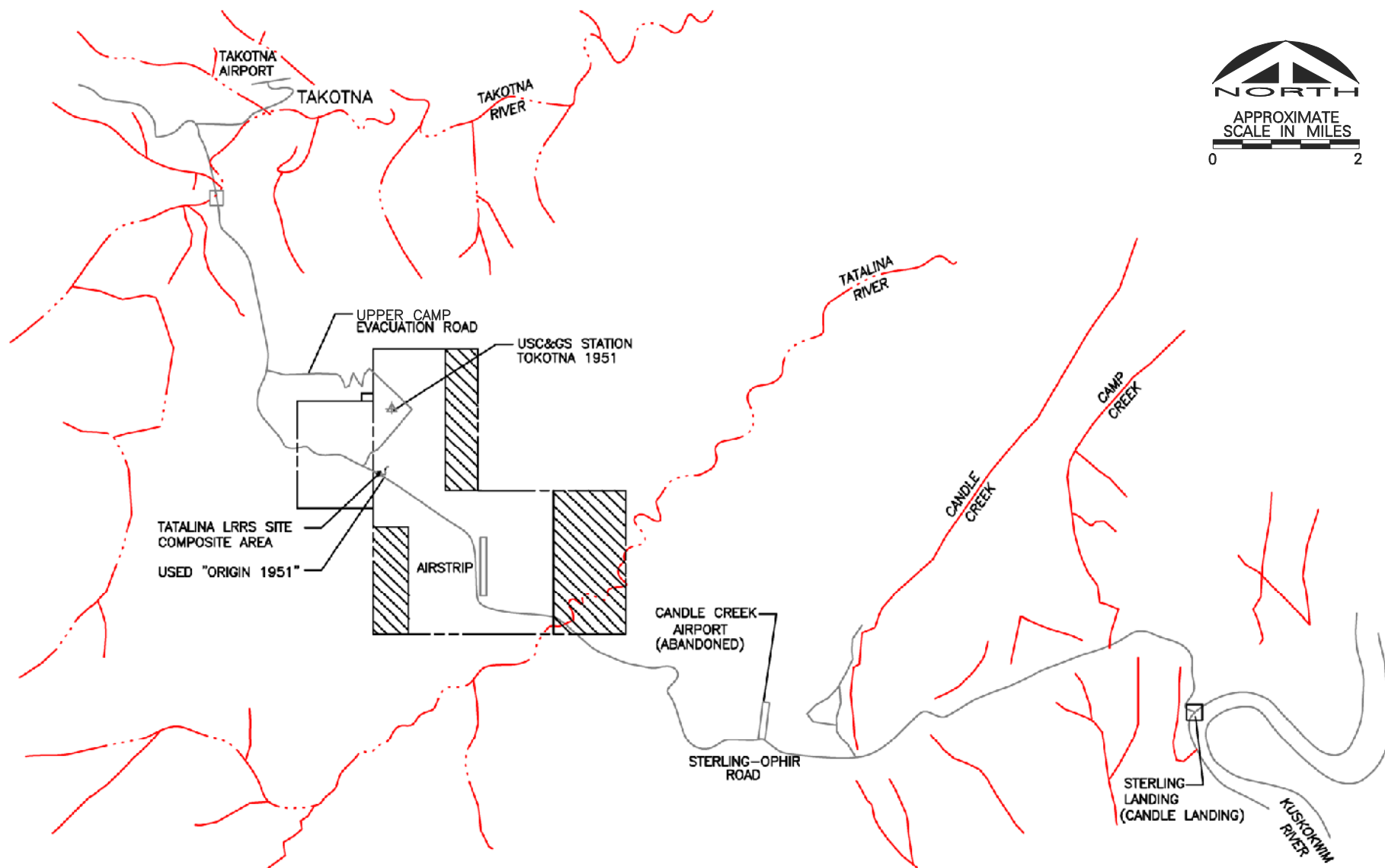
- RIVERS
- ROADS

FIGURE 1-1

U. S. AIR FORCE – TATALINA LRRS, ALASKA
HHERA WORK PLAN FOR SS03, SS08, AND SS11

LOCATION MAP

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**LEGEND:****FIGURE 1-2**

U. S. AIR FORCE – TATALINA LRRS, ALASKA
HHERA WORK PLAN FOR SS03, SS08, AND SS11

VICINITY MAP

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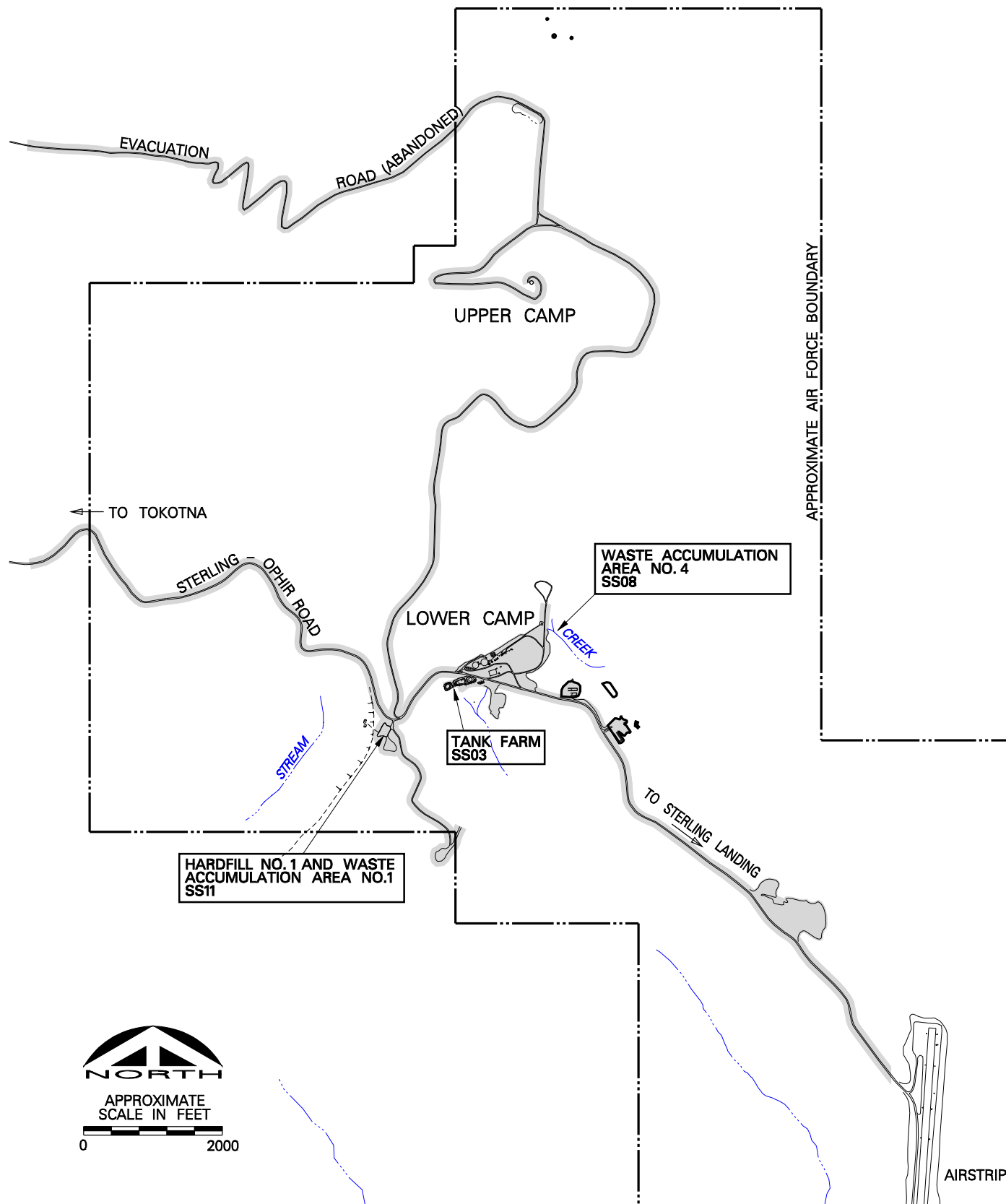


FIGURE 1-3

U. S. AIR FORCE – TATALINA LRRS, ALASKA
HHERA WORK PLAN FOR SS03, SS08, AND SS11

SITE MAP

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2.0 ENVIRONMENTAL SETTING

A general description of the environmental and human settings is described in this section. The discussion focuses on Lower Camp where SS03, SS08, and SS11 are located. A more detailed description of the environmental setting at Tatalina LRRS is provided in the Final RI Report (USAF, 1998b).

2.1 FACILITY DESCRIPTION

Tatalina LRRS consists of 4,968 acres located in the upper Kuskokwim River area, 240 miles northwest of Anchorage (Figure 1-2). The nearest settlement is Takotna, a community located about 10 miles by road north of Tatalina LRRS. The larger community of McGrath is about 14 miles east of Tatalina LRRS.

Tatalina LRRS consists of four areas: Upper Camp on Takotna Mountain, where radar facilities are located; Lower Camp, where residential and support facilities are located; the Airstrip; and Sterling Landing (barge landing) site along the Kuskokwim river. Figure 1-3 shows the relative locations of these areas.

Currently, four contract personnel are assigned to Tatalina LRRS to operate and maintain the facilities. Contract personnel are housed at Lower Camp, which consists of a living dome, an industrial dome, and several aboveground storage tanks used for fueling vehicles and equipment. Upper Camp consists of a radome that houses the Minimally Attended Radar (MAR).

2.2 CLIMATE

Tatalina LRRS has a cold, continental climate with extreme temperature differences. Winters are long, cold, and dry, and summers are short. Winter temperatures range from -42 to 0 degrees Fahrenheit (°F), and the average temperature in December is -15°F. Summer temperatures range from 42°F to 80°F, and average 50°F to 60°F. The Takotna River is generally ice free from June through October. The average annual total precipitation is 15 inches, with 84 inches of snowfall. Tatalina LRRS falls into the under 40-inch annual precipitation zone as defined by ADEC.

2.3 GEOLOGY

Regional, local, and site-specific geology at Lower Camp are summarized in the following subsections. A more detailed description of the geologic setting in the vicinity of Tatalina LRRS is provided in the Final RI Report (USAF, 1998b).

2.3.1 Regional Geologic Setting

Upper Camp, ranging in elevation from 2,880 to 3,203 feet, is above the tree line in the alpine tundra vegetative zone near the summit of Takotna Mountain. The mountain is drained on the north and south flanks by the Takotna and Tatalina rivers, respectively. Rain and snowmelt

probably infiltrate through the highly conductive granular soil to the bedrock at Upper Camp. The underlying bedrock would act as a lower boundary, conducting the water until it infiltrates into fractured bedrock or resurfaces as a spring.

Permafrost regions can be divided into two zones: discontinuous and continuous. In the discontinuous zone there may be lenses, or layers, of permafrost separated by unfrozen ground. The current southern boundary of the permafrost zone broadly parallels the 32°F annual isotherm in surface air (Flint, 1971). Tatalina LRRS is located in the zone of discontinuous permafrost. Neither seasonally frozen material nor permafrost was logged in the 1997 RI at Lower Camp (USAF, 1998b). Permafrost was encountered starting at depths of 34 feet in two wells drilled during the 1997 RI at Sterling Landing (USAF, 1998b).

2.3.2 Local Geology

Tatalina LRRS is located on the eastern flank of the Kuskokwim Mountains of the Western Alaska physiographic province. The most widespread lithologic unit surrounding Tatalina LRRS is the sedimentary Upper Cretaceous Kuskokwim Group, which consists of graywacke, shale, quartz-rich sandstone, and conglomerates. The most prominent structural feature in the Tatalina area is the right, lateral, northeast-trending Iditarod-Nixon Fork Fault. The structural grain of the Tatalina area is northeast trending, and many of the drainages are probably fault controlled (USAF, 1998b).

2.3.3 Lower Camp Geology

Lower Camp, on the southern flank of Takotna Mountain, is at an elevation of about 1,250 feet. The Airstrip is about 2 miles southeast of Lower Camp, at an elevation of about 890 feet. Both Lower Camp and the Airstrip are on the same relatively broad, flat-topped ridge that slopes gently southeast. Lower Camp rests on up to 30 feet of alluvium and talus capping fractured interbedded sandstone, siltstone, shale, and hornfels. Surficial sediments are dense, and the backhoe used during RI excavations could not penetrate more than 5 feet below ground surface (bgs) in some areas (USAF, 1998b). A low-permeability clay layer is present in some areas.

2.4 HYDROLOGY

Various watersheds originate from Takotna Mountain (Figure 2-1). Surface waters present in Upper Camp and other regions flow into the various stream channels and major drainages within the watershed. Surface water flows from rain events are intermittent, while water flows from snow melts can occur for longer periods. There are two main surface water drainages flowing toward the Tatalina River that could be affected by LRRS activities. One drainage extends from the south side of the mountain and another extends from the southeastern side of the mountain. Ridges separate these two major drainages. The drainage originating from the southeastern side passes through the eastern boarder of Lower Camp, continues on the northern side of the ridge and eventually enters the Tatalina River. The other drainage, originating from the southern region, west of Lower Camp, passes through the south side of

Lower camp, merges with another creek from the northern watershed and eventually enters the Tatalina River (USAF, 1998b).

An infiltration gallery was installed within the drainage along the eastern side of Lower Camp to provide a water source for Lower Camp. Surface water was observed within the drainage channel during the 1997 RI. The drainage eventually becomes a perennial stream downgradient from the infiltration gallery. This drainage can potentially transport contaminants from sites such as WAA No. 4 at SS08, the former truck fill stand, and other sites along the north side of the ridge.

The Lower Camp portion of the southeast-trending drainage has been disturbed through the grading of the Lower Camp gravel pad. SS03 is located above the drainage. During the 1997 RI, a surface water seep was observed near SS03 at the base of a fill slope that covers this drainage channel. The drainage channel downgradient of the Lower Camp pad is relatively undisturbed. The drainage that originates from the southern side, west of Lower Camp, was also investigated for surface water during the 1997 RI, but no surface water was found (USAF, 1998b).

2.5 HYDROGEOLOGY

The Upper Camp of Tatalina LRRS is the principal recharge zone for groundwater at the installation. Water collects downslope, into shallow aquifers and surface streams. Drinking water for the installation is collected from one such surface stream through an infiltration gallery adjacent to SS08. Groundwater at Upper Camp may occur in the sediments seasonally as perched water, but discharge of run-off into bedrock or downslope is more likely. Groundwater at Lower Camp is found primarily in the more permeable sediments at depths that range from 8 to 28 feet bgs. Depth to groundwater at Sterling Landing is influenced by the level of the Kuskokwim River, but generally occurs near 28 feet bgs. Permafrost occurs at depths of approximately 35 feet bgs and may act as a lower aquifer boundary. If the permafrost does act as a lower boundary for the aquifer, then the aquifer is about 7 feet thick at Sterling Landing.

During the 1997 RI at Tatalina LRRS, the following observations were recorded:

- Groundwater was encountered at Lower Camp at a minimum depth of 10 feet bgs.
- The saturated soil depth varied from 0 to 15 feet bgs.
- Groundwater flow was interpreted to follow the contours of the top of a low-permeability clay horizon and bedrock, with localized gradients.
- Groundwater was encountered in the vicinity of the infiltration gallery and the creek topographically upgradient of SS08.

The magnitude of seasonal groundwater fluctuations, potential changes in gradient, and aquifer thickness are not known.

2.6 DEMOGRAPHY AND LAND USE

Tatalina LRRS is located near the communities of McGrath and Takotna. McGrath, with a population of 401, is situated approximately 14 miles east of Tatalina LRRS. Takotna, a small community of 50 residents, lies about 10 miles northwest of the installation, and is connected by a road to the installation (Cushing, 1999). Both local communities operate on cash and subsistence economies.

Both the communities of McGrath and Takotna rely on subsistence resources for food, with a significant portion of their subsistence harvest comprised of fishing the rivers within the Kuskokwim floodplain (USAF, 1998b). Residents of Takotna and McGrath are not allowed to hunt on the LRRS.

Currently, four contract personnel are assigned to Tatalina LRRS to operate and maintain the facilities. Contract personnel are housed at Lower Camp, which consists of a living dome, an industrial dome, and several aboveground storage tanks used for fueling vehicles and equipment. Upper Camp consists of a radome that houses the MAR. Contract personnel who live and work at the LRRS hunt and fish at the LRRS.

2.7 ECOLOGY

The flora, fauna, and threatened and endangered species occurring in and around Tatalina LRRS are discussed in the following subsections.

2.7.1 Flora and Fauna

Plant and animal species occurring in and around Tatalina LRRS are described in Sections 2.7.1.1 and 2.7.1.2, respectively.

2.7.1.1 Flora

This subsection summarizes the prevalent floral species that occur in and around Tatalina LRRS. Table 2-1 presents the potentially occurring and observed floral species associated with Tatalina LRRS and surrounding areas.

The predominant habitat at Tatalina LRRS is upland spruce/hardwood forest, which is characterized by white spruce with scattered paper birch. Quaking aspen is found on moderate south-facing slopes and black spruce is found on northern exposures and poorly-drained flat areas. The understory within the forest consists of spongy mosses and low brush on the cool moist slopes, grasses on dry slopes, and willow and alder with dwarf birch in the high, open forests near timberline. Common shrubs are willow, highbush cranberry, and rose. Common herbs are bluebell, fireweed, lupine, and twinflower. Two common grasses are blue-joint reed grass and cotton grass. Sedges and rushes, as well as various ferns, mosses, and lichens, are common in moist areas (USAF, 1998b).

Some special status plants may occur in the general area of McGrath, which includes the Tatalina LRRS area. The Alaska National Heritage Program Database identifies the following plant species that might occur in the McGrath area and are considered rare or are of special interest: *Smelowskia pyriformis*, Hudson Bay sedge (*Carex heleonastes*), Alaska sweetflower, rockjasmine (*Androsace chamaejasme* Wulfen), and Arctic pennycress (*Noccaea arctica*) (USAF, 1998b). However, none of these plant species were actually observed during previous RI ecological surveys or site visits (USAF, 1998b).

2.7.1.2 Fauna

The prevalent faunal species that occur in and around Tatalina LRRS are summarized below. Information is presented for resident and migratory mammals, birds, amphibians/reptiles, and aquatic species. Tables 2-2 through 2-5 present the potentially occurring or observed mammals, birds, amphibians/reptiles, and aquatic species that inhabit or migrate through Tatalina LRRS, as well as those flora and fauna specifically noted in the June 17 to June 19, 1997 ecological survey (USAF, 1998b).

Mammals. Tatalina LRRS falls within the general range of many species of wildlife. Some of the more common mammals include: moose, caribou, brown bear, black bear, gray wolf, beaver, wolverines, and marten. Many smaller mammals, including muskrats, snowshoe hare, weasels, and voles, are also common (USAF, 1998b). Trapping and hunting, specifically of beaver, are common subsistence practices within the McGrath area (USAF, 1998b). Table 2-2 presents the potentially occurring or observed mammals that inhabit or migrate through Tatalina LRRS.

Birds. Shrub thickets at the Tatalina LRRS, particularly associated with water and riparian habitat, provide diverse vegetative structure and high productivity that has been correlated with breeding bird abundance, density, and species diversity. Spruce grouse, ruffed grouse, sharp-tailed grouse, and rock and willow ptarmigan inhabit the area. Many passerine species and a few raptor species live within the area of Tatalina LRRS year-round, including robins, raven, gray jay, chickadees, dark-eyed junco, thrushes, falcons, and red-tailed hawk (USAF, 1998b).

Some of the more common waterfowl that nest or migrate through the Tatalina LRRS area, specifically within the floodplain of the Kuskokwim River, include: American widgeon, mallards, green-winged teal, northern pintail ducks, Canada geese, white-fronted geese, snow geese, gulls, and loons. The Tatalina area also provides habitat for a variety of migratory shorebirds such as spotted sandpiper, solitary sandpiper, and semipalmated plover (USAF, 1998b). Table 2-3 presents the potentially occurring or observed birds that inhabit or migrate through Tatalina LRRS.

Amphibians/Reptiles. The only amphibian species potentially occurring in or around the Tatalina LRRS is the wood frog (*Rana sylvatica*) (Table 2-4; USBLM, 2001).

Aquatic Species. Fish species known to occur in streams within the Tatalina LRRS area include: coho, Chinook, chum, pink, and sockeye salmon; whitefish; sheefish; northern pike;

Arctic grayling; Arctic char; and dolly varden (USAF, 1998b). Table 2-5 presents the potentially occurring or observed aquatic species that inhabit or migrate through Tatalina LRRS.

2.7.2 Threatened and Endangered Species

No threatened or endangered plant, fish, or wildlife species are known to occur within Tatalina LRRS.

2.7.3 Areas of Critical Concern and Alaska Special Areas

The U.S. Bureau of Land Management (BLM) recognizes the Iditarod National Historic Trail as an Alaskan Special Area (USBLM, 2007). This is a trail that celebrates a 2,400-mile system of winter routes that first connected ancient Native villages (USBLM, 2007). The primary route of the Iditarod Trail runs directly through both McGrath and Takotna (USBLM, 2007).

The BLM denotes Areas of Critical Environmental Concern to identify sensitive and valuable aquatic resources that require special management. The BLM does not currently recognize any Areas of Critical Environmental Concern within the Tatalina LRRS or nearby areas. Additionally, crucial or critical habitats have not been identified for aquatic or terrestrial species in the vicinity of Tatalina LRRS.

Table 2-1 Potential and Observed Flora of Tatalina LRRS

Common Name	Scientific Name	Potentially Occurring	Observed
Trees and Shrubs			
Alder	<i>Alnus species</i>	X	1
River Alder	<i>Alnus rugosa</i>	X	1
Bog-rosemary	<i>Andromeda polifolia</i>	X	
Alpine Bearberry	<i>Arctostaphylos alpina</i>	X	
Red-fruit Bearberry	<i>Arctostaphylos rubra</i>	X	
Bearberry (kinikini)	<i>Arctostaphylos uva-ursi</i>	X	
Alaska Sagebrush	<i>Artemisia alaskana</i>	X	
Birch	<i>Betula species</i>	X	1
Alaska Paper Birch	<i>Betula papyrifera v. humilis</i>	X	1
Four-angled Cassiope	<i>Cassiope tetragona</i>	X	2
Leatherleaf	<i>Chamaecyparis calyculata</i>	X	
Bunchberry	<i>Cornus canadensis</i>	X	1
Red-osier Dogwood	<i>Cornus stolonifera</i>	X	
Diapensia	<i>Diapensia lapponica</i>	X	
Crowberry	<i>Empetrum nigrum</i>	X	
Common Juniper	<i>Juniperus communis</i>	X	
Tamarack	<i>Larix laricina</i>	X	1
Narrowleaf Labrador Tea	<i>Ledum decumbens</i>	X	
Labrador Tea	<i>Ledum groenlandicum</i>	X	2
Twin-flower	<i>Linnaea borealis</i>	X	
Alpine-azalea	<i>Loiseleuria procumbens</i>	X	
Sweet Gale	<i>Myrica gale</i>	X	
White Spruce	<i>Picea glauca</i>	X	1
Black Spruce	<i>Picea mariana</i>	X	1
Balsam Poplar	<i>Populus balsamifera</i>	X	1
Quaking Aspen	<i>Populus tremuloides</i>	X	1
Shrubby Cinquefoil	<i>Potentilla fruticosa</i>	X	
Northern Black Currant	<i>Ribes hudsonianum</i>	X	
Currant	<i>Ribes species</i>	X	
Red Currant	<i>Ribes triste</i>	X	1
Prickly Rose	<i>Rosa acicularis</i>	X	
Nagoon-berry	<i>Rubus arcticus</i>	X	
Cloudberry	<i>Rubus chamaemorus</i>	X	
Am. Red Raspberry	<i>Rubus idaeus v. strigosus</i>	X	
Feltleaf Willow	<i>Salix alaxensis</i>	X	1
Littleleaf Willow	<i>Salix arbusculoides</i>	X	1
Arctic Willow	<i>Salix arctica</i>	X	1,2
Bebb Willow	<i>Salix bebbiana</i>	X	1
Long-beaked Willow	<i>Salix depressa</i>	X	1
Alaska Bog Willow	<i>Salix fuscenscens</i>	X	1
Grayleaf Willow	<i>Salix glauca</i>	X	1
Halberd Willow	<i>Salix hastata</i>	X	1
Richardson Willow	<i>Salix lanata richardsonii</i>	X	1
Pacific Willow	<i>Salix lasiandra</i>	X	1
Skeletoleaf Willow	<i>Salix phlebophylla</i>	X	1
Diamondleaf Willow	<i>Salix planifolia pulchra</i>	X	1
Willow	<i>Salix pulchra</i>	X	1
Netleaf Willow	<i>Salix reticulata</i>	X	1
Beauverd Spirea	<i>Spiraea beauverdiana</i>	X	
Bog Cranberry	<i>Vaccinium oxycoccos</i>	X	

Table 2-1 Potential and Observed Flora of Tatalina LRRS

Common Name	Scientific Name	Potentially Occurring	Observed
Trees and Shrubs (Cont.)			
Bog Blueberry	<i>Vaccinium uliginosum</i>	X	
Mountain Cranberry	<i>Vaccinium vitis-idaea</i>	X	1
Highbush Cranberry	<i>Viburnum edule</i>	X	1
Herbaceous Plants			
Yarrow	<i>Achillea borealis</i>	X	
Common Yarrow	<i>Achillea millefolium</i>	X	1,2
Siberian Yarrow	<i>Achilles sibirica</i>	X	
Monkshood	<i>Aconitum delphinifolium</i>	X	
Musk Root, Moschatel	<i>Adoxa moschatellina</i>	X	
Wild Chives	<i>Allium schoenoprasum</i>	X	
Round Leaf Orchis	<i>Amerorchis rotundifolia</i>	X	
Pasque Flower	<i>Anemone drummondii</i>	X	
Narcissus-flower Anemone	<i>Anemone narcissiflora</i>	X	
Northern Anemone	<i>Anemone parviflora</i>	X	
Yellow Anemone	<i>Anemone richardsonii</i>	X	
Tall Pussytoes	<i>Antennaria pulcherrima</i>	X	
Hairy Rockcress	<i>Arabis divaricarpa</i>	X	
Pendent Grass	<i>Arctophila fulva</i>	X	
Alpine Arnica	<i>Arnica alpina</i>	X	
Tall Arnica	<i>Arnica attenuata</i>	X	
Frigid Arnica	<i>Arnica frigida</i>	X	
Lessing's Arnica	<i>Arnica lessignii</i>	X	
Arctic Wormwood	<i>Artemisa arctica</i>	X	
Northern Wormwood	<i>Artemisa borealis</i>	X	
Common Wormwood	<i>Artemisa tilesii</i>	X	
Alaska Wormwood	<i>Artemisia alaskana</i>	X	
Siberian Aster	<i>Aster sibiricus</i>	X	
American Milk Vetch	<i>Astragalus americanus</i>	X	
Beckmannia	<i>Beckmannia erucaeformis</i>	X	
Broomrape	<i>Boschniakia rossica</i>	X	
Moonwort	<i>Botrychium boreale</i>	X	
Moonwort	<i>Botrychium lunaria</i>	X	
Alaska Boykinia	<i>Boykinia richardsonii</i>	X	
Bluejoint Grass	<i>Calamagrostis canadensis</i>	X	1,2
Reed Bent Grass	<i>Calamagrostis sp.</i>	X	
Wild Calla Lily	<i>Calla palustris</i>	X	
Marsh Marigold	<i>Caltha palustris</i>	X	
Fairy Slipper	<i>Calypso bulbosa</i>	X	
Bluebell	<i>Campanula lasiocarpa</i>	X	1,2
Bitter Cress	<i>Cardamine purpurea</i>	X	
Cuckoo Flower	<i>Cardamine pratensis</i>	X	
Sedge	<i>Carex aquatilis</i>	X	1
Sedge	<i>Carex atherodes</i>	X	1
Sedge	<i>Cares bigelowii</i>	X	1
Sedge	<i>Carex sp.</i>		1
Paintbrush	<i>Castilleja sp.</i>	X	
Bering Sea Chickweed	<i>Cerastrium beeringianum</i>	X	

Table 2-1 Potential and Observed Flora of Tatalina LRRS

Common Name	Scientific Name	Potentially Occurring	Observed
Herbaceous Plants (Cont.)			
Strawberry Blight	<i>Chenopodium capitatum</i>	X	
Mackenzie Water Hemlock	<i>Cicuta mackenziana</i>	X	
Alaska Spring Beauty	<i>Claytonia sarmentosa</i>	X	
Goldthread	<i>Coptis trifolia</i>	X	1
Coral Root	<i>Corallorrhiza trifida</i>	X	
Northern Lady's Slipper	<i>Cypripedium passerinum</i>	X	
Arctic Larkspur	<i>Delphinium glaucum</i>	X	1
Tansy Mustard	<i>Descurainia sophia</i>	X	1
Frigid Shooting Star	<i>Dodecatheon frigidum</i>	X	2
Smoothing Whitlow-grass	<i>Draba hirta</i>	X	
Mountain Avens	<i>Dryas integrifolia</i>	X	2
Fireweed	<i>Epilobium angustifolium</i>	X	1
Dwarf Fireweed	<i>Epilobium latifolium</i>	X	2
Horsetail	<i>Equisetum pratense</i>	X	1
Fleabane	<i>Erigeron humilis</i>	X	
Arctic Fleabane	<i>Erigeron hyperboreus</i>	X	
Cotton Grass	<i>Eriphorum scheuchzeri</i>	X	
Arctic Forget-Me-Not	<i>Eritichum aretioides</i>	X	
Fescue Grass	<i>Festuca sp.</i>	X	
Northern Bedstraw	<i>Galium boreale</i>	X	
Glaucous Gentian	<i>Gentiana glauca</i>	X	
Glacier Avens	<i>Geum glaciale</i>	X	
Cow Parsnip	<i>Heracleum lanatum</i>	X	1
Common mares-tail	<i>Hippurus vulgans</i>	X	1
Wild Iris	<i>Iris setosa</i>	X	
Rushes	<i>Juncus spp.</i>	X	1
Vetchline	<i>Lathyrus palustris</i>	X	
Alp Lily	<i>lloydia serotina</i>	X	2
Lagotis	<i>Lagotis glauca</i>	X	2
Alpine Azalea	<i>Loiseleuria procumbens</i>	X	
Arctic Lupine	<i>Lupinus Arcticicus</i>	X	
Alpine Club Moss	<i>Lycopodium alpinum</i>	X	
Stiff Club Moss	<i>Lycopodium annotinum</i>	X	1
Ground Pine	<i>Lycopodium obscurum</i>	X	1
Wild Lily-of-the-valley	<i>Maianthemum canadense</i>	X	1
Bladder Campion	<i>Melandrium apetalum</i>	X	
Bogbean, Buckbean	<i>Menyanthes trifoliata</i>	X	
Bluebells	<i>Mertensia paniculata</i>	X	1
Arctic Sandwort	<i>Minuartia arctica</i>	X	
Shy Maiden	<i>Moneses uniflora</i>	X	
Alpine Forget-Me-Not	<i>Myosotis alpestris</i>	X	
Yellow Pond Lily	<i>Nuphar polysepalum</i>	X	
Bog Cranberry	<i>Oxycoccus microcarpus</i>	X	
Northern Yellow Oxytrope	<i>Oxytropis campestris</i>	X	
Blackish Oxytrope	<i>Oxytropis nigrescens</i>	X	
Alaska Poppy	<i>Papaver alaskanum</i>	X	2
Arctic Poppy	<i>Papaver lapponicum</i>	X	1
Grass of Parnassus	<i>Parnassia palustris</i>	X	
Woolly Lousewort	<i>Pedicularis lanata</i>	X	2
Oeder's Lousewort	<i>Pedicularis oederi</i>	X	2
Fernweed	<i>Pedicularis sudetica</i>		
Bumble Bee Flower	<i>Pedicularis verticillata</i>	X	
Yukon Beardtongue	<i>Pentstemon gormanii</i>	X	
Siberian Phlox	<i>Phlox sibirica</i>	X	

Table 2-1 Potential and Observed Flora of Tatalina LRRS

Common Name	Scientific Name	Potentially Occurring	Observed
Herbaceous Plants (Cont.)			
Common Plantain	<i>Plantago major</i>	X	1
Small Northern Bog Orchid	<i>Platanthera obtusaia</i>	X	
Blue Grass	<i>Poa pratensis</i>	X	
Tall Jacob's Ladder	<i>Polemonium acutiflorum</i>	X	1
Jacob's Ladder	<i>Polemonium pulcherrimum</i>	X	
Bistort	<i>Polygonum bistorta</i>	X	
Alpine Meadow Bistort	<i>Polygonum viviparum</i>	X	
Marsh Fivefinger	<i>Potentilla palustris</i>	X	2
Pasqueflower	<i>Pulsatilla patens</i>	X	
Pink Pyrola	<i>Pyrola asarifolia</i>	X	
Loarge-flowered Wintergreen	<i>Pyrola grandiflora</i>	X	
Buttercup	<i>Ranunculus spp.</i>	X	
Arctic dock	<i>Rumex Arcticus</i>	X	
Burnet	<i>Sanguisorba officianalis</i>	X	
Yellow Marsh Saxifrage	<i>Saxifraga hirculis</i>	X	
Spiked Saxifrage	<i>Saxifraga spicata</i>	X	
Roseroot	<i>Sedum rosea</i>	X	2
Mastodon Flower	<i>Senecio congestus</i>	X	
Black-tipped Groundsel	<i>Senecia lugens</i>	X	
Buffalo Berry, Soapberry	<i>Shepherdia canadensis</i>	X	
Campion Moss	<i>Silene acaulis</i>	X	2
Goldenrod	<i>Solidago multiradiata</i>	X	
Bur-reed	<i>Sparganium angustifolium</i>	X	
Ladies'Tresses	<i>Spiranthes romanzoffiana</i>	X	
Dandelion	<i>Taraxacum sp.</i>	X	
Bladderwort	<i>Utricularia intermedia</i>	X	
Valerian	<i>Valeriana capitata</i>	X	
Camas, Death	<i>Zygadenus elegans</i>	X	

Key:

1 - Observed includes species identified below the timberline during June 17 to 19, 1997 site visit (USAF, 1997).

2 - Observed includes species identified above the timberline during June 17 to 19, 1997 site visit (USAF, 1997).

Sources:

Final RI/FS Sampling and Analysis Plan (USAF, 1997).

Table 2-2 Mammalian Species Potentially Occurring in or Around Tatalina LRRS

Common Name	Scientific Name	Potentially Occurring	Observed
Insectivora Soricidae (Shrews)			
Dusky shrew	<i>Sorex obscurus</i>	X	
Masked shrew	<i>Sorex cinereus</i>	X	
Carnivora Ursidae (Bears)			
Black bear	<i>Ursus americanus</i>	X	
Brown bear	<i>Ursus arctos</i>	X	
Bear ^a	<i>Ursus spp.</i>	X	1
Mustelidae (Weasels, Skunks, etc.)			
Marten ^a	<i>Martes americana</i>	X	1
Least weasel	<i>Mustela rixosa</i>	X	1
Shorttail weasel	<i>Mustela erminea</i>	X	
Mink	<i>Mustela vison</i>	X	
River otter	<i>Lutra canadensis</i>	X	
Wolverine ^a	<i>Gulo gulo</i>	X	1
Canidae (Dogs, Wolves, and Foxes)			
Red fox ^b	<i>Vulpes vulpes</i>	X	1
Gray wolf	<i>Canis lupus</i>	X	1
Felidae (Cats)			
North American lynx	<i>Lynx canadensis</i>	X	
Rodentia Sciuridae (Squirrels)			
Arctic ground squirrel	<i>Citellus undulatus</i>	X	
Red squirrel	<i>Tamiasciurus hudsonicus</i>	X	
Cricetidae (Mice, Rats, Lemmings, and Voles)			
Tundra red-backed vole	<i>Clethrionomys rutilus</i>	X	
Tundra vole ^b	<i>Microtus oeconomus</i>	X	1
Meadow vole	<i>Microtus pennsylvanicus</i>	X	1
Muskrat	<i>Ondatra zibethica</i>	X	
Northern bog lemming	<i>Synaptomys borealis</i>	X	
Brown lemming ^b	<i>Lemmus trimucronatus</i>	X	1
Varying lemming	<i>Dicrionyx torquatus</i>	X	
Castoridae (Beaver)			
Beaver	<i>Castor canadensis</i>	X	
Zapodidae (Jumping Mice)			
Meadow jumping mouse	<i>Zapus hudsonius</i>	X	
Erethizontidae (Porcupine)			
Porcupine	<i>Erethizon dorsatum</i>	X	1
Lagomorpha Leporidae (Hares and Rabbits)			
Arctic hare	<i>Lepus timidus</i>	X	
Snowshoe hare	<i>Lepus americanus</i>	X	
Artiodactyla Cervidae (Deer)			
Moose	<i>Alces alces</i>	X	1
Caribou	<i>Rangifer tarandus</i>	X	2

Key:

1 - Observed includes species identified below the timberline during June 17 to 19, 1997 site visit (USAF, 1997).

2 - Observed includes species identified above the timberline during June 17 to 19, 1997 site visit (USAF, 1997).

X - Potential occurrence.

a - Only the animal's track's were observed during this site visit.

a - Only the animal's remains (carcass or bones) were observed during this site visit.

Sources:

Final RI/FS Sampling and Analysis Plan (USAF, 1997).

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Table 2-3 Bird Species Potentially Occurring in or Around Tatalina LRRS

Common Name	Scientific Name	Seasonal Occurrence				Breeding	Observed
		Spring	Summer	Fall	Winter		
Gaviformes							
Red-throated Loon	<i>Gavia stellata</i>	U	U	U	-	*	
Pacific Loon	<i>Gavia pacifica</i>	C	C	C	-	*	
Common Loon	<i>Gavia immer</i>	C	C	C	-	*	
Podicipediformes							
Horned Grebe	<i>Podiceps auritus</i>	C	C	C	-	*	
Red-necked Grebe	<i>Podiceps grisegena</i>	C	C	C	-	*	
Anseriformes							
Tundra Swan	<i>Cygnus columbianus</i>	C	U	C	-	*	
Trumpeter Swan	<i>Cygnus buccinator</i>	U	U	U	-	*	
Greater White-fronted Goose	<i>Anser albifrons</i>	C	U	C	-	*	
Snow Goose	<i>Chen caerulescens</i>	C	A	C	-		
Brant	<i>Branta bernicla</i>	A	-	-	-		
Canada Goose	<i>Branta canadensis</i>	C	C	C	-	*	
Green-winged Teal	<i>Anas crecca</i>	C	C	C	-	*	
Mallard	<i>Anas platyrhynchos</i>	C	C	C	R	*	
Northern Pintail	<i>Anas acuta</i>	C	C	C	A	*	
Blue-winged Teal	<i>Anas discors</i>	U	R	U	-	*	
Cinnamon Teal	<i>Anas cyanoptera</i>	A	A	-	-		
Northern Shoveler	<i>Anas clypeata</i>	C	C	C	A	*	
Gadwall	<i>Anas strepera</i>	R	R	R	-		
Eurasian Widgeon	<i>Anas penelope</i>	R	A	-	-		
American Widgeon	<i>Anas americana</i>	C	C	C	A	*	
Canvasback	<i>Aythya valisineria</i>	U	U	U	-	*	
Redhead	<i>Aythya americana</i>	U	R	U	-	*	
Ring-necked Duck	<i>Aythya collaris</i>	U	U	U	-	*	
Greater Scaup	<i>Aythya marila</i>	C	C	C	C	*	
Lesser Scaup	<i>Aythya affinis</i>	C	C	C	A	*	
Harlequin Duck	<i>Histrionicus histrionicus</i>	U	U	U	-	*	
Oldsquaw	<i>Clangula hyemalis</i>	C	U	C	-	*	
Black Scoter	<i>Melanitta nigra</i>	R	R	R	-	*	
Surf Scoter	<i>Melanitta perspicillata</i>	C	C	C	-	*	
White-winged Scoter	<i>Melanitta fusca</i>	C	C	C	-	*	
Common Goldeneye	<i>Bucephala clangula</i>	C	C	C	A	*	
Barrow's Goldeneye	<i>Bucephala islandica</i>	C	C	C	-	*	
Bufflehead	<i>Bucephala albeola</i>	C	C	C	A	*	
Common Merganser	<i>Mergus merganser</i>	R	R	R	R	*	
Red-breasted Merganser	<i>Mergus serrator</i>	R	R	R	R	*	
Falconiformes							
Osprey	<i>Pandion haliaetus</i>	R	R	R	-	*	
Bald Eagle	<i>Haliaeetus leucocephalus</i>	U	U	U	R	*	
Northern Harrier	<i>Circus cyaneus</i>	U	U	U	A	*	
Sharp-shinned Hawk	<i>Accipiter striatus</i>	C	C	C	A	*	1
Northern Goshawk	<i>Accipiter gentilis</i>	U	U	U	U	*	
Red-tailed Hawk	<i>Buteo jamaicensis</i>	C	C	C	-	*	
Rough-legged Hawk	<i>Buteo lagopus</i>	C	U	C	A	*	
Golden Eagle	<i>Aquila chrysaetos</i>	C	C	C	A	*	
American Kestrel	<i>Falco sparverius</i>	C	C	C	-	*	
Merlin	<i>Falco columbrius</i>	U	U	U	A	*	
Peregrine Falcon	<i>Falco peregrinus</i>	R	R	R	-	*	
Gyr Falcon	<i>Falco rusticolus</i>	U	U	U	R	*	

Table 2-3 Bird Species Potentially Occurring in or Around Tatalina LRRS

Common Name	Scientific Name	Seasonal Occurrence				Breeding	Observed
		Spring	Summer	Fall	Winter		
Galliformes							
Spruce Grouse	<i>Dendragapus canadensis</i>	C	C	C	C	*	1
Willow Ptarmigan	<i>Lagopus lagopus</i>	C	C	C	C	*	
Rock Ptarmigan	<i>Lagopus mutus</i>	C	C	C	C	*	
White-tailed ptarmigan	<i>Lagopus leucurus</i>	U	U	U	U	*	
Ruffed Grouse	<i>Bonasa umbellus</i>	C	C	C	C	*	
Sharp-tailed Grouse	<i>Tympanuchus phasianellus</i>	U	U	U	U	*	
Gruiformes							
Sandhill Crane	<i>Grus canadensis</i>	C	U	C	-	*	
Charadriiformes							
Black-bellied Plover	<i>Plavialis squatoarola</i>	R	R	R	-	*	
Lesser-golden Plover	<i>Pluvialis dominica</i>	C	C	C	-	*	
Semipalmated Plover	<i>Charadrius semipalmatus</i>	C	C	C	-	*	
Killdeer	<i>Charadrius vociferus</i>	R	R	R	-	*	
Greater Yellowlegs	<i>Tringa melanoleuca</i>	R	R	R	-	*	
Lesser Yellowlegs	<i>Tringa flavipes</i>	C	C	C	-	*	
Solitary Sandpiper	<i>Tringa solitaria</i>	U	U	U	-	*	
Wandering Tattler	<i>Heteroscelus incanus</i>	U	U	U	-	*	
Spotted Sandpiper	<i>Actitis macularia</i>	C	C	C	-	*	
Upland Sandpiper	<i>Bartramia longicauda</i>	U	U	U	-	*	
Whimbret	<i>Numenius phaeopus</i>	C	C	U	-	*	
Hudsonian Godwit	<i>Limosa haemastica</i>	R	A	-	-		
Ruddy Turnstone	<i>Arenaria interpres</i>	R	A	-	-		
Black Turnstone	<i>Arenaria melanocephala</i>	-	A	A	-		
Surfbird	<i>Aphriza virgata</i>	U	U	U	-	*	2
Semipalmated Sandpiper	<i>Calidris pusilla</i>	C	A	U	-	*	
Western Sandpiper	<i>Caldris mauri</i>	R	A	R	-	*	
Least Sandpiper	<i>Calidris minutilla</i>	C	U	U	-	*	
Baird's Sandpiper	<i>Calidris bairdii</i>	U	U	U	-	*	
Pectoral Sandpiper	<i>Calidris melanotos</i>	C	U	U	-	*	
Stilt Sandpiper	<i>Calidris himantopus</i>	R	-	A	-		
Buff-breasted Sandpiper	<i>Limicola falcinellus</i>	R	-	A	-		
Long-billed Dowitcher	<i>Limnodromus scolopaceus</i>	C	U	U	-	*	
Common Snipe	<i>Gallinago gallinago</i>	C	C	C	-	*	
Red-necked Phalarope	<i>Phalaropus lobatus</i>	C	C	C	-	*	
Long-tailed Jaeger	<i>Stercorarius longicaudus</i>	C	C	C	-	*	
Bonaparte's Gull	<i>Larus philadelphia</i>	U	U	U	-	*	
Mew Gull	<i>Larus canus</i>	C	C	C	-	*	
Herring Gull	<i>Larus argentatus</i>	U	U	U	-	*	
Glaucous-winged Gull	<i>Larus glaucescens</i>	-	R	R	-	*	
Glaucous Gull	<i>Larus hyperboreus</i>	R	R	R	-	*	
Arctic Tern	<i>Sterna paradisaea</i>	U	U	U	-	*	
Strigiformes							
Great Horned Owl	<i>Bubo viginianus</i>	C	C	C	C	-	
Snowy Owl	<i>Nyceta scandiana</i>	R	-	A	R		
Northern Hawk Owl	<i>Surnia ulula</i>	C	C	C	C	*	
Greaty Grey Owl	<i>Strix nebulosa</i>	R	R	R	R	*	
Short-eared Owl	<i>Asio flammeus</i>	C	C	C	-	*	
Boreal Owl	<i>Aegolius funereus</i>	C	C	C	C	*	

Table 2-3 Bird Species Potentially Occurring in or Around Tatalina LRRS

Common Name	Scientific Name	Seasonal Occurrence				Breeding	Observed
		Spring	Summer	Fall	Winter		
Coraciformes							
Belted Kingfisher	<i>Ceryle alcyon</i>	C	C	C	-	*	
Piciformes							
Downy Woodpecker	<i>Picoides pubescens</i>	U	U	U	U	*	1
Hairy Woodpecker	<i>Picoides villosus</i>	U	U	U	U	*	1
Three-toed Woodpecker	<i>Picoides tridactylus</i>	U	U	U	U	*	1
Black-backed Woodpecker	<i>Picoides arcticus</i>	R	R	R	R	*	
Northern Flicker	<i>Colaptes auratus</i>	C	C	C	A	*	
Passeriformes							
Olive-sided Flycatcher	<i>Contopus borealis</i>	U	U	U	-	*	
Western Wood-pewee	<i>Contopus sosrididus</i>	U	U	U	-	*	
Alder Flycatcher	<i>Empidonax alnorum</i>	C	C	C	-	*	1
Hammond's Flycatcher	<i>Empidonax hammondii</i>	C	C	C	-	*	1
Say's Phoebe	<i>Sayornis saya</i>	U	U	U	-	*	1
Horned Lark	<i>Eremophila alpestris</i>	C	C	C	-	*	2
Tree Swallow	<i>Tachycineta bicolor</i>	C	C	C	-	*	
Violet-green Swallow	<i>Tachycineta thalassina</i>	C	C	C	-	*	
Bank Swallow	<i>Riparia riparia</i>	C	C	C	-	*	
Cliff Swallow	<i>Hirundo pyrrhonota</i>	C	C	C	-	*	1
Barn Swallow	<i>Hirundo rustica</i>	A	A	A	-		
Gray Jay	<i>Perisoreus canadensis</i>	C	C	C	C	*	1
Black-billed Magpie	<i>Pica pica</i>	C	C	C	C	*	
Common Raven	<i>Corvusw corax</i>	C	C	C	C	*	1,2
Black-capped Chickadee	<i>Parus atricapillus</i>	C	C	C	C	*	
Boreal Chickadee	<i>Parus hudsonicus</i>	C	C	C	C	*	
Brown Creeper	<i>Certhia americana</i>	R	R	R	R	*	
American Dipper	<i>Cinclus mexicanus</i>	U	U	U	U	*	
Arctic Warbler	<i>Phylloscopus borealis</i>	C	C	C	-	*	1
Ruby-crowned Kinglet	<i>Regulus calendula</i>	C	C	C	-	*	1
Northern Wheatear	<i>Oenanthe oenanthe</i>	U	U	U	-	*	
Mountain Bluebird	<i>Sialia currucoides</i>	R	R	A	-	*	
Townsend's Solitaire	<i>Myadestes townsendi</i>	R	R	R	A	*	2
Grey-checked Thrush	<i>Catharus minimus</i>	C	C	C	-	*	
Swainson's Thrush	<i>Catharus ustalatus</i>	C	C	C	-	*	1
Hermit Thrush	<i>Catharus guttatus</i>	U	U	U	-	*	
American Robin	<i>Turdus migratorius</i>	C	C	C	A	*	
Varied Thrush	<i>Lxoreus naecinus</i>	C	C	C	-	*	
American Pipit	<i>Anthus rubescens</i>	C	C	C	-	*	
Bohemian Waxwing	<i>Bombycilla garrulus</i>	C	C	C	R	*	
Northern Shrike	<i>Laninus excubitor</i>	C	C	C	R	*	
Orange-crowned Warbler	<i>Vermivora celata</i>	C	C	C	-	*	1
Yellow Warbler	<i>Dendroica petechia</i>	C	C	C	-	*	
Yellow-rumped Warbler	<i>Dendroica coronata</i>	C	C	C	-	*	
Blackpoll Warbler	<i>Dendroica striata</i>	U	U	U	-	*	
Northern Waterthrush	<i>Seiurus noveboracensis</i>	C	C	C	-	*	
Wilson's Warbler	<i>Wilsonia pusilla</i>	C	C	C	-	*	1,2
American Tree Sparrow	<i>Spizella arborea</i>	C	C	C	A	*	1
Chipping Sparrow	<i>Spizella passerina</i>	U	U	U	-	*	1
Savannah Sparrow	<i>Passerculus sandwichensis</i>	C	C	C	A	*	
Fox Sparrow	<i>Passerella iliaca</i>	C	C	C	A	*	

Table 2-3 Bird Species Potentially Occurring in or Around Tatalina LRRS

Common Name	Scientific Name	Seasonal Occurrence				Breeding	Observed
		Spring	Summer	Fall	Winter		
Passeriformes (cont.)							
Lincoln's Sparrow	<i>Melospiza lincolnii</i>	C	C	C	-	*	
Golden-crowned Sparrow	<i>Zonotrichia atricapilla</i>	U	U	U	A	*	
White-crowned Sparrow	<i>Zonotrichia leuophrys</i>	C	C	C	A	*	1,2
Dark-eyed Junco	<i>Funco hyemalis</i>	C	C	C	R	*	1
Lapland Longspur	<i>Calcarius lappinicus</i>	C	C	C	-	*	
Snow Bunting	<i>Plectrophenax nivalis</i>	C	U	U	R	*	
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	U	U	U	A	*	
Rusty Blackbird	<i>Euphagus carolinus</i>	C	U	U	R	*	
Rosy Finch	<i>Leucoslite arctoa</i>	U	U	U	A	*	
Pine Grosbeak	<i>Pinicola enucleator</i>	U	U	U	U	*	
White-winged Crossbill	<i>Loxia Leucoptera</i>	U	U	U	U	*	
Common Redpoll	<i>Carduelis flammea</i>	C	C	C	C	*	
Hoary Redpoll	<i>Carduelis hornemanni</i>	C	R	U	C	*	
Pine Siskin	<i>Carduelis pinnus</i>	R	R	R	A	*	

Key:

1 - Observed includes species identified below the timberline during June 17 to 19, 1997 site visit (USAF, 1997).

2 - Observed includes species identified above the timberline during June 17 to 19, 1997 site visit (USAF, 1997).

C - Common

U - Uncommon

R - Rare

A - Accidental

* - Species potentially breeds in the vicinity of Tatalina.

Source:

Final RI/FS Sampling and Analysis Plan (USAF, 1997).

**Table 2-4 Amphibian and Reptile Species Potentially Occurring in or Around
Tatalina LRRS**

Common Name	Scientific Name	Potentially Occurring	Observed
Amphibians			
Wood frog	<i>Rana sylvatica</i>	X	

Source:

Amphibians of the Western Contiguous Eleven States and Alaska (USBLM, 2001).

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Table 2-5 Aquatic Species Potentially Occurring in or Around Tatalina LRRS

Common Name	Scientific Name	Potentially Occurring	Observed
Arctic char	<i>Salvelinus alpinus</i>	X	
Arctic grayling	<i>Thymallus arcticus</i>	X	1,2
Burbot	<i>Lota lota</i>	X	
Chinook salmon	<i>Oncorhynchus tshawytscha</i>	X	1,2
Chum salmon	<i>Oncorhynchus keta</i>	X	1,2
Coho salmon	<i>Oncorhynchus kisutch</i>	X	1,2
Pink salmon	<i>Oncorhynchus gorbuscha</i>	X	
Sheefish	<i>Stendous leucichthys nelma</i>	X	2
Sockeye salmon	<i>Oncorhynchus nerka</i>	X	
Dolly Vardon	<i>Salvelinus malma</i>	X	
Northern pike	<i>Esox lucius</i>	X	1,2
Whitefish	<i>Prosopium cylindraceum</i>	X	2

Sources:

1- Final RI/FS Sampling and Analysis Plan (USAF, 1997).

2 - Alaska Department of Fish and Game (ADF&G, 2001).

NatureServe Explorer at <http://www.natureserve.org/explorer> (Nov 2003).

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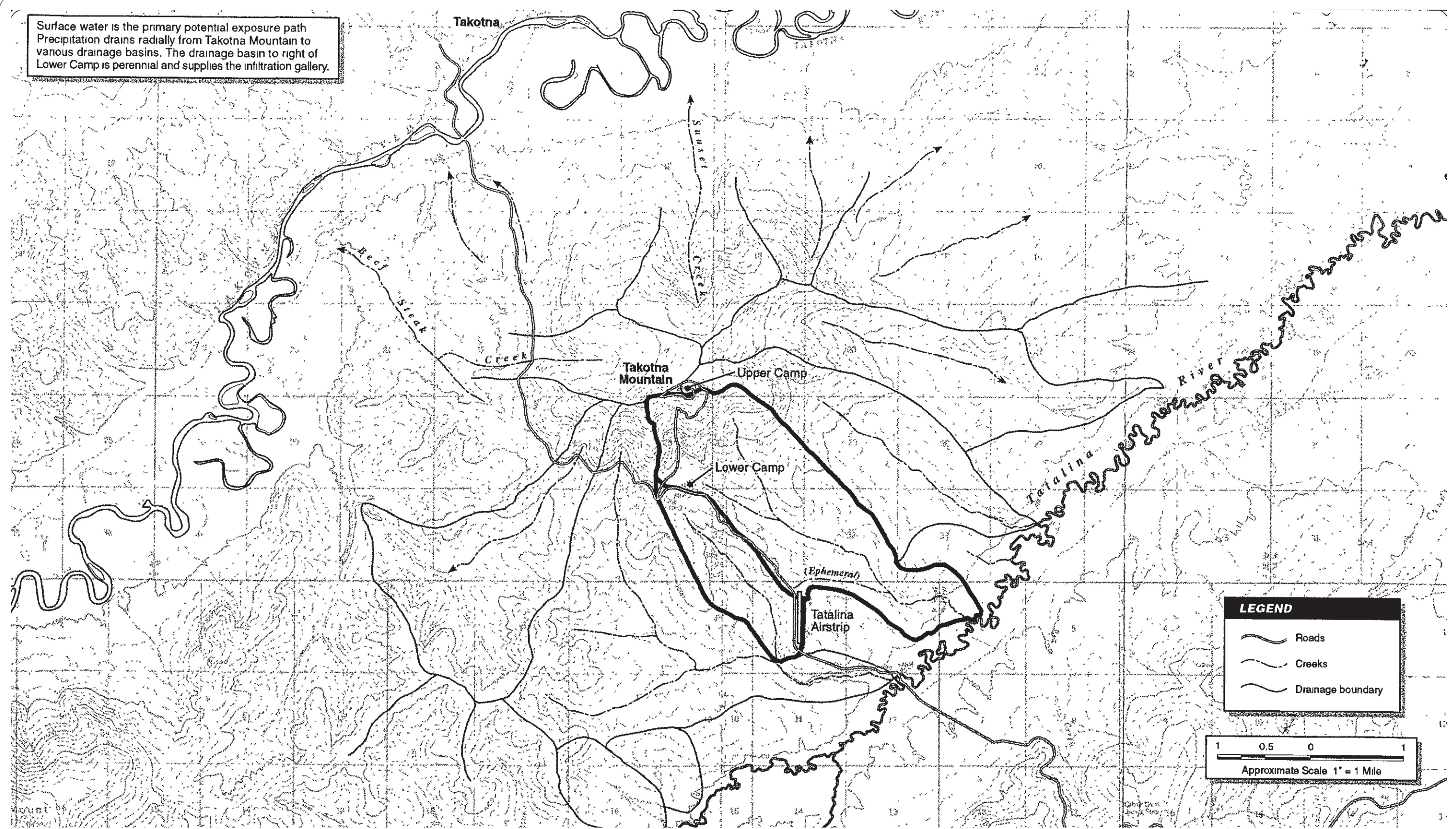


FIGURE 2-1
U. S. AIR FORCE - TATALINA LRRS, ALASKA
HERA WORK PLAN FOR SS03, SS08, AND SS11
**DRAINAGE PATTERNS
OF SURFACE WATER RUNOFF**

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3.0 SAMPLING INVESTIGATION HISTORY

In 1985, the Air Force conducted Phase I of an ERP (then called an IRP) at Tatalina LRRS (USAF, 1985). Phase I activities included field inspections, reviews of Alaskan Air Command and installation records and files, interviews with installation personnel, and evaluations using the Hazardous Assessment Rating Methodology system. Based on results of these activities, it was determined that SS03, SS08, and SS11 had sufficient potential to create environmental contamination and follow-on investigations were warranted. A brief description of the environmental investigations performed at Sites SS03, SS08 and SS11 and the results are provided below.

3.1 SS03 – FORMER POL TANK FARM

SS03 consists of the former POL Tank Farm and is located near the southwestern portion of Lower Camp (Figure 1-3). This area was used for aboveground diesel MOGAS fuel storage and dispensing from the 1950s to 1997.

3.1.1 Preliminary Site Investigation (SI) Activities at SS03

Prior to the 1997 RI, the 611th Civil Engineering Squadron cleaned and removed out-of-service tanks from the POL Tank Farm. Three bulk diesel storage tanks and two bulk MOGAS storage tanks were removed (USAF, 1993). The tank removal project did not investigate or remove soil or the liner within the POL Tank Farm bermed areas. The remaining three tanks are currently used for diesel and MOGAS storage and dispensing.

Site records indicate that the POL Tank Farm bermed area was previously drained. Water, potentially containing petroleum hydrocarbons, was released into the top of the drainage area that begins just below the POL Tank Farm pad. Four fuel spills, which occurred between 1970 and 1982, are also listed in site records (USAF, 2004). Records indicate that a liner was installed in the bermed POL Tank Farm area in 1983 (USAF, 2004).

3.1.2 RI Activities at SS03

A summary of RI and post-RI sampling activities conducted at SS03 is presented in Table 3-1. Sampling locations and results for contaminants of potential concern are presented in Figure 8.5-1 of the Final RI Report (USAF, 1998b). Data summaries for detected results are presented in Tables 3-2 through 3-6. A summary of all sample results for SS03, including non-detects, is presented in Appendix A. In cases where duplicate samples were collected, the higher value of the primary or duplicate sample is reported in the text and tables.

During the 1997 RI, one seep and sediment location, two surface soil locations, and three soil boring/monitoring wells were sampled to investigate the potential release of contaminants from the POL Tank Farm.

Three monitoring wells (BH1-MW, BH12-MW, and BH20-MW) were installed along the surface drainage at elevations downgradient of the POL Tank Farm (Figure 8.5-1 of the Final

RI Report; USAF, 1998b). Monitoring Well BH1-MW is located on the slope below the POL Tank Farm pad. A narrow, shallow drainage channel was observed at the edge of the POL Tank Farm pad; this drainage flows directly toward Monitoring Well BH12-MW.

Petroleum hydrocarbons were not detected with immunoassay field screening in surface soil samples collected at an elevation downgradient of the POL Tank Farm. In addition, organic vapor monitoring readings were zero parts per million (ppm) from the surface to 17 feet bgs in Monitoring Well BH1-MW, and then increased to 60 ppm and 111 ppm from 17 feet bgs to the groundwater interface. This suggests that fuel leaks/spills infiltrated vertically in the POL Tank Farm area until reaching the groundwater interface, and then spread horizontally (USAF, 2005). At Monitoring Well BH12-MW, located topographically downgradient of the POL Tank Farm, organic vapor monitoring readings of 70 ppm were recorded at the ground surface and increased to 400 ppm at 12 feet bgs (USAF, 2005).

2002 Follow-on RI. In 2002, 13 boreholes were drilled within the POL Tank Farm impoundment and on the berm. Diesel range organics (DRO) contamination above the ADEC Method Two cleanup level was found in several borings, primarily within the bermed area, at depths ranging from 5 to 22 feet bgs. The highest concentration of DRO detected was 12,300 milligrams per kilogram (mg/Kg) in a soil sample collected from 5 to 7 feet bgs in BH 2-20, located within the bermed area. Other analytes that exceeded their ADEC cleanup levels include benzene, gasoline range organics (GRO), methylene chloride, and naphthalene.

Downgradient from the POL Tank Farm, five monitoring wells (BH/MW02-8, BH/MW02-9, BH/MW02-21, BH/MW02-23, and BH/MW02-24) were installed in 2002. BH/MW02-8 was dry, but samples collected from the remaining four wells had benzene concentrations that exceeded ADEC Table C Groundwater cleanup levels. DRO concentrations exceeded the ADEC cleanup level in two samples, and GRO exceeded the ADEC cleanup level in one sample (USAF, 2003).

Sampling locations for the 2002 investigation at SS03 are shown in Figure 8 of the 2002 Remedial Action and Monitoring Program Annual Report (USAF, 2003).

2003 Follow-on RI. In 2003, Five surface soil samples (SS01 through SS05) were collected from within the bermed area (see Figure 3-1 of the 2003 Follow-On RI Report; USAF, 2004) and analyzed for DRO, GRO, volatile organic compounds (VOCs), polynuclear aromatic hydrocarbons (PAHs), and lead at an off-site laboratory. Surface soil samples had up to 2,300 mg/Kg DRO and exceeded the ADEC Method Two soil cleanup level for DRO of 250 mg/Kg in three of the five samples collected.

Groundwater samples were collected from the following eight existing monitoring wells at SS03: BH1/MW, BH12/MW, BH20/MW, BH/MW02-8, BH/MW02-9, BH/MW02-21, BH/MW02-23, and BH/MW02-24. Samples were analyzed for DRO, GRO, PAHs, VOCs, and lead at an offsite laboratory (see Figure 3-1 of the 2003 Follow-On RI Report; USAF, 2004).

Groundwater samples contained up to 2.5 milligrams per liter (mg/L) DRO, 3.87 mg/L GRO, and 0.087 mg/L benzene (USAF, 2004). These results exceed the ADEC Table C Groundwater cleanup levels for DRO, GRO, and benzene of 1.5 mg/L, 1.3 mg/L, and 0.005 mg/L, respectively. Regulatory exceedances were detected in six of eight monitoring wells sampled.

2004 Follow-on RI. During the 2004 Follow-on RI, liner material from Tank Pit 1 and Tank Pit 2/3 was removed and containerized in EP3 boxes, which consist of a one-ton capacity, heavy duty cardboard box with a plastic liner. The tank pit liner consisted of geotextile fabric overlain by a 10-mil plastic liner. In many areas, the plastic liner was again overlain by geotextile fabric. Although the liner was removed from the tank pit bottoms, the berms were left intact. Ponded water was not observed above the liner prior to removal.

Ten test pits were excavated at SS03 after removal of the liner material to evaluate possible contaminant migration. Two test pits were excavated in Tank Pit 1, three in Tank Pit 2/3, four in areas immediately adjacent to and topographically downgradient of the tank pits, and one upgradient of the tank pits (see Figure 3-2 of the 2004 Follow-On RI Report; USAF, 2005).

Soil samples were collected from the test pits at 2-foot intervals and screened in the field using a photoionization detector. The sample from the surface, the sample from the bottom of the test pit, and the sample with the highest photoionization detector reading of the remaining samples, were submitted for analysis of DRO, GRO, PAHs, and VOCs.

In Tank Pit 1, DRO was detected in three of six samples collected from Test Pits 9 and 10 at concentrations above the ADEC Method Two cleanup level of 250 mg/Kg (Figure 3-2 of the 2004 Follow-On RI Report; USAF, 2005). DRO concentrations that exceeded the cleanup level ranged from 860 mg/Kg to 4,900 mg/Kg. Surface soil samples collected from Test Pits 9 and 10 did not contain DRO above the cleanup level. Subsurface samples collected from Test Pit 9 had DRO above the cleanup level at 5 and 11 feet bgs, whereas Test Pit 10 had DRO above the cleanup level at 5 feet bgs.

Four analytes were detected in soil samples collected from Tank Pit 2/3 (Test Pits 1 through 3) at concentrations above the ADEC Method Two cleanup levels (see Figure 3-2 of the 2004 Follow-On RI Report; USAF, 2005), including:

- DRO – detected in nine samples at concentrations above the ADEC Method Two cleanup level of 250 mg/Kg. DRO concentrations ranged from 840 mg/Kg to 22,000 mg/Kg in samples collected from the surface to 11.5 feet bgs.
- GRO – detected in one sample at 3 feet bgs from Test Pit 2 at 440 mg/Kg, above the ADEC Method Two cleanup level of 300 mg/Kg. GRO was detected below the cleanup level in all other samples.
- Benzene – detected in five samples, collected from two of the three test pits (Test Pits 2 and 3), at concentrations above the ADEC Method Two cleanup level of 0.02 mg/Kg. Benzene concentrations that exceeded the cleanup level ranged from 0.024 mg/Kg to 0.17 mg/Kg in samples collected from the surface to 11.5 feet bgs.

- Naphthalene – detected at 33 mg/Kg in the surface sample, and at 29 mg/Kg in the 3-foot sample from Test Pit 2. Both detections were above the ADEC Method Two cleanup level of 21 mg/Kg. Naphthalene was analyzed by EPA Solid Waste Methods (SWs) 8260 and 8270 Selective Ion Monitoring (USEPA, 1986). The concentrations reported above reflect the highest concentrations reported for both methods.

In samples collected from test pits located outside of the tank pits (Test Pits 4 through 8), analytes were detected above the ADEC Method Two cleanup level in one sample (Table 3-1 of this document and Figure 3-2 of the 2004 Follow-On RI Report; USAF, 2005). DRO was detected in the sample collected from the 5-foot interval in Test Pit 7 at 2,000 mg/Kg, above the Method Two cleanup level of 250 mg/Kg. This test pit was excavated topographically downgradient from, and outside of, Tank Pit 1.

Groundwater samples were collected from the following seven, existing monitoring wells at SS03: MW02-9, BH/MW02-21, BH/MW02-23, BH/MW02-24, BH1-MW, BH12-MW, and BH20-MW (see Figure 3-1 of the 2004 Follow-On RI Report; USAF, 2005). Samples were analyzed for DRO, GRO, VOCs, and PAHs. Monitoring Well MW02-8 was also scheduled for sampling; however, this well was dry so no sample was collected.

Groundwater samples contained concentrations of benzene that exceed the ADEC Table C Groundwater Cleanup level of 0.005 mg/L (see Figure 3-1 of the 2004 Follow-On RI Report; USAF, 2005). Benzene was detected at concentrations ranging from 0.0093 mg/L to 0.094 mg/L. DRO was detected above the ADEC Table C Groundwater Cleanup level of 1.5 mg/L in three of the seven wells sampled (BH1-MW, BH/MW02-21, and BH/MW02-24), ranging from 2.1 mg/L to 6.4 mg/L (Figure 3-1 of the 2004 Follow-On RI Report; USAF, 2005). GRO was also detected above the ADEC Table C Groundwater Cleanup level of 1.3 mg/L in three of the seven wells sampled (BH1-MW, BH20-MW, and BH/MW02-23), ranging from 1.8 to mg/L to 5.1 mg/L.

3.2 SS08 – WAA NO. 4, OLD SANITARY SEWER SYSTEM, FORMER SEWAGE LAGOON, AND FORMER PAINT SHOP

SS08 consists of the inactive WAA No. 4, the old sanitary sewer system, the former sewage lagoon, and the former paint shop. WAA No. 4 was used from the 1950s to 1984 to store waste oil drums from the former motor pool. It was located on the eastern side of a large flat gravel pad containing the former Lower Camp structures, near the former garage and vehicle storage building (Figure 1-3). Lower Camp structures, including the garage and vehicle storage building, were demolished and removed in the mid-1980s. Some debris was removed from the site and some debris was buried on site in cells adjacent to the structures' former location.

SS08 also includes the old septic tank located downhill from the POL Tank Farm area (SS03) at Lower Camp. During the years of operation, all sewage drains from the Lower Camp facility were connected to this system.

3.2.1 Preliminary SI Activities at SS08

An SI was conducted at SS08 WAA No. 4 in 1992 (USAF, 1993). During the 1992 SI, three surface and three collocated subsurface soil samples were collected and analyzed for VOCs, semi-volatile organic compounds (SVOCs), pesticides/polychlorinated biphenyls (PCBs), and metals. Compounds detected in these samples included toluene, ethylbenzene, xylenes, 1,2,4-trichlorobenzene, pesticides/PCBs, and metals (USAF, 1993).

During the 1997 RI, an area, including sampling locations from the 1992 SI, was excavated. Therefore, these data were not used in the Final RI Report (USAF, 1998b) and will not be used in this document.

3.2.2 RI Activities at SS08

Summaries of RI and post-RI sampling activities conducted at SS08 are presented in Table 3-7. Sampling locations and results for contaminants of potential concern are presented in Figures 8.8-1 and 8.8-2 of the Final RI Report (USAF, 1998b). Data summaries for detected results are presented in Tables 3-8 through 3-13. A summary of all sample results for SS08, including non-detects, is presented in Appendix A. In cases where duplicate samples were collected, the higher value of the primary or duplicate sample is reported in the text, tables and risk assessment calculations.

During the 1997 RI, one seep and sediment location (downgradient of the Lower Camp Pad), six soil borings (BH2/MW, BH3/MW, BH4, BH6, BH7, and BH8), two test pits, and two monitoring wells (BH2/MW and BH3/MW) were sampled to investigate the potential release of contaminants from WAA No. 4. Also, sludge from the septic tank, two surface soil samples, three soil borings (BH9, BH12/MW, and BH20/MW), two monitoring wells (BH12/MW and BH20/MW), and one seep and sediment location (downgradient of the demolished structure below BH20/MW) were sampled to investigate the potential release of contaminants from the old sanitary sewer system, former sewage lagoon, and former paint shop. Soil Boring/Monitoring Well BH20/MW and the seep and sediment location downgradient of the demolished structure below BH20/MW were also evaluate in the 1997 RI as part of site SS03, which is located nearby.

1999 UST Closure Activities. In 1987, all buildings on the Lower Camp gravel pad were demolished. Five ADEC-registered USTs in the vicinity of SS08 were removed during the demolition. This removal did not include submittal of an application for tank closure with ADEC. In 1999, the former footprints of the USTs were re-located, excavated, and field screened. Soil samples also were collected for offsite geochemical analysis from the bottom of excavations at depths of 7 feet in the native soil/gravel fill interface at ADEC USTs 769-1 and 769-2, and 4 feet at ADEC USTs 769-5 and 769-6. Closure reports for all five tanks were submitted to ADEC in December 1999 (USAF, 1999a, 1999b, 1999c, and 1999d). The Air Force concluded that petroleum hydrocarbon contamination is present in soil around the former footprints of ADEC USTs 769-2, 769-5, and 769-6 from surface to a depth of at least 7 feet bgs.

1999 Follow-on RI. The 1999 Follow-on RI at SS08 consisted of installing one monitoring well (BH37-MW), two boreholes, and collecting two collocated surface water and sediment samples from the stream east and downgradient from the Lower Camp pad area (USAF, 2000). Samples were analyzed for GRO, DRO, residual range organics (RRO), pesticides/PCBs, SVOCs, metals, and benzene, toluene, ethylbenzene, and xylenes (BTEX). DRO, antimony, arsenic, chromium, nickel, and Aroclor 1260 were detected in soil above ADEC cleanup levels. Floating product with a petroleum odor was found on top of the groundwater in BH37-MW. The product was removed during well development before groundwater was sampled, and DRO, beryllium, cadmium, chromium, lead, nickel, and zinc were detected in groundwater above ADEC groundwater cleanup standards. DRO, RRO and trace concentrations of 1,1,1-trichloroethane, dichlorodiphenyldichloroethane (DDD), dichlorodiphenyldichloroethene (DDE), and dichlorodiphenyltrichloroethane (DDT) were detected in both of the sediment samples, and trace concentrations of GRO, toluene, m,p-xylene, and Aroclor 1260 were detected in one of the sediment samples. No compounds were detected in the surface water samples above Ambient Water Quality Criteria (USAF, 2000).

2002 Follow-on RI. Six monitoring wells (BH/MW02-25 through BH/MW02-30) were installed at this site during the 2002 Tatalina LRRS Follow-on RI performed by the 611th Civil Engineering Squadron (see Figure 7 of the Remedial Action and Monitoring Program Annual Report; USAF, 2003). A total of 0.4 inches of free product was encountered in Monitoring Well BH37-MW, although wells located within 100 feet of BH37-MW did not contain detectable levels of DRO, suggesting the free product might be localized in this area. One monitoring well (BH/MW02-28) had DRO at 2.07 mg/L, above the Table C Groundwater cleanup level of 1.5 mg/L.

2003 Follow-on RI. In 2003, groundwater samples collected from nine existing monitoring wells contained arsenic, chromium, and lead at levels that exceeded ADEC Table C Groundwater cleanup levels (USAF, 2004). Arsenic and chromium levels are considered representative of background conditions and are not attributable to site contamination. Lead was detected above the ADEC Table C Groundwater cleanup level of 0.015 mg/L in six of nine wells sampled, with a maximum of 0.107 mg/L in Monitoring Well BH2-MW. DRO was detected at levels below the ADEC Table C Groundwater cleanup level of 1.5 mg/L, with a maximum of 0.87 mg/L in Monitoring Well BH/MW02-29. No regulatory exceedances were detected in two of the nine wells sampled. Approximately 0.4 inches of free product were found in Monitoring Well BH37-MW.

2004 Follow-on RI. During the 2004 follow-on RI, groundwater samples were collected from nine existing monitoring wells. One well (BH37-MW) was not sampled, because it contained approximately 0.4 inches of free product. Samples from the remaining wells were analyzed for DRO, GRO, PAHs, VOCs, and metals. DRO, arsenic, barium, chromium, and lead were all detected above ADEC groundwater cleanup levels. DRO was detected at 2.1 mg/L, while the remaining metals exceedances were attributable to background levels and not site-specific activities (USAF, 2005). The detection of DRO at BH/MW02-29 was the first exceedance in this particular well, and most likely represented migration downgradient from BH37-MW where free product was discovered.

3.3 SS11 – HARDFILL NO. 1 AND WAA NO. 1

The SS11 area includes two locations of historical disposals, Hardfill No. 1 and WAA No. 1. Hardfill No. 1 was used for disposal of debris from construction and demolition activities. WAA No. 1 was used to store approximately 150 waste drums. Precise location, condition and content of the drums were unknown (USAF, 1998b).

3.3.1 Preliminary SI Activities at SS11

An SI was conducted at SS11 WAA No. 1 in 1992 (USAF, 1993). During the 1992 SI, three surface and three collocated subsurface soil samples were collected and analyzed for VOCs, SVOCs, pesticides/PCBs, and metals. Compounds detected in these samples included trichloroethene, PAHs, pesticides/PCBs, and metals (USAF, 1993).

During the 1997 RI, the area including sampling locations from the 1992 SI was excavated. Therefore, these data were not used in the Final RI Report (USAF, 1998b) and will not be used in this document.

3.3.2 RI Activities at SS11

Summaries of RI and post-RI sampling activities conducted at SS11 are presented in Table 3-14. Sampling locations and results for contaminants of potential concern are presented in Figure 8.4-1 of the Final RI Report (USAF, 1998b). Data summaries for detected results are presented in Tables 3-15 through 3-18. A summary of all sample results for SS11, including non-detects, is presented in Appendix A. In cases where duplicate samples were collected, the higher value of the primary or duplicate sample is reported in the text and tables.

During the 1997 RI, most of the waste drums located at WAA No.1 were removed. Confirmation sampling was performed at the storage locations and neither PCBs nor total petroleum hydrocarbons (TPHs) were detected at levels exceeding ADEC soil cleanup levels. A baseline risk assessment conducted at that time also determined that the drums were not the source of any chemicals of potential concern (COPCs) or chemicals of potential ecological concern (COPECs).

In the waste removal process at SS11, 5 to 10 additional drums were found partially buried near the site. One soil sample was collected from the surrounding soil where the additional drums were discovered. The results from this sample demonstrated concentrations of benzo(a)pyrene, benzo(g,h,i)perylene, dibenz(a,h)anthracene, and DRO that were higher than risk-based ecological screening levels and, in the subsequent risk assessment, were identified as COPECs. As there was only one additional sample collected from this alternate location, the nature and extent of contamination was not well understood. Additional monitoring of the area was recommended.

2002 Follow-on RI. In 2002, three sediment and surface water samples were collected downgradient of the slope (see Figure 9 of the 2002 Remedial Action and Monitoring Program Annual Report; USAF, 2003). Both media were sampled at the same locations. No

contaminants were detected in water exceeding the ADEC Groundwater cleanup levels or the National Oceanic and Atmospheric Administration (NOAA) Threshold Effects Levels (TELS).

After the 2002 Follow-on RI, more monitoring at this location was recommended. It was determined that because the burial area itself was too steep to feasibly allow for sampling, future sampling events would also attempt to study the soil, sediment, and seeps of the drainage area directly downgradient.

2003 Follow-on RI. During the RI work of 2003, three additional sediment and surface water samples were collected from the drainage water seeps downgradient of the slope. It was originally proposed to collect five samples at the site, but due to lack of drainage water only three distinct samples were available for sampling. The samples were analyzed for Resource Conservation and Recovery Act (RCRA) metals, PAHs, and VOCs.

Results from sediment samples found detected concentrations of arsenic ranging from 5.4 to 12.1 mg/Kg; the latter exceeding NOAA sediment screening levels. All the detected analytes in surface water samples were below ADEC Groundwater cleanup standards. During the 2003 RI, there was no evidence of petroleum product contamination in surface water or sediment downgradient from the buried waste drums. During the sampling efforts, 10 to 20 partially-buried drums were observed in this area. Following 2003 RI, work no additional monitoring was recommended; however, it was recommended that all the waste drums be removed to prevent potential future contamination. Six waste drums were removed during the 2004 Follow-on RI, as described below.

2004 Follow-on RI. In 2004, RI work at SS11 consisted of soil sampling, waste drum removal, and exploration for further locations of buried waste drums. Six partially-buried waste drums were removed from the slope. Five of the drums were empty; however, one waste drum contained less than 5 gallons of a material suspected to be diesel fuel. A sample from the drum waste was analyzed for organic halides, PCBs, arsenic, cadmium, chromium, lead, and ignitability. Also during this work, a magnetic tool was used to locate a 30-foot by 100-foot area of the slope where additional waste drums were potentially buried.

The five empty drums were crushed, placed on pallets, and shipped to Elmendorf Air Force Base for appropriate disposal. The product from the last drum was determined to be acceptable for an oil burner, and was also shipped to Elmendorf Air Force base.

Five surface soil samples were collected from the area directly downgradient of the slope where waste drums were exposed and removed. The analyte list for these samples included: RCRA metals, PAHs, VOCs, DRO, GRO, RRO, PCBs, and pesticides. In the five soil samples, DRO was detected at concentrations ranging from 420 mg/Kg to 11,000 mg/Kg, which exceeded ADEC cleanup levels (250 mg/kg) for all five samples. Two samples had detected RRO concentrations of 20,000 mg/Kg and 32,000 mg/Kg, and exceeded the ADEC soil cleanup level of 10,000 mg/Kg. Most samples had both arsenic and chromium concentrations exceeding the ADEC soil cleanup levels.

One particular sample at SS11, Sample SS03, had concentrations of PAHs detected at higher concentrations than the other samples. Seven PAH analytes were detected in sample SS03 above their cleanup levels:

- Benzo(a)anthracene was detected at 71 mg/Kg, with a respective cleanup level of 6 mg/Kg,
- Benzo(a)pyrene was detected at 47 mg/Kg, with a respective cleanup level of 1 mg/Kg,
- benzo(b)fluoranthene was detected at 44 mg/Kg, with a respective cleanup level of 11 mg/Kg,
- Dibenz(a,h)anthracene was detected at 6 mg/Kg, with a respective cleanup level of 1 mg/Kg,
- Dibenzofuran was detected at 42 mg/Kg, with a respective cleanup level of 15.6 mg/Kg,
- Indeno(1,2,3-cd)pyrene was detected at 22 mg/Kg, with a respective cleanup level of 11 mg/Kg, and
- Naphthalene was detected at 130 mg/Kg, with a respective cleanup level of 21 mg/Kg.

Detected concentrations in Sample SS03 represented a local hotspot, because surrounding locations were orders of magnitude lower.

Overall, there were concentrations of PAHs, DRO, RRO, and RCRA metals that exceeded the representative ADEC cleanup levels for soil. It should be noted, however, that the exceedances of metals were due to elevated background concentrations and were determined not to be site-related (USAF, 2005). No further recommendations were proposed in the 2004 Follow-On RI Report regarding SS11.

2007 Follow-on RI. The 2004 Follow-on RI identified an unknown number of partially-buried drums located on the steep hillside at SS11. The 2004 Follow-on RI determined that definitively locating the remaining drums, quantifying the area extent of buried materials, and mapping them would be necessary to properly characterize the site.

The 2007 Follow-on RI at SS11 involved mapping the area of buried drums using a magnetometer coupled with a high accuracy global positioning system (GPS). A Trimble Geoexplorer XT with a 2-meter external antenna, in conjunction with a base station, was used to map the extent of the buried debris. A Schonstedt XT Magnetic Locator was used to determine the extent of the buried debris. The extent of buried debris registering a magnetic signal at SS11 was approximately 2,500 square feet. Depending on the distribution and orientation of the buried debris (i.e., vertical, horizontal, or stacked), and presuming the 2,500 square feet is entirely drums, the area may contain up to 400 to 500 drums if tightly packed.

A total of 10 surface soil samples, nine primary and one duplicate, were collected from beneath exposed drums that showed signs that they had leaked their contents in the past. A

total of 10 exposed drums on the down slope side of the area identified by magnetic anomaly were noted. The drums were numbered sequentially from South to North, 1 through 10. Of these 10 drums, all had evidence of stained soils beneath them where their contents had previously leaked. Drum Number 4 could not be accessed for sampling. None of the 10 drums observed were currently leaking and they were, to the best of the field teams observations, noted to be empty. All 10 drums were partially buried in the surrounding hillside, approximately 50 percent or more, and could not be extricated by hand.

The ten samples collected were analyzed for the following suite of analytes:

- GRO by Alaska Test Method 101
- DRO by Alaska Test Method 102
- RRO by Alaska Test Method 103
- PAHs by SW8270C
- VOCs by SW8260 B
- PCBs by SW8081
- Pesticides and herbicides by SW8082 and
- RCRA Metals by SW6000 series and SW7020

Sample results are summarized in Tables 1 through 6 of the *Draft Follow-On RI Technical Memorandum* (USAF, 2008a). Based on the laboratory results, it is likely that the buried drums contained diesel fuel, used oil, solvents, pesticides, and herbicides.

Table 3-1 Summary of Remedial Investigation Sampling Conducted at SS03

Media	Year	Analyses ^a								
		Metals ^b (SW6010, 6020, 7000)	Cyanide (SW9010)	BTEX (SW8021B)	VOCs ^c (SW8260, 8260B)	SVOCs (SW8270, 8270SIM)	Pest/PCBs (SW8081)	GRO (AK101)	DRO (AK102)	RRO (AK103)
Surface Soil	1997	2 (SW6010/7000), 3 (SW7421)	2	0	3 (SW8260)	4 ¹ (SW8270)	2	3	3	3
	2003	6 ¹ (SW6020)	0	0	6 ¹ (SW8260B)	6 ¹ (SW8270SIM)	0	6 ¹	6 ¹	0
	2004	0	0	0	10 (SW8260B)	10 (SW8270SIM)	0	10	10	10
Subsurface Soil	1997	2 ¹ (SW7421)	0	0	2 ¹ (SW8260)	1 (SW8270)	0	2 ¹	2 ¹	2 ¹
	2002	0	0	3	2 (SW8260B)	2 (SW8270SIM)	0	5	5	5
	2004	0	0	0	12 ² (SW8260B)	12 ² (SW8270SIM)	0	12 ²	12 ²	12 ²
Sediment	1997	1 (SW6010/7000)	1	0	1 (SW8260)	1 (SW8270)	1	1	1	0
Surface Water	1997	1 (SW6010/7000)	1	0	1 (SW8260)	1 (SW8270)	0	1	1	0
Subsurface Water	1997	6 ² (SW7421)	0	0	4 ¹ (SW8260)	3 (SW8270)	0	3	4 ¹	1
	2002	0	0	0	5 ¹ (SW8260B)	5 ¹ (SW8270SIM)	0	5 ¹	5 ¹	5 ¹
	2003	9 ¹ (SW6010)	0	0	8 (SW8260B)	8 (SW8270SIM)	0	9 ¹	8	7
	2004	0	0	0	7 (SW8260B)	7 (SW8270SIM)	0	7	7	0

Key:

^a Number of duplicate sample analyses is shown in superscript type following the total number of analyse

^b Various analytical methods are included in SW7000 series

^c Including benzene, toluene, ethylbenzene, and xylenes

AK - Alaska Test Method

BTEX - benzene, toluene, ethylbenzene, and xylenes

DRO - diesel range organics

GRO - gasoline range organics

PCBs - polychlorinated biphenyls

Pest - pesticides

RRO - residual range organics

SVOCs - semi-volatile organic compounds

SW - U.S. Environmental Protection Agency Solid Waste Test Method

SIM - Selective Ion Monitoring

VOCs - volatile organic compounds

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Table 3-2 Data Summary for Surface Soil - Detected Results at Site SS03

Constituent	Surface Soil Data				
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected (mg/Kg)	Minimum Detected (mg/Kg)
Inorganics, Total					
Aluminum	2	2	100	28,800	24,000
Antimony	2	2	100	2	1
Arsenic	2	2	100	16	11
Barium	2	2	100	258	178
Beryllium	2	2	100	0.7	0.5
Cadmium	2	2	100	4	0.7
Calcium	2	2	100	4,990	2,720
Chromium	2	2	100	56	50
Cobalt	2	2	100	22	15
Copper	2	2	100	95	51
Iron	2	2	100	39,500	26,500
Lead	8	8	100	259	11.3
Magnesium	2	2	100	7,850	6,350
Manganese	2	2	100	609	454
Mercury	2	2	100	1.59	0.83
Molybdenum	2	1	50	1.1	1.1
Nickel	2	2	100	41	37
Potassium	2	2	100	2,620	2,480
Selenium	2	2	100	2	1.3
Silver	2	2	100	6	1.2
Sodium	2	2	100	120	90
Tin	2	2	100	50	12
Titanium	2	2	100	1,430	1,070
Vanadium	2	2	100	88	68
Zinc	2	2	100	518	156
Volatile Organic Compounds					
1,2,4-Trimethylbenzene	18	9	50	1,400	0.0014
1,3,5-Trimethylbenzene	18	9	50	510	0.00078
1,4-Dichlorobenzene	18	1	6	1.2	1.2
2-Butanone (MEK)	17	3	18	0.0033	0.0022
Acetone	17	9	53	2.9	0.026
Benzene	18	4	22	13	0.00043
Chloroform	18	1	6	0.00038	0.00038
Ethylbenzene	18	8	44	26	0.0019
Isopropylbenzene	17	8	47	3.5	0.012
m,p-Xylenes	15	7	47	22	0.0012
Methylene Chloride	18	2	11	0.65	0.0066
n-Butylbenzene	17	6	35	6.4	0.037
n-Propylbenzene	17	7	41	8.4	0.041
o-Xylene	15	6	40	7.9	0.029
p-Isopropyltoluene	18	8	44	11	0.0015
sec-Butylbenzene	17	6	35	6.4	0.034
Tert-Butylbenzene	17	4	24	18	0.18
Toluene	18	10	56	78	0.00064
Total xylenes	3	3	100	2600	0.0081
Trichloroethene	18	1	6	0.00049	0.00049

Table 3-2 Data Summary for Surface Soil - Detected Results at Site SS03

Constituent	Surface Soil Data				
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected (mg/Kg)	Minimum Detected (mg/Kg)
Semi-Volatile Organic Compounds					
3-and 4-Methylphenol Coelution	2	1	50	1	1
Bis(2-ethylhexyl) Phthalate	3	2	67	0.2	0.1
Dibenzofuran	13	9	69	2.8	0.00021
DiethylPhthalate	3	3	100	0.9	0.2
Polynuclear Aromatic Hydrocarbons					
2-Methylnaphthalene	3	2	67	33	4
Acenaphthene	17	7	41	0.82	0.00021
Acenaphthylene	17	1	6	0.0036	0.0036
Anthracene	17	8	47	0.029	0.0005
Benzo(a)anthracene	17	13	76	0.018	0.00025
Benzo(a)pyrene	17	9	53	0.044	0.000205
Benzo(b)fluoranthene	17	12	71	0.099	0.00092
Benzo(g,h,i)perylene	17	12	71	0.058	0.00052
Benzo(k)fluoranthene	15	9	60	0.013	0.00027
Chrysene	17	15	88	0.2	0.0005
Dibenz(a,h)anthracene	17	8	47	0.036	0.00043
Fluoranthene	17	13	76	0.027	0.00063
Fluorene	18	14	78	2.3	0.00029
Indeno(1,2,3-cd)Pyrene	17	11	65	0.01	0.00034
Naphthalene	18	13	72	160	0.00064
Phenanthrene	18	16	89	0.92	0.00075
Pyrene	18	16	89	0.2	0.00045
Pesticides					
4,4'-DDD	2	1	50	0.043	0.043
4,4'-DDE	2	2	100	0.02	0.01
4,4'-DDT	2	2	100	0.006	0.003
Dieldrin	2	1	50	0.004	0.004
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	18	14	78	38,000	8.6
Gasoline Range Organics (GRO)	18	7	39	3,500	0.95
Residual Range Organics (RRO)	13	12	92	1,260	12

Notes:

4,4'-DDD - dichlorodiphenyldichloroethane
 4,4'-DDE - dichlorodiphenyldichloroethylene
 4,4'-DDT - dichlorodiphenyltrichloroethane
 mg/Kg - Milligrams per kilogram

Table 3-3 Data Summary for Subsurface Soil - Detected Results at Site SS03

Constituent	Subsurface Soil Data				
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected (mg/Kg)	Minimum Detected (mg/Kg)
Inorganics, Total					
Lead	1	1	100	10.35	10.35
Volatile Organic Compounds					
1,2,4-Trimethylbenzene	13	8	62	12.8	0.000185
1,3,5-Trimethylbenzene	13	7	54	5.55	0.038
2-Butanone (MEK)	13	3	23.1	0.0065	0.0039
Acetone	11	5	45	0.13	0.0108
Benzene	16	7	44	0.522	0.00055
Ethylbenzene	16	9	56	2.15	0.018
Isopropylbenzene	13	6	46	1.7	0.004
m,p-Xylenes	15	10	67	6.24	0.0015
Methylene Chloride	13	2	15	1.52	0.0026
n-Butylbenzene	13	7	54	3.35	0.008
n-Propylbenzene	13	8	62	3.65	0.011
o-Xylene	15	8	53	7.72	0.00955
p-Isopropyltoluene	13	8	62	2	0.0022
sec-Butylbenzene	13	6	46	2.3	0.0032
Styrene	13	1	8	0.013	0.013
Tert-Butylbenzene	13	6	46	0.18	0.0068
Toluene	16	8	50	0.71	0.000325
Trichloroethene	13	1	8	0.000118	0.000118
Semi-Volatile Organic Compounds					
Dibenzofuran	11	8	73	0.475	0.00049
Polynuclear Aromatic Hydrocarbons					
Acenaphthene	13	9	69	0.872	0.00265
Acenaphthylene	13	1	8	0.00026	0.00026
Anthracene	13	6	46	0.0105	0.0003
Benzo(a)anthracene	13	8	62	0.028	0.000235
Benzo(a)pyrene	13	6	46	0.023	0.00036
Benzo(b)fluoranthene	13	7	54	0.03	0.00059
Benzo(g,h,i)perylene	13	6	46	0.015	0.00038
Benzo(k)fluoranthene	12	5	42	0.031	0.00061
Chrysene	13	9	69	0.038	0.00058
Dibenz(a,h)anthracene	13	1	8	0.0025	0.0025
Fluoranthene	13	9	69	0.091	0.000505
Fluorene	13	9	69	2.83	0.00042
Indeno(1,2,3-cd)Pyrene	13	5	38	0.017	0.00032
Naphthalene	13	10	77	55.7	0.011
Phenanthrene	13	12	92	1.71	0.00057
Pyrene	13	10	77	0.074	0.00059
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	16	12	75	13,000	13
Gasoline Range Organics (GRO)	16	12	75	582	1.035
Residual Range Organics (RRO)	16	10	63	251	7.9

Notes:

mg/Kg - Milligrams per kilogram

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Table 3-4 Data Summary for Sediment - Detected Results at Site SS03

Constituent	Sediment Data				
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)
Inorganics, Total					
Aluminum	1	1	100	27,900	27,900
Antimony	1	1	100	2	2
Arsenic	1	1	100	21	21
Barium	1	1	100	146	146
Beryllium	1	1	100	0.5	0.5
Cadmium	1	1	100	1	1
Calcium	1	1	100	4,540	4,540
Chromium	1	1	100	62	62
Cobalt	1	1	100	23	23
Copper	1	1	100	55	55
Iron	1	1	100	62,600	62,600
Lead	2	1	50	20	20
Magnesium	1	1	100	11,500	11,500
Manganese	1	1	100	1,320	1,320
Mercury	1	1	100	0.09	0.09
Nickel	1	1	100	65	65
Potassium	1	1	100	1,950	1,950
Selenium	1	1	100	1.7	1.7
Silver	1	1	100	2	2
Sodium	1	1	100	100	100
Titanium	1	1	100	1,160	1,160
Vanadium	1	1	100	107	107
Zinc	1	1	100	218	218
Volatile Organic Compounds					
1,1,2,2-Tetrachloroethane	1	1	100	0.00018	0.00018
1,2,3-Trichlorobenzene	1	1	100	0.00025	0.00025
1,2,3-Trichloropropane	1	1	100	0.00021	0.00021
1,2,4-Trichlorobenzene	2	1	50	0.00027	0.00027
cis-1,3-Dichloropropene	1	1	100	0.00017	0.00017
Methylene Chloride	1	1	100	0.013	0.013
trans-1,3-Dichloropropene	1	1	100	0.00013	0.00013
Semi-Volatile Organic Compounds					
3-and 4-Methylphenol Coelution	1	1	100	0.2	0.2
Bis(2-ethylhexyl) Phthalate	1	1	100	0.9	0.9
DiethylPhthalate	1	1	100	0.1	0.1
Phenol	1	1	100	0.1	0.1
Pesticides					
4,4'-DDD	1	1	100	0.00795	0.00795
4,4'-DDT	1	1	100	0.00954	0.00954
Endosulfan Sulfate	1	1	100	0.0033	0.0033
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	1	1	100	161	161
Gasoline Range Organics (GRO)	1	1	100	5.8	5.8

Notes:

4,4'-DDD - dichlorodiphenyldichloroethane

4,4'-DDT - dichlorodiphenyltrichloroethane

mg/Kg - Milligrams per kilogram

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Table 3-5 Data Summary for Surface Water - Detected Results at Site SS03

Constituent	Surface Water Data				
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)
Inorganics, Total					
Barium	1	1	100	0.008	0.008
Calcium	1	1	100	11.8	11.8
Iron	1	1	100	0.15	0.15
Magnesium	1	1	100	4.01	4.01
Manganese	1	1	100	0.015	0.015
Potassium	1	1	100	0.6	0.6
Sodium	1	1	100	4.7	4.7
Titanium	1	1	100	0.004	0.004
Zinc	1	1	100	0.005	0.005
Semi-Volatile Organic Compounds					
DiethylPhthalate	1	1	100	0.0005	0.0005
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	1	1	100	0.062	0.062

Notes:

mg/L- Milligrams per liter

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Table 3-6 Data Summary for Subsurface Water - Detected Results at Site SS03

Constituent	Subsurface Water Data				
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected (mg/L)	Minimum Detected (mg/L)
Inorganics, Total					
Lead	12	11	92	0.00646	0.00049
Volatile Organic Compounds					
1,2,4-Trichlorobenzene	23	1	4	0.0009	0.0009
1,2,4-Trimethylbenzene	22	21	95	0.355	0.00026
1,2-Dichlorobenzene	23	1	4	0.0007	0.0007
1,2-Dichloroethane	22	8	36	0.0023	0.00026
1,3,5-Trimethylbenzene	22	21	95	0.135	0.00015
1,3-Dichlorobenzene	23	1	4	0.0009	0.0009
1,4-Dichlorobenzene	23	1	4	0.001	0.001
2-Butanone (MEK)	22	2	9	0.0025	0.0023
4-Methyl-2-pentanone	22	1	5	0.0013	0.0013
Benzene	22	21	95	0.335	0.0028
Chloroethane	22	3	14	0.0011	0.00044
Chloroform	22	1	5	0.0012	0.0012
Chloromethane	22	2	9	0.0004	0.00016
Ethylbenzene	22	20	91	0.405	0.00049
Isopropylbenzene	22	21	95	0.034	0.00025
m,p-Xylenes	18	16	89	0.25	0.00071
n-Butylbenzene	22	20	91	0.0255	0.00029
n-Propylbenzene	22	20	91	0.0845	0.00049
o-Xylene	19	18	95	0.0072	0.00033
p-Isopropyltoluene	22	18	82	0.017	0.00037
sec-Butylbenzene	22	21	95	0.0165	0.00022
Styrene	22	1	5	0.001165	0.001165
Tert-Butylbenzene	22	14	64	0.018	0.00026
Toluene	22	16	73	0.067	0.00011
Total xylenes	3	3	100	0.72	0.061
Carbon Disulfide	14	2	14	0.00017	0.00016
Semi-Volatile Organic Compounds					
2,4,6-Trichlorophenol	3	1	33	0.0005	0.0005
2,4-Dichlorophenol	3	1	33	0.0005	0.0005
2,4-Dimethylphenol	3	1	33	0.004	0.004
2,4-Dinitrophenol	3	1	33	0.004	0.004
2-Chlorophenol	3	1	33	0.0004	0.0004
2-Methylphenol	3	1	33	0.0005	0.0005
2-Nitrophenol	3	1	33	0.0004	0.0004
3,3'-Dichlorobenzidine	3	1	33	0.005	0.005
3-and 4-Methylphenol Coelution	3	1	33	0.0008	0.0008
4-Chloroaniline	3	1	33	0.003	0.003
Benzoic Acid	1	1	100	0.069	0.069
Benzyl Alcohol	3	1	33	0.0007	0.0007
Bis(2-chloroethoxy)methane	3	1	33	0.0003	0.0003
Bis(2-chloroethyl) Ether	3	1	33	0.0005	0.0005
Dibenzofuran	10	6	60	0.00059	0.0000095
DiethylPhthalate	2	2	100	0.0007	0.0005

Table 3-6 Data Summary for Subsurface Water - Detected Results at Site SS03

Constituent	Subsurface Water Data				
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected (mg/L)	Minimum Detected (mg/L)
Hexachlorobutadiene	23	1	4	0.003	0.003
Hexachloroethane	3	1	33	0.0008	0.0008
Isophorone	3	1	33	0.0003	0.0003
Nitrobenzene	3	1	33	0.0008	0.0008
Phenol	3	2	67	0.011	0.0005
Polynuclear Aromatic Hydrocarbons					
2-Methylnaphthalene	3	1	33	0.005	0.005
Acenaphthene	22	14	64	0.000943	0.000019
Acenaphthylene	22	2	9	0.000479	0.000139
Anthracene	22	11	50	0.000026	0.0000023
Benzo(a)anthracene	22	5	23	0.0000031	0.0000023
Benzo(a)pyrene	22	1	5	0.000002	0.000002
Benzo(g,h,i)perylene	22	2	9	0.000031	0.0000091
Chrysene	22	10	45	0.000012	0.0000014
Fluoranthene	22	9	41	0.0000069	0.000003
Fluorene	22	17	77	0.00166	0.0000035
Indeno(1,2,3-cd)Pyrene	22	1	5	0.0000034	0.0000034
Naphthalene	23	22	96	0.18	0.0000033
Phenanthrene	22	16	73	0.000571	0.0000045
Pyrene	22	13	59	0.000015	0.000003
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	22	21	95	6.4	0.19
Gasoline Range Organics (GRO)	22	21	95	7.5	0.115
Residual Range Organics (RRO)	12	4	33	6.9	0.085

Notes:

mg/L - Milligrams per liter

Table 3-7 Summary of Remedial Investigation Sampling Conducted at SS08

Media	Year	Analyses ^a								
		Metals ^b (SW6010, 6020, 7000)	Cyanide (SW9010)	BTEX (SW8021B)	VOCs ^c (SW8260, 8260B)	SVOCs (SW8270, 8270SIM)	Pest/PCBs (SW8081, 8081A, 8082)	GRO (AK101)	DRO (AK102)	RRO (AK103)
Surface Soil	1997	6 (SW6010/7000), 5 (SW7841), 1 (SW7421/7541)	3	0	6 (SW8260)	5 (SW8270)	6 (SW8081)	6	6	5
	1999	3 ^d	0	3 ^d	0	3 ^d	3 ^d	3 ^d	3	1 ^d
Subsurface Soil	1997	7 (SW6010/7000), 2 (SW7421)	5	0	7 (SW8260)	5 (SW8270)	6 (SW8081)	7	7	7
	1999	4 ^d	0	2 ^d	0	4 ^d	2 ^d	4 ^d	4	2 ^d
	2002	3 ¹ (SW6020/7471A)	0	0	0	0	3 ¹ (SW8081A/8082)	0	3 ¹	0
Sediment	1997	1 (SW6010/7000)	0	0	1 (SW8260)	1 (SW8270)	1 (SW8081)	1	1	0
	1999	2 ^d	0	2 ^d	0	2 ^d	2 ^d	2 ^d	2 ^d	2 ^d
	2002	4 ¹ (SW6020/7471A)	0	4 ¹	4 ¹ (SW8260B)	4 ¹ (SW8270SIM)	4 ¹ (SW8081A/8082)	4 ¹	4 ¹	4 ¹
Sludge	1997	2 (SW6010/7000), 1 (SW7471)	2	0	2 (SW8260)	2 (SW8270)	2 (SW8081)	2	1	1
Surface Water	1997	1 (SW6010/7000)	0	0	1 (SW8260)	1 (SW8270)	1 (SW8081)	1	1	0
	1999	2 ^d	0	2 ^d	0	2 ^d	2 ^d	2 ^d	2 ^d	2 ^d
	2002	1 (SW6020/7470)	0	0	1 (SW8260B)	1 (SW8270)	0	1	1	1
Subsurface Water	1997	4 (SW6010/7000)	0	0	2 (SW8260)	2 (SW8270)	2	2	2	0
	1999	1 ^d	0	1 ^d	0	2 ^d	2 ^d	2 ^d	2 ^d	2 ^d
	2002	9 ¹ (SW6020/7470)	0	0	0	0	6 (SW8081), 9 ¹ (SW8082)	0	9 ¹	3 ¹
	2003	10 ¹ (SW6020/7470A)	0	0	10 ¹ (SW8260B)	10 ¹ (SW8270SIM)	0	10 ¹	10 ¹	9 ¹
	2004	11 ² (SW6020/ 7470A/7740)	0	0	11 ² (SW8260B)	11 ² (SW8270SIM)	0	11 ²	11 ²	0

Key:

^a Number of duplicate sample analyses is shown in superscript type following the total number of analyses

^b Various analytical methods are included in SW7000 series

^c Including benzene, toluene, ethylbenzene, and xylenes

^d Because reporting limits are not available for the 1999 data, only detected analytes are included in the risk assessment database for these samples.

AK - Alaska Test Method

BTEX - benzene, toluene, ethylbenzene, and xylenes

DRO - diesel range organics

GRO - gasoline range organics

PCBs - polychlorinated biphenyls

Pest - pesticides

RRO - residual range organics

SVOCs - semi-volatile organic compounds

SW - U.S. Environmental Protection Agency Solid Waste Test Method

SIM - Selective Ion Monitoring

VOCs - volatile organic compounds

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Table 3-8 Data Summary for Surface Soil - Detected Results at Site SS08

Constituent	Surface Soil Data				
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected (mg/Kg)	Minimum Detected (mg/Kg)
Inorganics, Total					
Aluminum	9	9	100	33,200	19,000
Antimony	9	9	100	3	0.46
Arsenic	9	9	100	22.9	10.4
Barium	9	9	100	307	101
Beryllium	9	9	100	0.8	0.4
Cadmium	9	7	78	2	0.6
Calcium	9	9	100	5,130	993
Chromium	9	9	100	60	31
Cobalt	9	9	100	25	11.6
Copper	9	9	100	76	22.3
Iron	9	9	100	45,400	28,500
Lead	10	10	100	39	9.4
Magnesium	9	9	100	10,300	4,670
Manganese	9	9	100	1,190	441
Mercury	8	4	50	0.2	0.06
Molybdenum	6	1	17	1.2	1.2
Nickel	9	9	100	74	23.6
Potassium	9	9	100	2,800	688
Selenium	6	3	50	1.3	0.8
Silver	7	3	43	1.1	0.55
Sodium	9	9	100	210	51.2
Thallium	8	5	63	0.24	0.1
Tin	6	2	33	11	7
Titanium	6	6	100	1,320	428
Vanadium	9	9	100	97	52.9
Zinc	9	9	100	150	61.3
Volatile Organic Compounds					
1,3,5-Trimethylbenzene	5	1	20	4.6	4.6
Acetone	5	3	60	1.2	0.01
Methylene Chloride	6	6	100	0.22	0.0024
Toluene	6	4	67	0.00035	0.00019
Trichloroethene	5	2	40	0.1	0.0073
Trichlorofluoromethane	6	1	17	0.00034	0.00034
Carbon Disulfide	6	1	17	0.00054	0.00054
Semi-Volatile Organic Compounds					
2,4-Dimethylphenol	5	1	20	0.06	0.06
2-Nitroaniline	5	1	20	0.06	0.06
3,3'-Dichlorobenzidine	5	1	20	0.05	0.05
3-and 4-Methylphenol Coelution	5	3	60	0.4	0.1
3-Nitroaniline	5	1	20	0.09	0.09

Table 3-8 Data Summary for Surface Soil - Detected Results at Site SS08

Constituent	Surface Soil Data				
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected (mg/Kg)	Minimum Detected (mg/Kg)
4-Chloro-3-methylphenol	5	1	20	0.1	0.1
4-Chloroaniline	5	1	20	0.09	0.09
Bis(2-ethylhexyl) Phthalate	5	4	80	0.2	0.1
Polynuclear Aromatic Hydrocarbons					
2-Methylnaphthalene	5	2	40	0.3	0.1
Benzo(a)pyrene	5	1	20	0.08	0.08
Benzo(g,h,i)perylene	5	1	20	0.05	0.05
Chrysene	5	1	20	0.08	0.08
Indeno(1,2,3-cd)Pyrene	5	1	20	0.04	0.04
Naphthalene	5	1	20	1.5	1.5
Phenanthrene	5	1	20	0.1	0.1
Pyrene	5	1	20	0.1	0.1
Pesticides					
4,4'-DDD	7	7	100	2.7	0.001
4,4'-DDE	8	6	75	0.09	0.0002
4,4'-DDT	9	9	100	4.81	0.008
alpha Endosulfan	6	1	17	0.0011	0.0011
alpha-BHC	6	1	17	0.00357	0.00357
beta Endosulfan	6	4	67	0.02	0.001
Endosulfan Sulfate	6	2	33	0.003	0.0008
gamma-BHC (Lindane)	6	1	17	0.00351	0.00351
gamma-Chlordane	6	3	50	0.02	0.00158
Methoxychlor	6	2	33	0.0163	0.009
Polychlorinated Biphenyls					
Arochlor 1260	8	7	88	17	0.02
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	9	9	100	2,500	4
Gasoline Range Organics (GRO)	6	6	100	630	0.98
Residual Range Organics (RRO)	5	5	100	529	43

Notes:

4,4'-DDD - dichlorodiphenyldichloroethane
4,4'-DDE - dichlorodiphenyldichloroethylene
4,4'-DDT - dichlorodiphenyltrichloroethane
mg/Kg - Milligrams per kilogram

Table 3-9 Data Summary for Subsurface Soil - Detected Results at Site SS08

Constituent	Subsurface Soil Data				
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected (mg/Kg)	Minimum Detected (mg/Kg)
Inorganics, Total					
Aluminum	9	9	100	35,700	21,000
Antimony	9	9	100	4	0.55
Arsenic	11	11	100	20	8.62
Barium	11	11	100	438	130
Beryllium	9	8	89	0.8	0.5
Cadmium	11	5	45	1.18	0.25
Calcium	9	9	100	8,030	1,280
Chromium	11	11	100	57	36.4
Cobalt	9	9	100	43	15
Copper	9	9	100	103	32.8
Iron	9	9	100	45,400	33,800
Lead	15	15	100	114	9
Magnesium	9	9	100	9,880	6,180
Manganese	9	9	100	1,040	566
Mercury	9	6	67	0.54	0.0506
Molybdenum	7	4	57	2	1.1
Nickel	9	9	100	65	34.3
Potassium	9	9	100	3,410	1,090
Selenium	9	5	56	3	0.8
Silver	9	4	44	1.1	0.151
Sodium	9	9	100	160	70
Thallium	8	5	63	0.3	0.1
Tin	7	1	14	8	8
Titanium	7	7	100	1,350	268
Vanadium	9	9	100	93	59
Zinc	9	9	100	200	75.1
Volatile Organic Compounds					
1,2,4-Trimethylbenzene	7	3	43	0.00073	0.0002
1,3,5-Trimethylbenzene	6	2	33	3.6	0.53
Acetone	7	5	71	4.2	0.012
Benzene	9	3	33	0.014	0.00023
Carbon Tetrachloride	6	2	33	0.0087	0.0049
Chloroform	6	1	17	0.0014	0.0014
cis-1,2-Dichloroethene	6	1	17	0.00028	0.00028
Dichlorodifluoromethane	6	1	17	0.016	0.016
Ethylbenzene	9	3	33	0.14	0.00023
Isopropylbenzene	6	1	17	0.18	0.18
m,p-Xylenes	2	2	100	0.98	0.1
Methylene Chloride	7	7	100	0.11	0.0025
o-Xylene	2	1	50	3.6	3.6
p-Isopropyltoluene	7	3	43	0.38	0.0016
Tetrachloroethene	6	1	17	0.00099	0.00099
Toluene	9	5	56	0.34	0.00018
Total xylenes	7	4	57	0.41	0.00049
Trichloroethene	6	3	50	0.055	0.00013
Trichlorofluoromethane	6	1	17	0.19	0.19
Carbon Disulfide	6	2	33	0.038	0.00034
3-and 4-Methylphenol Coelution	5	2	40	0.3	0.1
Bis(2-ethylhexyl) Phthalate	5	1	20	0.2	0.2

Table 3-9 Data Summary for Subsurface Soil - Detected Results at Site SS08

Constituent	Subsurface Soil Data				
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected (mg/Kg)	Minimum Detected (mg/Kg)
Dibenzofuran	7	2	29	0.33	0.027
2-Methylnaphthalene	7	3	43	7.3	0.26
Acenaphthene	7	2	29	0.29	0.016
Acenaphthylene	7	1	14	0.013	0.013
Anthracene	7	2	29	0.02	0.012
Benzo(a)anthracene	7	2	29	0.054	0.017
Benzo(a)pyrene	7	2	29	0.057	0.014
Benzo(b)fluoranthene	7	2	29	0.056	0.018
Benzo(g,h,i)perylene	7	2	29	0.036	0.013
Benzo(k)fluoranthene	2	2	100	0.043	0.014
Chrysene	7	2	29	0.095	0.034
Dibenz(a,h)anthracene	7	2	29	0.012	0.004
Fluoranthene	7	2	29	0.12	0.034
Fluorene	7	2	29	0.58	0.028
Phenanthrene	7	2	29	0.37	0.098
Pyrene	7	3	43	0.2	0.078
Pesticides					
4,4'-DDD	9	7	78	0.876	0.0024
4,4'-DDE	9	5	56	0.05	0.0008
4,4'-DDT	9	7	78	0.741	0.01
beta Endosulfan	8	1	13	0.01	0.01
Dieldrin	8	1	13	0.04	0.04
Methoxychlor	8	1	13	0.01	0.01
Polychlorinated Biphenyls					
Arochlor 1260	8	2	25	1.63	0.2
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	13	11	85	23,900	6
Gasoline Range Organics (GRO)	9	9	100	1,400	0.96
Residual Range Organics (RRO)	8	7	88	13,200	31

Notes:

4,4'-DDD - dichlorodiphenyldichloroethane
4,4'-DDE - dichlorodiphenyldichloroethylene
4,4'-DDT - dichlorodiphenyltrichloroethane
mg/Kg - Milligrams per kilogram

Table 3-10 Data Summary for Sediment - Detected Results at Site SS08

Constituent	Sediment Data				
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)
Inorganics, Total					
Aluminum	3	3	100	35,000	28,900
Antimony	3	2	67	0.8	0.66
Arsenic	6	6	100	24	10.5
Barium	6	6	100	258	188
Beryllium	3	3	100	1.2	0.6
Cadmium	6	5	83	1.9	0.309
Calcium	3	3	100	10,600	7,110
Chromium	6	6	100	77.7	36.8
Cobalt	3	3	100	31.5	18.8
Copper	3	3	100	122	49
Iron	3	3	100	74,400	36,600
Lead	6	6	100	69.3	15.9
Magnesium	3	3	100	16,200	7,930
Manganese	3	3	100	1,300	857
Mercury	6	6	100	0.256	0.0785
Molybdenum	1	1	100	3	3
Nickel	3	3	100	110	39.2
Potassium	3	3	100	2,820	1,710
Selenium	5	2	40	1.5	0.31
Silver	5	3	60	1	0.247
Sodium	3	3	100	209	146
Thallium	3	3	100	0.3	0.28
Titanium	1	1	100	1,470	1,470
Vanadium	3	3	100	106	86
Zinc	3	3	100	273	102
Volatile Organic Compounds					
1,1,1-Trichloroethane	4	1	25	0.057	0.057
m,p-Xylenes	4	2	50	0.0792	0.0031
Methylene Chloride	4	1	25	0.0018	0.0018
Tetrachloroethene	3	1	33	0.294	0.294
Toluene	4	1	25	0.0021	0.0021
3,3'-Dichlorobenzidine	1	1	100	0.08	0.08
4-Chloroaniline	1	1	100	0.2	0.2
Polynuclear Aromatic Hydrocarbons					
Acenaphthene	4	1	25	0.00996	0.00996
Acenaphthylene	4	1	25	0.00735	0.00735
Anthracene	4	2	50	0.0793	0.0121
Benzo(a)anthracene	4	2	50	0.0625	0.0215
Benzo(a)pyrene	4	2	50	0.0633	0.0226
Benzo(b)fluoranthene	4	2	50	0.0634	0.0347
Benzo(g,h,i)perylene	4	2	50	0.0439	0.0171
Benzo(k)fluoranthene	3	2	67	0.0417	0.0279
Chrysene	4	2	50	0.117	0.0678
Dibenz(a,h)anthracene	4	1	25	0.0148	0.0148

Table 3-10 Data Summary for Sediment - Detected Results at Site SS08

Constituent	Sediment Data				
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)
Fluoranthene	4	2	50	0.132	0.124
Fluorene	4	1	25	0.0146	0.0146
Indeno(1,2,3-cd)Pyrene	4	2	50	0.0329	0.0158
Pyrene	4	2	50	0.183	0.0842
Pesticides					
4,4'-DDD	6	6	100	0.666	0.0062
4,4'-DDE	6	5	83	0.255	0.028
4,4'-DDT	6	6	100	2.5	0.0561
Endosulfan Sulfate	4	1	25	0.0042	0.0042
Endrin	5	1	20	0.0011	0.0011
Polychlorinated Biphenyls					
Arochlor 1260	5	3	60	0.19	0.0548
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	6	5	83	2,740	25.6
Gasoline Range Organics (GRO)	5	3	60	4.21	2
Residual Range Organics (RRO)	5	5	100	1,190	119

Notes:

4,4'-DDD - dichlorodiphenyldichloroethane
4,4'-DDE - dichlorodiphenyldichloroethylene
4,4'-DDT - dichlorodiphenyltrichloroethane
mg/Kg - Milligrams per kilogram

Table 3-11 Data Summary for Sludge - Detected Results at Site SS08

Constituent	Sludge Data				
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected (mg/Kg)	Minimum Detected (mg/Kg)
Inorganics, Total					
Aluminum	2	2	100	31,000	26,600
Antimony	2	2	100	2	1
Arsenic	2	2	100	20	14
Barium	2	2	100	322	270
Beryllium	2	2	100	0.8	0.6
Cadmium	2	1	50	0.9	0.9
Calcium	2	2	100	3,480	2,580
Chromium	2	2	100	58	51
Cobalt	2	2	100	20	16
Copper	2	2	100	454	92
Iron	2	2	100	49,900	41,500
Lead	2	2	100	14	10
Magnesium	2	2	100	8,980	7,320
Manganese	2	2	100	877	868
Mercury	1	1	100	0.04	0.04
Nickel	2	2	100	46	45
Potassium	2	2	100	3,530	1,520
Selenium	2	2	100	4	1.3
Silver	2	1	50	1	1
Sodium	2	2	100	110	90
Thallium	2	1	50	0.1	0.1
Tin	2	1	50	8	8
Titanium	2	2	100	1,322	1,100
Vanadium	2	2	100	102	77
Zinc	2	2	100	831	136
Volatile Organic Compounds					
1,2,4-Trimethylbenzene	2	2	100	0.0045	0.0029
1,3,5-Trimethylbenzene	2	2	100	0.0018	0.0017
1,4-Dichlorobenzene	2	2	100	0.0082	0.0065
Acetone	2	2	100	0.05	0.019
Benzene	2	1	50	0.00025	0.00025
Chloroform	2	1	50	0.00026	0.00026
Methylene Chloride	2	2	100	0.004	0.0011
n-Butylbenzene	2	1	50	0.002	0.002
p-Isopropyltoluene	2	2	100	0.18	0.0033
Tetrachloroethene	2	2	100	0.00056	0.00023
Toluene	2	2	100	0.38	0.0061
Total xylenes	2	2	100	0.0045	0.0015
Trichloroethene	2	2	100	0.00095	0.00079
Carbon Disulfide	2	2	100	0.0092	0.0003
Semi-Volatile Organic Compounds					
2-Methylphenol	2	1	50	0.2	0.2
3-and 4-Methylphenol Coelution	2	2	100	0.4	0.2
Bis(2-ethylhexyl) Phthalate	2	2	100	0.8	0.4
DiethylPhthalate	2	1	50	0.2	0.2

Table 3-11 Data Summary for Sludge - Detected Results at Site SS08

Constituent	Sludge Data				
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected (mg/Kg)	Minimum Detected (mg/Kg)
Phenol	2	1	50	0.1	0.1
Polynuclear Aromatic Hydrocarbons					
Naphthalene	2	2	100	0.0083	0.0017
Pesticides					
4,4'-DDD	2	2	100	0.00956	0.004
4,4'-DDE	2	2	100	0.0037	0.003
4,4'-DDT	2	2	100	0.0372	0.01
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	1	1	100	1,430	1,430
Gasoline Range Organics (GRO)	2	2	100	16	14
Residual Range Organics (RRO)	1	1	100	574	574

Notes:

4,4'-DDD - dichlorodiphenyldichloroethane

4,4'-DDE - dichlorodiphenyldichloroethylene

4,4'-DDT - dichlorodiphenyltrichloroethane

mg/Kg - Milligrams per kilogram

Table 3-12 Data Summary for Surface Water - Detected Results at Site SS08

Constituent	Surface Water Data				
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected (mg/L)	Minimum Detected (mg/L)
Inorganics, Total					
Aluminum	3	2	67	1.21	0.576
Arsenic	4	2	50	0.001	0.0009
Barium	4	4	100	0.0152	0.005
Calcium	3	3	100	13.4	9.84
Chromium	4	2	50	0.005	0.004
Copper	2	1	50	0.0028	0.0028
Iron	3	3	100	1.45	0.06
Lead	4	2	50	0.0011	0.001
Magnesium	3	3	100	3.44	2.24
Manganese	3	3	100	0.0502	0.002
Potassium	3	3	100	1	0.4
Selenium	3	1	33	0.0012	0.0012
Silver	3	1	33	0.003	0.003
Sodium	3	3	100	2.41	2.08
Titanium	1	1	100	0.002	0.002
Vanadium	2	1	50	0.004	0.004
Zinc	3	2	67	0.01	0.004
Volatile Organic Compounds					
1,1,1-Trichloroethane	2	1	50	0.00026	0.00026
1,1-Dichloropropene	2	1	50	0.00029	0.00029
1-Chlorohexane	1	1	100	0.00024	0.00024
2,2-Dichloropropane	2	1	50	0.00025	0.00025
2-Chloroethyl Vinyl Ether	2	1	50	0.00019	0.00019
Bromomethane	3	1	33	0.00015	0.00015
Carbon Tetrachloride	2	1	50	0.00042	0.00042
Chloroethane	2	1	50	0.00031	0.00031
Chloromethane	2	1	50	0.00031	0.00031
Isopropylbenzene	2	1	50	0.00021	0.00021
n-Butylbenzene	2	1	50	0.00051	0.00051
sec-Butylbenzene	2	1	50	0.00031	0.00031
Styrene	2	1	50	0.00013	0.00013
Toluene	2	1	50	0.00019	0.00019
Trichlorofluoromethane	2	1	50	0.00036	0.00036
Vinyl Acetate	1	1	100	0.00032	0.00032
Vinyl Chloride	2	1	50	0.00036	0.00036
Carbon Disulfide	2	1	50	0.0025	0.0025

Table 3-12 Data Summary for Surface Water - Detected Results at Site SS08

Constituent	Surface Water Data				
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected (mg/L)	Minimum Detected (mg/L)
Semi-Volatile Organic Compounds					
Hexachlorobutadiene	2	1	50	0.00039	0.00039
Pesticides					
4,4'-DDD	1	1	100	0.0000022	0.0000022
4,4'-DDE	1	1	100	0.0000041	0.0000041
4,4'-DDT	2	2	100	0.000031	0.0000298

Notes:

4,4'-DDD - dichlorodiphenyldichloroethane

4,4'-DDE - dichlorodipenyldichloroethylene

4,4'-DDT - dichlorodiphenyltrichloroethane

mg/L - Milligrams per liter

Table 3-13 Data Summary for Subsurface Water - Detected Results at Site SS08

Constituent	Subsurface Water Data				
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected (mg/L)	Minimum Detected (mg/L)
Inorganics, Total					
Aluminum	5	5	100	176	0.09
Antimony	5	1	20	0.003	0.003
Arsenic	31	21	68	0.305	0.00376
Barium	31	31	100	2.18	0.006
Beryllium	5	1	20	0.0068	0.0068
Cadmium	31	18	58	0.0095	0.00013
Calcium	5	5	100	78.9	16.1
Chromium	31	26	84	0.371	0.00466
Cobalt	5	1	20	0.189	0.189
Copper	5	5	100	0.506	0.004
Iron	5	5	100	316	0.07
Lead	31	26	84	0.331	0.001
Magnesium	5	5	100	98.9	4.07
Manganese	5	5	100	15.8	0.036
Mercury	30	11	37	0.0006	0.00011
Nickel	5	1	20	0.451	0.451
Potassium	5	5	100	18.9	0.9
Selenium	30	10	33	0.025	0.0032
Silver	31	17	55	0.004	0.00011
Sodium	5	5	100	11	2.6
Thallium	5	1	20	0.0013	0.0013
Tin	4	1	25	0.042	0.042
Titanium	4	4	100	0.038	0.002
Vanadium	5	1	20	0.5	0.5
Zinc	5	3	60	0.882	0.006
Volatile Organic Compounds					
1,1,1,2-Tetrachloroethane	20	1	5	0.0005	0.0005
1,2,4-Trimethylbenzene	21	3	14	0.1	0.00026
1,2-Dibromoethane	20	1	5	0.001	0.001
1,3,5-Trimethylbenzene	21	2	10	0.01	0.00023
2-Chloroethyl Vinyl Ether	2	1	50	0.00019	0.00019
Acetone	19	3	16	0.01	0.0024
Benzene	21	1	5	0.001	0.001
Bromodichloromethane	20	1	5	0.0005	0.0005
Chlorobenzene	20	1	5	0.0005	0.0005
Chloroethane	21	1	5	0.003	0.003
Chloroform	20	1	5	0.00014	0.00014
Chloromethane	21	2	10	0.003	0.00019
cis-1,2-Dichloroethene	20	1	5	0.00011	0.00011
Dibromomethane	20	1	5	0.001	0.001
Ethylbenzene	21	2	10	0.008	0.00034
Isopropylbenzene	21	2	10	0.017	0.0012
m,p-Xylenes	18	1	6	0.00023	0.00023
n-Butylbenzene	21	2	10	0.029	0.00086
n-Propylbenzene	21	2	10	0.02	0.0011
o-Xylene	18	1	6	0.00013	0.00013

Table 3-13 Data Summary for Subsurface Water - Detected Results at Site SS08

Constituent	Subsurface Water Data				
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected (mg/L)	Minimum Detected (mg/L)
p-Isopropyltoluene	21	2	10	0.019	0.001
sec-Butylbenzene	21	3	14	0.022	0.00017
Styrene	20	1	5	0.00013	0.00013
Tert-Butylbenzene	21	2	10	0.006	0.00088
Toluene	20	8	40	0.12	0.0001
Total xylenes	3	1	33	0.011	0.011
Carbon Disulfide	11	1	9	0.00019	0.00019
Semi-Volatile Organic Compounds					
Dibenzofuran	11	1	9	0.000079	0.000079
Polynuclear Aromatic Hydrocarbons					
2-Methylnaphthalene	3	1	33	0.464	0.464
Acenaphthene	21	5	24	0.0055	0.0000047
Acenaphthylene	20	4	20	0.000016	0.0000028
Anthracene	20	7	35	0.00001	0.0000012
Benzo(a)anthracene	20	3	15	0.0000088	0.0000026
Benzo(a)pyrene	20	2	10	0.0000054	0.000002
Benzo(b)fluoranthene	20	3	15	0.0000079	0.0000028
Benzo(g,h,i)perylene	20	7	35	0.000013	0.000004
Benzo(k)fluoranthene	18	3	17	0.0000065	0.0000021
Chrysene	20	16	80	0.000013	0.0000014
Dibenz(a,h)anthracene	20	3	15	0.0000048	0.000002
Fluoranthene	20	13	65	0.000018	0.0000028
Fluorene	21	13	62	0.0115	0.0000027
Indeno(1,2,3-cd)Pyrene	20	3	15	0.000007	0.0000027
Naphthalene	23	18	78	0.14	0.0000051
Phenanthrene	21	19	90	0.0048	0.0000047
Pyrene	20	17	85	0.000026	0.0000026
Pesticides					
4,4'-DDD	9	2	22	0.000161	0.000004
4,4'-DDT	9	2	22	0.000105	0.00001
Heptachlor	8	2	25	0.00001	0.000009
Heptachlor Epoxide	7	1	14	0.000003	0.000003
Methoxychlor	8	2	25	0.00002	0.00001
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	29	15	52	190	0.036
Gasoline Range Organics (GRO)	21	3	14	0.37	0.14
Residual Range Organics (RRO)	10	6	60	0.3	0.059

Notes:

4,4'-DDD - dichlorodiphenyldichloroethane

4,4'-DDT - dichlorodiphenyltrichloroethane

mg/L- Milligrams per liter

Table 3-14 Summary of Remedial Investigation Sampling Conducted at SS11

Media	Year	Analyses ^a							
		Metals ^b (SW6010, 6020, 7000)	BTEX (SW8021B)	VOCs ^c (SW8260, 8260B)	SVOCs (SW8270, 8270SIM)	Pest/PCBs (SW8081, 8081A, 8082)	GRO (AK101)	DRO (AK102)	RRO (AK103)
Surface Soil	1997	4 (SW6010/7000)	0	4 (SW8260)	4 (SW8270)	3	4	4	4
	2004	6 ¹ (SW6020/7471A)	0	6 ¹ (SW8260B)	6 ¹ (SW8270SIM)	6 ¹ (SW8081A/8082)	6 ¹	6 ¹	6 ¹
	2007	9 ¹	0	9 ¹	9 ¹	9 ¹	9 ¹	9 ¹	9 ¹
Subsurface Soil	1997	2 (SW6010)	0	2 (SW6260)	2 (SW8270A)	2 (SW8081)	2	2	2
Sediment	2002	3 (SW6020/7471A)	0	3 (SW8260B)	3 (SW8270SIM)	3 (SW8081A/8082)	3	3	3
	2003	4 ¹ (SW6020/7471A)	0	4 ¹ (SW8260B)	4 ¹ (SW8270SIM)	0	0	0	0
Surface Water	2002	3 (SW6020/7470)	0	3 (SW8260B)	3 (SW8270SIM)	3 (SW8081A/8082)	2	3	3
	2003	0	0	3 ¹ (SW8260B)	3 ¹ (SW8270SIM)	0	0	0	0

Key:

^a Number of duplicate sample analyses is shown in superscript type following the total number of analyse

^b Various analytical methods are included in SW7000 series

^c Including benzene, toluene, ethylbenzene, and xylene

AK - Alaska Test Method

BTEX - benzene, toluene, ethylbenzene, and xylenes

DRO - diesel range organics

GRO - gasoline range organics

PCBs - polychlorinated biphenyls

Pest - pesticides

RRO - residual range organics

SVOCs - semi-volatile organic compounds

SW - U.S. Environmental Protection Agency Solid Waste Test Method

SIM - Selective Ion Monitoring

VOCs - volatile organic compounds

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Table 3-15 Data Summary for Surface Soil - Detected Results at Site SS11

Constituent	Surface Soil Data				
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected (mg/Kg)	Minimum Detected (mg/Kg)
Inorganics, Total					
Aluminum	4	4	100	22,700	14,200
Antimony	4	2	50	1	1
Arsenic	18	18	100	20	1.63
Barium	18	18	100	3,680	114
Beryllium	4	4	100	0.4	0.2
Cadmium	18	15	83	0.7	0.092
Calcium	4	4	100	2,820	1,380
Chromium	18	18	100	47.4	5.92
Cobalt	4	4	100	20	4
Copper	4	4	100	58	10
Iron	4	4	100	41,900	14,100
Lead	18	18	100	462	4.9
Magnesium	4	4	100	7,000	2,340
Manganese	4	4	100	1,080	107
Mercury	18	17	94	0.13	0.027
Molybdenum	4	3	75	3	1
Nickel	4	4	100	40	11
Potassium	4	4	100	1,800	920
Selenium	18	7	39	1.3	0.3
Silver	18	16	89	1	0.049
Sodium	4	4	100	120	80
Thallium	4	3	75	0.3	0.1
Tin	4	1	25	11	11
Titanium	4	4	100	1,460	423
Vanadium	4	4	100	68	35
Zinc	4	4	100	91	29
Volatile Organic Compounds					
1,2,4-Trimethylbenzene	16	3	19	17	0.058
1,3,5-Trimethylbenzene	16	2	13	4.4	0.032
2-Butanone (MEK)	16	4	25	0.51	0.033
4-Methyl-2-pentanone	15	1	7	0.0051	0.0051
Acetone	17	15	88	32	0.024
Chloroform	17	5	29	0.099	0.0014
Ethylbenzene	16	1	6	0.076	0.076
Isopropylbenzene	16	1	6	0.043	0.043
m,p-Xylenes	14	1	7	0.15	0.15
Methylene Chloride	18	3	17	0.043	0.0056
n-Butylbenzene	16	1	6	0.13	0.13
o-Xylene	14	1	7	2	2
p-Isopropyltoluene	16	3	19	0.19	0.017
Toluene	18	11	61	0.034	0.00029
Total xylenes	2	1	50	0.0012	0.0012
Trichloroethene	17	2	12	0.0041	0.001
Trichlorofluoromethane	17	1	6	0.0034	0.0034

Table 3-15 Data Summary for Surface Soil - Detected Results at Site SS11

Constituent	Surface Soil Data				
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected (mg/Kg)	Minimum Detected (mg/Kg)
Semi-Volatile Organic Compounds					
2,4-Dimethylphenol	13	1	8	25	25
2-Methylphenol	13	1	8	21	21
4-Methylphenol	9	1	11	46	46
Benzoic Acid	11	1	9	0.37	0.37
Dibenzofuran	18	8	44	1,700	0.003
DiethylPhthalate	13	1	8	0.2	0.2
Di-n-Butyl Phthalate	13	4	31	0.18	0.055
Phenol	13	1	8	16	16
Polynuclear Aromatic Hydrocarbons					
2-Methylnaphthalene	13	6	46	8,600	0.037
Acenaphthene	18	10	56	9,200	0.0011
Acenaphthylene	18	5	28	120	0.00046
Anthracene	18	9	50	7,300	0.0018
Benzo(a)anthracene	18	9	50	3,100	0.0068
Benzo(a)pyrene	18	7	39	1,800	0.0068
Benzo(b)fluoranthene	18	9	50	2,300	0.019
Benzo(g,h,i)perylene	18	8	44	740	0.0063
Benzo(k)fluoranthene	14	5	36	790	0.0085
Chrysene	18	10	56	3,500	0.049
Dibenz(a,h)anthracene	18	6	33	210	0.0025
Fluoranthene	18	9	50	10,000	0.017
Fluorene	18	9	50	5,700	0.0028
Phenanthrene	18	10	56	17,000	0.012
Pyrene	18	12	67	10,000	0.036
Pesticides					
4,4'-DDD	17	12	71	0.027	0.0028
4,4'-DDE	17	14	82	0.14	0.0026
4,4'-DDT	17	16	94	1.5	0.016
Aldrin	17	4	24	0.051	0.0039
alpha Endosulfan	17	6	35	0.17	0.0011
alpha-BHC	16	7	44	2	0.0003
alpha-Chlordane	17	10	59	2	0.00032
beta Endosulfan	17	5	29	0.099	0.00036
beta-BHC	17	4	24	0.027	0.0014
delta-BHC	15	5	33	1.7	0.0034
Dieldrin	17	3	18	0.027	0.027
Endosulfan Sulfate	17	9	53	0.027	0.00066
Endrin	17	5	29	3.5	0.0018
Endrin Aldehyde	17	12	71	2.9	0.00037
Endrin Ketone	9	4	44	2.2	0.0026
gamma-BHC (Lindane)	17	6	35	0.095	0.0038
gamma-Chlordane	17	5	29	0.027	0.0024
Heptachlor	17	7	41	0.28	0.0016
Heptachlor Epoxide	17	4	24	0.027	0.00064
Methoxychlor	17	6	35	0.67	0.0027
Toxaphene	17	4	24	1.7	1.3

Table 3-15 Data Summary for Surface Soil - Detected Results at Site SS11

Constituent	Surface Soil Data				
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected (mg/Kg)	Minimum Detected (mg/Kg)
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	18	18	100	200,000	19
Gasoline Range Organics (GRO)	18	6	33	18	2.9
Residual Range Organics (RRO)	18	18	100	160,000	104

Notes:

4,4'-DDD - dichlorodiphenyldichloroethane
4,4'-DDE - dichlorodiphenyldichloroethylene
4,4'-DDT - dichlorodiphenyltrichloroethane
mg/Kg - Milligrams per kilogram

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Table 3-16 Data Summary for Subsurface Soil - Detected Results at Site SS011

Constituent	Subsurface Soil Data				
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected (mg/Kg)	Minimum Detected (mg/Kg)
Inorganics, Total					
Arsenic	2	2	100	59	51
Barium	2	2	100	140	120
Chromium	2	2	100	43	36
Lead	2	2	100	12	11
Volatile Organic Compounds					
Acetone	2	1	50	0.13	0.13
Semi-Volatile Organic Compounds					
Di-n-Butyl Phthalate	2	1	50	0.041	0.041
Polynuclear Aromatic Hydrocarbons					
Chrysene	2	1	50	0.058	0.058
Fluoranthene	2	1	50	0.076	0.076
Pyrene	2	1	50	0.081	0.081
Pesticides					
4,4'-DDD	2	1	50	0.0047	0.0047
4,4'-DDT	2	2	100	0.038	0.025
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	2	2	100	180	88
Residual Range Organics (RRO)	2	2	100	940	540

Notes:

4,4'-DDD - dichlorodiphenyldichloroethane

4,4'-DDT - dichlorodiphenyltrichloroethane

mg/Kg - Milligrams per kilogram

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Table 3-17 Data Summary for Sediment - Detected Results at Site SS11

Constituent	Sediment Data				
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)
Inorganics, Total					
Arsenic	6	4	66.67	12.1	1.09
Barium	6	6	100	184	12.4
Cadmium	6	3	50	0.29	0.25
Chromium	6	6	100	34	1.84
Lead	6	6	100	14.1	0.653
Mercury	6	5	83.33	0.13	0.0421
Selenium	6	3	50	5.6	3.3
Silver	6	3	50	0.19	0.16
Polynuclear Aromatic Hydrocarbons					
Acenaphthene	6	1	16.67	0.0076	0.0076
Acenaphthylene	6	1	16.67	0.0076	0.0076
Anthracene	6	1	16.67	0.00076	0.00076
Benzo(a)anthracene	6	1	16.67	0.00034	0.00034
Benzo(a)pyrene	6	1	16.67	0.00053	0.00053
Benzo(b)fluoranthene	6	1	16.67	0.00053	0.00053
Benzo(g,h,i)perylene	6	3	50	0.00097	0.00043
Benzo(k)fluoranthene	6	1	16.67	0.00054	0.00054
Chrysene	6	2	33.33	0.0007	0.00046
Dibenz(a,h)anthracene	6	1	16.67	0.00083	0.00083
Fluoranthene	6	3	50	0.001	0.00066
Fluorene	6	1	16.67	0.00056	0.00056
Indeno(1,2,3-cd)Pyrene	6	3	50	0.0011	0.0004
Naphthalene	6	3	50	0.0009	0.00064
Phenanthrene	6	3	50	0.0017	0.0008
Pyrene	6	3	50	0.00071	0.00046
Pesticides					
4,4'-DDT	3	3	100	0.00572	0.00505
Petroleum Hydrocarbons					
Residual Range Organics (RRO)	3	3	100	342	236

Notes:

4,4'-DDT - dichlorodiphenyltrichloroethane
mg/Kg - Milligrams per kilogram

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Table 3-18 Data Summary for Surface Water - Detected Results at Site SS11

Constituent	Surface Water Data				
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected (mg/L)	Minimum Detected (mg/L)
Inorganics, Total					
Barium	3	3	100	0.0315	0.01
Chromium	3	1	33	0.00424	0.00424
Volatile Organic Compounds					
Chloromethane	5	1	20	0.00112	0.00112
Toluene	5	2	40	0.00022	0.00018
Carbon Disulfide	3	3	100	0.0194	0.00594
Polynuclear Aromatic Hydrocarbons					
Anthracene	5	1	20	0.0000015	0.0000015
Benzo(a)anthracene	5	2	40	0.0000027	0.0000024
Benzo(a)pyrene	5	1	20	0.0000033	0.0000033
Benzo(b)fluoranthene	5	1	20	0.0000045	0.0000045
Benzo(g,h,i)perylene	5	1	20	0.0000073	0.0000073
Benzo(k)fluoranthene	5	1	20	0.0000045	0.0000045
Chrysene	5	1	20	0.0000033	0.0000033
Dibenz(a,h)anthracene	5	1	20	0.000004	0.000004
Fluoranthene	5	1	20	0.000004	0.000004
Indeno(1,2,3-cd)Pyrene	5	1	20	0.0000057	0.0000057
Naphthalene	4	1	25	0.0000044	0.0000044
Phenanthrene	5	1	20	0.0000046	0.0000046
Pyrene	5	1	20	0.0000041	0.0000041

Notes:

mg/L- Milligrams per liter

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4.0 SITE CONCEPTUAL MODEL

The risk assessment process begins with the development of a site-specific conceptual site model (CSM). The CSM is a descriptive and graphical presentation of the physical, chemical, and biological relationships between sources of chemical contaminants and potentially exposed populations. As such, the CSM incorporates information on contaminant sources, migration and fate processes, complete and incomplete exposure pathways, and potentially exposed populations under current and future exposure scenarios (ADEC, 2005a, b; USEPA, 1989a, b).

The technical approach and assumptions described in the CSM included herein build on information included in the Final RI Report (USAF, 1998b). A refined CSM for Lower Camp Sites SS03, SS08, and SS11 identifies and evaluates the following information:

- Contaminated media and COPCs/COPECs.
- Contaminant fate and transport pathways.
- Potentially exposed populations.
- Potentially complete exposure pathways between contaminated media and receptors.

Each of these components of the CSM for Lower Camp is described below.

4.1 CONTAMINATED MEDIA AND COPCS/COPECS

Sources of contamination and potentially impacted media associated with SS03, SS08, and SS11 are described below. Inorganic and organic contaminants are identified as COPCs and COPECs based on a comparison of RI sampling results to human health and ecological screening criteria.

Human health screening criteria include numeric criteria and standards published in State of Alaska regulations (18 Alaska Administrative Code [AAC] 75 and 18 AAC 70 ([ADEC, 2008a, b])). Ecological screening criteria include numeric criteria and standards published in ADEC's ecoscoping guidance (2008c) and NOAA's screening quick reference table (Buchman, 2006). Detected chemicals without screening criteria are included as COPCs and COPECs.

4.1.1 COPC and COPEC Selection Methods

Methods used to screen COPCs and COPECs during the evaluation of potentially impacted media are described below.

4.1.1.1 Human Health Screening

Medium-specific human health screening criteria are available for soil (surface and subsurface), surface water, and subsurface water. Because human health screening criteria are not available for sediment and sludge, the soil screening criteria were used for these media. The human health screening criteria are presented in Tables 4-1 through 4-5. Human health

screening was conducted in accordance with State of Alaska regulations (18 AAC 75), ADEC's *Draft Risk Assessment Procedures Manual* (ADEC, 2005a).

Surface and Subsurface Soil. Human Health COPC screening for soil was based on comparison of maximum concentrations of chemicals detected in surface (0 to 2 ft bgs) and subsurface (generally 2 ft bgs to groundwater or refusal but not exceeding 15 ft bgs) soils to:

- ADEC Method Two Soil Cleanup Levels (under 40-inch zone) compiled from Tables B1 and B2 (18 AAC 75.345), adjusted to a one-in-one million risk for carcinogenic chemicals and a hazard quotient of 0.1 for noncarcinogenic chemicals to account for potential cumulative effects, OR
- EPA's Regional Screening Levels (RSLs) (USEPA, 2008a), adjusted to a hazard quotient of 0.1 for noncarcinogenic chemicals, where ADEC Method Two Soil Cleanup Levels were not available.

ADEC Method Two Soil Cleanup Levels (18 AAC 75.345) are chemical specific, applicable to surface and subsurface soils, and listed for the direct contact and inhalation exposure pathways. For some chemicals, cleanup levels are also listed for the ingestion pathway. For Tier I screening, maximum concentrations of chemicals detected in soil were compared to the values provided in the list above. The COPC Screening Benchmarks are presented in Table 4-1. Inorganic chemicals and organic chemicals exceeding the COPC Screening Benchmarks were identified as human health COPCs for soil.

Sediment. Numerical screening criteria are not published in either 18 AAC 70 or 18 AAC 75 for evaluating potential human health impacts from exposure to chemicals in sediment. However, ADEC Method Two Soil Cleanup Levels (18 AAC 75.345) adjusted to a one-in-one million risk for carcinogenic chemicals and a hazard quotient of 0.1 for noncarcinogenic chemicals or EPA RSLs for Residential Soil adjusted to a hazard quotient of 0.1 for noncarcinogenic chemicals were used in place of sediment screening criteria for human health concerns. Table 4-2 presents the COPC Screening Benchmarks for sediment.

For Tier I screening, maximum concentrations of chemicals detected in sediment were compared to the COPC Screening Benchmarks in Table 4-2. Chemicals exceeding these values were identified as human health COPCs for sediment.

Sludge. Numerical screening criteria are not published in either 18 AAC 70 or 18 AAC 75 for evaluating potential human health impacts from exposure to chemicals in sludge. However, ADEC Method Two Soil Cleanup Levels (18 AAC 75.345) adjusted to a one-in-one million risk for carcinogenic chemicals and a hazard quotient of 0.1 for noncarcinogenic chemicals or EPA RSLs for Residential Soil adjusted to a hazard quotient of 0.1 for noncarcinogenic chemicals were used in place of sludge screening criteria. Table 4-3 presents the COPC Screening Benchmarks for sludge.

For Tier I screening, maximum concentrations of chemicals detected in sludge were compared to the COPC Soil Screening Benchmarks in Table 4-3. Chemicals exceeding these values were identified as human health COPCs for sludge.

Surface Water. Human Health COPC screening for surface water was based on comparison of maximum concentrations of chemicals detected in surface water to:

- One-tenth of the Alaska surface water criteria included in 18 AAC 70, OR
- One-tenth of the ADEC Method Two Groundwater Cleanup Levels compiled from Table C (18 AAC 75.345) (equivalent to a one-in-one million risk for carcinogenic chemicals) to account for potential cumulative effects, OR
- One-tenth of the EPA RSLs for tapwater (USEPA, 2008a).

The human health screening criteria for surface water are listed in Table 4-4. Surface water quality criteria were adopted as surface water COPC screening criteria for arsenic, copper, lead, selenium, and zinc. EPA RSLs for tapwater (USEPA, 2008a) were adopted as surface water COPC screening criteria for: aluminum and manganese,. For the remaining chemicals, COPC screening criteria were based on ADEC Table C Groundwater Cleanup Levels.

Organic and inorganic chemicals exceeding either the Alaska surface water criteria (18 AAC 70), one-tenth of the Table C Groundwater Cleanup Levels or one-tenth the EPA RSLs for tapwater were identified as human health COPCs for surface water.

Subsurface Water. Human Health COPC screening for subsurface water was based on comparison of maximum concentrations of chemicals detected in subsurface water to:

- One-tenth of the ADEC Method Two Groundwater Cleanup Levels compiled from Table C (18 AAC 75.345) (equivalent to a one-in-one million risk for carcinogenic chemicals) to account for potential cumulative effects, OR
- One-tenth of the EPA RSLs for tap water.

The COPC Screening Benchmarks for subsurface water are listed in Table 4-5. Inorganic chemicals and organic chemicals exceeding the COPC Screening Benchmarks were identified as human health COPCs for subsurface water.

4.1.1.2 Ecological Screening

Media-specific ecological screening criteria are available for soil, surface water, and sediment (Tables 4-6 through 4-8). Ecological COPEC screening was conducted in accordance with State of Alaska regulations (18 AAC 75), ADEC's *Draft Risk Assessment Procedures Manual* (ADEC, 2005a). Screening benchmarks for ecological media include soil, surface water, and sediment standards listed in 18 AAC 70 and other information sources, including:

- Ecoscoping guidance (ADEC, 2008c).

- Sediment Quality Guidelines (ADEC, 2004).
- Ecotox thresholds, ECO Update 3(2):1–12 (USEPA, 1996).
- Aquatic Toxicity Information Retrieval (AQUIRE) Database (USEPA, 2005a).
- Terrestrial Toxicology (TERRETOX) Database (USEPA, 2005b).
- Phytotoxicity of Terrestrial Vascular Plants (PHYTOTOX) Database (USEPA, 2005c).
- Screening Benchmarks for Ecological Risk Assessment, Oak Ridge National Laboratory (ORNL, 1996a, b; 1997a, b, c).
- NOAA Sediment Guidelines (NOAA, 1999).
- National Ambient Water Quality Criteria (NAWQC) for freshwater and marine sources (USEPA, 1999).
- EPA sediment quality criteria and sediment quality benchmarks.
- EPA Hazardous Substances Database, currently located in a National Library of Medicine Database (NLM, 2004).
- EPA Integrated Risk Information System (IRIS) (USEPA, 2009).
- Benchmark criteria derived from consensus-based freshwater threshold effect concentrations (MacDonald et al., 2000).

Surface and Subsurface Soil. Ecological COPEC screening for soil was based on comparison of maximum concentrations of chemicals detected in surface soils to:

- Ecological benchmark criteria based on the following hierarchy:
 1. Soil ecological risk-based screening concentration (ERBSC) in Ecoscoping guidance (ADEC, 2008c)
 2. Ecological Soil Screening Levels (USEPA, 2005d)
 3. The lower of Oak Ridge National Laboratory (ORNL) soil invertebrate benchmarks (ORNL, 1997b), or plant benchmarks (ORNL, 1997c)
 4. The lower of ORNL mammalian or avian dietary wildlife benchmarks (ORNL, 1996b)

Inorganic chemicals exceeding the above ecological benchmarks (Table 4-6) and organic chemicals exceeding the above ecological benchmarks were identified as COPECs for surface soil. Subsurface soil was not evaluated for ecological receptors as they are unlikely to come into contact for any significant length of time with subsurface soils.

Surface Water. Ecological COPEC screening for surface water was based on comparison of maximum concentrations of chemicals detected in surface water to:

- Ecological benchmark criteria based on the following hierarchy:

1. Freshwater ERBSC in Ecoscoping guidance (ADEC, 2008c)
2. NAWQC – Freshwater Chronic Value (Buchman, 2006)
3. NAWQC – Marine Chronic Value (Buchman, 2006)
4. NAWQC – Freshwater Acute Value divided by 10 (Buchman, 2006)
5. NAWQC – Marine Acute Value divided by 10 (Buchman, 2006)
6. ORNL – Lowest Chronic Value (ORNL, 1996b)

Chemicals exceeding the above aquatic screening benchmarks (Table 4-7) were identified as COPECs for surface water.

Sediment. Ecological COPEC screening for sediment was based on comparison of maximum concentrations of chemicals detected in sediment to:

- Ecological benchmark criteria based on the following hierarchy:
 1. The lower value between TEL and PEL Sediment Quality Guidelines (SQGs), as published in the NOAA Screening Quick Reference Tables (SQuiRT) (Buchman, 2006)
 2. Consensus-based Freshwater Threshold Effects Concentrations (MacDonald et al., 2000)
 3. Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Sediment-Associated Biota (ORNL, 1997a)
 - a. Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario (Persaud et al., 1993)
 - b. Ecotox thresholds, ECO Update 3(2):1–12 (USEPA, 1996)
 - c. NOAA Effects Range-Low Concentrations for Sediment (Buchanan, 2006)
 - d. Approach to the Assessment of Sediment Quality in Florida Coastal Waters, (MacDonald, 1994)

Inorganic and organic chemicals exceeding the above sediment screening benchmarks (Table 4-8) were identified as COPECs for sediment.

4.1.2 COPC and COPEC Selection Results

Evaluation of contaminant source areas and medium-specific COPC and COPEC screening results for SS03, SS08, and SS11 are described in the following subsections.

4.1.2.1 SS03

The primary contaminants at SS03 include diesel and MOGAS that might have been released from aboveground storage tanks. In addition, four fuel spills were documented between 1970

and 1982. This area was investigated as part of SI, RI, and post-RI activities conducted for SS03, as described in Section 3.1.

The following discussion of contamination is specific to sampling results for media located at, or immediately downgradient of, SS03. Detailed tables for selection of COPCs and COPECs at SS03 are provided in Appendix B (Tables B-1 through B-8) and summarized below.

COPCs. Based on human health screening conducted on SS03 sampling results, COPCs identified for SS03 are provided in Table 4-9 and include:

- Surface soil – inorganics, VOCs, 2-methylnaphthalene, naphthalene, DRO, and GRO.
- Subsurface soil – 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, o-xylene, naphthalene, and DRO.
- Sediment – aluminum, arsenic, chromium, cobalt, manganese, titanium, and vanadium.
- Surface water– titanium.
- Subsurface water – 1,2,4-trimethylbenzene, 1,2-dichloroethane, benzene, ethylbenzene, 2-nitrophenol, 3,3'-dichlorobenzidine, 4-chloroaniline, bis(2-chloroxy)methane, hexachlorobutadiene, naphthalene, DRO, GRO, and RRO.

COPECs. Based on the results of ecological screening, COPECs identified for SS03 are provided in Table 4-10 and include:

- Surface soil – inorganics, VOCs, dibenzofuran, DRO, GRO, and RRO.
- Sediment – inorganics, VOCs, SVOCs, pesticides, DRO, and GRO.
- Surface water – barium, titanium, diethylphthalate, DRO.

4.1.2.2 SS08

The primary contaminants at SS08 include:

- Waste oils, MOGAS, and other liquids that might have been released from USTs associated with WAA No. 4.
- Waste oil that might have been released from drums at the former motor pool.
- Chemicals associated with disposal of building demolition debris.
- Chemicals potentially released from the old sanitary sewer system, the former sewage lagoon, and the former paint shop.

The following discussion of contamination is specific to sampling results for media located at, or immediately downgradient of, SS08. Detailed tables for selection of COPCs and COPECs at SS08 are provided in Appendix B (Tables B-9 through B-17) and summarized below.

COPCs. Based on human health screening conducted on sampling results, COPCs identified for SS08 are provided in Table 4-9 and include:

- Surface soil – inorganics, 1,3,5-trimethylbenzene, trichloroethene, SVOCs, benzo(a)pyrene, DDT, and Arochlor 1260.
- Subsurface soil – inorganics, benzo(a)pyrene, dieldrin, Arochlor 1260, DRO, and RRO.
- Sediment – inorganics, benzo(a)pyrene, DDT, and Arochlor 1260.
- Sludge – aluminum, arsenic, chromium, cobalt, copper, manganese, titanium, and vanadium.

Surface water – copper, lead, titanium, 1-chlorohexane, 2-chloroethyl vinyl ether, and vinyl chloride.

- Subsurface water – inorganics, VOCs, 2-methylnaphthalene, naphthalene, and DRO.

COPECs. Based on the results of ecological screening, COPECs identified for SS08 are provided in Table 4-10 and include:

- Surface soil – inorganics, 1,3,5-trimethylbenzene, carbon disulfide, trichlorofluoromethane, 2-nitroaniline, 3,3'-dichlorobenzidine, DDT, Arochlor 1260, DRO, GRO, and RRO.
- Sediment – inorganics, methylene chloride, m,p-xylenes, 3,3-dichlorobenzidine, 4-chloroaniline, PAHs, pesticides, Arochlor 1260, DRO, GRO, and RRO.
- Surface water – inorganics, VOCs, and pesticides.

4.1.2.3 SS11

Contaminants at SS11 are primarily related to chemicals that might have been released from waste drums at WAA No. 1, and chemicals associated with disposal of debris at Hardfill No. 1 from construction and demolition activities.

The following discussion of contamination is specific to sampling results for media located at, or immediately downgradient of, SS11. Detailed tables for selection of COPCs and COPECs at SS11 are provided in Appendix B (Tables B-18 through B-24) and summarized below.

COPCs. Based on the results of human health screening, COPCs identified for SS11 are provided in Table 4-9 and include:

- Surface soil – inorganics, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 4-methylphenol, dibenzofuran, PAHs, pesticides, DRO and RRO.
- Subsurface soil – arsenic and chromium.
- Sediment – arsenic and chromium.
- Surface water – no COPCs identified.

COPECs. Based on the results of ecological screening, COPECs identified for SS11 are provided in Table 4-10 and include:

- Surface soil – inorganics, VOCs, SVOCs (including PAHs), pesticides, DRO, GRO and RRO.
- Sediment – arsenic, barium, selenium, DDT, and RRO.
- Surface water – barium, chromium, chloromethane, and carbon disulfide.

4.2 CONTAMINANT FATE AND TRANSPORT

4.2.1 Site SS03

The primary contaminant sources at SS03 include POL releases from aboveground storage tanks. Three diesel tanks and two MOGAS tanks were used in the bermed area of the POL Tank Farm from the 1950s until the tanks were removed in 1997. There were four recorded diesel fuel spills prior to the installation of bermed area liners in 1983. Site records indicated that the POL Tank Farm bermed area was occasionally drained, and that water potentially containing PAHs was released into the top of the drainage area that begins just below the POL Tank Farm pad.

During the 1997 RI (USAF, 1998b), soil boring and surface soil samples indicated elevated PAH concentrations in soils beneath the POL Tank Farm. Groundwater samples had elevated PAH concentrations as well. Both soil and groundwater PAH concentrations decreased with increasing distances away from the POL Tank Farm. Groundwater and soil analytical results suggested that both media might have been contaminated by the tank farm source. Surface soil samples downgradient of the tanks were non-detect for TPH. TPH concentrations at BH1/MW were non-detect from the surface to 17 feet bgs and increased from 17 feet to the groundwater interface. Fuel probably infiltrated vertically until the groundwater interface and then spread horizontally. Seep and sediment samples taken at a creek drainage downgradient from SS03 did not have elevated concentrations of VOCs, SVOCs, and PAHS, indicating that contaminated groundwater or surface water runoff had not significantly contaminated the surface water drainage nearby.

Results of the 2002 Follow-on RI (USAF, 2003) were similar to the 1997 RI. The 2002 Follow-on RI found that, in general, soil upgradient of the tank farm had low contaminant concentrations, while the soil under the tank and downgradient of the tank had medium to high concentrations. In addition, an attempt was made to re-evaluate the seeps in 2002, but they were not present at that time and therefore could not be sampled. The 2003 Follow-on RI (USAF, 2004) indicated that soil collected at BH2-22, a boring between the POL Tank Farm and a downgradient monitoring well, had low DRO concentrations, while the downgradient well did contain DRO concentrations above cleanup criteria. The 2003 Follow-on RI concluded that the POL Tank Farm impoundment area was probably a continuing source of contamination to groundwater. The 2004 Follow-on RI (USAF, 2005) had similar results as the previous follow-on RI. The report found that soil beneath and downgradient of

the POL Tank Farm had elevated concentrations and concluded that soil and groundwater contamination was attributed to historical spills at the site.

4.2.2 Site SS08

SS08 consists of WAA No. 4, the old sanitary sewer system, the former sewage lagoon, and former paint shop. WAA No. 4 was used to store oil drums for the former motor pool from the 1950s to 1984. The old sanitary sewer system, constructed in the 1950s, received all drains from the Lower Camp. Neutralized battery acid, ethylene glycol and water, and possibly oil, fuels, and solvents, were disposed into the system. There have been reported releases of neutralized battery acid, as well as ethylene glycol and water discharges, into the former sewage lagoon. Primary contaminant sources at SS08 are related to waste oil drums storage at WAA No. 4 (located on the Eastern side of a large flat gravel pad), all drains from the Lower Camp Facility that are connected to the old septic tank (located downhill from SS03), and maybe some contaminants released onto the large flat gravel pad.

During the 1997 RI (USAF, 1998b), soil, seep, sediment, and groundwater samples were collected to determine the extent of contamination. Soil analytical results showed that POL contamination was present in the Lower Camp Pad. GRO, DRO, and RRO had elevated concentrations in BH7, BH8, TP1, and TP2. Concentrations of the contaminants at the indicated locations were generally significantly higher in shallower samples. The report concluded that the source of elevated concentrations is probably surface spills during various activities along the edge of the Lower Camp Pad. DRO was the only contaminant with elevated concentrations in groundwater. The RI report suggested that POL contaminant released at the Lower Camp Pad probably infiltrated to the bedrock, spread horizontally, and a portion sorbed to soil particles before reaching groundwater because there were low downgradient groundwater concentrations. Sediment and surface water samples collected from a creek downgradient of SS08 did not have elevated POL concentrations either. The low groundwater, surface water, and sediment POL contaminant concentrations suggest that contamination at the Lower Camp Pad is mostly confined in a subsurface region.

Sludge samples collected in septic tanks had elevated DRO concentrations, indicating that fuel-contaminated runoff, fuel, or fuel-contaminated fill material might have been released into the septic tanks. Groundwater, surface water and sediment samples all had relatively low contaminant concentrations, indicating that the old septic tank had not caused significant releases of contaminants into the area. Contaminant concentrations at the former sewage lagoon and former paint shop, based on the analytical results, are sources with little contribution to overall SS08 contamination.

Additional soil, groundwater, and surface water samples were collected during the 2002 Follow-on RI (USAF, 2003) to determine the extent of the contamination at this site. The surface water sample collected from a stream downgradient of SS08 had elevated barium concentrations. The 2002 Follow-on RI also suggested that the DRO plume appears to be confined to the base of the hill from the old Power Plant. During the 2003 Follow-on RI (USAF, 2004), lead concentrations were elevated in groundwater. DRO was detected in groundwater as well, but the concentrations were not elevated. The results of the 2004

Follow-on RI (USAF, 2005) were similar to that of the 2003 Follow-on RI, except for DRO. A groundwater sample from Monitoring Well BH/MW02-29, downgradient from the groundwater well with free product, had DRO concentrations that exceeded cleanup criteria.

4.2.3 Site SS11

Potential sources at SS11 include WAA No. 1, a region with buried drums, and Hardfill No. 1, a disposal area that received construction and demolition debris. The majority of the drums at WAA No. 1 were removed in 1997. Most drums were rusted and contained no hazardous materials or products. The 1997 Final RI report (USAF, 1998b) indicated that DRO and RRO were detected at a test pit, and VOCs, SVOCs and pesticides were detected in soil samples collected beneath partially-buried drums. Soil samples collected in a test pit downgradient from SS11 had low contaminant concentrations; the total extent of contamination, however, could not be determined due to limited sampling.

During the 2002 and 2003 Follow-on RIs (USAF, 2003; 2004), sediment and surface water samples were collected downgradient of the site to determine if there was contaminant migration. None of the samples had detections above the cleanup criteria that were not considered representative of background conditions, indicating that the two disposal areas are not significant sources of contamination. During the 2004 Follow-on RI (USAF, 2005), the remaining exposed drums were removed and more soil samples were collected. DRO concentrations exceeded cleanup criteria in all soil samples and PAH concentrations exceeded cleanup criteria in one soil sample.

4.2.4 Sites SS03, SS08, and SS11

Transport of contaminants between sites is determined partly by the major drainages that define the watershed, as described in Section 2.4.2. There are two major surface water divides at Lower Camp that determine surface water migration. One originates from the Southeastern direction and another originates from the Southern direction. Contaminants from fuel spills at the Truck Fill Stand can potentially migrate to areas of SS08 via surface runoff (USAF, 1998b). Surface water at SS03 can potentially migrate away from the Southeastern divide. Surface water at SS11 migrates away from the drainage that originates from the Southern side.

Where organic material is present in soil, subsurface water, surface water, and sediment at petroleum-impacted areas of SS03, SS08, and SS11, biodegradation of petroleum hydrocarbons is anticipated. Volatilization of lighter molecular weight hydrocarbons and VOCs would tend to be a significant fate process during the summer months. Wind transport of heavier hydrocarbons sorbed to soil or sediment particles might also occur during dry portions of the year. The transport of various contaminants between sites and to other areas depends on many factors such as the size, type, and chemical properties of the contaminant, the soil type, and physical properties such as temperature and pH.

Heavier, hydrophobic chemicals, including PAHs, DDT-related pesticides, and PCBs, tend to be relatively immobile in soil. Results of investigations at SS03, SS08, and SS11, show that

these chemicals are generally limited to soil and are non-detect or at low concentrations in sediment, surface water, and subsurface water. In contrast, metals and VOCs, which tend to be relatively mobile in soil, were frequently detected in subsurface water, albeit at very low concentrations.

Petroleum hydrocarbons, including PAHs, do not tend to bioaccumulate in terrestrial organisms (ATSDR, 1989; Eisler, 1987). As a result, uptake and food chain transfer is not anticipated to be an important fate and transport pathway for petroleum hydrocarbons, including DRO and GRO, detected in soil, subsurface water, surface water, and sediment at SS03, SS08, and SS11. Therefore, biological uptake and transport of contaminants present at Lower Camp most likely represents a minor fate and transport pathway, as discussed further in Section 4.3.

4.3 HUMAN HEALTH AND ECOLOGICAL CSMS

CSMs for human health and ecological receptors are described in the following sections, based upon the COPCs and COPECs identified in Sections 4.1.2.1, 4.1.2.2, 4.1.2.3, respectively, for SS03, SS08, and SS11 and are presented in Figures 4-1 through 4-6.

4.3.1 Human Health CSM

The human health CSMs for Lower Camp Sites SS03, SS08, and SS11 are graphically presented on Figures 4-1, 4-3 and 4-5, and discussed below for surface and subsurface soil, surface water and sediment, sludge, and subsurface water.

4.3.1.1 Surface and Subsurface Soils

COPCs identified for surface and subsurface soils at SS03, SS08, and SS11 are provided in Table 4-9. Human receptors with a potential for exposure to Lower Camp soils include Tatalina LRRS contract personnel (site workers), recreational hunter/fisher/gatherers who are contract personnel, trench workers, and site visitors. Areas of concern at the Lower Camp have posted restricted access and subsistence hunter/fisher/gatherers, including members of the Takotna community, located approximately 10 miles northwest of Tatalina, are not permitted access to these areas. However, the Sterling Landing/Takotna/Ohpir Road, a State of Alaska Department of Transportation and Public Facilities Road, bisects the Air Force Property and Lower Camp. The Industrial Dome and Residential Dome, as well as SS08, are on the upslope side of the road, while SS03 and SS11 are on the downslope side.

Site workers work primarily indoors at Lower Camp, performing routine maintenance activities. In addition, site workers who maintain the MAR facility at Upper Camp are based out of Lower Camp. Although exposures between site workers and Lower Camp soils are not anticipated on a routine basis, there is a potential for soil exposures, particularly during recreational activities such as hunting. Potentially complete exposure pathways between site workers and soil COPCs include incidental oral, dermal, and inhalation contact with soil or soil particulates. Trench workers and site visitors to the Lower Camp, such as contractors

performing environmental monitoring or cleanup activities, may be exposed to COPCs in soil through similar pathways.

As stated above, the Areas of Concern at Lower Camp have restricted access and subsistence fishing/hunting/gathering does not occur in these areas. However, site workers may engage in hunting or gathering in the area, or fishing in the rivers surrounding the LRRS (i.e., the Kuskokwim, Takotna, and Tatalina rivers) during non-work hours. Fishing does not occur at SS03, SS08, or SS11 because on-site surface water drainage channels, creeks, and seeps are ephemeral and do not contain fish.

Caribou, moose, bears, and other animals forage within Tatalina LRRS and may briefly come into contact with contaminated soils at SS03, SS08, or SS11. However, the primary COPCs present at Lower Camp Sites SS03, SS08, and SS11 (i.e., petroleum hydrocarbons including DRO, GRO, RRO, VOCs, and PAHs) do not tend to biomagnify in terrestrial organisms (ATSDR, 1989; Eisler, 1987). Furthermore, although some compounds that may biomagnify were also identified as COPCs, including DDT and Arochlor 1260 at SS08, the foraging range of game animals is considerably larger than the areas potentially affected by site-related contaminants and contact with site contaminants would be expected to be minimal. In addition, the presence of DDT is likely the result of historic application of DDT-related compounds at Tatalina LRRS for insect and vegetation control (USAF, 1998b). However, PCBs and DDTs will be carried through the HHRA and considered for cumulative risk purposes as appropriate.

Although site workers may gather herbs or berries in the area, berry bushes and other food plants generally do not grow in the cleared and disturbed areas of Lower Camp where sites SS03, SS08, and SS11 are located, and the potential for contamination to migrate to areas where the plants do grow is low (USAF, 1998b). In addition, the primary contaminants associated with surface soils at SS03, SS08, and SS11 (i.e., weathered GRO and DRO constituents) have a tendency to be sequestered in soil (Manilal and Alexander, 1991) and are only poorly taken up by plants and animals (Kaplan et al., 1996; Reeves et. al., 2001). Therefore, the potential for exposure of site workers who are recreational hunters to soil COPCs through harvesting wild game or gathering wild plants is deemed to be potentially complete, but insignificant.

4.3.1.2 Surface Water and Sediment

No COPCs were identified for surface water at SS11. Titanium was identified as the only COPC for surface water at SS03. Titanium was selected as a COPC because screening criteria were not available. VOCs (1-chlorohexane, 2-chloroethyl vinyl ether, and vinyl chloride) were identified as COPCs for a seep at SS08. In the baseline risk assessment conducted as part of the 1997 RI, these constituents were not selected as COPCs because they were not considered to be site-related. Vinyl chloride was detected in one surface water sample at only slightly greater than one-tenth the ADEC Table C Groundwater Cleanup Level.

The ADEC Table C Groundwater Cleanup Levels are based on the assumption that the water is used as a drinking water source, which is not the case for the seep at SS08. Potable water

for drinking and bathing is obtained from wells located at the infiltration gallery. Because potable water is obtained from another source, potential direct exposure pathways (i.e., oral, dermal, or inhalation routes of exposure) between surface water COPCs and site workers or visitors are incomplete. Furthermore, surface water at SS03, SS08, and SS11 is present only intermittently, so any potential incidental contact with this water would be minimal. Therefore, potential exposure to surface water at ERP Sites SS03, SS08, and SS11 is deemed potentially complete, but insignificant.

Caribou, moose, bears, and other animals may consume surface water from the ephemeral drainage channels, creeks, and seeps at SS03, SS08, or SS11. However, no COPCs were identified for surface water at SS11, the COPC for surface water at SS03 (titanium), and the COPCs for surface water at SS08 (1-chlorohexane, 2-chloroethyl vinyl ether, and vinyl chloride) are VOCs and would not be expected to biomagnify in terrestrial organisms. Furthermore, there are many sources of water in the area for game animals such that animals would not be expected to obtain a significant amount of water from the seep at SS08. Therefore, this exposure pathway was deemed to be potentially complete, but insignificant, because uptake by game animals is not expected to be significant.

Contract personnel may engage in recreational fishing in the rivers surrounding Tatalina LRRS during leisure time. However, since no COPCs were identified for surface water at SS11, the site-related contaminants that may reach the rivers are not expected to be present at concentrations that would be of concern. Therefore, potential exposure of contract personnel to surface water COPCs through incidental ingestion or dermal contact with surface water in the rivers surrounding the Tatalina LRRS while fishing is deemed potentially complete, but insignificant. Recreational fishermen may also potentially consume fish harvested from the rivers surrounding Tatalina LRRS. This exposure pathway is also deemed potentially complete, but insignificant, because uptake by fish is not expected to be significant, given the low potential for contaminants at concentrations of concern in the rivers and because VOCs are not expected to biomagnify in aquatic organisms.

Arsenic and chromium were identified as COPCs for sediment at SS11. Aluminum, arsenic, chromium, cobalt, manganese, titanium and vanadium were identified as COPCs for sediment at SS03. Aluminum, arsenic, chromium, cobalt, lead, manganese, titanium, vanadium, benzo(a)pyrene, DDT, and Arochlor 1260 were identified as COPCs for sediment at SS08. Both DDT and Arochlor 1260 were detected in SS08 sediment samples at maximum concentrations (2.5 mg/Kg for DDT and 0.19 mg/Kg for Arochlor 1260) only slightly greater than one-tenth the ADEC Table B Soil Cleanup Levels (2.1 mg/Kg for DDT and 0.1 mg/Kg for Arochlor 1260). However, Arochlor 1260 and DDT will be carried through the HHRA and considered for cumulative risk purposes as appropriate. Human contact with sediment within these areas is anticipated to be minimal. However, there is a potential (albeit low) for contract personnel or site visitors to be exposed to these areas during recreational hunting activities. Potential exposures between recreational hunters and COPCs to on-site sediment include direct exposure pathways (i.e., incidental ingestion and dermal contact).

As described above for soil (Section 4.3.1.1), the potential for exposure of recreational hunters to on-site sediment COPCs through harvesting of wild game is deemed to be

potentially complete, but insignificant. This is because wild game such as caribou, moose, and bears have minimal contact with Lower Camp ERP Sites SS03, SS08, and SS11.

4.3.1.3 Sludge

Upon comparison of maximum detected analyte concentrations in sludge to the soil screening criteria listed in Section 4.1.1.1, aluminum, arsenic, chromium, cobalt, copper, manganese, titanium and vanadium were identified as COPCs for sludge samples collected from the septic tank at SS08. No information could be found regarding the current status of the septic tank. The 1997 Final RI Report (USAF, 1998b) states that the septic tank was partially backfilled in the mid-1990s, but it is not known whether or not any additional actions were taken. According to the 1997 RI Report (USAF, 1998b), analytical results from sludge samples collected from the abandoned septic tank indicate the contents are not RCRA hazardous wastes and do not require special handling or disposal. The two sludge samples were analyzed by Methods SW6010, SW7470, SW8260 and SW8880 during the Toxicity Characteristic Leaching Procedure (TCLP); results were well below RCRA regulatory limits established in 40 CFR 261.

In addition to the TCLP analyses described above, the two sludge samples were also analyzed by Methods AK101, AK102, AK103, SW8260, SW8270, SW8081, SW9010, SW9030, SW9045, SW1020, SW6010, SW7041, SW7060, SW7470, SW7471, SW7740, and SW7841. As shown in Table 4-3, applicable soil screening criteria were only exceeded by the metals listed above. Concentrations of VOCs, SVOCs, PAHs, chlorinated pesticides, and petroleum hydrocarbons were all below applicable soil screening criteria. The septic tank at SS08 is buried and, as a result, direct contact with sludge in the septic tank is an incomplete exposure pathway. Furthermore, none of the COPCs for sludge are volatile so inhalation of constituents volatilizing from sludge into ambient air is also an incomplete exposure pathway. Therefore, sludge will not be evaluated further.

4.3.1.4 Subsurface Water

COPCs identified for subsurface water beneath SS03 and SS08 include various inorganics, VOCs, SVOCs (including PAHs), DRO, GRO, and RRO (Table 4-9). Groundwater was not observed beneath SS11 during site investigations.

Subsurface water beneath SS03 or SS08 is not currently used as a potable water supply, and it is unlikely that it will be used for such purposes in the future. Potable water for Tatalina LRRS is supplied through an infiltration gallery collection system located at Lower Camp. It is highly unlikely that contamination in subsurface water at SS03 or SS08 has impacted the infiltration gallery, because a water sample collected from the infiltration gallery in 1997 did not contain any VOCs, SVOCs, or pesticides. Low levels of metals and DRO were detected in that sample.

Consistent with State of Alaska regulations (18 AAC 75.345), however, all subsurface water within the State should be evaluated as a potential drinking water supply unless a 350 Determination precludes potable uses. Therefore, subsurface water beneath SS03 and SS08

will be evaluated as a potential potable supply for future human receptors (Figures 4-1 and 4-3).

4.3.2 Ecological CSM

The CSM for ecological habitats and receptors are graphically presented on Figures 4-2, 4-4, and 4-6 and are discussed below for surface soil, surface water, and sediment. Ecological receptors are not likely to come in contact with subsurface soil or subsurface water; therefore, these pathways are considered to be potentially complete, but insignificant. The ecological CSM was based, in part, on the site-specific Ecological Checklist prepared for Lower Camp (Appendix C). The COPECs discussed were identified in Sections 4.1.2.1, 4.1.2.2, and 4.1.2.3 for Sites SS03, SS08, and SS11, respectively.

4.3.2.1 Surface and Subsurface Soils

Based on results of ecological screening (Section 4.1.2.1), COPECs identified for SS03 surface soil include inorganics, VOCs, SVOCs, DRO, GRO, and RRO (Table 4-10). COPECs identified for SS08 surface soil include inorganics, 1,3,5-trimethylbenzene, carbon disulfide, trichlorofluoromethane, SVOCs, DDT-related pesticides, and Arochlor 1260, DRO, GRO and RRO (Table 4-10). COPECs identified for SS11 surface soil include inorganics, VOCs, SVOCs (including PAHs), pesticides (including DDT-related pesticides), DRO, GRO and RRO (Table 4-10). With the exception of DDT and its breakdown products (i.e., DDD and DDE), none of these COPECs tend to bioaccumulate in terrestrial organisms (ATSDR, 1989; Eisler, 1987). The presence of DDT and its breakdown products in various media at Tatalina LRRS may be attributable to historic application of DDT at Tatalina LRRS for insect control (USAF, 1998b). However, DDT and its breakdown products will be carried through the ERA and considered for cumulative hazard purposes as appropriate.

Lower Camp in the vicinity of SS03, SS08, and SS11 is highly disturbed, with discontinuous grassy areas. The area to the north and northeast of SS08 is heavily vegetated with brush or stands of alders and low willows, continuous with vegetation within SS08 on the north side. The vegetated portions of SS03, SS08, and SS11 may provide habitat or forage for various herbivorous, omnivorous, and carnivorous birds and mammals. No fences restrict access of ecological receptors to SS03, SS08, and SS11, allowing potential exposure of ecological receptors inhabiting the area to soil COPECs.

As depicted in the ecological CSM for Lower Camp Sites SS03, SS08, and SS11 (Figures 4-2, 4-4 and 4-6), exposure pathways between soil COPECs and terrestrial birds and mammals are complete. These exposure pathways include direct contact pathways (i.e., incidental soil ingestion, dermal contact with soil, and inhalation of dust), as well as uptake by biota (i.e., plants and animals) and food chain transfer (Figures 4-2, 4-4 and 4-6).

4.3.2.2 Surface Water and Sediment

Based on results of ecological screening (Section 4.1.2.1), COPECs identified for SS03 surface water includes barium, titanium, diethylphthalate and DRO (Table 4-10). COPECs

identified for SS08 surface water include inorganics, VOCs, and DDT (Table 4-10). COPECs identified for SS11 surface water includes barium, chromium, carbon disulfide and chloromethane (Table 4-10).

Based on results of ecological screening (Section 4.1.2.1), COPECs identified for SS03 sediment include inorganics, VOCs, SVOCs, DDT-related compounds, DRO, and GRO (Table 4-10). COPECs identified for SS08 sediment include inorganics, VOCs, SVOCs (including PAHs), DDD, DDT, Arochlor 1260, DRO, GRO, and RRO (Table 4-10). COPECs identified for SS11 sediment include inorganics, DDT, and RRO (Table 4-10).

Various ecological receptors (i.e., birds and mammals) may consume surface water from the ephemeral drainage channels, creeks, and seeps at SS03, SS08, or SS11. However, these surface water bodies are seasonal or ephemeral in nature and, therefore, not likely to support aquatic receptors (USAF, 1998b). Surface water from the three sites flows downgradient towards the Tatalina River. The drainage originating from the southeastern side passes through the eastern boarder of the Lower Camp, continues on the northern side of the ridge and eventually enters the Tatalina River. The other drainage originating from the south region, west of Lower Camp, passes through the south side of Lower camp, merges with another creek from the Northern watershed and eventually enters the Tatalina River. During the 1997 RI, no surface water was observed in drainages on the southern side of Lower Camp, but some surface water was observed in the southeastern drainage. Therefore, exposure of aquatic receptors (i.e., fish and macroinvertebrates) in the Tatalina River is deemed potentially complete, but insignificant, because uptake by fish is not expected to be significant, given the low potential for contaminants at concentrations of concern in this offsite river.

As depicted in the ecological CSMs for Lower Camp Sites SS03, SS08, and SS11 (Figures 4-2, 4-4 and 4-6), exposure pathways between surface water COPECs and terrestrial birds and mammals are complete for direct contact pathways, including incidental surface water ingestion and surface water dermal contact. Additionally, the ecological CSMs for Lower Camp Sites SS03, SS08, and SS11 (Figures 4-2, 4-4 and 4-6) indicates exposure pathways between sediment COPECs and terrestrial birds and mammals are complete for direct contact pathways (i.e., incidental sediment ingestion, and dermal contact with sediment).

Table 4-1 Human Health COPC Screening Criteria for Soil

Analyte	CAS Number	Regulatory Criteria ^a (mg/kg)	COPC Screening Benchmark ^b (mg/kg)	Cancer/ Noncancer	Source
Inorganics					
Aluminum	7429-90-5	77,000	7,700	noncancer	USEPA, 2008a
Antimony	7440-36-0	41	4.1	noncancer	ADEC, 2008a
Arsenic	7440-38-2	4.5	0.45	cancer	ADEC, 2008a
Barium	7440-39-3	20,300	2,030	noncancer	ADEC, 2008a
Beryllium	7440-41-7	200	20	cancer	ADEC, 2008a
Cadmium	7440-43-9	79	7.9	cancer	ADEC, 2008a
Calcium	7440-70-2	na ^c	na	na	na
Chromium	7440-47-3	300	30	noncancer	ADEC, 2008a
Cobalt	7440-48-4	na	na	na	na
Copper	7440-50-8	4,100	410	noncancer	ADEC, 2008a
Iron	7439-89-6	na ^c	na	na	na
Lead	7439-92-1	400 ^d	40	cancer	ADEC, 2008a
Magnesium	7439-95-4	na ^c	na	na	na
Manganese	7439-96-5	1,800	180	noncancer	USEPA, 2008a
Mercury	7439-97-6	18	1.8	noncancer	ADEC, 2008a
Molybdenum	7439-98-7	390	39	noncancer	USEPA, 2008a
Nickel	7440-02-0	2,000	200	noncancer	ADEC, 2008a
Potassium	7440-09-7	na ^c	na	na	na
Selenium	7782-49-2	510	51	noncancer	ADEC, 2008a
Silver	7440-22-4	510	51	noncancer	ADEC, 2008a
Sodium	7440-23-5	na ^c	na	na	na
Thallium	7440-28-0	8.1	0.81	noncancer	ADEC, 2008a
Tin	7440-31-5	47,000	4,700	noncancer	USEPA, 2008a
Titanium	7440-32-6	na	na	na	na
Vanadium	7440-62-2	710	71	noncancer	ADEC, 2008a
Zinc	7440-66-6	30,400	3,040	noncancer	ADEC, 2008a
Organics					
1,1,1,2-Tetrachloroethane	630-20-6	2.0	2.0	cancer	USEPA, 2008a
1,1,1-Trichloroethane	71-55-6	360	36	noncancer	ADEC, 2008a
1,1,2,2-Tetrachloroethane	79-34-5	5.5	0.55	cancer	ADEC, 2008a
1,1,2-Trichloroethane	79-00-5	11	1.1	cancer	ADEC, 2008a
1,1-Dichloroethane	75-34-3	900	90	cancer	ADEC, 2008a
1,1-Dichloroethene	75-35-4	0.85	0.085	cancer	ADEC, 2008a
1,1-Dichloropropene	563-58-6	27 ^e	2.7	cancer	ADEC, 2008a
1,2,3-Trichlorobenzene	87-61-6	41 ^f	4.1	noncancer	ADEC, 2008a
1,2,3-Trichloropropane	96-18-4	0.17	0.017	cancer	ADEC, 2008a
1,2,4-Trimethylbenzene	95-63-6	49	4.9	noncancer	ADEC, 2008a
1,2-Dibromo-3-chloropropane	96-12-8	0.0056	0.00056	cancer	ADEC, 2008a
1,2-Dibromoethane	106-93-4	0.6	0.06	cancer	ADEC, 2008a

Table 4-1 Human Health COPC Screening Criteria for Soil

Analyte	CAS Number	Regulatory Criteria ^a (mg/kg)	COPC Screening Benchmark ^b (mg/kg)	Cancer/ Noncancer	Source
1,2-Dichloroethane	107-06-2	4.8	0.48	cancer	ADEC, 2008a
1,2-Dichloropropane	78-87-5	5.3	0.53	cancer	ADEC, 2008a
1,4-Dichlorobenzene	106-46-7	30	3.0	cancer	ADEC, 2008a
1,3,5-Trimethylbenzene	108-67-8	42	4.2	noncancer	ADEC, 2008a
1,3-Dichloropropane	142-28-9	1,600	160	noncancer	USEPA, 2008a
1-Chlorohexane	544-10-5	na	na	na	na
2,2-Dichloropropane	594-20-7	5.3 ^g	5.3	cancer	USEPA, 2008a
2,4-Dimethylphenol	105-67-9	1300	130	noncancer	ADEC, 2008a
2,4-Dinitrophenol	51-28-5	160	16	noncancer	ADEC, 2008a
2-Butanone (MEK)	78-93-3	23,300	2,330	noncancer	ADEC, 2008a
2-Chloroethyl Vinyl Ether	10-75-8	na	na	na	na
2-Chlorotoluene	95-49-8	1,600	1,600	saturation	USEPA, 2008a
2-Hexanone	591-78-6	na	na	na	na
2-Methylnaphthalene	91-57-6	280	28	noncancer	ADEC, 2008a
2-Methylphenol	95-48-7	3,200	320	cancer	ADEC, 2008a
2-Nitroaniline	88-74-4	na	na	na	na
3-and 4-Methylphenol Coelution	108-39-4/106-44-5	350 ^h	35	cancer	ADEC, 2008a
3,3'-Dichlorobenzidine	91-94-1	11	1.1	cancer	ADEC, 2008a
3-Nitroaniline	99-09-2	na	na	na	na
4-Chloroaniline	106-47-8	90	9.0	cancer	ADEC, 2008a
4-Chlorotoluene	106-43-4	5,500	5,500	saturation	USEPA, 2008a
4-Chloro-3-methylphenol	59-50-7	na	na	na	na
4,4'-DDD	72-54-8	30	3.0	cancer	ADEC, 2008a
4,4'-DDE	72-55-9	21	2.1	cancer	ADEC, 2008a
4,4'-DDT	50-29-3	21	2.1	cancer	ADEC, 2008a
4-Methyl-2-pentanone	108-10-1	2,100	210	noncancer	ADEC, 2008a
4-Methylphenol	106-44-5	350	35	cancer	ADEC, 2008a
4-Nitroaniline	100-01-6	na	na	na	na
Acenaphthene	83-32-9	2,800	280	noncancer	ADEC, 2008a
Acenaphthylene	208-96-8	2,800	280	noncancer	ADEC, 2008a
Acetone	67-64-1	68,600	6,860	noncancer	ADEC, 2008a
Aldrin	309-00-2	0.30	0.030	cancer	ADEC, 2008a
alpha Endosulfan	959-98-8	610 ⁱ	61	noncancer	ADEC, 2008a
alpha-BHC	319-84-6	1.2	0.12	cancer	ADEC, 2008a
alpha-Chlordane	5103-71-9	19 ^j	1.9	cancer	ADEC, 2008a
Anthracene	120-12-7	20,600	2,060	noncancer	ADEC, 2008a
Arochlor 1260	11096-82-5	1 ^k	0.10	cancer	ADEC, 2008a
Benzene	71-43-2	11	1.1	cancer	ADEC, 2008a
Benzo(a)anthracene	56-55-3	4.9	0.49	cancer	ADEC, 2008a
Benzo(a)pyrene	50-32-8	0.49	0.049	cancer	ADEC, 2008a
Benzo(b)fluoranthene	205-99-2	4.9	0.49	cancer	ADEC, 2008a
Benzo(g,h,i)perylene	191-24-2	1,400	140	noncancer	ADEC, 2008a

Table 4-1 Human Health COPC Screening Criteria for Soil

Analyte	CAS Number	Regulatory Criteria ^a (mg/kg)	COPC Screening Benchmark ^b (mg/kg)	Cancer/ Noncancer	Source
Benzo(k)fluoranthene	207-08-9	49	4.9	cancer	ADEC, 2008a
Benzoic Acid	65-85-0	317,000	31,700	noncancer	ADEC, 2008a
beta Endosulfan	33213-65-9	610 ⁱ	61	noncancer	ADEC, 2008a
beta-BHC	319-85-7	4.0	0.40	cancer	ADEC, 2008a
bis(2-ethylhexyl) Phthalate	117-81-7	220	22	cancer	ADEC, 2008a
Bromobenzene	108-86-1	na	na	na	na
Bromochloromethane	74-97-5	na	na	na	na
Bromodichloromethane	75-27-4	10	1	cancer	ADEC, 2008a
Bromoform	75-25-2	420	42	cancer	ADEC, 2008a
Bromomethane	74-83-9	14	1.4	noncancer	ADEC, 2008a
Carbon Disulfide	75-15-0	250	25	noncancer	ADEC, 2008a
Carbon Tetrachloride	56-23-5	3.1	0.31	cancer	ADEC, 2008a
Chlorobenzene	108-90-7	200	20	noncancer	ADEC, 2008a
Chloroethane	75-00-3	36	3.6	cancer	ADEC, 2008a
Chloroform	67-66-3	3.2	0.32	cancer	ADEC, 2008a
Chloromethane	74-87-3	25	2.5	cancer	ADEC, 2008a
Chrysene	218-01-9	490	49	cancer	ADEC, 2008a
cis-1,2-Dichloroethene	156-59-2	130	13	noncancer	ADEC, 2008a
cis-1,3-Dichloropropene	10061-01-5	27 ⁱ	2.7	cancer	ADEC, 2008a
delta-BHC	319-86-8	1.2 ^m	0.12	cancer	ADEC, 2008a
Dibenz(a,h)anthracene	53-70-3	0.49	0.049	cancer	ADEC, 2008a
Dibenzofuran	132-64-9	200	20	noncancer	ADEC, 2008a
Dibromochloromethane	124-48-1	14	1.4	cancer	ADEC, 2008a
Dibromomethane	74-95-3	370	37	noncancer	ADEC, 2008a
Dichlorodifluoromethane	75-71-8	380	38	noncancer	ADEC, 2008a
Dieldrin	60-57-1	0.32	0.032	cancer	ADEC, 2008a
DiethylPhthalate	84-66-2	61,900	6,190	noncancer	ADEC, 2008a
Di-n-Butyl Phthalate	84-74-2	7,900	790	noncancer	ADEC, 2008a
Endosulfan Sulfate	1031-07-8	610 ⁱ	61	noncancer	ADEC, 2008a
Endrin	72-20-8	2	0.2	noncancer	ADEC, 2008a
Endrin Aldehyde	7421-93-4	2 ⁿ	0.2	noncancer	ADEC, 2008a
Endrin ketone	53494-70-5	2 ⁿ	0.2	noncancer	ADEC, 2008a
Ethylbenzene	100-41-4	110	11	cancer	ADEC, 2008a
Fluoranthene	206-44-0	1,900	190	noncancer	ADEC, 2008a
Fluorene	86-73-7	2300	230	noncancer	ADEC, 2008a
gamma-BHC (Lindane)	58-89-9	5.6	0.56	cancer	ADEC, 2008a
gamma-Chlordane	5566-34-7	19 ^j	1.9	cancer	ADEC, 2008a
Heptachlor	76-44-8	1.3	0.13	cancer	ADEC, 2008a
Heptachlor Epoxide	1024-57-3	0.63	0.063	cancer	ADEC, 2008a
Indeno(1,2,3-cd)Pyrene	193-39-5	4.9	0.49	cancer	ADEC, 2008a
Isopropylbenzene	98-82-8	62	6.2	noncancer	ADEC, 2008a
Methoxychlor	72-43-5	320	32	noncancer	ADEC, 2008a

Table 4-1 Human Health COPC Screening Criteria for Soil

Analyte	CAS Number	Regulatory Criteria ^a (mg/kg)	COPC Screening Benchmark ^b (mg/kg)	Cancer/ Noncancer	Source
Methylene Chloride	75-09-2	160	16	cancer	ADEC, 2008a
m,p-Xylenes	108-38-3/106-42-3	63 ^o	6.3	noncancer	ADEC, 2008a
Naphthalene	91-20-3	28	2.8	noncancer	ADEC, 2008a
n-Butylbenzene	104-51-8	42	4.2	noncancer	ADEC, 2008a
n-Propylbenzene	103-65-1	42	4.2	noncancer	ADEC, 2008a
o-Xylene	95-47-6	63 ^o	6.3	noncancer	ADEC, 2008a
p-Isopropyltoluene	99-87-6	62 ^p	6.2	noncancer	ADEC, 2008a
Phenanthrene	85-01-8	20,600	2,060	noncancer	ADEC, 2008a
Phenol	108-95-2	23,200	2,320	noncancer	ADEC, 2008a
Pyrene	129-00-0	1,400	140	noncancer	ADEC, 2008a
sec-Butylbenzene	135-98-8	41	4.1	noncancer	ADEC, 2008a
Styrene	100-42-5	200	20	noncancer	ADEC, 2008a
Tetrachloroethene	127-18-4	10	1.0	cancer	ADEC, 2008a
tert-Butylbenzene	98-06-6	70	7.0	noncancer	ADEC, 2008a
Toluene	108-88-3	220	22	noncancer	ADEC, 2008a
Total Xylenes	1330-20-7	63	6.3	noncancer	ADEC, 2008a
Toxaphene	8001-35-2	7.5	0.75	cancer	ADEC, 2008a
trans-1,2-Dichloroethene	156-60-5	160	16	noncancer	ADEC, 2008a
trans-1,3-Dichloropropene	10061-02-6	27 ^l	2.7	cancer	ADEC, 2008a
Trichloroethene	79-01-6	0.57	0.057	cancer	ADEC, 2008a
Trichlorofluoromethane	75-69-4	990	99	noncancer	ADEC, 2008a
Vinyl Acetate	108-05-4	1500	150	noncancer	ADEC, 2008a
Vinyl Chloride	75-01-4	4.3	0.43	cancer	ADEC, 2008a
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	na	10,250 ^q	10,250	noncancer	ADEC, 2008a
Gasoline Range Organics (GRO)	na	1,400 ^q	1,400	noncancer	ADEC, 2008a
Residual Range Organics (RRO)	na	10,000 ^q	10,000	noncancer	ADEC, 2008a

Notes:

COPC - Chemical of Potential Concern.

na - Not available

mg/kg - Milligram per kilogram.

RSL - Regional screening level

^a Regulatory Criteria is derived from the following hierarchy:

1. Minimum of the Direct Contact and Inhalation pathways listed in 18 AAC 75, Tables B1 and B2, Under 40 inch Zone (ADEC, 2008a).
2. Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites - Residential Soil (USEPA, 2008a).

^b COPC Screening Benchmark is based on cancer risk of 1×10^{-6} or a hazard index of 0.1.

^c This analyte is excluded as a COPC due to status as an essential nutrient.

^d Based on residential cleanup value calculated according to Risk Assessment Procedures Manual guidance (18 AAC 75.340). Lead is not included in the cumulative hazard estimate; therefore, the regulatory criterion was not modified (ie., not divided by 10).

^e 1,3-Dichloropropene used as a surrogate chemical.

^f 1,2,4-Trichlorobenzene used as a surrogate chemical.

Table 4-1 Human Health COPC Screening Criteria for Soil

Analyte	CAS Number	Regulatory Criteria^a (mg/kg)	COPC Screening Benchmark^b (mg/kg)	Cancer/ Noncancer	Source
^g 1,2-Dichloropropane used as a surrogate chemical.					
^h 4-Methylphenol (o-cresol) used as a surrogate chemical.					
ⁱ Endosulfan used as a surrogate chemical.					
^j Chlordane used as a surrogate chemical.					
^k PCBs used as a surrogate chemical.					
^l 1,3-Dichloropropene used as a surrogate chemical.					
^m alpha-BHC used as a surrogate chemical.					
ⁿ Endrin used as a surrogate chemical.					
^o Total xylenes used as a surrogate chemical.					
^p Isopropylbenzene used as a surrogate chemical.					
^q Because petroleum hydrocarbons are not included in the cumulative hazard estimate, the regulatory criterion was used unmodified (i.e. not divided by 10).					

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Table 4-2 Human Health COPC Screening Criteria for Sediment

Analyte	CAS Number	Regulatory Criteria ^a (mg/kg)	COPC Screening Benchmark ^b (mg/kg)	Cancer/ Noncancer?	Source
Inorganics					
Aluminum	7429-90-5	77,000	7,700	noncancer	USEPA, 2008a
Antimony	7440-36-0	41	4.1	noncancer	ADEC, 2008a
Arsenic	7440-38-2	4.5	0.45	cancer	ADEC, 2008a
Barium	7440-39-3	20,300	2,030	noncancer	ADEC, 2008a
Beryllium	7440-41-7	200	20	cancer	ADEC, 2008a
Cadmium	7440-43-9	79	7.9	cancer	ADEC, 2008a
Calcium	7440-70-2	na ^c	na	na	na
Chromium	7440-47-3	300	30	noncancer	ADEC, 2008a
Cobalt	7440-48-4	na	na	na	na
Copper	7440-50-8	4,100	410	noncancer	ADEC, 2008a
Iron	7439-89-6	na ^c	na	na	na
Lead	7439-92-1	400 ^d	40	cancer	ADEC, 2008a
Magnesium	7439-95-4	na ^c	na	na	na
Manganese	7439-96-5	1,800	180	noncancer	USEPA, 2008a
Mercury	7439-97-6	18	1.8	noncancer	ADEC, 2008a
Molybdenum	7439-98-7	390	39	noncancer	USEPA, 2008a
Nickel	7440-02-0	2,000	200	noncancer	ADEC, 2008a
Potassium	7440-09-7	na ^c	na	na	na
Selenium	7782-49-2	510	51	noncancer	ADEC, 2008a
Silver	7440-22-4	510	51	noncancer	ADEC, 2008a
Sodium	7440-23-5	na ^c	na	na	na
Thallium	7440-28-0	8.1	0.81	noncancer	ADEC, 2008a
Titanium	7440-32-6	na	na	na	na
Vanadium	7440-62-2	710	71	noncancer	ADEC, 2008a
Zinc	7440-66-6	30,400	3,040	noncancer	ADEC, 2008a
Organics					
1,1,2,2-Tetrachloroethane	79-34-5	5.5	0.55	cancer	ADEC, 2008a
1,1,1-Trichloroethane	71-55-6	360	36	noncancer	ADEC, 2008a
1,2,3-Trichlorobenzene	87-61-6	41 ^e	4.1	noncancer	ADEC, 2008a
1,2,3-Trichloropropane	96-18-4	0.17	0.017	cancer	ADEC, 2008a
1,2,4-Trichlorobenzene	120-82-1	41	4.1	noncancer	ADEC, 2008a
3-and 4-Methylphenol Coelution	108-39-4/106-	350 ^f	35	cancer	ADEC, 2008a
3,3'-Dichlorobenzidine	91-94-1	11	1.1	cancer	ADEC, 2008a
4-Chloroaniline	106-47-8	90	9.0	cancer	ADEC, 2008a
Acenaphthene	83-32-9	2,800	280	noncancer	ADEC, 2008a
Acenaphthylene	208-96-8	2,800	280	noncancer	ADEC, 2008a
Acetone	67-64-1	68,600	6,860	noncancer	ADEC, 2008a
Anthracene	120-12-7	20,600	2,060	noncancer	ADEC, 2008a
Arochlor 1260	11096-82-5	1.0 ^g	0.10	cancer	ADEC, 2008a
Benzo(a)anthracene	56-55-3	4.9	0.49	cancer	ADEC, 2008a
Benzo(a)pyrene	50-32-8	0.49	0.049	cancer	ADEC, 2008a
Benzo(b)fluoranthene	205-99-2	4.9	0.49	cancer	ADEC, 2008a
Benzo(g,h,i)perylene	191-24-2	1,400	140	noncancer	ADEC, 2008a

Table 4-2 Human Health COPC Screening Criteria for Sediment

Analyte	CAS Number	Regulatory Criteria ^a (mg/kg)	COPC Screening Benchmark ^b (mg/kg)	Cancer/ Noncancer?	Source
Benzo(k)fluoranthene	207-08-9	49	4.9	cancer	ADEC, 2008a
Bis(2-ethylhexyl) Phthalate	117-81-7	220	22	cancer	ADEC, 2008a
cis-1,3-Dichloropropene	10061-01-5	27 ^h	2.7	cancer	ADEC, 2008a
Chrysene	218-01-9	490	49	cancer	ADEC, 2008a
4,4'-DDD	72-54-8	30	3.0	cancer	ADEC, 2008a
4,4'-DDE	72-55-9	21	2.1	cancer	ADEC, 2008a
4,4'-DDT	50-29-3	21	2.1	cancer	ADEC, 2008a
Dibenz(a,h)anthracene	53-70-3	0.49	0.049	cancer	ADEC, 2008a
DiethylPhthalate	84-66-2	61,900	6,190	noncancer	ADEC, 2008a
Endosulfan Sulfate	1031-07-8	610 ⁱ	61	noncancer	ADEC, 2008a
Endrin	72-20-8	2.0	0.20	noncancer	ADEC, 2008a
Fluoranthene	206-44-0	1,900	190	noncancer	ADEC, 2008a
Fluorene	86-73-7	2,300	230	noncancer	ADEC, 2008a
Indeno(1,2,3-cd)pyrene	193-39-5	4.9	0.49	cancer	ADEC, 2008a
Methylene Chloride	75-09-2	160	16	cancer	ADEC, 2008a
m,p-Xylenes	108-38-3/106-	63 ^j	6.3	noncancer	ADEC, 2008a
Naphthalene	91-20-3	28	2.8	noncancer	ADEC, 2008a
Phenanthrene	85-01-8	20,600	2,060	noncancer	ADEC, 2008a
Phenol	108-95-2	23,200	2,320	noncancer	ADEC, 2008a
Pyrene	129-00-0	1,400	140	noncancer	ADEC, 2008a
Tetrachloroethene	127-18-4	10	1.0	cancer	ADEC, 2008a
Toluene	108-88-3	220	22	noncancer	ADEC, 2008a
trans-1,3-Dichloropropene	10061-02-6	27 ^h	2.7	cancer	ADEC, 2008a
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	na	10,250 ^k	10,250	noncancer	ADEC, 2008a
Gasoline Range Organics (GRO)	na	1,400 ^k	1,400	noncancer	ADEC, 2008a
Residual Range Organics (RRO)	na	10,000 ^k	10,000	noncancer	ADEC, 2008a

Notes:

COPC - Chemical of Potential Concern.

na - Not available

mg/kg - Milligram per kilogram.

RSL - Regional screening level

^a Regulatory Criteria is derived from the following hierarchy:

1. Minimum of the Direct Contact and Inhalation pathways listed in 18 AAC 75, Tables B1 and B2, Under 40 inch Zone (ADEC, 2008a).
2. Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites - Residential Soil (USEPA, 2008a).

^b COPC Screening Benchmark is based on cancer risk of 1×10^{-6} or a hazard index of 0.1.

^c This analyte is excluded as a COPC due to status as an essential nutrient.

^d Based on residential cleanup value calculated according to Risk Assessment Procedures Manual guidance (18 AAC 75.340).

Lead is not included in the cumulative hazard estimate; therefore, the regulatory criterion was not modified (ie., not divided

^e 1,2,4-Trichlorobenzene used as a surrogate chemical.

^f 4-Methylphenol (o-cresol) used as a surrogate chemical.

^g PCBs used as a surrogate chemical.

^h 1,3-Dichloropropene used as a surrogate chemical.

ⁱ Endosulfan used as a surrogate chemical.

^j Total xylenes used as a surrogate chemical.

^k Because petroleum hydrocarbons are not included in the cumulative hazard estimate, the regulatory criterion was used unmodified (i.e. not divided by 10).

Table 4-3 Human Health COPC Screening Criteria for Sludge

Analyte	CAS Number	Regulatory Criteria ^a (mg/kg)	COPC Screening Benchmark ^b (mg/kg)	Cancer/ Noncancer?	Source
Inorganics					
Aluminum	7429-90-5	77,000	7,700	noncancer	USEPA, 2008a
Antimony	7440-36-0	41	4.1	noncancer	ADEC, 2008a
Arsenic	7440-38-2	5	0.5	cancer	ADEC, 2008a
Barium	7440-39-3	20,300	2,030	noncancer	ADEC, 2008a
Beryllium	7440-41-7	200	20	cancer	ADEC, 2008a
Cadmium	7440-43-9	79	7.9	cancer	ADEC, 2008a
Calcium	7440-70-2	na ^c	na	na	na
Chromium	7440-47-3	300	30	noncancer	ADEC, 2008a
Cobalt	7440-48-4	na	na	na	na
Copper	7440-50-8	4,100	410	noncancer	ADEC, 2008a
Iron	7439-89-6	na ^c	na	na	na
Lead	7439-92-1	400 ^d	40	cancer	ADEC, 2008a
Magnesium	7439-95-4	na ^c	na	na	na
Manganese	7439-96-5	1,800	180	noncancer	USEPA, 2008a
Mercury	7439-97-6	18	1.8	noncancer	ADEC, 2008a
Nickel	7440-02-0	2,000	200	noncancer	ADEC, 2008a
Potassium	7440-09-7	na ^c	na	na	na
Selenium	7782-49-2	510	51	noncancer	ADEC, 2008a
Silver	7440-22-4	510	51	noncancer	ADEC, 2008a
Sodium	7440-23-5	na ^c	na	na	na
Thallium	7440-28-0	8	0.8	noncancer	ADEC, 2008a
Tin	7440-31-5	47,000	4,700	noncancer	USEPA, 2008a
Titanium	7440-32-6	na	na	na	na
Vanadium	7440-62-2	710	71	noncancer	ADEC, 2008a
Zinc	7440-66-6	30,400	3,040	noncancer	ADEC, 2008a
Organics					
1,2,4-Trimethylbenzene	95-63-6	49	4.9	noncancer	ADEC, 2008a
1,4-Dichlorobenzene	106-46-7	30	3.0	cancer	ADEC, 2008a
1,3,5-Trimethylbenzene	108-67-8	42	4.2	noncancer	ADEC, 2008a
2-Methylphenol	95-48-7	3,200	320	cancer	ADEC, 2008a
3-and 4-Methylphenol Coelution	108-39-4/106-	350 ^e	35	cancer	ADEC, 2008a
Acetone	67-64-1	68,600	6,860	noncancer	ADEC, 2008a
Benzene	71-43-2	11	1.1	cancer	ADEC, 2008a
Bis(2-ethylhexyl) Phthalate	117-81-7	220	22	cancer	ADEC, 2008a
Carbon disulfide	75-15-0	250	25	noncancer	ADEC, 2008a
Chloroform	67-66-3	3.2	0.32	cancer	ADEC, 2008a
4,4'-DDD	72-54-8	30	3.0	cancer	ADEC, 2008a
4,4'-DDE	72-55-9	21	2.1	cancer	ADEC, 2008a
4,4'-DDT	50-29-3	21	2.1	cancer	ADEC, 2008a

Table 4-3 Human Health COPC Screening Criteria for Sludge

Analyte	CAS Number	Regulatory Criteria ^a (mg/kg)		COPC Screening Benchmark ^b (mg/kg)	Cancer/ Noncancer?	Source
DiethylPhthalate	84-66-2	61,900		6,190	noncancer	ADEC, 2008a
Methylene Chloride	75-09-2	160		16	cancer	ADEC, 2008a
Naphthalene	91-20-3	28		2.8	noncancer	ADEC, 2008a
n-Butylbenzene	104-51-8	42		4.2	noncancer	ADEC, 2008a
p-Isopropyltoluene	99-87-6	62	^f	6.2	noncancer	ADEC, 2008a
Phenol	108-95-2	23,200		2,320	noncancer	ADEC, 2008a
Tetrachloroethene	127-18-4	10		1.0	cancer	ADEC, 2008a
Toluene	108-88-3	220		22	noncancer	ADEC, 2008a
Trichloroethene	79-01-6	0.57		0.057	cancer	ADEC, 2008a
Total Xylenes	1330-20-7	63		6.3	noncancer	ADEC, 2008a
Petroleum Hydrocarbons						
Diesel Range Organics (DRO)	na	10,250	^g	10,250	noncancer	ADEC, 2008a
Gasoline Range Organics (GRO)	na	1,400	^g	1,400	noncancer	ADEC, 2008a
Residual Range Organics (RRO)	na	10,000	^g	10,000	noncancer	ADEC, 2008a

Notes:

COPC - Chemical of Potential Concern.

na - Not available/applicable.

mg/kg - Milligram per kilogram.

RSL - Regional screening level

^a Regulatory Criteria is derived from the following hierarchy:

1. Minimum of the Direct Contact and Inhalation pathways listed in 18 AAC 75, Tables B1 and B2, Under 40 inch Zone (ADEC, 2008a).

2. Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites - Residential Soil (USEPA, 2008a).

^b COPC Screening Benchmark is based on cancer risk of 1×10^{-6} or a hazard index of 0.1.

^c This analyte is excluded as a COPC due to status as an essential nutrient.

^d Based on residential cleanup value calculated according to Risk Assessment Procedures Manual guidance (18 AAC 75.340). Lead is not included in the cumulative hazard estimate; therefore, the regulatory criterion was not modified

^e 4-Methylphenol (o-cresol) used as a surrogate chemical.

^f Isopropylbenzene used as a surrogate chemical.

^g Because petroleum hydrocarbons are not included in the cumulative hazard estimate, the regulatory criterion was used unmodified (i.e. not divided by 10).

Table 4-4 Human Health COPC Screening Criteria for Surface Water

Analyte	CAS Number	Regulatory Criteria ^a (mg/L)	COPC Screening Benchmark ^b (mg/L)	Cancer/ Noncancer?	Source
Inorganics					
Aluminum	7429-90-5	37	3.7	noncancer	USEPA, 2008a
Arsenic	7440-38-2	0.036	0.0036	cancer	ADEC, 2008b
Barium	7440-39-3	2	0.2	noncancer	ADEC, 2008a
Calcium	7440-70-2	NA ^c	na	na	na
Chromium	7440-47-3	0.1	0.01	noncancer	ADEC, 2008a
Copper	7440-50-8	0.0031	0.00031	noncancer	ADEC, 2008b
Iron	7439-89-6	NA ^c	na	noncancer	
Lead	7439-92-1	0.0081	0.00081	cancer	ADEC, 2008b
Magnesium	7439-95-4	NA ^c	na	na	na
Manganese	7439-96-5	0.88	0.088	noncancer	USEPA, 2008a
Potassium	7440-09-7	NA ^c	na	na	na
Selenium	7782-49-2	0.071	0.0071	noncancer	ADEC, 2008b
Silver	7440-22-4	0.10	0.01	noncancer	ADEC, 2008a
Sodium	7440-23-5	NA ^c	na	na	na
Titanium	7440-32-6	na	na	na	na
Vanadium	7440-62-2	0.26	0.026	noncancer	ADEC, 2008a
Zinc	7440-66-6	5 ^g	0.5	noncancer	ADEC, 2008a
Organics					
1,1,1-Trichloroethane	71-55-6	0.2	0.02	noncancer	ADEC, 2008a
1,1-Dichloropropene	563-58-6	0.0085 ^d	0.00085	cancer	ADEC, 2008a
1-Chlorohexane	544-10-5	na	na	na	na
2,2-Dichloropropane	594-20-7	0.005 ^e	0.0005	cancer	ADEC, 2008a
2-Chloroethyl Vinyl Ether	10-75-8	na	na	na	na
Anthracene	120-12-7	11	1.1	noncancer	ADEC, 2008a
Benzo(a)anthracene	56-55-3	0.0012	0.00012	cancer	ADEC, 2008a
Benzo(a)pyrene	50-32-8	0.0002	0.00002	cancer	ADEC, 2008a
Benzo(b)fluoranthene	205-99-2	0.001	0.0001	cancer	ADEC, 2008a
Benzo(g,h,i)perylene	191-24-2	1.1	0.11	noncancer	ADEC, 2008a
Benzo(k)fluoranthene	207-08-9	0.012	0.0012	cancer	ADEC, 2008a
Bromomethane	74-83-9	0.051	0.0051	noncancer	ADEC, 2008a
Carbon Disulfide	75-15-0	3.7	0.37	noncancer	ADEC, 2008a
Carbon Tetrachloride	56-23-5	0.005	0.0005	cancer	ADEC, 2008a
Chloroethane	75-00-3	0.29	0.029	cancer	ADEC, 2008a
Chloromethane	74-87-3	0.066	0.0066	cancer	ADEC, 2008a
Chrysene	218-01-9	0.12	0.012	cancer	ADEC, 2008a
4,4'-DDD	72-54-8	0.0035	0.00035	cancer	ADEC, 2008a
4,4'-DDE	72-55-9	0.0025	0.00025	cancer	ADEC, 2008a
4,4'-DDT	50-29-3	0.0025	0.00025	cancer	ADEC, 2008a
Dibenz(a,h)anthracene	53-70-3	0.00012	0.000012	cancer	ADEC, 2008a
DiethylPhthalate	84-66-2	29	2.9	noncancer	ADEC, 2008a
Fluoranthene	206-44-0	1.5	0.15	noncancer	ADEC, 2008a

Table 4-4 Human Health COPC Screening Criteria for Surface Water

Analyte	CAS Number	Regulatory Criteria ^a (mg/L)	COPC Screening Benchmark ^b (mg/L)	Cancer/ Noncancer?	Source
Hexachlorobutadiene	87-68-3	0.0073	0.00073	cancer	ADEC, 2008a
Indeno(1,2,3-cd)Pyrene	193-39-5	0.0012	0.00012	cancer	ADEC, 2008a
Isopropylbenzene	98-82-8	3.7	0.37	noncancer	ADEC, 2008a
Naphthalene	91-20-3	0.73	0.073	noncancer	ADEC, 2008a
n-Butylbenzene	104-51-8	0.37	0.037	noncancer	ADEC, 2008a
Phenanthrene	85-01-8	11	1.1	noncancer	ADEC, 2008a
Pyrene	129-00-0	1.1	0.11	noncancer	ADEC, 2008a
sec-Butylbenzene	135-98-8	0.37	0.037	noncancer	ADEC, 2008a
Styrene	100-42-5	0.1	0.01	noncancer	ADEC, 2008a
Toluene	108-88-3	1	0.1	noncancer	ADEC, 2008a
Trichlorofluoromethane	75-69-4	11	1.1	noncancer	ADEC, 2008a
Vinyl Acetate	108-05-4	37	3.7	noncancer	ADEC, 2008a
Vinyl Chloride	75-01-4	0.002	0.0002	cancer	ADEC, 2008a
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	na	1.5 ^f	1.5	noncancer	ADEC, 2008a

Notes:

COPC - Chemical of Potential Concern.

mg/L - Milligram per liter.

na - Not available.

NC - Not calculated.

PRG - Preliminary Remediation Goal

^a Regulatory Criteria was selected according to the following hierarchy:

- ADEC Water Quality Standards 18 AAC 70 (ADEC, 2008b).
- 18 AAC 75, Table C Groundwater Cleanup Levels (ADEC, 2008a).
- Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites - Tap Water (USEPA, 2008a).

^b COPC Screening Benchmark is based on cancer risk of 1×10^{-6} or a hazard index of 0.1.

^c This analyte is excluded as a COPC due to status as an essential nutrient.

^d 1,3-Dichloropropene used as a surrogate chemical.

^e 1,2-Dichloropropane used as a surrogate chemical.

^f Petroleum hydrocarbons are not included in the cumulative hazard calculations; therefore, the regulatory criterion was not modified (ie., no divided by 10).

^g - The zinc screening level for 18 AAC 75 was chosen over AAC 70 because the AAC 70 guidance was developed for more beneficial uses than protection of human health.

Table 4-5 Human Health COPC Screening Criteria for Subsurface Water

Analyte	CAS Number	Subsurface Water Background Value (mg/L)	Regulatory Criteria ^a (mg/L)	COPC Screening Benchmark ^b (mg/L)	Cancer/ Noncancer?	Source
Inorganics						
Aluminum	7429-90-5	8.03	37	3.7	noncancer	USEPA, 2008a
Antimony	7440-36-0	NC	0.006	0.0006	noncancer	ADEC, 2008a
Arsenic	7440-38-2	NC	0.010	0.001	cancer	ADEC, 2008a
Barium	7440-39-3	0.081	2.0	0.2	noncancer	ADEC, 2008a
Beryllium	7440-41-7	NC	0.004	0.0004	cancer	ADEC, 2008a
Cadmium	7440-43-9	NC	0.005	0.0005	cancer	ADEC, 2008a
Calcium	7440-70-2	33.9	na ^c	na	na	na
Chromium	7440-47-3	0.02	0.10	0.01	noncancer	ADEC, 2008a
Cobalt	7440-48-4	0.006	na	na	na	na
Copper	7440-50-8	0.009	1.0	0.1	noncancer	ADEC, 2008a
Iron	7439-89-6	9.68	26	2.6	noncancer	USEPA, 2008a
Lead	7439-92-1	0.004	0.015 ^d	0.002	cancer	ADEC, 2008a
Magnesium	7439-95-4	9.37	na ^c	na	na	na
Manganese	7439-96-5	0.267	0.88	0.088	noncancer	USEPA, 2008a
Mercury	7439-97-6	NC	0.002	0.0002	noncancer	ADEC, 2008a
Nickel	7440-02-0	0.02	0.10	0.01	noncancer	ADEC, 2008a
Potassium	7440-09-7	1.3	na ^c	na	na	na
Selenium	7782-49-2	0.005	0.05	0.005	noncancer	ADEC, 2008a
Silver	7440-22-4	NC	0.10	0.01	noncancer	ADEC, 2008a
Sodium	7440-23-5	3.4	na ^c	na	na	na
Thallium	7440-28-0	NC	0.002	0.0002	noncancer	ADEC, 2008a
Tin	7440-31-5	NC	22	2.2	noncancer	USEPA, 2008a
Titanium	7440-32-6	0.253	na	na	na	na
Vanadium	7440-62-2	0.02	0.26	0.026	noncancer	ADEC, 2008a
Zinc	7440-66-6	0.032	5	0.5	noncancer	ADEC, 2008a
Organics						
1,1,1,2-Tetrachloroethane	630-20-6	na	0.00052	0.00052	cancer	USEPA, 2008a
1,2,4-Trichlorobenzene	120-82-1	na	0.07	0.007	noncancer	ADEC, 2008a
1,2,4-Trimethylbenzene	95-63-6	na	1.8	0.18	noncancer	ADEC, 2008a
1,2-Dibromoethane	106-93-4	na	6.5E-06	0.0000065	cancer	USEPA, 2008a
1,2-Dichlorobenzene	95-50-1	na	0.6	0.06	noncancer	ADEC, 2008a
1,2-Dichloroethane	107-06-2	na	0.005	0.0005	cancer	ADEC, 2008a
1,3,5-Trimethylbenzene	108-67-8	na	1.8	0.18	noncancer	ADEC, 2008a
1,3-Dichlorobenzene	541-73-1	na	3.3	0.33	noncancer	ADEC, 2008a
1,4-Dichlorobenzene	106-46-7	na	0.075	0.0075	cancer	ADEC, 2008a
2-Butanone (MEK)	78-93-3	na	22	2.2	noncancer	ADEC, 2008a
2-Methylnaphthalene	91-57-6	na	0.15	0.015	noncancer	ADEC, 2008a
2,4,6-Trichlorophenol	88-06-2	na	0.077	0.0077	cancer	ADEC, 2008a
2,4-Dichlorophenol	120-83-2	na	0.11	0.011	noncancer	ADEC, 2008a
2,4-Dimethylphenol	105-67-9	na	0.73	0.073	noncancer	ADEC, 2008a
2,4-Dinitrophenol	51-28-5	na	0.073	0.0073	noncancer	ADEC, 2008a
2-Chloroethyl Vinyl Ether	10-75-8	na	na	na	na	na
2-Chlorophenol	95-57-8	na	0.18	0.018	noncancer	ADEC, 2008a
2-Methylphenol	95-48-7	na	1.8	0.18	cancer	ADEC, 2008a
2-Nitrophenol	88-75-5	na	na	na	na	na
3,3'-Dichlorobenzidine	91-94-1	na	0.0019	0.00019	cancer	ADEC, 2008a
3-and 4-Methylphenol Coelution	108-39-4/106-	na	0.18 ^e	0.018	noncancer	USEPA, 2008a
4-Chloroaniline	106-47-8	na	0.016	0.0016	cancer	ADEC, 2008a
4,4'-DDD	72-54-8	na	0.0035	0.00035	cancer	ADEC, 2008a
4,4'-DDT	50-29-3	na	0.0025	0.00025	cancer	ADEC, 2008a
4-Methyl-2-pentanone	108-10-1	na	2.9	0.29	noncancer	ADEC, 2008a
Acenaphthene	83-32-9	na	2.2	0.22	noncancer	ADEC, 2008a
Acenaphthylene	208-96-8	na	2.2	0.22	noncancer	ADEC, 2008a
Acetone	67-64-1	na	33	3.3	noncancer	ADEC, 2008a

Table 4-5 Human Health COPC Screening Criteria for Subsurface Water

Analyte	CAS Number	Subsurface Water Background Value (mg/L)	Regulatory Criteria ^a (mg/L)	COPC Screening Benchmark ^b (mg/L)	Cancer/ Noncancer?	Source
Anthracene	120-12-7	na	11	1.1	noncancer	ADEC, 2008a
Benzene	71-43-2	na	0.005	0.0005	cancer	ADEC, 2008a
Benzo(a)anthracene	56-55-3	na	0.0012	0.00012	cancer	ADEC, 2008a
Benzo(a)pyrene	50-32-8	na	0.0002	0.00002	cancer	ADEC, 2008a
Benzo(b)fluoranthene	205-99-2	na	0.0012	0.00012	cancer	ADEC, 2008a
Benzo(g,h,i)perylene	191-24-2	na	1.1	0.1	noncancer	ADEC, 2008a
Benzo(k)fluoranthene	207-08-9	na	0.012	0.0012	cancer	ADEC, 2008a
Benzoic Acid	65-85-0	na	150	15	noncancer	ADEC, 2008a
Benzyl Alcohol	100-51-6	na	18	1.8	noncancer	USEPA, 2008a
Bis(2-chloroethoxy)methane	111-91-1	na	0.11	0.011	noncancer	USEPA, 2008a
Bis(2-chloroethyl) Ether	111-44-4	na	0.00077	0.000077	cancer	ADEC, 2008a
Bromodichloromethane	75-27-4	na	0.014	0.0014	cancer	ADEC, 2008a
Bromomethane	74-83-9	na	0.051	0.0051	noncancer	ADEC, 2008a
Carbon Disulfide	75-15-0	na	3.7	0.37	noncancer	ADEC, 2008a
Chlorobenzene	108-90-7	na	0.1	0.01	noncancer	ADEC, 2008a
Chloroethane	75-00-3	na	0.29	0.029	cancer	ADEC, 2008a
Chloroform	67-66-3	na	0.14	0.014	cancer	ADEC, 2008a
Chloromethane	74-87-3	na	0.066	0.0066	cancer	ADEC, 2008a
Chrysene	218-01-9	na	0.12	0.012	cancer	ADEC, 2008a
cis-1,2-Dichloroethene	156-59-2	na	0.07	0.007	noncancer	ADEC, 2008a
Dibenz(a,h)anthracene	53-70-3	na	0.00012	0.000012	cancer	ADEC, 2008a
Dibenzofuran	132-64-9	na	0.073	0.0073	noncancer	ADEC, 2008a
Dibromomethane	74-95-3	na	0.37	0.037	noncancer	ADEC, 2008a
DiethylPhthalate	84-66-2	na	29	2.9	noncancer	ADEC, 2008a
Ethylbenzene	100-41-4	na	0.7	0.07	cancer	ADEC, 2008a
Fluoranthene	206-44-0	na	1.5	0.15	noncancer	ADEC, 2008a
Fluorene	86-73-7	na	1.5	0.15	noncancer	ADEC, 2008a
Heptachlor	76-44-8	na	0.0004	0.00004	cancer	ADEC, 2008a
Heptachlor Epoxide	1024-57-3	na	0.0002	0.00002	cancer	ADEC, 2008a
Hexachlorobutadiene	87-68-3	na	0.0073	0.00073	cancer	ADEC, 2008a
Hexachloroethane	67-72-1	na	0.04	0.004	cancer	ADEC, 2008a
Indeno(1,2,3-cd)pyrene	193-39-5	na	0.0012	0.00012	cancer	ADEC, 2008a
Isophorone	78-59-1	na	0.9	0.09	cancer	ADEC, 2008a
Isopropylbenzene	98-82-8	na	3.7	0.37	noncancer	ADEC, 2008a
m,p-Xylenes	na	na	10 ^f	1.0	noncancer	ADEC, 2008a
Methoxychlor	72-43-5	na	0.04	0.004	noncancer	ADEC, 2008a
n-Butylbenzene	104-51-8	na	0.37	0.04	noncancer	ADEC, 2008a
n-Propylbenzene	103-65-1	na	3.7 ^g	0.37	noncancer	ADEC, 2008a
Naphthalene	91-20-3	na	0.73	0.073	noncancer	ADEC, 2008a
Nitrobenzene	98-95-3	na	0.018	0.0018	noncancer	ADEC, 2008a
o-Xylene	95-47-6	na	10 ^f	1.0	noncancer	ADEC, 2008a
p-Isopropyltoluene	99-87-6	na	3.7 ^g	0.37	noncancer	ADEC, 2008a
Phenanthrene	85-01-8	na	11	1.1	noncancer	ADEC, 2008a
Phenol	108-95-2	na	11	1.1	noncancer	ADEC, 2008a
Pyrene	129-00-0	na	1.1	0.11	noncancer	ADEC, 2008a
sec-Butylbenzene	135-98-8	na	0.37	0.037	noncancer	ADEC, 2008a
Styrene	100-42-5	na	0.1	0.01	noncancer	ADEC, 2008a
Tert-Butylbenzene	98-06-6	na	0.37	0.037	noncancer	ADEC, 2008a
Toluene	108-88-3	na	1	0.1	noncancer	ADEC, 2008a
Total Xylenes	1330-20-7	na	10	1	noncancer	ADEC, 2008a

Table 4-5 Human Health COPC Screening Criteria for Subsurface Water

Analyte	CAS Number	Subsurface Water Background Value (mg/L)	Regulatory Criteria ^a (mg/L)	COPC Screening Benchmark ^b (mg/L)	Cancer/ Noncancer?	Source
Petroleum Hydrocarbons						
Diesel Range Organics (DRO)	na	na	1.5 ^h	1.5	noncancer	ADEC, 2008a
Gasoline Range Organics (GRO)	na	na	2.2 ^h	2.2	noncancer	ADEC, 2008a
Residual Range Organics (RRO)	na	na	1.1 ^h	1.1	noncancer	ADEC, 2008a

Notes:

COPC - Chemical of Potential Concern.

na - Not available

mg/L - Milligrams per liter.

RSL - Regional screening level

^a Regulatory Criteria is derived from the following hierarchy:

1. 18 AAC 75, Table C Groundwater Cleanup Levels (ADEC, 2008a).
2. Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites - Tap Water (USEPA, 2008a).

^b COPC Screening Benchmark is based on cancer risk of 1×10^{-6} or a hazard index of 0.1.

^c This analyte is excluded as a COPC due to status as an essential nutrient.

^d Based on residential cleanup value calculated according to Risk Assessment Procedures Manual guidance (18 AAC 75.340). Lead is not included in the cumulative hazard estimate, therefore the regulatory criterion was not modified (i.e., not divided by 10).

^e USEPA Tap Water RSL for 4-methylphenol used as a surrogate.

^f ADEC Table C Groundwater Cleanup Level (ADEC, 2008a) for total xylenes used as a surrogate.

^g ADEC Table C Groundwater Cleanup Level (ADEC, 2008a) for isopropylbenzene used as a surrogate.

^h Petroleum hydrocarbons are not included in the cumulative hazard calculations; therefore, the regulatory criterion was not modified (i.e., not divided by 10).

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Table 4-6 Ecological COPEC Screening Criteria for Soil

Analyte	CAS Number	Regulatory Criteria ^a (mg/kg)	COPEC Screening Benchmark ^b (mg/kg)	Source
Inorganics				
Aluminum	7429-90-5	5 ^c	5	ADEC, 2008c
Antimony	7440-36-0	0.27	0.27	ADEC, 2008c
Arsenic	7440-38-2	0.25 ^d	0.25	ADEC, 2008c
Barium	7440-39-3	5	5	ADEC, 2008c
Beryllium	7440-41-7	2.42	2.42	ADEC, 2008c
Cadmium	7440-43-9	0.2	0.2	ADEC, 2008c
Calcium	7440-70-2	NA ^e	NA	na
Chromium	7440-47-3	0.018 ^f	0.018	ADEC, 2008c
Cobalt	7440-48-4	13	13	ADEC, 2008c
Copper	7440-50-8	1	1	ADEC, 2008c
Iron	7439-89-6	NA ^e	NA	na
Lead	7439-92-1	9.36	9.36	ADEC, 2008c
Magnesium	7439-95-4	NA ^e	NA	na
Manganese	7439-96-5	100	100	ADEC, 2008c
Mercury	7439-97-6	0.3 ^g	0.3	ADEC, 2008c
Molybdenum	7439-98-7	2.0	2	ADEC, 2008c
Nickel	7440-02-0	25	25	ADEC, 2008c
Potassium	7440-09-7	NA ^e	NA	na
Selenium	7782-49-2	0.02	0.02	ADEC, 2008c
Silver	7440-22-4	2	2	ADEC, 2008c
Sodium	7440-23-5	NA ^e	NA	na
Thallium	7440-28-0	0.01	0.01	ADEC, 2008c
Tin	7440-31-5	5	5	ADEC, 2008c
Titanium	7440-32-6	1,000	1,000	ADEC, 2008c
Vanadium	7440-62-2	2	2	ADEC, 2008c
Zinc	7440-66-6	0.9	0.9	ADEC, 2008c
Organics				
1,1,1,2-Tetrachloroethane	630-20-6	na	na	na
1,1,1-Trichloroethane	71-55-6	15	15	ADEC, 2008c
1,1,2,2-Tetrachloroethane	79-34-5	na	na	ADEC, 2008c
1,1,2-Trichloroethane	79-00-5	10	10	ADEC, 2008c
1,1-Dichloroethane	75-34-3	15	15	ADEC, 2008c
1,1-Dichloroethene	75-35-4	0.3	0.3	ADEC, 2008c
1,1-Dichloropropene	563-58-6	na	na	na
1,2,3-Trichlorobenzene	87-61-6	20	20	ADEC, 2008c
1,2,3-Trichloropropane	96-18-4	20.0	20	ORNL, 1997b
1,2,4-Trimethylbenzene	95-63-6	0.0068 ^h	0.0068	ADEC, 2008c
1,2-Dibromo-3-chloropropane	96-12-8	na	na	na
1,2-Dibromoethane	106-93-4	na	na	na
1,2-Dichloroethane	107-06-2	4.0	4	ADEC, 2008c
1,2-Dichloropropane	78-87-5	700	700	ADEC, 2008c
1,3,5-Trimethylbenzene	108-67-8	0.0068 ^h	0.0068	ADEC, 2008c
1,3-Dichloropropane	142-28-9	na	na	ADEC, 2008c
1,4-Dichlorobenzene	106-46-7	0.1	0.1	ADEC, 2008c
1-Chlorohexane	544-10-5	na	na	na
2,2-Dichloropropane	594-20-7	na	na	na
2,4-Dimethylphenol	105-67-9	20.0	20	ADEC, 2008c
2,4-Dinitrophenol	51-28-5	20.0	20	ADEC, 2008c
2-Butanone (MEK)	78-93-3	6,487	6,487	ORNL, 1997b
2-Chloroethyl Vinyl Ether	10-75-8	na	na	ADEC, 2008c
2-Chlorotoluene	95-49-8	na	na	na
2-Hexanone	591-78-6	na	na	ADEC, 2008c
2-Methylnaphthalene	91-57-6	na ⁱ	na	ADEC, 2008c
2-Methylphenol	95-48-7	50	50	ADEC, 2008c
2-Nitroaniline	88-74-4	na	na	na

Table 4-6 Ecological COPEC Screening Criteria for Soil

Analyte	CAS Number	Regulatory Criteria ^a (mg/kg)	COPEC Screening Benchmark ^b (mg/kg)	Source
3-and 4-Methylphenol Coelution	108-39-4/106-44-	30	30	ORNL, 1997b
3,3'-Dichlorobenzidine	91-94-1	na	na	na
3-Nitroaniline	99-09-2	70	70	ADEC, 2008c
4-Chloroaniline	106-47-8	40.0	40	ADEC, 2008c
4-Chlorotoluene	106-43-4	na	na	na
4-Chloro-3-methylphenol	59-50-7	15	15	ADEC, 2008c
4-Methyl-2-pentanone	108-10-1	91.6	91.6	ADEC, 2008c
4-Methylphenol	106-44-5	50 ^j	50	ADEC, 2008c
4-Nitroaniline	100-01-6	40	40	ADEC, 2008c
Acenaphthene	83-32-9	na ⁱ	na	ADEC, 2008c
Acenaphthylene	208-96-8	na ⁱ	na	ADEC, 2008c
Acetone	67-64-1	20	20	ADEC, 2008c
Aldrin	309-00-2	0.22	0.22	ADEC, 2008c
alpha Endosulfan	959-98-8	0.55 ^k	0.55	ADEC, 2008c
alpha-BHC	319-84-6	17	17	ADEC, 2008c
alpha-Chlordane	5103-71-9	4.0 ^l	4	ADEC, 2008c
Anthracene	120-12-7	1.6 ⁱ	1.6	ADEC, 2008c
Arochlor 1260	11096-82-5	0.1	0.111	ORNL, 1996b
beta Endosulfan	33213-65-9	0.55 ^k	0.55	ADEC, 2008c
beta-BHC	319-85-7	7.33	7.33	ADEC, 2008c
Benzene	71-43-2	0.0068	0.0068	ADEC, 2008c
Benzo(a)anthracene	56-55-3	0.1 ⁿ	0.1	ADEC, 2008c
Benzo(a)pyrene	50-32-8	0.1 ⁿ	0.1	ADEC, 2008c
Benzo(b)fluoranthene	205-99-2	0.1 ^m	0.1	ADEC, 2008c
Benzo(g,h,i)perylene	191-24-2	33 ⁿ	33	ADEC, 2008c
Benzo(k)fluoranthene	207-08-9	0.1 ⁿ	0.1	ADEC, 2008c
Benzoic Acid	65-85-0	na	na	ADEC, 2008c
bis(2-ethylhexyl) Phthalate	117-81-7	0.91	0.91	ADEC, 2008c
Bromobenzene	108-86-1	na	na	na
Bromochloromethane	74-97-5	na	na	na
Bromodichloromethane	75-27-4	na	na	ADEC, 2008c
Bromoform	75-25-2	75.0	75	ADEC, 2008c
Bromomethane	74-83-9	na	na	ADEC, 2008c
Carbon Disulfide	75-15-0	na	na	ADEC, 2008c
Carbon Tetrachloride	56-23-5	58.6	58.6	ADEC, 2008c
Chlorobenzene	108-90-7	0.1	0.1	ADEC, 2008c
Chloroethane	75-00-3	na	na	ADEC, 2008c
Chloroform	67-66-3	150	150	ADEC, 2008c
Chloromethane	74-87-3	na	na	ADEC, 2008c
Chrysene	218-01-9	35 ⁱ	35	ADEC, 2008c
cis-1,2-Dichloroethene	156-59-2	89.6 ^m	89.6	ORNL, 1996b
cis-1,3-Dichloropropene	10061-01-5	na	na	na
4,4'-DDD	72-54-8	34	34	ADEC, 2008c
4,4'-DDE	72-55-9	1.3	1.3	ADEC, 2008c
4,4'-DDT	50-29-3	0.7	0.7	ADEC, 2008c
delta-BHC	319-86-8	1.2 ^o	1.2	ADEC, 2008c
Dibenz(a,h)anthracene	53-70-3	0.1 ⁿ	0.1	ADEC, 2008c
Dibenzofuran	132-64-9	na	na	ADEC, 2008c
Dibromochloromethane	124-48-1	na	na	na
Dibromomethane	74-95-3	na	na	na
Dichlorodifluoromethane	75-71-8	na	na	na
Dieldrin	60-57-1	0.011	0.011	ADEC, 2008c
DiethylPhthalate	84-66-2	53	53	ADEC, 2008c
Di-n-Butyl Phthalate	84-74-2	0.91	0.91	ADEC, 2008c
Endosulfan Sulfate	1031-07-8	0.55 ^k	0.55	ADEC, 2008c
Endrin	72-20-8	0.083	0.083	ADEC, 2008c
Endrin Aldehyde	7421-93-4	0.083 ^p	0.083	ADEC, 2008c

Table 4-6 Ecological COPEC Screening Criteria for Soil

Analyte	CAS Number	Regulatory Criteria ^a (mg/kg)	COPEC Screening Benchmark ^b (mg/kg)	Source
Endrin ketone	53494-70-5	0.083 ^p	0.083	ADEC, 2008c
Ethylbenzene	100-41-4	0.018	0.018	ADEC, 2008c
Fluoranthene	206-44-0	260 ⁱ	260	ADEC, 2008c
Fluorene	86-73-7	30 ⁱ	30	ADEC, 2008c
gamma-BHC (Lindane)	58-89-9	1.20	1.2	ADEC, 2008c
gamma-Chlordane	5566-34-7	4.0 ^k	4.0	ADEC, 2008c
Heptachlor	76-44-8	4.0	4.0	ADEC, 2008c
Heptachlor Epoxide	1024-57-3	4.0	4.0	ADEC, 2008c
High MW PAHs	na	1.1 ^q	1.1	EPA, 2007
Indeno(1,2,3-cd)Pyrene	193-39-5	0.1 ⁿ	0.1	ADEC, 2008c
Isopropylbenzene	98-82-8	0.0068 ^g	0.0068	ADEC, 2008c
Low MW PAHs	na	29 ^r	29	EPA, 2007
Methoxychlor	72-43-5	29.3	29.3	ADEC, 2008c
Methylene Chloride	75-09-2	183.0	183	ADEC, 2008c
m,p-Xylenes	108-38-3/106-42-	0.1 ^s	0.1	ADEC, 2008c
Naphthalene	91-20-3	0.1 ⁱ	0.1	ADEC, 2008c
n-Butylbenzene	104-51-8	0.0068 ^h	0.0068	ADEC, 2008c
n-Propylbenzene	103-65-1	0.0068 ^h	0.0068	ADEC, 2008c
o-Xylene	95-47-6	1.0	1.0	ADEC, 2008c
p-Isopropyltoluene	99-87-6	0.0068 ^h	0.0068	ADEC, 2008c
Phenanthrene	85-01-8	0.1 ⁱ	0.1	ADEC, 2008c
Phenol	108-95-2	3.8	3.8	ADEC, 2008c
Pyrene	129-00-0	0.1 ⁿ	0.1	ADEC, 2008c
sec-Butylbenzene	135-98-8	0.0068 ^h	0.0068	ADEC, 2008c
Styrene	100-42-5	0.1	0.1	ADEC, 2008c
tert-Butylbenzene	98-06-6	0.0068 ^h	0.0068	ADEC, 2008c
Tetrachloroethene	127-18-4	0.1	0.1	ADEC, 2008c
Toluene	108-88-3	0.08	0.08	ADEC, 2008c
Total Xylenes	1330-20-7	0.1	0.1	ADEC, 2008c
Toxaphene	8001-35-2	29.3	29.3	ADEC, 2008c
trans-1,2-Dichloroethene	156-60-5	89.6 ^m	89.6	ORNL, 1996b
trans-1,3-Dichloropropene	10061-02-6	na	na	na
Trichloroethene	79-01-6	0.1	0.1	ADEC, 2008c
Trichlorofluoromethane	75-69-4	na	na	na
Vinyl Acetate	108-05-4	na	na	ADEC, 2008c
Vinyl Chloride	75-01-4	0.1	0.1	ADEC, 2008c
Petroleum Hydrocarbons				
Diesel Range Organics (DRO)	na	na	na	na
Gasoline Range Organics (GRO)	na	na	na	na
Residual Range Organics (RRO)	na	na	na	na

Notes:

COPEC - Chemical of Potential Ecological Concern.

na - Not available.

mg/kg - Milligram per kilogram.

NC - Not calculated.

NA - Not applicable.

^a Regulatory Criteria selected based on the following hierarchy:

1) ADEC Ecoscoping Guidance (ADEC, 2008c- Appendix D).

2) Eco-SSLs - Ecological Soil Screening Level Guidance. Office of Emergency and Remedial Response. (USEPA, 2005e).

3) The lower of ORNL plant (ORNL, 1997c - Table 1) or soil invertebrate (ORNL, 1997b - Table 1) benchmarks.

4) The lower of ORNL mammalian or avian dietary wildlife benchmarks, assuming diet consists of 100 percent soil (ORNL, 1996b - Appendix D, Table 12).

^b COPEC Screening Benchmark is equal to the indicated regulatory criteria.

^c According to USEPA's Ecological Soil Screening Level Guidance (USEPA, 2003c), aluminum is only a chemical of concern (COC) when soil/sediment pH < 5.5; therefore, aluminum was not selected as a COPEC.

^d Screening value is for Arsenic III

^e Soil screening criteria are not available for this chemical. This analyte is excluded as a COPEC based on essential nutrient status.

Table 4-6 Ecological COPEC Screening Criteria for Soil

Analyte	CAS Number	Regulatory Criteria ^a (mg/kg)	COPEC Screening Benchmark ^b (mg/kg)	Source
^f Screening value is for Chromium VI				
^g Screening value is for inorganic mercury				
^h Benzene used as a surrogate chemical.				
ⁱ Individual low molecular weight (MW) PAH isomers are summed and screened against low MW PAH criteria.				
^j Total cresols used as surrogate				
^k Endosulfan used as a surrogate				
^l Chlordane used as a surrogate				
^m Benchmark Criteria Obtained from ORNL Wildlife Benchmarks (ORNL, 1996b) for 1,2-Dichlorethene.				
ⁿ Individual high molecular (MW) PAH isomers are summed and screened against high MW PAH criteria.				
^o Gamma BHC is used as a surrogate				
^p Endrin used as a surrogate.				
^q Value represents lowest Eco-SSL for high MW PAH (EPA, 2007). For risk assessment purposes, high MW PAHs are summed and compared to regulatory criteria.				
^r Value represents lowest Eco-SSL for low MW PAH (EPA, 2007). For risk assessment purposes, low MW PAHs are summed and compared to regulatory criteria.				
^s Total Xylenes used as a surrogate.				

Table 4-7 Ecological COPEC Screening Criteria for Surface Water

Analyte	CAS Number	Regulatory Criteria^a (mg/L)	COPEC Screening Benchmark^b (mg/L)	Source
Inorganics				
Aluminum	7429-90-5	0.075	0.075	ADEC, 2008c
Arsenic	7440-38-2	0.055 ^c	0.055	ADEC, 2008c
Barium	7440-39-3	0.0039	0.0039	ADEC, 2008c
Calcium	7440-70-2	NA ^d	NA	na
Chromium	7440-47-3	0.000266 ^e	0.000266	ADEC, 2008c
Copper	7440-50-8	0.000205	0.000205	ADEC, 2008c
Iron	7439-89-6	NA ^d	NA	na
Lead	7439-92-1	0.001	0.001	ADEC, 2008c
Magnesium	7439-95-4	82	82	ADEC, 2008c
Manganese	7439-96-5	0.08	0.08	ADEC, 2008c
Potassium	7440-09-7	NA ^d	NA	na
Selenium	7782-49-2	0.001	0.001	ADEC, 2008c
Silver	7440-22-4	0.000012	0.000012	ADEC, 2008c
Sodium	7440-23-5	NA ^d	NA	na
Titanium	7440-32-6	na	na	ADEC, 2008c
Vanadium	7440-62-2	0.019	0.019	ADEC, 2008c
Zinc	7440-66-6	0.021	0.021	ADEC, 2008c
Organics				
1,1,1-Trichloroethane	71-55-6	0.011	0.011	ADEC, 2008c
1,1-Dichloropropene	563-58-6	na	na	na
1-Chlorohexane	544-10-5	na	na	na
2,2-Dichloropropane	594-20-7	na	na	na
2-Chloroethyl Vinyl Ether	10-75-8	na	na	na
Anthracene	120-12-7	0.000012 ^f	0.000012	ADEC, 2008c
Benzo(a)anthracene	56-55-3	0.000018 ^g	0.000018	ADEC, 2008c
Benzo(a)pyrene	50-32-8	0.000014 ^g	0.000014	ADEC, 2008c
Benzo(b)fluoranthene	205-99-2	na ^g	na	ADEC, 2008c
Benzo(g,h,i)perylene	191-24-2	na ^g	na	ADEC, 2008c
Benzo(k)fluoranthene	207-08-9	na ^g	na	ADEC, 2008c
Bromomethane	74-83-9	na	na	na
Carbon Disulfide	75-15-0	0.00092	0.00092	ADEC, 2008c
Carbon Tetrachloride	56-23-5	0.0098	0.0098	ADEC, 2008c
Chloroethane	75-00-3	na	na	na
Chloromethane	74-87-3	na	na	ADEC, 2008c
Chrysene	218-01-9	na ^g	na	ADEC, 2008c
Dibenz(a,h)anthracene	53-70-3	0.000027 ^g	0.000027	ADEC, 2008c
DiethylPhthalate	84-66-2	0.00018	0.00018	ADEC, 2008c
Fluoranthene	206-44-0	0.00004 ^g	0.00004	ADEC, 2008c

Table 4-7 Ecological COPEC Screening Criteria for Surface Water

Analyte	CAS Number	Regulatory Criteria ^a (mg/L)	COPEC Screening Benchmark ^b (mg/L)	Source
Hexachlorobutadiene	87-68-3	0.00093	0.00093	ADEC, 2008c
High MW PAHs	na	0.3 ^h	0.03	NOAA, 2006
Indeno(1,2,3-cd)Pyrene	193-39-5	NA ^g	NA	na
Isopropylbenzene	98-82-8	na	na	na
Low MW PAHs	na	0.3 ⁱ	0.03	NOAA, 2006
Naphthalene	91-20-3	0.0011 ^f	0.0011	ADEC, 2008c
n-Butylbenzene	104-51-8	0.021 ^j	0.021	ADEC, 2008c
Phenanthrene	85-01-8	0.0004 ^f	0.0004	ADEC, 2008c
Pyrene	129-00-0	0.000025 ^g	0.000025	ADEC, 2008c
sec-Butylbenzene	135-98-8	0.021 ^j	0.021	ADEC, 2008c
Styrene	100-42-5	0.072	0.072	ADEC, 2008c
Toluene	108-88-3	0.002	0.002	ADEC, 2008c
Trichlorofluoromethane	75-69-4	6.4	6.4	NOAA, 2006
Vinyl Acetate	108-05-4	0.016	0.016	ADEC, 2008c
Vinyl Chloride	75-01-4	1.3	1.3	ADEC, 2008c
Petroleum Hydrocarbons				
Diesel Range Organics (DRO)	na	na	na	na
Pesticides				
4,4'-DDD	72-54-8	0.000000011	0.000000011	ADEC, 2008c
4,4'-DDE	72-55-9	0.000000011	0.000000011	ADEC, 2008c
4,4'-DDT	50-29-3	0.000000011	0.000000011	ADEC, 2008c

Notes:

COPEC - Chemical of Potential Ecological Concern.
mg/L - Milligrams per liter.

NA - Not applicable.
na - Not available.

^a Regulatory Criteria selected based on the following hierarchy:

- 1) ADEC Ecoscoping Guidance (ADEC, 2008c- Appendix D).
- 2) NAWQC - Freshwater Chronic Value. SQuIRT. (NOAA, 2006).
- 3) NAWQC - Marine Chronic Value. SQuIRT. (NOAA, 2006).
- 4) NAWQC - Freshwater Acute Value divided by 10. SQuIRT. (NOAA, 2006)
- 5) NAWQC - Marine Acute Value divided by 10. SQuIRT. (NOAA, 2006)
- 6) Lowest Chronic Value observed in freshwater daphnids (ORNL, 1996a - Table 1)

^b COPEC Screening Benchmark is equal to the indicated regulatory criteria.

^c Arsenic III screening value used.

^d Surface Water Screening Criteria are not available for this chemical. This analyte is excluded as a COPEC based on essential nutrient status.

^e Chromimum VI screening value used.

^f Is included as part of total low molecular weight (MW) PAHs in COPEC screening analysis.

^g Is included as part of total high molecular (MW) PAHs in COPEC screening analysis.

Table 4-7 Ecological COPEC Screening Criteria for Surface Water

Analyte	CAS Number	Regulatory	COPEC Screening	Source
		Criteria^a (mg/L)	Benchmark^b (mg/L)	

^h Benchmark Criteria Derived from NAWQC - Freshwater Acute Value for high MW PAH divided by 10 (NOAA, 2006).

ⁱ Benchmark Criteria Derived from NAWQC - Freshwater Acute Value for low MW PAH divided by 10 (NOAA, 2006).

^j Benzene is used as a surrogate

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Table 4-8 Ecological COPEC Screening Criteria for Sediment

Analyte	CAS Number	Regulatory Criteria ^a (mg/kg)	COPEC Screening Benchmark ^b (mg/kg)	Source
Inorganics				
Aluminum	7429-90-5	25,500 c, d	25,500	Buchman (2006)
Antimony	7440-36-0	2.0	2.0	NOAA ER-L (ORNL 1997)
Arsenic	7440-38-2	5.9	5.9	Buchman (2006)
Barium	7440-39-3	na	na	na
Beryllium	7440-41-7	na	na	na
Cadmium	7440-43-9	0.583	0.583	Buchman (2006)
Calcium	7440-70-2	NA e	NA	na
Chromium	7440-47-3	36	36	Buchman (2006)
Cobalt	7440-48-4	na	na	na
Copper	7440-50-8	28	28	Buchman (2006)
Iron	7439-89-6	NA e	NA	na
Lead	7439-92-1	35	35	Buchman (2006)
Magnesium	7439-95-4	NA e	NA	na
Manganese	7439-96-5	630	630	Buchman (2006)
Mercury	7439-97-6	0.17	0.17	Buchman (2006)
Molybdenum	7439-98-7	na	na	na
Nickel	7440-02-0	18	18	Buchman (2006)
Potassium	7440-09-7	NA e	NA	na
Selenium	7782-49-2	na	na	na
Silver	7440-22-4	1.0	1.0	NOAA ER-L (ORNL 1997)
Sodium	7440-23-5	NA e	NA	na
Thallium	7440-28-0	na	na	na
Titanium	7440-32-6	na	na	na
Vanadium	7440-62-2	na	na	na
Zinc	7440-66-6	98	98	Buchman (2006)
Organics				
1,1,2,2-Tetrachloroethane	79-34-5	0.94	0.94	EPA (1996)
1,1,1-Trichloroethane	71-55-6	0.17	0.17	EPA (1996)
1,2,3-Trichlorobenzene	87-61-6	na	na	na
1,2,3-Trichloropropane	96-18-4	na	na	na
1,2,4-Trichlorobenzene	120-82-1	9.2	9.2	EPA (1996)
3-and 4-Methylphenol Coelution	108-39-4/106-44-5	na	na	na
3,3'-Dichlorobenzidine	91-94-1	na	na	na
4-Chloroaniline	106-47-8	na	na	na
Acenaphthene	83-32-9	NA f	NA	na
Acenaphthylene	208-96-8	NA f	NA	na
Acetone	67-64-1	na	na	na
Anthracene	120-12-7	0.01	0.010	Buchman (2006)
Arochlor 1260	11096-82-5	0.005	0.005	Ontario MOE Low (ORNL 1997)
Benzo(a)anthracene	56-55-3	0.01572 g	0.0157	Buchman (2006)
Benzo(a)pyrene	50-32-8	0.0319 g	0.0319	Buchman (2006)
Benzo(b)fluoranthene	205-99-2	NA g	NA	na
Benzo(g,h,i)perylene	191-24-2	NA g	NA	na
Benzo(k)fluoranthene	207-08-9	0.03 g	0.027	Buchman (2006)
Bis(2-ethylhexyl) Phthalate	117-81-7	0.182	0.18	FDEP TEL (ORNL 1997)
cis-1,3-Dichloropropene	10061-01-5	na	na	na
Chrysene	218-01-9	0.02683 g	0.0268	Buchman (2006)
4,4'-DDD	72-54-8	0.0035	0.0035	Buchman (2006)
4,4'-DDE	72-55-9	0.0014	0.0014	Buchman (2006)
4,4'-DDT	50-29-3	0.0042	0.0042	MacDonald et al., 2000
Dibenz(a,h)anthracene	53-70-3	0.010 g	0.010	Buchman (2006)
DiethylPhthalate	84-66-2	0.63	0.63	EPA (1996)
Endosulfan Sulfate	1031-07-8	na	na	na
Endrin	72-20-8	0.0027	0.0027	Buchman (2006)

Table 4-8 Ecological COPEC Screening Criteria for Sediment

Analyte	CAS Number	Regulatory Criteria ^a (mg/kg)	COPEC Screening Benchmark ^b (mg/kg)	Source
Fluoranthene	206-44-0	0.031 ^g	0.031	Buchman (2006)
Fluorene	86-73-7	0.010 ^f	0.010	Buchman (2006)
Indeno(1,2,3-cd)pyrene	193-39-5	0.017 ^g	0.017	Buchman (2006)
High MW PAHs	na	0.19	0.19	Buchman (2006)
Methylene Chloride	75-09-2	na	na	na
m,p-Xylenes	108-38-3/106-42-3	0.025 ^h	0.025	EPA (1996)
Naphthalene	91-20-3	0.015 ^f	0.015	Buchman (2006)
Low MW PAHs	na	0.076	0.076	Buchman (2006)
Phenanthrene	85-01-8	0.01873 ^f	0.0187	Buchman (2006)
Phenol	108-95-2	na	na	na
Pyrene	129-00-0	0.044 ^g	0.044	Buchman (2006)
Tetrachloroethene	127-18-4	0.53	0.53	EPA (1996)
Toluene	108-88-3	0.67	0.67	EPA (1996)
trans-1,3-Dichloropropene	10061-02-6	na	na	na
Petroleum Hydrocarbons				
Diesel Range Organics (DRO)	na	na	na	na
Gasoline Range Organics (GRO)	na	na	na	na
Residual Range Organics (RRO)	na	na	na	na

Notes:

COPEC - Chemical of Potential Ecological Concern
mg/kg - Milligram per kilogram.

NA - Not applicable.

na - Not available.

^a Regulatory Criteria selected based on the following hierarchy:

- 1) The lower of value between Threshold Effects Level (TEL) and ARCS TEL- Sediment Quality Guidelines in Screening Quick Reference Tables (SQuiRTs) (Buchman, 2006).
- 2) Consensus-based Freshwater Threshold Effect Concentrations per MacDonald et al. (2000 - Table 2). Sediment quality guidelines for metals in freshwater ecosystems that reflect TECs (i.e., below which harmful effects are unlikely to be observed).
- 3) Assessment and Remediation of Contaminated Sediment Program - TEC (ORNL, 1997a - Table 4).
- 4) Ontario Ministry of the Environment: Lowest effect level (ORNL, 1997a - Table 4).
- 5) EPA (1996) per ORNL, 1997a - Table 5.
- 6) NOAA ER-L per ORNL, 1997a - Table 1.
- 7) Florida Department of Environmental Protection (FDEP) TEL Value per ORNL, 1997a - Table 1

^b COPEC Screening Benchmark is equal to the ecological benchmark criterion.

^c Aluminum ecological benchmark criterion derived from lowest ARCS TEL. listed in SQiRT. (Buchman, 2006).

^d According to USEPA's Ecological Soil Screening Level Guidance (USEPA, 2003c), aluminum is only a chemical of concern (COC) when soil/sediment pH < 5.5; therefore, aluminum was not selected as a COPEC.

^e Sediment screening criteria are not available for this chemical. This analyte is excluded as a COPEC based on essential nutrient status.

^f Is included as part of total low molecular weight (MW) PAHs in COPEC screening analysis.

^g Is included as part of total high molecular weight (MW) PAHs in COPEC screening analysis.

^h m-xylene used as a surrogate.

Table 4-9 Selected Chemicals of Potential Concern for Human Health at Sites SS03, SS08, and SS11

Chemical of Potential Concern ¹	Site SS03					Site SS08						Site SS11			
	Surface Soil	Subsurface Soil	Sediment	Surface Water	Subsurface Water	Surface Soil	Subsurface Soil	Sediment	Sludge	Surface Water	Subsurface Water	Surface Soil	Subsurface Soil	Sediment	Surface Water
Inorganics															
Aluminum	X		X			X	X	X	X		X	X			
Antimony											X				
Arsenic	X		X			X	X	X	X		X	X	X	X	
Barium											X	X			
Beryllium															
Cadmium											X				
Chromium	X		X			X	X	X	X		X	X	X	X	
Cobalt	X		X			X	X	X	X		X	X			
Copper									X	X	X				
Lead	X						X	X		X	X	X			
Manganese	X		X			X	X	X	X		X	X			
Mercury											X				
Nickel											X				
Selenium											X				
Thallium											X				
Titanium	X		X	X		X	X	X	X	X	X	X			
Vanadium	X		X			X	X	X	X		X				
Zinc											X				
Volatile Organic Compounds															
1,2-Dibromoethane											X				
1,2-Dichloroethane					X										
1,2,4-Trimethylbenzene	X	X			X							X			
1,3,5-Trimethylbenzene	X	X				X						X			
1-Chlorohexane										X					
2-Chloroethyl Vinyl Ether										X	X				
Benzene	X				X						X				
Ethylbenzene	X				X										
m,p-Xylenes	X														
n-Butylbenzene	X														
n-Propylbenzene	X														
o-Xylene	X	X													
p-Isopropyltoluene	X														
sec-Butylbenzene	X														
Tert-Butylbenzene	X														
Toluene	X										X				
Total xylenes	X														
Trichloroethene						X									
Vinyl Chloride										X					
Semi-volatile Organic Compounds															
2-Nitroaniline						X									
2-Nitrophenol					X										
3,3'-Dichlorobenzidine					X										
3-Nitroaniline						X									
4-Chloro-3-methylphenol						X									

Table 4-9 Selected Chemicals of Potential Concern for Human Health at Sites SS03, SS08, and SS11

Chemical of Potential Concern ¹	Site SS03					Site SS08						Site SS11			
	Surface Soil	Subsurface Soil	Sediment	Surface Water	Subsurface Water	Surface Soil	Subsurface Soil	Sediment	Sludge	Surface Water	Subsurface Water	Surface Soil	Subsurface Soil	Sediment	Surface Water
4-Chloroaniline					X										
4-Methylphenol												X			
Bis(2-chloroethyl) Ether					X										
Dibenzofuran												X			
Hexachlorobutadiene					X										
Polynuclear Aromatic Hydrocarbons															
2-Methylnaphthalene	X										X	X			
Acenaphthene												X			
Anthracene												X			
Benzo(a)anthracene												X			
Benzo(a)pyrene						X	X	X				X			
Benzo(b)fluoranthene												X			
Benzo(g,h,i)perylene												X			
Benzo(k)fluoranthene												X			
Chrysene												X			
Dibenz(a,h)anthracene												X			
Fluoranthene												X			
Fluorene												X			
Indeno(1,2,3-cd)pyrene												X			
Naphthalene	X	X			X						X	X			
Phenanthrene												X			
Pyrene												X			
Pesticides															
4,4'-DDT						X		X							
Aldrin												X			
Alpha-BHC												X			
Alpha-Chlordane												X			
Delta-BHC												X			
Dieldrin							X								
Endrin												X			
Endrin Aldehyde												X			
Endrin ketone												X			
Heptachlor												X			
Toxaphene												X			
Polychlorinated Biphenyls															
Arochlor 1260						X	X	X							
Petroleum Hydrocarbons															
Diesel Range Organics (DRO)	X	X			X		X				X	X			
Gasoline Range Organics (GRO)	X				X										
Residual Range Organics (RRO)					X		X					X			

Note:

1 – Refer to Appendix B for details of the screening process used to select the chemicals of potential concern.

4,4'-DDT - dichlorodiphenyltrichloroethane

Table 4-10 Selected Chemicals of Potential Concern for Ecological Receptors at Sites SS03, SS08, and SS11

Chemical of Potential Concern ¹	Site SS03			SS08			Site SS11		
	Surface Soil	Sediment	Surface Water	Surface Soil	Sediment	Surface Water	Surface Soil	Sediment	Surface Water
Inorganics									
Aluminum						X			
Antimony	X			X			X		
Arsenic	X	X		X	X		X	X	
Barium	X	X	X	X	X	X	X	X	X
Beryllium		X			X				
Cadmium	X	X		X	X		X		
Calcium									
Chromium	X	X		X	X	X	X		X
Cobalt	X	X		X	X		X		
Copper	X	X		X	X	X	X		
Iron									
Lead	X			X	X	X	X		
Magnesium									
Manganese	X	X		X	X		X		
Mercury	X				X				
Molybdenum					X		X		
Nickel	X	X		X	X		X		
Potassium									
Selenium	X	X		X	X	X	X	X	
Silver	X	X				X			
Sodium									
Thallium				X	X		X		
Tin	X			X			X		
Titanium	X	X	X	X	X	X	X		
Vanadium	X	X		X	X		X		
Zinc	X	X		X	X		X		
Volatile Organic Compounds									
1,1-Dichloropropene						X			
1,2,3-Trichlorobenzene		X							
1,2,3-Trichloropropane		X							
1,2,4-Trimethylbenzene	X						X		
1,3,5-Trimethylbenzene	X			X			X		
1,4-Dichlorobenzene	X								
1-Chlorohexane						X			
2,2-Dichloropropane						X			
2-Chloroethyl Vinyl Ether						X			
Acetone							X		

Table 4-10 Selected Chemicals of Potential Concern for Ecological Receptors at Sites SS03, SS08, and SS11

Chemical of Potential Concern ¹	Site SS03			SS08			Site SS11		
	Surface Soil	Sediment	Surface Water	Surface Soil	Sediment	Surface Water	Surface Soil	Sediment	Surface Water
Benzene	X								
Bromomethane						X			
Carbon Disulfide				X		X			X
Chloroethane						X			
Chloromethane						X			X
cis-1,3-Dichloropropene		X							
Ethylbenzene	X						X		
Isopropylbenzene	X					X	X		
Methylene Chloride		X			X				
m,p-Xylenes	X				X		X		
n-Butylbenzene	X						X		
n-Propylbenzene	X								
o-Xylene	X						X		
p-Isopropyltoluene	X						X		
sec-Butylbenzene	X								
Styrene									
Tert-Butylbenzene	X								
Toluene	X								
Total xylenes	X								
trans-1,3-Dichloropropene		X							
Trichlorofluoromethane				X			X		
Vinyl Acetate									
Semi-Volatile Organic Compounds									
2,4-Dimethylphenol							X		
2-Nitroaniline				X					
3-and 4-Methylphenol Coelution		X							
3,3'-Dichlorobenzidine				X	X				
3-Nitroaniline									
4-Chloro-3-methylphenol									
4-Chloroaniline					X				
4-Methylphenol									
Benzoic Acid							X		
Bis(2-ethylhexyl) Phthalate		X							
Dibenzofuran	X						X		
DiethylPhthalate			X						
Phenol		X					X		

Table 4-10 Selected Chemicals of Potential Concern for Ecological Receptors at Sites SS03, SS08, and SS11

Chemical of Potential Concern ¹	Site SS03			SS08			Site SS11		
	Surface Soil	Sediment	Surface Water	Surface Soil	Sediment	Surface Water	Surface Soil	Sediment	Surface Water
Polynuclear Aromatic Hydrocarbons									
2-Methylnaphthalene									
Acenaphthene					X				
Acenaphthylene					X				
Anthracene					X				
Benzo(a)anthracene					X				
Benzo(a)pyrene					X				
Benzo(b)fluoranthene					X				
Benzo(g,h,i)perylene					X				
Benzo(k)fluoranthene					X				
Chrysene					X				
Dibenz(a,h)anthracene					X				
Fluoranthene					X				
Fluorene					X				
Indeno(1,2,3-cd)pyrene					X				
Naphthalene					X				
Phenanthrene					X				
Pyrene					X				
Pesticides									
4,4'-DDD		X			X	X			
4,4'-DDE					X	X			
4,4'-DDT		X		X	X	X	X	X	
Endosulfan Sulfate		X			X				
delta-BHC							X		
Dieldrin							X		
Endrin							X		
Endrin Aldehyde							X		
Endrin ketone							X		
Polychlorinated Biphenyls									
Arochlor 1260				X	X				
Petroleum Hydrocarbons									
Diesel Range Organics (DRO)	X	X	X	X	X		X		
Gasoline Range Organics (GRO)	X	X		X	X		X		
Residual Range Organics (RRO)	X			X	X		X	X	

Note:

1 – Refer to Appendix B for details of the screening process used to select the chemicals of potential concern.

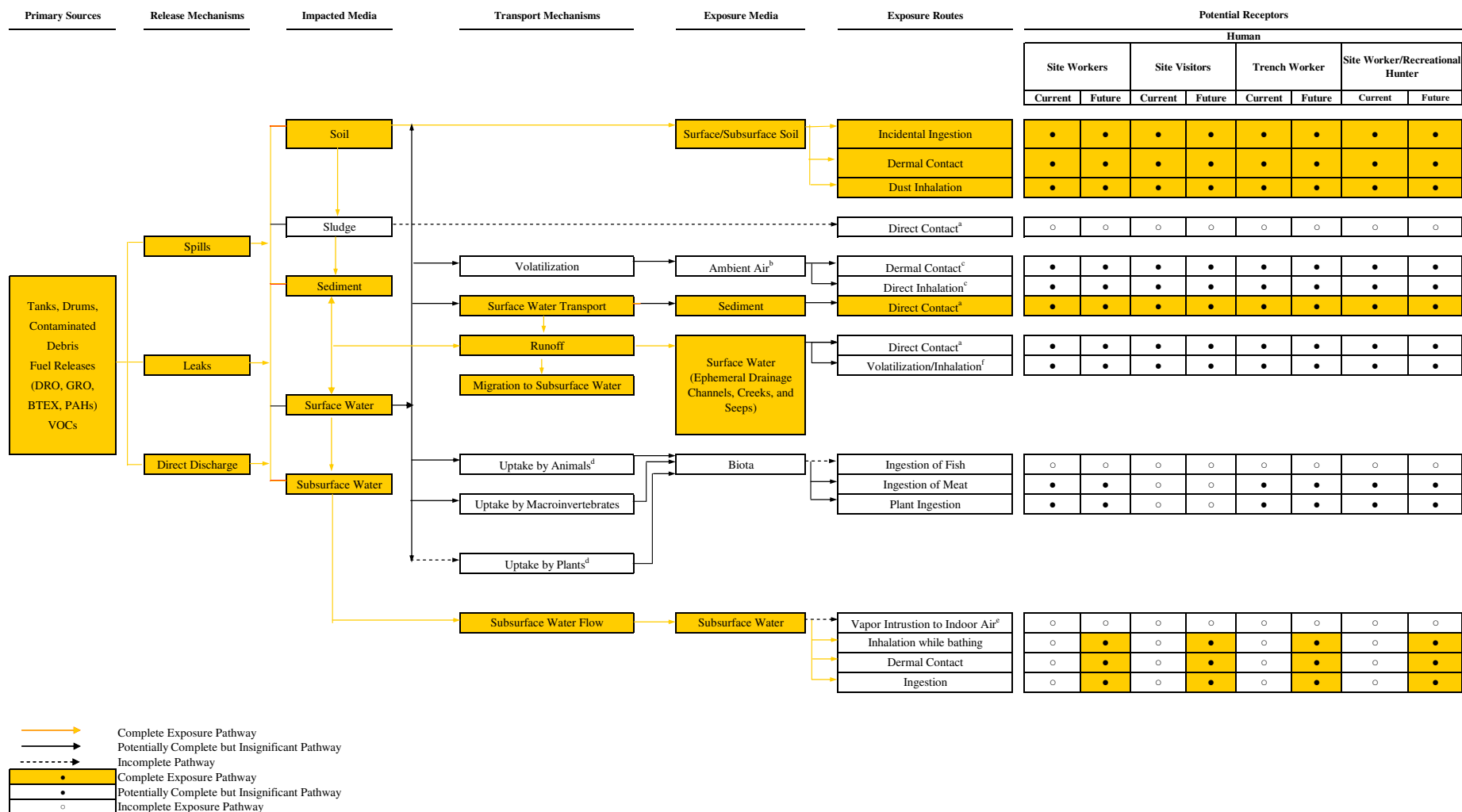
4,4'-DDD - dichlorodiphenyldichloroethane

4,4'-DDE - dichlorodiphenyldichloroethylene

4,4'-DDT - dichlorodiphenyltrichloroethane

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Figure 4-1 Human Health Conceptual Site Model for Lower Camp Site SS03



Notes:

^a Direct Contact means exposure through both incidental ingestion of sludge, sediment, or surface water and through dermal absorption of the contaminant from sludge, sediment, or surface water.

^b Ambient Air includes both Indoor Air and Outdoor Air.

^c This pathway is considered potentially complete but insignificant due to (1) being covered by snow much of the year, and (2) precipitation and cold temperatures minimize volatilization.

^d This refers to consumable plants or animals. Subsistence plant collection does not currently occur at Lower Camp, and is not anticipated in the future given the restricted access to Areas of Concern at Tatalina LRRS. Consumable animals include moose or caribou that roam through the site.

^e This pathway is considered to be incomplete because residences or other buildings are not currently located at SS03, nor will they be constructed there in the future.

^f This pathway is considered to be incomplete because residences or other buildings are not currently located at SS03, nor will they be constructed there in the future.

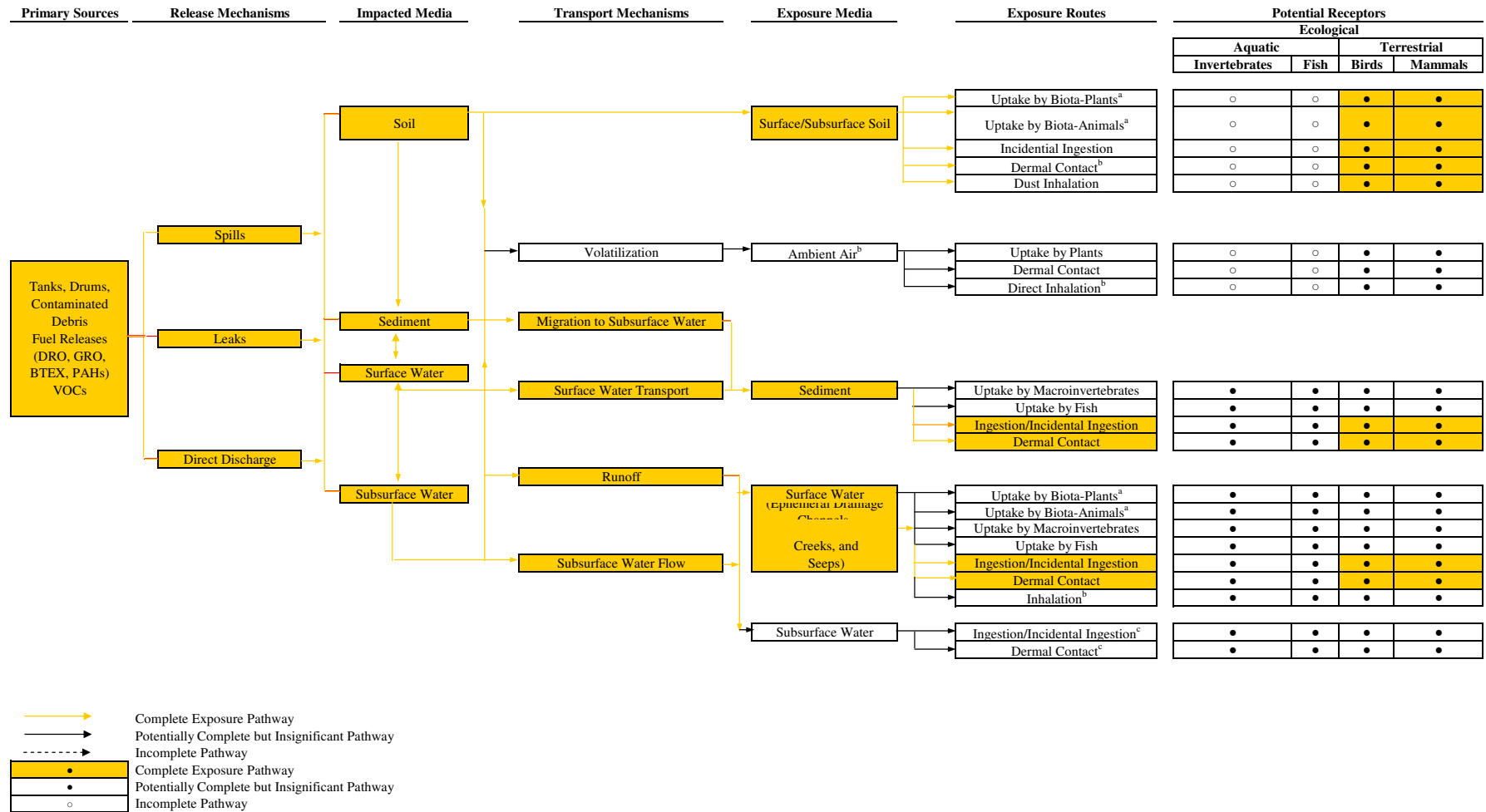
^g This pathway is potentially complete, but insignificant because surface water is present intermittently, human contact is minimal, and there are no chemicals of potential concern in surface water.

BTEX - benzene, toluene, ethylbenzene, and xylenes
DRO - diesel range organics
GRO - gasoline range organics

PAHs - polynuclear aromatic hydrocarbons
VOCs - volatile organic compounds

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Figure 4-2 Ecological Conceptual Site Model for Lower Camp Site SS03



Notes:

^a This refers to forage or prey items for the indicated receptor.

^b This pathway is considered potentially complete but insignificant due to (1) being covered by snow much of the year, and (2) precipitation and cold temperatures minimize volatilization.

^c Ecological receptors are not likely to come into contact with subsurface soil or water and, therefore, these pathways are considered potentially complete but insignificant.

BTEX - benzene, toluene, ethylbenzene, and xylenes

DRO - diesel range organics

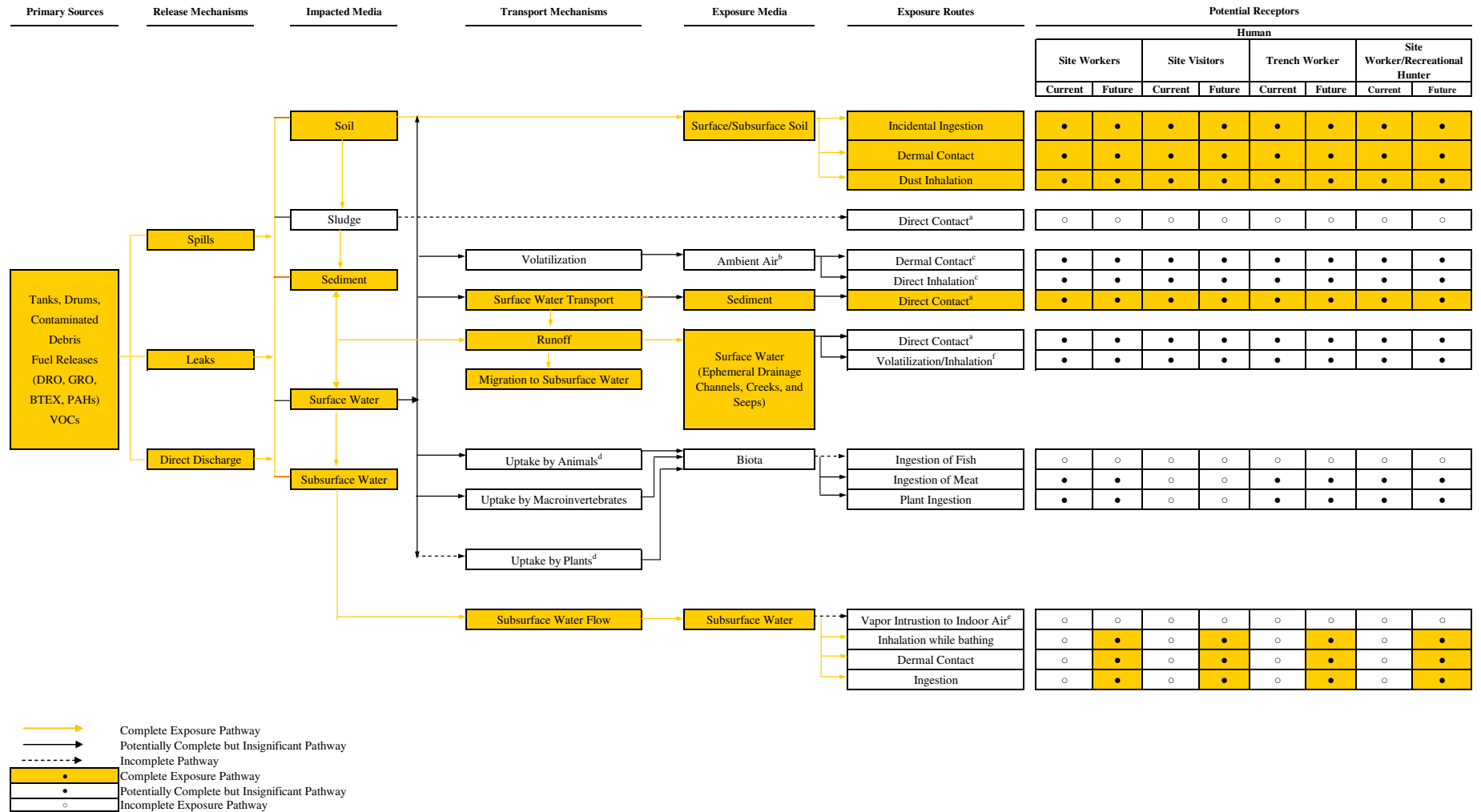
GRO - gasoline range organics

PAHs - polynuclear aromatic hydrocarbons

VOCs - volatile organic compounds

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Figure 4-3 Human Health Conceptual Site Model for Lower Camp Site SS08



Notes:

^a Direct Contact means exposure through both incidental ingestion of sludge, sediment, or surface water and through dermal absorption of the contaminant from sludge, sediment, or surface water.

^b Ambient Air includes both Indoor Air and Outdoor Air.

^c This pathway is considered potentially complete but insignificant due to (1) being covered by snow much of the year, and (2) precipitation and cold temperatures minimize volatilization.

^d This refers to consumable plants or animals. Subsistence plant collection does not currently occur at Lower Camp, and is not anticipated in the future given the restricted access to Areas of Concern at Tatalina LRSS. Consumable animals include moose or caribou that roam through the site.

^e This pathway is considered to be incomplete because residences or other buildings are not currently located at SS08 nor will they be constructed there in the future.

^f This pathway is considered to be incomplete because residences or other buildings are not currently located at SS08, nor will they be constructed there in the future.

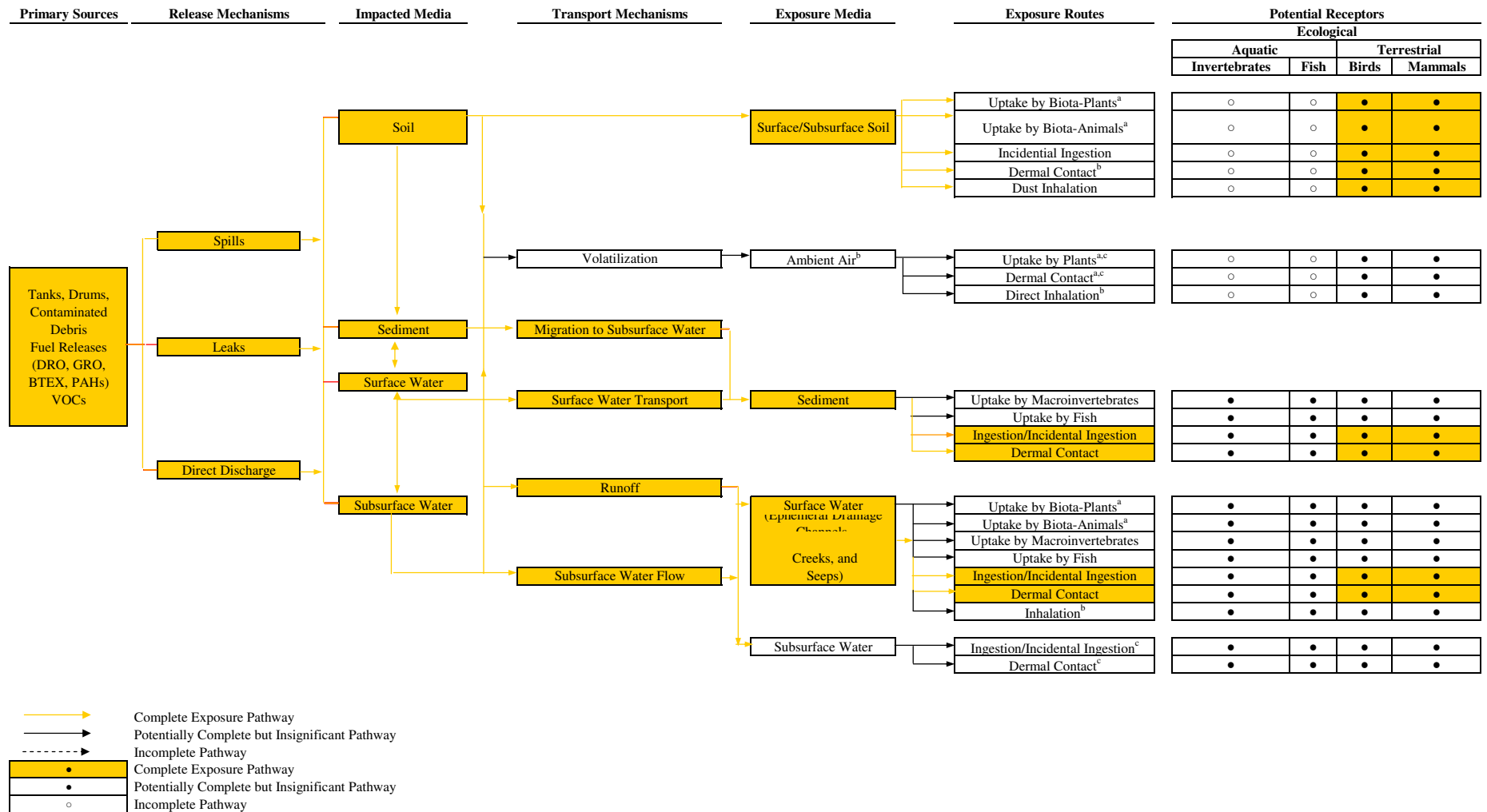
^f This pathway is potentially complete, but insignificant because surface water is present intermittently, human contact is minimal, and the chemicals of potential concern in surface water, 1-chlorohexane, 2-chloroethyl vinyl ether, and vinyl chloride, were detected at low concentrations.

BTEX - benzene, toluene, ethylbenzene, and xylenes
DRO - diesel range organics
GRO - gasoline range organics

PAHs - polynuclear aromatic hydrocarbons
VOCs - volatile organic compounds

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Figure 4-4 Ecological Conceptual Site Model for Lower Camp Site SS08



Notes:

^aThis refers to forage or prey items for the indicated receptor.

^b This pathway is considered potentially complete but insignificant due to (1) being covered by snow much of the year, and (2) precipitation and cold temperatures minimize volatilization.

^c Ecological receptors are not likely to come into contact with subsurface soil or water and, therefore, these pathways are considered potentially complete but insignificant.

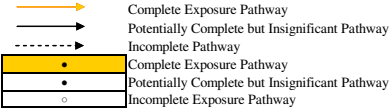
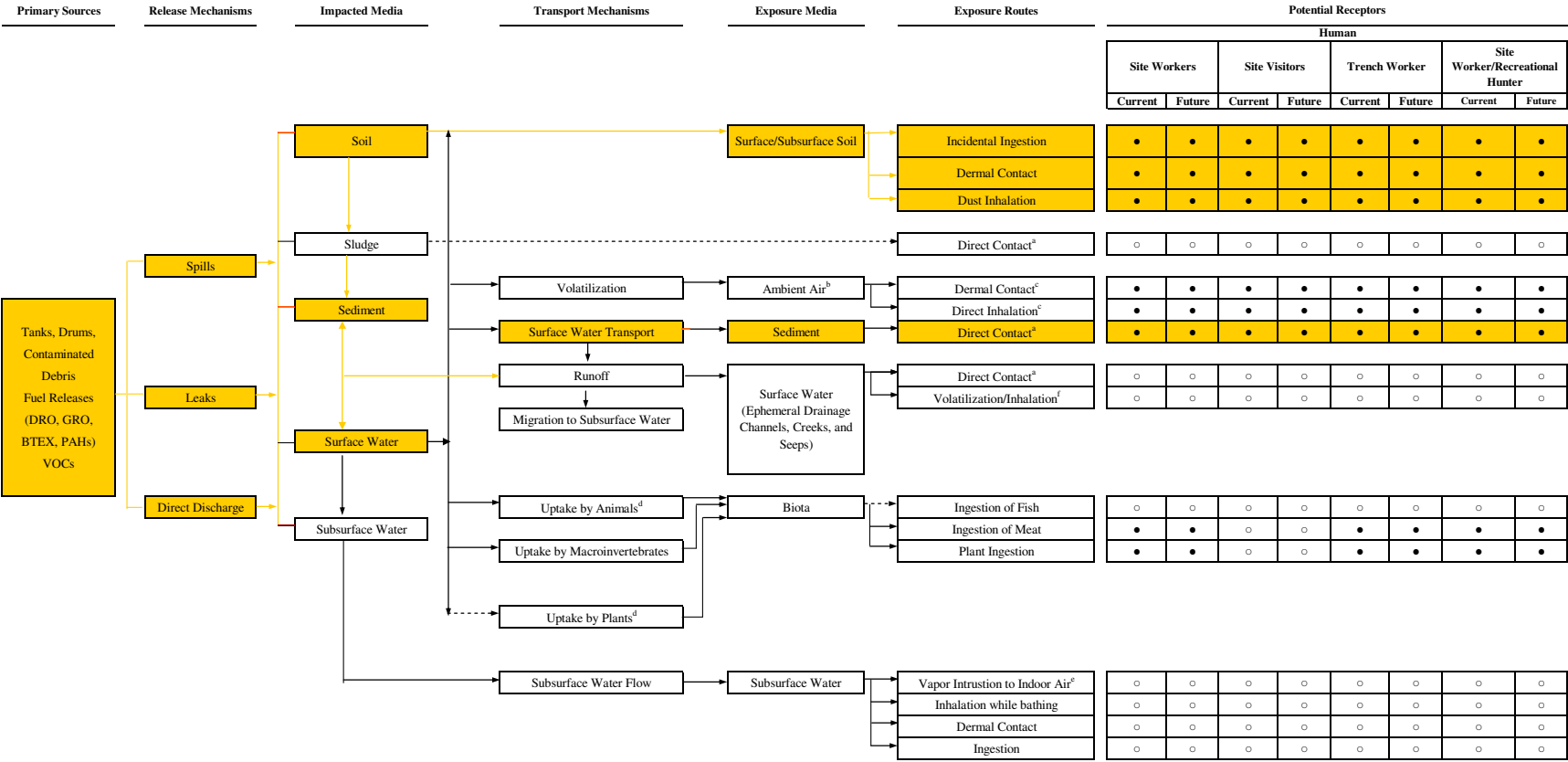
PAHs - polynuclear aromatic hydrocarbons

VOCs - volatile organic compounds

7025 Volatile organic compounds

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Figure 4-5 Human Health Conceptual Site Model for Lower Camp Site SS11



Notes:

^a Direct Contact means exposure through both incidental ingestion of sediment, or surface water and through dermal absorption of the contaminant from sediment, or surface water.

^b Ambient Air includes both Indoor Air and Outdoor Air.

^c This pathway is considered potentially complete but insignificant due to (1) being covered by snow much of the year, and (2) precipitation and cold temperatures minimize volatilization.

^d This refers to consumable plants or animals. Subsistence plant collection does not currently occur at Lower Camp, and is not anticipated in the future given the restricted access to Areas of Concern at Tatalina LRRS. Consumable animals include moose or caribou that roam through the site.

^e This pathway is considered to be incomplete because residences or other buildings are not currently located at SS11, nor will they be constructed there in the future.

^f This pathway is considered to be incomplete because residences or other buildings are not currently located at SS11, nor will they be constructed there in the future.

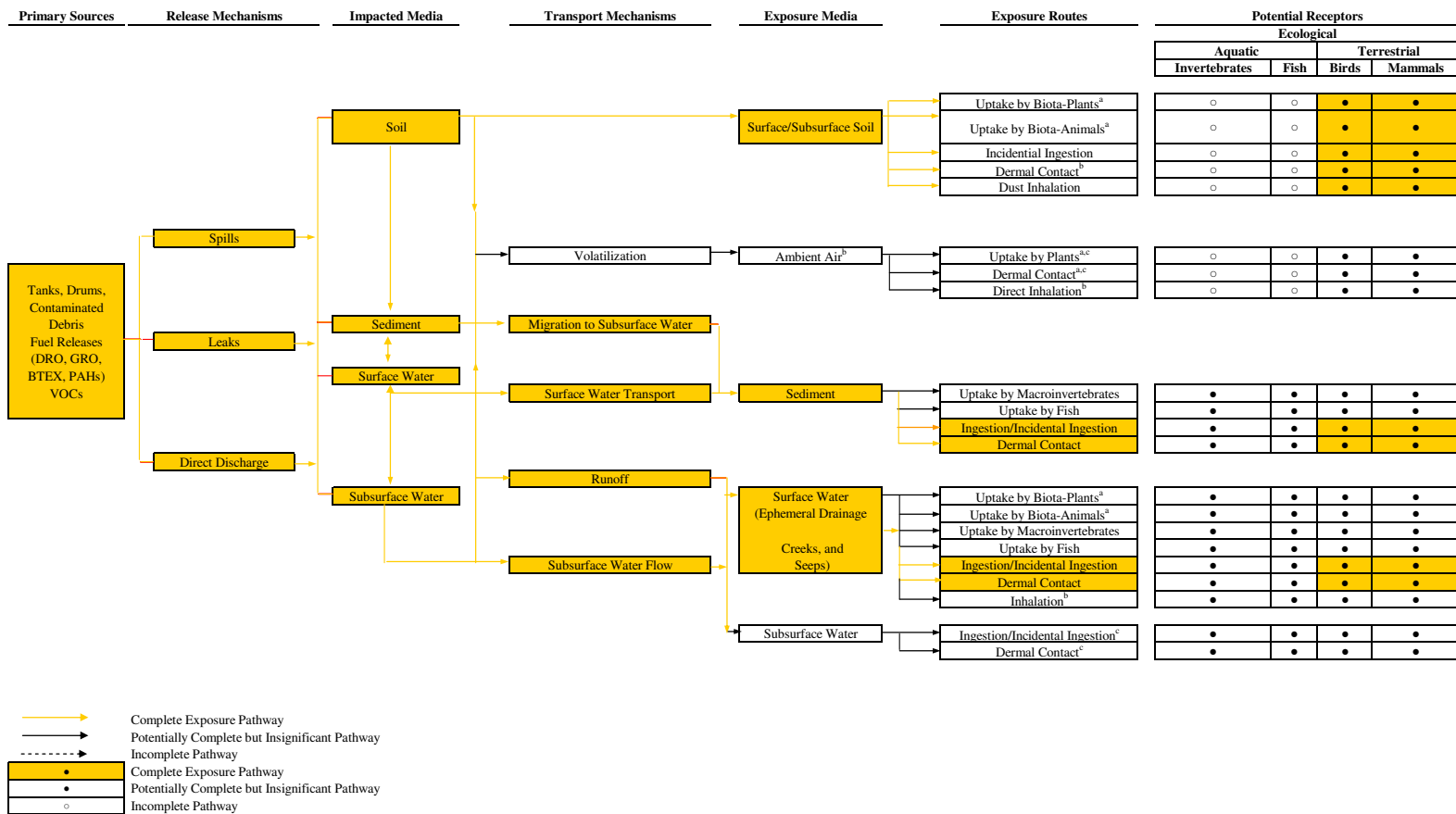
^g This pathway is potentially complete, but insignificant because surface water is present intermittently, human contact is minimal, and there are no chemicals of potential concern in surface water at SS11.

BTEX - benzene, toluene, ethylbenzene, and xylenes
DRO - diesel range organics
GRO - gasoline range organics

PAHs - polynuclear aromatic hydrocarbons
VOCs - volatile organic compounds

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Figure 4-6 Ecological Conceptual Site Model for Lower Camp Site SS11



Notes:

^aThis refers to forage or prey items for the indicated receptor.

^b This pathway is considered potentially complete but insignificant due to (1) being covered by snow much of the year, and (2) precipitation and cold temperatures minimize volatilization.

^c Ecological receptors are not likely to come into contact with subsurface soil or water and, therefore, these pathways are considered potentially complete but insignificant.

BTEX - benzene, toluene, ethylbenzene, and xylenes
DRO - diesel range organics
GRO - gasoline range organics

PAHs - polynuclear aromatic hydrocarbons
VOCs - volatile organic compounds

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5.0 HUMAN HEALTH RISK ASSESSMENT

This section presents the methods and assumptions used in, and results of, the HHRA for Lower Camp ERP Sites SS03, SS08, and SS11. Risks to public health were evaluated in accordance with the CERCLA Remedial Response process, as amended by the Superfund Amendments and Reauthorization Act, and Alaska Oil and Other Hazardous Substances Pollution Control Regulations (18 AAC 75). The HHRA evaluated potential public health risks associated with chemicals released from historic releases at SS03, SS08, and SS11 to the Tatalina environment. Potential threats to ecological habitats and receptors were evaluated as described in Section 6.0.

5.1 METHODS

The HHRA for SS03, SS08, and SS11 was performed in accordance with, or in consideration of, the following ADEC, EPA, and Air Force guidance documents or reference materials:

- Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Part A. Baseline Risk Assessment (USEPA, 1989a).
- The Installation Restoration Program Toxicology Guide – Volumes 1 – 4 (USAF, 1989).
- Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors (USEPA, 1991).
- Final Exposure Assessment Guidelines (USEPA, 1992a).
- Health Effects Assessment Summary Tables (HEAST) (USEPA, 1997a).
- Exposure Factors Handbook, Volume I: General Factors (USEPA, 1997b).
- Exposure Factors Handbook, Volume III: Activity Factors (USEPA, 1997c).
- Guidance for Cleanup of Petroleum Contaminated Sites (ADEC, 2000).
- Calculated Cleanup Levels for Compounds without Tabulated Values in Site Cleanup Rules, Technical Memorandum 01-007 (ADEC, 2003).
- Cumulative Risk Guidance (ADEC, 2002).
- 18 AAC 75 – *Oil and Other Hazardous Substance Control Regulations*, as amended through October 9, 2008 (ADEC, 2008).
- 18 AAC 70 – *Water Quality Standards*, amended through July 1, 2008 (ADEC, 2008b).
- Cleanup Levels Guidance (ADEC, 2008d).
- Risk Assessment Guidance for Superfund (RAGS), Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). (USEPA, 2004a).

- Draft Risk Assessment Procedures Manual (ADEC, 2005a).

The HHRA for SS03, SS08, and SS11 was conducted in accordance with 18 AAC 75. Site cleanup rules provided in 18 AAC 75 establish administrative processes and standards to determine the necessity for, and degree of, cleanup required to protect human health, safety, and welfare, and the environment at a site where one or more hazardous substances are located.

The administrative processes and standards in 18 AAC 75 include generic soil and groundwater cleanup levels (i.e., Methods One and Two), and procedures for establishing site-specific cleanup levels (i.e., Methods Three and Four).

As described in Section 4.1.2, COPCs including various inorganics, VOCs, SVOCs (including PAHs), pesticides, Arochlor 1260, DRO, GRO, and RRO were detected in SS03, SS08, and SS11 soils at maximum concentrations in excess of COPC screening benchmarks. Maximum concentrations of COPCs including various inorganics, DDT, and Arochlor 1260 in SS03 and/or SS08 sediment samples were greater than COPC screening benchmarks. Maximum concentrations of COPCs including aluminum, arsenic, chromium, cobalt, copper, manganese, titanium, and vanadium in SS08 sludge samples were also greater than COPC screening benchmarks. Maximum concentrations of COPCs including various inorganics, VOCs, SVOCs, DRO, GRO, and RRO in subsurface water samples collected from monitoring wells at SS03 and/or SS08 exceeded COPC screening benchmarks. In addition, 1-chlorohexane, 2-chloroethyl and vinyl ether were selected as COPCs because screening criteria were not available, and vinyl chloride was detected in one surface water sample collected from SS08 at a concentration slightly higher than one-tenth its ADEC Table C Groundwater Cleanup Level (18 AAC 75).

Consistent with current and future military operations at Tatalina LRRS, and the CSMs for Lower Camp (refer to Section 4.3.1), a potential residential scenario was not quantitatively evaluated in the HHRA for SS03, SS08, and SS11. An underlying assumption in this HHRA is that some form of institutional controls will be implemented for Lower Camp to preclude future residential land uses at this location.

The HHRA for SS03, SS08, and SS11 used a two-tiered approach. Conservative screening (Tier I) was performed to evaluate whether chemical concentrations measured in site media exceed protective screening criteria. If chemical concentrations exceed protective screening criteria, those chemicals were identified as COPCs and evaluated further in a Tier II baseline HHRA. The Tier II baseline HHRA was performed consistent with ADEC Method Four procedures. Those sites and media for which Tier II HHRA criteria were exceeded are proposed for evaluation of remedial alternatives.

Tier I screening was conducted for SS03, SS08, and SS11 in accordance with Alaska regulations (18 AAC 75), ADEC's *Draft Risk Assessment Procedures Manual* (ADEC, 2005a), as described in Section 4.1.1. The results of Tier I screening are documented in Section 4.1.2, and demonstrate that concentrations of chemicals including, but not limited to, inorganics, several chlorinated VOCs and petroleum-related compounds (e.g., BTEX,

PAHs, DRO, GRO, and RRO), pesticides, and PCBs, in site media, exceeded health protective screening criteria. These chemicals were identified as COPCs for SS03, SS08, and SS11. Methods and assumptions used in the Tier II baseline HHRA for SS03, SS08, and SS11 are described below.

The general framework for conducting baseline HHRA is provided in Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Part A. Baseline Risk Assessment (USEPA, 1989a) and ADEC's Draft Risk Assessment Procedures Manual (ADEC, 2005a). Consistent with these guidance documents, the Tier II baseline HHRA consisted of the following five steps:

1. Exposure assessment
2. Exposure quantification
3. Toxicity assessment
4. Risk characterization
5. Uncertainty analysis

The first four steps are described in the following sections, as they relate to the baseline HHRA for SS03, SS08, and SS11. Step 5, Uncertainty Analysis, is described in Section 7.0.

5.1.1 Exposure Assessment

The exposure assessment begins with development of a site-specific CSM. The human health CSMs for SS03, SS08, and SS11 were described in Section 4.3.1. Briefly, the Air Force operates and maintains an LRRS at Tatalina. The LRRS includes living and maintenance facilities for site workers at the installation. Site workers reside at Lower Camp and work both indoors and outside there, and primarily indoors at the Upper Camp Radar Dome, performing routine equipment maintenance. This site operation is planned to continue indefinitely. Although exposures between site workers and Lower Camp soils are not anticipated on a routine basis, there is a potential for soil exposures, particularly during recreation activities such as hunting. Potentially complete exposure pathways between site workers and soil COPCs include incidental ingestion of soil, dermal contact with soil, and inhalation of soil particulates or soil-derived VOCs. Trench workers and site visitors to Lower Camp, such as contractors performing environmental monitoring or cleanup activities, may be exposed to COPCs in soil through similar pathways.

Site workers perform routine industrial activities at Lower and Upper Camps daily, for 12 months of the year. Year-long activities occur at both the Lower and Upper Camps, in spite of the harsh climate at Tatalina LRRS, by the presence of an Industrial Dome and a Residential Dome at Lower Camp and the Radar Dome at Upper Camp. Although year-long industrial activities are possible, potential exposures to outdoor media (e.g., soil, surface water, and sediment) are less than one year due to the presence of snow on the ground and ice covering surface water bodies. For purposes of exposure quantification,

site workers are assumed to be exposed to outdoor media for 250 days per year (Table 5-1), consistent with ADEC guidance (ADEC, 2005a).

Site visitors, such as contractors performing environmental monitoring or cleanup activities, could also potentially be exposed to COPCs in site media at SS03, SS08, and SS11. However, environmental investigators/remediation workers are assumed to perform work activities according to approved health and safety policies and procedures, and with an appropriate level of personal protective equipment, as necessary. Based on use of the personal protective equipment and compliance with health and safety policies and procedures, and their lower frequency of exposure, environmental investigators/remediation workers are assumed to have lower exposures than site workers who maintain the Lower Camp and MAR facilities.

As described in Section 4.3.1.1, Lower Camp has restricted access and subsistence hunting/fishing/gathering does not occur at Lower Camp. However, site workers may engage in these activities during non-work hours. Consistent with the above, potential current and future human receptors for SS03, SS08, and SS11 include:

- Site workers
- Site workers/recreational hunters
- Trench workers
- Site visitors

Site workers who engage in recreational hunting are likely to have the highest exposures to outdoor media associated with SS03, SS08, and SS11. Therefore, site workers who engage in recreational hunting are assumed to be the reasonable maximum exposure (RME) scenario for the HHRA.

Relevant exposure pathways for the above receptors are visually presented on Figures 4-1, 4-3 and 4-5. Potentially complete and incomplete exposure pathways for human receptors are described in more detail below.

5.1.1.1 Ambient Air Exposure Pathways

Historic spills and releases of fuels, solvents, and other volatile contaminants to soil can result in direct release of volatile COPCs to ambient air through volatilization. Surface runoff from rainfall or snowmelt can transport volatile COPCs in soil to surface water and sediment, from which they volatilize to ambient air. Percolation and leaching can transport volatile COPCs to subsurface water, with subsequent volatilization to ambient air. Historic spills and releases of such contaminants at Lower Camp occurred more than 15 years ago, and it is likely that the majority of volatile residues in soil, surface water, sediment, or subsurface water have already migrated to ambient air and dissipated. Residual levels of volatile COPCs in these media may continue to volatilize. However, concentrations of volatile COPCs in ambient air at any given time are anticipated to be low because:

- Tatalina is located near the 32°F annual isotherm, with discontinuous permafrost and low ambient temperatures (Flint, 1971).
- Lower Camp is covered by snow during the winter months, with low average temperatures and high precipitation continuing into the summer months.

Potential human exposure pathways include:

- Uptake of volatile COPCs by plants that are subsequently consumed by site workers/recreational hunters.
- Dermal absorption by site workers, site workers/recreational hunters, trench workers or site visitors.
- Direct inhalation by site workers, site workers/recreational hunters, trench workers or site visitors.

Volatile COPCs in surface soil at SS03 included 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, butylbenzenes, n-propylbenzene, p-isopropyltoluene and BTEX constituents (Table 4-9). The only volatile COPC in surface soil at SS08 was 1,3,5-trimethylbenzene. The only volatile COPCs in surface soil at SS11 were 1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene. Based on the above-mentioned meteorological conditions, volatilization rates and associated ambient air concentrations for these VOCs are anticipated to be low. In addition, site workers at Lower Camp spend the majority of their time working indoors at the Industrial Dome, or relaxing/sleeping in the Residential Dome. The Residential and Industrial Domes are located on the other side of a ridge and approximately 1,600 feet from SS11, approximately 150 feet upgradient of SS03, and approximately 1,000 feet upgradient of SS08. No contaminants are believed to be present in the subsurface at, or in the vicinity of, the Residential or Industrial Domes. In addition, no buildings are present at SS03, SS08, or SS11; therefore, potential migration of VOCs in the subsurface to above-ground indoor air is currently an incomplete exposure pathway for SS03, SS08, and SS11. Time spent outdoors may include recreational activities such as hiking, hunting, fishing, or gathering. However, SS03 and SS08 offer limited opportunity for these activities, and no work is currently performed there. Based on the above, exposure pathways between human receptors and VOCs in ambient air are potentially complete, but insignificant (Figures 4-1, 4-3 and 4-5).

Additionally, the recommended ADEC guidance document, Vapor Intrusion Pathway: A Practical Guideline by the ITRC (ITRC, 2007), was used in further evaluation of this potential exposure pathway. Of the 13 steps utilized, Step 4 involves evaluation of buildings located in proximity to volatile chemicals in soil, soil gas, or groundwater, and to consider future development of the property. Due to the fact that there are no buildings on sites SS03, SS08, or SS11, that the buildings which do exist in the vicinity are more than 100 feet from the nearest detected concentration of contaminants, and that no future construction is proposed by AFCEE, the vapor intrusion to indoor air pathway will not be evaluated.

5.1.1.2 Soil Exposure Pathways

Contaminants may be released to surface and subsurface soil through historic spills, leaks, and disposal practices. Potential human exposure pathways include:

- Uptake of COPCs by plants and food-chain transfer to animals that are subsequently consumed by site workers/recreational hunters.
- Incidental ingestion of soil particulates by site workers, site workers/recreational hunters, trench workers, and site visitors.
- Dermal absorption of COPCs adsorbed to soil particulates by site workers, site workers/recreational hunters, trench workers, and site visitors.
- Inhalation of soil particulates by site workers, site workers/recreational hunters, trench workers, and site visitors.

As described in Sections 4.3.1.1 and 5.1, human receptors with a potential for exposure to Lower Camp soils include site workers, site workers/recreational hunters, trench workers, and site visitors. The Lower Camp has restricted access and subsistence hunter/fisher/gatherers, including members of the Takotna community, located approximately 10 miles northwest of Tatalina LRRS, are not permitted access to Areas of Concern at Lower Camp.

Site workers work primarily indoors at Lower Camp. Although exposures between contract personnel and soils at Lower Camp ERP Sites SS03, SS08, and SS11 are not anticipated on a routine basis, there is a potential for soil exposures during recreational activities such as hunting. Potentially complete exposure pathways between site workers and soil COPCs include incidental ingestion of soil, dermal contact with soil, and inhalation of soil particulates. Trench workers and site visitors to the Lower Camp, such as contractors performing environmental monitoring or cleanup activities, may be exposed to COPCs in soil through similar pathways.

Caribou, moose, bears, and other animals forage within Tatalina LRRS and may briefly come into contact with contaminated soils at SS03, SS08, or SS11. However, the primary COPCs present at SS03, SS08, and SS11 (i.e., petroleum hydrocarbons including DRO, GRO, RRO, and PAHs) do not tend to biomagnify in terrestrial organisms (ATSDR, 1989; Eisler, 1987). Furthermore, although some compounds that may biomagnify were also identified as COPCs, including DDT and Aroclor 1260 at SS08, the foraging range of game animals is considerably larger than the areas potentially affected by site-related contaminants and contact with site contaminants would be expected to be minimal. In addition, the presence of DDT is likely the result of historic application of DDT-related compounds at Tatalina LRRS for insect and vegetation control (USAF, 1998b). However, Aroclor 1260 and DDT will be carried through the HHRA and considered for cumulative risk purposes as appropriate.

Although site workers may gather herbs or berries in the area, berry bushes and other food plants generally do not grow in the cleared and disturbed areas of Lower Camp where SS03, SS08, and SS11 are located, and the potential for contamination to migrate to areas where the plants do grow is low (USAF, 1998b). In addition, the primary contaminants associated with surface soils at SS03, SS08, and SS11 (i.e., weathered GRO and DRO constituents) have a tendency to be sequestered in soil (Manilal and Alexander, 1991) and are only poorly taken up by plants and animals (Kaplan et al., 1996; Reeves et al., 2001). Therefore, the potential for exposure of site workers who are recreational hunters (i.e., RME receptors) to soil COPCs through harvesting of wild game or plants is deemed to be potentially complete, but insignificant. However, these RME receptors would most likely have higher exposure to soil COPCs than those site workers who are not hunters and work primarily indoors. Potentially complete exposure pathways between these RME receptors and soil COPCs include incidental ingestion of soil, dermal contact with soil, and inhalation of soil particulates (Figures 4-1, 4-3 and 4-5).

5.1.1.3 Surface Water and Sediment Exposure Pathways

Contaminants in the Lower Camp gravel pad North of the Southeastern surface water divide can potentially migrate to SS08 via surface runoff. Surface water at SS03 can potentially migrate away from the Southeastern divide. Surface water at SS11 migrates away from the drainage that originates from the Southern side. No COPCs were identified for surface water at SS11. Titanium was identified as the only COPC for surface water at SS03. Titanium was selected as a COPC because screening criteria were not available. Three VOCs (1-chlorohexane, 2-chloroethyl vinyl ether, and vinyl chloride) were identified as COPCs for a seep at SS08. However, these COPCs were only detected in one sample each at low concentrations (equal to their method detection limits). In addition, potable water for drinking and bathing at Tatalina LRRS is obtained from wells located at the infiltration gallery. Consequently, potential direct exposure pathways (i.e., oral, dermal, or inhalation routes of exposure) between surface water COPCs and site workers, site workers/recreational hunters, trench workers or site visitors are incomplete. Furthermore, the surface water at SS03, SS08, and SS11 is present only intermittently so any potential incidental contact with this water would be potentially minimal. Potential exposure to surface water at SS03, SS08, and SS11 is deemed complete, but insignificant.

Arsenic and chromium were identified as COPCs for sediment at SS11. Aluminum, arsenic, chromium, cobalt, manganese, titanium and vanadium were identified as COPCs for sediment at SS03. Aluminum, arsenic, chromium, cobalt, lead, manganese, vanadium, benzo(a)pyrene, DDT, and Arochlor 1260 were identified as COPCs for sediment at SS08. Both DDT and Arochlor 1260 were detected in SS08 sediment samples at maximum concentrations (2.5 mg/Kg for DDT and 0.19 mg/Kg for Arochlor 1260) only slightly greater than one-tenth the ADEC Table B Soil Cleanup Levels (2.1 mg/Kg for DDT and 0.1 mg/Kg for Arochlor 1260). However, Arochlor 1260 and DDT were carried through the HHRA and considered for cumulative risk purposes as appropriate. Human contact with sediment within these areas is anticipated to be minimal. However, there is a potential (albeit low) for site workers, site workers/recreational hunters, trench worker

or site visitors to be exposed to these areas during activities outdoor. Potential exposures of site workers, site workers/recreational hunters, trench worker and site visitors to COPCs in on-site sediment include direct exposure pathways (i.e., incidental ingestion and dermal contact; see Figures 4-1, 4-3 and 4-5).

5.1.1.4 Sludge

Sludge samples collected in septic tanks at SS08 had elevated DRO concentrations, indicating that fuel-contaminated runoff, fuel, or fuel-contaminated fill material might have been released into the septic tanks. Although DRO was not identified as a COPC for sludge collected from the septic tank at SS08, aluminum, chromium, copper, and vanadium were identified as COPCs for sludge samples. The septic tank at SS08 is buried and, as a result, direct contact with sludge in the septic tank is an incomplete exposure pathway. Furthermore, none of the COPCs for sludge are volatile so inhalation of constituents volatilizing from sludge into ambient air is also an incomplete exposure pathway. Therefore, sludge will not be evaluated further.

5.1.1.5 Subsurface Water Exposure Pathways

Past spills or releases of fuels, solvents, and other soluble contaminants to soil, followed by percolation and leaching, can transport contaminants to subsurface water. Subsurface water was not observed during investigations at SS11. COPCs identified for subsurface water beneath SS03 include benzene, 1,2,4-trimethylbenzene, 1,2-dichloroethane, chloroethane, ethylbenzene, 3,3'-dichlorobenzidine, isopropylbenzene, 2-nitrophenol, 4-chloroaniline, bis(2-chloroethyl)ether, hexachlorobutadiene, naphthalene, DRO, GRO, and RRO (Table 4-9). COPCs for subsurface water beneath SS08 include various inorganics, VOCs, 2-methylnaphthalene, naphthalene, and DRO (Table 4-9).

Subsurface water beneath SS03 and SS08 is not currently used as a potable supply, and it is unlikely that it would be used for such purposes in the future. Potable water is supplied to Lower Camp from potable supply wells located at the infiltration gallery. Consistent with State of Alaska regulations (18 AAC 75.345), however, all subsurface water within the State should be evaluated as a potential drinking water supply unless a 350 Determination precludes potable uses. Therefore, subsurface water beneath SS03 and SS08 was evaluated as a potential potable supply for future human receptors (Figures 4-1 and 4-3). Potentially complete exposure pathways between COPCs in subsurface water and future receptors include consumption of water as a drinking supply, dermal contact while bathing, and inhalation of VOCs from subsurface water while bathing (Figures 4-1 and 4-3).

Volatilization of subsurface water COPCs, such as 1,1,1,2-tetrachloroethane, 1,2-dibromoethane, 2-chloroethyl vinyl ether, benzene, chloroethane, toluene, and low molecular weight petroleum hydrocarbons from GRO and DRO, to aboveground ambient air is possible. However, potential exposure of site workers, site workers/recreational hunters, trench workers, or site visitors to COPCs in subsurface water through this pathway is considered insignificant, as described in Section 5.1.1. In addition, vapor

intrusion of volatile subsurface water COPCs to indoor air is an incomplete pathway because residences or other buildings are not currently present at SS03, SS08, or SS11, nor will they be constructed there in the future.

5.1.2 Exposure Quantification

Potential exposures and risks associated with the complete exposure pathways identified in Section 5.1 were quantified in the HHRA for SS03, SS08, and SS11. Methods used in the derivation of media exposure point concentrations (EPCs), and procedures for quantifying exposure doses for current and future human receptors, are described in the following subsections.

5.1.2.1 Deriving Exposure Point Concentrations

An EPC describes the level of a chemical in soil, sediment, water, or food to which a receptor is exposed (USEPA, 1989a, ADEC, 2005a). As such, the EPC serves as the basis for quantifying pathway-specific exposure doses. Calculation of EPCs in site media will be based on both measured concentrations and non-detect results.

Sampling results for SS03, SS08, and SS11 are based on phased site investigation activities conducted between 1997 and 2007. For some media, such as surface water and sediment, a limited number of biased samples were collected. For other media, including surface soil, subsurface soil, and groundwater at SS03, SS08, and SS11, substantially higher numbers of samples were collected. When the number of samples are insufficient to calculate a 95 percent upper confidence limit (95% UCL) on the mean concentration, or data are deemed to be of inadequate quality (e.g., due to elevated sample quantitation limits), maximum concentrations of site COPCs were used to quantify exposure doses and risk estimates.

For COPCs with sufficient quantity and quality of data, EPCs were estimated as either the 95% UCL on the arithmetic mean concentration, or the maximum detected contaminant concentration. If the calculated 95% UCL was greater than the maximum value, then the maximum value was used as the EPC.

The 95% UCL was calculated using the EPA's ProUCL software version 4.00.02 (USEPA, 2008b). Recommendations for appropriate distributions and 95% UCLs provided by the program were utilized. If a data set contains non-detect results, the non-detect results will be handled as recommended by the program. EPCs and summary statistics for each site, medium, and COPC are summarized in Appendix D to this HHRA Report.

5.1.3 Calculating Exposure Doses

This section describes HHRA methods for quantifying exposure doses for human receptors. As described in Section 5.1, complete and potentially significant exposure pathways between human receptors and site-related COPCs are limited to direct contact

pathways (i.e., incidental ingestion, and dermal contact) and inhalation of VOCs or particulates for soil, sediment, and subsurface water. Potential exposures and risks related to other pathways and media were qualitatively evaluated in the HHRA. The dose equations to be used in the quantification of direct exposure pathways are consistent with ADEC and EPA guidance for conducting exposure assessments (ADEC, 2005a; USEPA, 1989a). Exposure dose equations and sample hazard calculations are provided in Appendix E.

5.1.3.1 Soil and Sediment

Equations for quantifying potential exposures to human receptors through incidental ingestion, dermal contact, and inhalation of COPCs in soil and sediment are presented below.

Incidental Ingestion:

$$\text{Ingestion Intake for Soil/Sediment (mg/Kg-day)} = \frac{\text{CS} \times \text{IR} \times \text{CF} \times \text{EF} \times \text{ED}}{\text{BW} \times \text{AT}}$$

Where:

- CS = Concentration in soil (mg/Kg)
- IR = Ingestion rate (milligrams [mg] soil/day)
- CF = Conversion factor (10^{-6} kilogram [kg]/mg)
- EF = Exposure frequency (days/year)
- ED = Exposure duration (years)
- BW = Body weight (kg)
- AT = Averaging time (period over which exposure is averaged – days)

Dermal Contact:

$$\text{Dermal Intake for Soil/Sediment (mg/Kg-day)} = \frac{\text{CS} \times \text{CF} \times \text{SA} \times \text{AF} \times \text{ABS} \times \text{EF} \times \text{ED}}{\text{BW} \times \text{AT}}$$

Where:

- CS = Concentration in soil (mg/Kg)
- CF = Conversion factor (10^{-6} kg/mg)
- SA = Skin surface area exposed (square centimeter [cm^2])
- AF = Adherence factor of soil ($\text{mg}/\text{cm}^2\text{-day}$)
- ABS = Skin absorption factor (unitless)
- EF = Exposure frequency (days/year)
- ED = Exposure duration (years)
- BW = Body weight (kg)
- AT = Averaging time (period over which exposure is averaged – days)

Inhalation:

$$\text{Inhalation Intake for Soil/Sediment (mg/Kg-day)} = \frac{\text{CS} \times (1/\text{PEF or VF}) \times \text{InhR} \times \text{EF} \times \text{ED}}{\text{BW} \times \text{AT}}$$

Where:

- CS = Concentration in soil (mg/Kg)
- PEF = Particulate emission factor (cubic meters [m³]/kg)
- VF = Volatilization Factor (m³/kg)
- InhR = Inhalation rate (m³/day)
- EF = Exposure frequency (days/year)
- ED = Exposure duration (years)
- BW = Body weight (kg)
- AT = Averaging time (period over which exposure is averaged – days)

5.1.3.2 Subsurface Water

Equations for quantifying potential sources to human receptors through potable uses of subsurface water are presented below.

Incidental Ingestion:

$$\text{Ingestion Intake for Water (mg/Kg-day)} = \frac{\text{CW} \times \text{IR} \times \text{EF} \times \text{ED}}{\text{BW} \times \text{AT}}$$

Where:

- CW = Concentration in groundwater (mg/L)
- IR = Ingestion rate (liters groundwater/day)
- EF = Exposure frequency (days/year)
- ED = Exposure duration (years)
- BW = Body weight (kg)
- AT = Averaging time (period over which exposure is averaged – days).

Dermal Contact:

$$\text{Dermal Intake for Water (mg/Kg-day)} = \frac{\text{DAevent} \times \text{EV} \times \text{SA} \times \text{EF} \times \text{ED}}{\text{BW} \times \text{AT}}$$

Where:

- DAevent = Absorbed dose per event (mg/cm²-event)
- EV = Event frequency (1 event/day)
- SA = Skin surface area exposed (cm²)
- EF = Exposure frequency (days/year)
- ED = Exposure duration (years)
- BW = Body weight (kg)

AT = Averaging time (period over which exposure is averaged – days)

$$DA_{\text{event}} \text{ for Inorganic Compounds} = K_p \times C_w \times t_{\text{event}}$$

Where:

K_p = Dermal permeability coefficient of compound in water (cm/hr)
 C_w = Chemical concentration in water (mg/cm³)
 T_{event} = Event duration (hr/event)

$$DA_{\text{event}} \text{ for Organic Compounds} = 2 \text{ FA} \times K_p \times C_w \times \sqrt{\frac{t_{\text{event}}}{\pi}}$$

Where:

FA = Fraction absorbed water (dimensionless)
 C_w = Chemical concentration in water (mg/cm³)
 τ_{event} = Lag time per event (hr/event)
 t_{event} = Event duration (hr/event)

Inhalation:

$$\text{Inhalation Intake for VOCs in Water (mg/Kg-day)} = \frac{C_w \times C_F \times V_F \times 1/24 \times \text{InhR} \times E_T \times E_F \times E_D}{BW \times AT}$$

Where:

C_w = Concentration in groundwater (mg/L)
 C_F = Conversion factor (1000L/m³)
 V_F = Volatility factor (unitless)
 InhR = Inhalation rate (m³/day)
 E_T = Exposure time (hours/day)
 E_F = Exposure frequency (days/year)
 E_D = Exposure duration (years)
 BW = Body weight (kg)
 AT = Averaging time (period over which exposure is averaged - days)

Specific assumptions to be used in quantifying exposures for human receptors are provided in Table 5-1 and Appendix F of this HHERA **Report**. Where available and applicable, default ADEC or EPA exposure parameters are presented and **were** used in the HHRA.

5.1.4 Toxicity Assessment

This section describes the toxicity assessment methodology used in the evaluation of human health risks for SS03, SS08, and SS11. Human health toxicity assessment methods were developed in accordance with ADEC (2005a) and EPA (USEPA, 1989a) guidance.

Toxicity assessment involves a critical review and interpretation of toxicology data from epidemiological, clinical, animal, and in vitro studies. A review of toxicology data ideally determines both the nature of health effects associated with a particular chemical and the probability that a given dose of a chemical could result in an adverse health effect. In accordance with the EPA's 2003 Directive (USEPA, 2003a) and ADEC's Risk Assessment Procedure Manual (RAPM) (ADEC, 2005a), the following hierarchy of sources of toxicity values will be used in the baseline HHRA for SS03, SS08, and SS11:

1. EPA's Integrated Risk Information System (IRIS) Database (USEPA, 2009).
2. EPA's Provisional Peer Reviewed Toxicity Values (PPRTVs) (USEPA, 2008c)
3. Health Effects Assessment Summary Tables (HEAST) (USEPA, 1997a).
4. Agency for Toxic Substances and Disease Registry (ATSDR) minimal risk levels (ATSDR, 2007).
5. California EPA toxicity values (OEHHA, 2008); and
6. Other professionally peer reviewed documents as needed and as approved by ADEC on a case-by-case basis.

Toxicology information important for quantitative risk assessment of long-term health effects is generally divided into the following two categories:

- Potential for carcinogenic health effects.
- Potential for chronic noncarcinogenic, adverse health effects.

Table 5-2 presents the list of toxicity values used in the HHRA for SS03, SS08, and SS11.

5.1.4.1 Carcinogenic Effects of COPCs

The cancer slope factor (CSF) is the toxicity value used to quantitatively express the carcinogenic potential of cancer-causing constituents. The slope factor is expressed in units of mg/Kg-day^{-1} and represents the cancer risk per unit daily intake of a carcinogenic chemical (refer to Table 5-2). The CSF represents the upper 95 percent confidence interval of the slope of the dose response curve. The 95% UCL value assures a safety factor to protect the most sensitive receptors.

In cases where available carcinogenic toxicity values are presented as inhalation unit risks (expressed as the inverse of micrograms $[\mu\text{g}]/\text{m}^3$), the following conversion method was used:

$$\text{Inhalation Slope Factor (mg/Kg-day)}^{-1} = \frac{\text{Air Unit Risk } (\mu\text{g/m}^3)^{-1} \times 70 \text{ kg} \times 10^3 \mu\text{g/mg}}{20 \text{ m}^3/\text{day}}$$

The following default assumptions (USEPA, 1991) were incorporated as parameters for this equation:

- Body weight of 70 kg
- Inhalation rate of 20 m³/day

When an absorption fraction of less than 1.0 is applied in deriving the unit risk, an additional conversion factor is necessary so that the slope factor is based on an administered dose. The standardized duration assumption for slope factors is continuous lifetime exposure.

5.1.4.2 Noncarcinogenic Effects of COPCs

The reference dose (RfD) is the toxicity value used to quantitatively express the potential for a chemical to produce chronic, noncarcinogenic effects. The RfD is expressed in units of mg/Kg-day and represents a daily intake of contaminant per kilogram of body weight that is not sufficient to cause the threshold effect of concern for the contaminant (refer to Table 5-2). Exposure doses that are above the RfD, the threshold dose for noncarcinogens, could potentially cause adverse health effects. Confidence in the RfD is subjective, based on EPA review groups and the quality of the supporting database. Chemical-specific RfDs do not account for the potential effects of chemical mixtures.

RfDs are generally based on no observable adverse effect levels (NOAELs) derived from animal studies. When NOAEL values are unavailable, a lowest observable adverse effect level is generally used. An uncertainty factor (UF) is typically incorporated into the RfD to reduce the numerical value, resulting in a more conservative toxicity value.

In addition to UFs, modifying factors are often used in calculating RfDs. A modifying factor ranging from 0 to 10 can be included to reflect a qualitative, professional assessment of additional uncertainties in critical studies and available databases.

The equation for calculating an RfD is:

$$\text{RfD} = \frac{\text{NOAEL or LOAEL}}{\text{UF}_1 \times \text{UF}_2 \dots \times \text{MF}}$$

Where:

- RfD = Reference dose (mg/Kg-day)
- NOAEL = No observed adverse effect level (mg/Kg-day)
- LOAEL = Lowest observed adverse effect level (mg/Kg-day)
- UF_n = Uncertainty factor
- MF = Modifying factor

5.1.4.3 Chemical-Specific Assumptions

Modeled exposure doses were compared to toxicity values obtained from the general toxicity information sources described above. Toxicity values used in the quantitative evaluation of human health risks for Sites SS03, SS08, and SS11 are tabulated in Table 5-2. Where toxicity values were unavailable for a specific chemical, surrogate toxicity values were obtained from chemicals with similar chemical structures and/or mechanisms of toxicity, where appropriate. For example: toxicity values for benzo(g,h,i)perylene were not available, and so toxicity values for pyrene were used as surrogate values because pyrene is structurally related to this constituent.

Although the EPA has developed toxicity criteria for the oral and inhalation routes of exposure, toxicity criteria for the dermal route of exposure has not been developed. The EPA has proposed a method for extrapolating oral toxicity criteria to the dermal route in *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment)* (USEPA 2004a). This EPA guidance states that the adjustment of the oral toxicity factor for dermal exposures is necessary only when the oral-gastrointestinal absorption efficiency of the constituent of interest is less than 50 percent (due to the variability inherent in absorption studies).

Adjustment of oral toxicity criteria to derive dermal RfDs and CSFs was conducted as follows:

$$\begin{aligned}\text{Dermal RfD} &= \text{Oral RfD} \times \text{ABS}_{\text{GI}} \\ \text{Dermal CSF} &= \text{Oral SF} / \text{ABS}_{\text{GI}}\end{aligned}$$

Where:

ABS_{GI} = the oral absorption efficiency

For constituents lacking an oral-gastrointestinal absorption efficiency value, the oral absorption efficiency was assumed to be 100 percent and the oral RfD or CSF was used to estimate toxicity via the dermal route.

For many chemicals, inhalation toxicity values are not available. Consequently, oral to inhalation route-to-route extrapolations were performed where the toxicological information supports such extrapolation.

For several of the COPCs summarized in Table 4-9, additional interpretation of the toxicological literature is required. Soil COPCs for which chemical-specific assumptions were employed include lead and petroleum hydrocarbons (DRO, GRO, and RRO), as discussed below.

Lead. The quantification of lead exposure differs from other COPCs. Cause-and-effect relationships in humans have been correlated with blood concentrations of lead. Therefore, the preferred risk assessment approach for lead is the estimation of human blood lead concentrations associated with an exposure situation. The Adult Lead Model (USEPA,

2003b) was used to predict blood lead levels for receptors at the site, as recommended by ADEC (2005a).

Petroleum Hydrocarbons. Methods available for assessing risks from petroleum constituents include the following:

- Evaluating specific toxic indicator compounds of petroleum mixtures, such as PAHs and BTEX.
- Interpreting toxicity information developed for neat petroleum products, such as gasoline, jet fuel, or diesel.
- Interpreting toxicity values developed for petroleum components that are chemically and toxicologically representative of other components.
- Interpreting toxicity values developed for surrogate mixtures toxicologically similar to petroleum hydrocarbon mixtures to which human or ecological receptors are potentially exposed.

Although no universally accepted method is currently available for evaluating human risks associated with exposures to petroleum mixtures, toxicity values have been developed for neat petroleum products and for surrogate petroleum fractions. ADEC has developed RfDs and reference concentrations for petroleum hydrocarbon ranges. The values published in *Guidance for Cleanup of Petroleum Contaminated Sites* (ADEC, 2000) were used in evaluating potential health hazards associated with human exposures to DRO, GRO, and RRO (refer to Table 5-2).

Potential dermal exposures to DRO, GRO, and RRO **were not** quantitatively evaluated in the baseline HHRA due to uncertainties in extrapolating oral RfDs to the dermal route of administration.

Petroleum indicator compounds, including BTEX and PAHs, were analyzed for during the RI (USAF, 1998b). Assessing risks of these indicator compounds and risks of petroleum mixtures as described above could result in quantifying exposures for certain petroleum constituents twice. To avoid this potential overestimation, risks associated with indicator compounds **were** included in cumulative risk and hazard estimates for each site, while health hazards associated with petroleum mixtures **were** evaluated and reported separately.

5.1.5 Risk Characterization

The Tier II baseline human health risk characterization for SS03, SS08, and SS11 integrate the results of exposure and toxicity assessments described in Sections 5.1, 5.2, and 5.3 to derive a quantitative and qualitative evaluation of potential risks to current and potential future human receptors. Methods used in the characterization of Tier II baseline human health risks are described below.

Calculated exposure doses for each COPC identified for site media were used to estimate chemical-specific and cumulative cancer risks; and non-cancer hazard quotients (HQ) and hazard indices (HI).

Risk of developing cancer from exposure to a carcinogenic chemical is estimated by multiplying the CSF by the exposure dose (USEPA, 1989a):

$$ILCR (\text{unitless}) = \text{CSF} \times \text{Dose}$$

Where:

ILCR = Incremental lifetime cancer risk (unitless)
CSF = Cancer slope factor (mg/Kg-day)⁻¹
Dose = Exposure dose (mg/Kg-day)

Cancer risks from multiple COPCs identified for a site medium are assumed to be additive and were summed to estimate a cumulative incremental lifetime cancer risk for all carcinogenic site contaminants in that medium. Additionally, cancer risks calculated for various site media were summed, as appropriate, to estimate cumulative incremental lifetime cancer risks for each receptor.

The HQ describes the potential for site COPCs to produce noncarcinogenic effects. HQ is defined as the ratio of the exposure dose to the RfD (USEPA, 1989a):

$$HQ (\text{unitless}) = \frac{\text{Dose}}{\text{RfD}}$$

Where:

Dose = Exposure dose (mg/Kg-day)
RfD = Reference dose (mg/Kg-day)

An HQ greater than 1.0 indicates that the estimated exposure dose for that COPC may not be protective of noncarcinogenic health effects. An HQ of less than 1.0 suggests that noncarcinogenic health effects should not occur. Individual HQs for site COPCs were summed to produce a cumulative hazard estimate, termed the hazard index (HI). This procedure is consistent with risk assessment guidance (USEPA, 1989a; ADEC, 2002).

ADEC currently considers a cumulative cancer risk of 1×10^{-5} and noncancer HI of 1 as the point of departure for making risk management decisions concerning a site. Sites with associated cumulative cancer risk and noncancer HI estimates that exceed these criteria are proposed for evaluation of remedial alternatives. For informational purposes, it should be noted that according to ADEC (18 AAC 75.325(h)) and the EPA (USEPA, 1991), sites with a cumulative cancer risk estimate between 1×10^{-6} and 1×10^{-4} , and a noncancer HI of less than 1, may be appropriate for cleanup complete with institutional controls. The equivalent Air Force site classification is no further remedial action planned (NFRAP). Cleanup

complete with institutional controls (or NFRAP) will be considered following an evaluation of site-specific issues related to future land uses, the technical feasibility of remediation, and related considerations.

5.2 RESULTS

Results of the HHRA for SS03, SS08 and SS11 are presented and discussed in the following subsections.

5.2.1 SS03

Risk characterization results expressed as cumulative ILCR and noncarcinogenic HI estimates for human receptors at SS03 are presented below. Cumulative ILCR and noncarcinogenic HI estimates for SS03 are summarized in Table 5-3. Detailed ILCR and noncarcinogenic HI calculations are presented in Appendix F.

Current and Future Site Worker

Cumulative carcinogenic risk and noncarcinogenic HI estimates for a current site worker across all exposure media were 2×10^{-5} and 6, respectively, for non-petroleum hydrocarbon (PHC) COPCs. Primary contributors to a carcinogenic risk estimate in excess of ADEC's acceptable risk criterion of 1×10^{-5} were arsenic (EPC = 16 mg/kg) and naphthalene (EPC = 51 mg/kg) in surface soil. Primary contributors to a noncarcinogenic HI in excess of ADEC's acceptable HI criterion of 1 were 1,2,4-trimethylbenzene (EPC = 431 mg/kg) and 1,3,5-trimethylbenzene (EPC = 81 mg/kg) in surface soil. The cumulative noncarcinogenic HI estimate for a current site worker exposed to PHC-related COPCs was 0.2. This noncarcinogenic HI is below ADEC's acceptable HI criterion of 1.

Cumulative carcinogenic risk and noncarcinogenic HI estimates for a future site worker across all exposure media were 2×10^{-4} and 8, respectively, for non-PHC COPCs. Primary contributors to a carcinogenic risk estimate in excess of ADEC's acceptable risk criterion of 1×10^{-5} were arsenic and naphthalene in surface soil; and benzene (EPC = 0.12 mg/L), ethylbenzene (EPC = 0.14 mg/L) and 3,3-dichlorobenzidine (EPC = 0.005 mg/L) in subsurface water. Primary contributors to a noncarcinogenic HI in excess of ADEC's acceptable HI criterion of 1 were 1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene in surface soil; and 1,2,4-trimethylbenzene and benzene in subsurface water. The cumulative noncarcinogenic HI estimate for a future site worker exposed to PHC-related COPCs was 3. Primary contributors to a noncarcinogenic HI in excess of ADEC's acceptable HI criterion of 1 were DRO (EPC = 3.5 mg/L) and RRO (EPC = 3.4) in subsurface water.

Current and Future Site Worker/Recreational Hunter

Cumulative carcinogenic risk and noncarcinogenic HI estimates for a current site worker / recreational hunter across all exposure media were 3×10^{-5} and 6, respectively, for non-PHC COPCs. Primary contributors to a carcinogenic risk estimate in excess of ADEC's acceptable risk criterion of 1×10^{-5} were arsenic (EPC = 16 mg/kg) and naphthalene (EPC = 51 mg/kg)

in surface soil; and arsenic (EPC = 21 mg/kg) in sediment. Primary contributors to a noncarcinogenic HI in excess of ADEC's acceptable HI criterion of 1 were 1,2,4-trimethylbenzene (EPC = 431 mg/kg) and 1,3,5-trimethylbenzene (EPC = 81 mg/kg) in surface soil. The cumulative noncarcinogenic HI estimate for a current site worker / recreational hunter exposed to PHC-related COPCs was 0.4. This noncarcinogenic HI is below ADEC's acceptable HI criterion of 1.

Cumulative carcinogenic risk and noncarcinogenic HI estimates for a future site worker / recreational hunter across all exposure media were 2×10^{-4} and 9, respectively, for non-PHC COPCs. Primary contributors to a carcinogenic risk estimate in excess of ADEC's acceptable risk criterion of 1×10^{-5} were arsenic and naphthalene in surface soil; arsenic in sediment; and benzene (EPC = 0.12 mg/L), ethylbenzene (EPC = 0.14 mg/L) and 3,3-dichlorobenzidene (EPC = 0.005 mg/L) in subsurface water. Primary contributors to a noncarcinogenic HI in excess of ADEC's acceptable HI criterion of 1 were 1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene in surface soil; and 1,2,4-trimethylbenzene and benzene in subsurface water. The cumulative noncarcinogenic HI estimate for a future site worker / recreational hunter exposed to PHC-related COPCs was 3. Primary contributors to a noncarcinogenic HI in excess of ADEC's acceptable HI criterion of 1 were DRO (EPC = 3.5 mg/L) and RRO (EPC = 3.4) in subsurface water.

Current and Future Trench Worker

Cumulative carcinogenic risk and noncarcinogenic HI estimates for a current trench worker across all exposure media were 1×10^{-6} and 6, respectively, for non-PHC COPCs. The cumulative carcinogenic risk estimate is below ADEC's acceptable risk criterion of 1×10^{-5} . Primary contributors to a noncarcinogenic HI in excess of ADEC's acceptable HI criterion of 1 were 1,2,4-trimethylbenzene (EPC = 431 mg/kg) and 1,3,5-trimethylbenzene (EPC = 81 mg/kg) in surface soil. The cumulative noncarcinogenic HI estimate for a current trench worker exposed to PHC-related COPCs was 0.4. This noncarcinogenic HI is below ADEC's acceptable HI criterion of 1.

Cumulative carcinogenic risk and noncarcinogenic HI estimates for a future trench worker across all exposure media were 8×10^{-6} and 9, respectively, for non-PHC COPCs. The cumulative carcinogenic risk estimate is below ADEC's acceptable risk criterion of 1×10^{-5} . Primary contributors to a noncarcinogenic HI in excess of ADEC's acceptable HI criterion of 1 were 1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene in surface soil; and 1,2,4-trimethylbenzene and benzene in subsurface water. The cumulative noncarcinogenic HI estimate for a future trench worker exposed to PHC-related COPCs was 3. Primary contributors to a noncarcinogenic HI in excess of ADEC's acceptable HI criterion of 1 were DRO (EPC = 3.5 mg/L) and RRO (EPC = 3.4) in subsurface water.

Current and Future Site Visitor

Cumulative carcinogenic risk and noncarcinogenic HI estimates for a current site visitor across all exposure media were 1×10^{-6} and 0.3, respectively, for non-PHC COPCs. The cumulative carcinogenic risk and noncarcinogenic HI estimates are below ADEC's acceptable

carcinogenic risk and noncarcinogenic HI criteria of 1×10^{-5} and 1, respectively. The cumulative noncarcinogenic HI estimate for a current site visitor exposed to PHC-related COPCs was 0.01. This noncarcinogenic HI is below ADEC's acceptable HI criterion of 1.

Cumulative carcinogenic risk and noncarcinogenic HI estimates for a future site visitor across all exposure media were 8×10^{-6} and 0.4, respectively, for non-PHC COPCs. The cumulative carcinogenic risk and noncarcinogenic HI estimates are below ADEC's acceptable carcinogenic risk and noncarcinogenic HI criteria of 1×10^{-5} and 1, respectively. The cumulative noncarcinogenic HI estimate for a future site visitor exposed to PHC-related COPCs was 0.09. This noncarcinogenic HI is below ADEC's acceptable HI criterion of 1.

Subsurface water beneath SS03 is not currently used for potable purposes. Furthermore, it is unlikely that subsurface water beneath SS03 would be used as a potable supply in the future, given that all potable water is supplied to the Lower Camp from potable supply wells located at the infiltration gallery. Therefore, the above cumulative risk estimates for future receptors are most likely overestimated.

Lead was identified as a COPC for surface soil (EPC = 180 mg/kg) at SS03. Geometric mean adult blood-lead concentrations, and 95% blood-lead concentrations for the fetus of an adult, were below the target level of 10 µg/dl for all receptors (Table 5-6).

5.2.2 SS08

Risk characterization results expressed as cumulative ILCR and noncarcinogenic HI estimates for human receptors at SS08 are presented below. Cumulative ILCR and noncarcinogenic HI estimates for SS03 are summarized in Table 5-4. Detailed ILCR and noncarcinogenic HI calculations are presented in Appendix F.

Current and Future Site Worker

Cumulative carcinogenic risk and noncarcinogenic HI estimates for a current site worker across all exposure media were 4×10^{-5} and 0.9, respectively, for non-PHC COPCs. Primary contributors to a carcinogenic risk estimate in excess of ADEC's acceptable risk criterion of 1×10^{-5} were arsenic (EPC = 19 mg/kg) and Arochlor 1260 (EPC = 12 mg/kg) in surface soil; arsenic (EPC = 16 mg/kg) in subsurface soil; and arsenic (EPC = 21 mg/kg) in sediment. The noncarcinogenic HI is below ADEC's acceptable HI criterion of 1. The cumulative noncarcinogenic HI estimate for a current site worker exposed to PHC-related COPCs was 0.2, which is below ADEC's acceptable HI criterion of 1.

Cumulative carcinogenic risk and noncarcinogenic HI estimates for a future site worker across all exposure media were 1×10^{-3} and 61, respectively, for non-PHC COPCs. Primary contributors to a carcinogenic risk estimate in excess of ADEC's acceptable risk criterion of 1×10^{-5} were arsenic and Arochlor 1260 in surface soil; arsenic in subsurface soil; arsenic in sediment; and arsenic (EPC = 0.082 mg/L) and 1,2-dibromomethane (EPC = 0.001 mg/L) in subsurface water. Primary contributors to a noncarcinogenic HI in excess of ADEC's acceptable HI criterion of 1 were various metals (i.e., aluminum, arsenic, cobalt, manganese

and vanadium) and 2-methylnaphthalene in subsurface water. The cumulative noncarcinogenic HI estimate for a future site worker exposed to PHC-related COPCs was 18. The noncarcinogenic HI in excess of ADEC's acceptable HI criterion of 1 was attributable to DRO (EPC = 36 mg/L) in subsurface water.

Current and Future Site Worker/Recreational Hunter

Cumulative carcinogenic risk and noncarcinogenic HI estimates for a current site worker / recreational hunter across all exposure media were 5×10^{-5} and 1, respectively, for non-PHC COPCs. Primary contributors to a carcinogenic risk estimate in excess of ADEC's acceptable risk criterion of 1×10^{-5} included arsenic (EPC = 19 mg/kg) and Arochlor 1260 (EPC = 12 mg/kg) in surface soil; arsenic (EPC = 16 mg/kg) in subsurface soil; and arsenic (EPC = 21 mg/kg) in sediment. The noncarcinogenic HI is equal to ADEC's acceptable HI criterion of 1. The cumulative noncarcinogenic HI estimate for a current site worker / recreational hunter exposed to PHC-related COPCs was 0.3, which is below ADEC's acceptable HI criterion of 1.

Cumulative carcinogenic risk and noncarcinogenic HI estimates for a future site worker / recreational hunter across all exposure media were 1×10^{-3} and 61, respectively, for non-PHC COPCs. Primary contributors to a carcinogenic risk estimate in excess of ADEC's acceptable risk criterion of 1×10^{-5} were arsenic and Arochlor 1260 in surface soil; arsenic in subsurface soil; arsenic in sediment; and arsenic (EPC = 0.082 mg/L) and 1,2-dibromomethane (EPC = 0.001 mg/L) in subsurface water. Primary contributors to a noncarcinogenic HI in excess of ADEC's acceptable HI criterion of 1 were various metals (i.e., aluminum, arsenic, cobalt, manganese and vanadium) and 2-methylnaphthalene in subsurface water. The cumulative noncarcinogenic HI estimate for a future site worker / recreational hunter exposed to PHC-related COPCs was 18. The noncarcinogenic HI in excess of ADEC's acceptable HI criterion of 1 was attributable to DRO (EPC = 36 mg/L) in subsurface water.

Current and Future Trench Worker

Cumulative carcinogenic risk and noncarcinogenic HI estimates for a current trench worker across all exposure media were 2×10^{-6} and 1, respectively, for non-PHC COPCs. The cumulative carcinogenic risk estimate is below ADEC's acceptable risk criterion of 1×10^{-5} , and the cumulative noncarcinogenic HI estimate is equal to ADEC's acceptable HI criterion of 1. The cumulative noncarcinogenic HI estimate for a current trench worker exposed to PHC-related COPCs was 0.3. This noncarcinogenic HI is below ADEC's acceptable HI criterion of 1.

Cumulative carcinogenic risk and noncarcinogenic HI estimates for a future trench worker across all exposure media were 5×10^{-5} and 61, respectively, for non-PHC COPCs. The primary contributor to a cumulative carcinogenic risk estimate in excess of ADEC's acceptable risk criterion of 1×10^{-5} was arsenic (EPC = 0.082 mg/L) in subsurface water. Primary contributors to a noncarcinogenic HI in excess of ADEC's acceptable HI criterion of 1 were various metals (i.e., aluminum, arsenic, cobalt, manganese and vanadium) and 2-methylnaphthalene in subsurface water. The cumulative noncarcinogenic HI estimate for a

future trench worker exposed to PHC-related COPCs was 18. The noncarcinogenic HI in excess of ADEC's acceptable HI criterion of 1 was attributable to DRO (EPC = 36 mg/L) in subsurface water.

Current and Future Site Visitor

Cumulative carcinogenic risk and noncarcinogenic HI estimates for a current site visitor across all exposure media were 2×10^{-6} and 0.05, respectively, for non-PHC COPCs. The cumulative carcinogenic risk estimate is below ADEC's acceptable risk criterion of 1×10^{-5} , and the cumulative noncarcinogenic HI estimate is below ADEC's acceptable HI criterion of 1. The cumulative noncarcinogenic HI estimate for a current site visitor worker exposed to PHC-related COPCs was 0.009. This noncarcinogenic HI is below ADEC's acceptable HI criterion of 1.

Cumulative carcinogenic risk and noncarcinogenic HI estimates for a future site visitor across all exposure media were 5×10^{-5} and 2, respectively, for non-PHC COPCs. The primary contributor to a cumulative carcinogenic risk estimate in excess of ADEC's acceptable risk criterion of 1×10^{-5} was arsenic (EPC = 0.082 mg/L) in subsurface water. Primary contributors to a noncarcinogenic HI in excess of ADEC's acceptable HI criterion of 1 were various metals (i.e., aluminum, arsenic, cobalt, manganese and vanadium) and 2-methylnaphthalene in subsurface water. The cumulative noncarcinogenic HI estimate for a future site visitor exposed to PHC-related COPCs was 0.7. This noncarcinogenic HI is below ADEC's acceptable HI criterion of 1.

Subsurface water beneath SS08 is not currently used for potable purposes. Furthermore, it is unlikely that subsurface water beneath SS08 would be used as a potable supply in the future, given that all potable water is supplied to the Lower Camp from potable supply wells located at the infiltration gallery. Therefore, the above cumulative risk estimates for future receptors are most likely overestimated.

Lead was identified as a COPC for subsurface soil (EPC = 63 mg/kg) and sediment (EPC = 51 mg/kg) at SS08. Geometric mean adult blood-lead concentrations, and 95% blood-lead concentrations for the fetus of an adult, were below the target level of 10 µg/dl for all receptors (Table 5-6).

5.2.3 SS11

Risk characterization results expressed as cumulative ILCR and noncarcinogenic HI estimates for human receptors at SS11 are presented below. Cumulative ILCR and noncarcinogenic HI estimates for SS11 are summarized in Table 5-5. Detailed ILCR and noncarcinogenic HI calculations are presented in Appendix F.

No COPCs were identified for SS11 subsurface water. Therefore, exposure pathways and risk estimates are the same between current and future human receptors at SS11.

Current/Future Site Worker

Cumulative carcinogenic risk and noncarcinogenic HI estimates for a current / future site worker across all exposure media were 2×10^{-3} and 14, respectively, for non-PHC COPCs. Primary contributors to a carcinogenic risk estimate in excess of ADEC's acceptable risk criterion of 1×10^{-5} were arsenic (EPC = 10 mg/kg) and various PAHs in surface soil; and arsenic (EPC = 59 mg/kg) in subsurface soil. Primary contributors to a noncarcinogenic HI in excess of ADEC's acceptable HI criterion of 1 were 2-methylnaphthalene (EPC = 3,697 mg/kg) and naphthalene (EPC = 3,555 mg/kg) in surface soil. The cumulative noncarcinogenic HI estimate for a current / future site worker exposed to PHC-related COPCs was 1, which is equal to ADEC's acceptable HI criterion of 1.

Current and Future Site Worker/Recreational Hunter

Cumulative carcinogenic risk and noncarcinogenic HI estimates for a current / future site worker / recreational hunter across all exposure media were 3×10^{-3} and 15, respectively, for non-PHC COPCs. Primary contributors to a carcinogenic risk estimate in excess of ADEC's acceptable risk criterion of 1×10^{-5} were arsenic (EPC = 10 mg/kg) and various PAHs in surface soil; and arsenic (EPC = 59 mg/kg) in subsurface soil. Primary contributors to a noncarcinogenic HI in excess of ADEC's acceptable HI criterion of 1 were 2-methylnaphthalene (EPC = 3,697 mg/kg) and naphthalene (EPC = 3,555 mg/kg) in surface soil. The cumulative noncarcinogenic HI estimate for a current / future site worker / recreational hunter exposed to PHC-related COPCs was 2, which exceeds ADEC's acceptable HI criterion of 1. Primary contributors to a noncarcinogenic HI in excess of ADEC's acceptable HI criterion of 1 were DRO (EPC = 80,000 mg/kg) and RRO (EPC = 60,000) in surface soil.

Current and Future Trench Worker

Cumulative carcinogenic risk and noncarcinogenic HI estimates for a current / future trench worker across all exposure media were 1×10^{-4} and 14, respectively, for non-PHC COPCs. Primary contributors to a carcinogenic risk estimate in excess of ADEC's acceptable risk criterion of 1×10^{-5} were various PAHs in surface soil. Primary contributors to a noncarcinogenic HI in excess of ADEC's acceptable HI criterion of 1 were 2-methylnaphthalene (EPC = 3,697 mg/kg) and naphthalene (EPC = 3,555 mg/kg) in surface soil. The cumulative noncarcinogenic HI estimate for a current / future trench worker exposed to PHC-related COPCs was 2, which exceeds ADEC's acceptable HI criterion of 1. Primary contributors to a noncarcinogenic HI in excess of ADEC's acceptable HI criterion of 1 were DRO (EPC = 80,000 mg/kg) and RRO (EPC = 60,000) in surface soil.

Current and Future Site Visitor

Cumulative carcinogenic risk and noncarcinogenic HI estimates for a current / future site visitor across all exposure media were 1×10^{-4} and 0.8, respectively, for non-PHC COPCs. Primary contributors to a carcinogenic risk estimate in excess of ADEC's acceptable risk criterion of 1×10^{-5} were various PAHs in surface soil. The cumulative noncarcinogenic HI is

below ADEC's acceptable HI criterion of 1. The cumulative noncarcinogenic HI for a current/ future site visitor exposed to PHC-related COPCs was 0.06, which is below ADEC's acceptable HI criterion of 1.

Lead was identified as a COPC for surface soil (EPC = 120 mg/kg) at SS11. Geometric mean adult blood-lead concentrations, and 95% blood-lead concentrations for the fetus of an adult, were below the target level of 10 µg/dl for all receptors (Table 5-6).

Table 5-1 Exposure Assumptions for the Human Health Risk Assessment at Sites SS03, SS08, and SS11

Exposure Parameter	Units	Site							
		Site Worker ^a		Trench Worker ^b		Worker/Recreational Hunter ^c		Site Visitor ^d	
		Current	Future	Current	Future	Current	Future	Current	Future
General									
CS = soil/sediment/dust concentration ^e	mg/kg	SS	SS	SS	SS	SS	SS	SS	SS
CW = surface/subsurface water concentration ^e	mg/L	SS	SS	SS	SS	SS	SS	SS	SS
BW = body weight ^f	kg	70	70	70	70	70	70	70	70
ATc = averaging time for carcinogens ^f	years	70	70	70	70	70	70	70	70
ATn = averaging time for non-carcinogens ^f	years	25	25	1	1	25	25	25	25
Ingestion of Soil/Sediment/Dust									
IR = soil ingestion rate ^f	mg/day	50	50	100	100	100	100	50	50
CF = conversion factor ^e	kg/mg	10-6	10-6	10-6	10-6	10-6	10-6	10-6	10-6
EF = exposure frequency for soil-related exposures ^f	days/year	250	250	250	250	270	270	14	14
ED = exposure duration ^f	years	25	25	1	1	25	25	25	25
Inhalation of Particulates from Indoor Dust									
VF = volatilization factor ^g	m ³ /kg	CS	CS	CS	CS	CS	CS	CS	CS
PEF = particulate emission factor ^h	m ³ /kg	1.30E+09	1.30E+09	1.30E+09	1.30E+09	1.30E+09	1.30E+09	1.30E+09	1.30E+09
InhR = Inhalation rate ^f	m ³ /day	20	20	20	20	20	20	20	20
EF = exposure frequency for soil-related exposures ^f	days/year	250	250	250	250	270	270	14	14
ED = exposure duration ^f	years	25	25	1	1	25	25	25	25
Volatilization Factor (m3/kg)									
θ _a = air-filled soil porosity ^g	L _{air} /L _{soil}	0.284	0.284	0.284	0.284	0.284	0.284	0.284	0.284
θ _w = water-filled soil porosity ^g	L _{water} /L _{soil}	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
ρ _b = dry soil bulk density ^g	g/cm ³	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
D _A = apparent diffusivity ^h	cm ² /s	CS	CS	CS	CS	CS	CS	CS	CS
D _i = diffusivity in air ^h	cm ² /s	CS	CS	CS	CS	CS	CS	CS	CS
D _w = diffusivity in water ^h	cm ² /s	CS	CS	CS	CS	CS	CS	CS	CS
H' = dimensionless Henry's law constant ^h	unitless	CS	CS	CS	CS	CS	CS	CS	CS
K _d = soil-water partition coefficient (K _{oc} x f _{oc}) ^h	cm ³ /g	CS	CS	CS	CS	CS	CS	CS	CS
n = total soil porosity ^g	L _{pore} /L _{soil}	0.434 or ρ _b	0.434 or ρ _b	0.434 or ρ _b	0.434 or ρ _b	0.434 or ρ _b	0.434 or ρ _b	0.434 or ρ _b	0.434 or ρ _b
Q/C _{vf} = inverse of the mean conc. at the center of a 0.5 acre ² source ^g	g/m ² -s per kg/m ³	90.80	90.80	90.80	90.80	90.80	90.80	90.80	90.80
T = exposure interval(s) ^g	seconds	9.5 x 10 ⁸	9.5 x 10 ⁸	9.5 x 10 ⁸	9.5 x 10 ⁸	9.5 x 10 ⁸	9.5 x 10 ⁸	9.5 x 10 ⁸	9.5 x 10 ⁸

Table 5-1 Exposure Assumptions for the Human Health Risk Assessment at Sites SS03, SS08, and SS11

Exposure Parameter	Units	Site							
		Site Worker ^a		Trench Worker ^b		Worker/Recreational Hunter ^c		Site Visitor ^d	
		Current	Future	Current	Future	Current	Future	Current	Future
Soil-to-Air Particulate Emission Factor (PEF) (m3/kg)									
Q/C _{pef} = Inverse of the mean conc. at the center of a 0.5 acre ² source ^g	g/m ² -s per kg/m ³	90.80	90.80	90.80	90.80	90.80	90.80	90.80	90.80
V = fraction of vegetative cover ^h	unitless	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
U _m = mean annual windspeed ^h	m/s	4.69	4.69	4.69	4.69	4.69	4.69	4.69	4.69
U _i = equivalent threshold value of windspeed ^h	m/s	11.32	11.32	11.32	11.32	11.32	11.32	11.32	11.32
F(x) = function dependent on Um/Ut ^h	unitless	0.194	0.194	0.194	0.194	0.194	0.194	0.194	0.194
Dermal Contact with Soil/Sediment/Dust									
CF = conversion factor ^e	kg/mg	10 ⁻⁶	10 ⁻⁶	10 ⁻⁶	10 ⁻⁶	10 ⁻⁶	10 ⁻⁶	10 ⁻⁶	10 ⁻⁶
SA = surface area ^f	cm ²	3,300	3,300	3,300	3,300	5,700	5,700	3,300	3,300
AF = soil-to-dermal adherence factor ^f	mg/cm ²	0.2	0.2	0.2	0.2	0.07	0.07	0.2	0.2
ABS = absorption fraction through skin for chemicals in soil ⁱ	unitless	CS	CS	CS	CS	CS	CS	CS	CS
EF = exposure frequency for soil-related exposures ^f	days/year	250	250	250	250	270	270	14	14
ED = exposure duration ^f	years	25	25	1	1	25	25	25	25
Ingestion of Subsurface Water for Potable Uses									
IR = ingestion rate ^f	L/day	na	2	na	2	na	2	na	2
EF = exposure frequency ^f	day/yr	na	350	na	350	na	350	na	14
ED = exposure duration ^f	yr	na	25	na	1	na	25	na	25
Inhalation of Constituents Volatilizing from Subsurface Water While Bathing									
VF = volatilization factor ^g	m ³ /kg	na	CS	na	CS	na	CS	na	CS
InhR = inhalation rate ^f	m ³ /day	na	20	na	20	na	20	na	20
ET = exposure time ^{i,k}	hr/day	na	0.25	na	0.25	na	0.25	na	0.25
EF = exposure frequency ^{i,k}	day/yr	na	350	na	350	na	350	na	14
ED = exposure duration ^f	yr	na	25	na	1	na	25	na	25
Dermal Contact with Subsurface Water									
CF = conversion factor ^e	L/cm ³	na	10 ³	na	10 ³	na	10 ³	na	10 ³
SA = surface area ^{i,k}	cm ² /event	na	18,000	na	18,000	na	18,000	na	18,000
PC - dermal permeability coefficient ^j	cm/hr	na	CS	na	CS	na	CS	na	CS
ET = exposure time ^{i,k}	hr/day	na	0.25	na	0.25	na	0.25	na	0.25
EF = exposure frequency ^{i,k}	day/yr	na	350	na	350	na	350	na	14
ED = exposure duration ^f	yr	na	25	na	1	na	25	na	25

Table 5-1 Exposure Assumptions for the Human Health Risk Assessment at Sites SS03, SS08, and SS11

Exposure Parameter	Units	Site							
		Site Worker ^a		Trench Worker ^b		Worker/Recreational Hunter ^c		Site Visitor ^d	
		Current	Future	Current	Future	Current	Future	Current	Future
Blood Lead from Ingestion of Soil/Sediment/Dust									
PbS = Soil lead concentration	ug/g or ppm	SS	SS	SS	SS	SS	SS	SS	SS
R _{fetal/maternal} = Fetal/metal PbB ratio ¹	--	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
BKSF = Biokinetic Slope Factor ¹	ug/dL per ug/day	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
GSD _i = Geometric standard deviation PbB ¹	--	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
PbB ₀ = Baseline PbB ¹	ug/dL	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
IR _S = Soil ingestion rate (including soil-derived indoor dust) ^f	g/day	0.05	0.05	0.1	0.1	0.1	0.1	0.05	0.05
AF _{S, D} = Absorption fraction (same for soil and dust) ¹	--	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
EF _{S, D} = Exposure frequency (same for soil and dust) ^f	days/yr	250	250	250	250	270	270	14	14
AT _{S, D} = Averaging time (same for soil and dust) ¹	days/yr	365	365	365	365	365	365	365	365
PbB _t = Target PbB level of concern (e.g., 10 ug/dL) ¹	ug/dL	10	10	10	10	10	10	10	10
P(PbB _{fetal} > PbB _t) = Probability that fetal PbB > PbB _t ¹	%	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

Notes:

cm - centimeter(s)	kg - kilogram(s)	SS – site-specific
CS - chemical-specific	L - liter(s)	ug - micrograms
dL - decaliter	m - meter(s)	yr - year
g - gram(s)	mg - milligram(s)	
hr - hour	na – not applicable	

- ^a Values listed are standard ADEC and USEPA default parameters for the Site Worker working primarily indoors for "Under the 40-inch Zone", and assuming no recreational hunting.
- ^b Values presented are based on standard ADEC and USEPA default parameters for the trench worker working only outdoors for "Under the 40-inch Zone", with the exception of the site-specific ED which is based upon the assumption that an excavation project would be a one-time construction or maintenance project.
- ^c Values presented for the site worker/recreational hunter are standard default parameters for "Under the 40-inch Zone" based on the default IR for workers involved primarily in outdoor exposures.
- ^d Values presented are based on standard ADEC and USEPA default parameters for the site visitor for "Under the 40-inch Zone", with the exception of the EF which is based upon the assumption that agency representatives, contractors, or other individuals would visit the site for a total of 2 weeks per year (14 days). Site Visitor receptor does not include children because residents of Takotna and McGrath are not allowed access to SS03, SS08, or SS11
- ^e USEPA. 1989a. Risk Assessment Guidance for Superfund (RAGS). Volume I: Human Health Evaluation Manual (Part A), Interim Final, USEPA/540/1-89/002. December.
- ^f ADEC. 2005a. Draft Risk Assessment Procedures Manual. ADEC, Division of Spill Prevention and Response. Contaminated Sites Program. November.
- ^g ADEC. 2008d. Cleanup Levels Guidance. June 9
- ^h USEPA. 2002. Supplemental Soil Screening Guidance. December.
- ⁱ USEPA. 2004a. Risk Assessment Guidance for Superfund (RAGS) Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). USEPA/540/R/99/005.
- ^j USEPA. 1991. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors.
- ^k Standard default value for an adult showering/bathing from Exhibit 3-2 (USEPA 2004a).
- ^l USEPA. 2003b. Adult Lead Model Spreadsheet, <http://www.epa.gov/superfund/health/contaminants/lead/products.htm#alm>

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Table 5-2 Toxicity Values used in the Human Health Risk Assessment at Sites SS03, SS08, and SS11

Chemical of Potential Concern	CAS Number	Cancer Slope Factor (mg/kg-d) ⁻¹		URF (ug/m ³)		Chronic Reference Dose - RfD (mg/kg-d)		RfC (mg/m3)		ABS _{GI} ^a (%)	Critical Effect				
		Oral	Dermal ^b	Inhalation		Oral	Dermal ^b	Inhalation							
Inorganics															
Aluminum	7429-90-5	na	na	na		1.0E+00	P	1.0E+00	R	4.9E-03	P	100%	Neurological effects		
Antimony	7440-36-0	na	na	na		4.0E-04	I	6.0E-05	R	na		15%	Longevity, blood glucose, and cholesterol		
Arsenic	7440-38-2	1.5E+00	I	1.5E+00	R	4.3E-03	I	3.0E-04	I	3.0E-04	R	3.0E-05	C	95%	Dermal effects: Hyperpigmentation and keratosis
Barium	7440-39-3	na	na	na		2.0E-01	I	1.4E-02	R	4.9E-04	H	7%		Nephropathy	
Beryllium		na	na	2.4E-03	I	2.0E-03	I	1.4E-05	R	2.0E-05	I	0.7%		Lesions	
Cadmium, soil	7440-43-9	na	na	1.8E-03	I	1.0E-03	I	2.5E-05	R	na		2.5%		Hematologic: proteinuria	
Cadmium, water	7440-43-9	na	na	1.8E-03	I	5.0E-04	I	2.5E-05	R	na		5%		Hematologic: proteinuria	
Chromium (III)	16065-83-1	na	na	na		1.5E+00	I	2.0E-02		na		1.3%		na	
Cobalt	7440-48-4	na	na	9.0E-03	P	3.0E-04	P	3.0E-04	R	6.0E-06	P	100%		na	
Copper	7440-50-8	na	na	na		4.0E-02	H	4.0E-02	R	na		100%		na	
Lead	7439-92-1	na	c	na	c	na	c	na	c	na	c	na		na	
Manganese	7439-96-5	na	na	na		2.4E-02	I	9.6E-04	R	5.0E-05	I	4%		Neurological and neuro-behavioral effects	
Mercury	7439-97-6	na	na	na		3.0E-04	I	2.1E-05	R	3.0E-04	I	7%		Neurological and neuro-behavioral effects	
Nickel	7440-02-0	na	na	na		2.0E-02	I	8.0E-04		na		4%		Decreased body and organ weights	
Selenium	7782-49-2	na	na	na		5.0E-03	I	1.5E-03	R	na		30%		Clinical selenosis	
Thallium	7440-28-0	na	na	na		8.0E-05	I	8.0E-05	R	na		100%		Increased levels of SGOT and LDH	
Titanium	7440-32-6	na	na	na		na		na		na		na		na	
Vanadium	7440-62-2	na	na	na		5.0E-03	I	1.3E-04	R	na		2.6%		Decreased hair cystine	
Zinc	7440-66-6	na	na	na		3.0E-01	I	3.0E-01	R	na		na		Decrease in ESOD activity	
Volatile Organic Compounds															
1,2,4-Trimethylbenzene	95-63-6	na	na	na		na		na		7.0E-03	P	100%		na	
1,3,5-Trimethylbenzene	108-67-8	na	na	na		5.0E-02	P	5.0E-02	R	6.0E-03	P	100%		na	
1,2-Dibromoethane	106-93-4	2.0E+00	I	2.0E+00	R	6.0E-04	I	9.0E-03	R	9.0E-03	I	100%		Testicular atrophy, liver peliosis, and adrenal cortical degeneration	
1,2-Dichloroethane	107-06-2	9.1E-02	I	9.1E-02	R	2.6E-05	I	2.0E-02	P	2.0E-02	R	2.4E+00	A	100%	Hemangiosarcomas
1-Chlorohexane	544-10-5	na	na	na		na		na		na				na	
2-Chloroethyl Vinyl Ether	10-75-8	na	na	na		na		na		na				na	
Benzene	71-43-2	5.5E-02	I ^d	5.5E-02	R ^d	7.8E-06	I	4.0E-03	I	4.0E-03	R	3.0E-02	I	100%	Decreased lymphocyte count
Ethylbenzene	100-41-4	1.1E-02	C	1.1E-02	R	2.5E-06	C	1.0E-01	I	1.0E-01	R	1.0E+00	I	100%	Liver and kidney toxicity, and developmental effects
m,p-Xylenes	108-38-3/106-42-3	na	na	na		2.0E-01	I ^e	2.0E-01	R ^e	1.0E-01	I ^e	100%		Decreased body weight, increased mortality	
n-Butylbenzene	104-51-8	na	na	na		1.0E-01	I ^f	1.0E-01	R ^f	4.0E-01	I ^f	100%		Kidney Effects	
n-Propylbenzene	103-65-1	na	na	na		4.0E-02	I	4.0E-02	R	1.4E-01	I	100%		Hepatic and Renal Toxicity	
o-Xylene	95-47-6	na	na	na		2.0E+00	H	2.0E+00	R	1.0E-01	I ^e	100%		Decreased body weight, increased mortality	
p-Isopropyltoluene	99-87-6	na	na	na		1.0E-01	I ^g	1.0E-01	R ^g	4.0E-01	I ^g	100%		na	
sec-Butylbenzene	135-98-8	na	na	na		1.0E-01	I ^f	1.0E-01	R ^f	4.0E-01	I ^f	100%		Kidney Effects	
Tert-Butylbenzene	98-06-6	na	na	na		1.0E-01	I ^f	1.0E-01	R ^f	4.0E-01	I ^f	100%		Kidney Effects	
Toluene	108-88-3	na	na	na		8.0E-02	I	8.0E-02	R	5.0E+00	I	100%		Neurological effects	
Total xylenes	NA	na	na	na		2.0E-01	I	2.0E-01	R	1.0E-01	I	100%		Decreased body weight, increased mortality	
Trichloroethene	79-01-6	1.3E-02	C	1.3E-02	R	2.0E-06	C	na		na		100%		Hepatic, Renal and Neurotoxicity	
Vinyl Chloride	75-01-4	7.2E-01	I	7.2E-01	R	4.4E-06	I	3.0E-03	I	3.0E-03	R	1.0E-01	I	100%	Hepatic Toxicity
Semi-volatile Organic Compounds															
2-Nitroaniline	88-74-4	na	na	na		3.00E-03	P	3.0E-03	R	3.0E-05	P	100%		na	
2-Nitrophenol	88-75-5	na	na	na		5.0E-04	I ^h	5.0E-04	R ^h	2.0E-03	H ^h	100%		na	
3,3'-Dichlorobenzidine	91-94-1	4.5E-01	I	4.5E-01	R	na		na		na		100%		na	
3-Nitroaniline	99-09-2	2.1E-02	P	2.1E-02	R	na		3.00E-04	P	3.0E-04	R	1.0E-03	P	100%	na
4-Chloro-3-methylphenol	59-50-7	na	na	na		na		na		na		na		na	
4-Chloroaniline	106-47-8	2.1E-02	P	na		na		4.0E-03	I	4.0E-03	R	na		na	

Table 5-2 Toxicity Values used in the Human Health Risk Assessment at Sites SS03, SS08, and SS11

Chemical of Potential Concern	CAS Number	Cancer Slope Factor (mg/kg-d) ⁻¹		URF (ug/m ³)		Chronic Reference Dose - RfD (mg/kg-d)			RfC (mg/m3)		ABS _{GI} ^a (%)	Critical Effect
		Oral	Dermal ^b	Inhalation		Oral		Dermal ^b	Inhalation			
4-Methylphenol	106-44-5	na	na	na		5.0E-03 H ⁱ		5.0E-03 R ⁱ	na		100%	na
Bis(2-chloroethyl) Ether	111-44-4	1.1E+00 I	1.1E+00 R	3.3E-04 I		na		na	na		100%	na
Dibenzofuran	132-64-9	na	na	na		2.0E-03 P		2.0E-03 R	na		100%	na
Hexachlorobutadiene	87-68-3	7.8E-02 I	7.8E-02 R	2.20E-05 I		1.0E-03 P		1.0E-03 R	na		100	na
Polynuclear Aromatic Hydrocarbons												
2-Methylnaphthalene	91-57-6	na	na	na		4.0E-03 I		4.0E-03 R	na		89%	Pulmonary changes
Acenaphthene	83-32-9	na	na	na		6.0E-02 I		6.0E-02 R	na		89%	Hepatotoxicity
Anthracene	120-12-7	na	na	na		3.0E-01 I		3.0E-01 R	na		89%	No effects observed
Benzo(a)anthracene	56-55-3	7.3E-01 I	7.3E-01 R	1.1E-04 C		na		na	na		89%	na
Benzo(a)pyrene	50-32-8	7.3E+00 I	7.3E+00 R	1.1E-03 C		na		na	na		89%	na
Benzo(b)fluoranthene	205-99-2	7.3E-01 I	7.3E-01 R	1.1E-04 C		na		na	na		89%	na
Benzo(g,h,i)perylene	191-24-2	na	na	na		3.0E-02 I ^j		3.0E-02 R ^j	na		89%	Kidney effects
Benzo(k)fluoranthene	207-08-9	7.3E-02 I	7.3E-02 R	1.1E-04 C		na		na	na		89%	na
Chrysene	218-01-9	7.3E-03 I	7.3E-03 R	1.1E-05 C		na		na	na		89%	na
Dibenz(a,h)anthracene	53-70-3	7.3E+00 I	7.3E+00 R	1.2E-03 C		na		na	na		89%	na
Fluoranthene	206-44-0	na	na	na		4.0E-02 I		4.0E-02 R	na		89%	Nephropathy, increased liver weights, blood changes, and clinical effects
Fluorene	86-73-7	na	na	na		4.0E-02 I		4.0E-02 R	na		89%	
Indeno(1,2,3-cd)pyrene	193-39-5	7.3E-01	7.3E-01 R	1.1E-04 C		na		na	na		89%	na
Naphthalene	91-20-3	na	na	3.4E-05 C		2.0E-02 I		2.0E-02 R	3.0E-03 I	89%	Decreased body weight; Nasal, olfactory and respiratory effects	
Phenanthrene	85-01-8	na	na	na		3.0E-01 I ^k		3.0E-01 R ^k	na			89%
Pyrene	129-00-0	na	na	na		3.0E-02 I		3.0E-02 R	na			89%
Pesticides												
4,4'-DDT	50-29-3	3.4E-01 I	3.4E-01 I	9.7E-05 I		5.0E-04 I		5.0E-04 R	na		70%	Liver lesions
Aldrin	309-00-2	1.7E+01 I	1.7E+01 R	4.9E-03 I		3.0E-05 I		3.0E-05 R	na		100%	Liver toxicity
Alpha-BHC	319-84-6	6.3E+00 I	6.3E+00 R	1.8E-03 I		na		na	na		100%	na
Alpha-Chlordane	5103-71-9	3.5E-01 I ^l	3.5E-01 R ^l	1.0E-04 I ^l		5.0E-04 I ^l		5.0E-04 R ^l	7.0E-04 I ^l	80%	Hepatic necrosis	
Delta-BHC	319-86-8	1.8E+00 I	1.8E+00 R	5.10E-04 I		na		na	na		100%	Liver nodules and hepatocellular carcinomas
Dieldrin	60-57-1	1.6E-01 I	1.6E-01 R	4.60E-03		5.0E-05 I		5.0E-05 R	na		100%	Hepatic Toxicity
Endrin	72-20-8	na	na	na		3.0E-04 I		3.0E-04 R	na		100%	Mild liver lesions, occasional convulsions
Endrin Aldehyde	7421-93-4	na	na	na		3.0E-04 I ^m		3.0E-04 R ^m	na		100%	na
Endrin ketone	53494-70-5	na	na	na		3.0E-04 I ^m		3.0E-04 R ^m	na		100%	na
Heptachlor	76-44-8	4.5E+00 I	4.5E+00 R	1.3E-03 I		5.0E-04 I		5.0E-04 R	na		100%	Liver weight increases in males
Toxaphene	8001-35-2	1.1E+00 I	1.1E+00 R	3.1E-04 I		na		na	na		100%	na
Polychlorinated Biphenyls												
Arochlor 1260	11096-82-5	2.0E+00 I	2.0E+00 R	1.0E-04 I		na		na	na		81%	na
Petroleum Hydrocarbons												
Diesel Range Organics (DRO), Aliphatic	na	na	na	na		1.0E-01 ⁿ		na	1.0E+00 ⁿ		na	Hepatotox/Hemtological
Diesel Range Organics (DRO), Aromatic	na	na	na	na		4.0E-02 ⁿ		na	2.0E-01 ⁿ		na	Decreased body weight
Gasoline Range Organics (GRO), Aliphatic	na	na	na	na		5.0E+00 ⁿ		na	1.8E+01 ⁿ		na	Neurotoxicity
Gasoline Range Organics (GRO), Aromatic	na	na	na	na		2.0E-01 ⁿ		na	4.0E-01 ⁿ		na	Hepatotox/Nephrotox
Residual Range Organics (RRO), Aliphatic	na	na	na	na		2.0E+00 ⁿ		na	na		na	na
Residual Range Organics (RRO), Aromatic	na	na	na	na		3.0E-02 ⁿ		na	na		na	na

Table 5-2 Toxicity Values used in the Human Health Risk Assessment at Sites SS03, SS08, and SS11

Chemical of Potential Concern	CAS Number	Cancer Slope Factor (mg/kg-d) ⁻¹		URF (ug/m ³)	Chronic Reference Dose - RfD (mg/kg-d)		RfC (mg/m ³)	ABS _{GI} ^a	Critical Effect
		Oral	Dermal ^b	Inhalation	Oral	Dermal ^b	Inhalation	(%)	

Sources:

A Agency for Toxic Substances and Disease Registry (ATSDR) minimal risk levels (ATSDR, 2007)

I Integrated Risk Information System (IRIS) Database (USEPA, 2009).

P Provisional Peer Reviewed Toxicity Values (PPRTVs) (USEPA 2008)

C CalEPA Toxicity Values (OEHHA, 2008)

H Health Effects Assessment Summary Tables (HEAST) (USEPA, 1997a).

R Route Extrapolation.

Notes:

ADEC - Alaska Department of Environmental Conservation

RfD - Reference Dose

na - Not available.

RfC - Reference Concentration

CSF - Cancer Slope Factor

USEPA - U. S. Environmental Protection

ABS_{GI} - Oral Absorption Efficiencies

IRIS - Integrated Risk Information System

mg/kg-d - Milligram per kilogram per da

URF - Unit Risk Factor

^a Values are from USEPA RAGS Part E. Where no specific ABS_{GI} is available, the ABS_{GI} is assumed to be 100%. (USEPA 2004b)

^b The following equations are used as recommended by the USEPA (2004c) to estimate dermal CSF and RfDs from the ingestion toxicity values when ABS_{GI} is less than 50 percent: Dermal RfD = Oral RfD x ABS_{GI} and Dermal CSF = Oral SF/ABS_{GI}. When ABS_{GI} is greater than 50 percent, the dermal CSF and/or RfD is assumed to be equal to the oral CSF and/or RfD (USEPA, 2004c).

^c Per ADEC (2005a) guidance, lead is evaluated using biokinetic models; refer to Section 5.2.2.3.

^d Benzene oral slope factor range: 1.5 x 10⁻² to 5.5 x 10⁻² per (mg/kg)/day. Highest CSF shown for conservatism.

^e Xylenes used as a surrogate chemical based on similar chemical structure and toxicological properties.

^f Isopropylbenzene used as a surrogate chemical based on similar chemical structure and toxicological properties.

^g Cumene used as a surrogate chemical based on similar chemical structure and toxicological properties.

^h Nitrobenzene used as a surrogate chemical based on similar chemical structure and toxicological properties.

ⁱ p-cresol used as a surrogate chemical based on similar chemical structure and toxicological properties.

^j Pyrene used as a surrogate chemical based on similar chemical structure and toxicological properties.

^k Anthracene used as a surrogate chemical based on similar chemical structure and toxicological properties.

^l Chlordane (technical) used as a surrogate chemical based on similar chemical structure and toxicological properties.

^m Endrin used as a surrogate chemical based on similar chemical structure and toxicological properties.

ⁿ Source: ADEC (2000) guidance.

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Table 5-3
Summary of Human Health Risk Estimates for Human Receptors
SS03

Media	Site Worker				Site Worker/Recreational Hunter				Trench Worker				Site Visitor			
	Current		Future		Current		Future		Current		Future		Current		Future	
	ILCR	HI	ILCR	HI	ILCR	HI	ILCR	HI	ILCR	HI	ILCR	HI	ILCR	HI	ILCR	HI
Non-PHC																
Surface Soil	1E-05	5	1E-05	5	2E-05	5	2E-05	5	7E-07	5	7E-07	5	7E-07	0.3	7E-07	0.3
Subsurface Soil	3E-06	0.5	3E-06	0.5	3E-06	0.6	3E-06	0.6	1E-07	0.5	1E-07	0.5	2E-07	0.03	2E-07	0.03
Sediment	8E-06	0.3	8E-06	0.3	1E-05	0.4	1E-05	0.4	5E-07	0.4	5E-07	0.4	4E-07	0.02	4E-07	0.02
Subsurface Water	NA	NA	2E-04	3	NA	NA	2E-04	3	NA	NA	6E-06	3	NA	NA	6E-06	0.1
Non-PHC Cumulative Media ILCR/HI:	2E-05	6	2E-04	8	3E-05	6	2E-04	9	1E-06	6	8E-06	9	1E-06	0.3	8E-06	0.4
PHC																
Surface Soil	NA	0.1	NA	0.1	NA	0.3	NA	0.3	NA	0.3	NA	0.3	NA	0.007	NA	0.007
Subsurface Soil	NA	0.07	NA	0.07	NA	0.1	NA	0.1	NA	0.1	NA	0.1	NA	0.004	NA	0.004
Sediment	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Subsurface Water	NA	NA	NA	3	NA	NA	NA	3	NA	NA	NA	3	NA	NA	NA	0.1
PHC Cumulative Media ILCR/HI:	NA	0.2	NA	3	NA	0.4	NA	3	NA	0.4	NA	3	NA	0.01	NA	0.1
ADEC Risk Criteria:	10 ⁻⁵	1														
USEPA Risk Range:	10 ⁻⁶ - 10 ⁻⁴	1														

Notes:

^a Maximum detected concentration or 95% upper confidence limit (UCL) on the

^b The EPC is based on either the 95% UCL or the maximum detected concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

HI - Hazard Index.

ILCR - Incremental lifetime cancer risk.

NA - Not applicable

PHC - Petroleum hydrocarbon

USEPA - U. S. Environmental Protection Agency

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Table 5-4
Summary of Human Health Risk Estimates for Human Receptors
SS08

Media	Site Worker				Site Worker/Recreational Hunter				Trench Worker				Site Visitor			
	Current		Future		Current		Future		Current		Future		Current		Future	
	ILCR	HI	ILCR	HI	ILCR	HI	ILCR	HI	ILCR	HI	ILCR	HI	ILCR	HI	ILCR	HI
Non-PHC																
Surface Soil	2E-05	0.3	2E-05	0.3	3E-05	0.4	3E-05	0.4	1E-06	0.4	1E-06	0.4	1E-06	0.02	1E-06	0.02
Subsurface Soil	8E-06	0.2	8E-06	0.2	1E-05	0.3	1E-05	0.3	5E-07	0.4	5E-07	0.4	4E-07	0.01	4E-07	0.01
Sediment	8E-06	0.3	8E-06	0.3	1E-05	0.4	1E-05	0.4	6E-07	0.5	6E-07	0.5	5E-07	0.02	5E-07	0.02
Subsurface Water	NA	NA	1E-03	60	NA	NA	1E-03	60	NA	NA	5E-05	60	NA	NA	5E-05	2
Non-PHC Cumulative Media ILCR/HI:	4E-05	0.9	1E-03	61	5E-05	1	1E-03	61	2E-06	1	5E-05	61	2E-06	0.05	5E-05	2
PHC																
Surface Soil	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Subsurface Soil	NA	0.2	NA	0.2	NA	0.3	NA	0.3	NA	0.3	NA	0.3	NA	0.009	NA	0.009
Sediment	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Subsurface Water	NA	NA	NA	18	NA	NA	NA	18	NA	NA	NA	18	NA	NA	NA	0.7
PHC Cumulative Media ILCR/HI:	NA	0.2	NA	18	NA	0.3	NA	18	NA	0.3	NA	18	NA	0.009	NA	0.7
ADEC Risk Criteria:	10 ⁻⁵	1														
USEPA Risk Range:	10 ⁻⁶ - 10 ⁻⁴	1														

Notes:

^a Maximum detected concentration or 95% upper confidence limit (UCL) on the

^b The EPC is based on either the 95% UCL or the maximum detected concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

HI - Hazard Index.

ILCR - Incremental lifetime cancer risk.

NA - Not applicable

PHC - Petroleum hydrocarbon

USEPA - U. S. Environmental Protection Agency

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Table 5-5
Summary of Human Health Risk Estimates for Human Receptors
SS11

Media	Site Worker				Site Worker/Recreational Hunter				Trench Worker				Site Visitor			
	Current		Future		Current		Future		Current		Future		Current		Future	
	ILCR	HI	ILCR	HI	ILCR	HI	ILCR	HI	ILCR	HI	ILCR	HI	ILCR	HI	ILCR	HI
Non-PHC																
Surface Soil	2E-03	14	2E-03	14	3E-03	15	3E-03	15	1E-04	14	1E-04	14	1E-04	0.8	1E-04	0.8
Subsurface Soil	2E-05	0.1	2E-05	0.1	4E-05	0.2	4E-05	0.2	1E-06	0.2	1E-06	0.2	1E-06	0.008	1E-06	0.008
Sediment	3E-06	0.02	3E-06	0.02	6E-06	0.03	6E-06	0.03	2E-07	0.03	2E-07	0.03	2E-07	0.001	2E-07	0.001
Non-PHC Cumulative Media ILCR/HI:	2E-03	14	2E-03	14	3E-03	15	3E-03	15	1E-04	15	1E-04	15	1E-04	0.8	1E-04	0.8
PHC																
Surface Soil	NA	1	NA	1	NA	2	NA	2	NA	2	NA	2	NA	0.06	NA	0.06
Subsurface Soil	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PHC Cumulative Media ILCR/HI:	NA	1	NA	1	NA	2	NA	2	NA	2	NA	2	NA	0.06	NA	0.06
ADEC Risk Criteria:	10 ⁻⁵	1														
USEPA Risk Range:	10 ⁻⁶ - 10 ⁻⁴	1														

Notes:

^a Maximum detected concentration or 95% upper confidence limit (UCL) on the

^b The EPC is based on either the 95% UCL or the maximum detected concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

HI - Hazard Index.

ILCR - Incremental lifetime cancer risk.

NA - Not applicable

PHC - Petroleum hydrocarbon

USEPA - U. S. Environmental Protection Agency

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Table 5-6
Human Health Blood Lead Estimates Summary

Exposure Pathway/Receptor	Lead EPC (mg/kg)	Geometric Mean Blood Lead of Adult^a (ug/dL)	95% Blood Lead for Fetus of Adult^a (ug/dL)	Target Blood Lead of Adult (ug/dL)	Probability of Fetal Blood Lead > Target^b (%)
SS03 - Surface Soil					
Site Worker	180	1.8	5.6	10	0.78
Trench Worker	180	2.1	6.5	10	1.3
Recreational Hunter	180	2.2	6.7	10	1.4
Site Visitor	180	1.5	4.8	10	0.41
SS08 - Subsurface Soil					
Site Worker	63	1.6	5.0	10	0.51
Trench Worker	63	1.7	5.3	10	0.65
Recreational Hunter	63	1.8	5.4	10	0.67
Site Visitor	63	1.5	4.7	10	0.40
SS08 - Sediment					
Site Worker	51	1.6	5.0	10	0.49
Trench Worker	51	1.7	5.2	10	0.59
Recreational Hunter	51	1.7	5.3	10	0.61
Site Visitor	51	1.5	4.7	10	0.40
SS11 - Surface Soil					
Site Worker	120	1.6	5.0	10	0.51
Trench Worker	120	1.9	5.9	10	0.94
Recreational Hunter	120	2.0	6.0	10	1.0
Site Visitor	120	1.5	4.7	10	0.41

Notes:

^a - Blood lead concentrations for adults and potential fetuses were calculated using the Adult Lead Model (USEPA, 2003b)

^b - The probability of fetal blood lead concentrations exceeding a target blood lead concentration of 10 ug/dL was calculated using the Adult Lead Model (USEPA, 2005e) and assuming a lognormal distribution. The target probability is compared to the ADEC standard value of 5% for the protection of human health (ADEC, 2005a).

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6.0 ECOLOGICAL RISK ASSESSMENT

Methods for assessing ecological risk associated with chemical releases from Tatalina LRRS ERP Sites SS03, SS08, and SS11 are presented in this section. Ecological risk assessment (ERA) methods were developed in accordance with the EPA's *Guidelines for Ecological Risk Assessment – Final* (USEPA, 1998), and *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments – Interim Final* (USEPA, 1997d). In accordance with Alaska regulations (18 AAC 75) and ADEC's *Draft Risk Assessment Procedures Manual* (ADEC, 2005a), the ERA includes Tier I (screening) and Tier II (baseline) ecological assessments, as appropriate.

The ERA was performed in accordance with, or in consideration of, the following ADEC, EPA, and Air Force guidance documents or reference materials:

- Risk Assessment Guidance for Superfund. Volume II: Environmental Evaluation Manual. Interim Final. (USEPA, 1989b)
- Wildlife Exposure Factors Handbook (USEPA, 1993b).
- Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments, Interim Final (USEPA, 1997d).
- Guidelines for Ecological Risk Assessment (USEPA, 1998)
- User's Guide for Selection and Application of Default Assessment Endpoints and Indicator Species in Alaskan Ecoregions (ADEC, 1999).
- Guidance for Cleanup of Petroleum Contaminated Sites (ADEC, 2000).
- Draft Risk Assessment Procedures Manual (ADEC, 2005a).
- Calculated Cleanup Levels for Compounds without Tabulated Values in Site Cleanup Rules, Technical Memorandum 01-007 (ADEC, 2003).
- 18 AAC 75 – *Oil and Other Hazardous Substance Control Regulations*, Revised as of October 9, 2008 (ADEC, 2008a).
- Sediment Quality Guidelines, Technical Memorandum (ADEC, 2004)
- 18 AAC 70 – *Water Quality Standards*, amended as of July 1, 2008 (ADEC, 2008b).
- *Ecoscoping Guidance* (ADEC, 2008c)

The ERA for SS03, SS08, and SS11 was conducted in accordance with 18 AAC 75. Site cleanup rules provided in 18 AAC 75 establish administrative processes and standards to determine the necessity for and degree of cleanup required to protect the environment at a site where one or more hazardous substances are located.

The administrative processes and standards in 18 AAC 75 include generic soil and groundwater cleanup levels (i.e., Methods One and Two), and procedures for establishing site-specific cleanup levels (i.e., Methods Three and Four). The Air Force has elected to use Method Four to conduct HHERAs for Tatalina LRRS, consistent with 18 AAC 75 and the

RAPM (ADEC, 2005a). Risk assessments conducted under Method Four will ultimately serve as the basis for the development of media-specific cleanup levels for these sites.

The ERA for SS03, SS08, and SS11 used a two-tiered approach. Conservative screening (Tier I) was performed to evaluate whether chemical concentrations measured in site media exceeded protective screening criteria. If chemical concentrations exceeded protective screening criteria, such chemicals were identified as COPECs and evaluated further in a Tier II ERA. The Tier II ERA was performed consistent with ADEC Method Four procedures. Those sites and media for which Tier II ERA criteria were exceeded are proposed for evaluation of remedial alternatives.

6.1 TIER I ERA –COPEC SCREENING

The Tier I ERA includes comparisons of maximum analyte concentrations against protective, media-specific screening benchmarks. Tier I screening was conducted for SS03, SS08, and SS11 in accordance with State of Alaska regulations (18 AAC 75), ADEC's *Draft Risk Assessment Procedures Manual* (ADEC, 2005a), and ADEC's *Ecoscoping Guidance* (ADEC, 2008c) as described in Section 4.1.1.2. The results of Tier I screening are documented in Section 4.1.2, and demonstrate that concentrations of chemicals including, but not limited to, inorganics, VOCs, SVOCs including PAHs, DDT-related compounds and other pesticides, DRO, GRO, and RRO in site media exceeded ecological protective screening criteria. These chemicals were identified as COPECs for SS03, SS08, and SS11 (Table 4-10).

Because screening benchmarks do not necessarily consider increased retention and risks associated with bioaccumulating chemicals, potential bioaccumulation were addressed on a case-by-case basis in the Tier II ERA. The EPA (USEPA, 2008d) has identified the following as persistent, bioaccumulating and toxic chemicals: aldrin/dieldrin, benzo(a)pyrene, chlordane, DDT/DDD/DDE, hexachlorobenzene, alkyl-lead, mercury and its compounds, mirex, octachlorostyrene, PCBs, dioxins/furans, and toxaphene. These chemicals were analyzed for in samples collected from SS03, SS08, and SS11.

Of these bioaccumulating chemicals, Arochlor-1260, benzo(a)pyrene, DDT-related compounds (i.e., DDD, DDE, and DDT), dibenzofuran, dieldrin, and mercury were detected in site media.

6.2 TIER II ERA – GENERAL METHODS

The Tier I ERA included comparisons of maximum analyte concentrations against protective, media-specific screening benchmarks. The Tier II ERA involves a more detailed evaluation of ecological hazard, including: 1) a “problem formulation phase,” wherein biological resources are evaluated and assessment and measurement endpoints are selected, and 2) an “analysis phase,” wherein exposures are quantified for representative ecological receptors. Pending the outcome of the ecological problem formulation phase, an analysis phase may or may not be required.

The Tier II ERA typically consists of the following five specific steps:

1. Problem formulation
2. Exposure assessment
3. Ecological effects assessment
4. Risk characterization
5. Uncertainty analysis

If the problem formulation phase determines that COPECs or receptors are absent, or exposure pathways are incomplete or would result in insignificant ecological hazards, then the exposure assessment, ecological effects assessment, and risk characterization steps may not be required. The exposure assessment step consists of two parts: a qualitative exposure analysis (Section 6.2.2) and a quantitative exposure dose analysis (Section 6.2.3). The first four steps are described below, as they relate to the Tier II ERA for SS03, SS08, and SS11. The fifth step, a combined human health and ecological uncertainty analysis for SS03, SS08, and SS11, is presented and discussed in Section 7.0.

6.2.1 Problem Formulation

Problem formulation is intended to facilitate a preliminary understanding of how stressors, such as chemical contaminants, may impact ecological habitats and receptors. Problem formulation provides the foundation for the remainder of the ERA. Consistent with ADEC guidance (ADEC, 1999; 2005a), the initial steps involved in the Tier II ERA are as follows:

Determine the Alaska ecoregion in which the site falls.

- Identify the default assessment endpoints and indicator species for the applicable ecoregion.
- Evaluate the relevance of default assessment endpoints and indicator species, and modify as appropriate.

Tatalina LRRS falls within the ‘Interior’ ecoregion, according to ADEC guidance (ADEC, 1999). Consistent with ADEC (1999), default assessment endpoints and indicator species are identified for the applicable ecoregion to ensure that representative food guilds, trophic levels, and species are evaluated for all potentially impacted organisms. As defined in EPA guidelines (USEPA, 1998), an assessment endpoint is an explicit expression of the environmental value that is to be protected (for example, growth, survival, and reproduction of a specific species population). Default assessment endpoints and indicator species for the ‘Interior’ ecoregion are presented in Table 6-1.

The relevance of default assessment and measurement endpoints to the ERA is determined based on the following:

- The site-specific ecological CSM.
- The COPECs identified for the site.
- Physical factors and known site ecology.
- The availability of assessment endpoints.

The default assessment endpoints and indicator species for the ‘Interior’ ecoregion are evaluated and refined for SS03, SS08, and SS11, based on these criteria, in Section 6.2.2.4 and identified in Table 6-1.

6.2.2 Exposure Analysis

The ecological exposure analysis begins with development of a site-specific CSM. The CSM for SS03, SS08, and SS11, in turn, was based on information provided in the Ecological Checklist (Appendix C). The CSM is a descriptive and graphical presentation of relationships between chemical contaminants and potentially exposed receptors. The ecological CSM identifies chemical sources, ecological habitats and receptors, and complete exposure pathways between contaminant sources and ecological resources.

The ecological CSM for SS03, SS08, and SS11 was described in Section 4.3.2. Briefly, SS03, SS08, and SS11 identify three former Lower Camp areas of Tatalina LRRS where POL and other potential contaminants were released.

A variety of herbivorous or omnivorous birds and mammals occur in the vicinity of Tatalina LRRS, including dark-eyed junco (*Funco hyemalis*), Say’s phoebe (*Sayornis saya*), American robin (*Turdus migratorius*), Swainson’s thrush (*Catharus ustalatus*), Northern shrike (*Laninus excubitor*), tundra vole (*Microtus oeconomus*), and least weasel (*Mustela rixosa*). These consumer-level species potentially serve as prey for the great horned owl (*Bubo virginianus*), Northern hawk owl (*Surnia ulula*), red fox (*Vulpes vulpes*), North American lynx (*Lynx canadensis*), and brown bear (*Ursus arctos*), which have also been observed at Tatalina LRRS.

Lower Camp in the vicinity of SS03, SS08, and SS11 is highly disturbed, with discontinuous grassy areas. The area to the north and northeast of SS08 is heavily vegetated with brush or stands of alders and low willows, and is continuous with vegetation within SS08 on the north side. No fences restrict access of ecological receptors to SS03, SS08, and SS11 – allowing potential exposure of ecological receptors inhabiting the area to soil COPECs. Therefore, the vegetated portions of SS03, SS08, and SS11 may provide habitat or forage for various herbivorous, omnivorous, and carnivorous birds and mammals.

As depicted in the ecological CSM for Lower Camp Sites SS03, SS08, and SS11 (Figures 4-2, 4-4 and 4-6), exposure pathways between soil COPECs and terrestrial birds and mammals are complete. These exposure pathways include direct contact pathways (i.e., incidental soil ingestion, dermal contact with soil, and inhalation of dust), as well as uptake by biota (i.e., plants and animals) and food chain transfer (Figures 4-2, 4-4 and 4-6).

Various ecological receptors (i.e., birds and mammals) may consume surface water from the ephemeral drainage channels, creeks, and seeps at SS03, SS08, or SS11. However, many of these surface water bodies are seasonal or ephemeral in nature and, therefore, are not likely to support aquatic receptors. Surface water drainage at Lower Camp flows downgradient towards the Tatalina River. The drainage originating from the southeastern side passes through the eastern border of Lower Camp, continues on the northern side of the ridge and

eventually enters the Tatalina River. The other drainage originating from the south region, west of Lower Camp, passes through the south side of Lower Camp, merges with another creek from the Northern watershed and eventually enters the Tatalina River. During the 1997 RI, no surface water was observed in the southern drainage, but some surface water was observed in the southeastern drainage. Therefore, exposure pathways for any aquatic receptors (i.e., fish and macroinvertebrates) in the Tatalina River are deemed potentially complete, but insignificant (Figures 4-2, 4-4 and 4-6), because uptake by fish is not expected to be significant, given the low potential for contaminants at concentrations of concern in this offsite river.

As depicted in the ecological CSM for Lower Camp Sites SS03, SS08, and SS11 (Figures 4-2, 4-4 and 4-6), exposure pathways between surface water COPECs and terrestrial birds and mammals are complete for direct contact pathways of surface water ingestion and incidental surface water ingestion. Additionally, the ecological CSM for Lower Camp Sites SS03, SS08, and SS11 (Figures 4-2, 4-4 and 4-6) indicates exposure pathways between sediment COPECs and terrestrial birds and mammals are complete for direct contact pathways (i.e., incidental sediment ingestion and dermal contact with sediment).

COPECs were identified for soil, sediment, and surface water, as presented in Section 4.1.2. Secondary sources of potential exposure were identified as ambient air, soil, sediment, and surface water in the ecological CSM (Figures 4-2, 4-4 and 4-6). Each of these sources, as they relate to potential ecological exposures at SS03, SS08, and SS11, is discussed in the following subsections.

6.2.2.1 Ambient Air Exposure Pathways

Historic spills and releases of fuels, solvents, and other volatile contaminants to soil can result in direct release of volatile COPECs to ambient air through volatilization. Surface runoff from rainfall or snowmelt can transport volatile COPECs in soil to surface water and sediment, from which they volatilize to ambient air. Percolation and leaching can transport volatile COPECs to subsurface water, with subsequent volatilization to ambient air. Historic spills and releases of such contaminants at Lower Camp occurred more 15 years ago, and it is likely that the majority of volatile residues in soil, surface water, sediment, or subsurface water have already migrated to ambient air and dissipated. Residual levels of volatile COPECs in these media may continue to volatilize. However, concentrations of volatile COPECs in ambient air at any given time are anticipated to be low because:

- Tatalina LRRS is located near the 32°F annual isotherm, with discontinuous permafrost and low ambient temperatures (Flint, 1971).
- Lower Camp is covered by snow during the winter months, with low average temperatures and high precipitation continuing into the summer months.

Potential ecological exposure pathways include:

- Uptake of volatile COPECs by plants that are subsequently consumed by resident or migratory animals (e.g., terrestrial birds and mammals).

- Dermal absorption by resident or migratory animals.
- Direct inhalation by resident or migratory animals.

As described above, physical conditions at Tatalina LRRS are expected to minimize volatilization of VOCs from soil and subsurface water. Any volatile COPECs that reach ambient air would be substantially diluted, and undergo dissipation through wind transport. Caribou, moose, bears, and other animals forage within Tatalina LRRS and may briefly come into contact with ambient air at SS03, SS08, and SS11. However, such exposures are anticipated to be minimal in comparison to ingestion pathways. Consequently, ambient air pathways are deemed to be potentially complete but insignificant for ecological receptors (Figures 4-2, 4-4 and 4-6). However, uptake of COPECs (including VOCs) from soil, surface water, and sediment by plants and subsequent food chain transfer to terrestrial receptors is a potentially complete pathway and will be evaluated in the ERA for Sites SS03, SS08, and SS11, as described in the following subsections.

6.2.2.2 Soil Exposure Pathways

Contaminants may be released to surface and subsurface soil through historic spills, leaks, and disposal practices. Potential ecological exposure pathways include:

- Uptake of soil COPECs by plants, and subsequent food chain transfer to resident or migratory animals.
- Incidental ingestion of soil particulates by resident or migratory animals.
- Dermal absorption of COPECs adsorbed to soil particulates by resident or migratory animals.
- Inhalation of soil particulates by resident or migratory animals.

As depicted in the ecological CSMs for Lower Camp Sites SS03, SS08, and SS11 (Figures 4-2, 4-4 and 4-6), exposure pathways between soil COPECs and terrestrial birds and mammals are complete. The following exposure pathways **were** quantitatively evaluated in the ERA for SS03, SS08, and SS11: uptake of soil COPECs by plants and food chain transfer, and incidental ingestion of soil while foraging or grooming. Although dermal contact with soil COPECs is a potentially complete pathway, dose modeling methods for evaluating this pathway are currently not well developed. Therefore, the dermal pathway will be qualitatively evaluated for ecological receptors.

Caribou, moose, bears, and other animals forage within Tatalina LRRS and may briefly come into contact with contaminated soils at SS03, SS08, or SS11. However, the primary COPECs present at Lower Camp Sites SS03, SS08, and SS11 (i.e., petroleum hydrocarbons including DRO, GRO, RRO, and PAHs) do not tend to biomagnify in terrestrial organisms (ATSDR, 1989; Eisler, 1987). Furthermore, although some compounds that may biomagnify were also identified as COPECs, including DDT-related compounds and Aroclor 1260 at SS08, the foraging range of game animals is considerably larger than the areas potentially affected by site-related contaminants and contact with site contaminants would be expected to be

minimal. In addition, the presence of DDT is likely the result of historic application of DDT-related compounds at Tatalina LRRS for insect and vegetation control (USAF, 1998b).

Although inhalation of COPECs adsorbed to dust is a potentially complete exposure pathway, this pathway is typically minor in comparison to the ingestion and dermal pathways. Furthermore, methods for quantifying the inhalation pathway for ecological receptors are currently not well developed. Consequently, the inhalation pathway was not evaluated qualitatively for ecological receptors.

6.2.2.3 Surface Water and Sediment Exposure Pathways

Water soluble (BTEX) or lipophilic (PAHs) COPECs sorbed to soil particles or organic matter, can be transported to local surface water bodies via snowmelt and rainfall runoff from surface spills or releases. Contaminants in the Lower Camp gravel pad north of the Southeastern surface water divide can potentially migrate to SS08 via surface runoff. Surface water at SS03 can potentially migrate away from the Southeastern divide. Surface water at SS11 migrates away from the drainage that originates from the southern side.

Various ecological receptors (i.e., birds and mammals) may consume surface water from the ephemeral drainage channels, creeks, and seeps at SS03, SS08, or SS11. However, many of these surface water bodies are seasonal or ephemeral in nature and, therefore, not likely to support aquatic receptors. Surface water drainage flows downgradient towards the Tatalina River. The drainage originating from the southeastern side passes through the eastern border of the Lower Camp, continues on the northern side of the ridge and eventually enters the Tatalina River. The other drainage originating from the south region, west of Lower Camp, passes through the south side of Lower Camp, merges with another creek from the Northern watershed and eventually enters the Tatalina River. During the 1997 RI, surface water was observed in the southern drainage, but some surface water was observed in the southeastern drainage. Therefore, exposure pathways for any aquatic receptors (i.e., fish and macroinvertebrates) in the Tatalina River are deemed potentially complete, but insignificant (Figures 4-2, 4-4 and 4-6), because uptake by fish is not expected to be significant, given the low potential for contaminants at concentrations of concern in this offsite river.

As depicted in the ecological CSMs for Lower Camp Sites SS03, SS08, and SS11 (Figures 4-2, 4-4 and 4-6), exposure pathways between surface water COPECs and terrestrial birds and mammals are complete for direct contact pathways of surface water ingestion and incidental surface water ingestion. Additionally, the ecological CSMs for Lower Camp Sites SS03, SS08, and SS11 (Figures 4-2, 4-4 and 4-6) indicates exposure pathways between sediment COPECs and terrestrial birds and mammals are complete for direct contact pathways (i.e., incidental sediment ingestion and dermal contact with sediment).

6.2.2.4 Assessment and Measurement Endpoints

Assessment endpoints focus the ERA on the guild or community that might be adversely affected by exposure to a COPEC. As defined in EPA guidelines (USEPA, 1998), an assessment endpoint is an explicit expression of the environmental value that is to be

protected (for example, growth, survival, and reproduction of a specific species population). A measurement endpoint is defined as a quantitative expression of an observed or measured effect of the hazard; that is, a measurable response to a stressor related to the ecological characteristic chosen as the assessment endpoint (USEPA, 1998). Assessment and measurement endpoints selected for ecological receptors at ERP Sites SS03, SS08, and SS11 are described in the following subsections.

6.2.2.4.1 Terrestrial Habitats

Contaminants at SS03, SS08, and SS11 may enter plant tissues by root uptake of COPECs in soil and water, by air-to-plant transfer of COPECs in vapor form, and through diffusion of COPECs directly deposited on the leaves as dust (Section 6.2.2). Revegetation has occurred to some degree in areas of SS03, SS08, and SS11 where structures have been demolished and removed, such as in the SS08 area. Lower Camp in the vicinity of SS03, SS08, and SS11 is highly disturbed, with discontinuous grassy areas. The area to the north and northeast of SS08 is heavily vegetated with brush or stands of alders and low willows, and is continuous with vegetation within SS08 on the north side. The vegetated portions of SS03, SS08, and SS11 may provide habitat or forage for various herbivorous, omnivorous, and carnivorous birds and mammals. No fences restrict access of ecological receptors to SS03, SS08, and SS11, allowing potential exposure of ecological receptors inhabiting the area to soil COPECs.

Consistent with ADEC guidance (ADEC, 1999), and the ecological CSM for Lower Camp Sites SS03, SS08, and SS11 (Section 4.3.2 and Figure 4-2), appropriate assessment endpoints for SS03, SS08, and SS11 are as follows:

- The potential for significant adverse effects on terrestrial soil plant species abundance, diversity, and primary production (i.e., plants that obtain nutrients primarily from soil).
- The potential for significant adverse effects on soil invertebrate community abundance and diversity (i.e., all terrestrial invertebrates).
- The potential for significant adverse effects on terrestrial avian herbivore abundance and diversity (e.g., dark-eyed junco).
- The potential for significant adverse effects on terrestrial mammalian herbivore abundance and diversity (e.g., tundra vole).
- The potential for significant adverse effects on terrestrial avian invertivore abundance and diversity (e.g., American robin).
- The potential for significant adverse effects on terrestrial mammalian invertivore abundance and diversity (e.g., masked shrew).
- The potential for significant adverse effects on terrestrial avian carnivore abundance and diversity (e.g., northern shrike).
- The potential for significant adverse effects on terrestrial mammalian carnivore abundance and diversity (e.g., least weasel, mink).

- The potential for significant adverse effects on terrestrial avian omnivore abundance and diversity (e.g., mallard).

A measurement endpoint is defined as a quantitative expression of an observed or measured effect of the hazard; that is, a measurable response to a stressor related to the ecological characteristic chosen as the assessment endpoint (USEPA, 1998). To evaluate the potential for significant adverse effects of soil COPECs on terrestrial soil plant and invertebrate communities, soil concentrations were compared with phytotoxicity benchmarks and earthworm/soil organism benchmarks, respectively. This comparison was performed as part of the Tier I screening ERA process for SS03, SS08, and SS11. To evaluate the potential for significant adverse effects of soil COPECs on the remaining, higher trophic level organisms, COPEC concentrations in abiotic media (i.e., soil and surface water) and biotic media (i.e., plant and animal tissues) were used to model exposure doses for comparison to toxicity reference values (TRVs). This process is described in Sections 6.2.3 through 6.2.5.

The assessment and measurement endpoints evaluated for SS03, SS08, and SS11 are highlighted in Table 6-1. [Note: The measurement endpoint for each selected assessment endpoint is listed under the column heading ‘Typical Tier I Assessment Method’.]

6.2.2.4.2 Aquatic Wetland Habitats

As described in Sections 4.3.2 and 6.2.2.3, aquatic and/or wetland species are not anticipated to be significantly impacted by COPECs present at SS03, SS08, and SS11. Although water soluble COPECs (e.g., BTEX) in soil, or lipophilic COPECs (e.g., PAHs) sorbed to sediment particles or organic matter, can theoretically be transported to surface water bodies and sediment via snowmelt and rainfall runoff, surface water bodies in the vicinity of these Lower Camp areas include creeks that are only present intermittently. This suggests that adverse impacts to aquatic and wetland receptors is not occurring, given that the ephemeral surface water bodies at SS03, SS08, and SS11 do not support fish, and are unlikely to support other aquatic organisms.

Surface water drainage at Lower Camp flows in a generally southeastern direction towards the Tatalina River. During the 1997 RI, no surface water was observed in the southern drainage, but some surface water was observed in the southeastern drainage. Therefore, exposure pathways for aquatic receptors (i.e., fish and macroinvertebrates) in the Tatalina River are deemed potentially complete, but insignificant, because uptake by fish is not expected to be significant, given the low potential for COPECs at this offsite river.

Based on the above, adverse impacts of SS03, SS08, and SS11 COPECs on aquatic and wetland receptors are not anticipated. Therefore, assessment and measurement endpoints for aquatic and wetland species were identified, but were not evaluated in the ERA.

6.2.2.5 Indicator Receptors

Because an evaluation of all receptors inhabiting a given ecosystem, or even all receptors representing an assessment endpoint, is not possible, representative indicator species are

typically selected for quantitative evaluation in the ERA. The general criteria that are used to select indicator receptors are described in Section 6.2.2.5.1, and the specific indicator receptors that were selected for SS03, SS08, and SS11 are identified in Section 6.2.2.5.2.

6.2.2.5.1 Selection Criteria

Criteria used in the selection of indicator receptors for quantitative evaluation in the ERA are as follows (ADEC, 1999; USEPA, 1998):

- Ecological Relevance – Highly relevant receptors provide an important functional or structural aspect in the ecosystem. Attributes of highly relevant receptors typically fall under the categories of food, habitat, production, seed dispersal, pollination, and decomposition. Critical attributes include those that affect or determine the function or survival of a population.
- Exposure Potential – Receptors with high exposure potentials are those that, due to their metabolism, feeding habits, and range, location, or reproductive strategy, tend to have higher potentials for exposure than other receptors.
- Sensitivity – Highly susceptible receptors include those with low tolerances to a COPEC, and receptors with enhanced COPEC susceptibility due to other contaminant stressors that may not be related to a COPEC, such as reduced habitat availability. For example, a species that forages entirely within a contaminated site will be more exposed to a COPEC and, therefore, more sensitive to COPEC impacts.
- Availability of Natural History Information – Natural history information is essential to quantitatively evaluate risk to measurement receptors. If information such as body weight; food, soil, and surface water ingestion rates; or reproductive and behavioral information is unavailable for a potential receptor, then another species is chosen, or estimates are made from taxonomically related species.
- Status – Species designated as “threatened and endangered” or “priority for conservation and management” are typically given preference in selection as indicator receptors to ensure that potential risk to the most sensitive species is evaluated.

6.2.2.5.2 Selected Indicator Receptors

Default indicator receptors recommended by ADEC (ADEC, 1999) were selected for evaluation in the ERA for SS03, SS08, and SS11. Default assessment endpoints representative of the food guild to be protected by each of the assessment endpoints identified in Section 6.2.2.4 are as follows:

- Terrestrial plants – Terrestrial soil plant species.
- Terrestrial invertebrates – Soil invertebrate community.
- Dark-eyed junco (*Junco hyemalis*) – Terrestrial avian herbivore.
- Tundra vole (*Microtus oeconomus*) – Terrestrial mammalian herbivore.

- American robin (*Turdus migratorius*) – Terrestrial avian invertivore.
- Masked shrew (*Sorex cinereus*) – Terrestrial mammalian invertivore.
- Northern shrike (*Lanius excubitor*) – Terrestrial avian carnivore.
- Least weasel (*Mustela rixosa*) and Mink (*Neovison vison*) – Terrestrial mammalian carnivore.
- Mallard (*Anas platyrhynchos*) – Terrestrial avian omnivore.

The above avian and mammalian species are appropriate as indicator receptors for SS03, SS08, and SS11 because they have been observed at, or potentially occur within, the Tatalina LRRS (Tables 2-2 and 2-3).

6.2.3 Exposure Dose Analysis

Exposure dose analysis uses statistical methods to determine or predict ecological responses to stressors under exposure conditions of interest (USEPA, 1998). The following information is used to estimate the relationship between chemical stressor(s) and ecological response(s):

- Exposure pathways and routes.
- Exposure point concentrations.
- Exposure dose calculations.

Each of these steps in the exposure analysis process is described in the following subsections.

6.2.3.1 Exposure Pathways and Routes

All potential exposure pathways for indicator receptors present or potentially occurring at SS03, SS08, and SS11 were evaluated, and the potentially complete exposure pathways were identified. Complete exposure pathways for indicator receptors that were quantitatively evaluated in the ERA for SS03, SS08, and SS11 are shown on Figures 4-2, 4-4 and 4-6, and briefly summarized as follows:

- Direct exposure to contaminants in soil, surface water, or ‘sediment’ through incidental ingestion.
- Uptake through food chain transfer of chemicals in soil, surface water, or ‘sediment’.

Inhalation exposure estimates were not quantified in the Tier II ERA due to lack of toxicity data and exposure information for this pathway. In addition, dermal exposure estimates were not quantified for indicator receptors in the Tier II ERA. Dermal exposures are qualitatively, rather than quantitatively, evaluated for ecological receptors due to uncertainties in quantifying this pathway. Although algorithms exist for evaluating this route of exposure, the lack of toxicity information for quantifying dermal exposures and for estimating the probability of toxicological effects limits the reliability of such calculations. Potential uncertainties associated with not quantitatively evaluating the inhalation and dermal exposure pathways are described in Section 7.4.

6.2.3.2 Exposure Point Concentrations

Methods for the statistical derivation of EPCs were presented in Section 5.2.1, as they relate to human health exposures. The derivation of EPCs for ecological receptors includes the estimation of COPEC concentrations in biotic (i.e., plant and animal tissue) and abiotic media (i.e., soil, sediment, surface water, groundwater, and air) in order to evaluate contaminant exposures through food uptake and direct contact, respectively. Methods used in the derivation of EPCs during the Phase II ERA are the same as those previously described for human health (refer to Section 5.2.1).

6.2.3.3 Exposure Dose Calculations

Exposure dose calculation consolidates exposure pathways and routes, EPCs, and exposure parameters into an equation that provides an exposure dose estimate in units of mg/Kg-day.

Ingestion dose estimates were calculated using the following general equation derived from the EPA's *Wildlife Exposure Factors Handbook* (USEPA, 1993b):

$$\frac{Dose_{Ingestion} = [(IR_{Biotic} \times C_{Biotic}) + (IR_{Abiotic} \times EPC_{Abiotic})] \times ED \times SUF}{BW}$$

Where:

Dose _{Ingestion}	= Estimated exposure dose from ingestion of food and ingestion of abiotic media (mg/Kg-day)
IR _{Biotic}	= Food ingestion rate (kg tissue dry weight/day)
C _{Biotic}	= Concentration of COPEC in food items (mg COPEC/kg dry weight)
IR _{Abiotic}	= Abiotic media ingestion rate (kg soil dry wt./day)
EPC _{Abiotic}	= Concentration of COPEC in abiotic media (kg COPEC /kg dry weight soil)
ED	= Exposure duration (unitless)
SUF	= Site utilization factor (unitless)
BW	= Body weight (kg)

Exposure parameters required for calculating estimated exposure doses include the following:

- Biotic (i.e., plant and animal tissue) and abiotic (i.e., soil, sediment and surface water) media ingestion rates.
- Average concentrations of COPECs in food items and in abiotic media (i.e., soil, sediment and surface water).
- Exposure duration (time in a year that a receptor is exposed to site COPECs).

- Site utilization factor (the area of contamination in relation to the receptor's home range).
- Body weight.

Food ingestion rates for each indicator receptor were calculated using allometric equations provided in Nagy (2001) or in the EPA's *Wildlife Exposure Factors Handbook* (USEPA, 1993b). The equations are based on established relationships between body size and metabolic requirements, and are expressed in units of grams of food per day. Exposure parameters for ecological indicator receptors are identified in Table 6-2, and were obtained from the following sources:

- Wildlife Notebook Series (ADF&G, 2001).
- University of Michigan Museum of Zoology (UM, 2000).
- Field Guide to North American Mammals (NAS, 1996).
- Wildlife Exposure Factors Handbook (USEPA, 1993b).
- CRC Handbook of Avian Body Masses (Dunning, 1993).
- *California's Wildlife Volume II: Birds* (Zeiner, et al., 1990).

Dose estimation for higher trophic level receptors requires abiotic-to-abiotic media uptake factors and bioconcentration factors. Uptake factors and bioconcentration factors for individual COPECs evaluated in the ERA are summarized in Table 6-3. Finally, the specific equations used to estimate food ingestion rates (FIR), biotic media concentrations, and exposure doses for ecological indicator receptors are presented in Appendix G.

6.2.4 Ecological Effects Assessment

The Tier II ecological effects assessment describes how toxicity information are used in the characterization of potential ecological effects for indicator receptors. Ecological effects assessment for predictive ERA's of the type described in this HHERA Report require the use of ecological TRVs obtained from the literature. Two types of ecological TRVs were used, consistent with the nature of the ecological indicator receptors:

- Media-based TRVs for terrestrial plants and invertebrates exposed to soil.
- Dietary-based TRVs for upper trophic level receptors (i.e., herbivorous, omnivorous, invertivorous, or carnivorous birds and mammals).

Sources of media-based TRVs include:

- Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Processes: 1997 Revision. (ORNL, 1997b).
- *Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Terrestrial Plants: 1997 Revision* (ORNL, 1997c).

The TRVs developed as part of the ecological effects assessment are summarized in Tables 6-4 and 6-5 for mammalian and avian receptors, respectively. Sources of dietary exposure-based TRVs include:

- Guidance for Developing Ecological Soil Screening Levels (USEPA, 2005e).
- Screening Level Ecological Risk Assessment Guidance for Hazardous Waste Facilities (USEPA, 1999).
- Toxicological Benchmarks for Wildlife (ORNL, 1996b).
- *Great Lakes Water Quality Initiative Documents for the Protection of Wildlife* (USEPA, 1995).

Ecological hazards for petroleum hydrocarbons were evaluated based on the use of sampling results for specific indicator chemicals (e.g., BTEX and PAHs). Although ADEC has developed RfDs for individual petroleum hydrocarbons fractions, these toxicity values were developed based on the protection of human health. Therefore, they were not used to evaluate ecological receptors. In addition to the evaluation of indicator chemicals, as described above, potential impacts of petroleum hydrocarbon mixtures (such as DRO) were evaluated through the use of TRVs for surrogate compounds (e.g., naphthalene).

6.2.5 Risk Characterization

Ecological risk characterization integrates results of the exposure dose analysis and the effects assessment described in Section 6.2.3 and 6.2.4, respectively. For higher trophic level receptors, estimated exposure doses for each chemical and indicator receptor were compared to ecological TRVs to calculate a chemical-specific HQ. The equation for calculating the HQ is:

$$HQ = \frac{\text{Dose}}{\text{TRV}}$$

Where:

HQ = Hazard quotient (unitless).

Dose = Modeled exposure dose for indicator species (mg/Kg-day).

TRV = Toxicity reference value for the indicator species (mg/Kg-day).

The HQ value scheme is derived from toxicity testing in an aquatic framework, and a high HQ may not necessarily mean that representative ecological receptors are experiencing adverse health effects. For example, TRVs used in predictive ERAs are typically NOAEL-based. Therefore, environmental exposures higher than the TRV may be without adverse effect.

HQ values exceeding 1.0 are generally considered to be indicative of potential biological or ecological effects on representative receptors. HQ values above 1.0 do not necessarily indicate that a biological or ecological effect will occur, only that a lower threshold has been

exceeded (Menzie et al., 1992). Evaluating the significance of HQ values was conducted in a manner generally consistent with Menzie et al. (1992):

- HQ less than 1: no adverse effects on representative receptors.
- HQ between 1 and 10: limited potential for adverse effects on representative receptors.
- HQ between 10 and 100: potentially adverse effects on representative receptors.
- HQ exceeds 100: significant potential for adverse effects on representative receptors.

Note that these HQ ranges and anticipated outcomes are only guidelines. Site-specific factors such as spatial distribution and detection frequency of COPECs, uncertainty of assumptions used in exposure determination, and study endpoint used to determine toxicity benchmarks were considered when reviewing specific HQs.

In order to evaluate potential cumulative effects of exposure to multiple COPECs, ecological hazard indices (HIs) were calculated for COPECs having similar mechanisms of action or within specific chemical classes. Cumulative HI estimates were calculated as the sum of individual HQ estimates for COPECs with a similar mechanism of action or from a specific chemical class. Only COPECs with individual HQ estimates greater than or equal to 0.1 were included in the cumulative HI estimate; COPECs with HQs < 0.1 were deemed not to contribute significantly to the cumulative HI and were excluded from this calculation. Cumulative HI estimates were calculated for the following mechanisms of action (based on the toxicology of COPECs with HQ estimates greater than 0.1): growth/body weight changes, reproductive/developmental effects, and liver/kidney effects (refer to Tables 6-6 through 6-8). In addition, cumulative HI estimates were calculated for the following chemical classes: PAHs, chlorinated pesticides, PCBs and PHCs.

The ADEC risk management level is set at an ecological HI of 1. Consistent with ADEC guidance (ADEC, 2009), chemicals and sites associated with ecological HI estimates greater than 1 are retained for further evaluation. Options for further evaluation of sites with ecological HI estimates in excess of 1 may include, but are not limited to, ecological field validation studies, additional investigations of ambient conditions, or remedial options. Sites where HI estimates are less than 1 for all receptors, and uncertainties are acceptable, will be proposed for cleanup complete with institutional controls or NFRAP in regard to ecological concerns.

6.3 RESULTS

Results of the ERA for SS03, SS08 and SS11 are presented and discussed in the following subsections.

6.3.1 SS03

Hazard estimates for ecological indicator receptors exposed to contaminants associated with Site SS03 are summarized in Table 6-6. Detailed ecological hazard calculations for Site SS03 are presented in Appendix H (Tables H-1 through H-8).

Mammalian Receptors

Ecological HQ and HI estimates were calculated for the following mammalian indicator receptors exposed to COPECs in soil: tundra vole (herbivore), masked shrew (invertebrate), and least weasel (carnivore). Ecological HQ estimates in excess of 1.0 were calculated for the tundra vole, masked shrew, and least weasel exposed to soil. The highest HQ estimate (11) was calculated for the tundra vole and was attributable to barium in soil (EPC = 258 mg/kg). Other COPECs with HQ estimates in excess of 1.0 include: antimony, arsenic, cadmium, 1,2,4-trimethylbenzene, total xylenes, DRO and GRO.

Additionally, ecological HQ and estimates were calculated for the mink exposed to COPECs in sediment. No ecological HQ estimates in excess of 1.0 were calculated for the mink exposed to sediment.

In order to evaluate potential cumulative effects, ecological HQ estimates were summed to HIs for COPECs having similar mechanisms of action or within specific chemical classes. Cumulative HI estimates were calculated for the following mechanisms of action or specific chemical classes: growth/body weight changes, reproductive/developmental effects, chlorinated pesticides, and PHCs. Cumulative growth/body weight HI estimates for the tundra vole, masked shrew, least weasel, and mink were calculated as 13, 10, 3 and 0.9, respectively. Primary contributors to growth/body weight HI estimates in excess of the ADEC HI criterion of 1 were several metals in soil in order of descending contribution: barium, antimony, lead, copper, chromium, and silver.

Cumulative reproductive/developmental HI estimates for the tundra vole, masked shrew, least weasel, and mink were calculated as 6, 15, 1 and 0.6, respectively. Primary contributors to reproductive/developmental HI estimates in excess of the ADEC HI criterion of 1 in order of descending contribution were: antimony, total xylenes, arsenic, cadmium, lead, selenium, toluene, zinc, and vanadium.

A cumulative chlorinated pesticide HI estimate from sediment exposure was calculated for the mink only, and was equal to 0.005. This HI estimate is below the ADEC HI criterion of 1.

Cumulative PHC HI estimates for the tundra vole, masked shrew, least weasel, and mink were calculated as 2, 18, 0.5 and 0.003, respectively. Primary contributors to growth HI estimates in excess of the ADEC HI criterion of 1 were DRO and GRO at concentrations of 14,251 mg/kg and 629 mg/kg, respectively.

Avian Receptors

Ecological HQ and HI estimates were calculated for the following avian indicator receptors exposed to COPECs in soil: dark-eyed junco (herbivore), northern shrike (carnivore), and American robin (invertebrate). Additionally, ecological HQ and HI estimates were calculated for the mallard (omnivore) exposed to COPECs in sediment. No ecological HQ estimates in excess of 1.0 were calculated for the dark-eyed junco, northern shrike, or American robin exposed to soil, or for the mallard exposed to sediment.

In order to evaluate potential cumulative effects, ecological HQ estimates were summed to HIs for COPECs having similar mechanisms of action or within specific chemical classes. Cumulative HI estimates were calculated for the following mechanisms of action or specific chemical classes: growth/body weight changes, reproductive/developmental effects, and chlorinated pesticides. Cumulative growth/body weight HI estimates for the dark-eyed junco, northern shrike, American robin, and mallard were calculated as 0.2, 0.04, 0.4, and 0.00001, respectively. Cumulative growth/body weight HI estimates for avian receptors were below the ADEC HI criterion of 1.

Cumulative reproductive/developmental HI estimates for the dark-eyed junco, northern shrike, American robin, and mallard were calculated as 0.3, 0.06, 0.7, and 0.00002, respectively. Cumulative reproductive/developmental HI estimates for avian receptors were below the ADEC HI criterion of 1.

A cumulative chlorinated pesticide HI estimate from sediment exposure was calculated for the mallard only, and was equal to 0.000009. This HI estimate is below the ADEC HI criterion of 1.

Neither individual HQ estimates nor cumulative HI estimates for PHCs were calculated for the dark-eyed junco, northern shrike, American robin, or mallard because suitable avian toxicity values are not currently available for PHCs.

6.3.2 SS08

Hazard estimates for ecological indicator receptors exposed to contaminants associated with Site SS08 are summarized in Table 6-7. Detailed ecological hazard calculations for Site SS08 are presented in Appendix H (Tables H-9 through H-16).

Mammalian Receptors

Ecological HQ and HI estimates were calculated for the following mammalian indicator receptors exposed to COPECs in soil: tundra vole (herbivore), masked shrew (invertebrate), and least weasel (carnivore). Ecological HQ estimates in excess of 1.0 were calculated for the tundra vole, masked shrew, and least weasel exposed to soil. The highest HQ estimate (30) was calculated for the masked shrew and was attributable to Arochlor 1260 in soil (EPC = 12 mg/kg). Other COPECs with HQ estimates in excess of 1.0 include: antimony, arsenic, barium, 4,4'-DDT, DRO, and GRO.

Additionally, ecological HQ and HI estimates were calculated for the mink exposed to COPECs in sediment. An ecological HQ estimate in excess of 1.0 was calculated for the mink exposed to barium in sediment (EPC = 240 mg/kg).

In order to evaluate potential cumulative effects, ecological HQ estimates were summed to HIs for COPECs having similar mechanisms of action or within specific chemical classes. Cumulative HI estimates were calculated for the following mechanisms of action or specific

chemical classes: growth/body weight changes, reproductive/developmental effects, PAHs, chlorinated pesticides, and PHCs. Cumulative growth/body weight HI estimates for the tundra vole, masked shrew, least weasel, and mink were calculated as 13, 8, 2, and 1, respectively. Primary contributors to growth/body weight HI estimates in excess of the ADEC HI criterion of 1 were several metals in soil in order of descending contribution: barium, antimony, and cadmium.

Cumulative reproductive/developmental HI estimates for the tundra vole, masked shrew, least weasel, and mink were calculated as 4, 8, 0.9, and 0.6, respectively. Primary contributors to reproductive/developmental HI estimates in excess of the ADEC HI criterion of 1 in order of descending contribution were: antimony, arsenic, cadmium, and selenium.

A cumulative PAH HI estimate from sediment exposure was calculated for the mink only, and was equal to 0.00002. This HI estimate is below the ADEC HI criterion of 1.

Cumulative chlorinated pesticide HI estimates were calculated for the tundra vole, masked shrew, least weasel, and mink were calculated as 0.02, 2, 0.5, and 0.2, respectively. The primary contributor to the chlorinated pesticide HI estimate in excess of the ADEC HI criterion of 1 was 4,4'-DDT at a concentration of 3.8 mg/kg.

Cumulative PHC HI estimates for the tundra vole, masked shrew, least weasel, and mink were calculated as 1, 9, 0.1, and 0.1, respectively. Primary contributors to PHC HI estimates in excess of the ADEC HI criterion of 1 were DRO and GRO at concentrations of 2,159 mg/kg and 630 mg/kg, respectively.

Avian Receptors

Ecological HQ and HI estimates were calculated for the following avian indicator receptors exposed to COPECs in soil: dark-eyed junco (herbivore), northern shrike (carnivore), and American robin (invertivore). Additionally, ecological HQ and HI estimates were calculated for the mallard (omnivore) exposed to COPECs in sediment. No ecological HQ estimates in excess of 1.0 were calculated for the dark-eyed junco, northern shrike, or American robin exposed to soil, or for the mallard exposed to sediment.

In order to evaluate potential cumulative effects, ecological HQ estimates were summed to HIs for COPECs having similar mechanisms of action or within specific chemical classes. Cumulative HI estimates were calculated for the following mechanisms of action or specific chemical classes: growth/body weight changes, reproductive/developmental effects, PAHs, chlorinated pesticides, and PHCs. Cumulative growth/body weight HI estimates for the dark-eyed junco, northern shrike, American robin, and mallard were calculated as 0.1, 0.02, 0.2, and 0.00002, respectively. Cumulative growth/body weight HI estimates for avian receptors were below the ADEC HI criterion of 1.

Cumulative reproductive/developmental HI estimates for the dark-eyed junco, northern shrike, American robin, and mallard were calculated as 0.09, 0.02, 0.2, and 0.00002,

respectively. Cumulative reproductive/developmental HI estimates for avian receptors were below the ADEC HI criterion of 1.

Neither individual HQ estimates nor cumulative HI estimates for PAHs were calculated for the dark-eyed junco, northern shrike, American robin, or mallard because suitable avian toxicity values are not currently available for PAHs.

Cumulative chlorinated pesticide HI estimates for the dark-eyed junco, northern shrike, American robin, and mallard were calculated as 0.3, 3, 32, and 0.0005, respectively. The primary contributor to the chlorinated pesticide HI estimate in excess of the ADEC HI criterion of 1 was 4,4'-DDT at a concentration of 3.8 mg/kg.

Neither individual HQ estimates nor cumulative HI estimates for PHCs were calculated for the dark-eyed junco, northern shrike, American robin, or mallard because suitable avian toxicity values are not currently available for PHCs.

6.3.3 SS11

Hazard estimates for ecological indicator receptors exposed to contaminants associated with Site SS11 are summarized in Table 6-8. Detailed ecological hazard calculations for Site SS11 are presented in Appendix H (Tables H-17 through H-24).

Mammalian Receptors

Ecological HQ and HI estimates were calculated for the following mammalian indicator receptors exposed to COPECs in soil: tundra vole (herbivore), masked shrew (invertebrate), and least weasel (carnivore). Ecological HQ estimates in excess of 1.0 were calculated for the tundra vole, masked shrew, and least weasel exposed to soil. The highest HQ estimate (57) was calculated for the masked shrew and was attributable to DRO in soil (EPC = 79,575 mg/kg). Other COPECs with HQ estimates in excess of 1.0 include: antimony, arsenic, barium, molybdenum, acetone, various PAHs, various chlorinated pesticides, and RRO.

Additionally, ecological HQ and HI estimates were calculated for the mink exposed to COPECs in sediment. No ecological HQ estimates in excess of 1.0 were calculated for the mink exposed to sediment.

In order to evaluate potential cumulative effects, ecological HQ estimates were summed to HIs for COPECs having similar mechanisms of action or within specific chemical classes. Cumulative HI estimates were calculated for the following mechanisms of action or specific chemical classes: growth/body weight changes, reproductive/developmental effects, liver/kidney effects, PAHs, chlorinated pesticides, and PHCs. Cumulative growth/body weight HI estimates for the tundra vole, masked shrew, least weasel, and mink were calculated as 55, 23, 11, and 0.7, respectively. Primary contributors to growth/body weight HI estimates in excess of the ADEC HI criterion of 1 were several metals in soil in order of descending contribution: barium and antimony.

Cumulative reproductive/developmental HI estimates for the tundra vole, masked shrew, least weasel, and mink were calculated as 4, 7, 0.8, and 0.3, respectively. Primary contributors to reproductive/developmental HI estimates in excess of the ADEC HI criterion of 1 in order of descending contribution were: antimony, arsenic, and molybdenum.

Cumulative liver/kidney HI estimates for the tundra vole, masked shrew, and least weasel, were calculated as 4, 0.4, and 0.002, respectively. The primary contributor to liver/kidney HI estimates in excess of the ADEC HI criterion of 1 was acetone at a concentration of 11 mg/kg.

Cumulative PAH HI estimates for the tundra vole, masked shrew, and least weasel were calculated as 12, 124, and 0.8, respectively. Primary contributors to PAH HI estimates in excess of the ADEC HI criterion of 1 in order of descending contribution were: 2-methylnaphthalene, fluorene, naphthalene, fluoranthene, phenanthrene, anthracene, pyrene, and acenaphthene.

Cumulative chlorinated pesticide HI estimates for the tundra vole, masked shrew, least weasel, and mink were calculated as 0.4, 67, 0.3, and 0.003, respectively. Primary contributors to chlorinated pesticide HI estimates in excess of the ADEC HI criterion of 1 in order of descending contribution were: endrin aldehyde, endrin ketone, endrin, and dieldrin.

Cumulative PHC HI estimates for the tundra vole, masked shrew, least weasel, and mink were calculated as 13, 88, 4, and 0.01, respectively. Primary contributors to PHC HI estimates in excess of the ADEC HI criterion of 1 were DRO and RRO at concentrations of 79,575 mg/kg and 60,057 mg/kg, respectively.

Avian Receptors

Ecological HQ and HI estimates were calculated for the following avian indicator receptors exposed to COPECs in soil: dark-eyed junco (herbivore), northern shrike (carnivore), and American robin (invertivore). Additionally, ecological HQ and HI estimates were calculated for the mallard (omnivore) exposed to COPECs in sediment. Ecological HQ estimates in excess of 1.0 were calculated only for the American robin exposed to soil. The highest HQ estimate (7.1) was calculated for the American robin and was attributable to 4-4'-DDT in soil (EPC = 0.76 mg/kg).

In order to evaluate potential cumulative effects, ecological HQ estimates were summed to HIs for COPECs having similar mechanisms of action or within specific chemical classes. Cumulative HI estimates were calculated for the following mechanisms of action or specific chemical classes: growth/body weight changes, reproductive/developmental effects, liver/kidney effects, and chlorinated pesticides. Cumulative growth/body weight HI estimates for the dark-eyed junco, northern shrike, American robin, and mallard were calculated as 0.2, 0.02, 0.4, and 0.000003, respectively. Cumulative growth/body weight HI estimates for avian receptors were below the ADEC HI criterion of 1.

Cumulative reproductive/developmental HI estimates for the dark-eyed junco, northern shrike, American robin, and mallard were calculated as 0.09, 0.03, 0.3, and 0.000007,

respectively. Cumulative reproductive/developmental HI estimates for avian receptors were below the ADEC HI criterion of 1.

Cumulative liver/kidney HI estimates for the dark-eyed junco, northern shrike, and American robin were calculated as 0.00008, 0.0000008, and 0.000002, respectively. Cumulative liver/kidney HI estimates for avian receptors were below the ADEC HI criterion of 1.

Neither individual HQ estimates nor cumulative HI estimates for PAHs were calculated for the dark-eyed junco, northern shrike, American robin, or mallard because suitable avian toxicity values are not currently available for PAHs.

Cumulative chlorinated pesticide HI estimates for the dark-eyed junco, northern shrike, American robin, and mallard were calculated as 0.07, 0.9, 8, and 0.000003, respectively. The primary contributor to the chlorinated pesticide HI estimate in excess of the ADEC HI criterion of 1 was 4,4'-DDT at a concentration of 0.76 mg/kg.

Neither individual HQ estimates nor cumulative HI estimates for PHCs were calculated for the dark-eyed junco, northern shrike, American robin, or mallard because suitable avian toxicity values are not currently available for PHCs.

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Table 6-1 Summary of Default Assessment Endpoints and Indicator Species for the Interior Ecoregion ¹

Default Assessment Endpoint	Default Indicator Species	Typical Tier I Assessment Method	Primary (Bold) and Other Exposure Media
Primary Producers (Trophic Level 0)			
The potential for significant adverse effects on terrestrial soil plant species abundance, diversity and primary production.	All plants that obtain nutrients primarily from soil.	Compare soil concentrations with phytotoxicity benchmarks.	Surface soil.
The potential for significant adverse effects on terrestrial air plant species abundance, diversity and primary production.	All plants that obtain nutrients primarily from air.	Not evaluated under normal circumstances	Air.
The potential for significant adverse effects on freshwater plant species abundance, diversity and primary production.	All plants that obtain nutrients primarily from fresh water.	Compare media concentrations with available WQC.	Fresh water.
The potential for significant adverse effects on semi-aquatic plant species abundance, diversity and primary production.	All plants that obtain nutrients primarily from fresh water.	Compare media concentrations with available SQC.	Fresh water sediment. Fresh water.
Herbivores and Detritivores (Primary Consumers - Trophic Levels 1 and 2)			
The potential for significant adverse effects on freshwater aquatic invertebrate community abundance and diversity.	All freshwater aquatic invertebrates.	Compare media concentrations with available WQC.	Fresh water.
The potential for significant adverse effects on freshwater benthic invertebrate community abundance and diversity.	All freshwater benthic invertebrates.	Compare media concentrations with available SQC.	Fresh water sediment. Fresh water.
The potential for significant adverse effects on soil invertebrate community abundance and diversity.	All terrestrial invertebrates.	Compare media concentrations with earthworm/soil organism benchmarks.	Surface Soil
The potential for significant adverse effects on freshwater fish detritivore abundance and diversity.	All freshwater fish.	Compare media concentrations with available WQC.	Fresh water.
The potential for significant adverse effects on semi-aquatic avian herbivore abundance and diversity.	Mallard.	Model dose from aquatic plant ingestion, compare with TRVs.	Fresh water sediment. Fresh water.
The potential for significant adverse effects on terrestrial avian herbivore abundance and diversity.	Dark-eyed junco.	Model dose from soil, surface water and plant ingestion, compare to TRVs	Surface soil. Fresh water.
The potential for significant adverse effects on terrestrial semi-aquatic mammalian herbivore abundance and diversity.	Northern bog lemming.	Model dose from sediment, surface water, and plant ingestion, compare to TRVs	Fresh water.
The potential for significant adverse effects on terrestrial mammalian herbivore abundance and diversity.	Tundra vole.	Model dose from soil, surface water, and plant ingestion, compare to TRVs	Surface soil. Fresh water.

Table 6-1 Summary of Default Assessment Endpoints and Indicator Species for the Interior Ecoregion ¹

Default Assessment Endpoint	Default Indicator Species	Typical Tier I Assessment Method	Primary (Bold) and Other Exposure Media
Secondary Consumers (Trophic Level 3)			
The potential for significant adverse effects on freshwater avian invertevore abundance and diversity.	American dipper	Model dose from sediment and aquatic invertebrate ingestion, compare with TRVs.	Fresh water.
The potential for significant adverse effects on freshwater semi-aquatic avian invertevore abundance and diversity.	Common Snipe.	Model dose from sediment and benthic invertebrate ingestion, compare with TRVs.	Fresh water sediment.
The potential for significant adverse effects on terrestrial avian invertevore abundance and diversity.	American robin.	Model dose from soil and soil invertebrate ingestion, compare with TRVs.	Surface soil.
The potential for significant adverse effects on freshwater fish invertevore abundance and diversity.	All freshwater fish.	Compare media concentrations with available WQC.	Fresh water.
The potential for significant adverse effects on freshwater amphibian invertevore abundance and diversity.	Wood frog.	Compare media concentrations with available WQC.	Fresh water. Sediment.
The potential for significant adverse effects on terrestrial mammalian invertevore abundance and diversity.	Masked shrew.	Model dose from soil and soil invertebrate ingestion, compare with TRVs.	Surface soil. Fresh water.
Tertiary Consumers (Trophic Level 4)			
The potential for significant adverse effects on freshwater avian piscivore abundance and diversity.	Belted kingfisher.	Model dose from sediment, surface water, and plant ingestion, compare to TRVs.	Fresh water.
The potential for significant adverse effects on terrestrial avian carnivore abundance and diversity.	Northern shrike.	Model dose from soil and soil invertebrate ingestion, compare with TRVs.	Surface soil.
The potential for significant adverse effects on terrestrial mammalian carnivore abundance and diversity.	Least weasel.	Model dose from soil and terrestrial prey ingestion, compare with TRVs.	Surface soil.
The potential for significant adverse effects on freshwater semi-aquatic mammalian carnivore abundance and diversity.	Mink.	Model dose from sediment, surface water, and fish ingestion, compare to TRVs.	Fresh water. Sediment.
The potential for significant adverse effects on freshwater mammalian piscivore abundance and diversity.	River otter.	Model dose from fresh surface water and fish ingestion, compare to TRVs.	Fresh water.
The potential for significant adverse effects on freshwater fish piscivore abundance and diversity.	All freshwater fish.	Compare media concentrations with available WQC.	Fresh water.

Key:

1 - Source: ADEC, 1999.

SQC - Sediment quality criteria.

TRV - Toxicity reference value.

WQC - Water quality criteria.

Highlighted assessment endpoints and indicator species were evaluated in the Tier II Ecological Risk Assessment for Sites SS03, SS08, and SS11.

Table 6-2 Exposure Parameters for Ecological Receptors

Exposure Parameter	Exposure Value							
	Tundra Vole <i>Microtus oeconomus</i>	Masked Shrew <i>Sorex cinereus</i>	Dark-eyed Junco <i>Junco hyemalis</i>	Least Weasel <i>Mustela rixosa</i>	Mink <i>Turdus migratorius</i>	American Robin <i>Turdus migratorius</i>	Northern Shrike <i>Lanius excubitor</i>	Mallard <i>Anas platyrhynchos</i>
Body Mass average (grams) ^a	52.5 ^b	4.5 ^b	24 ^b	45 ^b	1,354 ^b	83.3 ^b	67.5 ^c	1,134 ^b
Male Range	25-80 ^e	3-6	18-30	39-63	974-1,734	63.5-103	56-79	1,043-1,225
Female Range	25-80 ^e	3-6	18-30	38-40	974-1,735	63.5-103	56-79	1,043-1,226
Diet Composition (percent)								
Plant Matter	100 ^e	0 ^e	100	0 ^e	0 ^e	30	0	90
Animal Matter	0 ^e	100 ^e	0	100 ^e	100 ^e	70	100	10
Food Ingestion Rate (grams/day) ^f	10.3	0.95	4.9	3.7	63	10.7	10.5	51
Plant Matter	10.3	0	4.9	0	0	3.2	0	46
Animal Matter	0	0.95	0	3.7	63	7.5	10.5	5.1
Soil/Sediment Ingestion Rate (grams/day)								
Percent ^{g,h}	2.4	2.4	3.3	2.8	2.8	10.4	3.3	3.3
Intake Rate (grams/day)	0.25	0.023	0.16	0.10	1.75	1.11	0.35	1.68
Water Ingestion Rate (L/day) ⁱ	0.0069	0.00076	0.0048	0.0061	0.13	0.011	0.0097	0.064
Home Range (acres) ^j	0.067	1.1	17	2.9	8.3	22	320	75,076
Exposure Area (acres) ^k	SS	SS	SS	SS	SS	SS	SS	SS
Site Utilization Factor (unitless) ^l	SS	SS	SS	SS	SS	SS	SS	SS
Exposure Duration (percent of year) ^m	1	1	0.5	1	1	0.5	0.5	0.5

Notes:

^a Average body weight for males and females combined.

^b Wildlife Exposure Factors Handbook (USEPA, 1993b).

^c From www.birds.cornell.edu.

^d Range of body weights for males and females.

^e Field Guide to North American Mammals (NAS, 1996).

^f Calculated using Equations 25 (northern shrike, least weasel, and mink), 29 (tundra vole and dark-eyed junco), 31 (masked shrew), and 33 (American robin and mallard) from Nagy (2001).

^g Soil ingestion rates were derived from Beyer et al. (1994). Tundra vole and masked shrew based on meadow vole soil ingestion rate. Dark-eyed junco and northern shrike based on mallard soil ingestion rate. Least weasel and mink based on red fox soil ingestion rate. American robin based on American woodcock soil ingestion rate.

^h Calculated as percent soil ingestion rates derived from Beyer et al. (1994) multiplied by the food ingestion rate (g/d).

ⁱ Calculated using Equation 15 (all birds) and Equation 17 from USEPA, 1993b.

^j Home range is equal to the area necessary to support the dietary and reproductive needs of each animal. Home range for tundra vole based on similar species home range, meadow vole (*Microtus pennsylvanicus*), USEPA (1993). Home range for masked shrew based on data from the University of Michigan, 2006. Home range for dark-eyed junco, American robin, Northern shrike, and mallard based on data from the California Wildlife Habitat Relationship System, 2006. Home range for least weasel and mink based on data from the Alaska Department of Fish and Game, 2006.

^k Exposure area based on the total area of each site.

^l Site utilization factors are calculated as the exposure area divided by the home range. Instances where the home range > exposure area are reported as 1.

^m Exposure duration (percent of year exposed) for species based on the following facts: tundra vole, masked shrew, least weasel, and mink = 1.0 – does not migrate and is active yearlong. American robin, dark-eyed junco, Northern shrike, and mallard = 0.5 – most individuals are anticipated to migrate between October and March.

SS – site-specific

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Table 6-3 Bioconcentration Factors for Use in Modeling Food Chain Exposure for Ecological Receptors

Chemicals of Potential Ecological Concern	Chemical Information			BCF _{AM-W} ^a			
	log (K _{ow})/ Source	K _{ow} /Source	K _{oc} /Source	BCF _{S-P} / Source	BCF _{S-I} / Source	BCF _{S-M} / Source	
				kg dry soil/ kg dry tissue	kg dry soil/ kg dry tissue	kg dry soil/ tissue	kg
Inorganics							
Aluminum	na	na	na	0.0040 b	na c	na c	
Antimony	na	na	na	0.20 b	1.0 b	na d	
Arsenic	na	na	na	0.040 b	Regression d	Regression d	
Barium	na	na	na	0.16 d	0.091 d	0.057 m	
Beryllium	na	na	na	Regression d	0.045 d	na d	
Cadmium	na	na	na	0.55 e	Regression d	0.33 m	
Chromium	na	na	na	0.041 d	0.31 d	Regression d	
Cobalt	na	na	na	0.0075 d	0.12 d	Regression d	
Copper	na	na	na	0.40 b	0.52 d	0.20 m	
Lead	na	na	na	Regression d	Regression d	0.11 m	
Manganese	na	na	na	0.079 d	Regression d	0.021 m	
Mercury	na	na	na	0.90 e	Regression f	0.054 f/m	
Molybdenum	na	na	na	0.25 e	0.95 f	0.0022 f	
Nickel	na	na	na	Regression d	na d	0.35 m	
Selenium	na	na	na	Regression d	Regression d	Regression d	
Silver	na	na	na	0.40 b	2.0 d	0.0040 d	
Thallium	na	na	na	0.0040 b	na	na	
Tin	na	na	na	0.030 e	na	na	
Titanium	na	na	na	0.0055 e	na	na	
Vanadium	na	na	na	0.0055 e	0.042 d	0.012 d	
Zinc	na	na	na	Regression d	Regression d	0.77 m	
Volatile Organic Compounds							
1,1-Dichloropropene	2.42 g	2.63E+02 g	6.77E+01 g	1.5 h	12 i	0.0 d	
1,2,3-Trichlorobenzene	4.05 g	1.12E+04 g	7.33E+02 g	0.18 h	28 i	0.0 d	
1,2,3-Trichloropropane	2.27 g	1.86E+02 g	1.31E+02 g	1.9 h	4.5 i	0.0 d	
1,2,4-Trimethylbenzene	3.63 g	4.27E+03 g	7.18E+02 g	0.31 h	13 i	0.0 d	
1,3,5-Trimethylbenzene	3.42 g	2.63E+03 g	7.03E+02 g	0.41 h	8.4 i	0.0 d	
1,4-Dichlorobenzene	3.44 g	2.75E+03 g	4.34E+02 g	0.40 h	14 i	0.0 d	
1-Chlorohexane	na	na	na	na	na	0.0 d	
2,2-Dichloropropane	na	na	na	na	na	0.0 d	
2-Chloroethyl Vinyl Ether	1.17 g	1.48E+01 g	8.11E+00 g	8.2 h	8.0 i	0.0 d	
Acetone	0.24 g	1.74E+00 g	1.98E+00 g	28.1 h	5.1 i	0.0 d	
Benzene	2.13 g	1.35E+02 g	1.66E+02 g	2.3 h	2.7 i	0.0 d	
Bromomethane	1.19 g	1.55E+01 g	1.43E+01 g	7.9 h	4.7 i	0.0 d	
Carbon Disulfide	2.00 g	1.00E+02 g	5.14E+01 g	2.7 h	6.7 i	0.0 d	
Chloroethane	0.91 g	8.13E+00 g	1.43E+01 g	12 h	2.7 i	0.0 d	
Chloromethane	0.91 g	8.13E+00 g	1.43E+01 g	12 h	2.7 i	0.0 d	
cis-1,3-Dichloropropene	2.06 g	1.15E+02 g	8.08E+01 g	2.5 h	4.8 i	0.0 d	
Ethylbenzene	3.15 g	1.41E+03 g	5.18E+02 g	0.59 h	6.6 i	0.0 d	
Isopropylbenzene	3.66 g	4.57E+03 g	8.17E+02 g	0.30 h	12 i	0.0 d	
Methylene Chloride	1.25 g	1.78E+01 g	2.37E+01 g	7.3 h	3.2 i	0.0 d	
m,p-Xylenes	3.12 g	1.32E+03 g	4.43E+02 g	0.61 h	7.3 i	0.0 d	
n-Butylbenzene	4.38 g	2.40E+04 g	1.76E+03 g	0.11 h	23 i	0.0 d	
n-Propylbenzene	3.69 g	4.90E+03 g	9.55E+02 g	0.29 h	11 i	0.0 d	
o-Xylene	3.12 g	1.32E+03 g	4.43E+02 g	0.61 h	7.3 i	0.0 d	
p-Isopropyltoluene	3.66 g	4.57E+03 g	8.17E+02 g	0.30 h	12 i	0.0 d	
sec-Butylbenzene	4.57 g	3.72E+04 g	1.58E+03 g	0.088 h	37 i	0.0 d	
Styrene	2.95 g	8.91E+02 g	5.18E+02 g	0.76 h	4.4 i	0.0 d	
Tert-Butylbenzene	4.11 g	1.29E+04 g	1.18E+03 g	0.16 h	20 i	0.0 d	
Toluene	2.73 g	5.37E+02 g	2.68E+02 g	1.02 h	5.5 i	0.0 d	
Total xylenes	3.12 g	1.32E+03 g	4.43E+02 g	0.61 h	7.3 i	0.0 d	
trans-1,3-Dichloropropene	2.03 g	1.07E+02 g	8.08E+01 g	2.6 h	4.5 i	0.0 d	

Table 6-3 Bioconcentration Factors for Use in Modeling Food Chain Exposure for Ecological Receptors

Chemicals of Potential Ecological Concern	Chemical Information			BCF _{AM-W} ^a			
	log (K _{ow})/ Source	K _{ow} /Source	K _{oc} /Source	BCF _{S-P} / Source	BCF _{S-I} / Source	BCF _{S-M} / Source	
				kg dry soil/ kg dry tissue	kg dry soil/ kg dry tissue	kg dry soil/ tissue	kg
Trichlorofluoromethane	2.53 g	3.39E+02 g	4.86E+01 g	1.3 h	20 i	0.0	d
Vinyl Acetate	0.73 g	5.37E+00 g	6.13E+00 g	15 h	4.4 i	0.0	d
Semi-Volatile Organic Compounds							
2,4-Dimethylphenol	2.30 g	2.00E+02 g	7.18E+02 g	1.8 h	0.87 i	0.0	d
2-Nitroaniline	1.85 g	7.08E+01 g	5.27E+01 g	3.3 h	4.8 i	0.0	d
3-and 4-Methylphenol Coelution	2.30 g	2.00E+02 g	7.18E+02 g	1.8 h	0.87 i	0.0	d
3,3'-Dichlorobenzidine	3.51 g	3.24E+03 g	7.49E+03 g	0.36 h	0.94 i	0.0	d
3-Nitroaniline	1.37 g	2.34E+01 g	5.16E+01 g	6.3 h	1.9 i	0.0	d
4-Chloro-3-methylphenol	3.10 g	1.26E+03 g	7.18E+02 g	0.63 h	4.3 i	0.0	d
4-Chloroaniline	1.88 g	7.59E+01 g	7.18E+02 g	3.2 h	0.38 i	0.0	d
4-Methylphenol	2.30 g	2.00E+02 g	7.18E+02 g	1.8 h	0.87 i	0.0	d
Benzoic Acid	1.87 g	7.41E+01 g	1.45E+01 g	3.2 h	18 i	0.0	d
Bis(2-ethylhexyl) Phthalate	7.60 g	3.98E+07 g	1.65E+05 g	0.0016 h	155 i	0.0	d
Dibenzofuran	4.12 g	1.32E+04 g	1.13E+04 g	0.16 h	2.1 i	0.0	d
DiethylPhthalate	2.42 g	2.63E+02 g	1.26E+02 g	1.5 h	6.3 i	0.0	d
Phenol	1.46 g	2.88E+01 g	2.68E+02 g	5.5 h	0.43 i	0.0	d
Polynuclear Aromatic Hydrocarbons							
2-Methylnaphthalene	3.86 g	7.24E+03 g	2.98E+03 g	0.23 h	4.4 d	0.0	d
Acenaphthene	3.92 g	8.32E+03 g	6.12E+03 g	0.21 h	1.5 d	0.0	d
Acenaphthylene	3.94 g	8.71E+03 g	6.12E+03 g	0.20 h	23 d	0.0	d
Anthracene	4.45 g	2.82E+04 g	2.04E+04 g	0.10 h	2.4 d	0.0	d
Benzo(a)anthracene	5.76 g	5.75E+05 g	2.31E+05 g	0.02 h	1.6 d	0.0	d
Benzo(a)pyrene	6.13 g	1.35E+06 g	7.87E+05 g	0.01 h	1.3 d	0.0	d
Benzo(b)fluoranthene	5.78 g	6.03E+05 g	8.03E+05 g	0.02 h	2.6 d	0.0	d
Benzo(g,h,i)perylene	6.63 g	4.27E+06 g	2.68E+06 g	0.0057 h	2.9 d	0.0	d
Benzo(k)fluoranthene	6.11 g	1.29E+06 g	7.87E+05 g	0.011 h	2.6 d	0.0	d
Chrysene	5.81 g	6.46E+05 g	2.36E+05 g	0.017 h	2.3 d	0.0	d
Dibenz(a,h)anthracene	6.75 g	5.62E+06 g	2.62E+06 g	0.0049 h	2.3 d	0.0	d
Fluoranthene	5.16 g	1.45E+05 g	7.09E+04 g	0.040 h	3.0 d	0.0	d
Fluorene	4.18 g	1.51E+04 g	1.13E+04 g	0.15 h	9.6 d	0.0	d
Indeno(1,2,3-cd)pyrene	6.70 g	5.01E+06 g	2.68E+06 g	0.0052 h	2.9 d	0.0	d
Naphthalene	3.30 g	2.00E+03 g	1.84E+03 g	0.48 h	4.4 d	0.0	d
Phenanthrene	4.46 g	2.88E+04 g	2.08E+04 g	0.10 h	1.7 d	0.0	d
Pyrene	4.88 g	7.59E+04 g	6.94E+04 g	0.059 h	1.8 d	0.0	d
Pesticides							
4,4'-DDD	6.02 g	1.05E+06 g	1.53E+05 g	0.013 h	Regression d	na	d
4,4'-DDE	6.51 g	3.24E+06 g	1.53E+05 g	0.0067 h	Regression d	Regression	d
4,4'-DDT	6.91 g	8.13E+06 g	2.20E+05 g	0.0039 h	Regression d	Regression	d
delta-BHC	na	na	na	na	na	na	
Dieldrin	5.20 g	1.58E+05 g	1.06E+04 g	0.038 h	15 d	1.2	d
Endosulfan Sulfate	3.66 g	4.57E+03 g	3.23E+04 g	0.30 h	0.30 i	na	
Endrin	5.20 g	1.58E+05 g	1.06E+04 g	0.038 h	20 i	na	
Endrin aldehyde	5.20 g	1.58E+05 g	1.06E+04 g	0.038 h	20 i	na	
Endrin ketone	5.20 g	1.58E+05 g	1.06E+04 g	0.038 h	20 i	na	
Polychlorinated Biphenyls							
Arochlor 1260	8.27 g	1.86E+08 g	2.07E+05 g	0.00064 h	6.7 n	1.2	f
Petroleum Hydrocarbons							
Diesel Range Organics (DRO)	3.37 j	2.36E+03 j	1.19E+03 j	0.43 h	0.25 i	0.0	d
Gasoline Range Organics (GRO)	2.14 k	1.37E+02 k	6.20E+01 k	2.3 h	na	0.0	d
Residual Range Organics (RRO)	6.13 l	1.35E+06 l	9.69E+05 l	0.011 h	0.42 i	0.0	d

Key:

BCF_{AM-W} -Bioconcentration Factor - Abiotic Media to Wildlife.

BCF_{S-I} -Bioconcentration Factor - Soil to Invertebrate.

Table 6-3 Bioconcentration Factors for Use in Modeling Food Chain Exposure for Ecological Receptors

Chemicals of Potential Ecological Concern	Chemical Information			BCF _{AM-W} ^a			
	log (K _{ow})/ Source	K _{ow} /Source	K _{oc} /Source	BCF _{S-P} / Source	BCF _{S-I} / Source	BCF _{S-M} / Source	
				kg dry soil/ kg dry tissue	kg dry soil/ kg dry tissue	kg dry soil/ tissue	kg

BCF_{S-P} - Bioconcentration Factor - Soil to Plant.

BCF_{S-M} - Bioconcentration Factor - Soil to Mammal

K_{oc} - Organic Carbon Partition Coefficient (L/kg)

K_{ow} - Octanol/Water Partition Coefficient

na - not applicable.

^a Bioconcentrations factors between abiotic media and wildlife (BCF_{AM-W}) were derived from various published sources, and were used to calculate exposure point concentrations in biotic media.

^b Source: Screening Level Ecological Risk Assessment Protocol for hazardous combustion facilities (USEPA, 1999).

^c Aluminum is not considered to be bioavailable in soil except under acidic (pH < 5.5) conditions. Source: Ecological Soil Screening Level Guidance, Exhibit 5.2: Review of Aluminum Chemistry and Toxicity in Soil (USEPA, 2003).

^d Source: Guidance for Developing Ecological Soil Screening Levels (Eco-SSLs), Attachment 4-1: Exposure Factors and Bioaccumulation Models for Derivation of Wildlife Eco-SSLs (USEPA, 2007d).

^e Source: A review and analysis of parameters for assessing transport of environmentally released radionuclides through agriculture. (Baes et al., 1984).

^f Source: Preliminary Remediation Goals for Ecological Endpoints (ORNL, 1997d).

^g Source: RAIS (http://risk.lsd.ornl.gov/tox/tox_values.shtml), June 2007.

^h Calculated based on the equation: $\log BCF_{S-P} = 1.588 - 0.578 \cdot \log K_{ow}$. Source: Travis & Arms (1988).

ⁱ Calculated based on the relationship K_{ww} (partition coefficient between a chemical in pore water and worm tissue; L/kg worm dry wt) divided by K_d (partition coefficient between a chemical in pore water and soil; L/Kg soil dry wt). Source: USEPA (2005) Table 5 footnotes.

^j Naphthalene used as a surrogate for DRO. Naphthalene is representative of the C10 – C25 aromatic fraction of petroleum hydrocarbons, and is a significant component of DRO.

^k Derived from Region 6 Draft SLERA Protocol (USEPA 1999, Appendix C) based on a wet to dry weight conversion factor of 5.99.

^l Benzo(a)pyrene used as a surrogate for RRO. Benzo(a)pyrene is representative of the C25 – C36 aromatic fraction of petroleum hydrocarbons, and may be a significant component of RRO.

^m - Sample et al. 1998 Development and Validation of Bioaccumulation Models for Small Mammals Table 7 and Appendix B.

ⁿ - Sample et al. 1998b Development and Validation of Bioaccumulation Models for Earthworms, Table 11.

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Table 6-4 Ecological Toxicity Reference Values for Mammalian Indicator Receptors¹

Chemicals of Potential Ecological Concern	Benchmark Dose (mg/kg-day)		Benchmark Species	Benchmark Species	Allometric TRV (mg/kg-day)			
				Body Weight (kg)	Masked Shrew (<i>Sorex cinereus</i>)	Tundra Vole (<i>Microtus oeconomus</i>)	Least Weasel (<i>Mustela rixosa</i>)	Mink <i>Turdus migratorius</i>
Inorganics								
Aluminum	1.9E+00	a	Mouse ^a	0.03 ^a	3.1E+00	1.7E+00	1.7E+00	7.5E-01
Antimony	5.9E-02	b	Vole ^b	0.044 ^a	1.0E-01	5.6E-02	5.9E-02	2.5E-02
Arsenic	1.3E-01	a	Mouse ^a	0.03 ^a	2.0E-01	1.1E-01	1.1E-01	4.9E-02
Barium	5.1E-01	a	Rat ^a	0.35 ^a	1.5E+00	8.2E-01	8.5E-01	3.6E-01
Beryllium	5.3E-01	b	Rat ^b	0.35 ^b	1.6E+00	8.5E-01	8.9E-01	3.8E-01
Cadmium	1.0E+00	a	Rat ^a	0.35 ^a	3.0E+00	1.6E+00	1.7E+00	7.1E-01
Chromium	3.5E+00	a	Rat ^a	0.35 ^a	1.0E+01	5.6E+00	5.8E+00	2.5E+00
Cobalt	7.3E+00	b	Rat ^b	0.35 ^b	2.2E+01	1.2E+01	1.2E+01	5.2E+00
Copper	1.2E+01	a	Mink ^a	1 ^a	4.5E+01	2.4E+01	2.5E+01	1.1E+01
Lead	4.7E+00	b	Rat ^b	0.35 ^b	1.4E+01	7.6E+00	7.8E+00	3.4E+00
Manganese	8.8E+01	a	Rat ^a	0.35 ^a	2.6E+02	1.4E+02	1.5E+02	6.3E+01
Mercury	1.0E+00	a	Mink ^a	1 ^a	3.9E+00	2.1E+00	2.2E+00	9.3E-01
Molybdenum	2.6E-01	a	Mouse ^a	0.03 ^a	4.2E-01	2.3E-01	2.3E-01	1.0E-01
Nickel	4.0E+01	a	Rat ^a	0.35 ^a	1.2E+02	6.4E+01	6.7E+01	2.9E+01
Selenium	2.0E-01	a	Rat ^a	0.35 ^a	5.9E-01	3.2E-01	3.3E-01	1.4E-01
Silver	6.0E+00	b	Rat ^b	0.35 ^b	1.8E+01	9.7E+00	1.0E+01	4.3E+00
Thallium	7.4E-03	a	Rat ^a	0.365	2.2E-02	1.2E-02	1.2E-02	5.3E-03
Tin	2.3E+01	a	Mouse ^a	0.03 ^a	3.8E+01	2.0E+01	2.1E+01	9.0E+00
Titanium	na		na	na	na	na	na	na
Vanadium	2.1E+00	c	Rat ^c	0.35 ^c	6.2E+00	3.4E+00	3.5E+00	1.5E+00
Zinc	1.6E+02	a	Rat ^a	0.035 ^a	2.7E+02	1.4E+02	1.5E+02	6.4E+01
Volatile Organic Compounds								
1,1-Dichloropropene	na		na	na	na	na	na	na
1,2,3-Trichlorobenzene	na		na	na	na	na	na	na
1,2,3-Trichloropropane	na		na	na	na	na	na	na
1,2,4-Trimethylbenzene ^d	2.6E+02	c	Rat ^c	0.35 ^c	7.8E+02	4.2E+02	4.4E+02	1.9E+02
1,3,5-Trimethylbenzene ^d	2.6E+02	c	Rat ^c	0.35 ^c	7.8E+02	4.2E+02	4.4E+02	1.9E+02
1,4-Dichlorobenzene	na		na	na	na	na	na	na
1-Chlorohexane	na		na	na	na	na	na	na
2,2-Dichloropropane	na		na	na	na	na	na	na
2-Chloroethyl Vinyl Ether	na		na	na	na	na	na	na
Acetone	1.0E+01	a	Rat ^a	0.35 ^a	3.0E+01	1.6E+01	1.7E+01	7.1E+00
Benzene	2.6E+02	a	Rat ^a	0.35 ^a	7.8E+02	4.2E+02	4.4E+02	1.9E+02
Bromomethane ⁱ	5.0E+01	c	Mouse ^c	0.03 ^c	8.0E+01	4.3E+01	4.5E+01	1.9E+01
Carbon Disulfide	na		na	na	na	na	na	na
Chloroethane	na		na	na	na	na	na	na
Chloromethane	na		na	na	na	na	na	na
cis-1,3-Dichloropropene	na		na	na	na	na	na	na
Ethylbenzene ^d	2.6E+02	a	Rat ^a	0.35 ^a	7.8E+02	4.2E+02	4.4E+02	1.9E+02
Isopropylbenzene	5.0E+02	c	Rat ^c	0.35 ^c	1.5E+03	8.0E+02	8.3E+02	3.6E+02
Methylene Chloride	5.9E+00	a	Rat ^a	0.35 ^a	1.7E+01	9.4E+00	9.8E+00	4.2E+00

Table 6-4 Ecological Toxicity Reference Values for Mammalian Indicator Receptors¹

Chemicals of Potential Ecological Concern	Benchmark Dose (mg/kg-day)	Benchmark Species	Benchmark Species		Allometric TRV (mg/kg-day)			
			Body Weight (kg)		Masked Shrew (<i>Sorex cinereus</i>)	Tundra Vole (<i>Microtus oeconomus</i>)	Least Weasel (<i>Mustela vison</i>)	Mink (<i>Turdus migratorius</i>)
m,p-Xylenes	5.0E+02	^c Rat	0.35	^a	1.5E+03	8.0E+02	8.3E+02	3.6E+02
n-Butylbenzene ^d	2.6E+02	^a Rat	0.35	^a	7.8E+02	4.2E+02	4.4E+02	1.9E+02
n-Propylbenzene ^d	2.6E+02	^a Rat	0.35	^a	7.8E+02	4.2E+02	4.4E+02	1.9E+02
o-Xylene	5.0E+02	^c Rat	0.35	^a	1.5E+03	8.0E+02	8.3E+02	3.6E+02
p-Isopropyltoluene ^j	5.0E+02	^c Rat	0.35	^c	1.5E+03	8.0E+02	8.3E+02	3.6E+02
sec-Butylbenzene	2.6E+02	^a Rat	0.35	^a	7.8E+02	4.2E+02	4.4E+02	1.9E+02
Styrene	na	na	na		na	na	na	na
Tert-Butylbenzene	2.6E+02	^a Rat	0.35	^a	7.8E+02	4.2E+02	4.4E+02	1.9E+02
Toluene	2.6E+01	^a Mouse	0.03	^a	4.2E+01	2.3E+01	2.3E+01	1.0E+01
Total xylenes	5.0E+02	^c Rat	0.35	^a	1.5E+03	8.0E+02	8.3E+02	3.6E+02
trans-1,3-Dichloropropene	na	na	na		na	na	na	na
Trichlorofluoromethane	na	na	na		na	na	na	na
Vinyl Acetate	na	na	na		na	na	na	na
Semi-Volatile Organic Compounds								
2,4-Dimethylphenol	na	na	na		na	na	na	na
2-Nitroaniline	na	na	na		na	na	na	na
3-and 4-Methylphenol Coelution ^e	2.2E+02	^a Mink	1	^a	8.5E+02	4.6E+02	4.8E+02	2.0E+02
3,3'-Dichlorobenzidine	na	na	na		na	na	na	na
3-Nitroaniline	na	na	na		na	na	na	na
4-Chloro-3-methylphenol ^f	2.2E+02	^a Mink	1	^a	8.5E+02	4.6E+02	4.8E+02	2.0E+02
4-Chloroaniline	1.1E+00	^c Rat	0.35	^a	3.1E+00	1.7E+00	1.8E+00	7.5E-01
4-Methylphenol ^f	2.2E+02	^a Mink	1	^a	8.5E+02	4.6E+02	4.8E+02	2.0E+02
Benzoic Acid	na	na	na		na	na	na	na
Bis(2-ethylhexyl) Phthalate	1.8E+01	^c Rat	0.35	^a	5.4E+01	2.9E+01	3.1E+01	1.3E+01
Dibenzofuran	na	na	na		na	na	na	na
DiethylPhthalate	4.6E+03	^a Mouse	0.03	^a	7.4E+03	4.0E+03	4.1E+03	1.8E+03
Phenol	na	na	na		na	na	na	na
Polynuclear Aromatic Hydrocarbons								
2-Methylnaphthalene	5.0E+01	^c Rat	0.35	^a	1.5E+02	8.0E+01	8.3E+01	3.6E+01
Acenaphthene	1.0E+02	^c Mouse	0.03	^a	1.6E+02	8.7E+01	9.0E+01	3.9E+01
Acenaphthylene	1.0E+02	^c Mouse	0.03	^a	1.6E+02	8.7E+01	9.0E+01	3.9E+01
Anthracene	1.0E+02	^c Mouse	0.03	^a	1.6E+02	8.7E+01	9.0E+01	3.9E+01
Benzo(a)anthracene	1.7E+02	^c Mouse	0.03	^a	2.7E+02	1.5E+02	1.5E+02	6.5E+01
Benzo(a)pyrene	1.0E+02	^c Mouse	0.03	^a	1.6E+02	8.7E+01	9.0E+01	3.9E+01
Benzo(b)fluoranthene	1.0E+02	^c Mouse	0.03	^a	1.6E+02	8.7E+01	9.0E+01	3.9E+01
Benzo(g,h,i)perylene	1.0E+02	^c Mouse	0.03	^a	1.6E+02	8.7E+01	9.0E+01	3.9E+01
Benzo(k)fluoranthene	1.0E+02	^c Mouse	0.03	^a	1.6E+02	8.7E+01	9.0E+01	3.9E+01
Chrysene	1.0E+02	^c Mouse	0.03	^a	1.6E+02	8.7E+01	9.0E+01	3.9E+01
Dibenz(a,h)anthracene	2.0E+00	^c Rat	0.35	^a	5.9E+00	3.2E+00	3.3E+00	1.4E+00
Fluoranthene	1.0E+02	^c Mouse	0.03	^a	1.6E+02	7.7E+01	9.0E+01	3.9E+01

Table 6-4 Ecological Toxicity Reference Values for Mammalian Indicator Receptors¹

Chemicals of Potential Ecological Concern	Benchmark Dose (mg/kg-day)		Benchmark Species	Body Weight (kg)	Allometric TRV (mg/kg-day)			
					Masked Shrew (<i>Sorex cinereus</i>)	Tundra Vole (<i>Microtus oeconomus</i>)	Least Weasel (<i>Mustela rixosa</i>)	Mink (<i>Turdus migratorius</i>)
Fluorene	1.0E+02	^c	Mouse ^c	0.03 ^a	1.6E+02	8.7E+01	9.0E+01	3.9E+01
Indeno(1,2,3-cd)pyrene	1.0E+02	^c	Mouse ^c	0.03 ^a	1.6E+02	8.7E+01	9.0E+01	3.9E+01
Naphthalene	5.0E+01	^c	Rat ^c	0.35 ^a	1.5E+02	8.0E+01	8.3E+01	3.6E+01
Phenanthrene	1.0E+02	^c	Mouse ^c	0.03 ^a	1.6E+02	8.7E+01	9.0E+01	3.9E+01
Pyrene	1.0E+02	^c	Mouse ^c	0.03 ^a	1.6E+02	8.7E+01	9.0E+01	3.9E+01
Pesticides								
4,4'-DDD	8.0E-01	^c	Rat ^c	0.35 ^a	2.4E+00	1.3E+00	1.3E+00	5.7E-01
4,4'-DDE	8.0E-01	^c	Rat ^c	0.35 ^a	2.4E+00	1.3E+00	1.3E+00	5.7E-01
4,4'-DDT	8.0E-01	^c	Rat ^c	0.35 ^a	2.4E+00	1.3E+00	1.3E+00	5.7E-01
delta-BHC	2.4E+00	^c	Rat ^c	0.35 ^c	7.1E+00	3.9E+00	4.0E+00	1.7E+00
Dieldrin	2.0E-02	^a	Rat ^a	0.35 ^a	5.9E-02	3.2E-02	3.3E-02	1.4E-02
Endosulfan Sulfate	1.0E+00	^c	Rat ^c	0.35 ^a	3.0E+00	1.6E+00	1.7E+00	7.1E-01
Endrin	9.2E-02	^a	Mouse ^a	0.03 ^a	1.5E-01	8.0E-02	8.3E-02	3.6E-02
Endrin aldehyde	9.2E-02	^a	Mouse ^a	0.03 ^a	1.5E-01	8.0E-02	8.3E-02	3.6E-02
Endrin ketone	9.2E-02	^a	Mouse ^a	0.03 ^a	1.5E-01	8.0E-02	8.3E-02	3.6E-02
Polychlorinated Biphenyls								
Arochlor 1260	1.4E-01	^a	Mink ^a	1 ^a	5.4E-01	2.9E-01	3.0E-01	1.3E-01
Petroleum Hydrocarbons								
Diesel Range Organics (DRO) ^f	5.0E+01	^c	Rat ^c	0.35 ^a	1.5E+02	8.0E+01	8.3E+01	3.6E+01
Gasoline Range Organics (GRO) ^g	2.6E+01	^a	Mouse ^a	0.03 ^a	4.2E+01	2.3E+01	2.4E+01	1.0E+01
Residual Range Organics (RRO) ^h	1.0E+02	^g	Mouse ^g	0.03 ^a	1.6E+02	8.7E+01	9.0E+01	3.9E+01

Notes:

4,4'-DDD - dichlorodiphenyldichloroethane

4,4'-DDE - dichlorodiphenyldichloroethylene

4,4'-DDT - dichlorodiphenyltrichloroethane

kg - Kilograms

mg/kg-dry - Milligrams per kilogram dry weight

na - Not applicable

TRV - Toxicity Reference Value

¹ Receptor-specific TRVs are derived from body weight based allometric conversion of the toxicity benchmark value (USDOE, 1996) .

^a Toxicological Benchmarks for Wildlife (ORNL, 1996b).

^b Ecological Soil Screening Levels (EcoSSLs) (USEPA, 2005e).

^c Technical Plan for Human Health and Ecological Risk Assessment (USEPA, 2000b).

^d Benzene used as a surrogate

^e o-Cresol used as a surrogate

^f Naphthalene used as a surrogate for DRO. Naphthalene is representative of the C10 – C25 aromatic fraction of petroleum hydrocarbons, and is a significant component of DRO.

^g Benzene used as a surrogate for GRO. Benzene is representative of the C6 – C10 aromatic fraction of petroleum hydrocarbons, and is a significant component of GRO.

^h Benzo(a)pyrene used as a surrogate for RRO. Benzo(a)pyrene is representative of the C25 – C36 aromatic fraction of petroleum hydrocarbons, and may be a significant component of RRO.

ⁱ 1,2-Dichloroethane is used as a surrogate for bromomethane.

^j Isopropylbenzene used as a surrogate for p-isopropyltoluene.

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Table 6-5 Ecological Toxicity Reference Values for Avian Indicator Receptors¹

Chemicals of Potential Ecological Concern	Benchmark		Benchmark Species	Benchmark Species Body Weight (kg)	Allometric TRV (mg/kg-day)			
	Dose (mg/kg-day)				Dark-eyed Junco	American Robin	Northern Shrike	Mallard
					<i>Funco hyemalis</i>	<i>Turdus migratorius</i>	<i>Laninus excubitor</i>	<i>Anas platyrhynchos</i>
Inorganics								
Aluminum	1.1E+02	a	Ringed Turtle Dove a,b	0.155 a	1.7E+02	1.3E+02	1.4E+02	6.7E+01
Antimony ^e	2.5E+00	a	Brown-headed cowbird a,b	0.049 a	2.9E+00	2.2E+00	2.3E+00	1.1E+00
Arsenic	2.5E+00	a	Brown-headed cowbird a,b	0.049 a	2.9E+00	2.2E+00	2.3E+00	1.1E+00
Barium	2.1E+01	a	1-day old chicks a,b	0.121 a	3.1E+01	2.3E+01	2.4E+01	1.2E+01
Beryllium	2.1E+01	a	1-day old chicks a,b	0.121 a	3.1E+01	2.3E+01	2.4E+01	1.2E+01
Cadmium	1.5E+00	a	Mallard duck a,b	1 a	3.7E+00	2.7E+00	2.8E+00	1.4E+00
Chromium	1.0E+00	a	Black duck a,b	1.25 a	2.7E+00	2.0E+00	2.1E+00	1.0E+00
Cobalt	7.6E+00	c	Chicken c	1.6 a,c	2.2E+01	1.6E+01	1.7E+01	8.3E+00
Copper	4.7E+01	a	1-day old chicks a,b	0.121 a	7.0E+01	5.2E+01	5.4E+01	2.7E+01
Lead	1.6E+00	c	Chicken c	1 a	4.1E+00	3.0E+00	3.2E+00	1.6E+00
Manganese	1.0E+03	a	Japanese Quail a,b	0.15 a	1.6E+03	1.2E+03	1.2E+03	6.0E+02
Mercury	4.5E-01	a	Japanese Quail a,b	0.15 a	7.1E-01	5.2E-01	5.5E-01	2.7E-01
Molybdenum	3.5E+00	a	Chicken a,b	1.5 a	9.8E+00	7.2E+00	7.6E+00	3.8E+00
Nickel	7.7E+01	a	Mallard a	1 a	2.0E+02	1.4E+02	1.5E+02	7.5E+01
Selenium	5.0E-01	a	Mallard a,b	1 a	1.3E+00	9.3E-01	9.8E-01	4.8E-01
Silver	2.0E+00	c	Turkey c	0.662 c	4.6E+00	3.4E+00	3.6E+00	1.8E+00
Thallium	na		na	na	na	na	na	na
Tin	6.8E+00	a	Japanese Quail a,b	0.15 a	1.1E+01	7.9E+00	8.3E+00	4.1E+00
Titanium	na		na	na	na	na	na	na
Vanadium	1.1E+01	a	Mallard a	1 a	2.9E+01	2.1E+01	2.2E+01	1.1E+01
Zinc	1.5E+01	a	White Leghorn hen a,b	1.935 a	4.3E+01	3.2E+01	3.4E+01	1.7E+01
Volatile Organic Compounds								
1,1-Dichloropropene	na		na	na	na	na	na	na
1,2,3-Trichlorobenzene	na		na	na	na	na	na	na
1,2,3-Trichloropropane	na		na	na	na	na	na	na
1,2,4-Trimethylbenzene	na		na	na	na	na	na	na
1,3,5-Trimethylbenzene	na		na	na	na	na	na	na
1,4-Dichlorobenzene	na		na	na	na	na	na	na
1-Chlorohexane	na		na	na	na	na	na	na
2,2-Dichloropropane	na		na	na	na	na	na	na
2-Chloroethyl Vinyl Ether	na		na	na	na	na	na	na
Acetone	5.2E+04	b	Coturnix Quail a,b	0.15 a	8.2E+04	6.0E+04	6.3E+04	3.1E+04
Benzene	na		na	na	na	na	na	na
Bromomethane	na		na	na	na	na	na	na
Carbon Disulfide	na		na	na	na	na	na	na

Table 6-5 Ecological Toxicity Reference Values for Avian Indicator Receptors¹

Chemicals of Potential Ecological Concern	Benchmark	Benchmark Species	Benchmark Species	Allometric TRV (mg/kg-day)			
	Dose		Body Weight	Dark-eyed Junco	American Robin	Northern Shrike	Mallard
	(mg/kg-day)		(kg)	<i>Junco hyemalis</i>	<i>Turdus migratorius</i>	<i>Lanius excubitor</i>	<i>Anas platyrhynchos</i>
Chloroethane	na	na	na	na	na	na	na
Chloromethane	na	na	na	na	na	na	na
cis-1,3-Dichloropropene	na	na	na	na	na	na	na
Ethylbenzene	na	na	na	na	na	na	na
Isopropylbenzene	na	na	na	na	na	na	na
Methylene Chloride	na	na	na	na	na	na	na
m,p-Xylenes	na	na	na	na	na	na	na
n-Butylbenzene	na	na	na	na	na	na	na
n-Propylbenzene	na	na	na	na	na	na	na
o-Xylene	na	na	na	na	na	na	na
p-Isopropyltoluene	na	na	na	na	na	na	na
sec-Butylbenzene	na	na	na	na	na	na	na
Styrene	na	na	na	na	na	na	na
Tert-Butylbenzene	na	na	na	na	na	na	na
Toluene	na	na	na	na	na	na	na
Total xylenes	na	na	na	na	na	na	na
trans-1,3-Dichloropropene	na	na	na	na	na	na	na
Trichlorofluoromethane	na	na	na	na	na	na	na
Vinyl Acetate	na	na	na	na	na	na	na
Semi-Volatile Organic Compounds							
2,4-Dimethylphenol	na	na	na	na	na	na	na
2-Nitroaniline	na	na	na	na	na	na	na
3-and 4-Methylphenol Coelution	na	na	na	na	na	na	na
3,3'-Dichlorobenzidine	na	na	na	na	na	na	na
3-Nitroaniline	na	na	na	na	na	na	na
4-Chloro-3-methylphenol	na	na	na	na	na	na	na
4-Chloroaniline	4.2E-01	Redwing Blackbird ^{a,b}	0.064 ^a	5.4E-01	3.9E-01	4.1E-01	2.0E-01
4-Methylphenol	na	na	na	na	na	na	na
Benzoic Acid	na	na	na	na	na	na	na
Bis(2-ethylhexyl) Phthalate	1.1E-01 ^b	Ringed Dove ^{a,b}	0.155 ^a	1.8E-01	1.3E-01	1.4E-01	6.7E-02
Dibenzofuran	na	na	na	na	na	na	na
DiethylPhthalate	na	na	na	na	na	na	na
Phenol	na	na	na	na	na	na	na

Table 6-5 Ecological Toxicity Reference Values for Avian Indicator Receptors¹

Chemicals of Potential Ecological Concern	Benchmark		Benchmark Species	Benchmark Species Body Weight (kg)	Allometric TRV (mg/kg-day)			
	Dose (mg/kg-day)				Dark-eyed Junco	American Robin	Northern Shrike	Mallard
					<i>Funco hyemalis</i>	<i>Turdus migratorius</i>	<i>Lanius excubitor</i>	<i>Anas platyrhynchos</i>
Polynuclear Aromatic Hydrocarbons								
2-Methylnaphthalene	na		na	na	na	na	na	na
Acenaphthene	na		na	na	na	na	na	na
Acenaphthylene	na		na	na	na	na	na	na
Anthracene	na		na	na	na	na	na	na
Benzo(a)anthracene	na		na	na	na	na	na	na
Benzo(a)pyrene	na		na	na	na	na	na	na
Benzo(b)fluoranthene	na		na	na	na	na	na	na
Benzo(ghi)perylene	na		na	na	na	na	na	na
Benzo(k)fluoranthene	na		na	na	na	na	na	na
Chrysene	na		na	na	na	na	na	na
Dibenz(a,h)anthracene	na		na	na	na	na	na	na
Indeno(1,2,3-cd)pyrene	na		na	na	na	na	na	na
Fluoranthene	na		na	na	na	na	na	na
Fluorene	na		na	na	na	na	na	na
Naphthalene	na		na	na	na	na	na	na
Phenanthrene	na		na	na	na	na	na	na
Pyrene	na		na	na	na	na	na	na
Pesticides								
4,4'-DDD ^f	2.8E-03	^{a,d}	Brown pelican ^{a,b}	3.5 ^{a,d}	9.7E-03	7.1E-03	7.5E-03	3.7E-03
4,4'-DDE ^f	2.8E-03	^{a,d}	Brown pelican ^{a,b}	3.5 ^{a,d}	9.7E-03	7.1E-03	7.5E-03	3.7E-03
4,4'-DDT	2.8E-03	^{a,d}	Brown pelican ^{a,b}	3.5 ^{a,d}	9.7E-03	7.1E-03	7.5E-03	3.7E-03
delta-BHC	2.0E+00	^a	Mallard ^{a,b}	1 ^a	5.1E+00	3.7E+00	3.9E+00	1.9E+00
Dieldrin	7.7E-02	^a	Barn Owl ^{a,b}	0.466 ^a	1.6E-01	1.2E-01	1.2E-01	6.2E-02
Endosulfan Sulfate	1.0E+01	^{a,d}	Gray Partridge ^{a,b}	0.4 ^{a,d}	2.0E+01	1.5E+01	1.6E+01	7.7E+00
Endrin	3.0E-01	^a	Mallard ^{a,b}	1 ^a	7.6E-01	5.6E-01	5.9E-01	2.9E-01
Endrin Aldehyde	3.0E-01	^a	Mallard ^{a,b}	1 ^a	7.6E-01	5.6E-01	5.9E-01	2.9E-01
Endrin Ketone	3.0E-01	^a	Mallard ^{a,b}	1 ^a	7.6E-01	5.6E-01	5.9E-01	2.9E-01
Polychlorinated Biphenyls								
Arochlor 1260	4.2E-01	^a	Screech Owl ^{a,d}	0.2 ^a	7.1E-01	5.2E-01	5.5E-01	2.7E-01
Petroleum Hydrocarbons								
Diesel Range Organics ^g	na		na	na	na	na	na	na
Gasoline Range Organics ^g	na		na	na	na	na	na	na
Residual Range Organics ^g	na		na	na	na	na	na	na

Table 6-5 Ecological Toxicity Reference Values for Avian Indicator Receptors¹

Chemicals of Potential Ecological Concern	Benchmark Dose (mg/kg-day)	Benchmark Species	Benchmark Species Body Weight (kg)	Allometric TRV (mg/kg-day)			
				Dark-eyed Junco <i>Junco hyemalis</i>	American Robin <i>Turdus migratorius</i>	Northern Shrike <i>Lanius excubitor</i>	Mallard <i>Anas platyrhynchos</i>

Notes:

kg - Kilograms

mg/kg-dry - Milligrams per kilogram dry weight

na - Not available

RRO - Residual range organics

TRV - Toxicity Reference Value

¹ Receptor-specific TRVs are derived from body weight based allometric conversion of the toxicity benchmark value (USDOE, 1996) .

^a Toxicological Benchmarks for Wildlife (ORNL 1996b).

^b Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities (USEPA, 1999).

^c Ecological Soil Screening Levels (EcoSSLs) (USEPA, 2005e).

^d Technical Plan for Human Health and Ecological Risk Assessment (USEPA, 2000)

^e Arsenic used as a surrogate chemical.

^f 4,4-DDT used as a surrogate for 4,4-DDD and 4,4-DDE.

^g Avian toxicity values are currently unavailable for DRO, GRO (or potential surrogates of GRO, such as hexane or benzene) or RRO,

Table 6-6
Summary of Ecological Hazard Estimates
Site SS03

	EPC ^a			Ecological Hazard Estimates (HQ)							
	Soil (mg/kg)	Sediment (mg/kg)	Surface Water (mg/L)	Tundra Vole	Masked Shrew	Least Weasel	Mink	Dark-eyed Junco	Northern Shrike	American Robin	Mallard
COPEC											
Non-PHCs											
Inorganics											
Antimony	2.0	0	0	1.6	4.1	0.078	--	0.0041	0.00095	0.010	--
Arsenic	16	21	0	1.8	2.2	0.38	0.34	0.010	0.0010	0.018	0.0000019
Barium	258	146	0.0080	11	4.1	2.1	0.78	0.040	0.0014	0.030	0.0000029
Beryllium	0	0.50	0	--	--	--	0.00084	--	--	--	0.00000036
Cadmium	4.0	1.0	0	0.28	1.8	0.071	0.012	0.016	0.0092	0.086	0.0000012
Chromium	56	62	0	0.13	0.38	0.085	0.060	0.040	0.0096	0.12	0.0000078
Cobalt	22	23	0	0.012	0.031	0.0085	0.0059	0.0010	0.00021	0.0033	0.00000019
Copper	95	55	0	0.32	0.24	0.069	0.026	0.015	0.0010	0.014	0.0000012
Lead	180	0	0	0.24	0.87	0.25	--	0.067	0.019	0.24	--
Manganese	609	1,320	0	0.087	0.040	0.017	0.023	0.0011	0.000048	0.0011	0.00000031
Mercury	1.6	0	0	0.14	0.021	0.0050	--	0.054	0.00075	0.020	--
Nickel	41	65	0	0.0084	0.0017	0.019	0.020	0.00040	0.0000093	0.00042	0.000000075
Selenium	2.0	1.7	0	0.70	0.57	0.22	0.14	0.024	0.0017	0.022	0.0000027
Silver	6.0	2.0	0	0.052	0.15	0.0016	0.00034	0.014	0.0036	0.037	0.00000087
Tin	50	0	0	0.026	0.0067	0.0054	--	0.0075	0.00021	0.0090	--
Titanium	1,430	1,160	0.0040	--	--	--	--	--	--	--	--
Vanadium	88	107	0	0.15	0.20	0.083	0.066	0.0030	0.00031	0.0070	0.00000052
Zinc	518	218	0	0.23	0.53	0.23	0.063	0.10	0.021	0.22	0.0000011
Cumulative Growth/Body Weight HI^b:				13	10	3	0.9	0.2	0.04	0.4	0.000013
Volatile Organic Compounds											
1,2,3-Trichlorobenzene	0	0.00025	0	--	--	--	--	--	--	--	--
1,2,3-Trichloropropane	0	0.00021	0	--	--	--	--	--	--	--	--
1,2,4-Trimethylbenzene	431	0	0	0.067	1.5	0.0023	--	--	--	--	--
1,3,5-Trimethylbenzene	81	0	0	0.016	0.18	0.00042	--	--	--	--	--
1,4-Dichlorobenzene	1.2	0	0	--	--	--	--	--	--	--	--
Benzene	2.1	0	0	0.0023	0.0016	0.000011	--	--	--	--	--
cis-1,3-Dichloropropene	0	0.00017	0	--	--	--	--	--	--	--	--
Ethylbenzene	8.3	0	0	0.0023	0.015	0.000043	--	--	--	--	--
Isopropylbenzene	1.5	0	0	0.00012	0.0025	0.0000041	--	--	--	--	--
Methylene Chloride	0	0.013	0	--	--	--	0.0000020	--	--	--	--
m,p-Xylenes	8.2	0	0	0.0013	0.0085	0.000023	--	--	--	--	--
n-Butylbenzene	1.7	0	0	0.00011	0.011	0.0000090	--	--	--	--	--
n-Propylbenzene	3.9	0	0	0.00057	0.011	0.000021	--	--	--	--	--
o-Xylene	3.0	0	0	0.00046	0.0031	0.0000082	--	--	--	--	--
p-Isopropyltoluene	2.1	0	0	0.00016	0.0035	0.0000058	--	--	--	--	--
sec-Butylbenzene	1.6	0	0	0.000083	0.016	0.0000083	--	--	--	--	--
Tert-Butylbenzene	3.4	0	0	0.00029	0.018	0.000018	--	--	--	--	--

Table 6-6
Summary of Ecological Hazard Estimates
Site SS03

COPEC	EPC ^a			Ecological Hazard Estimates (HQ)							
	Soil (mg/kg)	Sediment (mg/kg)	Surface Water (mg/L)	Tundra Vole	Masked Shrew	Least Weasel	Mink	Dark-eyed Junco	Northern Shrike	American Robin	Mallard
Toluene	24	0	0	0.22	0.67	0.0023	--	--	--	--	--
Total xylenes	2,600	0	0	0.40	2.7	0.0072	--	--	--	--	--
trans-1,3-Dichloropropene	0	0.00013	0	--	--	--	--	--	--	--	--
Cumulative Reproductive/Development HI^b:				6	15	1	0.6	0.3	0.06	0.7	0.00002
Semivolatile Organic Compounds											
3-and 4-Methylphenol Coelution	0	0.20	0	--	--	--	0.00000063	--	--	--	--
Bis(2-ethylhexyl) Phthalate	0	0.90	0	--	--	--	0.000044	--	--	--	0.00027
Dibenzofuran	0.71	0	0	--	--	--	--	--	--	--	--
DiethylPhthalate	0	0	0.00050	0.000000016	0.000000011	0.000000016	0.000000013	--	--	--	--
Pesticides											
4,4'-DDD	0	0.0080	0	--	--	--	0.0000089	--	--	--	0.0000039
4,4'-DDT	0	0.0095	0	--	--	--	0.0045	--	--	--	0.0000052
Endosulfan Sulfate	0	0.0033	0	--	--	--	0.0000030	--	--	--	0.00000000018
Cumulative Chlorinated Pesticide HI^d:				--	--	--	0.005	--	--	--	0.000009
PHCs											
Diesel Range Organics (DRO)	14,251	161	0.062	0.91	10	0.39	0.0030	--	--	--	--
Gasoline Range Organics (GRO)	629	5.8	0	0.96	7.1	0.061	0.00036	--	--	--	--
Residual Range Organics (RRO)	605	0	0	0.075	0.31	0.015	--	--	--	--	--
Cumulative PHC HI^e:				2	18	0.5	0.003	--	--	--	--
Ecological Hazard Criterion:				1	1	1	1	1	1	1	1

Notes:

^a The exposure point concentration (EPC) is the lower of the maximum detected concentration or 95% upper confidence limit (UCL) concentration on the mean concentration measured in soil, sediment and surface water samples.

^b The cumulative growth/body weight HI is equal to the sum of the growth/body weight related HQs for antimony, barium, chromium, copper, lead, and silver.

^c The cumulative reproductive/development HI is equal to the sum of the reproductive/development related HQs for antimony, arsenic, cadmium, lead, mercury, selenium, silver, vanadium, zinc, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, total xylenes, and toluene.

^d The cumulative chlormiated pesticide HI is equal to the sum of HQs for 4,4'-DDD, 4,4'-DDT, and endosulfan sulfate.

^e The cumulative PHC HI is equal to the sum of HQs for DRO, GRO, and RRO.

Boldface indicates exceedence of the hazard criterion of 1.

% - Percent

4,4'-DDD - dichlorodiphenyldichloroethane

4,4'-DDT - dichlorodiphenyltrichloroethane

COPEC - Chemical of potential ecological concern

EPC - Exposure point concentration

HQ - Hazard quotient

HI - Hazard index

mg/L - Milligram per liter

mg/kg - Milligrams per kilogram

-- Not applicable

PHC - Petroleum hydrocarbons

USEPA - U. S. Environmental Protection Agency

Table 6-7
Summary of Ecological Hazard Estimates
Site SS08

COPEC	EPC ^a			Ecological Hazard Estimates (HQ)							
	Soil (mg/kg)	Sediment (mg/kg)	Surface Water (mg/L)	Tundra Vole	Masked Shrew	Least Weasel	Mink	Dark-eyed Junco	Northern Shrike	American Robin	Mallard
Non-PHCs											
Inorganics											
Aluminum	0	0	1.2	0.095	0.066	0.094	0.072	0.00016	0.0000080	0.00011	0.000000027
Antimony	1.6	0	0	1.3	3.3	0.063	--	0.0031	0.00071	0.0075	--
Arsenic	19	21	0	2.2	2.5	0.46	0.31	0.012	0.0011	0.020	0.0000018
Barium	261	240	0.015	11	4.2	2.1	1.2	0.038	0.0013	0.029	0.0000044
Beryllium	0	1.2	0	--	--	--	0.0019	--	--	--	0.00000007
Cadmium	1.2	1.4	0	0.081	0.66	0.020	0.015	0.0044	0.0032	0.029	0.0000016
Chromium	54	62	0.0050	0.12	0.36	0.083	0.056	0.036	0.0086	0.11	0.0000073
Cobalt	22	32	0	0.011	0.031	0.0083	0.0079	0.00096	0.00019	0.0030	0.00000024
Copper	65	122	0.0028	0.22	0.16	0.047	0.054	0.0096	0.00064	0.0086	0.0000024
Lead	28	51	0.0011	0.062	0.19	0.039	0.044	0.015	0.0039	0.045	0.0000044
Manganese	1,030	1,300	0	0.15	0.063	0.028	0.021	0.0018	0.000067	0.0017	0.00000028
Mercury	0	0.20	0	--	--	--	0.00038	--	--	--	0.00000079
Molybdenum	0	3.0	0	--	--	--	0.019	--	--	--	0.00000034
Nickel	58	110	0	0.011	0.0025	0.027	0.031	0.00051	0.000012	0.00054	0.00000011
Selenium	1.1	1.5	0.0012	0.36	0.36	0.18	0.12	0.011	0.0010	0.012	0.0000022
Silver	0	0	0.0030	0.000041	0.000028	0.000040	0.000031	0.000015	0.00000075	0.000011	0.000000026
Thallium	0.18	0.30	0	0.085	0.042	0.034	0.034	--	--	--	--
Tin	9.4	0	0	0.0049	0.0013	0.0010	--	0.0013	0.000036	0.0016	--
Titanium	1,271	1,470	0.0020	--	--	--	--	--	--	--	--
Vanadium	83	106	0	0.14	0.19	0.078	0.061	0.0026	0.00027	0.0062	0.00000048
Zinc	135	273	0	0.10	0.34	0.059	0.073	0.043	0.013	0.12	0.000012
Cumulative Growth/Body Weight HI^b:				13	8	2	1	0.1	0.02	0.2	0.00002
Volatile Organic Compounds											
1,1-Dichloropropene	0	0	0.00029	--	--	--	--	--	--	--	--
1,3,5-Trimethylbenzene	4.6	0	0	0.00092	0.010	0.000024	--	--	--	--	--
1-Chlorohexane	0	0	0.00024	--	--	--	--	--	--	--	--
2,2-Dichloropropane	0	0	0.00025	--	--	--	--	--	--	--	--
2-Chloroethyl Vinyl Ether	0	0	0.00019	--	--	--	--	--	--	--	--
Bromomethane	0	0	0.00015	0.00000045	0.00000032	0.00000045	0.00000034	--	--	--	--
Carbon Disulfide	0.00054	0	0.0025	--	--	--	--	--	--	--	--
Chloroethane	0	0	0.00031	--	--	--	--	--	--	--	--
Chloromethane	0	0	0.00031	--	--	--	--	--	--	--	--
Isopropylbenzene	0	0	0.00021	0.000000034	0.000000024	0.000000034	0.000000026	--	--	--	--
Methylene Chloride	0	0.0018	0	--	--	--	0.00000026	--	--	--	--
m,p-Xylenes	0	0.079	0	--	--	--	0.00000014	--	--	--	--
Trichlorofluoromethane	0.00034	0	0	--	--	--	--	--	--	--	--
Cumulative Reproductive/Development HI^b:				4	8	0.9	0.6	0.09	0.02	0.2	0.00002

Table 6-7
Summary of Ecological Hazard Estimates
Site SS08

COPEC	EPC ^a			Ecological Hazard Estimates (HQ)							
	Soil (mg/kg)	Sediment (mg/kg)	Surface Water (mg/L)	Tundra Vole	Masked Shrew	Least Weasel	Mink	Dark-eyed Junco	Northern Shrike	American Robin	Mallard
Semivolatile Organic Compounds											
2-Nitroaniline	0.060	0	0	--	--	--	--	--	--	--	--
3,3'-Dichlorobenzidine	0.050	0.080	0	--	--	--	--	--	--	--	--
4-Chloroaniline	0	0.20	0	--	--	--	0.00016	--	--	--	0.0000034
Polynuclear Aromatic Hydrocarbons											
Acenaphthene	0	0.010	0	--	--	--	0.00000015	--	--	--	--
Acenaphthylene	0	0.0074	0	--	--	--	0.00000011	--	--	--	--
Anthracene	0	0.079	0	--	--	--	0.0000012	--	--	--	--
Benzo(a)anthracene	0	0.063	0	--	--	--	0.00000058	--	--	--	--
Benzo(a)pyrene	0	0.063	0	--	--	--	0.0000010	--	--	--	--
Benzo(b)fluoranthene	0	0.063	0	--	--	--	0.0000010	--	--	--	--
Benzo(g,h,i)perylene	0	0.044	0	--	--	--	0.00000068	--	--	--	--
Benzo(k)fluoranthene	0	0.042	0	--	--	--	0.00000064	--	--	--	--
Chrysene	0	0.12	0	--	--	--	0.0000018	--	--	--	--
Dibenz(a,h)anthracene	0	0.015	0	--	--	--	0.0000062	--	--	--	--
Fluoranthene	0	0.13	0	--	--	--	0.0000020	--	--	--	--
Fluorene	0	0.015	0	--	--	--	0.00000023	--	--	--	--
Indeno(1,2,3-cd)pyrene	0	0.033	0	--	--	--	0.00000051	--	--	--	--
Naphthalene	0	0.055	0	--	--	--	0.00000093	--	--	--	--
Phenanthrene	0	0.17	0	--	--	--	0.0000026	--	--	--	--
Pyrene	0	0.18	0	--	--	--	0.0000028	--	--	--	--
Cumulative PAH HI^d:				--	--	--	0.00002	--	--	--	--
Pesticides											
4,4'-DDD	0	0.42	0.0000022	0.00000022	0.00000016	0.00000022	0.00044	0.0000053	0.00000026	0.0000037	0.000063
4,4'-DDE	0	0.21	0.0000041	0.00000042	0.00000029	0.00000042	0.00053	0.0000099	0.00000049	0.0000069	0.0000043
4,4'-DDT	3.8	2.0	0.000031	0.016	2.4	0.54	0.20	0.3	3	32	0.00051
Endosulfan Sulfate	0	0.0042	0	--	--	--	0.0000035	--	--	--	0.00000000021
Cumulative Chlorinated Pesticide HI^f:				0.02	2	0.5	0.2	0.3	3	32	0.0005
Polychlorinated Biphenyls											
Arochlor 1260	12	0.17	0.00000	0.19	30	3.8	0.034	0.013	0.14	1.2	0.00000052
PHCs											
Diesel Range Organics (DRO)	2,159	2,506	0	0.14	1.5	0.060	0.042	--	--	--	--
Gasoline Range Organics (GRO)	630	3.6	0	0.97	7.1	0.061	0.00021	--	--	--	--
Residual Range Organics (RRO)	529	871	0	0.066	0.27	0.013	0.013	--	--	--	--
Cumulative PHC HI^f:				1	9	0.1	0.1	--	--	--	--
Ecological Hazard Criterion:				1	1	1	1	1	1	1	1

Table 6-7
Summary of Ecological Hazard Estimates
Site SS08

	EPC ^a			Ecological Hazard Estimates (HQ)							
	Soil (mg/kg)	Sediment (mg/kg)	Surface Water (mg/L)	Tundra Vole	Masked Shrew	Least Weasel	Mink	Dark-eyed Junco	Northern Shrike	American Robin	Mallard
COPEC											

Notes:

^a The exposure point concentration (EPC) is the lower of the maximum detected concentration or 95% upper confidence limit (UCL) concentration on the mean concentration measured in soil, sediment and surface water samples.

^b The cumulative growth/body weight HI is equal to the sum of the growth/body weight related HQs for antimony, barium, chromium, copper, lead, and silver.

^c The cumulative reproductive/development HI is equal to the sum of the reproductive/development related HQs for antimony, arsenic, cadmium, lead, mercury, selenium, silver, vanadium, zinc, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, total xylenes, and toluene.

^d The cumulative PAH HI is equal to the sum HQs for all polynuclear aromatic hydrocarbons.

^e The cumulative chlorniated pesticide HI is equal to the sum of HQs for 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, and endosulfan sulfate.

^f The cumulative PHC HI is equal to the sum of HQs for DRO, GRO, and RRO.

Boldface indicates exceedence of the hazard criterion of 1.

% - Percent

4,4'-DDD - dichlorodiphenyldichloroethane

4,4'-DDE - dichlorodiphenyldichloroethylene

4,4'-DDT - dichlorodiphenyltrichloroethane

COPEC - Chemical of potential ecological concern

EPC - Exposure point concentration

HQ - Hazard quotient

HI - Hazard index

mg/L - Milligram per liter

mg/kg - Milligrams per kilogram

-- Not applicable

PHC - Petroleum hydrocarbons

USEPA - U. S. Environmental Protection Agency

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Table 6-8
Summary of Ecological Hazard Estimates
Site SS11

COPEC	EPC ^a			Ecological Hazard Estimates (HQ)							
	Soil (mg/kg)	Sediment (mg/kg)	Surface Water (mg/L)	Tundra Vole	Masked Shrew	Least Weasel	Mink	Dark-eyed Junco	Northern Shrike	American Robin	Mallard
Non-PHCs											
Inorganics											
Antimony	1.0	0	0	0.78	2.1	0.039	--	0.0018	0.00041	0.0043	--
Arsenic	10	8.8	0	1.2	1.5	0.24	0.12	0.0055	0.00062	0.010	0.00000071
Barium	1,256	150	0.032	54	20	10	0.72	0.17	0.0058	0.13	0.00000025
Cadmium	0.37	0	0	0.026	0.27	0.0065	--	0.0013	0.0012	0.011	--
Chromium	40	0	0.0042	0.092	0.27	0.065	0.000073	0.025	0.0059	0.073	0.0000000058
Cobalt	20	0	0	0.011	0.028	0.0076	--	0.00082	0.00017	0.0026	--
Copper	58	0	0	0.20	0.15	0.042	--	0.0079	0.00053	0.0071	--
Lead	120	0	0	0.18	0.62	0.17	--	0.042	0.012	0.14	--
Manganese	1,080	0	0	0.15	0.063	0.029	--	0.0017	0.000065	0.0016	--
Molybdenum	3.0	0	0	0.71	1.5	0.032	--	0.0019	0.00035	0.0038	--
Nickel	40	0	0	0.0082	0.0017	0.019	--	0.00034	0.0000078	0.00035	--
Selenium	0.74	4.7	0	0.23	0.27	0.15	0.19	0.0068	0.00071	0.0082	0.00000068
Thallium	0.30	0	0	0.14	0.068	0.055	--	--	--	--	--
Tin	11	0	0	0.0058	0.0015	0.0012	--	0.0014	0.000039	0.0017	--
Titanium	1,460	0	0	--	--	--	--	--	--	--	--
Vanadium	68	0	0	0.12	0.15	0.064	--	0.0020	0.00021	0.0047	--
Zinc	91	0	0	0.083	0.30	0.040	--	0.032	0.010	0.098	--
Cumulative Growth/Body Weight HI^b:				55	23	11	0.7	0.2	0.02	0.4	0.000003
Volatile Organic Compounds											
1,2,4-Trimethylbenzene	6.6	0	0	0.0010	0.022	0.000035	--	--	--	--	--
1,3,5-Trimethylbenzene	1.9	0	0	0.00039	0.0044	0.000010	--	--	--	--	--
Acetone	11	0	0	3.8	0.40	0.0015	--	0.000084	0.00000080	0.000024	--
Carbon Disulfide	0	0	0.019	--	--	--	--	--	--	--	--
Chloromethane	0	0	0.0011	--	--	--	--	--	--	--	--
Ethylbenzene	0.076	0	0	0.000022	0.00014	0.00000040	--	--	--	--	--
Isopropylbenzene	0.043	0	0	0.0000034	0.000072	0.00000012	--	--	--	--	--
m,p-Xylenes	0.15	0	0	0.000023	0.00016	0.00000041	--	--	--	--	--
n-Butylbenzene	0.13	0	0	0.0000083	0.00081	0.00000068	--	--	--	--	--
o-Xylene	2.0	0	0	0.00031	0.0021	0.0000055	--	--	--	--	--
p-Isopropyltoluene	0.077	0	0	0.0000061	0.00013	0.00000021	--	--	--	--	--
Trichlorofluoromethane	0.0034	0	0	--	--	--	--	--	--	--	--
Cumulative Reproductive/Development HI^c:				4	7	0.8	0.3	0.09	0.03	0.3	0.000007
Cumulative Liver/Kidney HI^d:				4	0.4	0.002	--	0.00008	0.0000008	0.00002	--
Semivolatile Organic Compounds											
2,4-Dimethylphenol	25	0	0	--	--	--	--	--	--	--	--
Benzoic Acid	0.37	0	0	--	--	--	--	--	--	--	--
Dibenzofuran	267	0	0	--	--	--	--	--	--	--	--
Phenol	16	0	0	--	--	--	--	--	--	--	--

Table 6-8
Summary of Ecological Hazard Estimates
Site SS11

	EPC ^a			Ecological Hazard Estimates (HQ)							
	Soil (mg/kg)	Sediment (mg/kg)	Surface Water (mg/L)	Tundra Vole	Masked Shrew	Least Weasel	Mink	Dark-eyed Junco	Northern Shrike	American Robin	Mallard
COPEC											
Polynuclear Aromatic Hydrocarbons											
2-Methylnaphthalene	3,697	0	0	2.3	23	0.10	--	--	--	--	--
Acenaphthene	2,800	0	0	1.5	5.5	0.071	--	--	--	--	--
Anthracene	2,230	0	0	0.64	7.2	0.057	--	--	--	--	--
Benzo(a)anthracene	950	0	0	0.054	1.2	0.014	--	--	--	--	--
Benzo(a)pyrene	286	0	0	0.023	0.51	0.0073	--	--	--	--	--
Benzo(b)fluoranthene	705	0	0	0.067	2.4	0.018	--	--	--	--	--
Benzo(g,h,i)perylene	229	0	0	0.015	0.89	0.0058	--	--	--	--	--
Benzo(k)fluoranthene	166	0	0	0.013	0.57	0.0042	--	--	--	--	--
Chrysene	1,066	0	0	0.099	3.2	0.027	--	--	--	--	--
Dibenz(a,h)anthracene	34	0	0	0.060	2.8	0.023	--	--	--	--	--
Fluoranthene	3,063	0	0	0.50	12	0.078	--	--	--	--	--
Fluorene	1,744	0	0	0.68	22	0.044	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	103	0	0	0.0068	0.39	0.0026	--	--	--	--	--
Naphthalene	3,555	0	0	4.4	22	0.098	--	--	--	--	--
Phenanthrene	5,177	0	0	1.5	12	0.13	--	--	--	--	--
Pyrene	3,029	0	0	0.57	7.1	0.077	--	--	--	--	--
Cumulative PAH HI^f:				12	124	0.8	--	--	--	--	--
Pesticides											
4,4'-DDT	0.76	0.0057	0	0.0032	0.58	0.16	0.0028	0.063	0.79	7.1	0.0000029
delta-BHC	0.65	0	0	0.00081	0.00046	0.00038	--	0.000093	0.0000049	0.00020	--
Dieldrin	0.027	0	0	0.010	1.4	0.082	--	0.00026	0.0029	0.026	--
Endrin	0.61	0	0	0.093	17	0.017	--	0.0013	0.018	0.16	--
Endrin aldehyde	0.94	0	0	0.14	26	0.026	--	0.0019	0.028	0.25	--
Endrin ketone	0.75	0	0	0.11	21	0.021	--	0.0015	0.023	0.20	--
Cumulative Chlorinated Pesticide HI^f:				0.4	67	0.3	0.003	0.07	0.9	8	0.000003
PHCs											
Diesel Range Organics (DRO)	79,575	0	0	5.1	57	2.2	--	--	--	--	--
Gasoline Range Organics (GRO)	7.1	0	0	0.011	0.080	0.00068	--	--	--	--	--
Residual Range Organics (RRO)	60,057	342	0	7.5	31	1.5	0.005	--	--	--	--
Cumulative PHC HI^g:				13	88	4	0.01	--	--	--	--
Ecological Hazard Criterion:				1	1	1	1	1	1	1	1

Table 6-8
Summary of Ecological Hazard Estimates
Site SS11

	EPC ^a			Ecological Hazard Estimates (HQ)							
	Soil (mg/kg)	Sediment (mg/kg)	Surface Water (mg/L)	Tundra Vole	Masked Shrew	Least Weasel	Mink	Dark-eyed Junco	Northern Shrike	American Robin	Mallard
COPEC											

Notes:

^a The exposure point concentration (EPC) is the lower of the maximum detected concentration or 95% upper confidence limit (UCL) concentration on the mean concentration measured in soil, sediment and surface water samples.

^b The cumulative growth/body weight HI is equal to the sum of the growth/body weight related HQs for antimony, barium, chromium, copper, lead, and silver.

^c The cumulative reproductive/development HI is equal to the sum of the reproductive/development related HQs for antimony, arsenic, cadmium, lead, manganese, molybdenum, selenium, thallium, vanadium, and zinc.

^d The cumulative liver/kidney HI is equal to the HQ for acetone.

^e The cumulative PAH HI is equal to the sum HQs for all polynuclear aromatic hydrocarbons.

^f The cumulative chlorniated pesticide HI is equal to the sum of HQs for 4,4'-DDT, delta-BHC, dieldrin, endrin, endrin aldehyde, and endrin ketone.

^g The cumulative PHC HI is equal to the sum of HQs for DRO, GRO, and RRO.

Boldface indicates exceedence of the hazard criterion of 1.

% - Percent

4,4'-DDT - dichlorodiphenyltrichloroethane

COPEC - Chemical of potential ecological concern

EPC - Exposure point concentration

HQ - Hazard quotient

HI - Hazard index

mg/L - Milligram per liter

mg/kg - Milligrams per kilogram

-- Not applicable

PHC - Petroleum hydrocarbons

USEPA - U. S. Environmental Protection Agency

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7.0 UNCERTAINTY ANALYSIS

Following is a discussion of potential uncertainties associated with the HHERA conducted for Tatalina LRRS Sites SS03, SS08, and SS11. Uncertainties are inherent in risk assessment and arise from limitations in the available information, methods, or assumptions that are included in the HHERA. Potential uncertainties in the HHERA for SS03, SS08, and SS11 are described in the following subsections.

7.1 CONTAMINANT SOURCE CHARACTERIZATION

Environmental investigations conducted at ERP Sites SS03, SS08, and SS11 were based on site histories, known or suspected contaminant releases, and physical characteristics (i.e., the presence of waste materials or topographic anomalies) identified during preliminary SI activities. These environmental investigations focused on known or suspected sources of contamination, and included a tiered approach to collecting and analyzing field screening and fixed laboratory samples of soil, sediment, surface water, and subsurface water between 1997 and 2007. Due to the biased nature of the sampling (e.g., the surface soil samples collected at SS11 in 2007 were collected directly beneath leaking drums and most likely represent the highest concentrations of contaminants at the site), the contaminant characterization is expected to result in a protective assessment of potential risks. Nevertheless, a degree of uncertainty remains in the characterization of contamination associated with SS03, SS08, and SS11, because it is not practicable to sample all areas of Lower Camp and downgradient areas.

At the request of ADEC in a conference call on August 3, 2008, maximum concentrations of total chromium were compared to hexavalent chromium screening benchmarks. There is no known historic use of or activities relating to hexavalent chromium, such as chrome plating, metallurgical operations, or photo processing at Sites SS03, SS08, or SS11. Additionally, hexavalent chromium is very unstable in soil and without a high concentration of total chromium, there are unlikely to be high concentrations of hexavalent chromium at Tatalina LRRS. Therefore based upon screening total chromium against the most conservative risk screening value for hexavalent chromium, the current identification of total chromium as a COPC and COPEC at all three sites is likely the most protective.

Biological investigations, including monitoring mammals or birds that may be directly exposed to contaminants present at Lower Camp, have not been conducted. As described in Section 4.3.1.1, contract personnel may engage in hunting or fishing activities during non-work hours. Caribou, moose, bears, and other animals forage within Tatalina LRRS and may briefly come into contact with contaminated soils at SS03, SS08, or SS11. However, large game animals are widely roaming species that would have relatively infrequent and limited contact with media at Lower Camp. In addition, the primary COPCs present at SS03, SS08, and SS11 (i.e., petroleum hydrocarbons including DRO and GRO) do not tend to biomagnify in terrestrial organisms (ATSDR, 1989; Eisler, 1987). Therefore, the potential for exposure of contract personnel to soil COPCs through harvesting of wild game is deemed to be potentially complete, but insignificant, and lack of chemical monitoring data for such species is believed to represent a low uncertainty.

It should also be noted that wild game animals including caribou, moose, or bears were not chemically monitored because:

- They are not anticipated to receive significant exposures to contaminants originating from Lower Camp as described in Sections 4.2 and 4.3.2.
- It is not practical or feasible to monitor these species due to the time, expense, and numbers of animals that would be required to obtain a statistically valid sampling population.
- It would be difficult to attribute body burdens resulting from Lower Camp exposures to such wide-ranging species.
- Methods are not currently available to correlate body burdens in large mammals with a toxic response.

7.2 SITE COPC AND COPEC IDENTIFICATION

The process used in selecting site COPCs may introduce a degree of uncertainty in the HHRA. However, protective methods and assumptions were used in selecting COPCs, in accordance with State of Alaska regulations (18 AAC 75). Protective assumptions used in the COPC screening procedure included comparison of maximum detected chemical concentrations to one-tenth of the most protective screening criteria for the ingestion or inhalation exposure pathways listed in 18 AAC 70 and 18 AAC 75. Chemicals without risk-based screening benchmarks were screened based on toxicity information for surrogate chemicals to the extent appropriate (refer to Tables 4-1 through 4-5). Chemicals that exceeded criteria and benchmarks, and chemicals without screening benchmarks or appropriate surrogates, were proposed for further evaluation in the Tier II baseline HHRA for Sites SS03, SS08, and SS11 (refer to Section 4.1.2).

The specific process used in the selection of site COPECs for evaluation of risks to ecological receptors may also introduce a degree of uncertainty in the ERA. The State of Alaska does not list specific numeric criteria for screening environmental media for potential impacts to ecological receptors. However, State of Alaska regulations (18 AAC 70 and 18 AAC 75) and guidance documents do identify risk assessment procedures, sources of ecological screening benchmarks, and other information for the identification of site COPECs. Chemicals without risk-based screening benchmarks were screened based on ecotoxicity information for surrogate chemicals to the extent appropriate (refer to Tables 4-6 through 4-8). Chemicals that exceeded criteria and benchmarks, and chemicals without screening benchmarks or appropriate surrogates were proposed for further evaluation in the Tier II baseline ERA (refer to Section 4.1.2).

This HHRA is based on data collected between 1997 and 2007, and a limited number of samples for each medium. Data validation was performed during the RI, as described in Section 4.2.3 of the Final RI Report (USAF, 1998b). Data usability for risk assessment was also evaluated during the RI, as described in Appendix B of the Final RI Report (USAF, 1998b). Data were evaluated according to the EPA's *Risk Assessment Guidance for*

Superfund, Part A (USEPA, 1989a) and *Guidance for Data Usability in Risk Assessment* (USEPA, 1992b). Post-RI samples were analyzed in accordance with EPA Methods, including *Test Methods for Evaluating Solid Waste*, SW-846, Third Edition (USEPA, 1986).

Data verification and data review were conducted in accordance with the approved SAP (USAF, 1997) and SAP Addendum (USAF, 1999e). Data review included an evaluation of precision, accuracy, representativeness, comparability, and completeness in accordance with the EPA's *Data Quality Objectives Process for Superfund, Interim Final Guidance* (USEPA, 1993a) and the AFCEE Quality Assurance Program Plan (AFCEE, 1997). These data were deemed to meet usability criteria for risk assessment.

As part of the data review, a comparison of method reporting limits (MRLs) to screening criteria was conducted. This evaluation concluded that there were elevated MRLs for PAHs in a couple of surface soil samples collected from SS11. However, these cases were limited to samples with high concentrations of DRO and/or RRO (e.g., 07TATSS11004 and 07TATSS11008); presumably, due to matrix interference caused by high concentrations of petroleum hydrocarbons. In the case of 07TATSS11004, all PAHs were detected results at concentrations above their MRLs; so this issue had no impact on COPC or COPEC selection. In the case of 07TATSS11008, three PAHs [i.e., benzo(a)anthracene, benzo(a)pyrene, and naphthalene] were non-detect with elevated MRLs. However, maximum detected concentrations of these chemicals in surface soil at SS11 were above MRLs for Sample ID 07TATSS11008, and they were selected as COPC and/or COPECs for surface soil at SS11 based on results for other samples.

7.3 BACKGROUND SAMPLES

During the 1997 RI, background samples were collected from surface soil, subsurface soil, surface water, water from the infiltration gallery, and sediment (USAF, 1998b). Background locations were sampled where a specific medium was available for sampling and represented similar geological conditions to the sites of concern. These background sites were not used for disposal purposes and were not located either adjacent to or downgradient of sites where disposal activities occurred. A detailed description of the background investigation for Lower Camp is provided in Appendix D of the Final RI Report (USAF, 1998b).

Each background sample was analyzed for metals, cyanide, pesticides, DRO, and RRO. Detected metals concentrations in background samples collected from Lower Camp were used to determine medium-specific background values during the RI (USAF, 1998b). At the request of ADEC, however, these background values were not used during the COPC/COPEC selection process. However, background values may be compared to detected concentrations at the Site to address potential uncertainties in COPC/COPEC selections.

If background samples were non-detect for an analyte, background values were not calculated for that analyte (USAF, 1998b). Background samples were not available for subsurface soil from 2 to 10 feet bgs or subsurface water, so the surface soil background values were used for both surface and subsurface soil and the surface water background values were used for both

surface and subsurface water. Background Upper Tolerance Limits (BUTLs) were calculated at the 95th percentile, with 95 percent confidence, using formulas provided in Gilbert (1987).

Although data from these samples were not used to establish BUTLs for organic chemicals, the results suggest that several organic chemicals are either present at low levels throughout the region as a result of ubiquitous contamination, or detection is the result of laboratory contamination. Several pesticides including DDE, DDT, aldrin, delta-benzene hexachloride, and heptachlor were detected in background surface soil samples from Lower Camp. DDT was also detected in background sediment samples. The presence of DDE and DDT in background samples is likely the result of historic pesticides application at Tatalina LRRS for insect and vegetation control (USAF, 1998b). The other pesticides detected in background samples may also have been used historically at Tatalina LRRS, or could be present as the result of widespread global use and subsequent atmospheric transport and deposition of these chemicals. Three pesticides (alpha-benzene-hexachloride, delta-benzene-hexachloride, and endrin aldehyde) were detected in the background surface water sample. These same analytes were non-detect in surface water samples collected from Lower Camp study areas.

Petroleum hydrocarbons (including DRO and RRO) were also detected in surface soil samples collected from Lower Camp background sampling locations. Detected concentrations were well below screening criteria for petroleum hydrocarbons. One of the Lower Camp background soil samples (THSL23A1) had high values of DRO that were anomalous compared to the other background samples. However, the metals concentrations detected in this sample were within the range of the other background samples. This sample was collected above the landing strip and was considered upgradient of source areas. Therefore, the metals data from this background location were considered to be representative of background conditions and were used in the background data set (USAF, 1998b).

Maximum detected concentrations of some metals identified as COPC/COPEC in SS03, SS08 and SS11 were below the established BUTLs for Tatalina LRRS and may represent ambient concentrations. Some metals identified as COPCs in soil (aluminum, arsenic, chromium, manganese, titanium, and vanadium), sediment (arsenic and titanium) and surface water (titanium) at SS03 had detected concentrations below the established BUTLs. Various metals identified as COPECs in soil (aluminum, antimony, arsenic, manganese, nickel, selenium, titanium and vanadium), sediment (arsenic, beryllium, selenium, and titanium) and surface water (barium and titanium) at SS03 also had detected concentrations below the established BUTLs.

Several metals identified as COPCs in surface soil (chromium and titanium), subsurface soil (chromium, titanium, and vanadium), sediment (arsenic and titanium), sludge (arsenic, cobalt, manganese and titanium), surface water (copper, lead, titanium and zinc) and subsurface water (titanium) at SS08 had detected concentrations below the established BUTLs. Various metals identified as COPECs in surface soil (selenium and titanium), sediment (arsenic, selenium, thallium and titanium), and surface water (aluminum, barium, chromium, copper, lead, selenium, and titanium) had detected concentrations below the established BUTLs.

Some metals identified as COPCs in surface soil (aluminum, chromium, cobalt and titanium) and sediment (arsenic and chromium) in SS11 had detected concentrations below the established BUTLs. Various metals identified as COPECs in surface soil (aluminum, antimony, cobalt, copper, nickel, selenium, titanium, vanadium and zinc), sediment (arsenic) and surface water (barium and chromium) had detected concentrations below the established BUTLs.

7.4 EXPOSURE ASSESSMENT/PROBLEM FORMULATION

Exposure assessment and problem formulation describe the processes used to identify potentially important receptors, exposure media, exposure pathways, and methods to quantify exposure of human health and ecological receptors, respectively, to site contaminants. Potential uncertainties in the exposure assessment for ERP Sites SS03, SS08, and SS11 include, but are not limited to, the receptors, exposure pathways, exposure assumptions, and EPCs that will be quantitatively and/or qualitatively evaluated in the HHRA and ERA. Receptors to be quantitatively evaluated in the HHRA for SS03, SS08, and SS11 include site workers, site visitors, and recreational hunters. Consumption of wild game by recreational hunters was considered a potentially complete exposure pathway, but not likely to result in significant exposures. This is because large game animals including caribou, moose, and bears, are anticipated to have only brief, infrequent contact with COPCs at SS03, SS08, and SS11.

The media-specific EPCs used to quantify exposures for human receptors may result in uncertainty in the exposure dose estimates. To address this potential uncertainty, maximum or 95% UCL concentrations were used to estimate exposure doses for current and hypothetical future receptors exposed to site-related media, consistent with ADEC (2005a) and EPA (USEPA, 1989a; 1992b) guidelines. Where the number of samples are insufficient to calculate 95% UCL concentrations, maximum concentrations of site COPCs were used to quantify exposure doses and risk estimates. Based on the above considerations, the exposure doses that were used in the HHRA for SS03, SS08, and SS11 are believed to represent protective, upper bound estimates of exposure.

Potential uncertainties in the problem formulation phase of the ERA included, but are not limited to, ecological resources determined to be potentially impacted, applicable exposure pathways, exposure information and assumptions, and available contaminant characterization information. It is possible that ecological species not identified in the biological characterization may occur at Lower Camp. However, the species listed in Tables 2-1 through 2-5 were identified based on biological sampling reports, known sightings by biologists or other investigation personnel, communication with Alaska Department of Fish and Game personnel, and habitat-specific field guides. Although inhalation and dermal exposure pathways were identified for ecological receptors, these pathways were not evaluated in the ERA due the uncertainties in available methods.

Potentially complete, but insignificant, exposure pathways were identified for large animals, including caribou, moose, or bears migrating or roaming through Lower Camp, and fish or other aquatic organisms inhabiting the Tatalina River. As described in Sections 4.3.2 and 7.1,

large game animals including caribou, moose, or bears are not anticipated to receive significant exposures to contaminants originating from SS03, SS08, or SS11 because they would have only brief, infrequent contact with site media. Fish and other aquatic organisms are not anticipated to receive significant exposure to contaminants originating from SS03, SS08, and SS11, because surface water at the three sites is ephemeral in nature and available site characterization data suggests that site-derived contaminants most likely have not migrated to the Tatalina River in appreciable concentrations.

7.5 TOXICITY ASSESSMENT

The Tier I screening assessments that were used to identify COPCs and COPECs for SS03, SS08, and SS11 included the use of surrogate toxicity benchmarks for chemicals without benchmarks. Identification of surrogate toxicity benchmarks was based on similarities in chemical structure and/or toxicological mechanism between surrogate chemicals and site chemicals. The use of surrogate toxicity information results in some uncertainty in the COPC/COPEC selection and toxicity assessment processes. However, chemicals for which surrogate toxicity information could not be identified were proposed as COPCs and/or COPECs for further evaluation in the Tier II HHERA for SS03, SS08, and SS11.

The toxicity values (CSFs and RfDs) that are proposed for use in estimating carcinogenic risks and noncarcinogenic hazards for human receptors also represent a potential source of uncertainty. The toxicity values used in the HHRA for SS03, SS08, and SS11 were derived from ADEC or EPA sources, as described in Section 5.3. Toxicity values that are developed by the EPA generally represent upper bound estimates of toxicity, and incorporate UFs for extrapolation from animal data to humans, differences in individual sensitivity within populations, and the overall confidence in the data set. Because the toxicity values established by the EPA are based on NOAEL concentrations and incorporate UFs, they are generally considered to be protective. The use of conservative toxicity values in the risk estimate tends to overestimate actual risks.

Dermal toxicity criteria are not available from the EPA. Typically, a simple route-to-route (oral-to-dermal) extrapolation is assumed such that the available oral toxicity criteria (RfD and CSF) are used to quantify potential systemic effects associated with dermal exposure. However, as noted in the EPA's *Risk Assessment Guidance for Superfund, Part E Supplemental Guidance for Dermal Risk Assessment* (USEPA 2004a), there is uncertainty associated with this approach because the oral toxicity criteria are based on an administered dose and not an absorbed dose. In general, EPA guidance recommends an adjustment to the oral toxicity criteria to convert an administered dose into an absorbed dose (USEPA, 2004a). The adjustment accounts for the absorption efficiency of the constituent in the "critical study" that is the basis of the oral toxicity criterion. If the oral absorption in the critical study is 100 percent, then the absorbed dose is equivalent to the administered dose and no adjustment is necessary. If the oral absorption of a constituent in the critical study is poor (i.e., less than 50 percent), then the absorbed dose is much smaller than the administered dose. In this situation, an adjustment to the oral toxicity criteria is recommended.

As described in Section 5.3.3, potential dermal exposures to DRO, GRO, and RRO **were not** quantitatively evaluated in the baseline HHRA due to uncertainties in extrapolating oral RfDs to the dermal route of administration. Not quantifying dermal exposures associated with DRO, GRO, and RRO results in some uncertainty in the human health risk estimates for SS03, SS08, and SS11, because petroleum hydrocarbons have relatively high dermal absorption coefficients. Similar to other organic chemicals, however, the majority of the exposure dose and risk estimate for higher molecular weight petroleum hydrocarbons is received through the oral route of exposure. So, not quantifying the dermal pathway for DRO, GRO, and RRO is not anticipated to result in significant underestimation of risks for these constituents. It should also be noted that individual petroleum hydrocarbons (e.g., BTEX and PAHs) were detected in site media and **were** evaluated in the HHRA.

7.6 RISK CHARACTERIZATION

The different sources of uncertainty previously described are incorporated in the risk estimate. Because the majority of these uncertainties err on the conservative side, the estimated risks presented in the HHRA for ERP Sites SS03, SS08, and SS11 most likely represent upper bound estimates of site risk.

ADEC currently considers a cumulative cancer risk estimate of 1×10^{-5} and a noncancer HI of 1 as the point of departure for making risk management decisions concerning a site. It should be noted, however, that according to State of Alaska (AAC 75.325(h)) and EPA (USEPA, 1991) guidance, sites with a cumulative cancer risk estimate between 1×10^{-6} and 1×10^{-4} , and a noncancer HI of less than 1, may be appropriate for cleanup complete with institutional controls (or Air Force classification, NFRAP following an evaluation of site-specific issues related to future land uses, technical feasibility of remediation, and related considerations.

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APPENDIX A

*Remedial Investigation Data
Summary Tables*

Table A-1 Analytical Results for Surface Soil at Site SS03

Constituent	Surface Soil Data					Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
Inorganics, Total								
Aluminum	2	2	100	28800	24000	na	na	24000
Antimony	2	2	100	2	1	na	na	1
Arsenic	2	2	100	16	11	na	na	11
Barium	2	2	100	258	178	na	na	178
Beryllium	2	2	100	0.7	0.5	na	na	0.5
Cadmium	2	2	100	4	0.7	na	na	0.7
Calcium	2	2	100	4990	2720	na	na	2720
Chromium	2	2	100	56	50	na	na	50
Cobalt	2	2	100	22	15	na	na	15
Copper	2	2	100	95	51	na	na	51
Cyanide	2	0	0	ND	ND	0.25	0.25	<0.25
Iron	2	2	100	39500	26500	na	na	26500
Lead	8	8	100	259	11.3	na	na	11.3
Magnesium	2	2	100	7850	6350	na	na	6350
Manganese	2	2	100	609	454	na	na	454
Mercury	2	2	100	1.59	0.83	na	na	0.83
Molybdenum	2	1	50	1.1	1.1	0.80	0.8	1.1
Nickel	2	2	100	41	37	na	na	37
Potassium	2	2	100	2620	2480	na	na	2480
Selenium	2	2	100	2	1.3	na	na	1.3
Silver	2	2	100	6	1.2	na	na	1.2
Sodium	2	2	100	120	90	na	na	90
Thallium	2	0	0	ND	ND	0.10	0.1	<0.1
Tin	2	2	100	50	12	na	na	12
Titanium	2	2	100	1430	1070	na	na	1070
Vanadium	2	2	100	88	68	na	na	68
Zinc	2	2	100	518	156	na	na	156
Volatile Organic Compounds								
1,1,1,2-Tetrachloroethane	17	0	0	ND	ND	0.07	0.002	<0.002
1,1,1-Trichloroethane	17	0	0	ND	ND	0.14	0.002	<0.002
1,1,2,2-Tetrachloroethane	17	0	0	ND	ND	0.04	0.002	<0.002
1,1,2-Trichloroethane	17	0	0	ND	ND	0.04	0.002	<0.002
1,1-Dichloroethane	17	0	0	ND	ND	0.14	0.002	<0.002
1,1-Dichloroethene	17	0	0	ND	ND	0.02	0.002	<0.002

Table A-1 Analytical Results for Surface Soil at Site SS03

Constituent	Surface Soil Data					Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
1,1-Dichloropropene	17	0	0	ND	ND	0.14	0.002	<0.002
1,2,3-Trichlorobenzene	17	0	0	ND	ND	0.14	0.0077	<0.0077
1,2,3-Trichloropropane	17	0	0	ND	ND	0.14	0.002	<0.002
1,2,4-Trichlorobenzene	18	0	0	ND	ND	0.14	0.00027	<0.00027
1,2,4-Trimethylbenzene	18	9	50	1400	0.0014	0.09	0.0077	0.0014
1,2-Dibromo-3-chloropropane	17	0	0	ND	ND	0.27	0.0077	<0.0077
1,2-Dibromoethane	17	0	0	ND	ND	0.14	0.0077	<0.0077
1,2-Dichlorobenzene	18	0	0	ND	ND	0.14	0.00016	<0.00016
1,2-Dichloroethane	17	0	0	ND	ND	0.03	0.002	<0.002
1,2-Dichloropropane	17	0	0	ND	ND	0.02	0.002	<0.002
1,3,5-Trimethylbenzene	18	9	50	510	0.00078	0.09	0.0077	0.00078
1,3-Dichlorobenzene	18	0	0	ND	ND	0.14	0.0002	<0.0002
1,3-Dichloropropane	17	0	0	ND	ND	0.05	0.0020	<0.002
1,4-Dichlorobenzene	18	1	6	1.2	1.2	0.09	0.0002	1.2
1-Chlorohexane	7	0	0	ND	ND	0.05	0.019	<0.019
2,2-Dichloropropane	17	0	0	ND	ND	0.14	0.002	<0.002
2-Butanone (MEK)	17	3	18	0.0033	0.0022	1.40	0.0077	0.0022
2-Chloroethyl Vinyl Ether	2	0	0	ND	ND	0.13	0.09581	<0.09581
2-Chlorotoluene	17	0	0	ND	ND	0.14	0.0077	<0.0077
4-Chlorotoluene	17	0	0	ND	ND	0.14	0.0077	<0.0077
4-Methyl-2-pentanone	17	0	0	ND	ND	2.70	0.0077	<0.0077
Acetone	17	9	53	2.9	0.026	0.96	0.060	0.026
Benzene	18	4	22	13	0.00043	0.02	0.002	0.00043
Bromobenzene	17	0	0	ND	ND	0.14	0.002	<0.002
Bromochloromethane	17	0	0	ND	ND	0.14	0.002	<0.002
Bromodichloromethane	17	0	0	ND	ND	0.07	0.002	<0.002
Bromoform	17	0	0	ND	ND	0.14	0.002	<0.002
Bromomethane	17	0	0	ND	ND	0.40	0.002	<0.002
Carbon Tetrachloride	17	0	0	ND	ND	0.03	0.002	<0.002
Chlorobenzene	17	0	0	ND	ND	0.07	0.00077	<0.00077
Chloroethane	17	0	0	ND	ND	0.14	0.002	<0.002
Chloroform	18	1	6	0.00038	0.00038	0.04	0.002	0.00038
Chloromethane	17	0	0	ND	ND	0.14	0.002	<0.002
cis-1,2-Dichloroethene	17	0	0	ND	ND	0.14	0.002	<0.002
cis-1,3-Dichloropropene	17	0	0	ND	ND	0.07	0.002	<0.002
Dibromochloromethane	17	0	0	ND	ND	0.07	0.002	<0.002

Table A-1 Analytical Results for Surface Soil at Site SS03

Constituent	Surface Soil Data					Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
Dibromomethane	17	0	0	ND	ND	0.14	0.002	<0.002
Dichlorodifluoromethane	17	0	0	ND	ND	0.14	0.002	<0.002
Ethylbenzene	18	8	44	26	0.0019	0.03	0.002	0.0019
Isopropylbenzene	17	8	47	3.5	0.012	0.09	0.008	0.012
m,p-Xylenes	15	7	47	22	0.0012	0.02	0.002	0.0012
Methyl tert-Butyl Ether	15	0	0	ND	ND	0.67	0.002	<0.002
Methylene Chloride	18	2	11	0.65	0.0066	0.10	0.004	0.0066
n-Butylbenzene	17	6	35	6.4	0.037	0.44	0.008	0.037
n-Propylbenzene	17	7	41	8.4	0.041	0.09	0.008	0.041
o-Xylene	15	6	40	7.9	0.029	0.02	0.002	0.029
p-Isopropyltoluene	18	8	44	11	0.0015	0.09	0.008	0.0015
sec-Butylbenzene	17	6	35	6.4	0.034	0.09	0.008	0.034
Styrene	17	0	0	ND	ND	0.14	0.002	<0.002
Tert-Butylbenzene	17	4	24	18	0.18	0.10	0.008	0.18
Tetrachloroethene	17	0	0	ND	ND	0.04	0.002	<0.002
Toluene	18	10	56	78	0.00064	0.03	0.002	0.00064
Total xylenes	3	3	100	2600	0.0081	na	na	0.0081
trans-1,2-Dichloroethene	17	0	0	ND	ND	0.14	0.002	<0.002
trans-1,3-Dichloropropene	17	0	0	ND	ND	0.14	0.002	<0.002
Trichloroethene	18	1	6	0.00049	0.00049	0.02	0.002	0.00049
Trichlorofluoromethane	17	0	0	ND	ND	0.14	0.002	<0.002
Vinyl Chloride	17	0	0	ND	ND	0.03	0.002	<0.002
Carbon Disulfide	12	0	0	ND	ND	0.07	0.002	<0.002
Semi-Volatile Organic Compounds								
2,4,5-Trichlorophenol	2	0	0	ND	ND	0.20	0.145	<0.145
2,4,6-Trichlorophenol	2	0	0	ND	ND	0.20	0.15	<0.15
2,4-Dichlorophenol	2	0	0	ND	ND	0.20	0.145	<0.145
2,4-Dimethylphenol	2	0	0	ND	ND	0.08	0.065	<0.065
2,4-Dinitrophenol	2	0	0	ND	ND	0.20	0.15	<0.15
2,4-Dinitrotoluene	2	0	0	ND	ND	0.20	0.09	<0.09
2,6-Dinitrotoluene	2	0	0	ND	ND	0.08	0.065	<0.065
2-Chloronaphthalene	2	0	0	ND	ND	0.08	0.065	<0.065
2-Chlorophenol	2	0	0	ND	ND	0.10	0.075	<0.075
2-Hexanone	2	0	0	ND	ND	1.40	1.0	<1
2-Methyl-4,6-dinitrophenol	2	0	0	ND	ND	0.05	0.04	<0.04

Table A-1 Analytical Results for Surface Soil at Site SS03

Constituent	Surface Soil Data					Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
2-Methylphenol	2	0	0	ND	ND	0.20	0.145	<0.145
2-Nitroaniline	2	0	0	ND	ND	0.08	0.065	<0.065
2-Nitrophenol	2	0	0	ND	ND	0.20	0.09	<0.09
3,3'-Dichlorobenzidine	2	0	0	ND	ND	0.07	0.055	<0.055
3-and 4-Methylphenol Coelution	2	1	50	1	1	0.15	0.15	1
3-Nitroaniline	2	0	0	ND	ND	0.20	0.09	<0.09
4-Bromophenyl Phenyl Ether	2	0	0	ND	ND	0.05	0.04	<0.04
4-Chloro-3-methylphenol	2	0	0	ND	ND	0.20	0.145	<0.145
4-Chloroaniline	2	0	0	ND	ND	0.20	0.09	<0.09
4-Chlorophenyl Phenyl Ether	2	0	0	ND	ND	0.20	0.15	<0.15
4-Nitroaniline	2	0	0	ND	ND	0.08	0.065	<0.065
4-Nitrophenol	2	0	0	ND	ND	0.20	0.145	<0.145
Benzoic Acid	2	0	0	ND	ND	0.50	0.400	<0.4
Benzyl Alcohol	2	0	0	ND	ND	0.20	0.200	<0.2
Bis(2-chloroethoxy)methane	2	0	0	ND	ND	0.20	0.09	<0.09
Bis(2-chloroethyl) Ether	2	0	0	ND	ND	0.15	0.08	<0.08
Bis(2-chloroisopropyl) Ether	2	0	0	ND	ND	0.08	0.06	<0.06
Bis(2-ethylhexyl) Phthalate	3	2	67	0.2	0.1	0.20	0.2	0.1
Butyl Benzyl Phthalate	2	0	0	ND	ND	0.20	0.09	<0.09
Dibenzofuran	13	9	69	2.8	0.00021	0.20	0.0044	0.00021
DiethylPhthalate	3	3	100	0.9	0.2	na	na	0.2
DimethylPhthalate	2	0	0	ND	ND	0.20	0.20	<0.2
Di-n-Butyl Phthalate	2	0	0	ND	ND	0.20	0.09	<0.09
Di-n-OctylPhthalate	2	0	0	ND	ND	0.10	0.075	<0.075
Hexachlorobenzene	2	0	0	ND	ND	0.10	0.075	<0.075
Hexachlorobutadiene	18	0	0	ND	ND	0.10	0.002	<0.002
Hexachlorocyclopentadiene	2	0	0	ND	ND	0.20	0.09	<0.09
Hexachloroethane	2	0	0	ND	ND	0.20	0.09	<0.09
Isophorone	2	0	0	ND	ND	0.20	0.15	<0.15
Nitrobenzene	2	0	0	ND	ND	0.20	0.145	<0.145
N-Nitrosodi-n-propylamine	2	0	0	ND	ND	0.20	0.145	<0.145
N-Nitrosodiphenylamine	2	0	0	ND	ND	0.20	0.15	<0.15
Pentachlorophenol	2	0	0	ND	ND	0.08	0.065	<0.065
Phenol	2	0	0	ND	ND	0.20	0.15	<0.15

Polynuclear Aromatic Hydrocarbons

Table A-1 Analytical Results for Surface Soil at Site SS03

Constituent	Surface Soil Data					Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
2-Methylnaphthalene	3	2	67	33	4	0.15	0.15	4
Acenaphthene	17	7	41	0.82	0.00021	0.10	0.0044	0.00021
Acenaphthylene	17	1	6	0.0036	0.0036	0.12	0.0044	0.0036
Anthracene	17	8	47	0.029	0.0005	0.08	0.0044	0.0005
Benzo(a)anthracene	17	13	76	0.018	0.00025	0.10	0.0044	0.00025
Benzo(a)pyrene	17	9	53	0.044	0.000205	0.10	0.0044	0.000205
Benzo(b)fluoranthene	17	12	71	0.099	0.00092	0.20	0.0044	0.00092
Benzo(g,h,i)perylene	17	12	71	0.058	0.00052	0.07	0.0044	0.00052
Benzo(k)fluoranthene	15	9	60	0.013	0.00027	0.01	0.0044	0.00027
Chrysene	17	15	88	0.2	0.0005	0.20	0.09	0.0005
Dibenz(a,h)anthracene	17	8	47	0.036	0.00043	0.05	0.0044	0.00043
Fluoranthene	17	13	76	0.027	0.00063	0.20	0.0044	0.00063
Fluorene	18	14	78	2.3	0.00029	0.09	0.0044	0.00029
Indeno(1,2,3-cd)Pyrene	17	11	65	0.01	0.00034	0.07	0.0044	0.00034
Naphthalene	18	13	72	160	0.00064	0.08	0.0044	0.00064
Phenanthrene	18	16	89	0.92	0.00075	0.20	0.15	0.00075
Pyrene	18	16	89	0.2	0.00045	0.10	0.08	0.00045
Pesticides								
4,4'-DDD	2	1	50	0.043	0.043	0.07	0.069	0.043
4,4'-DDE	2	2	100	0.02	0.01	na	na	0.01
4,4'-DDT	2	2	100	0.006	0.003	na	na	0.003
Aldrin	2	0	0	ND	ND	0.00	0.00039	<0.00039
alpha Endosulfan	2	0	0	ND	ND	0.00	0.00038	<0.00038
alpha-BHC	2	0	0	ND	ND	0.00	0.00046	<0.00046
alpha-Chlordane	2	0	0	ND	ND	0.01	0.00047	<0.00047
beta Endosulfan	2	0	0	ND	ND	0.01	0.006	<0.006
beta-BHC	2	0	0	ND	ND	0.01	0.00086	<0.00086
Dieldrin	2	1	50	0.004	0.004	0.00	0.004	0.004
Endosulfan Sulfate	2	0	0	ND	ND	0.01	0.00051	<0.00051
Endrin	2	0	0	ND	ND	0.01	0.004	<0.004
Endrin Aldehyde	2	0	0	ND	ND	0.00	0.00037	<0.00037
gamma-BHC (Lindane)	2	0	0	ND	ND	0.00	0.00066	<0.00066
gamma-Chlordane	2	0	0	ND	ND	0.01	0.002	<0.002
Heptachlor	2	0	0	ND	ND	0.00	0.00059	<0.00059
Heptachlor Epoxide	2	0	0	ND	ND	0.01	0.00300	<0.003
Methoxychlor	2	0	0	ND	ND	0.00	0.00110	<0.0011

Table A-1 Analytical Results for Surface Soil at Site SS03

Constituent	Surface Soil Data					Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
Toxaphene	2	0	0	ND	ND	0.52	0.51	<0.51
Petroleum Hydrocarbons								
Diesel Range Organics (DRO)	18	14	78	38000	8.6	21.00	20	8.6
Gasoline Range Organics (GRO)	18	7	39	3500	0.95	12.00	0.83	0.95
Residual Range Organics (RRO)	13	12	92	1260	12	100.00	100	12

Notes:

4,4'-DDD - dichlorodiphenyldichloroethane
4,4'-DDE - dichlorodiphenyldichloroethylene
4,4'-DDT - dichlorodiphenyltrichloroethane
ND - not detected
na - not available
mg/Kg - Milligram per kilogram.

¹ - Minimum Result reported as smallest detected concentration or smallest reporting limit if ND

Table A-2 Analytical Results for Subsurface Soil at Site SS03

Constituent	Subsurface Soil Data					Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
Inorganics, Total								
Lead	1	1	100	10.35	10.35	na	na	10.35
Volatile Organic Compounds								
1,1,1,2-Tetrachloroethane	13	0	0	ND	ND	0.155	0.00014	<0.00014
1,1,1-Trichloroethane	13	0	0	ND	ND	0.155	0.000099	<0.000099
1,1,2,2-Tetrachloroethane	13	0	0	ND	ND	0.155	0.00018	<0.00018
1,1,2-Trichloroethane	13	0	0	ND	ND	0.0805	0.0002	<0.0002
1,1-Dichloroethane	13	0	0	ND	ND	0.155	0.000078	<0.000078
1,1-Dichloroethene	13	0	0	ND	ND	0.155	0.00009	<0.00009
1,1-Dichloropropene	13	0	0	ND	ND	0.155	0.00018	<0.00018
1,2,3-Trichlorobenzene	13	0	0	ND	ND	0.155	0.00025	<0.00025
1,2,3-Trichloropropane	13	0	0	ND	ND	0.155	0.00021	<0.00021
1,2,4-Trichlorobenzene	13	0	0	ND	ND	0.155	0.00027	<0.00027
1,2,4-Trimethylbenzene	13	8	62	12.8	0.000185	0.046	0.0098	0.000185
1,2-Dibromo-3-chloropropane	13	0	0	ND	ND	0.619	0.00052	<0.00052
1,2-Dibromoethane	13	0	0	ND	ND	0.155	0.00022	<0.00022
1,2-Dichlorobenzene	13	0	0	ND	ND	0.155	0.00016	<0.00016
1,2-Dichloroethane	13	0	0	ND	ND	0.0805	0.00013	<0.00013
1,2-Dichloropropane	13	0	0	ND	ND	0.048	0.000083	<0.000083
1,3,5-Trimethylbenzene	13	7	54	5.55	0.038	0.046	0.00037	0.038
1,3-Dichlorobenzene	13	0	0	ND	ND	0.155	0.0002	<0.0002
1,3-Dichloropropane	13	0	0	ND	ND	0.155	0.000096	<0.000096
1,4-Dichlorobenzene	13	0	0	ND	ND	0.155	0.0002	<0.0002
1-Chlorohexane	1	0	0	ND	ND	0.00024	0.00024	<0.00024
2,2-Dichloropropane	13	0	0	ND	ND	0.155	0.00011	<0.00011
2-Butanone (MEK)	13	3	23	0.0065	0.0039	1.55	0.0068	0.0039
2-Chloroethyl Vinyl Ether	2	0	0	ND	ND	1.55	0.213	<0.213
2-Chlorotoluene	13	0	0	ND	ND	0.155	0.00013	<0.00013
2-Hexanone	3	0	0	ND	ND	1.55	0.007	<0.007
4-Chlorotoluene	13	0	0	ND	ND	0.155	0.00018	<0.00018
4-Methyl-2-pentanone	13	0	0	ND	ND	2.05	0.0058	<0.0058
Acetone	11	5	45	0.13	0.0108	1.045	0.42	0.0108
Benzene	16	7	44	0.522	0.00055	0.114	0.000084	0.00055
Bromobenzene	13	0	0	ND	ND	0.155	0.00014	<0.00014

Table A-2 Analytical Results for Subsurface Soil at Site SS03

Constituent	Subsurface Soil Data							
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)	Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
Bromochloromethane	13	0	0	ND	ND	0.155	0.00012	<0.00012
Bromodichloromethane	13	0	0	ND	ND	0.155	0.00014	<0.00014
Bromoform	13	0	0	ND	ND	0.155	0.00019	<0.00019
Bromomethane	13	0	0	ND	ND	0.619	0.00023	<0.00023
Carbon Tetrachloride	13	0	0	ND	ND	0.155	0.00016	<0.00016
Chlorobenzene	13	0	0	ND	ND	0.155	0.000085	<0.000085
Chloroethane	13	0	0	ND	ND	0.619	0.00016	<0.00016
Chloroform	13	0	0	ND	ND	0.155	0.000062	<0.000062
Chloromethane	13	0	0	ND	ND	0.155	0.00014	<0.00014
cis-1,2-Dichloroethene	13	0	0	ND	ND	0.155	0.00011	<0.00011
cis-1,3-Dichloropropene	13	0	0	ND	ND	0.124	0.00017	<0.00017
Dibromochloromethane	13	0	0	ND	ND	0.155	0.00016	<0.00016
Dibromomethane	13	0	0	ND	ND	0.155	0.0002	<0.0002
Dichlorodifluoromethane	13	0	0	ND	ND	0.155	0.00015	<0.00015
Ethylbenzene	16	9	56	2.15	0.018	0.046	0.00014	0.018
Isopropylbenzene	13	6	46	1.7	0.004	0.048	0.000096	0.004
m,p-Xylenes	15	10	67	6.24	0.0015	0.092	0.0025	0.0015
Methyl tert-Butyl Ether	10	0	0	ND	ND	0.51	0.0025	<0.0025
Methylene Chloride	13	2	15	1.52	0.0026	0.619	0.0049	0.0026
n-Butylbenzene	13	7	54	3.35	0.008	0.046	0.0002	0.008
n-Propylbenzene	13	8	62	3.65	0.011	0.046	0.00017	0.011
o-Xylene	15	8	53	7.72	0.00955	0.294	0.0025	0.00955
p-Isopropyltoluene	13	8	62	2	0.0022	0.046	0.00017	0.0022
sec-Butylbenzene	13	6	46	2.3	0.0032	0.048	0.0001	0.0032
Styrene	13	1	8	0.013	0.013	0.155	0.00013	0.013
Tert-Butylbenzene	13	6	46	0.18	0.0068	0.0975	0.00009	0.0068
Tetrachloroethene	13	0	0	ND	ND	0.155	0.00019	<0.00019
Toluene	16	8	50	0.71	0.000325	0.13	0.0025	0.000325
Total xylenes	1	0	0	ND	ND	0.00033	0.00033	<0.00033
trans-1,2-Dichloroethene	13	0	0	ND	ND	0.155	0.000093	<0.000093
trans-1,3-Dichloropropene	13	0	0	ND	ND	0.155	0.00013	<0.00013
Trichloroethene	13	1	8	0.000118	0.000118	0.124	0.0025	0.000118
Trichlorofluoromethane	13	0	0	ND	ND	0.155	0.00015	<0.00015
Vinyl Acetate	1	0	0	ND	ND	0.00064	0.00064	<0.00064
Vinyl Chloride	13	0	0	ND	ND	0.0805	0.00011	<0.00011

Table A-2 Analytical Results for Subsurface Soil at Site SS03

Constituent	Subsurface Soil Data							
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)	Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
Carbon Disulfide	13	0	0	ND	ND	0.619	0.00023	<0.00023
Semi-Volatile Organic Compounds								
2,4,5-Trichlorophenol	1	0	0	ND	ND	0.1	0.1	<0.1
2,4,6-Trichlorophenol	1	0	0	ND	ND	0.2	0.2	<0.2
2,4-Dichlorophenol	1	0	0	ND	ND	0.1	0.1	<0.1
2,4-Dimethylphenol	1	0	0	ND	ND	0.06	0.06	<0.06
2,4-Dinitrophenol	1	0	0	ND	ND	0.2	0.2	<0.2
2,4-Dinitrotoluene	1	0	0	ND	ND	0.08	0.08	<0.08
2,6-Dinitrotoluene	1	0	0	ND	ND	0.06	0.06	<0.06
2-Chloronaphthalene	1	0	0	ND	ND	0.06	0.06	<0.06
2-Chlorophenol	1	0	0	ND	ND	0.07	0.07	<0.07
2-Methyl-4,6-dinitrophenol	1	0	0	ND	ND	0.04	0.04	<0.04
2-Methylphenol	1	0	0	ND	ND	0.1	0.1	<0.1
2-Nitroaniline	1	0	0	ND	ND	0.06	0.06	<0.06
2-Nitrophenol	1	0	0	ND	ND	0.08	0.08	<0.08
3,3'-Dichlorobenzidine	1	0	0	ND	ND	0.05	0.05	<0.05
3-and 4-Methylphenol Coelution	1	0	0	ND	ND	0.2	0.2	<0.2
3-Nitroaniline	1	0	0	ND	ND	0.08	0.08	<0.08
4-Bromophenyl Phenyl Ether	1	0	0	ND	ND	0.04	0.04	<0.04
4-Chloro-3-methylphenol	1	0	0	ND	ND	0.1	0.1	<0.1
4-Chloroaniline	1	0	0	ND	ND	0.08	0.08	<0.08
4-Chlorophenyl Phenyl Ether	1	0	0	ND	ND	0.2	0.2	<0.2
4-Nitroaniline	1	0	0	ND	ND	0.06	0.06	<0.06
4-Nitrophenol	1	0	0	ND	ND	0.1	0.1	<0.1
Benzoic Acid	1	0	0	ND	ND	0.4	0.4	<0.4
Benzyl Alcohol	1	0	0	ND	ND	0.2	0.2	<0.2
Bis(2-chloroethoxy)methane	1	0	0	ND	ND	0.08	0.08	<0.08
Bis(2-chloroethyl) Ether	1	0	0	ND	ND	0.1	0.1	<0.1
Bis(2-chloroisopropyl) Ether	1	0	0	ND	ND	0.07	0.07	<0.07
Bis(2-ethylhexyl) Phthalate	1	0	0	ND	ND	0.2	0.2	<0.2
Butyl Benzyl Phthalate	1	0	0	ND	ND	0.08	0.08	<0.08
Dibenzofuran	11	8	73	0.475	0.00049	0.2	0.0047	0.00049
DiethylPhthalate	1	0	0	ND	ND	0.2	0.2	<0.2
DimethylPhthalate	1	0	0	ND	ND	0.2	0.2	<0.2
Di-n-Butyl Phthalate	1	0	0	ND	ND	0.08	0.08	<0.08

Table A-2 Analytical Results for Subsurface Soil at Site SS03

Constituent	Subsurface Soil Data							
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)	Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
Di-n-OctylPhthalate	1	0	0	ND	ND	0.07	0.07	<0.07
Hexachlorobenzene	1	0	0	ND	ND	0.07	0.07	<0.07
Hexachlorobutadiene	13	0	0	ND	ND	0.155	0.0025	<0.0025
Hexachlorocyclopentadiene	1	0	0	ND	ND	0.08	0.08	<0.08
Hexachloroethane	1	0	0	ND	ND	0.08	0.08	<0.08
Isophorone	1	0	0	ND	ND	0.2	0.2	<0.2
Nitrobenzene	1	0	0	ND	ND	0.1	0.1	<0.1
N-Nitrosodi-n-propylamine	1	0	0	ND	ND	0.1	0.1	<0.1
N-Nitrosodiphenylamine	1	0	0	ND	ND	0.2	0.2	<0.2
Pentachlorophenol	1	0	0	ND	ND	0.06	0.06	<0.06
Phenol	1	0	0	ND	ND	0.2	0.2	<0.2
Polynuclear Aromatic Hydrocarbons								
2-Methylnaphthalene	1	0	0	ND	ND	0.2	0.2	<0.2
Acenaphthene	13	9	69	0.872	0.00265	0.07	0.0047	0.00265
Acenaphthylene	13	1	8	0.00026	0.00026	0.0905	0.0047	0.00026
Anthracene	13	6	46	0.0105	0.0003	0.06	0.0047	0.0003
Benzo(a)anthracene	13	8	62	0.028	0.000235	0.07	0.0047	0.000235
Benzo(a)pyrene	13	6	46	0.023	0.00036	0.07	0.00026	0.00036
Benzo(b)fluoranthene	13	7	54	0.03	0.00059	0.1	0.0047	0.00059
Benzo(g,h,i)perylene	13	6	46	0.015	0.00038	0.0594	0.0047	0.00038
Benzo(k)fluoranthene	12	5	42	0.031	0.00061	0.0594	0.0047	0.00061
Chrysene	13	9	69	0.038	0.00058	0.08	0.0047	0.00058
Dibenz(a,h)anthracene	13	1	8	0.0025	0.0025	0.0594	0.00294	0.0025
Fluoranthene	13	9	69	0.091	0.000505	0.1	0.0047	0.000505
Fluorene	13	9	69	2.83	0.00042	0.08	0.0047	0.00042
Indeno(1,2,3-cd)Pyrene	13	5	38	0.017	0.00032	0.0594	0.0047	0.00032
Naphthalene	13	10	77	55.7	0.011	0.005	0.0002	0.011
Phenanthrene	13	12	92	1.71	0.00057	0.1	0.1	0.00057
Pyrene	13	10	77	0.074	0.00059	0.07	0.0047	0.00059
Petroleum Hydrocarbons								
Diesel Range Organics (DRO)	16	12	75	13000	13	20	3.2	3.2
Gasoline Range Organics (GRO)	16	12	75	582	1.035	11	2	1.035
Residual Range Organics (RRO)	16	10	63	251	7.9	1190	12.1	7.9

Table A-2 Analytical Results for Subsurface Soil at Site SS03

Constituent	Subsurface Soil Data				Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)	Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Detection Frequency						

Notes:

ND - not detected

na - not available

mg/Kg - Milligram per kilogram.

¹ - Minimum Result reported as smallest detected concentration or smallest reporting limit if ND

Table A-3 Analytical Results for Sediment at Site SS03

Constituent	Sediment Data					Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/Kg)	Detected Concentration (mg/Kg)			
Inorganics, Total								
Aluminum	1	1	100	27900	27900	na	na	27900
Antimony	1	1	100	2	2	na	na	2
Arsenic	1	1	100	21	21	na	na	21
Barium	1	1	100	146	146	na	na	146
Beryllium	1	1	100	0.5	0.5	na	na	0.5
Cadmium	1	1	100	1	1	na	na	1
Calcium	1	1	100	4540	4540	na	na	4540
Chromium	1	1	100	62	62	na	na	62
Cobalt	1	1	100	23	23	na	na	23
Copper	1	1	100	55	55	na	na	55
Cyanide	1	0	0	ND	ND	0.25	0.25	<0.25
Iron	1	1	100	62600	62600	na	na	62600
Lead	2	1	50	20	20	0	0	20
Magnesium	1	1	100	11500	11500	na	na	11500
Manganese	1	1	100	1320	1320	na	na	1320
Mercury	1	1	100	0.09	0.09	na	na	0.09
Molybdenum	1	0	0	ND	ND	0.8	0.8	<0.8
Nickel	1	1	100	65	65	na	na	65
Potassium	1	1	100	1950	1950	na	na	1950
Selenium	1	1	100	1.7	1.7	na	na	1.7
Silver	1	1	100	2	2	na	na	2
Sodium	1	1	100	100	100	na	na	100
Thallium	1	0	0	ND	ND	0.1	0.1	<0.1
Tin	1	0	0	ND	ND	8	8	<8
Titanium	1	1	100	1160	1160	na	na	1160
Vanadium	1	1	100	107	107	na	na	107
Zinc	1	1	100	218	218	na	na	218
Volatile Organic Compounds								
1,1,2,2-Tetrachloroethane	1	1	100	0.00018	0.00018	na	na	0.00018
1,2,3-Trichlorobenzene	1	1	100	0.00025	0.00025	na	na	0.00025
1,2,3-Trichloropropane	1	1	100	0.00021	0.00021	na	na	0.00021
1,2,4-Trichlorobenzene	2	1	50	0.00027	0.00027	0.3	0.3	0.00027
1,2-Dichlorobenzene	1	0	0	ND	ND	0.3	0.3	<0.3
1,3-Dichlorobenzene	1	0	0	ND	ND	0.3	0.3	<0.3
1,4-Dichlorobenzene	1	0	0	ND	ND	0.3	0.3	<0.3
cis-1,3-Dichloropropene	1	1	100	0.00017	0.00017	na	na	0.00017

Table A-3 Analytical Results for Sediment at Site SS03

Constituent	Sediment Data					Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/Kg)	Detected Concentration (mg/Kg)			
Methylene Chloride	1	1	100	0.013	0.013	na	na	0.013
trans-1,3-Dichloropropene	1	1	100	0.00013	0.00013	na	na	0.00013
Semi-Volatile Organic Compounds								
2,4,5-Trichlorophenol	1	0	0	ND	ND	0.4	0.4	<0.4
2,4,6-Trichlorophenol	1	0	0	ND	ND	0.4	0.4	<0.4
2,4-Dichlorophenol	1	0	0	ND	ND	0.4	0.4	<0.4
2,4-Dimethylphenol	1	0	0	ND	ND	0.3	0.3	<0.3
2,4-Dinitrophenol	1	0	0	ND	ND	0.4	0.4	<0.4
2,4-Dinitrotoluene	1	0	0	ND	ND	0.3	0.3	<0.3
2,6-Dinitrotoluene	1	0	0	ND	ND	0.3	0.3	<0.3
2-Chloronaphthalene	1	0	0	ND	ND	0.3	0.3	<0.3
2-Chlorophenol	1	0	0	ND	ND	0.3	0.3	<0.3
2-Methyl-4,6-dinitrophenol	1	0	0	ND	ND	0.2	0.2	<0.2
2-Methylphenol	1	0	0	ND	ND	0.4	0.4	<0.4
2-Nitroaniline	1	0	0	ND	ND	0.3	0.3	<0.3
2-Nitrophenol	1	0	0	ND	ND	0.3	0.3	<0.3
3,3'-Dichlorobenzidine	1	0	0	ND	ND	0.2	0.2	<0.2
3-and 4-Methylphenol Coelution	1	1	100	0.2	0.2	na	na	0.2
3-Nitroaniline	1	0	0	ND	ND	0.3	0.3	<0.3
4-Bromophenyl Phenyl Ether	1	0	0	ND	ND	0.2	0.2	<0.2
4-Chloro-3-methylphenol	1	0	0	ND	ND	0.4	0.4	<0.4
4-Chloroaniline	1	0	0	ND	ND	0.3	0.3	<0.3
4-Chlorophenyl Phenyl Ether	1	0	0	ND	ND	0.4	0.4	<0.4
4-Nitroaniline	1	0	0	ND	ND	0.3	0.3	<0.3
4-Nitrophenol	1	0	0	ND	ND	0.4	0.4	<0.4
Benzoic Acid	1	0	0	ND	ND	2	2	<2
Benzyl Alcohol	1	0	0	ND	ND	0.5	0.5	<0.5
Bis(2-chloroethoxy)methane	1	0	0	ND	ND	0.3	0.3	<0.3
Bis(2-chloroethyl) Ether	1	0	0	ND	ND	0.4	0.4	<0.4
Bis(2-chloroisopropyl) Ether	1	0	0	ND	ND	0.3	0.3	<0.3
Bis(2-ethylhexyl) Phthalate	1	1	100	0.9	0.9	na	na	0.9
Butyl Benzyl Phthalate	1	0	0	ND	ND	0.3	0.3	<0.3
Dibenzofuran	1	0	0	ND	ND	0.4	0.4	<0.4
DiethylPhthalate	1	1	100	0.1	0.1	na	na	0.1
DimethylPhthalate	1	0	0	ND	ND	0.5	0.5	<0.5
Di-n-Butyl Phthalate	1	0	0	ND	ND	0.3	0.3	<0.3
Di-n-OctylPhthalate	1	0	0	ND	ND	0.3	0.3	<0.3

Table A-3 Analytical Results for Sediment at Site SS03

Constituent	Sediment Data					Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/Kg)	Detected Concentration (mg/Kg)			
Hexachlorobenzene	1	0	0	ND	ND	0.3	0.3	<0.3
Hexachlorobutadiene	1	0	0	ND	ND	0.3	0.3	<0.3
Hexachlorocyclopentadiene	1	0	0	ND	ND	0.3	0.3	<0.3
Hexachloroethane	1	0	0	ND	ND	0.3	0.3	<0.3
Isophorone	1	0	0	ND	ND	0.4	0.4	<0.4
Nitrobenzene	1	0	0	ND	ND	0.4	0.4	<0.4
N-Nitrosodi-n-propylamine	1	0	0	ND	ND	0.4	0.4	<0.4
N-Nitrosodiphenylamine	1	0	0	ND	ND	0.4	0.4	<0.4
Pentachlorophenol	1	0	0	ND	ND	0.3	0.3	<0.3
Phenol	1	1	100	0.1	0.1	na	na	0.1
Polynuclear Aromatic Hydrocarbons								
2-Methylnaphthalene	1	0	0	ND	ND	0.4	0.4	<0.4
Acenaphthene	1	0	0	ND	ND	0.3	0.3	<0.3
Acenaphthylene	1	0	0	ND	ND	0.3	0.3	<0.3
Anthracene	1	0	0	ND	ND	0.3	0.3	<0.3
Benzo(a)anthracene	1	0	0	ND	ND	0.3	0.3	<0.3
Benzo(a)pyrene	1	0	0	ND	ND	0.3	0.3	<0.3
Benzo(b)fluoranthene	1	0	0	ND	ND	0.4	0.4	<0.4
Benzo(g,h,i)perylene	1	0	0	ND	ND	0.2	0.2	<0.2
Chrysene	1	0	0	ND	ND	0.3	0.3	<0.3
Dibenz(a,h)anthracene	1	0	0	ND	ND	0.2	0.2	<0.2
Fluoranthene	1	0	0	ND	ND	0.4	0.4	<0.4
Fluorene	1	0	0	ND	ND	0.3	0.3	<0.3
Indeno(1,2,3-cd)Pyrene	1	0	0	ND	ND	0.2	0.2	<0.2
Naphthalene	2	0	0	ND	ND	0	0	<0
Phenanthrene	1	0	0	ND	ND	0.4	0.4	<0.4
Pyrene	1	0	0	ND	ND	0.3	0.3	<0.3
Pesticides								
4,4'-DDD	1	1	100	0.00795	0.00795	na	na	0.00795
4,4'-DDE	1	0	0	ND	ND	0.003	0.003	<0.003
4,4'-DDT	1	1	100	0.00954	0.00954	na	na	0.00954
Aldrin	1	0	0	ND	ND	0.00039	0.00039	<0.00039
alpha Endosulfan	1	0	0	ND	ND	0.00038	0.00038	<0.00038
alpha-Chlordane	1	0	0	ND	ND	0.0007	0.0007	<0.0007
beta Endosulfan	1	0	0	ND	ND	0.00036	0.00036	<0.00036
beta-BHC	1	0	0	ND	ND	0.00086	0.00086	<0.00086

Table A-3 Analytical Results for Sediment at Site SS03

Constituent	Sediment Data							
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/Kg)	Detected Concentration (mg/Kg)	Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
Dieldrin	1	0	0	ND	ND	0.003	0.003	<0.003
Endosulfan Sulfate	1	1	100	0.0033	0.0033	na	na	0.0033
Endrin	1	0	0	ND	ND	0.0008	0.0008	<0.0008
Endrin Aldehyde	1	0	0	ND	ND	0.00037	0.00037	<0.00037
gamma-BHC (Lindane)	1	0	0	ND	ND	0.00066	0.00066	<0.00066
gamma-Chlordane	1	0	0	ND	ND	0.0008	0.0008	<0.0008
Heptachlor	1	0	0	ND	ND	0.00059	0.00059	<0.00059
Heptachlor Epoxide	1	0	0	ND	ND	0.0008	0.0008	<0.0008
Methoxychlor	1	0	0	ND	ND	0.0011	0.0011	<0.0011
Toxaphene	1	0	0	ND	ND	0.07	0.07	<0.07
Petroleum Hydrocarbons								
Diesel Range Organics (DRO)	1	1	100	161	161	na	0	161
Gasoline Range Organics (GRO)	1	1	100	5.8	5.8	na	0	5.8
Polychlorinated Biphenyl (PCB)								
Arochlor 1016	1	0	0	ND	ND	0.013	ND	ND
Arochlor 1221	1	0	0	ND	ND	0.012	ND	ND
Arochlor 1232	1	0	0	ND	ND	0.019	ND	ND
Arochlor 1242	1	0	0	ND	ND	0.03	ND	ND
Arochlor 1248	1	0	0	ND	ND	0.04	ND	ND
Arochlor 1254	1	0	0	ND	ND	0.04	ND	ND
Arochlor 1260	1	0	0	ND	ND	0.2	ND	ND

Notes:

4,4'-DDD - dichlorodiphenyldichloroethane

4,4'-DDE - dichlorodiphenyldichloroethylene

4,4'-DDT - dichlorodiphenyltrichloroethane

ND - not detected

na - not available

mg/Kg - Milligram per kilogram.

¹ - Minimum Result reported as smallest detected concentration or smallest reporting limit if ND

Table A-4 Analytical Results for Surface Water at Site SS03

Constituent	Surface Water Data			Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)	Maximum Reporting Level (mg/L)	Minimum Reporting Level (mg/L)	Minimum Result ¹ (mg/L)
	Number of Samples	Number of Detects	Frequency of Detection					
Inorganics, Total								
Aluminum	1	0	0	ND	ND	0.1	0.1	<0.1
Antimony	1	0	0	ND	ND	0.0025	0.0025	<0.0025
Arsenic	1	0	0	ND	ND	0.002	0.002	<0.002
Barium	1	1	100	0.008	0.008	na	na	0.008
Beryllium	1	0	0	ND	ND	0.001	0.001	<0.001
Cadmium	1	0	0	ND	ND	0.003	0.003	<0.003
Calcium	1	1	100	11.8	11.8	na	na	11.8
Chromium	1	0	0	ND	ND	0.005	0.005	<0.005
Cobalt	1	0	0	ND	ND	0.004	0.004	<0.004
Copper	1	0	0	ND	ND	0.003	0.003	<0.003
Cyanide	1	0	0	ND	ND	0.01	0.01	<0.01
Iron	1	1	100	0.15	0.15	na	na	0.15
Lead	1	0	0	ND	ND	0.001	0.001	<0.001
Magnesium	1	1	100	4.01	4.01	na	na	4.01
Manganese	1	1	100	0.015	0.015	na	na	0.015
Mercury	1	0	0	ND	ND	0.0001	0.0001	<0.0001
Molybdenum	1	0	0	ND	ND	0.005	0.005	<0.005
Nickel	1	0	0	ND	ND	0.01	0.01	<0.01
Potassium	1	1	100	0.6	0.6	na	na	0.6
Selenium	1	0	0	ND	ND	0.004	0.004	<0.004
Silver	1	0	0	ND	ND	0.004	0.004	<0.004
Sodium	1	1	100	4.7	4.7	na	na	4.7
Thallium	1	0	0	ND	ND	0.001	0.001	<0.001
Tin	1	0	0	ND	ND	0.042	0.042	<0.042
Titanium	1	1	100	0.004	0.004	na	na	0.004
Vanadium	1	0	0	ND	ND	0.01	0.01	<0.01
Zinc	1	1	100	0.005	0.005	na	na	0.005
Volatile Organic Compounds								
1,1,1,2-Tetrachloroethane	1	0	0	ND	ND	0.00022	0.00022	<0.00022
1,1,1-Trichloroethane	1	0	0	ND	ND	0.00026	0.00026	<0.00026
1,1,2-Trichloroethane	1	0	0	ND	ND	0.0001	0.0001	<0.0001
1,1-Dichloroethane	1	0	0	ND	ND	0.00015	0.00015	<0.00015

Table A-4 Analytical Results for Surface Water at Site SS03

Constituent	Surface Water Data			Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)	Maximum Reporting Level (mg/L)	Minimum Reporting Level (mg/L)	Minimum Result ¹ (mg/L)
	Number of Samples	Number of Detects	Frequency of Detection					
1,1-Dichloroethene	1	0	0	ND	ND	0.00022	0.00022	<0.00022
1,1-Dichloropropene	1	0	0	ND	ND	0.00029	0.00029	<0.00029
1,2,3-Trichlorobenzene	1	0	0	ND	ND	0.00013	0.00013	<0.00013
1,2,3-Trichloropropane	1	0	0	ND	ND	0.00033	0.00033	<0.00033
1,2,4-Trichlorobenzene	1	0	0	ND	ND	0.00019	0.00019	<0.00019
1,2,4-Trimethylbenzene	1	0	0	ND	ND	0.00026	0.00026	<0.00026
1,2-Dibromo-3-chloropropane	1	0	0	ND	ND	0.00058	0.00058	<0.00058
1,2-Dibromoethane	1	0	0	ND	ND	0.00012	0.00012	<0.00012
1,2-Dichlorobenzene	1	0	0	ND	ND	0.00015	0.00015	<0.00015
1,2-Dichloroethane	1	0	0	ND	ND	0.0002	0.0002	<0.0002
1,2-Dichloropropane	1	0	0	ND	ND	0.00013	0.00013	<0.00013
1,3,5-Trimethylbenzene	1	0	0	ND	ND	0.00023	0.00023	<0.00023
1,3-Dichlorobenzene	1	0	0	ND	ND	0.0002	0.0002	<0.0002
1,3-Dichloropropane	1	0	0	ND	ND	0.000092	0.000092	<0.000092
1,4-Dichlorobenzene	1	0	0	ND	ND	0.00014	0.00014	<0.00014
1-Chlorohexane	1	0	0	ND	ND	0.00024	0.00024	<0.00024
2,2-Dichloropropane	1	0	0	ND	ND	0.00025	0.00025	<0.00025
2-Butanone (MEK)	1	0	0	ND	ND	0.0013	0.0013	<0.0013
2-Chloroethyl Vinyl Ether	1	0	0	ND	ND	0.00019	0.00019	<0.00019
2-Chlorotoluene	1	0	0	ND	ND	0.000059	0.000059	<0.000059
2-Hexanone	1	0	0	ND	ND	0.0013	0.0013	<0.0013
4-Chlorotoluene	1	0	0	ND	ND	0.00017	0.00017	<0.00017
4-Methyl-2-pentanone	1	0	0	ND	ND	0.0011	0.0011	<0.0011
Acetone	1	0	0	ND	ND	0.0017	0.0017	<0.0017
Benzene	1	0	0	ND	ND	0.000015	0.000015	<0.000015
Bromobenzene	1	0	0	ND	ND	0.000065	0.000065	<0.000065
Bromochloromethane	1	0	0	ND	ND	0.00014	0.00014	<0.00014
Bromodichloromethane	1	0	0	ND	ND	0.0001	0.0001	<0.0001
Bromoform	1	0	0	ND	ND	0.00014	0.00014	<0.00014
Bromomethane	1	0	0	ND	ND	0.00032	0.00032	<0.00032
Carbon Tetrachloride	1	0	0	ND	ND	0.00042	0.00042	<0.00042
Chlorobenzene	1	0	0	ND	ND	0.00013	0.00013	<0.00013
Chloroethane	1	0	0	ND	ND	0.00031	0.00031	<0.00031
Chloroform	1	0	0	ND	ND	0.00015	0.00015	<0.00015
Chloromethane	1	0	0	ND	ND	0.00031	0.00031	<0.00031

Table A-4 Analytical Results for Surface Water at Site SS03

Constituent	Surface Water Data							
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)	Maximum Reporting Level (mg/L)	Minimum Reporting Level (mg/L)	Minimum Result ¹ (mg/L)
cis-1,2-Dichloroethene	1	0	0	ND	ND	0.00011	0.00011	<0.00011
cis-1,3-Dichloropropene	1	0	0	ND	ND	0.00019	0.00019	<0.00019
Dibromochloromethane	1	0	0	ND	ND	0.00013	0.00013	<0.00013
Dibromomethane	1	0	0	ND	ND	0.00009	0.00009	<0.00009
Dichlorodifluoromethane	1	0	0	ND	ND	0.00021	0.00021	<0.00021
Ethylbenzene	1	0	0	ND	ND	0.0002	0.0002	<0.0002
Isopropylbenzene	1	0	0	ND	ND	0.00021	0.00021	<0.00021
Methylene Chloride	1	0	0	ND	ND	0.00012	0.00012	<0.00012
n-Butylbenzene	1	0	0	ND	ND	0.00051	0.00051	<0.00051
n-Propylbenzene	1	0	0	ND	ND	0.00017	0.00017	<0.00017
p-Isopropyltoluene	1	0	0	ND	ND	0.00036	0.00036	<0.00036
sec-Butylbenzene	1	0	0	ND	ND	0.00031	0.00031	<0.00031
Styrene	1	0	0	ND	ND	0.00013	0.00013	<0.00013
Tert-Butylbenzene	1	0	0	ND	ND	0.00022	0.00022	<0.00022
Tetrachloroethene	1	0	0	ND	ND	0.00027	0.00027	<0.00027
Toluene	1	0	0	ND	ND	0.00019	0.00019	<0.00019
Total xylenes	1	0	0	ND	ND	0.00013	0.00013	<0.00013
trans-1,2-Dichloroethene	1	0	0	ND	ND	0.00021	0.00021	<0.00021
trans-1,3-Dichloropropene	1	0	0	ND	ND	0.00017	0.00017	<0.00017
Trichloroethene	1	0	0	ND	ND	0.00024	0.00024	<0.00024
Trichlorofluoromethane	1	0	0	ND	ND	0.00036	0.00036	<0.00036
Vinyl Acetate	1	0	0	ND	ND	0.00032	0.00032	<0.00032
Vinyl Chloride	1	0	0	ND	ND	0.00036	0.00036	<0.00036
Carbon Disulfide	1	0	0	ND	ND	0.0025	0.0025	<0.0025
Semi-Volatile Organic Compounds								
2,4,5-Trichlorophenol	1	0	0	ND	ND	0.0006	0.0006	<0.0006
2,4,6-Trichlorophenol	1	0	0	ND	ND	0.0004	0.0004	<0.0004
2,4-Dichlorophenol	1	0	0	ND	ND	0.0004	0.0004	<0.0004
2,4-Dimethylphenol	1	0	0	ND	ND	0.003	0.003	<0.003
2,4-Dinitrophenol	1	0	0	ND	ND	0.003	0.003	<0.003
2,4-Dinitrotoluene	1	0	0	ND	ND	0.002	0.002	<0.002
2,6-Dinitrotoluene	1	0	0	ND	ND	0.0004	0.0004	<0.0004
2-Chloronaphthalene	1	0	0	ND	ND	0.0005	0.0005	<0.0005
2-Chlorophenol	1	0	0	ND	ND	0.0003	0.0003	<0.0003

Table A-4 Analytical Results for Surface Water at Site SS03

Constituent	Surface Water Data			Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)	Maximum Reporting Level (mg/L)	Minimum Reporting Level (mg/L)	Minimum Result ¹ (mg/L)
	Number of Samples	Number of Detects	Frequency of Detection					
2-Methyl-4,6-dinitrophenol	1	0	0	ND	ND	0.005	0.005	<0.005
2-Methylphenol	1	0	0	ND	ND	0.0004	0.0004	<0.0004
2-Nitroaniline	1	0	0	ND	ND	0.006	0.006	<0.006
2-Nitrophenol	1	0	0	ND	ND	0.0003	0.0003	<0.0003
3,3'-Dichlorobenzidine	1	0	0	ND	ND	0.004	0.004	<0.004
3-and 4-Methylphenol Coelution	1	0	0	ND	ND	0.0007	0.0007	<0.0007
3-Nitroaniline	1	0	0	ND	ND	0.005	0.005	<0.005
4-Bromophenyl Phenyl Ether	1	0	0	ND	ND	0.0003	0.0003	<0.0003
4-Chloro-3-methylphenol	1	0	0	ND	ND	0.0003	0.0003	<0.0003
4-Chloroaniline	1	0	0	ND	ND	0.002	0.002	<0.002
4-Chlorophenyl Phenyl Ether	1	0	0	ND	ND	0.0002	0.0002	<0.0002
4-Nitroaniline	1	0	0	ND	ND	0.003	0.003	<0.003
4-Nitrophenol	1	0	0	ND	ND	0.005	0.005	<0.005
Benzyl Alcohol	1	0	0	ND	ND	0.0006	0.0006	<0.0006
Bis(2-chloroethoxy)methane	1	0	0	ND	ND	0.0002	0.0002	<0.0002
Bis(2-chloroethyl) Ether	1	0	0	ND	ND	0.0004	0.0004	<0.0004
Bis(2-chloroisopropyl) Ether	1	0	0	ND	ND	0.0008	0.0008	<0.0008
Bis(2-ethylhexyl) Phthalate	1	0	0	ND	ND	0.006	0.006	<0.006
Butyl Benzyl Phthalate	1	0	0	ND	ND	0.0005	0.0005	<0.0005
Dibenzofuran	1	0	0	ND	ND	0.0002	0.0002	<0.0002
DiethylPhthalate	1	1	100	0.0005	0.0005	na	na	0.0005
DimethylPhthalate	1	0	0	ND	ND	0.006	0.006	<0.006
Di-n-Butyl Phthalate	1	0	0	ND	ND	0.0004	0.0004	<0.0004
Di-n-OctylPhthalate	1	0	0	ND	ND	0.0003	0.0003	<0.0003
Hexachlorobenzene	1	0	0	ND	ND	0.0003	0.0003	<0.0003
Hexachlorobutadiene	1	0	0	ND	ND	0.00039	0.00039	<0.00039
Hexachlorocyclopentadiene	1	0	0	ND	ND	0.006	0.006	<0.006
Hexachloroethane	1	0	0	ND	ND	0.0007	0.0007	<0.0007
Isophorone	1	0	0	ND	ND	0.0002	0.0002	<0.0002
Nitrobenzene	1	0	0	ND	ND	0.0007	0.0007	<0.0007
N-Nitrosodi-n-propylamine	1	0	0	ND	ND	0.0003	0.0003	<0.0003
N-Nitrosodiphenylamine	1	0	0	ND	ND	0.0004	0.0004	<0.0004
Pentachlorophenol	1	0	0	ND	ND	0.003	0.003	<0.003
Phenol	1	0	0	ND	ND	0.0004	0.0004	<0.0004

Table A-4 Analytical Results for Surface Water at Site SS03

Constituent	Surface Water Data				Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)	Maximum Reporting Level (mg/L)	Minimum Reporting Level (mg/L)	Minimum Result ¹ (mg/L)
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)					
Polynuclear Aromatic Hydrocarbons									
2-Methylnaphthalene	1	0	0	ND	ND	0.0008	0.0008	<0.0008	
Acenaphthene	1	0	0	ND	ND	0.0003	0.0003	<0.0003	
Acenaphthylene	1	0	0	ND	ND	0.0003	0.0003	<0.0003	
Anthracene	1	0	0	ND	ND	0.0003	0.0003	<0.0003	
Benzo(a)anthracene	1	0	0	ND	ND	0.0003	0.0003	<0.0003	
Benzo(a)pyrene	1	0	0	ND	ND	0.0003	0.0003	<0.0003	
Benzo(b)fluoranthene	1	0	0	ND	ND	0.0002	0.0002	<0.0002	
Benzo(g,h,i)perylene	1	0	0	ND	ND	0.0004	0.0004	<0.0004	
Chrysene	1	0	0	ND	ND	0.0003	0.0003	<0.0003	
Dibenz(a,h)anthracene	1	0	0	ND	ND	0.0004	0.0004	<0.0004	
Fluoranthene	1	0	0	ND	ND	0.0002	0.0002	<0.0002	
Fluorene	1	0	0	ND	ND	0.0002	0.0002	<0.0002	
Indeno(1,2,3-cd)Pyrene	1	0	0	ND	ND	0.0002	0.0002	<0.0002	
Naphthalene	1	0	0	ND	ND	0.00012	0.00012	<0.00012	
Phenanthrene	1	0	0	ND	ND	0.0002	0.0002	<0.0002	
Pyrene	1	0	0	ND	ND	0.0003	0.0003	<0.0003	
Petroleum Hydrocarbons									
Diesel Range Organics (DRO)	1	1	100	0.062	0.062	na	na	0.062	
Gasoline Range Organics (GRO)	1	0	0	ND	ND	0.02	0.02	<0.02	

Notes:

ND - not detected

na - not available

mg/L - Milligrams per liter

¹ - Minimum Result reported as smallest detected concentration or smallest reporting limit if ND

Table A-5 Analytical Results for Subsurface Water at Site SS03

Constituent	Subsurface Water Data				Maximum Reporting Level (mg/L)	Minimum Reporting Level (mg/L)	Minimum Result ¹ (mg/L)
	Number of Samples	Number of Detects	Frequency of Detection	Detected Concentration (mg/L)			
Inorganics, Total							
Lead	12	11	92	0.00646	0.00049	0.001	0.00049
Volatile Organic Compounds							
1,1,1,2-Tetrachloroethane	22	0	0	ND	ND	0.002	<0.00022
1,1,1-Trichloroethane	22	0	0	ND	ND	0.002	<0.00026
1,1,2,2-Tetrachloroethane	21	0	0	ND	ND	0.002	<0.00018
1,1,2-Trichloroethane	22	0	0	ND	ND	0.002	<0.0001
1,1-Dichloroethane	22	0	0	ND	ND	0.002	<0.00015
1,1-Dichloroethene	22	0	0	ND	ND	0.002	<0.00022
1,1-Dichloropropene	22	0	0	ND	ND	0.002	<0.00029
1,2,3-Trichlorobenzene	22	0	0	ND	ND	0.002	<0.00013
1,2,3-Trichloropropane	22	0	0	ND	ND	0.004	<0.00033
1,2,4-Trichlorobenzene	23	1	4	0.0009	0.0009	0.002	0.0009
1,2,4-Trimethylbenzene	22	21	95	0.355	0.00026	0.001	0.00026
1,2-Dibromo-3-chloropropane	22	0	0	ND	ND	0.004	<0.00058
1,2-Dibromoethane	22	0	0	ND	ND	0.002	<0.00012
1,2-Dichlorobenzene	23	1	4	0.0007	0.0007	0.002	0.0007
1,2-Dichloroethane	22	8	36	0.0023	0.00026	0.002	0.00026
1,2-Dichloropropane	22	0	0	ND	ND	0.002	<0.00013
1,3,5-Trimethylbenzene	22	21	95	0.135	0.00015	0.001	0.00015
1,3-Dichlorobenzene	23	1	4	0.0009	0.0009	0.002	0.0009
1,3-Dichloropropane	22	0	0	ND	ND	0.002	<0.000092
1,4-Dichlorobenzene	23	1	4	0.001	0.001	0.002	0.001
1-Chlorohexane	11	0	0	ND	ND	0.001	<0.00024
2,2-Dichloropropane	20	0	0	ND	ND	0.002	<0.00025
2-Butanone (MEK)	22	2	9	0.0025	0.0023	0.02	0.0023
2-Chloroethyl Vinyl Ether	7	0	0	ND	ND	0.002	<0.00019
2-Chlorotoluene	22	0	0	ND	ND	0.002	<0.000059
2-Hexanone	7	0	0	ND	ND	0.02	<0.0013
4-Chlorotoluene	22	0	0	ND	ND	0.002	<0.00017
4-Methyl-2-pentanone	22	1	5	0.0013	0.0013	0.02	0.0013
Acetone	17	0	0	ND	ND	0.01	<0.0017
Benzene	22	21	95	0.335	0.0028	0.0004	0.0028
Bromobenzene	22	0	0	ND	ND	0.002	<0.000065
Bromochloromethane	22	0	0	ND	ND	0.002	<0.00014
Bromodichloromethane	22	0	0	ND	ND	0.002	<0.0001

Table A-5 Analytical Results for Subsurface Water at Site SS03

Constituent	Subsurface Water Data				Maximum Reporting Level (mg/L)	Minimum Reporting Level (mg/L)	Minimum Result ¹ (mg/L)
	Number of Samples	Number of Detects	Frequency of Detection	Detected Concentration (mg/L)			
Bromoform	22	0	0	ND	0.002	0.00014	<0.00014
Bromomethane	22	0	0	ND	0.003	0.00032	<0.00032
Carbon Tetrachloride	22	0	0	ND	0.002	0.00042	<0.00042
Chlorobenzene	22	0	0	ND	0.002	0.00013	<0.00013
Chloroethane	22	3	14	0.0011	0.002	0.001	0.00044
Chloroform	22	1	5	0.0012	0.002	0.00015	0.0012
Chloromethane	22	2	9	0.0004	0.002	0.00031	0.00016
cis-1,2-Dichloroethene	22	0	0	ND	0.002	0.00011	<0.00011
cis-1,3-Dichloropropene	22	0	0	ND	0.002	0.00019	<0.00019
Dibromochloromethane	22	0	0	ND	0.002	0.00013	<0.00013
Dibromomethane	22	0	0	ND	0.002	0.00009	<0.00009
Dichlorodifluoromethane	21	0	0	ND	0.002	0.00021	<0.00021
Ethylbenzene	22	20	91	0.405	0.001	0.001	0.00049
Isopropylbenzene	22	21	95	0.034	0.001	0.001	0.00025
m,p-Xylenes	18	16	89	0.25	0.002	0.002	0.00071
Methyl tert-Butyl Ether	15	0	0	ND	0.005	0.005	<0.005
Methylene Chloride	22	0	0	ND	0.021	0.00012	<0.00012
n-Butylbenzene	22	20	91	0.0255	0.001	0.001	0.00029
n-Propylbenzene	22	20	91	0.0845	0.001	0.001	0.00049
o-Xylene	19	18	95	0.0072	0.001	0.001	0.00033
p-Isopropyltoluene	22	18	82	0.017	0.001	0.00044	0.00037
sec-Butylbenzene	22	21	95	0.0165	0.001	0.001	0.00022
Styrene	22	1	5	0.001165	0.002	0.00013	0.001165
Tert-Butylbenzene	22	14	64	0.018	0.002	0.00039	0.00026
Tetrachloroethene	22	0	0	ND	0.002	0.00027	<0.00027
Toluene	22	16	73	0.067	0.0016	0.00015	0.00011
Total xylenes	3	3	100	0.72	na	na	0.061
trans-1,2-Dichloroethene	22	0	0	ND	0.002	0.00021	<0.00021
trans-1,3-Dichloropropene	22	0	0	ND	0.002	0.00017	<0.00017
Trichloroethene	22	0	0	ND	0.002	0.00024	<0.00024
Trichlorofluoromethane	22	0	0	ND	0.002	0.00036	<0.00036
Vinyl Acetate	3	0	0	ND	0.00032	0.00032	<0.00032
Vinyl Chloride	21	0	0	ND	0.002	0.00036	<0.00036
Carbon Disulfide	14	2	14	0.00017	0.004	0.0005	0.00016
Semi-Volatile Organic Compounds							
2,4,5-Trichlorophenol	3	0	0	ND	0.0007	0.0006	<0.0006
2,4,6-Trichlorophenol	3	1	33	0.0005	0.0004	0.0004	0.0005

Table A-5 Analytical Results for Subsurface Water at Site SS03

Constituent	Subsurface Water Data				Maximum Reporting Level (mg/L)	Minimum Reporting Level (mg/L)	Minimum Result ¹ (mg/L)
	Number of Samples	Number of Detects	Frequency of Detection	Detected Concentration (mg/L)			
2,4-Dichlorophenol	3	1	33	0.0005	0.0005	0.0004	0.0005
2,4-Dimethylphenol	3	1	33	0.004	0.004	0.003	0.004
2,4-Dinitrophenol	3	1	33	0.004	0.004	0.003	0.004
2,4-Dinitrotoluene	3	0	0	ND	ND	0.003	<0.002
2,6-Dinitrotoluene	3	0	0	ND	ND	0.0005	<0.0004
2-Chloronaphthalene	3	0	0	ND	ND	0.0006	<0.0005
2-Chlorophenol	3	1	33	0.0004	0.0004	0.0003	0.0004
2-Methyl-4,6-dinitrophenol	3	0	0	ND	ND	0.006	<0.005
2-Methylphenol	3	1	33	0.0005	0.0005	0.0004	0.0005
2-Nitroaniline	3	0	0	ND	ND	0.007	<0.006
2-Nitrophenol	3	1	33	0.0004	0.0004	0.0003	0.0004
3,3'-Dichlorobenzidine	3	1	33	0.005	0.005	0.004	0.005
3-and 4-Methylphenol Coelution	3	1	33	0.0008	0.0008	0.0007	0.0008
3-Nitroaniline	3	0	0	ND	ND	0.006	<0.005
4-Bromophenyl Phenyl Ether	3	0	0	ND	ND	0.0004	<0.0003
4-Chloro-3-methylphenol	3	0	0	ND	ND	0.0004	<0.0003
4-Chloroaniline	3	1	33	0.003	0.003	0.002	0.003
4-Chlorophenyl Phenyl Ether	3	0	0	ND	ND	0.0003	<0.0002
4-Nitroaniline	3	0	0	ND	ND	0.004	<0.003
4-Nitrophenol	3	0	0	ND	ND	0.006	<0.005
Benzoic Acid	1	1	100	0.069	0.069	na	0.069
Benzyl Alcohol	3	1	33	0.0007	0.0007	0.0006	0.0007
Bis(2-chloroethoxy)methane	3	1	33	0.0003	0.0003	0.0002	0.0003
Bis(2-chloroethyl) Ether	3	1	33	0.0005	0.0005	0.0004	0.0005
Bis(2-chloroisopropyl) Ether	3	0	0	ND	ND	0.0009	<0.0008
Bis(2-ethylhexyl) Phthalate	3	0	0	ND	ND	0.007	<0.006
Butyl Benzyl Phthalate	3	0	0	ND	ND	0.0006	<0.0005
Dibenzofuran	10	6	60	0.00059	0.0000095	0.0002	0.0000095
DiethylPhthalate	2	2	100	0.0007	0.0005	na	0.0005
DimethylPhthalate	2	0	0	ND	ND	0.006	<0.006
Di-n-Butyl Phthalate	3	0	0	ND	ND	0.0005	<0.0004
Di-n-OctylPhthalate	3	0	0	ND	ND	0.0004	<0.0003
Hexachlorobenzene	3	0	0	ND	ND	0.0004	<0.0003
Hexachlorobutadiene	23	1	4	0.003	0.003	0.002	0.003
Hexachlorocyclopentadiene	2	0	0	ND	ND	0.006	<0.006
Hexachloroethane	3	1	33	0.0008	0.0008	0.0007	0.0008
Isophorone	3	1	33	0.0003	0.0003	0.0002	0.0003
Nitrobenzene	3	1	33	0.0008	0.0008	0.0007	0.0008

Table A-5 Analytical Results for Subsurface Water at Site SS03

Constituent	Subsurface Water Data				Maximum Reporting Level (mg/L)	Minimum Reporting Level (mg/L)	Minimum Result ¹ (mg/L)
	Number of Samples	Number of Detects	Frequency of Detection	Detected Concentration (mg/L)			
N-Nitrosodi-n-propylamine	3	0	0	ND	0.0004	0.0003	<0.0003
N-Nitrosodiphenylamine	3	0	0	ND	0.0005	0.0004	<0.0004
Pentachlorophenol	3	0	0	ND	0.004	0.003	<0.003
Phenol	3	2	67	0.011	0.0005	0.0004	0.0005
Polynuclear Aromatic Hydrocarbons							
2-Methylnaphthalene	3	1	33	0.005	0.0008	0.0008	0.005
Acenaphthene	22	14	64	0.000943	0.0004	0.00002	0.000019
Acenaphthylene	22	2	9	0.000479	0.0004	0.00002	0.000139
Anthracene	22	11	50	0.000026	0.0004	0.00002	0.0000023
Benzo(a)anthracene	22	5	23	0.0000031	0.004	0.00002	0.0000023
Benzo(a)pyrene	22	1	5	0.000002	0.0004	0.00002	0.000002
Benzo(b)fluoranthene	22	0	0	ND	0.0003	0.00002	<0.00002
Benzo(g,h,i)perylene	22	2	9	0.000031	0.0005	0.00002	0.0000091
Benzo(k)fluoranthene	19	0	0	ND	0.000108	0.00002	<0.00002
Chrysene	22	10	45	0.000012	0.0004	0.00002	0.0000014
Dibenz(a,h)anthracene	22	0	0	ND	0.0004	0.00002	<0.00002
Fluoranthene	22	9	41	0.0000069	0.0003	0.00002	0.000003
Fluorene	22	17	77	0.00166	0.0003	0.00002	0.0000035
Indeno(1,2,3-cd)Pyrene	22	1	5	0.0000034	0.0003	0.00002	0.0000034
Naphthalene	23	22	96	0.18	0.07	0.07	0.0000033
Phenanthrene	22	16	73	0.000571	0.0003	0.00002	0.0000045
Pyrene	22	13	59	0.000015	0.0004	0.00002	0.000003
Petroleum Hydrocarbons							
Diesel Range Organics (DRO)	22	21	95	6.4	0.77	0.77	0.19
Gasoline Range Organics (GRO)	22	21	95	7.5	0.1	0.1	0.115
Residual Range Organics (RRO)	12	4	33	6.9	1	0.341	0.085

Notes:

< - less than

ND - not detected

na - not available

mg/L - Milligrams per liter

¹ - Minimum Result reported as smallest detected concentration or smallest reporting limit if ND

Table A-6 Analytical Results for Surface Soil at Site SS08

Constituent	Surface Soil Data					Maximum Reporting Level (mg/Kg)	Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Detection Frequency	Detected Concentration (mg/Kg)	Detected Concentration (mg/Kg)			
Inorganics, Total								
Aluminum	9	9	100	33200	19000	na	na	19000
Antimony	9	9	100	3	0.46	na	na	0.46
Arsenic	9	9	100	22.9	10.4	na	na	10.4
Barium	9	9	100	307	101	na	na	101
Beryllium	9	9	100	0.8	0.4	na	na	0.4
Cadmium	9	7	78	2	0.6	0.6	0.6	0.6
Calcium	9	9	100	5130	993	na	na	993
Chromium	9	9	100	60	31	na	na	31
Cobalt	9	9	100	25	11.6	na	na	11.6
Copper	9	9	100	76	22.3	na	na	22.3
Cyanide	4	0	0	0	0	0.25	0.25	<0.25
Iron	9	9	100	45400	28500	na	na	28500
Lead	10	10	100	39	9.4	na	na	9.4
Magnesium	9	9	100	10300	4670	na	na	4670
Manganese	9	9	100	1190	441	na	na	441
Mercury	8	4	50	0.2	0.06	0.02	0.02	0.06
Molybdenum	6	1	17	1.2	1.2	0.8	0.8	1.2
Nickel	9	9	100	74	23.6	na	na	23.6
Potassium	9	9	100	2800	688	na	na	688
Selenium	6	3	50	1.3	0.8	0.8	0.8	0.8
Silver	7	3	43	1.1	0.55	0.8	0.8	0.55
Sodium	9	9	100	210	51.2	na	na	51.2
Thallium	8	5	63	0.24	0.1	0.1	0.1	0.1
Tin	6	2	33	11	7	8	8	7
Titanium	6	6	100	1320	428	na	na	428
Vanadium	9	9	100	97	52.9	na	na	52.9
Zinc	9	9	100	150	61.3	na	na	61.3
Volatile Organic Compounds								
1,1,1,2-Tetrachloroethane	5	0	0	0	0	0.016	0.00014	<0.00014
1,1,1-Trichloroethane	5	0	0	0	0	0.012	0.000099	<0.000099
1,1,2,2-Tetrachloroethane	5	0	0	0	0	0.021	0.00018	<0.00018
1,1,2-Trichloroethane	5	0	0	0	0	0.023	0.0002	<0.0002
1,1-Dichloroethane	5	0	0	0	0	0.009	0.000078	<0.000078
1,1-Dichloroethene	5	0	0	0	0	0.01	0.00009	<0.00009
1,1-Dichloropropene	5	0	0	0	0	0.021	0.00018	<0.00018
1,2,3-Trichlorobenzene	5	0	0	0	0	0.029	0.00025	<0.00025
1,2,3-Trichloropropane	5	0	0	0	0	0.024	0.00021	<0.00021
1,2,4-Trichlorobenzene	5	0	0	0	0	0.031	0.00027	<0.00027
1,2,4-Trimethylbenzene	5	0	0	0	0	0.016	0.00014	<0.00014
1,2-Dibromo-3-chloropropane	5	0	0	0	0	0.06	0.00052	<0.00052
1,2-Dibromoethane	5	0	0	0	0	0.026	0.00022	<0.00022

Table A-6 Analytical Results for Surface Soil at Site SS08

Constituent	Surface Soil Data						Maximum Reporting Level (mg/Kg)	Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Detection Frequency	Detected Concentration (mg/Kg)	Detected Concentration (mg/Kg)				
1,2-Dichlorobenzene	5	0	0	0	0	0.019	0.00016	<0.00016	
1,2-Dichloroethane	5	0	0	0	0	0.015	0.00013	<0.00013	
1,2-Dichloropropane	5	0	0	0	0	0.01	0.000083	<0.000083	
1,3,5-Trimethylbenzene	5	1	20	4.6	4.6	0.034	0.00037	4.6	
1,3-Dichlorobenzene	5	0	0	0	0	0.023	0.0002	<0.0002	
1,3-Dichloropropane	5	0	0	0	0	0.011	0.000096	<0.000096	
1,4-Dichlorobenzene	5	0	0	0	0	0.023	0.0002	<0.0002	
1-Chlorohexane	5	0	0	0	0	0.028	0.00024	<0.00024	
2,2-Dichloropropane	5	0	0	0	0	0.013	0.00011	<0.00011	
2-Butanone (MEK)	5	0	0	0	0	0.79	0.0068	<0.0068	
2-Chloroethyl Vinyl Ether	4	0	0	0	0	0.078	0.00067	<0.00067	
2-Chlorotoluene	5	0	0	0	0	0.015	0.00013	<0.00013	
2-Hexanone	5	0	0	0	0	0.81	0.007	<0.007	
4-Chlorotoluene	5	0	0	0	0	0.021	0.00018	<0.00018	
4-Methyl-2-pentanone	5	0	0	0	0	0.67	0.0058	<0.0058	
Acetone	5	3	60	1.2	0.01	0.8	0.0086	0.01	
Benzene	5	0	0	0	0	0.01	0.000084	<0.000084	
Bromobenzene	5	0	0	0	0	0.016	0.00014	<0.00014	
Bromochloromethane	5	0	0	0	0	0.014	0.00012	<0.00012	
Bromodichloromethane	5	0	0	0	0	0.016	0.00014	<0.00014	
Bromoform	5	0	0	0	0	0.022	0.00019	<0.00019	
Bromomethane	5	0	0	0	0	0.027	0.00023	<0.00023	
Carbon Tetrachloride	5	0	0	0	0	0.019	0.00016	<0.00016	
Chlorobenzene	5	0	0	0	0	0.01	0.000085	<0.000085	
Chloroethane	5	0	0	0	0	0.019	0.00016	<0.00016	
Chloroform	5	0	0	0	0	0.0072	0.000062	<0.000062	
Chloromethane	5	0	0	0	0	0.016	0.00014	<0.00014	
cis-1,2-Dichloroethene	5	0	0	0	0	0.013	0.00011	<0.00011	
cis-1,3-Dichloropropene	5	0	0	0	0	0.02	0.00017	<0.00017	
Dibromochloromethane	5	0	0	0	0	0.019	0.00016	<0.00016	
Dibromomethane	5	0	0	0	0	0.023	0.0002	<0.0002	
Dichlorodifluoromethane	5	0	0	0	0	0.017	0.00015	<0.00015	
Ethylbenzene	5	0	0	0	0	0.016	0.00014	<0.00014	
Isopropylbenzene	5	0	0	0	0	0.011	0.000096	<0.000096	
Methylene Chloride	6	6	100	0.22	0.0024	na	na	0.0024	
n-Butylbenzene	5	0	0	0	0	0.023	0.0002	<0.0002	
n-Propylbenzene	5	0	0	0	0	0.02	0.00017	<0.00017	
p-Isopropyltoluene	5	0	0	0	0	0.02	0.00017	<0.00017	
sec-Butylbenzene	5	0	0	0	0	0.012	0.0001	<0.0001	
Styrene	5	0	0	0	0	0.015	0.00013	<0.00013	
Tert-Butylbenzene	5	0	0	0	0	0.01	0.00009	<0.00009	
Tetrachloroethene	5	0	0	0	0	0.022	0.00019	<0.00019	
Toluene	6	4	67	0.00035	0.00019	0.015	0.012	0.00019	

Table A-6 Analytical Results for Surface Soil at Site SS08

Constituent	Surface Soil Data						Maximum Reporting Level (mg/Kg)	Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Detection Frequency	Detected Concentration (mg/Kg)	Detected Concentration (mg/Kg)				
Total xylenes	5	0	0	0	0	0.038	0.00033	<0.00033	
trans-1,2-Dichloroethene	5	0	0	0	0	0.011	0.000093	<0.000093	
trans-1,3-Dichloropropene	5	0	0	0	0	0.015	0.00013	<0.00013	
Trichloroethene	5	2	40	0.1	0.0073	0.0089	0.000096	0.0073	
Trichlorofluoromethane	6	1	17	0.00034	0.00034	0.017	0.00015	0.00034	
Vinyl Acetate	3	0	0	0	0	0.074	0.00064	<0.00064	
Vinyl Chloride	5	0	0	0	0	0.013	0.00011	<0.00011	
Carbon Disulfide	6	1	17	0.00054	0.00054	0.027	0.00023	0.00054	
Semi-Volatile Organic Compounds									
2,4,5-Trichlorophenol	5	0	0	0	0	0.1	0.09	<0.09	
2,4,6-Trichlorophenol	5	0	0	0	0	0.2	0.1	<0.1	
2,4-Dichlorophenol	5	0	0	0	0	0.1	0.09	<0.09	
2,4-Dimethylphenol	5	1	20	0.06	0.06	0.06	0.06	0.06	
2,4-Dinitrophenol	3	0	0	0	0	0.2	0.1	<0.1	
2,4-Dinitrotoluene	5	0	0	0	0	0.09	0.08	<0.08	
2,6-Dinitrotoluene	5	0	0	0	0	0.06	0.06	<0.06	
2-Chloronaphthalene	5	0	0	0	0	0.06	0.06	<0.06	
2-Chlorophenol	5	0	0	0	0	0.08	0.07	<0.07	
2-Methyl-4,6-dinitrophenol	5	0	0	0	0	0.04	0.04	<0.04	
2-Methylphenol	5	0	0	0	0	0.1	0.09	<0.09	
2-Nitroaniline	5	1	20	0.06	0.06	0.06	0.06	0.06	
2-Nitrophenol	5	0	0	0	0	0.09	0.08	<0.08	
3,3'-Dichlorobenzidine	5	1	20	0.05	0.05	0.05	0.05	0.05	
3-and 4-Methylphenol Coelution	5	3	60	0.4	0.1	0.2	0.1	0.1	
3-Nitroaniline	5	1	20	0.09	0.09	0.09	0.08	0.09	
4-Bromophenyl Phenyl Ether	5	0	0	0	0	0.04	0.04	<0.04	
4-Chloro-3-methylphenol	5	1	20	0.1	0.1	0.4	0.09	0.1	
4-Chloroaniline	5	1	20	0.09	0.09	0.09	0.08	0.09	
4-Chlorophenyl Phenyl Ether	5	0	0	0	0	0.2	0.1	<0.1	
4-Nitroaniline	4	0	0	0	0	0.6	0.06	<0.06	
4-Nitrophenol	5	0	0	0	0	0.1	0.09	<0.09	
Benzoic Acid	5	0	0	0	0	0.4	0.4	<0.4	
Benzyl Alcohol	5	0	0	0	0	0.2	0.2	<0.2	
Bis(2-chloroethoxy)methane	5	0	0	0	0	0.09	0.08	<0.08	
Bis(2-chloroethyl) Ether	5	0	0	0	0	0.1	0.08	<0.08	
Bis(2-chloroisopropyl) Ether	5	0	0	0	0	0.08	0.07	<0.07	
Bis(2-ethylhexyl) Phthalate	5	4	80	0.2	0.1	0.2	0.2	0.1	
Butyl Benzyl Phthalate	5	0	0	0	0	0.09	0.08	<0.08	
Dibenzofuran	5	0	0	0	0	0.2	0.1	<0.1	
DiethylPhthalate	5	0	0	0	0	0.2	0.2	<0.2	
DimethylPhthalate	5	0	0	0	0	0.2	0.2	<0.2	
Di-n-Butyl Phthalate	5	0	0	0	0	0.09	0.08	<0.08	

Table A-6 Analytical Results for Surface Soil at Site SS08

Constituent	Surface Soil Data					Maximum Reporting Level (mg/Kg)	Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Detection Frequency	Detected Concentration (mg/Kg)	Detected Concentration (mg/Kg)			
Di-n-Octyl Phthalate	5	0	0	0	0	0.08	0.07	<0.07
Hexachlorobenzene	5	0	0	0	0	0.08	0.07	<0.07
Hexachlorobutadiene	5	0	0	0	0	0.09	0.00025	<0.00025
Hexachlorocyclopentadiene	5	0	0	0	0	0.09	0.08	<0.08
Hexachloroethane	5	0	0	0	0	0.09	0.08	<0.08
Isophorone	5	0	0	0	0	0.2	0.1	<0.1
Nitrobenzene	5	0	0	0	0	0.1	0.09	<0.09
N-Nitrosodi-n-propylamine	5	0	0	0	0	0.1	0.09	<0.09
N-Nitrosodiphenylamine	5	0	0	0	0	0.2	0.1	<0.1
Pentachlorophenol	5	0	0	0	0	0.06	0.06	<0.06
Phenol	5	0	0	0	0	0.2	0.1	<0.1
Polynuclear Aromatic Hydrocarbons								
2-Methylnaphthalene	5	2	40	0.3	0.1	0.2	0.1	0.1
Acenaphthene	5	0	0	0	0	0.08	0.07	<0.07
Acenaphthylene	5	0	0	0	0	0.06	0.06	<0.06
Anthracene	5	0	0	0	0	0.06	0.06	<0.06
Benzo(a)anthracene	5	0	0	0	0	0.08	0.07	<0.07
Benzo(a)pyrene	5	1	20	0.08	0.08	0.08	0.07	0.08
Benzo(b)fluoranthene	5	0	0	0	0	0.1	0.09	<0.09
Benzo(g,h,i)perylene	5	1	20	0.05	0.05	0.05	0.05	0.05
Chrysene	5	1	20	0.08	0.08	0.09	0.08	0.08
Dibenz(a,h)anthracene	5	0	0	0	0	0.04	0.04	<0.04
Fluoranthene	5	0	0	0	0	0.1	0.09	<0.09
Fluorene	5	0	0	0	0	0.09	0.08	<0.08
Indeno(1,2,3-cd)Pyrene	5	1	20	0.04	0.04	0.05	0.05	0.04
Naphthalene	5	1	20	1.5	1.5	0.019	0.0002	1.5
Phenanthrene	5	1	20	0.1	0.1	0.1	0.09	0.1
Pyrene	5	1	20	0.1	0.1	0.08	0.07	0.1
Pesticides								
4,4'-DDD	7	7	100	2.7	0.001	na	na	0.001
4,4'-DDE	8	6	75	0.09	0.0002	0.0007	0.0007	0.0002
4,4'-DDT	9	9	100	4.81	0.008	na	na	0.008
Aldrin	6	0	0	0	0	0.0039	0.00039	<0.00039
alpha Endosulfan	6	1	17	0.0011	0.0011	0.0038	0.00038	0.0011
alpha-BHC	6	1	17	0.00357	0.00357	0.0046	0.00046	0.00357
alpha-Chlordane	6	0	0	0	0	0.0047	0.00047	<0.00047
beta Endosulfan	6	4	67	0.02	0.001	0.00036	0.00036	0.001
beta-BHC	6	0	0	0	0	0.0086	0.00086	<0.00086
delta-BHC	6	0	0	0	0	0.006	0.0006	<0.0006
Dieldrin	6	0	0	0	0	0.0055	0.00055	<0.00055
Endosulfan Sulfate	6	2	33	0.003	0.0008	0.009	0.00051	0.0008

Table A-6 Analytical Results for Surface Soil at Site SS08

Constituent	Surface Soil Data						Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Detection Frequency	Detected Concentration (mg/Kg)	Detected Concentration (mg/Kg)	Maximum Reporting Level (mg/Kg)		
Endrin	6	0	0	0	0	0.008	0.0008	<0.0008
Endrin Aldehyde	6	0	0	0	0	0.0037	0.00037	<0.00037
gamma-BHC (Lindane)	6	1	17	0.00351	0.00351	0.0066	0.00066	0.00351
gamma-Chlordane	6	3	50	0.02	0.00158	0.00076	0.00076	0.00158
Heptachlor	6	0	0	0	0	0.0059	0.00059	<0.00059
Heptachlor Epoxide	6	0	0	0	0	0.008	0.0008	<0.0008
Methoxychlor	6	2	33	0.0163	0.009	0.03	0.0011	0.009
Toxaphene	6	0	0	0	0	2	0.05	<0.05
Polychlorinated Biphenyls								
Arochlor 1016	6	0	0	0	0	0.07	0.013	<0.013
Arochlor 1221	6	0	0	0	0	0.4	0.012	<0.012
Arochlor 1232	6	0	0	0	0	0.15	0.019	<0.019
Arochlor 1242	6	0	0	0	0	0.15	0.012	<0.012
Arochlor 1248	6	0	0	0	0	0.2	0.011	<0.011
Arochlor 1254	6	0	0	0	0	0.3	0.011	<0.011
Arochlor 1260	8	7	88	17	0.02	0.005	0.005	0.02
Petroleum Hydrocarbons								
Diesel Range Organics (DRO)	9	9	100	2500	4	na	na	4
Gasoline Range Organics (GRO)	6	6	100	630	0.98	na	na	0.98
Residual Range Organics (RRO)	5	5	100	529	43	na	na	43

Notes:

DDD - 1,1-bis(chlorophenyl)-2,2-dichloroethane
DDE - 1,1-bis(chlorophenyl)-2,2-dichloroethene
DDT - 1,1-bis(chlorophenyl)-2,2,2-trichloroethane
ND - not detected
na - not available
mg/Kg - Milligram per kilogram.

¹ - Minimum Result reported as smallest detected concentration or smallest reporting limit if ND

Table A-7 Analytical Results for Subsurface Soil at Site SS08

Constituent	Subsurface Soil Data					Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
Inorganics, Total								
Aluminum	9	9	100	35700	21000	na	na	21000
Antimony	9	9	100	4	0.55	na	na	0.55
Arsenic	11	11	100	20	8.62	na	na	8.62
Barium	11	11	100	438	130	na	na	130
Beryllium	9	8	89	0.8	0.5	0.1	0.1	0.5
Cadmium	11	5	45	1.18	0.25	0.6	0.6	0.25
Calcium	9	9	100	8030	1280	na	na	1280
Chromium	11	11	100	57	36.4	na	na	36.4
Cobalt	9	9	100	43	15	na	na	15
Copper	9	9	100	103	32.8	na	na	32.8
Cyanide	5	0	0	ND	ND	0.25	0.25	<0.25
Iron	9	9	100	45400	33800	na	na	33800
Lead	15	15	100	114	9	na	na	9
Magnesium	9	9	100	9880	6180	na	na	6180
Manganese	9	9	100	1040	566	na	na	566
Mercury	9	6	67	0.54	0.0506	0.02	0.02	0.0506
Molybdenum	7	4	57	2	1.1	0.8	0.8	1.1
Nickel	9	9	100	65	34.3	na	na	34.3
Potassium	9	9	100	3410	1090	na	na	1090
Selenium	9	5	56	3	0.8	1.15	0.8	0.8
Silver	9	4	44	1.1	0.151	0.8	0.8	0.151
Sodium	9	9	100	160	70	na	na	70
Thallium	8	5	63	0.3	0.1	0.1	0.1	0.1
Tin	7	1	14	8	8	8	8	8
Titanium	7	7	100	1350	268	na	na	268
Vanadium	9	9	100	93	59	na	na	59
Zinc	9	9	100	200	75.1	na	na	75.1
Volatile Organic Compounds								
1,1,1,2-Tetrachloroethane	6	0	0	ND	ND	0.0065	0.00014	<0.00014
1,1,1-Trichloroethane	6	0	0	ND	ND	0.0046	0.000099	<0.000099
1,1,2,2-Tetrachloroethane	6	0	0	ND	ND	0.0084	0.00018	<0.00018
1,1,2-Trichloroethane	6	0	0	ND	ND	0.0093	0.0002	<0.0002
1,1-Dichloroethane	6	0	0	ND	ND	0.0036	0.000078	<0.000078
1,1-Dichloroethene	6	0	0	ND	ND	0.0042	0.00009	<0.00009
1,1-Dichloropropene	6	0	0	ND	ND	0.0084	0.00018	<0.00018
1,2,3-Trichlorobenzene	6	0	0	ND	ND	0.012	0.00025	<0.00025
1,2,3-Trichloropropane	6	0	0	ND	ND	0.0098	0.00021	<0.00021
1,2,4-Trichlorobenzene	7	0	0	ND	ND	0.07	0.00027	<0.00027
1,2,4-Trimethylbenzene	7	3	43	0.00073	0.0002	0.0065	0.00014	0.0002
1,2-Dibromo-3-chloropropane	6	0	0	ND	ND	0.024	0.00052	<0.00052
1,2-Dibromoethane	6	0	0	ND	ND	0.0103	0.00022	<0.00022
1,2-Dichlorobenzene	7	0	0	ND	ND	0.09	0.00016	<0.00016
1,2-Dichloroethane	6	0	0	ND	ND	0.0061	0.00013	<0.00013

Table A-7 Analytical Results for Subsurface Soil at Site SS08

Constituent	Subsurface Soil Data					Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
1,2-Dichloropropane	6	0	0	ND	ND	0.0039	0.000083	<0.000083
1,3,5-Trimethylbenzene	6	2	33	3.6	0.53	0.00042	0.00037	0.53
1,3-Dichlorobenzene	7	0	0	ND	ND	0.09	0.0002	<0.0002
1,3-Dichloropropane	6	0	0	ND	ND	0.0045	0.000096	<0.000096
1,4-Dichlorobenzene	7	0	0	ND	ND	0.09	0.0002	<0.0002
1-Chlorohexane	6	0	0	ND	ND	0.011	0.00024	<0.00024
2,2-Dichloropropane	6	0	0	ND	ND	0.0051	0.00011	<0.00011
2-Butanone (MEK)	6	0	0	ND	ND	0.32	0.0068	<0.0068
2-Chloroethyl Vinyl Ether	5	0	0	ND	ND	0.019	0.00067	<0.00067
2-Chlorotoluene	6	0	0	ND	ND	0.0061	0.00013	<0.00013
2-Hexanone	5	0	0	ND	ND	0.33	0.007	<0.007
4-Chlorotoluene	6	0	0	ND	ND	0.0084	0.00018	<0.00018
4-Methyl-2-pentanone	6	0	0	ND	ND	0.27	0.0058	<0.0058
Acetone	7	5	71	4.2	0.012	0.0086	0.0086	0.012
Benzene	9	3	33	0.014	0.00023	0.05	0.000084	0.00023
Bromobenzene	6	0	0	ND	ND	0.0065	0.00014	<0.00014
Bromochloromethane	6	0	0	ND	ND	0.0056	0.00012	<0.00012
Bromodichloromethane	6	0	0	ND	ND	0.0065	0.00014	<0.00014
Bromoform	6	0	0	ND	ND	0.0089	0.00019	<0.00019
Bromomethane	6	0	0	ND	ND	0.011	0.00023	<0.00023
Carbon Tetrachloride	6	2	33	0.0087	0.0049	0.0075	0.00016	0.0049
Chlorobenzene	6	0	0	ND	ND	0.004	0.000085	<0.000085
Chloroethane	6	0	0	ND	ND	0.0075	0.00016	<0.00016
Chloroform	6	1	17	0.0014	0.0014	0.0029	0.000062	0.0014
Chloromethane	6	0	0	ND	ND	0.0065	0.00014	<0.00014
cis-1,2-Dichloroethene	6	1	17	0.00028	0.00028	0.0051	0.00011	0.00028
cis-1,3-Dichloropropene	6	0	0	ND	ND	0.0079	0.00017	<0.00017
Dibromochloromethane	6	0	0	ND	ND	0.0075	0.00016	<0.00016
Dibromomethane	6	0	0	ND	ND	0.0093	0.0002	<0.0002
Dichlorodifluoromethane	6	1	17	0.016	0.016	0.0043	0.00015	0.016
Ethylbenzene	9	3	33	0.14	0.00023	0.05	0.00014	0.00023
Isopropylbenzene	6	1	17	0.18	0.18	0.0027	0.000096	0.18
m,p-Xylenes	2	2	100	0.98	0.1	na	na	0.1
Methylene Chloride	7	7	100	0.11	0.0025	na	na	0.0025
n-Butylbenzene	6	0	0	ND	ND	0.0093	0.0002	<0.0002
n-Propylbenzene	6	0	0	ND	ND	0.0079	0.00017	<0.00017
o-Xylene	2	1	50	3.6	3.6	0.05	0.05	3.6
p-Isopropyltoluene	7	3	43	0.38	0.0016	0.0049	0.00017	0.0016
sec-Butylbenzene	6	0	0	ND	ND	0.0047	0.0001	<0.0001
Styrene	6	0	0	ND	ND	0.0061	0.00013	<0.00013
Tert-Butylbenzene	6	0	0	ND	ND	0.0042	0.00009	<0.00009
Tetrachloroethene	6	1	17	0.00099	0.00099	0.0089	0.00019	0.00099
Toluene	9	5	56	0.34	0.00018	0.05	0.00013	0.00018
Total xylenes	7	4	57	0.41	0.00049	0.0094	0.00033	0.00049
trans-1,2-Dichloroethene	6	0	0	ND	ND	0.0043	0.000093	<0.000093

Table A-7 Analytical Results for Subsurface Soil at Site SS08

Constituent	Subsurface Soil Data					Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
trans-1,3-Dichloropropene	6	0	0	ND	ND	0.0061	0.00013	<0.00013
Trichloroethene	6	3	50	0.055	0.00013	0.0045	0.000096	0.00013
Trichlorofluoromethane	6	1	17	0.19	0.19	0.0043	0.00015	0.19
Vinyl Acetate	5	0	0	ND	ND	0.03	0.00064	<0.00064
Vinyl Chloride	6	0	0	ND	ND	0.0051	0.00011	<0.00011
Carbon Disulfide	6	2	33	0.038	0.00034	0.0066	0.00023	0.00034
Semi-Volatile Organic Compounds								
2,4,5-Trichlorophenol	5	0	0	ND	ND	0.1	0.09	<0.09
2,4,6-Trichlorophenol	5	0	0	ND	ND	0.2	0.2	<0.2
2,4-Dichlorophenol	5	0	0	ND	ND	0.1	0.09	<0.09
2,4-Dimethylphenol	5	0	0	ND	ND	0.07	0.06	<0.06
2,4-Dinitrophenol	5	0	0	ND	ND	0.2	0.2	<0.2
2,4-Dinitrotoluene	5	0	0	ND	ND	0.09	0.08	<0.08
2,6-Dinitrotoluene	5	0	0	ND	ND	0.07	0.06	<0.06
2-Chloronaphthalene	5	0	0	ND	ND	0.07	0.06	<0.06
2-Chlorophenol	5	0	0	ND	ND	0.08	0.07	<0.07
2-Methyl-4,6-dinitrophenol	5	0	0	ND	ND	0.04	0.04	<0.04
2-Methylphenol	5	0	0	ND	ND	0.1	0.09	<0.09
2-Nitroaniline	5	0	0	ND	ND	0.07	0.06	<0.06
2-Nitrophenol	5	0	0	ND	ND	0.09	0.08	<0.08
3,3'-Dichlorobenzidine	5	0	0	ND	ND	0.05	0.05	<0.05
3-and 4-Methylphenol Coelution	5	2	40	0.3	0.1	0.2	0.2	0.1
3-Nitroaniline	5	0	0	ND	ND	0.09	0.08	<0.08
4-Bromophenyl Phenyl Ether	5	0	0	ND	ND	0.04	0.04	<0.04
4-Chloro-3-methylphenol	5	0	0	ND	ND	0.1	0.09	<0.09
4-Chloroaniline	5	0	0	ND	ND	0.09	0.08	<0.08
4-Chlorophenyl Phenyl Ether	5	0	0	ND	ND	0.2	0.2	<0.2
4-Nitroaniline	4	0	0	ND	ND	0.07	0.06	<0.06
4-Nitrophenol	5	0	0	ND	ND	0.1	0.09	<0.09
Benzoic Acid	5	0	0	ND	ND	0.4	0.4	<0.4
Benzyl Alcohol	5	0	0	ND	ND	0.2	0.2	<0.2
Bis(2-chloroethoxy)methane	5	0	0	ND	ND	0.09	0.08	<0.08
Bis(2-chloroethyl) Ether	5	0	0	ND	ND	0.1	0.09	<0.09
Bis(2-chloroisopropyl) Ether	5	0	0	ND	ND	0.08	0.07	<0.07
Bis(2-ethylhexyl) Phthalate	5	1	20	0.2	0.2	0.2	0.2	0.2
Butyl Benzyl Phthalate	5	0	0	ND	ND	0.09	0.08	<0.08
Dibenzofuran	7	2	29	0.33	0.027	0.2	0.2	0.027
DiethylPhthalate	5	0	0	ND	ND	0.2	0.2	<0.2
DimethylPhthalate	5	0	0	ND	ND	0.2	0.2	<0.2
Di-n-Butyl Phthalate	5	0	0	ND	ND	0.09	0.08	<0.08
Di-n-Octyl Phthalate	5	0	0	ND	ND	0.08	0.07	<0.07
Hexachlorobenzene	5	0	0	ND	ND	0.08	0.07	<0.07
Hexachlorobutadiene	6	0	0	ND	ND	0.09	0.00025	<0.00025
Hexachlorocyclopentadiene	5	0	0	ND	ND	0.09	0.08	<0.08

Table A-7 Analytical Results for Subsurface Soil at Site SS08

Constituent	Subsurface Soil Data					Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
Hexachloroethane	5	0	0	ND	ND	0.09	0.08	<0.08
Isophorone	5	0	0	ND	ND	0.2	0.2	<0.2
Nitrobenzene	5	0	0	ND	ND	0.1	0.09	<0.09
N-Nitrosodi-n-propylamine	5	0	0	ND	ND	0.1	0.09	<0.09
N-Nitrosodiphenylamine	5	0	0	ND	ND	0.2	0.2	<0.2
Pentachlorophenol	5	0	0	ND	ND	0.07	0.06	<0.06
Phenol	5	0	0	ND	ND	0.2	0.2	<0.2
Polynuclear Aromatic Hydrocarbons								
2-Methylnaphthalene	7	3	43	7.3	0.26	0.2	0.2	0.26
Acenaphthene	7	2	29	0.29	0.016	0.08	0.07	0.016
Acenaphthylene	7	1	14	0.013	0.013	0.07	0.05	0.013
Anthracene	7	2	29	0.02	0.012	0.07	0.06	0.012
Benzo(a)anthracene	7	2	29	0.054	0.017	0.08	0.07	0.017
Benzo(a)pyrene	7	2	29	0.057	0.014	0.08	0.07	0.014
Benzo(b)fluoranthene	7	2	29	0.056	0.018	0.1	0.09	0.018
Benzo(g,h,i)perylene	7	2	29	0.036	0.013	0.05	0.05	0.013
Benzo(k)fluoranthene	2	2	100	0.043	0.014	na	na	0.014
Chrysene	7	2	29	0.095	0.034	0.09	0.08	0.034
Dibenz(a,h)anthracene	7	2	29	0.012	0.004	0.04	0.04	0.004
Fluoranthene	7	2	29	0.12	0.034	0.1	0.09	0.034
Fluorene	7	2	29	0.58	0.028	0.09	0.08	0.028
Indeno(1,2,3-cd)Pyrene	7	2	29	0.04	0.013	0.08	0.05	0.013
Naphthalene	9	4	44	1.1	0.085	0.07	0.0002	0.085
Phenanthrene	7	2	29	0.37	0.098	0.1	0.09	0.098
Pyrene	7	3	43	0.2	0.078	0.08	0.07	0.078
Pesticides								
4,4'-DDD	9	7	78	0.876	0.0024	0.05	0.023	0.0024
4,4'-DDE	9	5	56	0.05	0.0008	0.023	0.0007	0.0008
4,4'-DDT	9	7	78	0.741	0.01	0.023	0.023	0.01
Aldrin	8	0	0	ND	ND	0.017	0.00039	<0.00039
alpha Endosulfan	8	0	0	ND	ND	0.017	0.00038	<0.00038
alpha-BHC	7	0	0	ND	ND	0.017	0.00046	<0.00046
alpha-Chlordane	8	0	0	ND	ND	0.017	0.00047	<0.00047
beta Endosulfan	8	1	13	0.01	0.01	0.023	0.00036	0.01
beta-BHC	8	0	0	ND	ND	0.017	0.00086	<0.00086
delta-BHC	6	0	0	ND	ND	0.017	0.0006	<0.0006
Dieldrin	8	1	13	0.04	0.04	0.023	0.00055	0.04
Endosulfan Sulfate	8	0	0	ND	ND	0.023	0.00051	<0.00051
Endrin	8	0	0	ND	ND	0.023	0.0008	<0.0008
Endrin Aldehyde	8	0	0	ND	ND	0.023	0.00037	<0.00037
Endrin Ketone	2	0	0	ND	ND	0.023	0.023	<0.023
gamma-BHC (Lindane)	8	0	0	ND	ND	0.017	0.00066	<0.00066
gamma-Chlordane	8	0	0	ND	ND	0.017	0.00076	<0.00076

Table A-7 Analytical Results for Subsurface Soil at Site SS08

Constituent	Subsurface Soil Data					Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
Heptachlor	8	0	0	ND	ND	0.023	0.00059	<0.00059
Heptachlor Epoxide	8	0	0	ND	ND	0.023	0.0008	<0.0008
Methoxychlor	8	1	13	0.01	0.01	0.09	0.0011	0.01
Toxaphene	8	0	0	ND	ND	1.7	0.05	<0.05
Polychlorinated Biphenyls								
Arochlor 1016	8	0	0	ND	ND	0.6	0.013	<0.013
Arochlor 1221	8	0	0	ND	ND	0.35	0.012	<0.012
Arochlor 1232	8	0	0	ND	ND	0.3	0.019	<0.019
Arochlor 1242	8	0	0	ND	ND	0.3	0.012	<0.012
Arochlor 1248	8	0	0	ND	ND	0.3	0.011	<0.011
Arochlor 1254	8	0	0	ND	ND	0.6	0.011	<0.011
Arochlor 1260	8	2	25	1.63	0.2	0.125	0.005	0.2
Petroleum Hydrocarbons								
Diesel Range Organics (DRO)	13	11	85	23900	6	5	3.83	6
Gasoline Range Organics (GRO)	9	9	100	1400	0.96	na	na	0.96
Residual Range Organics (RRO)	8	7	88	13200	31	10	10	31

Notes:

DDD - 1,1-bis(chlorophenyl)-2,2-dichloroethane

DDE - 1,1-bis(chlorophenyl)-2,2-dichloroethene

DDT - 1,1-bis(chlorophenyl)-2,2,2-trichloroethane

ND - not detected

na - not available

mg/Kg - Milligram per kilogram.

¹ - Minimum Result reported as smallest detected concentration or smallest reporting limit if ND

Table A-8 Analytical Results for Sediment at Site SS08

Constituent	Sediment Data					Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
Inorganics, Total								
Aluminum	3	3	100	35000	28900	na	na	28900
Antimony	3	2	67	0.8	0.66	0.5	0.5	0.66
Arsenic	6	6	100	24	10.5	na	na	10.5
Barium	6	6	100	258	188	na	na	188
Beryllium	3	3	100	1.2	0.6	na	na	0.6
Cadmium	6	5	83	1.9	0.309	0.6	0.6	0.309
Calcium	3	3	100	10600	7110	na	na	7110
Chromium	6	6	100	77.7	36.8	na	na	36.8
Cobalt	3	3	100	31.5	18.8	na	na	18.8
Copper	3	3	100	122	49	na	na	49
Iron	3	3	100	74400	36600	na	na	36600
Lead	6	6	100	69.3	15.9	na	na	15.9
Magnesium	3	3	100	16200	7930	na	na	7930
Manganese	3	3	100	1300	857	na	na	857
Mercury	6	6	100	0.256	0.0785	na	na	0.0785
Molybdenum	1	1	100	3	3	na	na	3
Nickel	3	3	100	110	39.2	na	na	39.2
Potassium	3	3	100	2820	1710	na	na	1710
Selenium	5	2	40	1.5	0.31	0.911	0.607	0.31
Silver	5	3	60	1	0.247	0.111	0.0878	0.247
Sodium	3	3	100	209	146	na	na	146
Thallium	3	3	100	0.3	0.28	na	na	0.28
Tin	1	0	0	ND	ND	8	8	<8
Titanium	1	1	100	1470	1470	na	na	1470
Vanadium	3	3	100	106	86	na	na	86
Zinc	3	3	100	273	102	na	na	102
Volatile Organic Compounds								
1,1,1,2-Tetrachloroethane	3	0	0	ND	ND	0.0371	0.0196	<0.0196
1,1,1-Trichloroethane	4	1	25	0.057	0.057	0.0371	0.0196	0.057
1,1,2,2-Tetrachloroethane	3	0	0	ND	ND	0.0371	0.0196	<0.0196
1,1,2-Trichloroethane	3	0	0	ND	ND	0.0193	0.0102	<0.0102
1,1-Dichloroethane	3	0	0	ND	ND	0.0371	0.0196	<0.0196
1,1-Dichloroethene	3	0	0	ND	ND	0.0371	0.0196	<0.0196
1,1-Dichloropropene	3	0	0	ND	ND	0.0371	0.0196	<0.0196
1,2,3-Trichlorobenzene	3	0	0	ND	ND	0.0371	0.0196	<0.0196
1,2,3-Trichloropropane	3	0	0	ND	ND	0.0371	0.0196	<0.0196
1,2,4-Trichlorobenzene	4	0	0	ND	ND	0.2	0.0196	<0.0196
1,2,4-Trimethylbenzene	3	0	0	ND	ND	0.0741	0.0391	<0.0391
1,2-Dibromo-3-chloropropane	3	0	0	ND	ND	0.148	0.0783	<0.0783
1,2-Dibromoethane	3	0	0	ND	ND	0.0371	0.0196	<0.0196
1,2-Dichlorobenzene	4	0	0	ND	ND	0.2	0.0196	<0.0196

Table A-8 Analytical Results for Sediment at Site SS08

Constituent	Sediment Data			Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)	Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Frequency of Detection					
1,2-Dichloroethane	3	0	0	ND	ND	0.0193	0.00629	<0.00629
1,2-Dichloropropane	3	0	0	ND	ND	0.0193	0.0102	<0.0102
1,3,5-Trimethylbenzene	3	0	0	ND	ND	0.0741	0.0391	<0.0391
1,3-Dichlorobenzene	4	0	0	ND	ND	0.2	0.0196	<0.0196
1,3-Dichloropropane	3	0	0	ND	ND	0.0371	0.0196	<0.0196
1,4-Dichlorobenzene	4	0	0	ND	ND	0.2	0.0196	<0.0196
2,2-Dichloropropane	3	0	0	ND	ND	0.0371	0.0196	<0.0196
2-Butanone (MEK)	3	0	0	ND	ND	0.371	0.00824	<0.00824
2-Chloroethyl Vinyl Ether	3	0	0	ND	ND	0.371	0.196	<0.196
2-Chlorotoluene	3	0	0	ND	ND	0.0371	0.0196	<0.0196
2-Hexanone	3	0	0	ND	ND	0.371	0.196	<0.196
4-Chlorotoluene	3	0	0	ND	ND	0.0371	0.0196	<0.0196
4-Methyl-2-pentanone	3	0	0	ND	ND	0.371	0.196	<0.196
Benzene	3	0	0	ND	ND	0.0185	0.00646	<0.00646
Bromobenzene	3	0	0	ND	ND	0.0371	0.0196	<0.0196
Bromochloromethane	3	0	0	ND	ND	0.0371	0.0196	<0.0196
Bromodichloromethane	3	0	0	ND	ND	0.0371	0.0196	<0.0196
Bromoform	3	0	0	ND	ND	0.0371	0.0196	<0.0196
Bromomethane	3	0	0	ND	ND	0.148	0.0783	<0.0783
Carbon Tetrachloride	3	0	0	ND	ND	0.0371	0.0196	<0.0196
Chlorobenzene	3	0	0	ND	ND	0.0371	0.0196	<0.0196
Chloroethane	3	0	0	ND	ND	0.148	0.0783	<0.0783
Chloroform	3	0	0	ND	ND	0.0371	0.0196	<0.0196
Chloromethane	3	0	0	ND	ND	0.0371	0.0196	<0.0196
cis-1,2-Dichloroethene	3	0	0	ND	ND	0.0371	0.0196	<0.0196
cis-1,3-Dichloropropene	3	0	0	ND	ND	0.0296	0.0157	<0.0157
Dibromochloromethane	3	0	0	ND	ND	0.0371	0.0196	<0.0196
Dibromomethane	3	0	0	ND	ND	0.0371	0.0196	<0.0196
Dichlorodifluoromethane	3	0	0	ND	ND	0.0371	0.0196	<0.0196
Ethylbenzene	3	0	0	ND	ND	0.0741	0.0125	<0.0125
Isopropylbenzene	3	0	0	ND	ND	0.0371	0.0196	<0.0196
m,p-Xylenes	4	2	50	0.0792	0.0031	0.0319	0.0202	0.0031
Methylene Chloride	4	1	25	0.0018	0.0018	0.148	0.0783	0.0018
n-Butylbenzene	3	0	0	ND	ND	0.0371	0.0196	<0.0196
n-Propylbenzene	3	0	0	ND	ND	0.0371	0.0196	<0.0196
o-Xylene	3	0	0	ND	ND	0.0391	0.0158	<0.0158
p-Isopropyltoluene	3	0	0	ND	ND	0.0371	0.0196	<0.0196
sec-Butylbenzene	3	0	0	ND	ND	0.0371	0.0196	<0.0196
Styrene	3	0	0	ND	ND	0.0371	0.0196	<0.0196
Tert-Butylbenzene	3	0	0	ND	ND	0.0371	0.0196	<0.0196
Tetrachloroethene	3	1	33	0.294	0.294	0.0217	0.0196	0.294
Toluene	4	1	25	0.0021	0.0021	0.0292	0.0184	0.0021
trans-1,2-Dichloroethene	3	0	0	ND	ND	0.0371	0.0196	<0.0196
trans-1,3-Dichloropropene	3	0	0	ND	ND	0.0371	0.0196	<0.0196

Table A-8 Analytical Results for Sediment at Site SS08

Constituent	Sediment Data			Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)	Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Frequency of Detection					
Trichloroethene	3	0	0	ND	ND	0.0296	0.0157	<0.0157
Trichlorofluoromethane	3	0	0	ND	ND	0.0371	0.0196	<0.0196
Vinyl Chloride	3	0	0	ND	ND	0.0193	0.0102	<0.0102
Carbon Disulfide	3	0	0	ND	ND	0.148	0.0783	<0.0783
Semi-Volatile Organic Compounds								
2,4,5-Trichlorophenol	1	0	0	ND	ND	0.2	0.2	<0.2
2,4,6-Trichlorophenol	1	0	0	ND	ND	0.2	0.2	<0.2
2,4-Dichlorophenol	1	0	0	ND	ND	0.2	0.2	<0.2
2,4-Dimethylphenol	1	0	0	ND	ND	0.1	0.1	<0.1
2,4-Dinitrophenol	1	0	0	ND	ND	0.2	0.2	<0.2
2,4-Dinitrotoluene	1	0	0	ND	ND	0.2	0.2	<0.2
2,6-Dinitrotoluene	1	0	0	ND	ND	0.1	0.1	<0.1
2-Chloronaphthalene	1	0	0	ND	ND	0.1	0.1	<0.1
2-Chlorophenol	1	0	0	ND	ND	0.2	0.2	<0.2
2-Methyl-4,6-dinitrophenol	1	0	0	ND	ND	0.06	0.06	<0.06
2-Methylphenol	1	0	0	ND	ND	0.2	0.2	<0.2
2-Nitroaniline	1	0	0	ND	ND	0.1	0.1	<0.1
2-Nitrophenol	1	0	0	ND	ND	0.2	0.2	<0.2
3,3'-Dichlorobenzidine	1	1	100	0.08	0.08	na	na	0.08
3-Nitroaniline	1	0	0	ND	ND	0.2	0.2	<0.2
4-Bromophenyl Phenyl Ether	1	0	0	ND	ND	0.06	0.06	<0.06
4-Chloro-3-methylphenol	1	0	0	ND	ND	0.2	0.2	<0.2
4-Chloroaniline	1	1	100	0.2	0.2	na	na	0.2
4-Chlorophenyl Phenyl Ether	1	0	0	ND	ND	0.2	0.2	<0.2
4-Nitroaniline	1	0	0	ND	ND	0.1	0.1	<0.1
4-Nitrophenol	1	0	0	ND	ND	0.2	0.2	<0.2
Benzyl Alcohol	1	0	0	ND	ND	0.2	0.2	<0.2
Bis(2-chloroethoxy)methane	1	0	0	ND	ND	0.2	0.2	<0.2
Bis(2-chloroethyl) Ether	1	0	0	ND	ND	0.2	0.2	<0.2
Bis(2-chloroisopropyl) Ether	1	0	0	ND	ND	0.2	0.2	<0.2
Bis(2-ethylhexyl) Phthalate	1	0	0	ND	ND	0.2	0.2	<0.2
Butyl Benzyl Phthalate	1	0	0	ND	ND	0.2	0.2	<0.2
Dibenzofuran	1	0	0	ND	ND	0.2	0.2	<0.2
DiethylPhthalate	1	0	0	ND	ND	0.2	0.2	<0.2
DimethylPhthalate	1	0	0	ND	ND	0.2	0.2	<0.2
Di-n-Butyl Phthalate	1	0	0	ND	ND	0.2	0.2	<0.2
Di-n-Octyl Phthalate	1	0	0	ND	ND	0.2	0.2	<0.2
Hexachlorobenzene	1	0	0	ND	ND	0.2	0.2	<0.2
Hexachlorobutadiene	4	0	0	ND	ND	0.2	0.0196	<0.0196
Hexachloroethane	1	0	0	ND	ND	0.2	0.2	<0.2
Isophorone	1	0	0	ND	ND	0.2	0.2	<0.2
Nitrobenzene	1	0	0	ND	ND	0.2	0.2	<0.2
N-Nitrosodi-n-propylamine	1	0	0	ND	ND	0.2	0.2	<0.2

Table A-8 Analytical Results for Sediment at Site SS08

Constituent	Sediment Data					Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
N-Nitrosodiphenylamine	1	0	0	ND	ND	0.2	0.2	<0.2
Pentachlorophenol	1	0	0	ND	ND	0.1	0.1	<0.1
Phenol	1	0	0	ND	ND	0.2	0.2	<0.2
Polynuclear Aromatic Hydrocarbons								
2-Methylnaphthalene	1	0	0	ND	ND	0.2	0.2	<0.2
Acenaphthene	4	1	25	0.00996	0.00996	0.2	0.00266	0.00996
Acenaphthylene	4	1	25	0.00735	0.00735	0.1	0.00547	0.00735
Anthracene	4	2	50	0.0793	0.0121	0.1	0.00547	0.0121
Benzo(a)anthracene	4	2	50	0.0625	0.0215	0.2	0.00547	0.0215
Benzo(a)pyrene	4	2	50	0.0633	0.0226	0.2	0.00547	0.0226
Benzo(b)fluoranthene	4	2	50	0.0634	0.0347	0.2	0.00279	0.0347
Benzo(g,h,i)perylene	4	2	50	0.0439	0.0171	0.08	0.00172	0.0171
Benzo(k)fluoranthene	3	2	67	0.0417	0.0279	0.00217	0.00217	0.0279
Chrysene	4	2	50	0.117	0.0678	0.2	0.00597	0.0678
Dibenz(a,h)anthracene	4	1	25	0.0148	0.0148	0.06	0.00536	0.0148
Fluoranthene	4	2	50	0.132	0.124	0.2	0.00335	0.124
Fluorene	4	1	25	0.0146	0.0146	0.2	0.00409	0.0146
Indeno(1,2,3-cd)Pyrene	4	2	50	0.0329	0.0158	0.08	0.00547	0.0158
Naphthalene	4	2	50	0.0554	0.00779	0.2	0.00243	0.00779
Phenanthrene	4	3	75	0.17	0.0118	0.2	0.2	0.0118
Pyrene	4	2	50	0.183	0.0842	0.2	0.00296	0.0842
Pesticides								
4,4'-DDD	6	6	100	0.666	0.0062	na	na	0.0062
4,4'-DDE	6	5	83	0.255	0.028	0.0144	0.0144	0.028
4,4'-DDT	6	6	100	2.5	0.0561	na	na	0.0561
Aldrin	4	0	0	ND	ND	0.021	0.00039	<0.00039
alpha Endosulfan	4	0	0	ND	ND	0.021	0.00038	<0.00038
alpha-BHC	3	0	0	ND	ND	0.021	0.016	<0.016
alpha-Chlordane	4	0	0	ND	ND	0.021	0.0019	<0.0019
beta Endosulfan	4	0	0	ND	ND	0.029	0.00036	<0.00036
beta-BHC	4	0	0	ND	ND	0.021	0.00086	<0.00086
delta-BHC	3	0	0	ND	ND	0.021	0.016	<0.016
Dieldrin	4	0	0	ND	ND	0.029	0.00055	<0.00055
Endosulfan Sulfate	4	1	25	0.0042	0.0042	0.029	0.022	0.0042
Endrin	5	1	20	0.0011	0.0011	0.029	0.0008	0.0011
Endrin Aldehyde	4	0	0	ND	ND	0.029	0.00037	<0.00037
Endrin Ketone	3	0	0	ND	ND	0.029	0.022	<0.022
gamma-BHC (Lindane)	4	0	0	ND	ND	0.021	0.00066	<0.00066
gamma-Chlordane	4	0	0	ND	ND	0.021	0.00076	<0.00076
Heptachlor	4	0	0	ND	ND	0.029	0.00059	<0.00059
Heptachlor Epoxide	4	0	0	ND	ND	0.029	0.0008	<0.0008
Methoxychlor	4	0	0	ND	ND	0.029	0.0027	<0.0027

Table A-8 Analytical Results for Sediment at Site SS08

Constituent	Sediment Data					Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
Toxaphene	4	0	0	ND	ND	1.2	0.55	<0.55
Polychlorinated Biphenyls								
Arochlor 1016	4	0	0	ND	ND	0.0859	0.025	<0.025
Arochlor 1221	4	0	0	ND	ND	0.098	0.0329	<0.0329
Arochlor 1232	4	0	0	ND	ND	0.0859	0.0329	<0.0329
Arochlor 1242	4	0	0	ND	ND	0.0859	0.0329	<0.0329
Arochlor 1248	4	0	0	ND	ND	0.0859	0.031	<0.031
Arochlor 1254	4	0	0	ND	ND	0.15	0.0329	<0.0329
Arochlor 1260	5	3	60	0.19	0.0548	0.11	0.0329	0.0548
Petroleum Hydrocarbons								
Diesel Range Organics (DRO)	6	5	83	2740	25.6	8.92	8.92	25.6
Gasoline Range Organics (GRO)	5	3	60	4.21	2	1.5	0.851	2
Residual Range Organics (RRO)	5	5	100	1190	119	na	na	119

Notes:

DDD - 1,1-bis(chlorophenyl)-2,2-dichloroethane
DDE - 1,1-bis(chlorophenyl)-2,2-dichloroethene
DDT - 1,1-bis(chlorophenyl)-2,2,2-trichloroethane
ND - not detected
na - not available
mg/Kg - Milligram per kilogram.

¹ - Minimum Result reported as smallest detected concentration or smallest reporting limit if ND

Table A-9 Analytical Results for Sludge at Site SS08

Constituent	Subsurface Soil Data					Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
Inorganics, Total								
Aluminum	2	2	100	31000	26600	na	na	26600
Antimony	2	2	100	2	1	na	na	1
Arsenic	2	2	100	20	14	na	na	14
Arsenic (TCLP) (SW6010)	2	0	0	ND	ND	0.03	0.03	<0.03
Barium	2	2	100	322	270	na	na	270
Barium (TCLP) (SW6010)	2	2	100	1.14	1	na	na	1
Beryllium	2	2	100	0.8	0.6	na	na	0.6
Cadmium	2	1	50	0.9	0.9	0.6	0.6	0.9
Cadmium (TCLP) (SW6010)	2	2	100	0.006	0.005	na	na	0.005
Calcium	2	2	100	3480	2580	na	na	2580
Chromium	2	2	100	58	51	na	na	51
Chromium (TCLP) (SW6010)	2	1	50	0.003	0.003	0.003	0.003	0.003
Cobalt	2	2	100	20	16	na	na	16
Copper	2	2	100	454	92	na	na	92
Cyanide	2	0	0	ND	ND	0.25	0.25	<0.25
Iron	2	2	100	49900	41500	na	na	41500
Lead	2	2	100	14	10	na	na	10
Lead (TCLP) (SW6010)	2	0	0	ND	ND	0.03	0.03	<0.03
Magnesium	2	2	100	8980	7320	na	na	7320
Manganese	2	2	100	877	868	na	na	868
Mercury	1	1	100	0.04	0.04	na	na	0.04
Mercury (TCLP) (SW7470)	2	0	0	ND	ND	0.001	0.001	<0.001
Molybdenum	2	0	0	ND	ND	0.8	0.8	<0.8
Nickel	2	2	100	46	45	na	na	45
Potassium	2	2	100	3530	1520	na	na	1520
Selenium	2	2	100	4	1.3	na	na	1.3
Selenium (TCLP) (SW6010)	2	0	0	ND	ND	0.03	0.03	<0.03
Silver	2	1	50	1	1	0.8	0.8	1
Silver (TCLP) (SW6010)	2	0	0	ND	ND	0.003	0.003	<0.003
Sodium	2	2	100	110	90	na	na	90
Thallium	2	1	50	0.1	0.1	0.1	0.1	0.1
Tin	2	1	50	8	8	8	8	8
Titanium	2	2	100	1322	1100	na	na	1100
Total Sulfide	2	0	0	ND	ND	10	10	<10
Vanadium	2	2	100	102	77	na	na	77
Zinc	2	2	100	831	136	na	na	136
Volatile Organic Compounds								
1,1,1,2-Tetrachloroethane	2	0	0	ND	ND	0.00017	0.00014	<0.00014
1,1,1-Trichloroethane	2	0	0	ND	ND	0.00012	0.000099	<0.000099
1,1,2,2-Tetrachloroethane	2	0	0	ND	ND	0.00022	0.00018	<0.00018
1,1,2-Trichloroethane	2	0	0	ND	ND	0.00025	0.0002	<0.0002
1,1-Dichloroethane	2	0	0	ND	ND	0.0001	0.000078	<0.000078
1,1-Dichloroethene	2	0	0	ND	ND	0.00011	0.00009	<0.00009
1,1-Dichloropropene	2	0	0	ND	ND	0.00022	0.00018	<0.00018

Table A-9 Analytical Results for Sludge at Site SS08

Constituent	Subsurface Soil Data					Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
1,2,3-Trichlorobenzene	2	0	0	ND	ND	0.00031	0.00025	<0.00025
1,2,3-Trichloropropane	2	0	0	ND	ND	0.00026	0.00021	<0.00021
1,2,4-Trichlorobenzene	2	0	0	ND	ND	0.00033	0.00027	<0.00027
1,2,4-Trimethylbenzene	2	2	100	0.0045	0.0029	na	na	0.0029
1,2-Dibromo-3-chloropropane	2	0	0	ND	ND	0.00064	0.00052	<0.00052
1,2-Dibromoethane	2	0	0	ND	ND	0.00027	0.00022	<0.00022
1,2-Dichlorobenzene	2	0	0	ND	ND	0.0002	0.00016	<0.00016
1,2-Dichloroethane	2	0	0	ND	ND	0.00016	0.00013	<0.00013
1,2-Dichloroethane (EDC) (TCLP)	1	0	0	ND	ND	0.01	0.01	<0.01
1,2-Dichloropropane	2	0	0	ND	ND	0.0001	0.000083	<0.000083
1,3,5-Trimethylbenzene	2	2	100	0.0018	0.0017	na	na	0.0017
1,3-Dichlorobenzene	2	0	0	ND	ND	0.00025	0.0002	<0.0002
1,3-Dichloropropane	2	0	0	ND	ND	0.00012	0.000096	<0.000096
1,4-Dichlorobenzene	2	2	100	0.0082	0.0065	na	na	0.0065
1,4-Dichlorobenzene (TCLP)	1	0	0	ND	ND	0.02	0.02	<0.02
1-Chlorohexane	2	0	0	ND	ND	0.0003	0.00024	<0.00024
2,2-Dichloropropane	2	0	0	ND	ND	0.00014	0.00011	<0.00011
2-Butanone (MEK)	2	0	0	ND	ND	0.00842	0.0068	<0.0068
2-Butanone (MEK) (TCLP)	1	0	0	ND	ND	0.04	0.04	<0.04
2-Chloroethyl Vinyl Ether	1	0	0	ND	ND	0.00083	0.00083	<0.00083
2-Chlorotoluene	2	0	0	ND	ND	0.00016	0.00013	<0.00013
2-Hexanone	2	0	0	ND	ND	0.0087	0.007	<0.007
4-Chlorotoluene	2	0	0	ND	ND	0.00022	0.00018	<0.00018
4-Methyl-2-pentanone	2	0	0	ND	ND	0.0072	0.0058	<0.0058
Acetone	2	2	100	0.05	0.019	na	na	0.019
Benzene	2	1	50	0.00025	0.00025	0.000084	0.000084	0.00025
Benzene (TCLP)	1	0	0	ND	ND	0.02	0.02	<0.02
Bromobenzene	2	0	0	ND	ND	0.00017	0.00014	<0.00014
Bromochloromethane	2	0	0	ND	ND	0.00015	0.00012	<0.00012
Bromodichloromethane	2	0	0	ND	ND	0.00017	0.00014	<0.00014
Bromoform	2	0	0	ND	ND	0.00024	0.00019	<0.00019
Bromomethane	2	0	0	ND	ND	0.00028	0.00023	<0.00023
Carbon Tetrachloride	2	0	0	ND	ND	0.0002	0.00016	<0.00016
Carbon Tetrachloride (TCLP)	1	0	0	ND	ND	0.01	0.01	<0.01
Chlorobenzene	2	0	0	ND	ND	0.00011	0.000085	<0.000085
Chlorobenzene (TCLP)	1	0	0	ND	ND	0.01	0.01	<0.01
Chloroethane	2	0	0	ND	ND	0.0002	0.00016	<0.00016
Chloroform	2	1	50	0.00026	0.00026	0.00077	0.00077	0.00026
Chloroform (TCLP)	1	0	0	ND	ND	0.01	0.01	<0.01
Chloromethane	2	0	0	ND	ND	0.00017	0.00014	<0.00014
cis-1,2-Dichloroethene	2	0	0	ND	ND	0.00014	0.00011	<0.00011
cis-1,3-Dichloropropene	2	0	0	ND	ND	0.00021	0.00017	<0.00017
Dibromochloromethane	2	0	0	ND	ND	0.0002	0.00016	<0.00016
Dibromomethane	2	0	0	ND	ND	0.00025	0.0002	<0.0002
Dichlorodifluoromethane	2	0	0	ND	ND	0.00019	0.00015	<0.00015
Ethylbenzene	2	0	0	ND	ND	0.00017	0.00014	<0.00014

Table A-9 Analytical Results for Sludge at Site SS08

Constituent	Subsurface Soil Data					Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
Isopropylbenzene	2	0	0	ND	ND	0.00012	0.000096	<0.000096
Methylene Chloride	2	2	100	0.004	0.0011	na	na	0.0011
n-Butylbenzene	2	1	50	0.002	0.002	0.0002	0.0002	0.002
n-Propylbenzene	2	0	0	ND	ND	0.00021	0.00017	<0.00017
p-Isopropyltoluene	2	2	100	0.18	0.0033	na	na	0.0033
sec-Butylbenzene	2	0	0	ND	ND	0.00012	0.0001	<0.0001
Styrene	2	0	0	ND	ND	0.00016	0.00013	<0.00013
Tert-Butylbenzene	2	0	0	ND	ND	0.00011	0.00009	<0.00009
Tetrachloroethene	2	2	100	0.00056	0.00023	na	na	0.00023
Tetrachloroethene (PCE) (TCLP)	1	0	0	ND	ND	0.01	0.01	<0.01
Toluene	2	2	100	0.38	0.0061	na	na	0.0061
Total xylenes	2	2	100	0.0045	0.0015	na	na	0.0015
trans-1,2-Dichloroethene	2	0	0	ND	ND	0.00012	0.000093	<0.000093
trans-1,3-Dichloropropene	2	0	0	ND	ND	0.00016	0.00013	<0.00013
Trichloroethene	2	2	100	0.00095	0.00079	na	na	0.00079
Trichlorofluoromethane	2	0	0	ND	ND	0.00019	0.00015	<0.00015
Vinyl Acetate	2	0	0	ND	ND	0.00079	0.00064	<0.00064
Vinyl Chloride	2	0	0	ND	ND	0.00014	0.00011	<0.00011
Vinyl Chloride (TCLP)	1	0	0	ND	ND	0.03	0.03	<0.03
Carbon Disulfide	2	2	100	0.0092	0.0003	na	na	0.0003
Semi-Volatile Organic Compounds								
2,4,5-Trichlorophenol	2	0	0	ND	ND	0.2	0.1	<0.1
2,4,6-Trichlorophenol	2	0	0	ND	ND	0.2	0.2	<0.2
2,4-Dichlorophenol	2	0	0	ND	ND	0.2	0.1	<0.1
2,4-Dimethylphenol	2	0	0	ND	ND	0.08	0.07	<0.07
2,4-Dinitrophenol	1	0	0	ND	ND	0.2	0.2	<0.2
2,4-Dinitrotoluene	1	0	0	ND	ND	0.09	0.09	<0.09
2,6-Dinitrotoluene	2	0	0	ND	ND	0.08	0.07	<0.07
2-Chloronaphthalene	2	0	0	ND	ND	0.08	0.07	<0.07
2-Chlorophenol	2	0	0	ND	ND	0.1	0.08	<0.08
2-Methyl-4,6-dinitrophenol	1	0	0	ND	ND	0.04	0.04	<0.04
2-Methylphenol	2	1	50	0.2	0.2	0.2	0.2	0.2
2-Nitroaniline	2	0	0	ND	ND	0.08	0.07	<0.07
2-Nitrophenol	2	0	0	ND	ND	0.2	0.09	<0.09
3,3'-Dichlorobenzidine	2	0	0	ND	ND	0.07	0.05	<0.05
3-and 4-Methylphenol Coelution	2	2	100	0.4	0.2	na	na	0.2
3-Nitroaniline	2	0	0	ND	ND	0.2	0.09	<0.09
4-Bromophenyl Phenyl Ether	2	0	0	ND	ND	0.08	0.04	<0.04
4-Chloro-3-methylphenol	2	0	0	ND	ND	0.2	0.1	<0.1
4-Chloroaniline	2	0	0	ND	ND	0.2	0.09	<0.09
4-Chlorophenyl Phenyl Ether	2	0	0	ND	ND	0.2	0.2	<0.2
4-Nitroaniline	2	0	0	ND	ND	0.08	0.07	<0.07
4-Nitrophenol	2	0	0	ND	ND	0.2	0.1	<0.1
Benzoic Acid	2	0	0	ND	ND	0.5	0.4	<0.4
Benzyl Alcohol	2	0	0	ND	ND	0.2	0.2	<0.2

Table A-9 Analytical Results for Sludge at Site SS08

Constituent	Subsurface Soil Data					Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
Bis(2-chloroethoxy)methane	2	0	0	ND	ND	0.2	0.09	<0.09
Bis(2-chloroethyl) Ether	2	0	0	ND	ND	0.2	0.1	<0.1
Bis(2-chloroisopropyl) Ether	2	0	0	ND	ND	0.1	0.08	<0.08
Bis(2-ethylhexyl) Phthalate	2	2	100	0.8	0.4	na	na	0.4
Butyl Benzyl Phthalate	2	0	0	ND	ND	0.2	0.09	<0.09
Dibenzofuran	2	0	0	ND	ND	0.2	0.2	<0.2
DiethylPhthalate	2	1	50	0.2	0.2	0.2	0.2	0.2
DimethylPhthalate	2	0	0	ND	ND	0.2	0.2	<0.2
Di-n-Butyl Phthalate	2	0	0	ND	ND	0.2	0.09	<0.09
Di-n-Octyl Phthalate	2	0	0	ND	ND	0.1	0.08	<0.08
Hexachlorobenzene	2	0	0	ND	ND	0.1	0.08	<0.08
Hexachlorobutadiene	2	0	0	ND	ND	0.00031	0.00025	<0.00025
Hexachlorocyclopentadiene	2	0	0	ND	ND	0.2	0.09	<0.09
Hexachloroethane	2	0	0	ND	ND	0.2	0.09	<0.09
Isophorone	2	0	0	ND	ND	0.2	0.2	<0.2
Nitrobenzene	2	0	0	ND	ND	0.2	0.1	<0.1
N-Nitrosodi-n-propylamine	2	0	0	ND	ND	0.2	0.1	<0.1
N-Nitrosodiphenylamine	2	0	0	ND	ND	0.2	0.2	<0.2
Pentachlorophenol	2	0	0	ND	ND	0.08	0.07	<0.07
Phenol	2	1	50	0.1	0.1	0.2	0.2	0.1
Polynuclear Aromatic Hydrocarbons								
2-Methylnaphthalene	2	0	0	ND	ND	0.2	0.2	<0.2
Acenaphthene	2	0	0	ND	ND	0.1	0.08	<0.08
Acenaphthylene	2	0	0	ND	ND	0.08	0.07	<0.07
Anthracene	2	0	0	ND	ND	0.08	0.07	<0.07
Benzo(a)anthracene	2	0	0	ND	ND	0.1	0.08	<0.08
Benzo(a)pyrene	2	0	0	ND	ND	0.1	0.08	<0.08
Benzo(b)fluoranthene	2	0	0	ND	ND	0.2	0.1	<0.1
Benzo(g,h,i)perylene	2	0	0	ND	ND	0.07	0.05	<0.05
Chrysene	2	0	0	ND	ND	0.2	0.09	<0.09
Dibenz(a,h)anthracene	2	0	0	ND	ND	0.05	0.04	<0.04
Fluoranthene	2	0	0	ND	ND	0.2	0.1	<0.1
Fluorene	2	0	0	ND	ND	0.2	0.09	<0.09
Indeno(1,2,3-cd)Pyrene	2	0	0	ND	ND	0.07	0.05	<0.05
Naphthalene	2	2	100	0.0083	0.0017	na	na	0.0017
Phenanthrene	2	0	0	ND	ND	0.2	0.1	<0.1
Pyrene	2	0	0	ND	ND	0.1	0.08	<0.08
Pesticides								
4,4'-DDD	2	2	100	0.00956	0.004	na	na	0.004
4,4'-DDE	2	2	100	0.0037	0.003	na	na	0.003
4,4'-DDT	2	2	100	0.0372	0.01	na	na	0.01
Aldrin	2	0	0	ND	ND	0.00039	0.00039	<0.00039
alpha Endosulfan	2	0	0	ND	ND	0.00038	0.00038	<0.00038
alpha-BHC	1	0	0	ND	ND	0.00046	0.00046	<0.00046

Table A-9 Analytical Results for Sludge at Site SS08

Constituent	Subsurface Soil Data					Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
alpha-Chlordane	2	0	0	ND	ND	0.00047	0.00047	<0.00047
beta Endosulfan	2	0	0	ND	ND	0.00036	0.00036	<0.00036
beta-BHC	2	0	0	ND	ND	0.00086	0.00086	<0.00086
Chlordane (TCLP)	1	0	0	ND	ND	0.002	0.002	<0.002
Dieldrin	2	0	0	ND	ND	0.00055	0.00055	<0.00055
Endosulfan Sulfate	2	0	0	ND	ND	0.00051	0.00051	<0.00051
Endrin	2	0	0	ND	ND	0.0008	0.0008	<0.0008
Endrin (TCLP)	1	0	0	ND	ND	0.00001	0.00001	<0.00001
Endrin Aldehyde	2	0	0	ND	ND	0.00037	0.00037	<0.00037
gamma-BHC (Lindane)	2	0	0	ND	ND	0.00066	0.00066	<0.00066
gamma-BHC (Lindane) (TCLP)	1	0	0	ND	ND	0.00002	0.00002	<0.00002
gamma-Chlordane	2	0	0	ND	ND	0.00076	0.00076	<0.00076
Heptachlor	2	0	0	ND	ND	0.00059	0.00059	<0.00059
Heptachlor (TCLP)	1	0	0	ND	ND	0.00004	0.00004	<0.00004
Heptachlor Epoxide	2	0	0	ND	ND	0.0008	0.0008	<0.0008
Heptachlor Epoxide (TCLP)	1	0	0	ND	ND	0.00003	0.00003	<0.00003
Methoxychlor	2	0	0	ND	ND	0.0011	0.0011	<0.0011
Methoxychlor (TCLP)	1	0	0	ND	ND	0.00002	0.00002	<0.00002
Toxaphene	2	0	0	ND	ND	0.2	0.05	<0.05
Toxaphene (TCLP)	1	0	0	ND	ND	0.005	0.005	<0.005
Polychlorinated Biphenyls								
Arochlor 1016	2	0	0	ND	ND	0.04	0.013	<0.013
Arochlor 1221	2	0	0	ND	ND	0.1	0.012	<0.012
Arochlor 1232	2	0	0	ND	ND	0.07	0.019	<0.019
Arochlor 1242	2	0	0	ND	ND	0.04	0.012	<0.012
Arochlor 1248	2	0	0	ND	ND	0.02	0.011	<0.011
Arochlor 1254	2	0	0	ND	ND	0.06	0.011	<0.011
Arochlor 1260	2	0	0	ND	ND	0.08	0.005	<0.005
Petroleum Hydrocarbons								
Diesel Range Organics (DRO)	1	1	100	1430	1430	na	na	1430
Gasoline Range Organics (GRO)	2	2	100	16	14	na	na	14
Residual Range Organics (RRO)	1	1	100	574	574	na	na	574

Notes:

DDD - 1,1-bis(chlorophenyl)-2,2-dichloroethane
DDE - 1,1-bis(chlorophenyl)-2,2-dichloroethene
DDT - 1,1-bis(chlorophenyl)-2,2,2-trichloroethane
ND - not detected
na - not available
mg/Kg - Milligram per kilogram.

¹ - Minimum Result reported as smallest detected concentration or smallest reporting limit if ND

Table A-10 Analytical Results for Surface Water at Site SS08

Constituent	Surface Water Data							
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)	Maximum Reporting Level (mg/L)	Minimum Reporting Level (mg/L)	Minimum Result ¹ (mg/L)
Inorganics, Total								
Aluminum	3	2	67	1.21	0.576	0.05	0.05	0.576
Antimony	1	0	0	ND	ND	0.0025	0.0025	<0.0025
Arsenic	4	2	50	0.001	0.0009	0.005	0.002	0.0009
Barium	4	4	100	0.0152	0.005	na	na	0.005
Beryllium	1	0	0	ND	ND	0.001	0.001	<0.001
Cadmium	2	0	0	ND	ND	0.003	0.002	<0.002
Calcium	3	3	100	13.4	9.84	na	na	9.84
Chromium	4	2	50	0.005	0.004	0.005	0.004	0.004
Cobalt	1	0	0	ND	ND	0.004	0.004	<0.004
Copper	2	1	50	0.0028	0.0028	0.003	0.003	0.0028
Iron	3	3	100	1.45	0.06	na	na	0.06
Lead	4	2	50	0.0011	0.001	0.002	0.001	0.001
Magnesium	3	3	100	3.44	2.24	na	na	2.24
Manganese	3	3	100	0.0502	0.002	na	na	0.002
Mercury	2	0	0	ND	ND	0.0002	0.0001	<0.0001
Molybdenum	1	0	0	ND	ND	0.005	0.005	<0.005
Nickel	1	0	0	ND	ND	0.01	0.01	<0.01
Potassium	3	3	100	1	0.4	na	na	0.4
Selenium	3	1	33	0.0012	0.0012	0.005	0.004	0.0012
Silver	3	1	33	0.003	0.003	0.004	0.002	0.003
Sodium	3	3	100	2.41	2.08	na	na	2.08
Thallium	1	0	0	ND	ND	0.001	0.001	<0.001
Tin	1	0	0	ND	ND	0.042	0.042	<0.042
Titanium	1	1	100	0.002	0.002	na	na	0.002
Vanadium	2	1	50	0.004	0.004	0.01	0.01	0.004
Zinc	3	2	67	0.01	0.004	0.002	0.002	0.004
Volatile Organic Compounds								
1,1,1,2-Tetrachloroethane	2	0	0	ND	ND	0.001	0.00022	<0.00022
1,1,1-Trichloroethane	2	1	50	0.00026	0.00026	0.001	0.001	0.00026
1,1,2,2-Tetrachloroethane	2	0	0	ND	ND	0.001	0.00018	<0.00018
1,1,2-Trichloroethane	2	0	0	ND	ND	0.001	0.0001	<0.0001
1,1-Dichloroethane	2	0	0	ND	ND	0.001	0.00015	<0.00015
1,1-Dichloroethene	2	0	0	ND	ND	0.001	0.00022	<0.00022
1,1-Dichloropropene	2	1	50	0.00029	0.00029	0.001	0.001	0.00029
1,2,3-Trichlorobenzene	2	0	0	ND	ND	0.001	0.00013	<0.00013
1,2,3-Trichloropropane	2	0	0	ND	ND	0.002	0.00033	<0.00033
1,2,4-Trichlorobenzene	2	0	0	ND	ND	0.001	0.00019	<0.00019
1,2,4-Trimethylbenzene	2	0	0	ND	ND	0.001	0.00026	<0.00026
1,2-Dibromo-3-chloropropane	2	0	0	ND	ND	0.002	0.00058	<0.00058
1,2-Dibromoethane	2	0	0	ND	ND	0.001	0.00012	<0.00012
1,2-Dichlorobenzene	2	0	0	ND	ND	0.001	0.00015	<0.00015
1,2-Dichloroethane	2	0	0	ND	ND	0.001	0.0002	<0.0002

Table A-10 Analytical Results for Surface Water at Site SS08

Constituent	Surface Water Data							
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)	Maximum Reporting Level (mg/L)	Minimum Reporting Level (mg/L)	Minimum Result ¹ (mg/L)
1,2-Dichloropropane	2	0	0	ND	ND	0.001	0.00013	<0.00013
1,3,5-Trimethylbenzene	2	0	0	ND	ND	0.001	0.00023	<0.00023
1,3-Dichlorobenzene	2	0	0	ND	ND	0.001	0.0002	<0.0002
1,3-Dichloropropane	2	0	0	ND	ND	0.001	0.000092	<0.000092
1,4-Dichlorobenzene	2	0	0	ND	ND	0.001	0.00014	<0.00014
1-Chlorohexane	1	1	100	0.00024	0.00024	na	na	0.00024
2,2-Dichloropropane	2	1	50	0.00025	0.00025	0.001	0.001	0.00025
2-Butanone (MEK)	2	0	0	ND	ND	0.01	0.0013	<0.0013
2-Chloroethyl Vinyl Ether	2	1	50	0.00019	0.00019	0.001	0.001	0.00019
2-Chlorotoluene	2	0	0	ND	ND	0.001	0.000059	<0.000059
2-Hexanone	2	0	0	ND	ND	0.01	0.0013	<0.0013
4-Chlorotoluene	2	0	0	ND	ND	0.001	0.00017	<0.00017
4-Methyl-2-pentanone	2	0	0	ND	ND	0.01	0.0011	<0.0011
Acetone	1	0	0	ND	ND	0.0017	0.0017	<0.0017
Benzene	2	0	0	ND	ND	0.0005	0.00015	<0.00015
Bromobenzene	2	0	0	ND	ND	0.001	0.000065	<0.000065
Bromochloromethane	2	0	0	ND	ND	0.001	0.00014	<0.00014
Bromodichloromethane	2	0	0	ND	ND	0.001	0.0001	<0.0001
Bromoform	2	0	0	ND	ND	0.001	0.00014	<0.00014
Bromomethane	3	1	33	0.00015	0.00015	0.001	0.00032	0.00015
Carbon Tetrachloride	2	1	50	0.00042	0.00042	0.001	0.001	0.00042
Chlorobenzene	2	0	0	ND	ND	0.001	0.00013	<0.00013
Chloroethane	2	1	50	0.00031	0.00031	0.001	0.001	0.00031
Chloroform	2	0	0	ND	ND	0.001	0.00015	<0.00015
Chloromethane	2	1	50	0.00031	0.00031	0.001	0.001	0.00031
cis-1,2-Dichloroethene	2	0	0	ND	ND	0.001	0.00011	<0.00011
cis-1,3-Dichloropropene	2	0	0	ND	ND	0.001	0.00019	<0.00019
Dibromochloromethane	2	0	0	ND	ND	0.001	0.00013	<0.00013
Dibromomethane	2	0	0	ND	ND	0.001	0.0009	<0.0009
Dichlorodifluoromethane	1	0	0	ND	ND	0.001	0.001	<0.001
Ethylbenzene	2	0	0	ND	ND	0.001	0.0002	<0.0002
Isopropylbenzene	2	1	50	0.00021	0.00021	0.001	0.001	0.00021
m,p-Xylenes	1	0	0	ND	ND	0.002	0.002	<0.002
Methylene Chloride	2	0	0	ND	ND	0.005	0.00012	<0.00012
n-Butylbenzene	2	1	50	0.00051	0.00051	0.001	0.001	0.00051
n-Propylbenzene	2	0	0	ND	ND	0.001	0.00017	<0.00017
o-Xylene	1	0	0	ND	ND	0.001	0.001	<0.001
p-Isopropyltoluene	2	0	0	ND	ND	0.001	0.00036	<0.00036
sec-Butylbenzene	2	1	50	0.00031	0.00031	0.001	0.001	0.00031
Styrene	2	1	50	0.00013	0.00013	0.001	0.001	0.00013
Tert-Butylbenzene	2	0	0	ND	ND	0.001	0.00022	<0.00022
Tetrachloroethene	2	0	0	ND	ND	0.001	0.00027	<0.00027
Toluene	2	1	50	0.00019	0.00019	0.001	0.001	0.00019
Total xylenes	1	0	0	ND	ND	0.00013	0.00013	<0.00013

Table A-10 Analytical Results for Surface Water at Site SS08

Constituent	Surface Water Data				Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)	Maximum Reporting Level (mg/L)	Minimum Reporting Level (mg/L)	Minimum Result ¹ (mg/L)
	Number of Samples	Number of Detects	Frequency of Detection						
trans-1,2-Dichloroethene	2	0	0		ND	ND	0.001	0.00021	<0.00021
trans-1,3-Dichloropropene	2	0	0		ND	ND	0.001	0.00017	<0.00017
Trichloroethene	2	0	0		ND	ND	0.001	0.00024	<0.00024
Trichlorofluoromethane	2	1	50		0.00036	0.00036	0.001	0.001	0.00036
Vinyl Acetate	1	1	100		0.00032	0.00032	na	na	0.00032
Vinyl Chloride	2	1	50		0.00036	0.00036	0.001	0.001	0.00036
Carbon Disulfide	2	1	50		0.0025	0.0025	0.002	0.002	0.0025
Semi-Volatile Organic Compounds									
2,4,5-Trichlorophenol	1	0	0		ND	ND	0.0006	0.0006	<0.0006
2,4,6-Trichlorophenol	1	0	0		ND	ND	0.0004	0.0004	<0.0004
2,4-Dichlorophenol	1	0	0		ND	ND	0.0004	0.0004	<0.0004
2,4-Dimethylphenol	1	0	0		ND	ND	0.003	0.003	<0.003
2,4-Dinitrophenol	1	0	0		ND	ND	0.003	0.003	<0.003
2,4-Dinitrotoluene	1	0	0		ND	ND	0.002	0.002	<0.002
2,6-Dinitrotoluene	1	0	0		ND	ND	0.0004	0.0004	<0.0004
2-Chloronaphthalene	1	0	0		ND	ND	0.0005	0.0005	<0.0005
2-Chlorophenol	1	0	0		ND	ND	0.0003	0.0003	<0.0003
2-Methyl-4,6-dinitrophenol	1	0	0		ND	ND	0.005	0.005	<0.005
2-Methylphenol	1	0	0		ND	ND	0.0004	0.0004	<0.0004
2-Nitroaniline	1	0	0		ND	ND	0.006	0.006	<0.006
2-Nitrophenol	1	0	0		ND	ND	0.0003	0.0003	<0.0003
3,3'-Dichlorobenzidine	1	0	0		ND	ND	0.004	0.004	<0.004
3-and 4-Methylphenol Coelution	1	0	0		ND	ND	0.0007	0.0007	<0.0007
3-Nitroaniline	1	0	0		ND	ND	0.005	0.005	<0.005
4-Bromophenyl Phenyl Ether	1	0	0		ND	ND	0.0003	0.0003	<0.0003
4-Chloro-3-methylphenol	1	0	0		ND	ND	0.0003	0.0003	<0.0003
4-Chloroaniline	1	0	0		ND	ND	0.002	0.002	<0.002
4-Chlorophenyl Phenyl Ether	1	0	0		ND	ND	0.0002	0.0002	<0.0002
4-Nitroaniline	1	0	0		ND	ND	0.003	0.003	<0.003
4-Nitrophenol	1	0	0		ND	ND	0.005	0.005	<0.005
Benzyl Alcohol	1	0	0		ND	ND	0.0006	0.0006	<0.0006
Bis(2-chloroethoxy)methane	1	0	0		ND	ND	0.0002	0.0002	<0.0002
Bis(2-chloroethyl) Ether	1	0	0		ND	ND	0.0004	0.0004	<0.0004
Bis(2-chloroisopropyl) Ether	1	0	0		ND	ND	0.0008	0.0008	<0.0008
Bis(2-ethylhexyl) Phthalate	1	0	0		ND	ND	0.006	0.006	<0.006
Butyl Benzyl Phthalate	1	0	0		ND	ND	0.0005	0.0005	<0.0005
Dibenzofuran	1	0	0		ND	ND	0.0002	0.0002	<0.0002
DiethylPhthalate	1	0	0		ND	ND	0.0002	0.0002	<0.0002
DimethylPhthalate	1	0	0		ND	ND	0.006	0.006	<0.006
Di-n-Butyl Phthalate	1	0	0		ND	ND	0.0004	0.0004	<0.0004
Di-n-Octyl Phthalate	1	0	0		ND	ND	0.0003	0.0003	<0.0003
Hexachlorobenzene	1	0	0		ND	ND	0.0003	0.0003	<0.0003
Hexachlorobutadiene	2	1	50		0.00039	0.00039	0.001	0.001	0.00039

Table A-10 Analytical Results for Surface Water at Site SS08

Constituent	Surface Water Data					Maximum Reporting Level (mg/L)	Minimum Reporting Level (mg/L)	Minimum Result ¹ (mg/L)
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)			
Hexachloroethane	1	0	0	ND	ND	0.0007	0.0007	<0.0007
Isophorone	1	0	0	ND	ND	0.0002	0.0002	<0.0002
Nitrobenzene	1	0	0	ND	ND	0.0007	0.0007	<0.0007
N-Nitrosodi-n-propylamine	1	0	0	ND	ND	0.0003	0.0003	<0.0003
N-Nitrosodiphenylamine	1	0	0	ND	ND	0.0004	0.0004	<0.0004
Pentachlorophenol	1	0	0	ND	ND	0.003	0.003	<0.003
Phenol	1	0	0	ND	ND	0.0004	0.0004	<0.0004
Polynuclear Aromatic Hydrocarbons								
2-Methylnaphthalene	1	0	0	ND	ND	0.0008	0.0008	<0.0008
Acenaphthene	2	0	0	ND	ND	0.0003	0.0001	<0.0001
Acenaphthylene	2	0	0	ND	ND	0.0003	0.0001	<0.0001
Anthracene	2	0	0	ND	ND	0.0003	0.0001	<0.0001
Benzo(a)anthracene	2	0	0	ND	ND	0.0003	0.0001	<0.0001
Benzo(a)pyrene	2	0	0	ND	ND	0.0003	0.0001	<0.0001
Benzo(b)fluoranthene	2	0	0	ND	ND	0.0002	0.0001	<0.0001
Benzo(g,h,i)perylene	2	0	0	ND	ND	0.0004	0.0001	<0.0001
Benzo(k)fluoranthene	1	0	0	ND	ND	0.0001	0.0001	<0.0001
Chrysene	2	0	0	ND	ND	0.0003	0.0001	<0.0001
Dibenz(a,h)anthracene	2	0	0	ND	ND	0.0004	0.0001	<0.0001
Fluoranthene	2	0	0	ND	ND	0.0002	0.0001	<0.0001
Fluorene	2	0	0	ND	ND	0.0002	0.0001	<0.0001
Indeno(1,2,3-cd)Pyrene	2	0	0	ND	ND	0.0002	0.0001	<0.0001
Naphthalene	3	0	0	ND	ND	0.002	0.0000484	<0.0000484
Phenanthrene	2	0	0	ND	ND	0.0002	0.0001	<0.0001
Pyrene	2	0	0	ND	ND	0.0003	0.0001	<0.0001
Pesticides								
4,4'-DDD	1	1	100	0.0000022	0.0000022	na	na	0.0000022
4,4'-DDE	1	1	100	0.0000041	0.0000041	na	na	0.0000041
4,4'-DDT	2	2	100	0.000031	0.0000298	na	na	0.0000298
Aldrin	1	0	0	ND	ND	0.0000055	0.0000055	<0.0000055
alpha Endosulfan	1	0	0	ND	ND	0.000001	0.000001	<0.000001
alpha-BHC	1	0	0	ND	ND	0.0000016	0.0000016	<0.0000016
alpha-Chlordane	1	0	0	ND	ND	0.0000014	0.0000014	<0.0000014
beta Endosulfan	1	0	0	ND	ND	0.0000012	0.0000012	<0.0000012
beta-BHC	1	0	0	ND	ND	0.0000022	0.0000022	<0.0000022
delta-BHC	1	0	0	ND	ND	0.000001	0.000001	<0.000001
Dieldrin	1	0	0	ND	ND	0.000001	0.000001	<0.000001
Endosulfan Sulfate	1	0	0	ND	ND	0.0000063	0.0000063	<0.0000063
Endrin	1	0	0	ND	ND	0.0000012	0.0000012	<0.0000012
Endrin Aldehyde	1	0	0	ND	ND	0.0000015	0.0000015	<0.0000015
gamma-BHC (Lindane)	1	0	0	ND	ND	0.000001	0.000001	<0.000001
gamma-Chlordane	1	0	0	ND	ND	0.0000021	0.0000021	<0.0000021

Table A-10 Analytical Results for Surface Water at Site SS08

Constituent	Surface Water Data					Maximum Reporting Level (mg/L)	Minimum Reporting Level (mg/L)	Minimum Result ¹ (mg/L)
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)			
Heptachlor	1	0	0	ND	ND	0.000018	0.000018	<0.000018
Heptachlor Epoxide	1	0	0	ND	ND	0.000012	0.000012	<0.000012
Methoxychlor	1	0	0	ND	ND	0.000005	0.000005	<0.000005
Toxaphene	1	0	0	ND	ND	0.00017	0.00017	<0.00017
Polychlorinated Biphenyls								
Arochlor 1016	1	0	0	ND	ND	0.000044	0.000044	<0.000044
Arochlor 1221	1	0	0	ND	ND	0.000026	0.000026	<0.000026
Arochlor 1232	1	0	0	ND	ND	0.000021	0.000021	<0.000021
Arochlor 1242	1	0	0	ND	ND	0.000034	0.000034	<0.000034
Arochlor 1248	1	0	0	ND	ND	0.000057	0.000057	<0.000057
Arochlor 1254	1	0	0	ND	ND	0.000034	0.000034	<0.000034
Arochlor 1260	1	0	0	ND	ND	0.00004	0.00004	<0.00004
Petroleum Hydrocarbons								
Diesel Range Organics (DRO)	2	0	0	ND	ND	0.495	0.05	<0.05
Gasoline Range Organics (GRO)	2	0	0	ND	ND	0.09	0.02	<0.02
Residual Range Organics (RRO)	1	0	0	ND	ND	0.99	0.99	<0.99

Notes:

DDD - 1,1-bis(chlorophenyl)-2,2-dichloroethane

DDE - 1,1-bis(chlorophenyl)-2,2-dichloroethene

DDT - 1,1-bis(chlorophenyl)-2,2,2-trichloroethane

ND - not detected

na - not available

mg/L - Milligrams per liter

¹ - Minimum Result reported as smallest detected concentration or smallest reporting limit if ND

Table A-11 Analytical Results for Subsurface Water at Site SS08

Constituent	Subsurface Water Data					Minimum Reporting Level (mg/L)	Minimum Reporting Level (mg/L)	Minimum Result ¹ (mg/L)
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)			
Inorganics, Total								
Aluminum	5	5	100	176	0.09	na	na	0.09
Antimony	5	1	20	0.003	0.003	0.0025	0.0025	0.003
Arsenic	31	21	68	0.305	0.00376	0.005	0.002	0.00376
Barium	31	31	100	2.18	0.006	na	na	0.006
Beryllium	5	1	20	0.0068	0.0068	0.001	0.001	0.0068
Cadmium	31	18	58	0.0095	0.00013	0.003	0.0005	0.00013
Calcium	5	5	100	78.9	16.1	na	na	16.1
Chromium	31	26	84	0.371	0.00466	0.005	0.00358	0.00466
Cobalt	5	1	20	0.189	0.189	0.004	0.004	0.189
Copper	5	5	100	0.506	0.004	na	na	0.004
Iron	5	5	100	316	0.07	na	na	0.07
Lead	31	26	84	0.331	0.001	0.002	0.000928	0.001
Magnesium	5	5	100	98.9	4.07	na	na	4.07
Manganese	5	5	100	15.8	0.036	na	na	0.036
Mercury	30	11	37	0.0006	0.00011	0.001	0.0001	0.00011
Molybdenum	4	0	0	ND			0.005	<0.005
Nickel	5	1	20	0.451	0.451	0.01	0.01	0.451
Potassium	5	5	100	18.9	0.9	na	na	0.9
Selenium	30	10	33	0.025	0.0032	0.01	0.002	0.0032
Silver	31	17	55	0.004	0.00011	0.004	0.00007	0.00011
Sodium	5	5	100	11	2.6	na	na	2.6
Thallium	5	1	20	0.0013	0.0013	0.001	0.001	0.0013
Tin	4	1	25	0.042	0.042	0.042	0.042	0.042
Titanium	4	4	100	0.038	0.002	na	na	0.002
Vanadium	5	1	20	0.5	0.5	0.01	0.01	0.5
Zinc	5	3	60	0.882	0.006	0.002	0.002	0.006
Volatile Organic Compounds								
1,1,1,2-Tetrachloroethane	20	1	5	0.0005	0.0005	0.0005	0.00022	0.0005
1,1,1-Trichloroethane	20	0	0	ND	ND		0.00026	<0.00026
1,1,2,2-Tetrachloroethane	20	0	0	ND	ND		0.00018	<0.00018
1,1,2-Trichloroethane	20	0	0	ND	ND		0.0001	<0.0001
1,1-Dichloroethane	20	0	0	ND	ND		0.00015	<0.00015
1,1-Dichloroethene	20	0	0	ND	ND		0.00022	<0.00022
1,1-Dichloropropene	20	0	0	ND	ND		0.00029	<0.00029
1,2,3-Trichlorobenzene	20	0	0	ND	ND		0.00013	<0.00013
1,2,3-Trichloropropane	20	0	0	ND	ND		0.00033	<0.00033
1,2,4-Trichlorobenzene	22	0	0	ND	ND		0.00019	<0.00019
1,2,4-Trimethylbenzene	21	3	14	0.1	0.00026	0.001	0.00026	0.00026
1,2-Dibromo-3-chloropropane	20	0	0	ND	ND		0.00058	<0.00058
1,2-Dibromoethane	20	1	5	0.001	0.001	0.001	0.00012	0.001
1,2-Dichlorobenzene	22	0	0	ND	ND		0.00015	<0.00015
1,2-Dichloroethane	20	0	0	ND	ND		0.0002	<0.0002
1,2-Dichloropropane	20	0	0	ND	ND		0.00013	<0.00013

Table A-11 Analytical Results for Subsurface Water at Site SS08

Constituent	Subsurface Water Data				Minimum Detected Concentration (mg/L)	Minimum Reporting Level (mg/L)	Minimum Reporting Level (mg/L)	Minimum Result ¹ (mg/L)
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)				
1,3,5-Trimethylbenzene	21	2	10	0.01	0.00023	0.001	0.00023	0.00023
1,3-Dichlorobenzene	22	0	0	ND	ND		0.0002	<0.0002
1,3-Dichloropropane	20	0	0	ND	ND		0.000092	<0.000092
1,4-Dichlorobenzene	22	0	0	ND	ND		0.00014	<0.00014
1-Chlorohexane	11	0	0	ND	ND		0.00024	<0.00024
2,2-Dichloropropane	18	0	0	ND	ND		0.001	<0.001
2-Butanone (MEK)	20	0	0	ND	ND		0.0013	<0.0013
2-Chloroethyl Vinyl Ether	2	1	50	0.00019	0.00019	0.00019	0.00019	0.00019
2-Chlorotoluene	20	0	0	ND	ND		0.000059	<0.000059
2-Hexanone	2	0	0	ND	ND		0.0013	<0.0013
4-Chlorotoluene	20	0	0	ND	ND		0.00017	<0.00017
4-Methyl-2-pentanone	20	0	0	ND	ND	0.02	0.0011	<0.0011
Acetone	19	3	16	0.01	0.0024	0.01	0.0017	0.0024
Benzene	21	1	5	0.001	0.001	0.0004	0.00015	0.001
Bromobenzene	20	0	0	ND	ND	0.001	0.000065	<0.000065
Bromochloromethane	20	0	0	ND	ND	0.001	0.00014	<0.00014
Bromodichloromethane	20	1	5	0.0005	0.0005	0.0005	0.0001	0.0005
Bromoform	20	0	0	ND	ND	0.001	0.00014	<0.00014
Bromomethane	20	0	0	ND	ND	0.003	0.00032	<0.00032
Carbon Tetrachloride	20	0	0	ND	ND	0.001	0.00042	<0.00042
Chlorobenzene	20	1	5	0.0005	0.0005	0.0005	0.00013	0.0005
Chloroethane	21	1	5	0.003	0.003	0.001	0.00031	0.003
Chloroform	20	1	5	0.00014	0.00014	0.0003	0.00015	0.00014
Chloromethane	21	2	10	0.003	0.00019	0.001	0.00031	0.00019
cis-1,2-Dichloroethene	20	1	5	0.00011	0.00011	0.001	0.00011	0.00011
cis-1,3-Dichloropropene	20	0	0	ND	ND	0.0005	0.00019	<0.00019
Dibromochloromethane	20	0	0	ND	ND	0.0005	0.00013	<0.00013
Dibromomethane	20	1	5	0.001	0.001	0.001	0.00009	0.001
Dichlorodifluoromethane	19	0	0	ND	ND	0.001	0.00021	<0.00021
Ethylbenzene	21	2	10	0.008	0.00034	0.001	0.0002	0.00034
Isopropylbenzene	21	2	10	0.017	0.0012	0.001	0.00021	0.0012
m,p-Xylenes	18	1	6	0.00023	0.00023	0.002	0.002	0.00023
Methyl tert-Butyl Ether	18	0	0	ND	ND	0.005	0.005	<0.005
Methylene Chloride	20	0	0	ND	ND	0.001	0.00012	<0.00012
n-Butylbenzene	21	2	10	0.029	0.00086	0.001	0.00051	0.00086
n-Propylbenzene	21	2	10	0.02	0.0011	0.001	0.00017	0.0011
o-Xylene	18	1	6	0.00013	0.00013	0.001	0.001	0.00013
p-Isopropyltoluene	21	2	10	0.019	0.001	0.001	0.00036	0.001
sec-Butylbenzene	21	3	14	0.022	0.00017	0.001	0.00031	0.00017
Styrene	20	1	5	0.00013	0.00013	0.001	0.00013	0.00013
Tert-Butylbenzene	21	2	10	0.006	0.00088	0.001	0.00022	0.00088
Tetrachloroethene	20	0	0	ND	ND	0.001	0.00027	<0.00027
Toluene	20	8	40	0.12	0.0001	0.001	0.00011	0.0001
Total Xylenes	3	1	33	0.011	0.011	0.00013	0.00013	0.011
trans-1,2-Dichloroethene	20	0	0	ND	ND	0.001	0.00021	<0.00021

Table A-11 Analytical Results for Subsurface Water at Site SS08

Constituent	Subsurface Water Data					Minimum Reporting Level (mg/L)	Minimum Reporting Level (mg/L)	Minimum Result ¹ (mg/L)
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)			
trans-1,3-Dichloropropene	20	0	0	ND	ND	0.001	0.00017	<0.00017
Trichloroethene	20	0	0	ND	ND	0.001	0.00024	<0.00024
Trichlorofluoromethane	20	0	0	ND	ND	0.001	0.00036	<0.00036
Vinyl Acetate	2	0	0	ND	ND	0.00032	0.00032	<0.00032
Vinyl Chloride	20	0	0	ND	ND	0.001	0.00036	<0.00036
Carbon Disulfide	11	1	9	0.00019	0.00019	0.0025	0.0005	0.00019
Semi-Volatile Organic Compounds								
2,4,5-Trichlorophenol	2	0	0	ND	ND	0.0006	0.0006	<0.0006
2,4,6-Trichlorophenol	2	0	0	ND	ND	0.0004	0.0004	<0.0004
2,4-Dichlorophenol	2	0	0	ND	ND	0.0004	0.0004	<0.0004
2,4-Dimethylphenol	2	0	0	ND	ND	0.003	0.003	<0.003
2,4-Dinitrophenol	2	0	0	ND	ND	0.003	0.003	<0.003
2,4-Dinitrotoluene	2	0	0	ND	ND	0.002	0.002	<0.002
2,6-Dinitrotoluene	2	0	0	ND	ND	0.0004	0.0004	<0.0004
2-Chloronaphthalene	2	0	0	ND	ND	0.0005	0.0005	<0.0005
2-Chlorophenol	2	0	0	ND	ND	0.0003	0.0003	<0.0003
2-Methyl-4,6-dinitrophenol	2	0	0	ND	ND	0.005	0.005	<0.005
2-Methylphenol	2	0	0	ND	ND	0.0004	0.0004	<0.0004
2-Nitroaniline	2	0	0	ND	ND	0.006	0.006	<0.006
2-Nitrophenol	2	0	0	ND	ND	0.0003	0.0003	<0.0003
3,3'-Dichlorobenzidine	2	0	0	ND	ND	0.004	0.004	<0.004
3-and 4-Methylphenol Coelution	2	0	0	ND	ND	0.0007	0.0007	<0.0007
3-Nitroaniline	2	0	0	ND	ND	0.005	0.005	<0.005
4-Bromophenyl Phenyl Ether	2	0	0	ND	ND	0.0003	0.0003	<0.0003
4-Chloro-3-methylphenol	2	0	0	ND	ND	0.0003	0.0003	<0.0003
4-Chloroaniline	2	0	0	ND	ND	0.002	0.002	<0.002
4-Chlorophenyl Phenyl Ether	2	0	0	ND	ND	0.0002	0.0002	<0.0002
4-Nitroaniline	2	0	0	ND	ND	0.003	0.003	<0.003
4-Nitrophenol	2	0	0	ND	ND	0.005	0.005	<0.005
Benzyl Alcohol	2	0	0	ND	ND	0.0006	0.0006	<0.0006
Bis(2-chloroethoxy)methane	2	0	0	ND	ND	0.0002	0.0002	<0.0002
Bis(2-chloroethyl) Ether	2	0	0	ND	ND	0.0004	0.0004	<0.0004
Bis(2-chloroisopropyl) Ether	2	0	0	ND	ND	0.0008	0.0008	<0.0008
Bis(2-ethylhexyl) Phthalate	2	0	0	ND	ND	0.006	0.006	<0.006
Butyl Benzyl Phthalate	2	0	0	ND	ND	0.0005	0.0005	<0.0005
Dibenzofuran	11	1	9	0.000079	0.000079	0.0002	0.00002	0.000079
DiethylPhthalate	2	0	0	ND	ND	0.0002	0.0002	<0.0002
DimethylPhthalate	2	0	0	ND	ND	0.006	0.006	<0.006
Di-n-Butyl Phthalate	2	0	0	ND	ND	0.0004	0.0004	<0.0004
Di-n-Octyl Phthalate	2	0	0	ND	ND	0.0003	0.0003	<0.0003
Hexachlorobenzene	2	0	0	ND	ND	0.0003	0.0003	<0.0003
Hexachlorobutadiene	22	0	0	ND	ND	0.002	0.00039	<0.00039
Hexachloroethane	2	0	0	ND	ND	0.0007	0.0007	<0.0007
Isophorone	2	0	0	ND	ND	0.0002	0.0002	<0.0002

Table A-11 Analytical Results for Subsurface Water at Site SS08

Constituent	Subsurface Water Data					Minimum Reporting Level (mg/L)	Minimum Reporting Level (mg/L)	Minimum Result ¹ (mg/L)
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)			
Nitrobenzene	2	0	0	ND	ND	0.0007	0.0007	<0.0007
N-Nitrosodi-n-propylamine	2	0	0	ND	ND	0.0003	0.0003	<0.0003
N-Nitrosodiphenylamine	2	0	0	ND	ND	0.0004	0.0004	<0.0004
Pentachlorophenol	2	0	0	ND	ND	0.003	0.003	<0.003
Phenol	2	0	0	ND	ND	0.0004	0.0004	<0.0004
Polynuclear Aromatic Hydrocarbons								
2-Methylnaphthalene	3	1	33	0.464	0.464	0.0008	0.0008	0.464
Acenaphthene	21	5	24	0.0055	0.0000047	0.0003	0.000019	0.0000047
Acenaphthylene	20	4	20	0.000016	0.0000028	0.0003	0.00002	0.0000028
Anthracene	20	7	35	0.00001	0.0000012	0.0003	0.000019	0.0000012
Benzo(a)anthracene	20	3	15	0.0000088	0.0000026	0.0003	0.000019	0.0000026
Benzo(a)pyrene	20	2	10	0.0000054	0.000002	0.0003	0.000019	0.000002
Benzo(b)fluoranthene	20	3	15	0.0000079	0.0000028	0.0002	0.000019	0.0000028
Benzo(g,h,i)perylene	20	7	35	0.000013	0.000004	0.0004	0.000019	0.000004
Benzo(k)fluoranthene	18	3	17	0.0000065	0.0000021	0.00002	0.000019	0.0000021
Chrysene	20	16	80	0.000013	0.0000014	0.0003	0.00002	0.0000014
Dibenz(a,h)anthracene	20	3	15	0.0000048	0.000002	0.0004	0.000019	0.000002
Fluoranthene	20	13	65	0.000018	0.0000028	0.0002	0.000019	0.0000028
Fluorene	21	13	62	0.0115	0.0000027	0.0002	0.00002	0.0000027
Indeno(1,2,3-cd)Pyrene	20	3	15	0.000007	0.0000027	0.0002	0.000019	0.0000027
Naphthalene	23	18	78	0.14	0.0000051	0.0006	0.00012	0.0000051
Phenanthrene	21	19	90	0.0048	0.0000047	0.0002	0.0002	0.0000047
Pyrene	20	17	85	0.000026	0.0000026	0.0003	0.000019	0.0000026
Pesticides								
4,4'-DDD	9	2	22	0.000161	0.000004	0.000031	0.0000018	0.000004
4,4'-DDE	7	0	0	ND	ND	0.000031	0.0000013	<0.0000013
4,4'-DDT	9	2	22	0.000105	0.00001	0.000031	0.0000011	0.00001
Aldrin	7	0	0	ND	ND	0.000031	0.0000011	<0.0000011
alpha Endosulfan	7	0	0	ND	ND	0.000031	0.000001	<0.000001
alpha-BHC	7	0	0	ND	ND	0.000031	0.0000016	<0.0000016
alpha-Chlordane	7	0	0	ND	ND	0.000031	0.0000014	<0.0000014
beta Endosulfan	7	0	0	ND	ND	0.000031	0.0000012	<0.0000012
beta-BHC	7	0	0	ND	ND	0.000031	0.0000022	<0.0000022
delta-BHC	6	0	0	ND	ND	0.000031	0.00003	<0.00003
Dieldrin	7	0	0	ND	ND	0.000031	0.000001	<0.000001
Endosulfan Sulfate	7	0	0	ND	ND	0.000031	0.000005	<0.000005
Endrin	7	0	0	ND	ND	0.000031	0.0000012	<0.0000012
Endrin Aldehyde	7	0	0	ND	ND	0.000031	0.0000015	<0.0000015
Endrin Ketone	6	0	0	ND	ND	0.000031	0.00003	<0.00003
gamma-BHC (Lindane)	7	0	0	ND	ND	0.000031	0.000001	<0.000001
gamma-Chlordane	7	0	0	ND	ND	0.000031	0.0000019	<0.0000019
Heptachlor	8	2	25	0.00001	0.000009	0.000031	0.00003	0.000009
Heptachlor Epoxide	7	1	14	0.000003	0.000003	0.000031	0.00003	0.000003

Table A-11 Analytical Results for Subsurface Water at Site SS08

Constituent	Subsurface Water Data				Minimum Detected Concentration (mg/L)	Minimum Reporting Level (mg/L)	Minimum Reporting Level (mg/L)	Minimum Result ¹ (mg/L)
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)				
Methoxychlor	8	2	25	0.00002	0.00001	0.000031	0.00003	0.00001
Toxaphene	7	0	0	ND	ND	0.0026	0.00017	<0.00017
Polychlorinated Biphenyls								
Arochlor 1016	9	0	0	ND	ND	0.000103	0.00008	<0.00008
Arochlor 1221	9	0	0	ND	ND	0.00015	0.000099	<0.000099
Arochlor 1232	9	0	0	ND	ND	0.00015	0.000099	<0.000099
Arochlor 1242	9	0	0	ND	ND	0.00015	0.000099	<0.000099
Arochlor 1248	9	0	0	ND	ND	0.000103	0.000057	<0.000057
Arochlor 1254	9	0	0	ND	ND	0.000103	0.000034	<0.000034
Arochlor 1260	9	0	0	ND	ND	0.000103	0.00004	<0.00004
Petroleum Hydrocarbons								
Diesel Range Organics (DRO)	29	15	52	190	0.036	0.78	0.259	0.036
Gasoline Range Organics (GRO)	21	3	14	0.37	0.14	0.1	0.02	0.14
Residual Range Organics (RRO)	10	6	60	0.3	0.059	1.01	0.48	0.059

Notes:

DDD - 1,1-bis(chlorophenyl)-2,2-dichloroethane
 DDE - 1,1-bis(chlorophenyl)-2,2-dichloroethene
 DDT - 1,1-bis(chlorophenyl)-2,2,2-trichloroethane
 ND - not detected
 na - not available
 mg/L - Milligrams per liter.

¹ - Minimum Result reported as smallest detected concentration or smallest reporting limit if ND

Table A-12 Analytical Results for Surface Soil at Site SS11

Constituent	Surface Soil Data					Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
Inorganics, Total								
Aluminum	4	4	100	22700	14200	na	na	14200
Antimony	4	2	50	1	1	0.5	0.5	1
Arsenic	18	18	100	20	1.63	na	na	1.63
Barium	18	18	100	3680	114	na	na	114
Beryllium	4	4	100	0.4	0.2	na	na	0.2
Cadmium	18	15	83	0.7	0.092	0.6	0.6	0.092
Calcium	4	4	100	2820	1380	na	na	1380
Chromium	18	18	100	47.4	5.92	na	na	5.92
Cobalt	4	4	100	20	4	na	na	4
Copper	4	4	100	58	10	na	na	10
Iron	4	4	100	41900	14100	na	na	14100
Lead	18	18	100	462	4.9	na	na	4.9
Magnesium	4	4	100	7000	2340	na	na	2340
Manganese	4	4	100	1080	107	na	na	107
Mercury	18	17	94	0.13	0.027	0.02	0.02	0.027
Molybdenum	4	3	75	3	1	0.8	0.8	1
Nickel	4	4	100	40	11	na	na	11
Potassium	4	4	100	1800	920	na	na	920
Selenium	18	7	39	1.3	0.3	1.2	0.8	0.3
Silver	18	16	89	1	0.049	0.8	0.8	0.049
Sodium	4	4	100	120	80	na	na	80
Thallium	4	3	75	0.3	0.1	0.1	0.1	0.1
Tin	4	1	25	11	11	8	8	11
Titanium	4	4	100	1460	423	na	na	423
Vanadium	4	4	100	68	35	na	na	35
Zinc	4	4	100	91	29	na	na	29
Volatile Organic Compounds								
1,1,1,2-Tetrachloroethane	16	0	0	ND	ND	0.5	0.00014	<0.00014
1,1,1-Trichloroethane	16	0	0	ND	ND	1	0.000099	<0.000099
1,1,2,2-Tetrachloroethane	16	0	0	ND	ND	0.34	0.00018	<0.00018
1,1,2-Trichloroethane	16	0	0	ND	ND	0.34	0.0002	<0.0002
1,1-Dichloroethane	16	0	0	ND	ND	1	0.000078	<0.000078
1,1-Dichloroethene	16	0	0	ND	ND	0.34	0.00009	<0.00009
1,1-Dichloropropene	16	0	0	ND	ND	1	0.00018	<0.00018
1,2,3-Trichlorobenzene	16	0	0	ND	ND	1.4	0.00025	<0.00025
1,2,3-Trichloropropane	16	0	0	ND	ND	1	0.00021	<0.00021
1,2,4-Trichlorobenzene	18	0	0	ND	ND	1	0.00027	<0.00027
1,2,4-Trimethylbenzene	16	3	19	17	0.058	1.4	0.00014	0.058
1,2-Dibromo-3-chloropropane	16	0	0	ND	ND	2	0.00052	<0.00052
1,2-Dibromoethane	16	0	0	ND	ND	1.4	0.00022	<0.00022
1,2-Dichlorobenzene	18	0	0	ND	ND	2	0.00016	<0.00016
1,2-Dichloroethane	16	0	0	ND	ND	0.34	0.00013	<0.00013
1,2-Dichloropropane	16	0	0	ND	ND	0.34	0.000083	<0.000083
1,3,5-Trimethylbenzene	16	2	13	4.4	0.032	1.4	0.00037	0.032
1,3-Dichlorobenzene	18	0	0	ND	ND	2	0.0002	<0.0002
1,3-Dichloropropane	16	0	0	ND	ND	0.4	0.000096	<0.000096
1,4-Dichlorobenzene	18	0	0	ND	ND	2	0.0002	<0.0002
1-Chlorohexane	2	0	0	ND	ND	0.00024	0.00024	<0.00024
2,2-Dichloropropane	16	0	0	ND	ND	1	0.00011	<0.00011
2-Butanone (MEK)	16	4	25	0.51	0.033	14	0.0068	0.033
2-Chloroethyl Vinyl Ether	2	0	0	ND	ND	0.00067	0.00067	<0.00067
2-Chlorotoluene	16	0	0	ND	ND	1.4	0.00013	<0.00013
2-Hexanone	11	0	0	ND	ND	14	0.007	<0.007
4-Chlorotoluene	16	0	0	ND	ND	1.4	0.00018	<0.00018
4-Methyl-2-pentanone	15	1	7	0.0051	0.0051	20	0.0058	0.0051
Acetone	17	15	88	32	0.024	10	0.0086	0.024
Aniline	9	0	0	ND	ND		0.97	<0.97
Bromobenzene	16	0	0	ND	ND	1.4	0.00014	<0.00014
Bromochloromethane	16	0	0	ND	ND	1	0.00012	<0.00012
Bromodichloromethane	16	0	0	ND	ND	0.34	0.00014	<0.00014
Bromoform	16	0	0	ND	ND	0.34	0.00019	<0.00019
Bromomethane	16	0	0	ND	ND	3	0.00023	<0.00023
Carbon Tetrachloride	16	0	0	ND	ND	0.34	0.00016	<0.00016
Chlorobenzene	16	0	0	ND	ND	0.5	0.000085	<0.000085
Chloroethane	16	0	0	ND	ND	1	0.00016	<0.00016
Chloroform	17	5	29	0.099	0.0014	0.3	0.000062	0.0014
Chloromethane	16	0	0	ND	ND	1	0.00014	<0.00014
cis-1,2-Dichloroethene	16	0	0	ND	ND	0.34	0.00011	<0.00011
cis-1,3-Dichloropropene	16	0	0	ND	ND	0.5	0.00017	<0.00017
Dibromochloromethane	16	0	0	ND	ND	0.5	0.00016	<0.00016

Table A-12 Analytical Results for Surface Soil at Site SS11

Constituent	Surface Soil Data			Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)	Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Detection Frequency					
Dibromomethane	16	0	0	ND	ND	1	0.0002	<0.0002
Dichlorodifluoromethane	16	0	0	ND	ND	1	0.00015	<0.00015
Ethylbenzene	16	1	6	0.076	0.076	1	0.00014	0.076
Isopropylbenzene	16	1	6	0.043	0.043	1.4	0.000096	0.043
m,p-Xylenes	14	1	7	0.15	0.15	2	0.0047	0.15
Methyl tert-Butyl Ether	5	0	0	ND	ND	5	0.0047	<0.0047
Methylene Chloride	18	3	17	0.043	0.0056	1.4	0.00038	0.0056
n-Butylbenzene	16	1	6	0.13	0.13	1.4	0.0002	0.13
n-Propylbenzene	16	0	0	ND	ND	1.4	0.00017	<0.00017
o-Xylene	14	1	7	2	2	1	0.0047	2
p-Isopropyltoluene	16	3	19	0.19	0.017	1.4	0.00017	0.017
sec-Butylbenzene	16	0	0	ND	ND	1.4	0.0001	<0.0001
Styrene	16	0	0	ND	ND	1	0.00013	<0.00013
Tert-Butylbenzene	16	0	0	ND	ND	1.4	0.00009	<0.00009
Tetrachloroethene	16	0	0	ND	ND	0.34	0.00019	<0.00019
Toluene	18	11	61	0.034	0.00029	1	0.0053	0.00029
Total xylenes	2	1	50	0.0012	0.0012	0.00033	0.00033	0.0012
trans-1,2-Dichloroethene	16	0	0	ND	ND	0.34	0.000093	<0.000093
trans-1,3-Dichloropropene	16	0	0	ND	ND	1	0.00013	<0.00013
Trichloroethene	17	2	12	0.0041	0.001	0.34	0.000096	0.001
Trichlorofluoromethane	17	1	6	0.0034	0.0034	1	0.00015	0.0034
Vinyl Acetate	1	0	0	ND	ND	0.00064	0.00064	<0.00064
Vinyl Chloride	16	0	0	ND	ND	0.34	0.00011	<0.00011
Carbon Disulfide	16	0	0	ND	ND	0.5	0.00023	<0.00023
Semi-Volatile Organic Compounds								
2,4,5-Trichlorophenol	13	0	0	ND	ND	26	0.1	<0.1
2,4,6-Trichlorophenol	13	0	0	ND	ND	26	0.2	<0.2
2,4-Dichlorophenol	13	0	0	ND	ND	14	0.1	<0.1
2,4-Dimethylphenol	13	1	8	25	25	5.1	0.06	25
2,4-Dinitrophenol	13	0	0	ND	ND	160	0.2	<0.2
2,4-Dinitrotoluene	13	0	0	ND	ND	26	0.09	<0.09
2,6-Dinitrotoluene	13	0	0	ND	ND	26	0.06	<0.06
2-Chloronaphthalene	13	0	0	ND	ND	26	0.06	<0.06
2-Chlorophenol	13	0	0	ND	ND	7.8	0.07	<0.07
2-Methyl-4,6-dinitrophenol	13	0	0	ND	ND	160	0.04	<0.04
2-Methylphenol	13	1	8	21	21	5.1	0.1	21
2-Nitroaniline	13	0	0	ND	ND	160	0.06	<0.06
2-Nitrophenol	13	0	0	ND	ND	14	0.09	<0.09
3,3'-Dichlorobenzidine	13	0	0	ND	ND	940	0.05	<0.05
3-and 4-Methylphenol Coelution	4	0	0	ND	ND	2	0.2	<0.2
3-Nitroaniline	13	0	0	ND	ND	160	0.09	<0.09
4-Bromophenyl Phenyl Ether	13	0	0	ND	ND	26	0.04	<0.04
4-Chloro-3-methylphenol	13	0	0	ND	ND	14	0.1	<0.1
4-Chloroaniline	13	0	0	ND	ND	14	0.09	<0.09
4-Chlorophenyl Phenyl Ether	13	0	0	ND	ND	26	0.2	<0.2
4-Methylphenol	9	1	11	46	46		0.32	46
4-Nitroaniline	13	0	0	ND	ND	160	0.06	<0.06
4-Nitrophenol	13	0	0	ND	ND	160	0.1	<0.1
Benzene	16	0	0	ND	ND	0.34	0.000084	<0.000084
Benzoic Acid	11	1	9	0.37	0.37	85	0.4	0.37
Benzyl Alcohol	13	0	0	ND	ND	7.8	0.2	<0.2
Bis(2-chloroethoxy)methane	13	0	0	ND	ND	14	0.09	<0.09
Bis(2-chloroethyl) Ether	13	0	0	ND	ND	7.8	0.1	<0.1
Bis(2-chloroisopropyl) Ether	13	0	0	ND	ND	7.8	0.07	<0.07
Bis(2-ethylhexyl) Phthalate	13	0	0	ND	ND	160	0.2	<0.2
Butyl Benzyl Phthalate	13	0	0	ND	ND	160	0.09	<0.09
Dibenzofuran	18	8	44	1700	0.003	26	0.2	0.003
DiethylPhthalate	13	1	8	0.2	0.2	26	0.2	0.2
DimethylPhthalate	13	0	0	ND	ND	26	0.2	<0.2
Di-n-Butyl Phthalate	13	4	31	0.18	0.055	26	0.09	0.055
Di-n-Octyl Phthalate	13	0	0	ND	ND	160	0.07	<0.07
Hexachlorobenzene	13	0	0	ND	ND	26	0.07	<0.07
Hexachlorobutadiene	18	0	0	ND	ND	2	0.00025	<0.00025
Hexachlorocyclopentadiene	11	0	0	ND	ND	26	0.09	<0.09
Hexachloroethane	13	0	0	ND	ND	7.8	0.09	<0.09
Isophorone	13	0	0	ND	ND	14	0.2	<0.2
Nitrobenzene	13	0	0	ND	ND	7.8	0.1	<0.1
N-Nitrosodimethylamine	9	0	0	ND	ND	47	2	<2
N-Nitrosodi-n-propylamine	13	0	0	ND	ND	7.8	0.1	<0.1
N-Nitrosodiphenylamine	13	0	0	ND	ND	26	0.2	<0.2
Pentachlorophenol	13	0	0	ND	ND	160	0.06	<0.06

Table A-12 Analytical Results for Surface Soil at Site SS11

Constituent	Surface Soil Data					Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
Phenol	13	1	8	16	16	5.1	0.2	16
Polynuclear Aromatic Hydrocarbons								
2-Methylnaphthalene	13	6	46	8600	0.037	5.1	0.2	0.037
Acenaphthene	18	10	56	9200	0.0011	2	0.07	0.0011
Acenaphthylene	18	5	28	120	0.00046	26	0.0044	0.00046
Anthracene	18	9	50	7300	0.0018	26	0.06	0.0018
Benzo(a)anthracene	18	9	50	3100	0.0068	14	0.07	0.0068
Benzo(a)pyrene	18	7	39	1800	0.0068	14	0.0044	0.0068
Benzo(b)fluoranthene	18	9	50	2300	0.019	14	0.1	0.019
Benzo(g,h,i)perylene	18	8	44	740	0.0063	14	0.05	0.0063
Benzo(k)fluoranthene	14	5	36	790	0.0085	14	0.0044	0.0085
Chrysene	18	10	56	3500	0.049	14	0.09	0.049
Dibenz(a,h)anthracene	18	6	33	210	0.0025	14	0.0044	0.0025
Fluoranthene	18	9	50	10000	0.017	26	0.014	0.017
Fluorene	18	9	50	5700	0.0028	26	0.09	0.0028
Indeno(1,2,3-cd)Pyrene	18	6	33	640	0.007	14	0.0044	0.007
Naphthalene	20	11	55	13000	0.0016	2	0.0002	0.0016
Phenanthrene	18	10	56	17000	0.012	26	0.1	0.012
Pyrene	18	12	67	10000	0.036	14	0.07	0.036
Pesticides								
4,4'-DDD	17	12	71	0.027	0.0028	5	0.00076	0.0028
4,4'-DDE	17	14	82	0.14	0.0026	5	0.005	0.0026
4,4'-DDT	17	16	94	1.5	0.016	5	5	0.016
Aldrin	17	4	24	0.051	0.0039	5	0.00039	0.0039
alpha Endosulfan	17	6	35	0.17	0.0011	5	0.00038	0.0011
alpha-BHC	16	7	44	2	0.0003	0.05	0.00046	0.0003
alpha-Chlordane	17	10	59	2	0.00032	0.025	0.00047	0.00032
beta Endosulfan	17	5	29	0.099	0.00036	5	0.00036	0.00036
beta-BHC	17	4	24	0.027	0.0014	5	0.00086	0.0014
delta-BHC	15	5	33	1.7	0.0034	0.05	0.0006	0.0034
Dieldrin	17	3	18	0.027	0.027	5	0.00055	0.027
Endosulfan Sulfate	17	9	53	0.027	0.00066	5	0.00051	0.00066
Endrin	17	5	29	3.5	0.0018	0.073	0.0008	0.0018
Endrin Aldehyde	17	12	71	2.9	0.00037	0.005	0.00037	0.00037
Endrin Ketone	9	4	44	2.2	0.0026	0.005	0.0049	0.0026
gamma-BHC (Lindane)	17	6	35	0.095	0.0038	5	0.00066	0.0038
gamma-Chlordane	17	5	29	0.027	0.0024	5	0.00076	0.0024
Heptachlor	17	7	41	0.28	0.0016	0.025	0.00059	0.0016
Heptachlor Epoxide	17	4	24	0.027	0.00064	5	0.0008	0.00064
Methoxychlor	17	6	35	0.67	0.0027	5	0.0011	0.0027
Toxaphene	17	4	24	1.7	1.3	250	0.05	1.3
Polychlorinated Biphenyls								
Arochlor 1016	17	0	0	ND	ND	0.5	0.013	<0.013
Arochlor 1221	17	0	0	ND	ND	1	0.012	<0.012
Arochlor 1232	17	0	0	ND	ND	2.3	0.019	<0.019
Arochlor 1242	17	0	0	ND	ND	0.5	0.012	<0.012
Arochlor 1248	17	0	0	ND	ND	1.2	0.011	<0.011
Arochlor 1254	17	0	0	ND	ND	0.52	0.011	<0.011
Arochlor 1260	17	0	0	ND	ND	0.5	0.005	<0.005
Petroleum Hydrocarbons								
Diesel Range Organics (DRO)	18	18	100	200000	19	na	na	19
Gasoline Range Organics (GRO)	18	6	33	18	2.9	66	1.4	2.9
Residual Range Organics (RRO)	18	18	100	160000	104	na	na	104

Notes:

4,4'-DDD - dichlorodiphenyldichloroethane
 4,4'-DDE - dichlorodiphenyldichloroethylene
 4,4'-DDT - dichlorodiphenyltrichloroethane
 ND - not detected
 na - not available
 mg/Kg - Milligram per kilogram.

¹ - Minimum Result reported as smallest detected concentration or smallest reporting limit if ND

Table A-13 Analytical Results for Subsurface Soil at Site SS011

Constituent	Subsurface Soil Data					Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)		
Inorganics, Total							
Arsenic	2	2	100	59	51	NA	51
Barium	2	2	100	140	120	NA	120
Chromium	2	2	100	43	36	NA	36
Lead	2	2	100	12	11	NA	11
Volatile Organic Compounds							
Acetone	2	1	200	0.13	0.13	0.061	0.061
Semi-Volatile Organic Compounds							
Di-n-Butyl Phthalate	2	1	200	0.041	0.041	0.41	0.041
Polynuclear Aromatic Hydrocarbons							
Chrysene	2	1	200	0.058	0.058	0.41	0.058
Fluoranthene	2	1	200	0.076	0.076	0.41	0.076
Pyrene	2	1	200	0.081	0.081	0.41	0.081
Pesticides							
4,4'-DDD	2	1	200	0.0047	0.0047	0.004	0.004
4,4'-DDT	2	2	100	0.038	0.025	0.004	0.004
Polychlorinated Biphenyls							
Arochlor 1260	2	1	200	0.061	0.061	0.04	0.04
Petroleum Hydrocarbons							
Diesel Range Organics (DRO)	2	2	100	180	88	NA	88
Residual Range Organics (RRO)	2	2	100	940	540	NA	540

Notes:

4,4'-DDD - dichlorodiphenyldichloroethane

4,4'-DDT - dichlorodiphenyltrichloroethane

ND - not detected

NA - not applicable

na - not available

mg/Kg - Milligram per kilogram.

¹ - Minimum Result reported as smallest detected concentration or smallest reporting limit if ND

Table A-14 Analytical Results for Sediment at Site SS11

Constituent	Sediment Data					Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Frequency of Detection	Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
Inorganics, Total								
Arsenic	6	4	66.67	12.1	1.09	0.889	0.583	1.09
Barium	6	6	100.00	184	12.4	na	na	12.4
Cadmium	6	3	50.00	0.29	0.25	0.19	0.183	0.25
Chromium	6	6	100.00	34	1.84	na	na	1.84
Lead	6	6	100.00	14.1	0.653	na	na	0.653
Mercury	6	5	83.33	0.13	0.0421	0.0372	0.0372	0.0421
Selenium	6	3	50.00	5.6	3.3	0.661	0.379	3.3
Silver	6	3	50.00	0.19	0.16	0.0943	0.0319	0.16
Volatile Organic Compounds								
1,1,1,2-Tetrachloroethane	6	0	0.00	ND	ND	0.058	0.023	<0.023
1,1,1-Trichloroethane	6	0	0.00	ND	ND	0.058	0.023	<0.023
1,1,2,2-Tetrachloroethane	6	0	0.00	ND	ND	0.058	0.023	<0.023
1,1,2-Trichloroethane	6	0	0.00	ND	ND	0.058	0.012	<0.012
1,1-Dichloroethane	6	0	0.00	ND	ND	0.058	0.023	<0.023
1,1-Dichloroethene	6	0	0.00	ND	ND	0.058	0.023	<0.023
1,1-Dichloropropene	6	0	0.00	ND	ND	0.058	0.023	<0.023
1,2,3-Trichlorobenzene	6	0	0.00	ND	ND	0.24	0.023	<0.023
1,2,3-Trichloropropane	6	0	0.00	ND	ND	0.064	0.023	<0.023
1,2,4-Trichlorobenzene	6	0	0.00	ND	ND	0.24	0.023	<0.023
1,2,4-Trimethylbenzene	6	0	0.00	ND	ND	0.24	0.0461	<0.0461
1,2-Dibromo-3-chloropropane	6	0	0.00	ND	ND	0.298	0.0921	<0.0921
1,2-Dibromoethane	6	0	0.00	ND	ND	0.24	0.023	<0.023
1,2-Dichlorobenzene	6	0	0.00	ND	ND	0.058	0.023	<0.023
1,2-Dichloroethane	6	0	0.00	ND	ND	0.058	0.012	<0.012
1,2-Dichloropropane	6	0	0.00	ND	ND	0.058	0.012	<0.012
1,3,5-Trimethylbenzene	6	0	0.00	ND	ND	0.24	0.0461	<0.0461
1,3-Dichlorobenzene	6	0	0.00	ND	ND	0.058	0.023	<0.023
1,3-Dichloropropane	6	0	0.00	ND	ND	0.058	0.023	<0.023
1,4-Dichlorobenzene	6	0	0.00	ND	ND	0.058	0.023	<0.023
1-Chlorohexane	3	0	0.00	ND	ND	0.058	0.04	<0.04
2,2-Dichloropropane	6	0	0.00	ND	ND	0.058	0.023	<0.023
2-Butanone (MEK)	6	0	0.00	ND	ND	2.4	0.23	<0.23
2-Chloroethyl Vinyl Ether	3	0	0.00	ND	ND	0.329	0.23	<0.23
2-Chlorotoluene	6	0	0.00	ND	ND	0.24	0.023	<0.023
2-Hexanone	3	0	0.00	ND	ND	0.329	0.23	<0.23
4-Chlorotoluene	6	0	0.00	ND	ND	0.24	0.023	<0.023
4-Methyl-2-pentanone	6	0	0.00	ND	ND	2.4	0.23	<0.23
Acetone	3	0	0.00	ND	ND	2.4	1.6	<1.6
Benzene	6	0	0.00	ND	ND	0.058	0.012	<0.012
Bromobenzene	6	0	0.00	ND	ND	0.24	0.023	<0.023
Bromochloromethane	6	0	0.00	ND	ND	0.058	0.023	<0.023
Bromodichloromethane	6	0	0.00	ND	ND	0.058	0.023	<0.023
Bromoform	6	0	0.00	ND	ND	0.0838	0.023	<0.023
Bromomethane	6	0	0.00	ND	ND	0.131	0.0515	<0.0515
Carbon Tetrachloride	6	0	0.00	ND	ND	0.058	0.023	<0.023
Chlorobenzene	6	0	0.00	ND	ND	0.058	0.023	<0.023
Chloroethane	6	0	0.00	ND	ND	0.131	0.041	<0.041
Chloroform	6	0	0.00	ND	ND	0.058	0.023	<0.023
Chloromethane	6	0	0.00	ND	ND	0.058	0.023	<0.023
cis-1,2-Dichloroethene	6	0	0.00	ND	ND	0.058	0.023	<0.023
cis-1,3-Dichloropropene	6	0	0.00	ND	ND	0.058	0.0184	<0.0184
Dibromochloromethane	6	0	0.00	ND	ND	0.058	0.023	<0.023
Dibromomethane	6	0	0.00	ND	ND	0.058	0.023	<0.023
Dichlorodifluoromethane	6	0	0.00	ND	ND	0.058	0.023	<0.023
Ethylbenzene	6	0	0.00	ND	ND	0.0657	0.04	<0.04
Isopropylbenzene	6	0	0.00	ND	ND	0.24	0.023	<0.023
m,p-Xylenes	6	0	0.00	ND	ND	0.0657	0.0441	<0.0441
Methyl tert-Butyl Ether	3	0	0.00	ND	ND	0.058	0.04	<0.04
Methylene Chloride	6	0	0.00	ND	ND	0.24	0.0921	<0.0921
n-Butylbenzene	6	0	0.00	ND	ND	0.24	0.023	<0.023
n-Propylbenzene	6	0	0.00	ND	ND	0.24	0.023	<0.023
o-Xylene	6	0	0.00	ND	ND	0.0657	0.04	<0.04
p-Isopropyltoluene	6	0	0.00	ND	ND	0.24	0.023	<0.023
sec-Butylbenzene	6	0	0.00	ND	ND	0.24	0.023	<0.023
Styrene	6	0	0.00	ND	ND	0.058	0.023	<0.023
Tert-Butylbenzene	6	0	0.00	ND	ND	0.24	0.023	<0.023
Tetrachloroethene	6	0	0.00	ND	ND	0.058	0.023	<0.023
Toluene	6	0	0.00	ND	ND	0.0657	0.04	<0.04
trans-1,2-Dichloroethene	6	0	0.00	ND	ND	0.058	0.023	<0.023

Table A-14 Analytical Results for Sediment at Site SS11

Constituent	Sediment Data					Maximum Reporting Level (mg/Kg)	Minimum Reporting Level (mg/Kg)	Minimum Result ¹ (mg/Kg)
	Number of Samples	Number of Detects	Frequency of Detection	Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
trans-1,3-Dichloropropene	6	0	0.00	ND	ND	0.058	0.023	<0.023
Trichloroethene	6	0	0.00	ND	ND	0.058	0.0184	<0.0184
Trichlorofluoromethane	6	0	0.00	ND	ND	0.058	0.023	<0.023
Vinyl Chloride	6	0	0.00	ND	ND	0.0634	0.012	<0.012
Carbon Disulfide	3	0	0.00	ND	ND	0.131	0.0921	<0.0921
Semi-Volatile Organic Compounds								
Hexachlorobutadiene	6	0	0.00	ND	ND	0.24	0.023	<0.023
Polynuclear Aromatic Hydrocarbons								
Acenaphthene	6	1	16.67	0.0076	0.0076	0.0095	0.00491	0.0076
Acenaphthylene	6	1	16.67	0.0076	0.0076	0.0095	0.00491	0.0076
Anthracene	6	1	16.67	0.00076	0.00076	0.0095	0.00491	0.00076
Benzo(a)anthracene	6	1	16.67	0.00034	0.00034	0.0095	0.00491	0.00034
Benzo(a)pyrene	6	1	16.67	0.00053	0.00053	0.0095	0.00491	0.00053
Benzo(b)fluoranthene	6	1	16.67	0.00053	0.00053	0.0095	0.00491	0.00053
Benzo(g,h,i)perylene	6	3	50.00	0.00097	0.00043	0.00506	0.00491	0.00043
Benzo(k)fluoranthene	6	1	16.67	0.00054	0.00054	0.0095	0.00491	0.00054
Chrysene	6	2	33.33	0.0007	0.00046	0.0095	0.00491	0.00046
Dibenz(a,h)anthracene	6	1	16.67	0.00083	0.00083	0.0095	0.00491	0.00083
Fluoranthene	6	3	50.00	0.001	0.00066	0.00506	0.00491	0.00066
Fluorene	6	1	16.67	0.00056	0.00056	0.0095	0.00491	0.00056
Indeno(1,2,3-cd)Pyrene	6	3	50.00	0.0011	0.0004	0.00506	0.00491	0.0004
Naphthalene	6	3	50.00	0.0009	0.00064	0.0657	0	0.00064
Phenanthrene	6	3	50.00	0.0017	0.0008	0.00506	0.00491	0.0008
Pyrene	6	3	50.00	0.00071	0.00046	0.00506	0.00491	0.00046
Pesticides								
4,4'-DDD	3	0	0.00	ND	ND	0.002	0.00151	<0.00151
4,4'-DDE	3	0	0.00	ND	ND	0.002	0.00115	<0.00115
4,4'-DDT	3	3	100.00	0.00572	0.00505	na	na	0.00505
Aldrin	3	0	0.00	ND	ND	0.0015	0.0015	<0.0015
alpha Endosulfan	3	0	0.00	ND	ND	0.0015	0.0015	<0.0015
alpha-BHC	3	0	0.00	ND	ND	0.0015	0.0015	<0.0015
alpha-Chlordane	3	0	0.00	ND	ND	0.0015	0.0015	<0.0015
beta Endosulfan	3	0	0.00	ND	ND	0.002	0.002	<0.002
beta-BHC	3	0	0.00	ND	ND	0.0015	0.0015	<0.0015
delta-BHC	3	0	0.00	ND	ND	0.0015	0.0015	<0.0015
Dieldrin	3	0	0.00	ND	ND	0.002	0.002	<0.002
Endosulfan Sulfate	3	0	0.00	ND	ND	0.002	0.002	<0.002
Endrin	3	0	0.00	ND	ND	0.002	0.002	<0.002
Endrin Aldehyde	3	0	0.00	ND	ND	0.002	0.002	<0.002
Endrin Ketone	3	0	0.00	ND	ND	0.002	0.002	<0.002
gamma-BHC (Lindane)	3	0	0.00	ND	ND	0.0015	0.0015	<0.0015
gamma-Chlordane	3	0	0.00	ND	ND	0.0015	0.0015	<0.0015
Heptachlor	3	0	0.00	ND	ND	0.002	0.002	<0.002
Heptachlor Epoxide	3	0	0.00	ND	ND	0.002	0.002	<0.002
Methoxychlor	3	0	0.00	ND	ND	0.002	0.002	<0.002
Toxaphene	3	0	0.00	ND	ND	0.05	0.049	<0.049
Polychlorinated Biphenyls								
Arochlor 1016	3	0	0.00	ND	ND	0.0301	0.0296	<0.0296
Arochlor 1221	3	0	0.00	ND	ND	0.0301	0.0296	<0.0296
Arochlor 1232	3	0	0.00	ND	ND	0.0301	0.0296	<0.0296
Arochlor 1242	3	0	0.00	ND	ND	0.0301	0.0296	<0.0296
Arochlor 1248	3	0	0.00	ND	ND	0.0301	0.0296	<0.0296
Arochlor 1254	3	0	0.00	ND	ND	0.0301	0.0296	<0.0296
Arochlor 1260	3	0	0.00	ND	ND	0.0301	0.0296	<0.0296
Petroleum Hydrocarbons								
Diesel Range Organics (DRO)	3	0	0.00	ND	ND	37.1	31.4	<31.4
Gasoline Range Organics (GRO)	3	0	0.00	ND	ND	3.29	2.3	<2.3
Residual Range Organics (RRO)	3	3	100.00	342	236	na	na	236

Notes:

4,4'-DDD - dichlorodiphenyldichloroethane

4,4'-DDE - dichlorodiphenyldichloroethylene

4,4'-DDT - dichlorodiphenyltrichloroethane

ND - not detected

na - not available

mg/Kg - Milligram per kilogram.

¹ - Minimum Result reported as smallest detected concentration or smallest reporting limit if ND

Table A-15 Analytical Results for Surface Water at Site SS11

Constituent	Surface Water Data					Maximum Reporting Level (mg/L)	Minimum Reporting Level (mg/L)	Minimum Result ¹ (mg/L)
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)			
Inorganics, Total								
Arsenic	3	0	0	ND	ND	0.005	0.005	<0.005
Barium	3	3	100	0.0315	0.01	na	na	0.01
Cadmium	3	0	0	ND	ND	0.002	0.002	<0.002
Chromium	3	1	33	0.00424	0.00424	0.00235	0.00213	0.00424
Lead	3	0	0	ND	ND	0.002	0.002	<0.002
Mercury	3	0	0	ND	ND	0.0002	0.0002	<0.0002
Selenium	3	0	0	ND	ND	0.005	0.005	<0.005
Silver	3	0	0	ND	ND	0.002	0.002	<0.002
Volatile Organic Compounds								
1,1,1,2-Tetrachloroethane	5	0	0	ND	ND	0.001	0.0005	<0.0005
1,1,1-Trichloroethane	5	0	0	ND	ND	0.001	0.001	<0.001
1,1,2,2-Tetrachloroethane	5	0	0	ND	ND	0.001	0.0005	<0.0005
1,1,2-Trichloroethane	5	0	0	ND	ND	0.001	0.001	<0.001
1,1-Dichloroethane	5	0	0	ND	ND	0.001	0.001	<0.001
1,1-Dichloroethene	5	0	0	ND	ND	0.001	0.001	<0.001
1,1-Dichloropropene	5	0	0	ND	ND	0.001	0.001	<0.001
1,2,3-Trichlorobenzene	5	0	0	ND	ND	0.001	0.001	<0.001
1,2,3-Trichloropropane	5	0	0	ND	ND	0.002	0.001	<0.001
1,2,4-Trichlorobenzene	5	0	0	ND	ND	0.001	0.001	<0.001
1,2,4-Trimethylbenzene	5	0	0	ND	ND	0.001	0.001	<0.001
1,2-Dibromo-3-chloropropane	5	0	0	ND	ND	0.002	0.002	<0.002
1,2-Dibromoethane	5	0	0	ND	ND	0.001	0.001	<0.001
1,2-Dichlorobenzene	5	0	0	ND	ND	0.001	0.001	<0.001
1,2-Dichloroethane	5	0	0	ND	ND	0.001	0.0005	<0.0005
1,2-Dichloropropane	5	0	0	ND	ND	0.001	0.001	<0.001
1,3,5-Trimethylbenzene	5	0	0	ND	ND	0.001	0.001	<0.001
1,3-Dichlorobenzene	5	0	0	ND	ND	0.001	0.001	<0.001
1,3-Dichloropropane	5	0	0	ND	ND	0.001	0.0004	<0.0004
1,4-Dichlorobenzene	5	0	0	ND	ND	0.001	0.0005	<0.0005
1-Chlorohexane	2	0	0	ND	ND	0.001	0.001	<0.001
2,2-Dichloropropane	5	0	0	ND	ND	0.001	0.001	<0.001
2-Butanone (MEK)	5	0	0	ND	ND	0.01	0.01	<0.01
2-Chloroethyl Vinyl Ether	3	0	0	ND	ND	0.001	0.001	<0.001
2-Chlorotoluene	5	0	0	ND	ND	0.001	0.001	<0.001
2-Hexanone	3	0	0	ND	ND	0.01	0.01	<0.01
4-Chlorotoluene	5	0	0	ND	ND	0.001	0.001	<0.001
4-Methyl-2-pentanone	5	0	0	ND	ND	0.02	0.01	<0.01
Acetone	2	0	0	ND	ND	0.01	0.01	<0.01
Benzene	5	0	0	ND	ND	0.0005	0.0004	<0.0004
Bromobenzene	5	0	0	ND	ND	0.001	0.001	<0.001
Bromochloromethane	5	0	0	ND	ND	0.001	0.001	<0.001
Bromodichloromethane	5	0	0	ND	ND	0.001	0.0005	<0.0005
Bromoform	5	0	0	ND	ND	0.001	0.001	<0.001
Bromomethane	5	0	0	ND	ND	0.003	0.001	<0.001
Carbon Tetrachloride	5	0	0	ND	ND	0.001	0.001	<0.001
Chlorobenzene	5	0	0	ND	ND	0.001	0.0005	<0.0005
Chloroethane	5	0	0	ND	ND	0.001	0.001	<0.001
Chloroform	5	0	0	ND	ND	0.001	0.0003	<0.0003
Chloromethane	5	1	20	0.00112	0.00112	0.001	0.001	0.00112
cis-1,2-Dichloroethene	5	0	0	ND	ND	0.001	0.001	<0.001
cis-1,3-Dichloropropene	5	0	0	ND	ND	0.001	0.0005	<0.0005
Dibromochloromethane	5	0	0	ND	ND	0.001	0.0005	<0.0005
Dibromomethane	5	0	0	ND	ND	0.001	0.001	<0.001
Dichlorodifluoromethane	5	0	0	ND	ND	0.001	0.001	<0.001
Ethylbenzene	5	0	0	ND	ND	0.001	0.001	<0.001
Isopropylbenzene	5	0	0	ND	ND	0.001	0.001	<0.001
m,p-Xylenes	5	0	0	ND	ND	0.002	0.002	<0.002
Methyl tert-Butyl Ether	2	0	0	ND	ND	0.005	0.005	<0.005
Methylene Chloride	5	0	0	ND	ND	0.005	0.001	<0.001
n-Butylbenzene	5	0	0	ND	ND	0.001	0.001	<0.001
n-Propylbenzene	5	0	0	ND	ND	0.001	0.001	<0.001
o-Xylene	5	0	0	ND	ND	0.001	0.001	<0.001
p-Isopropyltoluene	5	0	0	ND	ND	0.001	0.001	<0.001
sec-Butylbenzene	5	0	0	ND	ND	0.001	0.001	<0.001
Styrene	5	0	0	ND	ND	0.001	0.001	<0.001
Tert-Butylbenzene	5	0	0	ND	ND	0.001	0.001	<0.001
Tetrachloroethene	5	0	0	ND	ND	0.001	0.001	<0.001
Toluene	5	2	40	0.00022	0.00018	0.001	0.001	0.00018

Table A-15 Analytical Results for Surface Water at Site SS11

Constituent	Surface Water Data				Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)	Maximum Reporting Level (mg/L)	Minimum Reporting Level (mg/L)	Minimum Result ¹ (mg/L)
	Number of Samples	Number of Detects	Frequency of Detection						
trans-1,2-Dichloroethene	5	0	0		ND	ND	0.001	0.001	<0.001
trans-1,3-Dichloropropene	5	0	0		ND	ND	0.001	0.001	<0.001
Trichloroethene	5	0	0		ND	ND	0.001	0.001	<0.001
Trichlorofluoromethane	5	0	0		ND	ND	0.001	0.001	<0.001
Vinyl Chloride	5	0	0		ND	ND	0.001	0.001	<0.001
Carbon Disulfide	3	3	100		0.0194	0.00594	na	na	0.00594
Semi-Volatile Organic Compounds									
Hexachlorobutadiene	5	0	0		ND	ND	0.001	0.0006	<0.0006
Polynuclear Aromatic Hydrocarbons									
Acenaphthene	5	0	0		ND	ND	0.000099	0.00002	<0.00002
Acenaphthylene	5	0	0		ND	ND	0.000099	0.00002	<0.00002
Anthracene	5	1	20		0.0000015	0.0000015	0.000099	0.00002	0.0000015
Benzo(a)anthracene	5	2	40		0.0000027	0.0000024	0.000099	0.000099	0.0000024
Benzo(a)pyrene	5	1	20		0.0000033	0.0000033	0.000099	0.00002	0.0000033
Benzo(b)fluoranthene	5	1	20		0.0000045	0.0000045	0.000099	0.00002	0.0000045
Benzo(g,h,i)perylene	5	1	20		0.0000073	0.0000073	0.000099	0.00002	0.0000073
Benzo(k)fluoranthene	5	1	20		0.0000045	0.0000045	0.000099	0.00002	0.0000045
Chrysene	5	1	20		0.0000033	0.0000033	0.000099	0.00002	0.0000033
Dibenz(a,h)anthracene	5	1	20		0.000004	0.000004	0.000099	0.00002	0.000004
Fluoranthene	5	1	20		0.000004	0.000004	0.000099	0.00002	0.000004
Fluorene	5	0	0		ND	ND	0.000099	0.00002	<0.00002
Indeno(1,2,3-cd)Pyrene	5	1	20		0.0000057	0.0000057	0.000099	0.00002	0.0000057
Naphthalene	4	1	25		0.0000044	0.0000044	0.002	0.002	0.0000044
Phenanthrene	5	1	20		0.0000046	0.0000046	0.000099	0.00002	0.0000046
Pyrene	5	1	20		0.0000041	0.0000041	0.000099	0.00002	0.0000041
Pesticides									
4,4'-DDD	3	0	0		ND	ND	0.00003	0.00003	<0.00003
4,4'-DDE	3	0	0		ND	ND	0.00003	0.00003	<0.00003
4,4'-DDT	3	0	0		ND	ND	0.00003	0.00003	<0.00003
Aldrin	3	0	0		ND	ND	0.00003	0.00003	<0.00003
alpha Endosulfan	3	0	0		ND	ND	0.00003	0.00003	<0.00003
alpha-BHC	3	0	0		ND	ND	0.00003	0.00003	<0.00003
alpha-Chlordane	3	0	0		ND	ND	0.00003	0.00003	<0.00003
beta Endosulfan	3	0	0		ND	ND	0.00003	0.00003	<0.00003
beta-BHC	3	0	0		ND	ND	0.00003	0.00003	<0.00003
delta-BHC	3	0	0		ND	ND	0.00003	0.00003	<0.00003
Dieldrin	3	0	0		ND	ND	0.00003	0.00003	<0.00003
Endosulfan Sulfate	3	0	0		ND	ND	0.00003	0.00003	<0.00003
Endrin	3	0	0		ND	ND	0.00003	0.00003	<0.00003
Endrin Aldehyde	3	0	0		ND	ND	0.00003	0.00003	<0.00003
Endrin Ketone	3	0	0		ND	ND	0.00003	0.00003	<0.00003
gamma-BHC (Lindane)	3	0	0		ND	ND	0.00003	0.00003	<0.00003
gamma-Chlordane	3	0	0		ND	ND	0.00003	0.00003	<0.00003
Heptachlor	3	0	0		ND	ND	0.00003	0.00003	<0.00003
Heptachlor Epoxide	3	0	0		ND	ND	0.00003	0.00003	<0.00003
Methoxychlor	3	0	0		ND	ND	0.00003	0.00003	<0.00003
Toxaphene	3	0	0		ND	ND	0.0025	0.0025	<0.0025
Polychlorinated Biphenyls									
Arochlor 1016	3	0	0		ND	ND	0.0001	0.000099	<0.000099
Arochlor 1221	4	0	0		ND	ND	0.0001	0.000099	<0.000099
Arochlor 1232	3	0	0		ND	ND	0.0001	0.000099	<0.000099
Arochlor 1242	3	0	0		ND	ND	0.0001	0.000099	<0.000099
Arochlor 1248	3	0	0		ND	ND	0.0001	0.000099	<0.000099
Arochlor 1254	3	0	0		ND	ND	0.0001	0.000099	<0.000099
Arochlor 1260	3	0	0		ND	ND	0.0001	0.000099	<0.000099
Petroleum Hydrocarbons									
Diesel Range Organics (DRO)	3	0	0		ND	ND	0.495	0.495	<0.495
Gasoline Range Organics (GRO)	2	0	0		ND	ND	0.09	0.09	<0.09
Residual Range Organics (RRO)	3	0	0		ND	ND	0.99	0.99	<0.99

Notes:

4,4'-DDD - dichlorodiphenyldichloroethane

4,4'-DDE - dichlorodiphenyldichloroethylene

4,4'-DDT - dichlorodiphenyltrichloroethane

ND - not detected

na - not available

mg/L - Milligrams per liter

¹ - Minimum Result reported as smallest detected concentration or smallest reporting limit if ND

APPENDIX B

*Selection of Chemicals of Potential
Concern and Chemicals of Potential
Ecological Concern*

Table B-1 Selection of Chemicals of Potential Concern for Human Health - Surface Soil at SS03

Constituent	Surface Soil Data					Regulatory Criteria ^a (mg/Kg)	COPC Screening Benchmark ^b (mg/Kg)	COPC?
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
<u>Inorganics, Total</u>								
Aluminum	2	2	100	28,800	24,000	77,000	7,700	Yes
Antimony	2	2	100	2.0	1.0	41	4.1	No
Arsenic	2	2	100	16	11	4.5	0.45	Yes
Barium	2	2	100	258	178	20,300	2,030	No
Beryllium	2	2	100	0.70	0.50	200	20	No
Cadmium	2	2	100	4.0	0.70	79	7.9	No
Calcium	2	2	100	4,990	2,720	na	na	No
Chromium	2	2	100	56	50	300	30	Yes
Cobalt	2	2	100	22	15	na	na	Yes
Copper	2	2	100	95	51	4,100	410	No
Iron	2	2	100	39,500	26,500	na	na	No
Lead	8	8	100	259	11.3	400	40	Yes
Magnesium	2	2	100	7,850	6,350	na	na	No
Manganese	2	2	100	609	454	1,800	180	Yes
Mercury	2	2	100	1.59	0.83	18	1.8	No
Molybdenum	2	1	50	1.1	1.1	390	39	No
Nickel	2	2	100	41	37	2,000	200	No
Potassium	2	2	100	2,620	2,480	na	na	No
Selenium	2	2	100	2	1.3	510	51	No
Silver	2	2	100	6	1.2	510	51	No
Sodium	2	2	100	120	90	na	na	No
Tin	2	2	100	50	12	47,000	4,700	No
Titanium	2	2	100	1,430	1,070	na	na	Yes
Vanadium	2	2	100	88	68	710	71	Yes
Zinc	2	2	100	518	156	30,400	3,040	No
<u>Volatile Organic Compounds</u>								
1,2,4-Trimethylbenzene	18	9	50	1,400	0.0014	49	4.9	Yes
1,3,5-Trimethylbenzene	18	9	50	510	0.00078	42	4.2	Yes
1,4-Dichlorobenzene	18	1	6	1.2	1.2	30	3.0	No
2-Butanone (MEK)	17	3	18	0.0033	0.0022	23,300	2,330	No
Acetone	17	9	53	2.9	0.026	68,600	6,860	No
Benzene	18	4	22	13	0.00043	11	1.1	Yes
Chloroform	18	1	6	0.00038	0.00038	3.2	0.32	No
Ethylbenzene	18	8	44	26	0.0019	110	11	Yes

Table B-1 Selection of Chemicals of Potential Concern for Human Health - Surface Soil at SS03

Constituent	Surface Soil Data					Regulatory Criteria ^a (mg/Kg)	COPC Screening Benchmark ^b (mg/Kg)	COPC?
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
Isopropylbenzene	17	8	47	3.5	0.012	62	6.2	No
m,p-Xylenes	15	7	47	22	0.0012	63 ^e	6.3	Yes
Methylene Chloride	18	2	11	0.65	0.0066	160	16	No
n-Butylbenzene	17	6	35	6.4	0.037	42	4.2	Yes
n-Propylbenzene	17	7	41	8.4	0.041	42	4.2	Yes
o-Xylene	15	6	40	7.9	0.029	63 ^e	6.3	Yes
p-Isopropyltoluene	18	8	44	11	0.0015	62 ^f	6.2	Yes
sec-Butylbenzene	17	6	35	6.4	0.034	41	4.1	Yes
Tert-Butylbenzene	17	4	24	18	0.18	70	7.0	Yes
Toluene	18	10	56	78	0.00064	220	22	Yes
Total xylenes	3	3	100	2,600	0.0081	63	6.3	Yes
Trichloroethene	18	1	6	0.00049	0.00049	0.57	0.057	No
<u>Semi-Volatile Organic Compounds</u>								
3-and 4-Methylphenol Coelution	2	1	50	1.0	1.0	350 ^g	35	No
Bis(2-ethylhexyl) Phthalate	3	2	67	0.20	0.10	220	22	No
Dibenzofuran	13	9	69	2.8	0.00021	200	20	No
DiethylPhthalate	3	3	100	0.90	0.20	61,900	6,190	No
<u>Polynuclear Aromatic Hydrocarbons</u>								
2-Methylnaphthalene	3	2	67	33	4.0	280	28	Yes
Acenaphthene	17	7	41	0.82	0.00021	2,800	280	No
Acenaphthylene	17	1	6	0.0036	0.0036	2,800	280	No
Anthracene	17	8	47	0.029	0.0005	20,600	2,060	No
Benzo(a)anthracene	17	13	76	0.018	0.00025	4.9	0.49	No
Benzo(a)pyrene	17	9	53	0.044	0.000205	0.49	0.049	No
Benzo(b)fluoranthene	17	12	71	0.099	0.00092	4.9	0.49	No
Benzo(g,h,i)perylene	17	12	71	0.058	0.00052	1,400	140	No
Benzo(k)fluoranthene	15	9	60	0.013	0.00027	49	4.9	No
Chrysene	17	15	88	0.20	0.0005	490	49	No
Dibenz(a,h)anthracene	17	8	47	0.036	0.00043	0.49	0.049	No
Fluoranthene	17	13	76	0.027	0.00063	1,900	190	No
Fluorene	18	14	78	2.3	0.00029	2,300	230	No
Indeno(1,2,3-cd)Pyrene	17	11	65	0.010	0.00034	4.9	0.49	No
Naphthalene	18	13	72	160	0.00064	28	2.8	Yes
Phenanthrene	18	16	89	0.92	0.00075	20,600	2,060	No

Table B-1 Selection of Chemicals of Potential Concern for Human Health - Surface Soil at SS03

Constituent	Surface Soil Data					Regulatory Criteria ^a (mg/Kg)	COPC Screening Benchmark ^b (mg/Kg)	COPC?
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
Pyrene	18	16	89	0.20	0.00045	1,400	140	No
<u>Pesticides</u>								
4,4'-DDD	2	1	50	0.043	0.043	30	3.0	No
4,4'-DDE	2	2	100	0.020	0.010	21	2.1	No
4,4'-DDT	2	2	100	0.0060	0.0030	21	2.1	No
Dieldrin	2	1	50	0.0040	0.0040	0.32	0.032	No
<u>Petroleum Hydrocarbons</u>								
Diesel Range Organics (DRO)	18	14	78	38,000	8.6	10,250 ^h	10,250	Yes
Gasoline Range Organics (GRO)	18	7	39	3,500	0.95	1,400 ^h	1,400	Yes
Residual Range Organics (RRO)	13	12	92	1,260	12	10,000 ^h	10,000	No

Notes:

COPC - Chemical of Potential Concern

4,4'-DDD - dichlorodiphenyldichloroethane

4,4'-DDE - dichlorodiphenyldichloroethylene

4,4'-DDT - dichlorodiphenyltrichloroethane

mg/Kg - Milligram per kilogram.

NA - Not applicable.

na - Not available.

NC - Not calculated.

^a Regulatory Criteria is derived from the following hierarchy

1. Minimum of the Direct Contact and Inhalation pathways listed in 18 AAC 75, Tables B1 and B2, Under 40 inch Zone (ADEC, 2008a).
2. Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites - Residential Soil (USEPA, 2008a).

^b COPC Screening Benchmark is based on cancer risk of 1×10^{-6} or a hazard index of 0.1.

^c This analyte is excluded as a COPC due to status as an essential nutrient.

^d Based on residential cleanup value calculated according to Risk Assessment Procedures Manual guidance (18 AAC 75.340). Lead is not included in the cumulative hazard estimate, therefore the regulatory criterion was not modified (i.e., not divided by 10).

^e Total xylenes used as a surrogate chemical.

^f Isopropylbenzene used as a surrogate chemical.

^g 4-Methylphenol (o-cresol) used as a surrogate chemical.

^h Because petroleum hydrocarbons are not included in the cumulative hazard estimate, the regulatory criterion was used unmodified (i.e., not divided by 10).

Table B-2 Selection of Chemicals of Potential Concern for Human Health - Subsurface Soil at Site SS03

Constituent	Subsurface Soil Data					Regulatory Criteria ^a (mg/Kg)	COPC Screening Benchmark ^b (mg/Kg)	COPC?	
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)				
<u>Inorganics, Total</u>									
Lead	1	1	100	10	10	400	c	40	No
<u>Volatile Organic Compounds</u>									
1,2,4-Trimethylbenzene	13	8	62	13	0.00019	49		4.9	Yes
1,3,5-Trimethylbenzene	13	7	54	5.6	0.038	42		4.2	Yes
2-Butanone (MEK)	13	3	23	0.0065	0.0039	23,300		2,330	No
Acetone	11	5	45	0.13	0.011	68,600		6,860	No
Benzene	16	7	44	0.52	0.00055	11		1.1	No
Ethylbenzene	16	9	56	2.2	0.018	110		11	No
Isopropylbenzene	13	6	46	1.7	0.0040	62		6.2	No
m,p-Xylenes	15	10	67	6.2	0.0015	63	d	6.3	No
Methylene Chloride	13	2	15	1.5	0.0026	160		16	No
n-Butylbenzene	13	7	54	3.4	0.0080	42		4.2	No
n-Propylbenzene	13	8	62	3.7	0.011	42		4.2	No
o-Xylene	15	8	53	7.7	0.0096	63	d	6.3	Yes
p-Isopropyltoluene	13	8	62	2.0	0.0022	62	e	6.2	No
sec-Butylbenzene	13	6	46	2.3	0.0032	41		4.1	No
Styrene	13	1	8	0.013	0.013	200		20	No
Tert-Butylbenzene	13	6	46	0.18	0.0068	70		7.0	No
Toluene	16	8	50	0.71	0.00033	220		22	No
Trichloroethene	13	1	8	0.00012	0.00012	0.57		0.057	No
<u>Semi-Volatile Organic Compounds</u>									
Dibenzofuran	11	8	73	0.48	0.00049	200		20	No
<u>Polynuclear Aromatic Hydrocarbons</u>									
Acenaphthene	13	9	69	0.87	0.0027	2,800		280	No
Acenaphthylene	13	1	8	0.00026	0.00026	2,800		280	No
Anthracene	13	6	46	0.011	0.00030	20,600		2,060	No
Benzo(a)anthracene	13	8	62	0.028	0.00024	4.9		0.49	No
Benzo(a)pyrene	13	6	46	0.023	0.00036	0.49		0.049	No
Benzo(b)fluoranthene	13	7	54	0.030	0.00059	4.9		0.49	No
Benzo(g,h,i)perylene	13	6	46	0.015	0.00038	1,400		140	No
Benzo(k)fluoranthene	12	5	42	0.031	0.00061	49		4.9	No
Chrysene	13	9	69	0.038	0.00058	490		49	No

Table B-2 Selection of Chemicals of Potential Concern for Human Health - Subsurface Soil at Site SS03

Constituent	Subsurface Soil Data					Regulatory Criteria ^a (mg/Kg)	COPC Screening Benchmark ^b (mg/Kg)	COPC?
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
Dibenz(a,h)anthracene	13	1	8	0.0025	0.0025	0.49	0.049	No
Fluoranthene	13	9	69	0.091	0.00051	1,900	190	No
Fluorene	13	9	69	2.8	0.00042	2,300	230	No
Indeno(1,2,3-cd)Pyrene	13	5	38	0.017	0.00032	4.9	0.49	No
Naphthalene	13	10	77	56	0.011	28	2.8	Yes
Phenanthrene	13	12	92	1.7	0.00057	20,600	2,060	No
Pyrene	13	10	77	0.074	0.00059	1,400	140	No
<u>Petroleum Hydrocarbons</u>								
Diesel Range Organics (DRO)	16	12	75	13,000	13	10,250 f	10,250	Yes
Gasoline Range Organics (GRO)	16	12	75	582	1.0	1,400 f	1,400	No
Residual Range Organics (RRO)	16	10	63	251	7.9	10,000 f	10,000	No

Notes:

COPC - Chemical of Potential Concern

4,4'-DDD - dichlorodiphenyldichloroethane

4,4'-DDE - dichlorodiphenyldichloroethylene

4,4'-DDT - dichlorodiphenyltrichloroethane

mg/Kg - Milligram per kilogram.

NA - Not applicable.

na - Not available.

NC - Not calculated.

^a Regulatory Criteria is derived from the following hierarchy

1. Minimum of the Direct Contact and Inhalation pathways listed in 18 AAC 75, Tables B1 and B2, Under 40 inch Zone (ADEC, 2008a).
2. Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites - Residential Soil (USEPA, 2008a).

^b COPC Screening Benchmark is based on cancer risk of 1×10^{-6} or a hazard index of 0.1.

^c Based on residential cleanup value calculated according to Risk Assessment Procedures Manual guidance (18 AAC 75.340). Lead is not included in the cumulative hazard estimate, therefore the regulatory criterion was not modified (i.e., not divided by 10).

^d Total xylenes used as a surrogate chemical.

^e Isopropylbenzene used as a surrogate chemical.

^f Because petroleum hydrocarbons are not included in the cumulative hazard estimate, the regulatory criterion was used unmodified (i.e., not divided by 10).

Table B-3 Selection of Chemicals of Potential Concern for Human Health - Sediment at SS03

Constituent	Sediment Data					Regulatory Criteria ^a (mg/Kg)	COPC Screening Benchmark ^b (mg/Kg)	COPC?
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
<u>Inorganics, Total</u>								
Aluminum	1	1	100	27,900	27,900	77,000	7,700	Yes
Antimony	1	1	100	2.0	2.0	41	4.1	No
Arsenic	1	1	100	21	21	4.5	0.45	Yes
Barium	1	1	100	146	146	20,300	2,030	No
Beryllium	1	1	100	0.50	0.50	200	20	No
Cadmium	1	1	100	1.0	1.0	79	7.9	No
Calcium	1	1	100	4,540	4,540	na	na	No
Chromium	1	1	100	62	62	300	30	Yes
Cobalt	1	1	100	23	23	na	na	Yes
Copper	1	1	100	55	55	4,100	410	No
Iron	1	1	100	62,600	62,600	na	na	No
Lead	2	1	50	20	20	400	40	No
Magnesium	1	1	100	11,500	11,500	na	na	No
Manganese	1	1	100	1,320	1,320	1,800	180	Yes
Mercury	1	1	100	0.090	0.090	18	1.8	No
Nickel	1	1	100	65	65	2,000	200	No
Potassium	1	1	100	1,950	1,950	na	na	No
Selenium	1	1	100	1.7	1.7	510	51	No
Silver	1	1	100	2.0	2.0	510	51	No
Sodium	1	1	100	100	100	na	na	No
Titanium	1	1	100	1,160	1,160	na	na	Yes
Vanadium	1	1	100	107	107	710	71	Yes
Zinc	1	1	100	218	218	30,400	3,040	No
<u>Volatile Organic Compounds</u>								
1,1,2,2-Tetrachloroethane	1	1	100	0.00018	0.00018	5.5	0.55	No
1,2,3-Trichlorobenzene	1	1	100	0.00025	0.00025	41	4.1	No
1,2,3-Trichloropropane	1	1	100	0.00021	0.00021	0.17	0.017	No
1,2,4-Trichlorobenzene	2	1	50	0.00027	0.00027	41	4.1	No
cis-1,3-Dichloropropene	1	1	100	0.00017	0.00017	27	2.7	No
Methylene Chloride	1	1	100	0.013	0.013	160	16	No
trans-1,3-Dichloropropene	1	1	100	0.00013	0.00013	27	2.7	No
<u>Semi-Volatile Organic Compounds</u>								
3-and 4-Methylphenol Coelution	1	1	100	0.20	0.20	350	35	No

Table B-3 Selection of Chemicals of Potential Concern for Human Health - Sediment at SS03

Constituent	Sediment Data					Regulatory Criteria ^a (mg/Kg)	COPC Screening Benchmark ^b (mg/Kg)	COPC?
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
Bis(2-ethylhexyl) Phthalate	1	1	100	0.90	0.90	220	22	No
DiethylPhthalate	1	1	100	0.10	0.10	61,900	6,190	No
Phenol	1	1	100	0.10	0.10	23,200	2,320	No
<u>Pesticides</u>								
4,4'-DDD	1	1	100	0.0080	0.0080	30	3.0	No
4,4'-DDT	1	1	100	0.0095	0.0095	21	2.1	No
Endosulfan Sulfate	1	1	100	0.0033	0.0033	610 ^h	61	No
<u>Petroleum Hydrocarbons</u>								
Diesel Range Organics (DRO)	1	1	100	161	161	10,250 ⁱ	10,250	No
Gasoline Range Organics (GRO)	1	1	100	5.8	5.8	1,400 ⁱ	1,400	No

Notes:

COPC - Chemical of Potential Concern

mg/Kg - Milligram per kilogram.

4,4'-DDD - dichlorodiphenyldichloroethane

NA - Not applicable.

4,4'-DDT - dichlorodiphenyltrichloroethane

na - Not available.

^a Regulatory Criteria is derived from the following hierarchy:

1. Minimum of the Direct Contact and Inhalation pathways listed in 18 AAC 75, Tables B1 and B2, Under 40 inch Zone (ADEC, 2008a).
2. Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites - Residential Soil (USEPA, 2008a).

^b COPC Screening Benchmark is based on cancer risk of 1×10^{-6} or a hazard index of 0.1.

^c This analyte is excluded as a COPC due to status as an essential nutrient.

^d Based on residential cleanup value calculated according to Risk Assessment Procedures Manual guidance (18 AAC 75.340). Lead is not included in the cumulative hazard estimate; therefore, the regulatory criterion was not modified (i.e., not divided by 10)

^e 1,2,4-Trichlorobenzene used as a surrogate chemical.

^f 1,3-Dichloropropene used as a surrogate chemical.

^g 4-Methylphenol (o-cresol) used as a surrogate chemical.

^h Endosulfan used as a surrogate chemical.

ⁱ Because petroleum hydrocarbons are not included in the cumulative hazard estimate, the regulatory criterion was used unmodified (i.e., not divided by 10).

Table B-4 Selection of Chemicals of Potential Concern for Human Health - Surface Water at Site SS03

Constituent	Surface Water Data					Regulatory Criteria ^a		COPC Screening Benchmark ^b		COPC?
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)					
<u>Inorganics, Total</u>										
Barium	1	1	100	0.0080	0.0080	2.0		0.2	No	
Calcium	1	1	100	12	12	NA	c	na	No	
Iron	1	1	100	0.15	0.15	NA	c	na	No	
Magnesium	1	1	100	4.0	4.0	NA	c	na	No	
Manganese	1	1	100	0.015	0.015	0.88		0.088	No	
Potassium	1	1	100	0.60	0.60	NA	c	na	No	
Sodium	1	1	100	4.7	4.7	NA	c	na	No	
Titanium	1	1	100	0.0040	0.0040	na		na	Yes	
Zinc	1	1	100	0.0050	0.0050	5.0		0.5	No	
<u>Semi-Volatile Organic Compounds</u>										
DiethylPhthalate	1	1	100	0.00050	0.00050	29		2.9	No	
<u>Petroleum Hydrocarbons</u>										
Diesel Range Organics (DRO)	1	1	100	0.062	0.062	1.5	d	1.5	No	

Notes:

COPC - Chemical of potential concern.

mg/L - Milligram per liter.

NA - Not applicable.

na - Not available.

^aRegulatory Criteria was selected according to the following hierarchy:

- ADEC Water Quality Standards 18 AAC 70 (ADEC, 2008b).
- 18 AAC 75, Table C Groundwater Cleanup Levels (ADEC, 2008a).
- Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites - Tap Water (USEPA, 2008a).

^b COPC Screening Benchmark is based on cancer risk of 1×10^{-6} or a hazard index of 0.1.

^c This analyte is excluded as a COPC due to status as an essential nutrient.

^d Petroleum hydrocarbons are not included in the cumulative hazard calculations; therefore, the regulatory criterion was not modified (i.e., not divided by 10).

Table B-5 Selection of Chemicals of Potential Concern for Human Health - Subsurface Water at Site SS03

Constituent	Subsurface Water Data					Regulatory Criteria ^a (mg/L)	COPC Screening Benchmark ^b (mg/L)	COPC?	
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)				
<u>Inorganics, Total</u>									
Lead	12	11	92	0.00646	0.00049	0.015	c	0.0015	No
<u>Volatile Organic Compounds</u>									
1,2,4-Trichlorobenzene	23	1	4	0.0009	0.0009	0.070		0.0070	No
1,2,4-Trimethylbenzene	22	21	95	0.355	0.00026	1.8		0.18	Yes
1,2-Dichlorobenzene	23	1	4	0.0007	0.0007	0.60		0.060	No
1,2-Dichloroethane	22	8	36	0.0023	0.00026	0.0050		0.00050	Yes
1,3,5-Trimethylbenzene	22	21	95	0.135	0.00015	1.8		0.18	No
1,3-Dichlorobenzene	23	1	4	0.0009	0.0009	3.3		0.33	No
1,4-Dichlorobenzene	23	1	4	0.001	0.001	0.075		0.0075	No
2-Butanone (MEK)	22	2	9	0.0025	0.0023	22		2.2	No
4-Methyl-2-pentanone	22	1	5	0.0013	0.0013	2.9		0.29	No
Benzene	22	21	95	0.335	0.0028	0.0050		0.00050	Yes
Chloroethane	22	3	14	0.0011	0.00044	0.29		0.029	No
Chloroform	22	1	5	0.0012	0.0012	0.14		0.014	No
Chloromethane	22	2	9	0.0004	0.00016	0.066		0.0066	No
Ethylbenzene	22	20	91	0.405	0.00049	0.70		0.070	Yes
Isopropylbenzene	22	21	95	0.034	0.00025	3.7		0.37	No
m,p-Xylenes	18	16	89	0.25	0.00071	10	d	1.0	No
n-Butylbenzene	22	20	91	0.0255	0.00029	0.37		0.037	No
n-Propylbenzene	22	20	91	0.0845	0.00049	3.7	e	0.37	No
o-Xylene	19	18	95	0.0072	0.00033	10	d	1.0	No
p-Isopropyltoluene	22	18	82	0.017	0.00037	3.7	e	0.37	No
sec-Butylbenzene	22	21	95	0.0165	0.00022	0.37		0.037	No
Styrene	22	1	5	0.001165	0.001165	0.10		0.010	No
Tert-Butylbenzene	22	14	64	0.018	0.00026	0.37		0.037	No
Toluene	22	16	73	0.067	0.00011	1.0		0.10	No
Total xylenes	3	3	100	0.72	0.061	10		1.0	No
Carbon Disulfide	14	2	14	0.00017	0.00016	3.7		0.37	No
<u>Semi-Volatile Organic Compounds</u>									
2,4,6-Trichlorophenol	3	1	33	0.0005	0.0005	0.077		0.0077	No
2,4-Dichlorophenol	3	1	33	0.0005	0.0005	0.11		0.011	No
2,4-Dimethylphenol	3	1	33	0.004	0.004	0.73		0.073	No

Table B-5 Selection of Chemicals of Potential Concern for Human Health - Subsurface Water at Site SS03

Constituent	Subsurface Water Data					Regulatory Criteria ^a (mg/L)	COPC Screening Benchmark ^b (mg/L)	COPC?
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)			
2,4-Dinitrophenol	3	1	33	0.004	0.004	0.073	0.0073	No
2-Chlorophenol	3	1	33	0.0004	0.0004	0.18	0.018	No
2-Methylphenol	3	1	33	0.0005	0.0005	1.8	0.18	No
2-Nitrophenol	3	1	33	0.0004	0.0004	na	na	Yes
3,3'-Dichlorobenzidine	3	1	33	0.005	0.005	0.0019	0.00019	Yes
3-and 4-Methylphenol Coelution	3	1	33	0.0008	0.0008	0.18 ^f	0.018	No
4-Chloroaniline	3	1	33	0.003	0.003	0.016	0.0016	Yes
Benzoic Acid	1	1	100	0.069	0.069	150	15	No
Benzyl Alcohol	3	1	33	0.0007	0.0007	18	1.8	No
Bis(2-chloroethoxy)methane	3	1	33	0.0003	0.0003	0.11	0.011	No
Bis(2-chloroethyl) Ether	3	1	33	0.0005	0.0005	0.00077	0.000077	Yes
Dibenzofuran	10	6	60	0.00059	0.0000095	0.073	0.0073	No
DiethylPhthalate	2	2	100	0.0007	0.0005	29	2.9	No
Hexachlorobutadiene	23	1	4	0.003	0.003	0.0073	0.00073	Yes
Hexachloroethane	3	1	33	0.0008	0.0008	0.040	0.0040	No
Isophorone	3	1	33	0.0003	0.0003	0.90	0.090	No
Nitrobenzene	3	1	33	0.0008	0.0008	0.018	0.0018	No
Phenol	3	2	67	0.011	0.0005	11	1.1	No
<u>Polynuclear Aromatic Hydrocarbons</u>								
2-Methylnaphthalene	3	1	33	0.0050	0.0050	0.15	0.015	No
Acenaphthene	22	14	64	0.000943	0.000019	2.2	0.22	No
Acenaphthylene	22	2	9	0.000479	0.000139	2.2	0.22	No
Anthracene	22	11	50	0.000026	0.0000023	11	1.1	No
Benzo(a)anthracene	22	5	23	0.0000031	0.0000023	0.0012	0.00012	No
Benzo(a)pyrene	22	1	5	0.000002	0.000002	0.0002	0.00002	No
Benzo(g,h,i)perylene	22	2	9	0.000031	0.0000091	1.1	0.11	No
Chrysene	22	10	45	0.000012	0.0000014	0.12	0.012	No
Fluoranthene	22	9	41	0.0000069	0.0000030	1.5	0.15	No
Fluorene	22	17	77	0.00166	0.0000035	1.5	0.15	No
Indeno(1,2,3-cd)Pyrene	22	1	5	0.0000034	0.0000034	0.0012	0.00012	No
Naphthalene	23	22	96	0.18	0.0000033	0.73	0.073	Yes
Phenanthrene	22	16	73	0.000571	0.0000045	11	1.1	No
Pyrene	22	13	59	0.000015	0.000003	1.1	0.11	No

Table B-5 Selection of Chemicals of Potential Concern for Human Health - Subsurface Water at Site SS03

Constituent	Subsurface Water Data					Regulatory Criteria ^a (mg/L)	COPC Screening Benchmark ^b (mg/L)	COPC?
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)			
<u>Petroleum Hydrocarbons</u>								
Diesel Range Organics (DRO)	22	21	95	6.4	0.19	1.5 _g	1.5	Yes
Gasoline Range Organics (GRO)	22	21	95	7.5	0.115	2.2 _g	2.2	Yes
Residual Range Organics (RRO)	12	4	33	6.9	0.085	1.1 _g	1.1	Yes

Notes:

COPC - Chemical of Potential Concern.

na - Not available.

mg/L - Milligrams per liter.

NC - Not calculated.

NA - Not applicable.

^a Regulatory Criteria is derived from the following hierarchy:

1. 18 AAC 75, Table C Groundwater Cleanup Levels (ADEC, 2008a).
2. Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites - Tap Water (USEPA, 2008a).

^b COPC Screening Benchmark is based on cancer risk of 1×10^{-6} or a hazard index of 0.1.

^c Based on residential cleanup value calculated according to Risk Assessment Procedures Manual guidance (18 AAC 75.340). Lead is not included in the cumulative hazard estimate, therefore the regulatory criterion was not modified (i.e., not divided by 10).

^d ADEC Table C Groundwater Cleanup Level (ADEC, 2008a) for total xylenes used as a surrogate.

^e ADEC Table C Groundwater Cleanup Level (ADEC, 2008a) for isopropylbenzene used as a surrogate.

^f USEPA Tap Water RSL for 4-methylphenol used as a surrogate.

^g Petroleum hydrocarbons are not included in the cumulative hazard calculations, therefore the regulatory criterion was not modified (i.e., not divided by 10).

Table B-6 Selection of Chemicals of Potential Concern for Ecological Receptors - Surface Soil at Site SS03

Constituent	Surface Soil Data					Regulatory Criteria ^a (mg/Kg)	COPEC Screening Benchmark ^b (mg/Kg)	COPEC?
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected	Minimum Detected			
				Concentration (mg/Kg)	Concentration (mg/Kg)			
<u>Inorganics, Total</u>								
Aluminum ^c	2	2	100	28,800	24,000	5	5	No
Antimony	2	2	100	2	1	0.27	0.27	Yes
Arsenic	2	2	100	16	11	0.25	0.25	Yes
Barium	2	2	100	258	178	5	5	Yes
Beryllium	2	2	100	0.7	0.5	2.42	2.42	No
Cadmium	2	2	100	4	0.7	0.2	0.2	Yes
Calcium	2	2	100	4,990	2,720	NA ^d	NA	No
Chromium	2	2	100	56	50	0.018 ^e	0.018	Yes
Cobalt	2	2	100	22	15	13	13	Yes
Copper	2	2	100	95	51	1	1	Yes
Iron	2	2	100	39,500	26,500	NA ^d	NA	No
Lead	8	8	100	259	11.3	9.36	9.36	Yes
Magnesium	2	2	100	7,850	6,350	NA ^d	NA	No
Manganese	2	2	100	609	454	100	100	Yes
Mercury	2	2	100	1.59	0.83	0.3 ^f	0.3	Yes
Molybdenum	2	1	50	1.1	1.1	2	2	No
Nickel	2	2	100	41	37	25	25	Yes
Potassium	2	2	100	2,620	2,480	NA ^d	NA	No
Selenium	2	2	100	2	1.3	0.02	0.02	Yes
Silver	2	2	100	6	1.2	2	2	Yes
Sodium	2	2	100	120	90	NA ^d	NA	No
Tin	2	2	100	50	12	5	5	Yes
Titanium	2	2	100	1,430	1,070	1,000	1,000	Yes
Vanadium	2	2	100	88	68	2	2	Yes
Zinc	2	2	100	518	156	0.9	1	Yes
<u>Volatile Organic Compounds</u>								
1,2,4-Trimethylbenzene	18	9	50	1400	0.0014	0.0068 ^g	0	Yes
1,3,5-Trimethylbenzene	18	9	50	510	0.00078	0.0068 ^g	0.0068	Yes
1,4-Dichlorobenzene	18	1	6	1.2	1.2	0.1	0	Yes
2-Butanone (MEK)	17	3	18	0.0033	0.0022	6,487	6,487	No
Acetone	17	9	53	2.9	0.026	20	20	No
Benzene	18	4	22	13	0.00043	0.0068	0.0068	Yes
Chloroform	18	1	6	0.00038	0.00038	150	150	No
Ethylbenzene	18	8	44	26	0.0019	0.018	0.018	Yes
Isopropylbenzene	17	8	47	3.5	0.012	0.0068 ^g	0.0068	Yes
m,p-Xylenes	15	7	47	22	0.0012	0.1 ^l	0.1	Yes
Methylene Chloride	18	2	11	0.65	0.0066	183	183	No

Table B-6 Selection of Chemicals of Potential Concern for Ecological Receptors - Surface Soil at Site SS03

Constituent	Surface Soil Data					Regulatory Criteria ^a (mg/Kg)	COPEC Screening Benchmark ^b (mg/Kg)	COPEC?
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
n-Butylbenzene	17	6	35	6.4	0.037	0.0068 _g	0.0068	Yes
n-Propylbenzene	17	7	41	8.4	0.041	0.0068 _g	0.0068	Yes
o-Xylene	15	6	40	7.9	0.029	1	1	Yes
p-Isopropyltoluene	18	8	44	11	0.0015	0.0068 _g	0.0068	Yes
sec-Butylbenzene	17	6	35	6.4	0.034	0.0068 _g	0.0068	Yes
tert-Butylbenzene	17	4	24	18	0.18	0.0068 _g	0.0068	Yes
Toluene	18	10	56	78	0.00064	0.08	0.08	Yes
Total xylenes	3	3	100	2600	0.0081	0.1	0.1	Yes
Trichloroethene	18	1	6	0.00049	0.00049	0.1	0.1	No
Semi-Volatile Organic Compounds								
3-and 4-Methylphenol Coelution	2	1	50	1	1	30	30	No
Bis(2-ethylhexyl) Phthalate	3	2	67	0.2	0.1	0.91	0.91	No
Dibenzofuran	13	9	69	2.8	0.00021	na	na	Yes
DiethylPhthalate	3	3	100	0.9	0.2	53	53	No
Polynuclear Aromatic Hydrocarbons								
2-Methylnaphthalene	3	2	67	33	4	na _h	na	No
Acenaphthene	17	7	41	0.82	0.00021	na _h	na	No
Acenaphthylene	17	1	6	0.0036	0.0036	na _h	na	No
Anthracene	17	8	47	0.029	0.0005	1.6 _h	1.6	No
Benzo(a)anthracene	17	13	76	0.018	0.00025	0.1 _i	0.1	No
Benzo(a)pyrene	17	9	53	0.044	0.000205	0.1 _i	0.1	No
Benzo(b)fluoranthene	17	12	71	0.099	0.00092	0.1 _i	0.1	No
Benzo(g,h,i)perylene	17	12	71	0.058	0.00052	33 _i	33	No
Benzo(k)fluoranthene	15	9	60	0.013	0.00027	0.1 _i	0.1	No
Chrysene	17	15	88	0.2	0.0005	35 _h	35	No
Dibenz(a,h)anthracene	17	8	47	0.036	0.00043	0.1 _i	0.1	No
Fluoranthene	17	13	76	0.027	0.00063	260 _h	260	No
Fluorene	18	14	78	2.3	0.00029	30 _h	30	No
Indeno(1,2,3-cd)Pyrene	17	11	65	0.01	0.00034	0.1 _i	0.1	No
Naphthalene	18	13	72	160	0.00064	0.1 _h	0.1	No
Phenanthrene	18	16	89	0.92	0.00075	0.1 _h	0.1	No
Pyrene	18	16	89	0.2	0.00045	0.1 _i	0.1	No
Low MW PAHs	NA	NA	NA	197.1	4.0	29 _j	29	NA
High MW PAHs	NA	NA	NA	0.705	0.0045	1.1 _k	1.1	NA
Pesticides								
4,4'-DDD	2	1	50	0.043	0.043	34	34	No

Table B-6 Selection of Chemicals of Potential Concern for Ecological Receptors - Surface Soil at Site SS03

Constituent	Surface Soil Data					Regulatory Criteria ^a (mg/Kg)	COPEC Screening Benchmark ^b (mg/Kg)	COPEC?
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
4,4'-DDE	2	2	100	0.02	0.01	1.3	1.3	No
4,4'-DDT	2	2	100	0.006	0.003	0.7	0.7	No
Dieldrin	2	1	50	0.004	0.004	0.011	0.011	No
<u>Petroleum Hydrocarbons</u>								
Diesel Range Organics (DRO)	18	14	78	38,000	8.6	na	na	Yes
Gasoline Range Organics (GRO)	18	7	39	3,500	0.95	na	na	Yes
Residual Range Organics (RRO)	13	12	92	1,260	12	na	na	Yes

Notes:

4,4'-DDD - dichlorodiphenyldichloroethane

COPEC - Chemical of Potential Ecological Concern.

na - Not available.

4,4'-DDE - dichlorodiphenyldichloroethylene

mg/kg - Milligram per kilogram.

NC - Not calculated.

4,4'-DDT - dichlorodiphenyltrichloroethane

NA - Not applicable.

^a Regulatory Criteria selected based on the following hierarchy:

1) ADEC Ecoscoping Guidance (ADEC, 2008c- Appendix D).

2) Eco-SSLs - Ecological Soil Screening Level Guidance. Office of Emergency and Remedial Response. (USEPA, 2005e).

3) The lower of ORNL plant (ONRL, 1997c - Table 1) or soil invertebrate (ORNL, 1997b - Table 1) benchmarks.

4) The lower of ORNL mammalian or avian dietary wildlife benchmarks, assuming diet consists of 100 percent soil (ORNL, 1996b - Appendix D, Table 12).

^b COPEC Screening Benchmark is equal to the indicated regulatory criteria.

^c According to USEPA's Ecological Soil Screening Level Guidance (USEPA, 2003c), aluminum is only a COC when soil/sediment pH < 5.5; therefore, aluminum was not selected as a COPEC.

^d Soil Screening Criteria are not available for this essential nutrient. This analyte is excluded as a COPEC based on essential nutrient status.

^e Screening value is for Chromium VI

^f Screening value is for Inorganic Mercury

^g Benzene used as a surrogate chemical.

^h Individual low MW PAH isomers are summed and screened against low MW PAH criteria.

ⁱ Individual high MW PAH isomers are summed and screened against high MW PAH criteria.

^j Value represents lowest Eco-SSL for low MW PAH (EPA, 2007). For risk assessment purposes, low MW PAHs are summed and compared to regulatory criteria.

^k Value represents lowest Eco-SSL for high MW PAH (EPA, 2007). For risk assessment purposes, high MW PAHs are summed and compared to regulatory criteria.

^l Total Xylenes used as a surrogate.

Table B-7 Selection of Chemicals of Potential Concern for Ecological Receptors - Sediment at Site SS03

Constituent	Surface Water Data					Regulatory Criteria ^a (mg/Kg)	COPEC Screening Benchmark ^b (mg/Kg)	COPEC?	
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)				
<u>Inorganics, Total</u>									
Aluminum ^c	1	1	100	27,900	27,900	25,500	d	25,500	No
Antimony	1	1	100	2	2	2		2	No
Arsenic	1	1	100	21	21	5.9		5.9	Yes
Barium	1	1	100	146	146	na		na	Yes
Beryllium	1	1	100	0.5	0.5	na		na	Yes
Cadmium	1	1	100	1	1	0.583		0.58	Yes
Calcium	1	1	100	4,540	4,540	NA	d	NA	No
Chromium	1	1	100	62	62	36.286		36	Yes
Cobalt	1	1	100	23	23	na		na	Yes
Copper	1	1	100	55	55	28.012		28	Yes
Iron	1	1	100	62,600	62,600	NA	d	NA	No
Lead	2	1	50	20	20	35		35	No
Magnesium	1	1	100	11,500	11,500	NA	d	NA	No
Manganese	1	1	100	1,320	1,320	630		630	Yes
Mercury	1	1	100	0.09	0.09	0.174		0.17	No
Nickel	1	1	100	65	65	18		18	Yes
Potassium	1	1	100	1,950	1,950	NA	d	NA	No
Selenium	1	1	100	1.7	1.7	na		na	Yes
Silver	1	1	100	2	2	1		1	Yes
Sodium	1	1	100	100	100	NA	d	NA	No
Titanium	1	1	100	1,160	1,160	na			Yes
Vanadium	1	1	100	107	107	na		na	Yes
Zinc	1	1	100	218	218	98		98	Yes
<u>Volatile Organic Compounds</u>									
1,1,2,2-Tetrachloroethane	1	1	100	0.00018	0.00018	0.94		0.94	No
1,2,3-Trichlorobenzene	1	1	100	0.00025	0.00025	na		na	Yes
1,2,3-Trichloropropane	1	1	100	0.00021	0.00021	na		na	Yes
1,2,4-Trichlorobenzene	2	1	50	0.00027	0.00027	9.2		9	No
cis-1,3-Dichloropropene	1	1	100	0.00017	0.00017	na		na	Yes
Methylene Chloride	1	1	100	0.013	0.013	na		na	Yes
trans-1,3-Dichloropropene	1	1	100	0.00013	0.00013	na		na	Yes

Table B-7 Selection of Chemicals of Potential Concern for Ecological Receptors - Sediment at Site SS03

Constituent	Surface Water Data					Regulatory Criteria ^a (mg/Kg)	COPEC Screening Benchmark ^b (mg/Kg)	COPEC?
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
<u>Semi-Volatile Organic Compounds</u>								
3-and 4-Methylphenol Coelution	1	1	100	0.2	0.2	na	na	Yes
Bis(2-ethylhexyl) Phthalate	1	1	100	0.9	0.9	0.182	0.18	Yes
DiethylPhthalate	1	1	100	0.1	0.1	0.63	0.63	No
Phenol	1	1	100	0.1	0.1	na	na	Yes
<u>Pesticides</u>								
4,4'-DDD	1	1	100	0.00795	0.00795	0.00354	0.0035	Yes
4,4'-DDT	1	1	100	0.00954	0.00954	0.00416	0.0042	Yes
Endosulfan Sulfate	1	1	100	0.0033	0.0033	na	na	Yes
<u>Petroleum Hydrocarbons</u>								
Diesel Range Organics (DRO)	1	1	100	161	161	na	na	Yes
Gasoline Range Organics (GRO)	1	1	100	5.8	5.8	na	na	Yes

Notes:

COPEC - Chemical of Potential Ecological Concern

4,4'-DDD - dichlorodiphenyldichloroethane

4,4'-DDT - dichlorodiphenyltrichloroethane

mg/Kg - Milligram per kilogram.

NA - Not applicable.

na - Not available.

NC - Not calculated.

^a Regulatory Criteria selected based on the following hierarchy:

1) The lower of value between Threshold Effects Level (TEL) and ARCS TEL- Sediment Quality Guidelines in Screening Quick Reference Tables (SQuiRTs) (Buchman, 2006).

2) Consensus-based Freshwater Threshold Effect Concentrations per MacDonald et al. (2000 - Table 2). Sediment quality guidelines for metals in freshwater ecosystems that reflect TECs (i.e., below which harmful effects are unlikely to be observed).

3) Assessment and Remediation of Contaminated Sediment Program - TEC (ORNL, 1997a - Table 4).

4) Ontario Ministry of the Environment: Lowest effect level (ORNL, 1997a - Table 4).

5) EPA OSWER Value per ORNL, 1997a - Table 5.

6) NOAA ER-L per ORNL, 1997a - Table 1.

7) FDEP TEL Value per ORNL, 1997a - Table 1.

^b COPEC Screening Benchmark is equal to the ecological benchmark criterion.

Table B-7 Selection of Chemicals of Potential Concern for Ecological Receptors - Sediment at Site SS03

Constituent	Surface Water Data					Regulatory Criteria ^a (mg/Kg)	COPEC Screening Benchmark ^b (mg/Kg)	COPEC?
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			

^c According to USEPA's Ecological Soil Screening Level Guidance (USEPA, 2003c), aluminum is only a COC when soil/sediment pH < 5.5; therefore, aluminum was not selected as a COPEC.

^d Aluminum ecological benchmark criterion derived from lowest ARCS TEL (Buchman, 2006 - SQuIRTs).

^e Soil Screening Criteria are not available for this essential nutrient. This analyte is excluded as a COPEC based on essential nutrient status.

Table B-8 Selection of Chemicals of Potential Concern for Ecological Receptors - Surface Water at Site SS03

Constituent	Surface Water Data					Regulatory Criteria ^a (mg/L)	COPEC Screening		
	Number of Samples	Number of Detects	Frequency of Detection	Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)		Benchmark ^b (mg/L)	COPEC?	
<u>Inorganics, Total</u>									
Barium	1	1	100	0.008	0.008	0.0039		0.0039	Yes
Calcium	1	1	100	11.8	11.8	NA	c	NA	No
Iron	1	1	100	0.15	0.15	NA	c	NA	No
Magnesium	1	1	100	4.01	4.01	82		82	No
Manganese	1	1	100	0.015	0.015	0.08		0.08	No
Potassium	1	1	100	0.6	0.6	NA	c	NA	No
Sodium	1	1	100	4.7	4.7	NA	c	NA	No
Titanium	1	1	100	0.004	0.004	na		na	Yes
Zinc	1	1	100	0.005	0.005	0.021		0.021	No
<u>Semi-Volatile Organic Compounds</u>									
DiethylPhthalate	1	1	100	0.0005	0.0005	0.00018		0.00018	Yes
<u>Petroleum Hydrocarbons</u>									
Diesel Range Organics (DRO)	1	1	100	0.062	0.062	na		na	Yes

Notes:

COPEC - Chemical of Potential Ecological Concern.

na - Not available.

mg/L - Milligrams per liter.

NC - Not calculated.

NA - Not applicable.

^a Regulatory Criteria selected based on the following hierarchy:

- 1) ADEC Ecoscoping Guidance (ADEC, 2008c- Appendix D).
- 2) NAWQC - Freshwater Chronic Value. SQUIRT (Buchman, 2006).
- 3) NAWQC - Marine Chronic Value. SQUIRT (Buchman, 2006).
- 4) EPA NAWQC - Freshwater Acute Value divided by 10. SQUIRT (Buchman, 2006).
- 5) EPA NAWQC - Marine Acute Value divided by 10. SQUIRT (Buchman, 2006).
- 6) Lowest Chronic Value observed in freshwater daphnids (ORNL, 1996a - Table 1).

^b COPEC Screening Benchmark is equal to the ecological benchmark criterion.

^c Surface Water Screening Criteria are not available for this essential nutrient. This analyte is excluded as a COPEC based on essential nutrient status.

Table B-9 Selection of Chemicals of Potential Concern for Human Health - Surface Soil at Site SS08

Constituent	Surface Soil Data					Regulatory Criteria ^b (mg/Kg)	COPC Screening Benchmark ^c (mg/kg)	COPC?
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Detected Concentration (mg/L)			
<u>Inorganics, Total</u>								
Aluminum	9	9	100	33,200	19,000	77,000	7,700	Yes
Antimony	9	9	100	3	0.46	41	4.1	No
Arsenic	9	9	100	22.9	10.4	4.5	0.45	Yes
Barium	9	9	100	307	101	20,300	2,030	No
Beryllium	9	9	100	0.8	0.4	200	20	No
Cadmium	9	7	78	2	0.6	79	7.9	No
Calcium	9	9	100	5,130	993	na ^c	na	No
Chromium	9	9	100	60	31	300	30	Yes
Cobalt	9	9	100	25	11.6	na	na	Yes
Copper	9	9	100	76	22.3	4,100	410	No
Iron	9	9	100	45,400	28,500	na ^c	na	No
Lead	10	10	100	39	9.4	400 ^d	40	No
Magnesium	9	9	100	10,300	4,670	na ^c	na	No
Manganese	9	9	100	1,190	441	1,800	180	Yes
Mercury	8	4	50	0.2	0.06	18	1.8	No
Molybdenum	6	1	17	1.2	1.2	390	39	No
Nickel	9	9	100	74	23.6	2,000	200	No
Potassium	9	9	100	2,800	688	na ^c	na	No
Selenium	6	3	50	1.3	0.8	510	51	No
Silver	7	3	43	1.1	0.55	510	51	No
Sodium	9	9	100	210	51.2	na ^c	na	No
Thallium	8	5	63	0.24	0.1	8.1	0.81	No
Tin	6	2	33	11	7	47,000	4,700	No
Titanium	6	6	100	1,320	428	na	na	Yes
Vanadium	9	9	100	97	52.9	710	71	Yes
Zinc	9	9	100	150	61.3	30,400	3,040	No
<u>Volatile Organic Compounds</u>								
1,3,5-Trimethylbenzene	5	1	20	4.6	4.6	42	4.2	Yes

Table B-9 Selection of Chemicals of Potential Concern for Human Health - Surface Soil at Site SS08

Constituent	Surface Soil Data					Regulatory Criteria ^b (mg/Kg)	COPC Screening Benchmark ^c (mg/kg)	COPC?
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Detected Concentration (mg/L)			
Acetone	5	3	60	1.2	0.01	68600	6860	No
Carbon Disulfide	6	1	17	0.00054	0.00054	250	25	No
Methylene Chloride	6	6	100	0.22	0.0024	160	16	No
Toluene	6	4	67	0.00035	0.00019	220	22	No
Trichloroethene	5	2	40	0.1	0.0073	0.57	0.057	Yes
Trichlorofluoromethane	6	1	17	0.00034	0.00034	990	99	No
<u>Semi-Volatile Organic Compounds</u>								
2,4-Dimethylphenol	5	1	20	0.06	0.06	1,300	130	No
2-Nitroaniline	5	1	20	0.06	0.06	na	na	Yes
3,3'-Dichlorobenzidine	5	1	20	0.05	0.05	11	1.1	No
3-and 4-Methylphenol Coelution	5	3	60	0.4	0.1	350 ^e	35	No
3-Nitroaniline	5	1	20	0.09	0.09	na	na	Yes
4-Chloro-3-methylphenol	5	1	20	0.1	0.1	na	na	Yes
4-Chloroaniline	5	1	20	0.09	0.09	90	9	No
Bis(2-ethylhexyl) Phthalate	5	4	80	0.2	0.1	220	22	No
<u>Polynuclear Aromatic Hydrocarbons</u>								
2-Methylnaphthalene	5	2	40	0.3	0.1	280	28	No
Benzo(a)pyrene	5	1	20	0.08	0.08	0.49	0.049	Yes
Benzo(g,h,i)perylene	5	1	20	0.05	0.05	1400	140	No
Chrysene	5	1	20	0.08	0.08	490	49	No
Indeno(1,2,3-cd)Pyrene	5	1	20	0.04	0.04	4.9	0.49	No
Naphthalene	5	1	20	1.5	1.5	28	2.8	No
Phenanthrene	5	1	20	0.1	0.1	20,600	2,060	No
Pyrene	5	1	20	0.1	0.1	1,400	140	No
<u>Pesticides</u>								
4,4'-DDD	7	7	100	2.7	0.001	30	3	No
4,4'-DDE	8	6	75	0.09	0.0002	21	2.1	No

Table B-9 Selection of Chemicals of Potential Concern for Human Health - Surface Soil at Site SS08

Constituent	Surface Soil Data					Regulatory Criteria ^b (mg/Kg)	COPC Screening Benchmark ^c (mg/kg)	COPC?
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Detected Concentration (mg/L)			
4,4'-DDT	9	9	100	4.81	0.008	21		Yes
alpha Endosulfan	6	1	17	0.0011	0.0011	610 ^f	61	No
alpha-BHC	6	1	17	0.00357	0.00357	1.2	0.12	No
beta Endosulfan	6	4	67	0.02	0.001	610 ^f	61	No
Endosulfan Sulfate	6	2	33	0.003	0.0008	610 ^f	61	No
gamma-BHC (Lindane)	6	1	17	0.00351	0.00351	5.6	0.56	No
gamma-Chlordane	6	3	50	0.02	0.00158	19 ^g	1.9	No
Methoxychlor	6	2	33	0.0163	0.009	320	32	No
<u>Polychlorinated Biphenyls</u>								
Arochlor 1260	8	7	88	17	0.02	1 ^h	0.1	Yes
<u>Petroleum Hydrocarbons</u>								
Diesel Range Organics (DRO)	9	9	100	2500	4	10,250 ⁱ	10,250	No
Gasoline Range Organics (GRO)	6	6	100	630	0.98	1,400 ⁱ	1,400	No
Residual Range Organics (RRO)	5	5	100	529	43	10,000 ⁱ	10,000	No

Notes:

4,4'-DDD - dichlorodiphenyldichloroethane mg/Kg - Milligram per kilogram.

4,4'-DDE - dichlorodiphenyldichloroethylene NA - Not applicable.

4,4'-DDT - dichlorodiphenyltrichloroethane na - Not available.

COPC - Chemical of Potential Concern nc - Not calculated.

^a Regulatory Criteria is derived from the following hierarchy:

1. Minimum of the Direct Contact and Inhalation pathways listed in 18 AAC 75, Tables B1 and B2, Under 40 inch Zone (ADEC, 2008a).
2. Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites - Residential Soil (USEPA, 2008a).

^b COPC Screening Benchmark is based on cancer risk of 1×10^{-6} or a hazard index of 0.1.

^c This analyte is excluded as a COPC due to status as an essential nutrient.

^d Based on residential cleanup value calculated according to Risk Assessment Procedures Manual guidance (18 AAC 75.340). Lead is

Table B-9 Selection of Chemicals of Potential Concern for Human Health - Surface Soil at Site SS08

Constituent	Surface Soil Data					Regulatory Criteria ^b (mg/Kg)	COPC Screening Benchmark ^c (mg/kg)	COPC?
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Detected Concentration (mg/L)			

not included in the cumulative hazard estimate, therefore the regulatory criterion was not modified (ie., not divided by 10).

^e 4-Methylphenol (o-cresol) used as a surrogate chemical.

^f Endosulfan used as a surrogate chemical.

^g Chlordane used as a surrogate chemical.

^h PCBs used as a surrogate chemical.

ⁱ Because petroleum hydrocarbons are not included in the cumulative hazard estimate, the regulatory criterion was used unmodified (ie.

Table B-10 Selection of Chemicals of Potential Concern for Human Health - Subsurface Soil at Site SS08

Constituent	Subsurface Soil Data					Regulatory Criteria ^a (mg/Kg)	COPC Screening Benchmark ^b (mg/Kg)	COPC?
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected	Minimum Detected			
				Concentration (mg/Kg)	Concentration (mg/Kg)			
<u>Inorganics, Total</u>								
Aluminum	9	9	100	35,700	21,000	77,000	7,700	Yes
Antimony	9	9	100	4.0	0.55	41	4.1	No
Arsenic	11	11	100	20	8.6	4.5	0.45	Yes
Barium	11	11	100	438	130	20,300	2,030	No
Beryllium	9	8	89	0.80	0.50	200	20	No
Cadmium	11	5	45	1.2	0.25	79	7.9	No
Calcium	9	9	100	8,030	1,280	na ^c	na	No
Chromium	11	11	100	57	36	300	30	Yes
Cobalt	9	9	100	43	15	na	na	Yes
Copper	9	9	100	103	33	4,100	410	No
Iron	9	9	100	45,400	33,800	na ^c	na	No
Lead	15	15	100	114	9.0	400 ^d	40	Yes
Magnesium	9	9	100	9,880	6,180	na ^c	na	No
Manganese	9	9	100	1,040	566	1,800	180	Yes
Mercury	9	6	67	0.54	0.051	18	1.8	No
Molybdenum	7	4	57	2.0	1.1	390	39	No
Nickel	9	9	100	65	34.3	2,000	200	No
Potassium	9	9	100	3,410	1,090	na ^c	na	No
Selenium	9	5	56	3.0	0.80	510	51	No
Silver	9	4	44	1.1	0.151	510	51	No
Sodium	9	9	100	160	70	na ^c	na	No
Thallium	8	5	63	0.30	0.10	8.1	0.81	No
Tin	7	1	14	8.0	8.0	47,000	4,700	No
Titanium	7	7	100	1,350	268	na	na	Yes
Vanadium	9	9	100	93	59	710	71	Yes
Zinc	9	9	100	200	75	30,400	3,040	No
<u>Volatile Organic Compounds</u>								
1,2,4-Trimethylbenzene	7	3	43	0.00073	0.00020	49	4.9	No
1,3,5-Trimethylbenzene	6	2	33	3.6	0.53	42	4.2	No
Acetone	7	5	71	4.2	0.012	68,600	6,860	No
Benzene	9	3	33	0.014	0.00023	11	1.1	No

Table B-10 Selection of Chemicals of Potential Concern for Human Health - Subsurface Soil at Site SS08

Constituent	Subsurface Soil Data			Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)	Regulatory Criteria ^a (mg/Kg)	COPC Screening Benchmark ^b (mg/Kg)	COPC?
	Number of Samples	Number of Detects	Detection Frequency					
Carbon Disulfide	6	2	33	0.038	0.00034	250	25	No
Carbon Tetrachloride	6	2	33	0.0087	0.0049	3.1	0.31	No
Chloroform	6	1	17	0.0014	0.0014	3.2	0.32	No
cis-1,2-Dichloroethene	6	1	17	0.00028	0.00028	130	13	No
Dichlorodifluoromethane	6	1	17	0.016	0.016	380	38	No
Ethylbenzene	9	3	33	0.14	0.00023	110	11	No
Isopropylbenzene	6	1	17	0.18	0.18	62	6.2	No
Methylene Chloride	7	7	100	0.11	0.0025	160	16	No
Naphthalene	9	4	44	1.1	0.085	28	2.8	No
p-Isopropyltoluene	7	3	43	0.38	0.0016	62	6.2	No
Tetrachloroethene	6	1	17	0.00099	0.00099	10	1.0	No
Toluene	9	5	56	0.34	0.00018	220	22	No
Total xylenes	7	4	57	0.41	0.00049	63	6.3	No
Trichloroethene	6	3	50	0.055	0.00013	0.57	0.057	No
Trichlorofluoromethane	6	1	17	0.19	0.19	990	99	No
3-and 4-Methylphenol Coelution	5	2	40	0.30	0.10	350	35	No
Bis(2-ethylhexyl) Phthalate	5	1	20	0.20	0.20	220	22	No
2-Methylnaphthalene	7	3	43	7.30	0.26	280	28	No
Pyrene	7	3	43	0.200	0.078	1,400	140	No
<u>Polynuclear Aromatic Hydrocarbons</u>								
Benzo(a)pyrene	7	2	29	0.057	0.014	0	0.049	Yes
<u>Pesticides</u>								
4,4'-DDD	9	7	78	0.88	0.0024	30	3.0	No
4,4'-DDE	9	5	56	0.050	0.00080	21	2.1	No
4,4'-DDT	9	7	78	0.74	0.010	21	2.1	No
beta Endosulfan	8	1	13	0.010	0.010	610	61	No
Dieldrin	8	1	13	0.040	0.040	0.32	0.032	Yes
Methoxychlor	8	1	13	0.010	0.010	320	32	No
<u>Polychlorinated Biphenyls</u>								
Arochlor 1260	8	2	25	1.6	0.20	1.0	0.10	Yes

Table B-10 Selection of Chemicals of Potential Concern for Human Health - Subsurface Soil at Site SS08

Constituent	Subsurface Soil Data					Regulatory Criteria ^a (mg/Kg)	COPC Screening Benchmark ^b (mg/Kg)	COPC?	
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected	Minimum Detected				
				Concentration (mg/Kg)	Concentration (mg/Kg)				
Petroleum Hydrocarbons									
Diesel Range Organics (DRO)	13	11	85	23,900	6.0	10,250	i	10,250	Yes
Gasoline Range Organics (GRO)	9	9	100	1,400	0.96	1,400	i	1,400	No
Residual Range Organics (RRO)	8	7	88	13,200	31	10,000	i	10,000	Yes

Notes:

4,4'-DDD - dichlorodiphenyldichloroethane COPC - Chemical of Potential Concern
 4,4'-DDE - dichlorodiphenyldichloroethylene mg/Kg - Milligram per kilogram.
 4,4'-DDT - dichlorodiphenyltrichloroethane NA - Not applicable.

^a Regulatory Criteria is derived from the following hierarchy:

1. Minimum of the Direct Contact and Inhalation pathways listed in 18 AAC 75, Tables B1 and B2, Under 40 inch Zone (ADEC, 2008a).
2. Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites - Residential Soil (USEPA, 2008a).

^b COPC Screening Benchmark is based on cancer risk of 1×10^{-6} or a hazard index of 0.1.

^c This analyte is excluded as a COPC due to status as an essential nutrient.

^d Based on residential cleanup value calculated according to Risk Assessment Procedures Manual guidance (18 AAC 75.340). Lead is not included in the cumulative hazard estimate, therefore the regulatory criterion was not modified (ie., not divided by 10).

^e Isopropylbenzene used as a surrogate chemical.

^f 4-Methylphenol (o-cresol) used as a surrogate chemical.

^g Endosulfan used as a surrogate chemical.

^h PCBs used as a surrogate chemical.

ⁱ Because petroleum hydrocarbons are not included in the cumulative hazard estimate, the regulatory criterion was used unmodified (i.e., not divided by 10).

Table B-11 Selection of Chemicals of Potential Concern for Human Health - Sediment at SS08

Constituent	Sediment Data					Regulatory Criteria ^a (mg/Kg)	COPC Screening Benchmark ^b (mg/Kg)	COPC?	
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)				
<u>Inorganics, Total</u>									
Aluminum	3	3	100	35,000	28,900	77,000	7,700	Yes	
Antimony	3	2	67	0.80	0.66	41	4.1	No	
Arsenic	6	6	100	24	10.5	4.5	0.45	Yes	
Barium	6	6	100	258	188	20,300	2,030	No	
Beryllium	3	3	100	1.2	0.60	200	20	No	
Cadmium	6	5	83	1.9	0.309	79	7.9	No	
Calcium	3	3	100	10,600	7,110	na	c	na	No
Chromium	6	6	100	78	37	300	30	Yes	
Cobalt	3	3	100	32	19	na	na	Yes	
Copper	3	3	100	122	49	4,100	410	No	
Iron	3	3	100	74,400	36,600	na	c	na	No
Lead	6	6	100	69	16	400	d	40	Yes
Magnesium	3	3	100	16,200	7,930	na	c	na	No
Manganese	3	3	100	1,300	857	1800	180	Yes	
Mercury	6	6	100	0.26	0.079	18	1.8	No	
Molybdenum	1	1	100	3.0	3.0	390	39	No	
Nickel	3	3	100	110	39	2,000	200	No	
Potassium	3	3	100	2,820	1,710	na	c	na	No
Selenium	5	2	40	1.5	0.31	510	51	No	
Silver	5	3	60	1.0	0.25	510	51	No	
Sodium	3	3	100	209	146	na	c	na	No
Thallium	3	3	100	0.30	0.28	8.1	0.81	No	
Titanium	1	1	100	1,470	1,470	na	na	Yes	
Vanadium	3	3	100	106	86	710	71	Yes	
Zinc	3	3	100	273	102	30,400	3,040	No	
<u>Volatile Organic Compounds</u>									
1,1,1-Trichloroethane	4	1	25	0.057	0.057	360	36	No	
3,3'-Dichlorobenzidine	1	1	100	0.080	0.080	11	1.1	No	
4-Chloroaniline	1	1	100	0.20	0.20	90	9	No	
m,p-Xylenes	4	2	50	0.079	0.0031	63	e	6.3	No
Methylene Chloride	4	1	25	0.0018	0.0018	160	16	No	
Tetrachloroethene	3	1	33	0.29	0.29	10	1.0	No	
Toluene	4	1	25	0.0021	0.0021	220	22	No	

Table B-11 Selection of Chemicals of Potential Concern for Human Health - Sediment at SS08

Constituent	Sediment Data					Regulatory Criteria ^a (mg/Kg)		COPC Screening Benchmark ^b (mg/Kg)		COPC?
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)					
<u>Polynuclear Aromatic Hydrocarbons</u>										
Acenaphthene	4	1	25	0.010	0.010	2,800		280		No
Acenaphthylene	4	1	25	0.0074	0.0074	2,800		280		No
Anthracene	4	2	50	0.079	0.012	20,600		2,060		No
Benzo(a)anthracene	4	2	50	0.063	0.022	4.9		0.49		No
Benzo(a)pyrene	4	2	50	0.063	0.023	0.49		0.049		Yes
Benzo(b)fluoranthene	4	2	50	0.063	0.035	4.9		0.49		No
Benzo(g,h,i)perylene	4	2	50	0.044	0.017	1,400		140		No
Benzo(k)fluoranthene	3	2	67	0.042	0.028	49		4.9		No
Chrysene	4	2	50	0.12	0.068	490		49		No
Dibenz(a,h)anthracene	4	1	25	0.015	0.015	0.49		0.049		No
Fluoranthene	4	2	50	0.13	0.12	1,900		190		No
Fluorene	4	1	25	0.015	0.015	2,300		230		No
Indeno(1,2,3-cd)Pyrene	4	2	50	0.033	0.016	4.9		0.49		No
Naphthalene	4	2	50	0.055	0.0078	28		2.8		No
Phenanthrene	4	3	75	0.17	0.012	20,600		2,060		No
Pyrene	4	2	50	0.18	0.084	1,400		140		No
<u>Pesticides</u>										
4,4'-DDD	6	6	100	0.67	0.0062	30		3.0		No
4,4'-DDE	6	5	83	0.26	0.028	21		2.1		No
4,4'-DDT	6	6	100	2.5	0.056	21		2.1		Yes
Endrin	5	1	20	0.0011	0.0011	2.0		0.20		No
Endosulfan Sulfate	4	1	25	0.0042	0.0042	610	f	61		No
<u>Polychlorinated Biphenyls</u>										
Arochlor 1260	5	3	60	0.19	0.055	1.0	g	0.10		Yes
<u>Petroleum Hydrocarbons</u>										
Diesel Range Organics (DRO)	6	5	83	2,740	26	10,250	h	10,250		No
Gasoline Range Organics (GRO)	5	3	60	4.2	2.0	1,400	h	1,400		No
Residual Range Organics (RRO)	5	5	100	1,190	119	10,000	h	10,000		No

Notes:

COPC - Chemical of Potential Concern

mg/Kg - Milligram per kilogram.

Table B-11 Selection of Chemicals of Potential Concern for Human Health - Sediment at SS08

Constituent	Sediment Data				Regulatory Criteria ^a (mg/Kg)	COPC Screening Benchmark ^b (mg/Kg)	COPC?
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)		
4,4'-DDD - dichlorodiphenyldichloroethane				na - Not available.			
4,4'-DDE - dichlorodiphenyldichloroethylene				NC - Not calculated.			
4,4'-DDT - dichlorodiphenyltrichloroethane							

^a Regulatory Criteria is derived from the following hierarchy:

1. Minimum of the Direct Contact and Inhalation pathways listed in 18 AAC 75, Tables B1 and B2, Under 40 inch Zone (ADEC, 2008a).
2. Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites - Residential Soil (USEPA, 2008a).

^b COPC Screening Benchmark is based on cancer risk of 1×10^{-6} or a hazard index of 0.1.

^c This analyte is excluded as a COPC due to status as an essential nutrient.

^d Based on residential cleanup value calculated according to Risk Assessment Procedures Manual guidance (18 AAC 75.340). Lead is not included in the cumulative hazard estimate; therefore, the regulatory criterion was not modified (i.e., not divided by 10).

^e Total xylenes used as a surrogate chemical.

^f Endosulfan used as a surrogate chemical.

^g PCBs used as a surrogate chemical.

^h Because petroleum hydrocarbons are not included in the cumulative hazard estimate, the regulatory criterion was used unmodified (i.e., not divided by 10).

Table B-12 Selection of Chemicals of Potential Concern for Human Health - Sludge at Site SS08

Constituent	Sludge Data					Regulatory Criteria ^a (mg/Kg)	COPC Screening Benchmark ^b (mg/Kg)	COPC?
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
<u>Inorganics, Total</u>								
Aluminum	2	2	100	31,000	26,600	77,000	7,700	Yes
Antimony	2	2	100	2.0	1.0	41	4.1	No
Arsenic	2	2	100	20	14	4.5	0.45	Yes
Barium	2	2	100	322	270	20,300	2,030	No
Beryllium	2	2	100	0.80	0.60	200	20	No
Cadmium	2	1	50	0.90	0.90	79	7.9	No
Calcium	2	2	100	3,480	2,580	na ^c	na	No
Chromium	2	2	100	58	51	300	30	Yes
Cobalt	2	2	100	20	16	na	na	Yes
Copper	2	2	100	454	92	4,100	410	Yes
Iron	2	2	100	49,900	41,500	na ^c	na	No
Lead	2	2	100	14	10	400 ^d	40	No
Magnesium	2	2	100	8,980	7,320	na ^c	na	No
Manganese	2	2	100	877	868	1,800	180	Yes
Mercury	1	1	100	0.040	0.040	18	1.8	No
Nickel	2	2	100	46	45	2,000	200	No
Potassium	2	2	100	3,530	1,520	na ^c	na	No
Selenium	2	2	100	4.0	1.3	510	51	No
Silver	2	1	50	1.0	1.0	510	51	No
Sodium	2	2	100	110	90	na ^c	na	No
Thallium	2	1	50	0.10	0.10	8.1	0.81	No
Tin	2	1	50	8.0	8.0	47,000	4,700	No
Titanium	2	2	100	1,322	1,100	na	na	Yes
Vanadium	2	2	100	102	77	710	71	Yes
Zinc	2	2	100	831	136	30,400	3,040	No
<u>Volatile Organic Compounds</u>								
1,2,4-Trimethylbenzene	2	2	100	0.0045	0.0029	49	4.9	No
1,3,5-Trimethylbenzene	2	2	100	0.0018	0.0017	42	4.2	No

Table B-12 Selection of Chemicals of Potential Concern for Human Health - Sludge at Site SS08

Constituent	Sludge Data					Regulatory Criteria ^a (mg/Kg)	COPC Screening Benchmark ^b (mg/Kg)	COPC?
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
1,4-Dichlorobenzene	2	2	100	0.0082	0.0065	30	3.0	No
Carbon Disulfide	2	2	100	0.0092	0.0003	250	25	No
Acetone	2	2	100	0.050	0.019	68,600	6,860	No
Benzene	2	1	50	0.00025	0.00025	11	1.1	No
Chloroform	2	1	50	0.00026	0.00026	3.2	0.32	No
Methylene Chloride	2	2	100	0.0040	0.0011	160	16	No
n-Butylbenzene	2	1	50	0.0020	0.0020	42	4.2	No
p-Isopropyltoluene	2	2	100	0.18	0.0033	62	6.2	No
Tetrachloroethene	2	2	100	0.00056	0.00023	10	1.0	No
Toluene	2	2	100	0.38	0.0061	220	22	No
Total xylenes	2	2	100	0.0045	0.0015	63	6.3	No
Trichloroethene	2	2	100	0.00095	0.00079	0.57	0.057	No
<u>Semi-Volatile Organic Compounds</u>								
2-Methylphenol	2	1	50	0.20	0.20	3,200	320	No
3-and 4-Methylphenol Coelution	2	2	100	0.40	0.20	350	35	No
Bis(2-ethylhexyl) Phthalate	2	2	100	0.80	0.40	220	22	No
DiethylPhthalate	2	1	50	0.20	0.20	61,900	6,190	No
Phenol	2	1	50	0.10	0.10	23,200	2,320	No
<u>Polynuclear Aromatic Hydrocarbons</u>								
Naphthalene	2	2	100	0.0083	0.0017	28	2.8	No
<u>Pesticides</u>								
4,4'-DDD	2	2	100	0.0096	0.0040	30	3.0	No
4,4'-DDE	2	2	100	0.0037	0.0030	21	2.1	No
4,4'-DDT	2	2	100	0.037	0.010	21	2.1	No
<u>Petroleum Hydrocarbons</u>								
Diesel Range Organics (DRO)	1	1	100	1,430	1,430	10,250	10,250	No

Table B-12 Selection of Chemicals of Potential Concern for Human Health - Sludge at Site SS08

Constituent	Sludge Data					Regulatory Criteria ^a (mg/Kg)	COPC Screening Benchmark ^b (mg/Kg)	COPC?
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
Gasoline Range Organics (GRO)	2	2	100	16	14	1,400 ^g	1,400	No
Residual Range Organics (RRO)	1	1	100	574	574	10,000 ^g	10,000	No

Notes:

4,4'-DDD - dichlorodiphenyldichloroethane mg/Kg - Milligram per kilogram.

4,4'-DDE - dichlorodiphenyldichloroethylene NA - Not applicable.

4,4'-DDT - dichlorodiphenyltrichloroethane na - Not available.

COPC - Chemical of Potential Concern NC - Not calculated.

^a Regulatory Criteria is derived from the following hierarchy:

1. Minimum of the Direct Contact and Inhalation pathways listed in 18 AAC 75, Tables B1 and B2, Under 40 inch Zone (ADEC, 2008a).

2. Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites - Residential Soil (USEPA, 2008a).

^b COPC Screening Benchmark is based on cancer risk of 1×10^{-6} or a hazard index of 0.1.

^c This analyte is excluded as a COPC due to status as an essential nutrient.

^d Based on residential cleanup value calculated according to Risk Assessment Procedures Manual guidance (18 AAC 75.340). Lead is not included in the cumulative hazard estimate, therefore the regulatory criterion was not modified (ie., not divided by 10).

^e Isopropylbenzene used as a surrogate chemical.

^f 4-Methylphenol (o-cresol) used as a surrogate chemical.

^g Because petroleum hydrocarbons are not included in the cumulative hazard estimate, the regulatory criterion was used unmodified (i.e., not divided by 10).

Table B-13 Selection of Chemicals of Potential Concern for Human Health - Surface Water at Site SS08

Constituent	Surface Water Data					Regulatory Criteria ^a (mg/L)	COPC Screening Benchmark ^b (mg/L)	COPC?
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)			
Inorganics, Total								
Aluminum	3	2	67	1.2	0.58	37	3.7	No
Arsenic	4	2	50	0.0010	0.00090	0.036	0.0036	No
Barium	4	4	100	0.015	0.0050	2.0	0.20	No
Calcium	3	3	100	13	9.8	NA	na	No
Chromium	4	2	50	0.0050	0.0040	0.10	0.010	No
Copper	2	1	50	0.0028	0.0028	0.0031	0.00031	Yes
Iron	3	3	100	1.5	0.060	NA	na	No
Lead	4	2	50	0.0011	0.0010	0.0081	0.00081	Yes
Magnesium	3	3	100	3.4	2.2	NA	na	No
Manganese	3	3	100	0.050	0.0020	0.88	0.088	No
Potassium	3	3	100	1.0	0.40	NA	na	No
Selenium	3	1	33	0.0012	0.0012	0.071	0.0071	No
Silver	3	1	33	0.0030	0.0030	0.10	0.010	No
Sodium	3	3	100	2.4	2.1	NA	na	No
Titanium	1	1	100	0.0020	0.0020	na	na	Yes
Vanadium	2	1	50	0.0040	0.0040	0.26	0.026	No
Zinc	3	2	67	0.010	5	0.5	0..5	No
<u>Volatile Organic Compounds</u>								
1,1,1-Trichloroethane	2	1	50	0.00026	0.00026	0.20	0.020	No
1,1-Dichloropropene	2	1	50	0.00029	0.00029	0.0085	0.00085	No
1-Chlorohexane	1	1	100	0.00024	0.00024	na	na	Yes
2,2-Dichloropropane	2	1	50	0.00025	0.00025	0.0050	0.00050	No
2-Chloroethyl Vinyl Ether	2	1	50	0.00019	0.00019	na	na	Yes
Bromomethane	3	1	33.3	0.00015	0.00015	0.051	0.0051	No
Carbon Disulfide	2	1	50	0.0025	0.0025	3.7	0.37	No
Carbon Tetrachloride	2	1	50	0.00042	0.00042	0.0050	0.00050	No
Chloroethane	2	1	50	0.00031	0.00031	0.29	0.029	No
Chloromethane	2	1	50	0.00031	0.00031	0.066	0.0066	No
Isopropylbenzene	2	1	50	0.00021	0.00021	3.7	0.37	No
n-Butylbenzene	2	1	50	0.00051	0.00051	0.37	0.037	No
sec-Butylbenzene	2	1	50	0.00031	0.00031	0.37	0.037	No
Styrene	2	1	50	0.00013	0.00013	0.10	0.010	No
Toluene	2	1	50	0.00019	0.00019	1.0	0.10	No

Table B-13 Selection of Chemicals of Potential Concern for Human Health - Surface Water at Site SS08

Constituent	Surface Water Data					Regulatory Criteria ^a (mg/L)	COPC Screening Benchmark ^b (mg/L)	COPC?
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)			
Trichlorofluoromethane	2	1	50	0.00036	0.00036	11	1.1	No
Vinyl Acetate	1	1	100	0.00032	0.00032	37	3.7	No
Vinyl Chloride	2	1	50	0.00036	0.00036	0.0020	0.00020	Yes
<u>Semi-Volatile Organic Compounds</u>								
Hexachlorobutadiene	2	1	50	0.00039	0.00039	0.0073	0.00073	No
<u>Pesticides</u>								
4,4'-DDD	1	1	100	0.0000022	0.0000022	0.0035	0.00035	No
4,4'-DDE	1	1	100	0.0000041	0.0000041	0.0025	0.00025	No
4,4'-DDT	2	2	100	0.000031	0.000030	0.0025	0.00025	No

Notes:

4,4'-DDD - dichlorodiphenyldichloroethane

4,4'-DDE - dichlorodiphenyldichloroethylene

4,4'-DDT - dichlorodiphenyltrichloroethane

COPC - Chemical of potential concern.

mg/L - Milligram per liter.

^aRegulatory Criteria was selected according to the following hierarchy:

- ADEC Water Quality Standards 18 AAC 70 (ADEC, 2008b).
- 18 AAC 75, Table C Groundwater Cleanup Levels (ADEC, 2008a).
- Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites - Tap Water (USEPA, 2008a).

^b COPC Screening Benchmark is based on cancer risk of 1×10^{-6} or a hazard index of 0.1.

^c This analyte is excluded as a COPC due to status as an essential nutrient.

^d 1,3-Dichloropropene used as a surrogate chemical.

^e 1,2-Dichloropropane used as a surrogate chemical.

Table B-14 Selection of Chemicals of Potential Concern for Human Health - Subsurface Water at Site SS08

Constituent	Subsurface Water Data					Regulatory Criteria ^b (mg/L)	COPC Screening Benchmark ^c (mg/L)	COPC?
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)			
<u>Inorganics, Total</u>								
Aluminum	5	5	100	176	0.090	37	3.7	Yes
Antimony	5	1	20	0.0030	0.0030	0.0060	0.00060	Yes
Arsenic	31	21	68	0.31	0.0038	0.010	0.0010	Yes
Barium	31	31	100	2.2	0.0060	2.0	0.20	Yes
Beryllium	5	1	20	0.0068	0.0068	0.0040	0.00040	Yes
Cadmium	31	18	58	0.0095	0.00013	0.0050	0.00050	Yes
Calcium	5	5	100	79	16	na	na	No
Chromium	31	26	84	0.37	0.0047	0.10	0.010	Yes
Cobalt	5	1	20	0.19	0.19	na	na	Yes
Copper	5	5	100	0.51	0.0040	1.0	0.10	Yes
Iron	5	5	100	316	0.070	26	2.6	No
Lead	31	26	84	0.33	0.0010	0.015	0.0015	Yes
Magnesium	5	5	100	99	4.1	na	na	No
Manganese	5	5	100	16	0.036	0.88	0.088	Yes
Mercury	30	11	37	0.00060	0.00011	0.0020	0.00020	Yes
Nickel	5	1	20	0.45	0.45	0.10	0.010	Yes
Potassium	5	5	100	19	0.90	na	na	No
Selenium	30	10	33	0.025	0.0032	0.050	0.0050	Yes
Silver	31	17	55	0.0040	0.00011	0.10	0.010	No
Sodium	5	5	100	11	2.6	na	na	No
Thallium	5	1	20	0.0013	0.0013	0.0020	0.00020	Yes
Tin	4	1	25	0.042	0.042	22	2.2	No
Titanium	4	4	100	0.038	0.0020	na	na	Yes
Vanadium	5	1	20	0.50	0.50	0.26	0.026	Yes
Zinc	5	3	60	0.88	0.0060	5.0	0.50	Yes
<u>Volatile Organic Compounds</u>								
1,1,1,2-Tetrachloroethane	20	1	5	0.00050	0.00050	0.00052	0.00052	No
1,2,4-Trimethylbenzene	21	3	14	0.10	0.00026	1.8	0.18	No
1,2-Dibromoethane	20	1	5	0.0010	0.0010	6.5E-06	0.0000065	Yes
1,3,5-Trimethylbenzene	21	2	10	0.010	0.00023	1.8	0.18	No
2-Chloroethyl Vinyl Ether	2	1	50	0.00019	0.00019	na	na	Yes
Acetone	19	3	16	0.010	0.0024	33	3.3	No
Benzene	21	1	5	0.0010	0.0010	0.0050	0.00050	Yes

Table B-14 Selection of Chemicals of Potential Concern for Human Health - Subsurface Water at Site SS08

Constituent	Subsurface Water Data					Regulatory Criteria ^b (mg/L)	COPC Screening Benchmark ^c (mg/L)	COPC?
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)			
Bromodichloromethane	20	1	5	0.00050	0.00050	0.014	0.0014	No
Carbon Disulfide	11	1	9	0.00019	0.00019	3.7	0.37	No
Chlorobenzene	20	1	5	0.00050	0.00050	0.10	0.010	No
Chloroethane	21	1	5	0.0030	0.0030	0.29	0.029	No
Chloroform	20	1	5	0.00014	0.00014	0.14	0.014	No
Chloromethane	21	2	10	0.0030	0.00019	0.066	0.0066	No
cis-1,2-Dichloroethene	20	1	5	0.00011	0.00011	0.070	0.0070	No
Dibromomethane	20	1	5	0.0010	0.0010	0.37	0.037	No
Ethylbenzene	21	2	10	0.0080	0.00034	0.70	0.070	No
Isopropylbenzene	21	2	10	0.017	0.0012	3.7	0.37	No
m,p-Xylenes	18	1	6	0.00023	0.00023	10 ^e	1.0	No
n-Butylbenzene	21	2	10	0.029	0.00086	0.37	0.037	No
n-Propylbenzene	21	2	10	0.020	0.0011	3.7 ^f	0.37	No
o-Xylene	18	1	6	0.00013	0.00013	10 ^e	1.0	No
p-Isopropyltoluene	21	2	10	0.019	0.0010	3.7 ^f	0.37	No
sec-Butylbenzene	21	3	14	0.022	0.00017	0.37	0.037	No
Styrene	20	1	5	0.00013	0.00013	0.10	0.010	No
Tert-Butylbenzene	21	2	10	0.0060	0.00088	0.37	0.037	No
Toluene	20	8	40	0.12	0.0001	1.0	0.10	Yes
Total Xylenes	3	1	33	0.011	0.011	10	1.0	No
<u>Semi-Volatile Organic Compounds</u>								
Dibenzofuran	11	1	9	0.000079	0.000079	0.073	0.0073	No
<u>Polynuclear Aromatic Hydrocarbons</u>								
2-Methylnaphthalene	3	1	33	0.46	0.46	0.15	0.015	Yes
Acenaphthene	21	5	24	0.0055	0.0000047	2.2	0.22	No
Acenaphthylene	20	4	20	0.000016	0.0000028	2.2	0.22	No
Anthracene	20	7	35	0.000010	0.0000012	11	1.1	No
Benzo(a)anthracene	20	3	15	0.0000088	0.0000026	0.0012	0.00012	No
Benzo(a)pyrene	20	2	10	0.0000054	0.000002	0.00020	0.000020	No
Benzo(b)fluoranthene	20	3	15	0.0000079	0.0000028	0.0012	0.00012	No
Benzo(g,h,i)perylene	20	7	35	0.000013	0.000004	1.1	0.11	No
Benzo(k)fluoranthene	18	3	17	0.000007	0.0000021	0.012	0.0012	No
Chrysene	20	16	80	0.000013	0.0000014	0.12	0.012	No

Table B-14 Selection of Chemicals of Potential Concern for Human Health - Subsurface Water at Site SS08

Constituent	Subsurface Water Data					Regulatory Criteria ^b (mg/L)	COPC Screening	
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)		Benchmark ^c (mg/L)	COPC?
Dibenz(a,h)anthracene	20	3	15	0.000048	0.000002	0.00012	0.000012	No
Fluoranthene	20	13	65	0.000018	0.0000028	1.5	0.15	No
Fluorene	21	13	62	0.012	0.0000027	1.5	0.15	No
Indeno(1,2,3-cd)Pyrene	20	3	15	0.000007	0.0000027	0.0012	0.00012	No
Naphthalene	23	18	78	0.14	0.0000051	0.73	0.073	Yes
Phenanthrene	21	19	90	0.0048	0.0000047	11	1.1	No
Pyrene	20	17	85	0.000026	0.0000026	1.1	0.11	No
Pesticides								
4,4'-DDD	9	2	22	0.00016	0.0000040	0.0035	0.00035	No
4,4'-DDT	9	2	22	0.00011	0.000010	0.0025	0.00025	No
Heptachlor	8	2	25	0.000010	0.0000090	0.00040	0.000040	No
Heptachlor Epoxide	7	1	14	0.0000030	0.0000030	0.00020	0.000020	No
Methoxychlor	8	2	25	0.000020	0.000010	0.040	0.0040	No
Petroleum Hydrocarbons								
Diesel Range Organics (DRO)	29	15	52	190	0.036	1.5 g	1.5	Yes
Gasoline Range Organics (GRO)	21	3	14	0.37	0.14	2.2 g	2.2	No
Residual Range Organics (RRO)	10	6	60	0.3	0.059	1.1 g	1.1	No

Notes:

4,4'-DDD - dichlorodiphenyldichloroethane

NA - Not applicable.

4,4'-DDT - dichlorodiphenyltrichloroethane

na - Not available.

COPC - Chemical of Potential Concern.

NC - Not calculated.

mg/L - Milligrams per liter.

^a Regulatory Criteria is derived from the following hierarchy:

1. 18 AAC 75, Table C Groundwater Cleanup Levels (ADEC, 2008a).
2. Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites - Tap Water (USEPA, 2008a).

^b COPC Screening Benchmark is based on cancer risk of 1×10^{-6} or a hazard index of 0.1.

^c This analyte is excluded as a COPC due to status as an essential nutrient.

^d Based on residential cleanup value calculated according to Risk Assessment Procedures Manual guidance (18 AAC 75.340). Lead is not included in the cumulative hazard estimate, therefore the regulatory criterion was not modified (ie., not divided by 10).

^e ADEC Table C Groundwater Cleanup Level (ADEC, 2008a) for total xylenes used as a surrogate.

Table B-14 Selection of Chemicals of Potential Concern for Human Health - Subsurface Water at Site SS08

Constituent	Subsurface Water Data					Regulatory Criteria ^b (mg/L)	COPC Screening Benchmark ^c (mg/L)	COPC?
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)			

^f ADEC Table C Groundwater Cleanup Level (ADEC, 2008a) for isopropylbenzene used as a surrogate.

^g Petroleum hydrocarbons are not included in the cumulative hazard calculations, therefore the regulatory criterion was not modified (i.e., no divided by 10).

Table B-15 Selection of Chemicals of Potential Concern for Ecological Receptors - Surface Soil at Site SS08

Constituent	Surface Soil Data					Regulatory Criteria ^a (mg/L)	COPEC Screening Benchmark ^b (mg/L)	COPEC?
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)			
<u>Inorganics, Total</u>								
Aluminum ^c	9	9	100	33,200	19,000	5.0	5.0	No
Antimony	9	9	100	3	0.46	0.27	0.27	Yes
Arsenic	9	9	100	22.9	10.4	0.25	0.25	Yes
Barium	9	9	100	307	101	5.0	5.0	Yes
Beryllium	9	9	100	0.8	0.4	2.4	2.42	No
Cadmium	9	7	78	2	0.6	0.20	0.20	Yes
Calcium	9	9	100	5,130	993	NA	NA	No
Chromium	9	9	100	60	31	0.018	0.018	Yes
Cobalt	9	9	100	25	11.6	13	13	Yes
Copper	9	9	100	76	22.3	1.0	1.0	Yes
Iron	9	9	100	45,400	28,500	NA	NA	No
Lead	10	10	100	39	9.4	9.4	9.4	Yes
Magnesium	9	9	100	10,300	4,670	NA	NA	No
Manganese	9	9	100	1,190	441	100	100	Yes
Mercury	8	4	50	0.2	0.06	0.30	0.30	No
Molybdenum	6	1	17	1.2	1.2	2.0	2.0	No
Nickel	9	9	100	74	23.6	25	25	Yes
Potassium	9	9	100	2,800	688	NA	NA	No
Selenium	6	3	50	1.3	0.8	0.020	0.020	Yes
Silver	7	3	43	1.1	0.55	2.0	2.0	No
Sodium	9	9	100	210	51.2	NA	NA	No
Thallium	8	5	63	0.24	0.1	0.010	0.010	Yes
Tin	6	2	33	11	7	5.0	5.0	Yes
Titanium	6	6	100	1,320	428	1000	1,000	Yes

Table B-15 Selection of Chemicals of Potential Concern for Ecological Receptors - Surface Soil at Site SS08

Constituent	Surface Soil Data					Regulatory Criteria ^a (mg/L)	COPEC Screening Benchmark ^b (mg/L)	COPEC?
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)			
Vanadium	9	9	100	97	52.9	2.0	2.0	Yes
Zinc	9	9	100	150	61.3	0.90	0.90	Yes
<u>Volatile Organic Compounds</u>								
1,3,5-Trimethylbenzene	5	1	20	4.6	4.6	0.0068 ^h	0.0068	Yes
Acetone	5	3	60	1.2	0.01	20	20	No
Carbon Disulfide	6	1	17	0.00054	0.00054	na	na	Yes
Methylene Chloride	6	6	100	0.22	0.0024	183	183	No
Toluene	6	4	67	0.00035	0.00019	0.080	0.080	No
Trichloroethene	5	2	40	0.1	0.0073	0.10	0.10	No
Trichlorofluoromethane	6	1	17	0.00034	0.00034	na	na	Yes
<u>Semi-Volatile Organic Compounds</u>								
2,4-Dimethylphenol	5	1	20	0.06	0.06	20	20	No
2-Nitroaniline	5	1	20	0.06	0.06	na	na	Yes
3,3'-Dichlorobenzidine	5	1	20	0.05	0.05	na	na	Yes
3-and 4-Methylphenol Coelution	5	3	60	0.4	0.1	30	30	No
3-Nitroaniline	5	1	20	0.09	0.09	70	70	No
4-Chloro-3-methylphenol	5	1	20	0.1	0.1	15	15	No
4-Chloroaniline	5	1	20	0.09	0.09	40	40	No
Bis(2-ethylhexyl) Phthalate	5	4	80	0.2	0.1	0.91	0.91	No
<u>Polynuclear Aromatic Hydrocarbons</u>								
2-Methylnaphthalene	5	2	40	0.3	0.1	na ⁱ	na	No
Benzo(a)pyrene	5	1	20	0.08	0.08	0.10 ^j	0.10	No

Table B-15 Selection of Chemicals of Potential Concern for Ecological Receptors - Surface Soil at Site SS08

Constituent	Surface Soil Data					Regulatory Criteria ^a (mg/L)	COPEC Screening Benchmark ^b (mg/L)	COPEC?
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)			
Benzo(g,h,i)perylene	5	1	20	0.05	0.05	33 ^j	33	No
Chrysene	5	1	20	0.08	0.08	35 ⁱ	35	No

Table B-15 Selection of Chemicals of Potential Concern for Ecological Receptors - Surface Soil at Site SS08

Constituent	Surface Soil Data					Regulatory Criteria ^a (mg/L)	COPEC Screening Benchmark ^b (mg/L)	COPEC?
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)			
Indeno(1,2,3-cd)Pyrene	5	1	20	0.04	0.04	0.10 ^j	0.10	No
Naphthalene	5	1	20	1.5	1.5	0.10 ⁱ	0.10	No
Phenanthrene	5	1	20	0.1	0.1	0.10 ⁱ	0.10	No
Pyrene	5	1	20	0.1	0.1	0.10 ^j	0.10	No
Low MW PAHs	NA	NA	NA	1.9	1.7	29 ^k	29	No
High MW PAHs	NA	NA	NA	0.35	0.35	1 ^l	1.1	No
<u>Pesticides</u>								
4,4'-DDD	7	7	100	2.7	0.001	34	34	No
4,4'-DDE	8	6	75	0.09	0.0002	1.3	1.3	No
4,4'-DDT	9	9	100	4.81	0.008	0.70	0.70	Yes
alpha Endosulfan	6	1	17	0.0011	0.0011	0.55 ^m	0.55	No
alpha-BHC	6	1	17	0.00357	0.00357	17	17	No
beta Endosulfan	6	4	67	0.02	0.001	0.55 ^m	0.55	No
Endosulfan Sulfate	6	2	33	0.003	0.0008	0.55 ^m	0.55	No
gamma-BHC (Lindane)	6	1	17	0.00351	0.00351	1.2 ^m	1.2	No
gamma-Chlordane	6	3	50	0.02	0.00158	4.0 ⁿ	4.0	No
Methoxychlor	6	2	33	0.0163	0.009	29	29	No
<u>Polychlorinated Biphenyls</u>								
Arochlor 1260	8	7	88	17	0.02	0.11	0.11	Yes
<u>Petroleum Hydrocarbons</u>								
Diesel Range Organics (DRO)	9	9	100	2500	4	na	na	Yes
Gasoline Range Organics (GRO)	6	6	100	630	0.98	na	na	Yes

Table B-15 Selection of Chemicals of Potential Concern for Ecological Receptors - Surface Soil at Site SS08

Constituent	Surface Soil Data					Regulatory Criteria ^a (mg/L)	COPEC Screening Benchmark ^b (mg/L)	COPEC?
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)			
Residual Range Organics (RRO)	5	5	100	529	43	na	na	Yes

Notes:

4,4'-DDD - dichlorodiphenyldichloroethane

4,4'-DDE - dichlorodiphenyldichloroethylene

4,4'-DDT - dichlorodiphenyltrichloroethane

COPEC - Chemical of Potential Ecological Concern.

mg/Kg - Milligram per kilogram.

na - Not available.

NC - Not calculated.

Table B-15 Selection of Chemicals of Potential Concern for Ecological Receptors - Surface Soil at Site SS08

Constituent	Surface Soil Data					Regulatory Criteria ^a (mg/L)	COPEC Screening Benchmark ^b (mg/L)	COPEC?
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)			

^a Regulatory Criteria selected based on the following hierarchy:

- 1) ADEC Ecoscoping Guidance (ADEC, 2008c - Appendix D).
- 2) Eco-SSLs - Ecological Soil Screening Level Guidance. Office of Emergency and Remedial Response. (USEPA, 2005d).
- 3) The lower of ORNL plant (ONRL, 1997c - Table 1) or soil invertebrate (ORNL, 1997b - Table 1) benchmarks.
- 4) The lower of ORNL mammalian or avian dietary wildlife benchmarks, assuming diet consists of 100 percent soil (ORNL, 1996b - Appendix D, Table 12).

^b COPEC Screening Benchmark is equal to the indicated regulatory criteria.

^c According to USEPA's Ecological Soil Screening Level Guidance (USEPA, 2003c), aluminum is only a COC when soil/sediment pH < 5.5; therefore, aluminum was not selected as a COPEC.

^d Screening value is for Arsenic III

^e Soil Screening Criteria are not available for this essential nutrient. This analyte is excluded as a COPEC based on essential nutrient status.

^f Screening value is for Chromium VI

^g Screening value is for Inorganic Mercury

^h Benzene used as a surrogate chemical.

ⁱ Individual low MW PAH isomers are summed and screened against low MW PAH criteria.

^j Individual high MW PAH isomers are summed and screened against high MW PAH criteria.

^k Value represents lowest Eco-SSL for low MW PAH (EPA, 2007). For risk assessment purposes, low MW PAHs are summed and compared to regulatory criteria.

^l Value represents lowest Eco-SSL for high MW PAH (EPA, 2007). For risk assessment purposes, high MW PAHs are summed and compared to regulatory criteria.

ⁱ Benchmark Criteria Obtained from ORNL Wildlife Benchmarks (ORNL, 1996b).

^m Endosulfan used as a surrogate chemical.

ⁿ Chlordane used as a surrogate

Table B-16 Selection of Chemicals of Potential Concern for Ecological Receptors - Sediment at Site SS08

Constituent	Sediment Data					Regulatory Criteria ^a (mg/Kg)	COPEC Screening Benchmark ^b (mg/Kg)	COPEC?	
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)				
<u>Inorganics, Total</u>									
Aluminum ^c	3	3	100	35,000	28,900	25,500	^c	25,500	No
Antimony	3	2	67	0.8	0.66	2		2	No
Arsenic	6	6	100	24	10.5	5.9		5.9	Yes
Barium	6	6	100	258	188	na		na	Yes
Beryllium	3	3	100	1.2	0.6	na		na	Yes
Cadmium	6	5	83	1.9	0.309	0.583		0.583	Yes
Calcium	3	3	100	10,600	7,110	NA	^d	NA	No
Chromium	6	6	100	77.7	36.8	36.286		36.286	Yes
Cobalt	3	3	100	31.5	18.8	na		na	Yes
Copper	3	3	100	122	49	28.012		28.012	Yes
Iron	3	3	100	74,400	36,600	NA	^d	NA	No
Lead	6	6	100	69.3	15.9	35		35	Yes
Magnesium	3	3	100	16,200	7,930	NA	^d	NA	No
Manganese	3	3	100	1,300	857	630		630	Yes
Mercury	6	6	100	0.256	0.0785	0.174		0.174	Yes
Molybdenum	1	1	100	3	3	na		na	Yes
Nickel	3	3	100	110	39.2	18		18	Yes
Potassium	3	3	100	2,820	1,710	NA	^d	NA	No
Selenium	5	2	40	1.5	0.31	na		na	Yes
Silver	5	3	60	1	0.247	1		1	No
Sodium	3	3	100	209	146	NA	^d	NA	No
Thallium	3	3	100	0.3	0.28	na		na	Yes
Titanium	1	1	100	1,470	1,470	na		na	Yes
Vanadium	3	3	100	106	86	na		na	Yes
Zinc	3	3	100	273	102	98		98	Yes
<u>Volatile Organic Compounds</u>									
1,1,1-Trichloroethane	4	1	25	0.057	0.057	0.17		0.17	No
m,p-Xylenes	4	2	50	0.0792	0.0031	0.025	^e	0.025	Yes
Methylene Chloride	4	1	25	0.0018	0.0018	na		na	Yes
Tetrachloroethene	3	1	33	0.294	0.294	0.53		0.53	No
Toluene	4	1	25	0.0021	0.0021	0.67		0.67	No
<u>Semi-Volatile Organic Compounds</u>									
3,3'-Dichlorobenzidine	1	1	100	0.08	0.08	na		na	Yes

Table B-16 Selection of Chemicals of Potential Concern for Ecological Receptors - Sediment at Site SS08

Constituent	Sediment Data					Regulatory Criteria ^a (mg/Kg)	COPEC Screening Benchmark ^b (mg/Kg)	COPEC?
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
4-Chloroaniline	1	1	100	0.2	0.2	na	na	Yes
<u>Polynuclear Aromatic Hydrocarbons</u>								
Acenaphthene	4	1	25	0.00996	0.00996	NA f	NA	Yes
Acenaphthylene	4	1	25	0.00735	0.00735	NA f	NA	Yes
Anthracene	4	2	50	0.0793	0.0121	0.01	0.01	Yes
Benzo(a)anthracene	4	2	50	0.0625	0.0215	0.01572 g	0.01572	Yes
Benzo(a)pyrene	4	2	50	0.0633	0.0226	0.0319 g	0.0319	Yes
Benzo(b)fluoranthene	4	2	50	0.0634	0.0347	NA g	NA	Yes
Benzo(g,h,i)perylene	4	2	50	0.0439	0.0171	NA g	NA	Yes
Benzo(k)fluoranthene	3	2	67	0.0417	0.0279	0.0272 g	0.0272	Yes
Chrysene	4	2	50	0.117	0.0678	0.02683 g	0.02683	Yes
Dibenz(a,h)anthracene	4	1	25	0.0148	0.0148	0.01 g	0.01	Yes
Fluoranthene	4	2	50	0.132	0.124	0.03146 g	0.03146	Yes
Fluorene	4	1	25	0.0146	0.0146	0.01 f	0.01	Yes
Indeno(1,2,3-cd)Pyrene	4	2	50	0.0329	0.0158	0.01732 g	0.01732	Yes
Naphthalene	4	2	50	0.0554	0.00779	0.01465 f	0.01465	Yes
Phenanthrene	4	3	75	0.17	0.0118	0.01873 f	0.01873	Yes
Pyrene	4	2	50	0.183	0.0842	0.04427 g	0.04427	Yes
Low MW PAHs	NA	NA	NA	0.11	0.064	0.07642	0.07642	NA
High MW PAHs	NA	NA	NA	0.75	0.43	0.19295	0.19295	NA
<u>Pesticides</u>								
4,4'-DDD	6	6	100	0.666	0.0062	0.00354	0.00354	Yes
4,4'-DDE	6	5	83	0.255	0.028	0.00142	0.00142	Yes
4,4'-DDT	6	6	100	2.5	0.0561	0.00416	0.00416	Yes
Endosulfan Sulfate	4	1	25	0.0042	0.0042	na	na	Yes
Endrin	5	1	20	0.0011	0.0011	0.00267	0.00267	No
<u>Polychlorinated Biphenyls</u>								
Arochlor 1260	5	3	60	0.19	0.0548	0.005	0.005	Yes
<u>Petroleum Hydrocarbons</u>								
Diesel Range Organics (DRO)	6	5	83	2,740	25.6	na	na	Yes
Gasoline Range Organics (GRO)	5	3	60	4.21	2	na	na	Yes
Residual Range Organics (RRO)	5	5	100	1,190	119	na	na	Yes

Table B-16 Selection of Chemicals of Potential Concern for Ecological Receptors - Sediment at Site SS08

Constituent	Sediment Data					Regulatory Criteria ^a (mg/Kg)	COPEC Screening Benchmark ^b (mg/Kg)	COPEC?
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			

Notes:

4,4'-DDD - dichlorodiphenyldichloroethane

mg/Kg - Milligram per kilogram.

4,4'-DDE - dichlorodiphenyldichloroethylene

na - Not available.

4,4'-DDT - dichlorodiphenyltrichloroethane

NC - Not calculated.

COPEC - Chemical of Potential Ecological Concern.

^a Regulatory Criteria selected based on the following hierarchy:

1) The lower of value between Threshold Effects Level (TEL) and ARCS TEL- Sediment Quality Guidelines in Screening Quick Reference Tables (SQuiRTs) (Buchman, 2006).

2) Consensus-based Freshwater Threshold Effect Concentrations per MacDonald et al. (2000 - Table 2). Sediment quality guidelines for metals in freshwater ecosystems that reflect TECs (i.e., below which harmful effects are unlikely to be observed).

3) Assessment and Remediation of Contaminated Sediment Program - TEC (ORNL, 1997a - Table 4).

4) Ontario Ministry of the Environment: Lowest effect level (ORNL, 1997a - Table 4).

5) EPA OSWER Value per ORNL, 1997a - Table 5.

6) NOAA ER-L per ORNL, 1997a - Table 1.

7) Florida Department of Environmental Protection (FDEP) TEL Value per ORNL, 1997a - Table 1.

^b COPEC Screening Benchmark is equal to the ecological benchmark criterion.

^c Aluminum ecological benchmark criterion derived from lowest ARCS TEL (NOAA, 1999 - SQiRTs).

^d Soil Screening Criteria are not available for this essential nutrient. This analyte is excluded as a COPEC based on essential nutrient status.

^e Value is for m-xylene.

^f Is included as part of total low MW PAHs in COPEC screening analysis.

^g Is included as part of total high MW PAHs in COPEC screening analysis.

Table B-17 Selection of Chemicals of Potential Concern for Ecological Receptors - Surface Water at Site SS08

Constituent	Surface Water Data					COPEC Screening		
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)	Regulatory Criteria ^a (mg/L)	Benchmark ^b (mg/L)	COPEC?
<u>Inorganics, Total</u>								
Aluminum	3	2	67	1.21	0.576	0.075		Yes
Arsenic	4	2	50	0.001	0.0009	0.055	c	No
Barium	4	4	100	0.0152	0.005	0.0039		Yes
Calcium	3	3	100	13.4	9.84	NA	d	No
Chromium	4	2	50	0.005	0.004	0.000266	e	Yes
Copper	2	1	50	0.0028	0.0028	0.00021		Yes
Iron	3	3	100	1.45	0.06	NA	d	No
Lead	4	2	50	0.0011	0.001	0.0010		Yes
Magnesium	3	3	100	3.44	2.24	82		No
Manganese	3	3	100	0.0502	0.002	0.080		No
Potassium	3	3	100	1	0.4	NA	d	No
Selenium	3	1	33	0.0012	0.0012	0.0010		Yes
Silver	3	1	33	0.003	0.003	0.000012		Yes
Sodium	3	3	100	2.41	2.08	NA	d	No
Titanium	1	1	100	0.002	0.002	na		Yes
Vanadium	2	1	50	0.004	0.004	0.019		No
Zinc	3	2	67	0.01	0.004	0.021		No
<u>Volatile Organic Compounds</u>								
1,1,1-Trichloroethane	2	1	50	0.00026	0.00026	0.011		No
1,1-Dichloropropene	2	1	50	0.00029	0.00029	na		Yes
1-Chlorohexane	1	1	100	0.00024	0.00024	na		Yes
2,2-Dichloropropane	2	1	50	0.00025	0.00025	na		Yes
2-Chloroethyl Vinyl Ether	2	1	50	0.00019	0.00019	na		Yes
Bromomethane	3	1	33.3	0.00015	0.00015	na		Yes
Carbon Disulfide	2	1	50	0.0025	0.0025	0.00092		Yes

Table B-17 Selection of Chemicals of Potential Concern for Ecological Receptors - Surface Water at Site SS08

Constituent	Surface Water Data				Regulatory Criteria ^a (mg/L)	COPEC Screening Benchmark ^b		COPEC?
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)	(mg/L)	(mg/L)	
Carbon Tetrachloride	2	1	50	0.00042	0.00042	0.0098	0.0098	No

Table B-17 Selection of Chemicals of Potential Concern for Ecological Receptors - Surface Water at Site SS08

Constituent	Surface Water Data					COPEC Screening		
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)	Regulatory Criteria ^a (mg/L)	Benchmark ^b (mg/L)	COPEC?
Chloroethane	2	1	50	0.00031	0.00031	na	na	Yes
Chloromethane	2	1	50	0.00031	0.00031	na	na	Yes
Isopropylbenzene	2	1	50	0.00021	0.00021	na	na	Yes
n-Butylbenzene	2	1	50	0.00051	0.00051	0.021 f	0.021	No
sec-Butylbenzene	2	1	50	0.00031	0.00031	0.021 f	0.021	No
Styrene	2	1	50	0.00013	0.00013	0.072	0.072	No
Toluene	2	1	50	0.00019	0.00019	0.002	0.002	No
Trichlorofluoromethane	2	1	50	0.00036	0.00036	6.4 g	6.4	No
Vinyl Acetate	1	1	100	0.00032	0.00032	0.016	0.016	No
Vinyl Chloride	2	1	50	0.00036	0.00036	1.3	1.3	No
<u>Semi-Volatile Organic Compounds</u>								
Hexachlorobutadiene	2	1	50	0.00039	0.00039	0.00093	0.00093	No
<u>Pesticides</u>								
4,4'-DDD	1	1	100	0.0000022	0.0000022	0.000000011	0.000000011	Yes
4,4'-DDE	1	1	100	0.0000041	0.0000041	0.000000011	0.000000011	Yes
4,4'-DDT	2	2	100	0.000031	0.0000298	0.000000011	0.000000011	Yes

Notes:

4,4'-DDD - dichlorodiphenyldichloroethane

4,4'-DDE - dichlorodiphenyldichloroethylene

4,4'-DDT - dichlorodiphenyltrichloroethane

COPEC - Chemical of potential ecological concern.

mg/L - Milligram per liter.

NA - Not applicable.

na - Not available.

NC - Not calculated.

^a Regulatory Criteria selected based on the following hierarchy:

1) ADEC Ecoscoping Guidance (ADEC, 2008c - Appendix D).

2) NAWQC - Freshwater Chronic Value. SQuiRT (Buchman, 2006).

3) NAWQC - Marine Chronic Value. SQuiRT (Buchman, 2006).

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Table B-17 Selection of Chemicals of Potential Concern for Ecological Receptors - Surface Water at Site SS08

Constituent	Surface Water Data				Regulatory Criteria ^a (mg/L)	COPEC Screening Benchmark ^b		COPEC?
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)	(mg/L)	(mg/L)	

4) NAWQC - Freshwater Acute Value divided by 10. SQuiRT (Buchman, 2006).

5) NAWQC - Marine Acute Value divided by 10. SQuiRT (Buchman, 2006).

6) Lowest Chronic Value observed in freshwater daphnids (ORNL, 1996a - Table 1).

^b COPEC Screening Benchmark is equal to the ecological benchmark criterion.

^c Arsenic III screening value used.

^d Surface Water Screening Criteria are not available for this essential nutrient. This analyte is excluded as a COPEC based on essential nutrient status.

^e Chromium VI screening value used.

^f Benzene is used as a surrogate

^g Benchmark Criteria Derived from NAWQC - Marine Chronic Value SQuiRT (Buchman, 2006).

Table B-18 Selection of Chemicals of Potential Concern for Human Health - Surface Soil at Site SS11

Constituent	Surface Soil Data					Regulatory Criteria ^a (mg/Kg)	COPC Screening Benchmark ^b (mg/Kg)	COPC?
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected	Minimum Detected			
				Concentration (mg/Kg)	Concentration (mg/Kg)			
<u>Inorganics, Total</u>								
Aluminum	4	4	100	22,700	14,200	77,000	7,700	Yes
Antimony	4	2	50	1.0	1.0	41	4.1	No
Arsenic	18	18	100	20	1.6	4.5	0.45	Yes
Barium	18	18	100	3,680	114	20,300	2,030	Yes
Beryllium	4	4	100	0.40	0.20	200	20	No
Cadmium	18	15	83	0.70	0.092	79	7.9	No
Calcium	4	4	100	2,820	1,380	na	na	No
Chromium	18	18	100	47	5.9	300	30	Yes
Cobalt	4	4	100	20	4.0	na	na	Yes
Copper	4	4	100	58	10	4,100	410	No
Iron	4	4	100	41,900	14,100	na	na	No
Lead	18	18	100	462	4.9	400	40	Yes
Magnesium	4	4	100	7,000	2,340	na	na	No
Manganese	4	4	100	1,080	107	1,800	180	Yes
Mercury	18	17	94	0.13	0.027	18	1.8	No
Molybdenum	4	3	75	3.0	1.0	390	39	No
Nickel	4	4	100	40	11	2,000	200	No
Potassium	4	4	100	1,800	920	na	na	No
Selenium	18	7	39	1.3	0.30	510	51	No
Silver	18	16	89	1.0	0.049	510	51	No
Sodium	4	4	100	120	80	na	na	No
Thallium	4	3	75	0.30	0.10	8.1	0.81	No
Tin	4	1	25	11	11	47,000	4,700	No
Titanium	4	4	100	1,460	423	na	na	Yes
Vanadium	4	4	100	68	35	710	71	No
Zinc	4	4	100	91	29	30,400	3,040	No
<u>Volatile Organic Compounds</u>								
1,2,4-Trimethylbenzene	16	3	19	17	0.058	49	4.9	Yes
1,3,5-Trimethylbenzene	16	2	13	4.4	0.032	42	4.2	Yes
2-Butanone (MEK)	16	4	25	0.51	0.033	23,300	2,330	No
4-Methyl-2-pentanone	15	1	7	0.0051	0.0051	2,100	210	No
Acetone	17	15	88	32	0.024	68,600	6,860	No
Chloroform	17	5	29	0.099	0.0014	3.2	0.32	No
Ethylbenzene	16	1	6	0.1	0.1	110	11	No

Table B-18 Selection of Chemicals of Potential Concern for Human Health - Surface Soil at Site SS11

Constituent	Surface Soil Data					Regulatory Criteria ^a (mg/Kg)	COPC Screening Benchmark ^b (mg/Kg)	COPC?
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
Isopropylbenzene	16	1	6	0	0	62	6.2	No
Methylene Chloride	18	3	17	0.043	0.0056	160	16	No
m,p-Xylenes	14	1	7	0.2	0.2	63 ^e	6.3	No
n-Butylbenzene	16	1	6	0.13	0.13	42	4.2	No
o-Xylene	14	1	7	2.0	2.0	63 ^e	6.3	No
p-Isopropyltoluene	16	3	19	0.19	0.017	62 ^f	6.2	No
Toluene	18	11	61	0.034	0.00029	220	22	No
Total xylenes	2	1	50	0.0012	0.0012	63	6.3	No
Trichloroethene	17	2	12	0.0041	0.0010	0.57	0.057	No
Trichlorofluoromethane	17	1	6	0.0034	0.0034	990	99	No
<u>Semi-Volatile Organic Compounds</u>								
2-Methylphenol	13	1	8	21	21	3,200	320	No
2,4-Dimethylphenol	13	1	8	25	25	1,300	130	No
4-Methylphenol	9	1	11	46	46	350	35	Yes
Benzoic Acid	11	1	9	0.37	0.37	317,000	31,700	No
Dibenzofuran	18	8	44	1,700	0.003	200	20	Yes
DiethylPhthalate	13	1	8	0.20	0.20	61,900	6,190	No
Di-n-Butyl Phthalate	13	4	31	0.18	0.055	7,900	790	No
Phenol	13	1	8	16	16	23,200	2,320	No
<u>Polynuclear Aromatic Hydrocarbons</u>								
2-Methylnaphthalene	13	6	46	8,600	0.037	280	28	Yes
Acenaphthene	18	10	56	9,200	0.00110	2,800	280	Yes
Acenaphthylene	18	5	28	120	0.00046	2,800	280	No
Anthracene	18	9	50	7,300	0.0018	20,600	2,060	Yes
Benzo(a)anthracene	18	9	50	3,100	0.0068	4.9	0.49	Yes
Benzo(a)pyrene	18	7	39	1,800	0.0068	0.49	0.049	Yes
Benzo(b)fluoranthene	18	9	50	2,300	0.019	4.9	0.49	Yes
Benzo(g,h,i)perylene	18	8	44	740	0.0063	1,400	140	Yes
Benzo(k)fluoranthene	14	5	36	790	0.0085	49	4.9	Yes
Chrysene	18	10	56	3,500	0.049	490	49	Yes
Dibenz(a,h)anthracene	18	6	33	210	0.0025	0.49	0.049	Yes
Fluoranthene	18	9	50	10,000	0.017	1,900	190	Yes
Fluorene	18	9	50	5,700	0.0028	2,300	230	Yes
Indeno(1,2,3-cd)pyrene	18	6	33	640	0.0070	4.9	0.49	Yes

Table B-18 Selection of Chemicals of Potential Concern for Human Health - Surface Soil at Site SS11

Constituent	Surface Soil Data					Regulatory Criteria ^a (mg/Kg)	COPC Screening Benchmark ^b (mg/Kg)	COPC?
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
Naphthalene	20	11	55	13,000	0.0016	28	2.8	Yes
Phenanthrene	18	10	56	17,000	0.012	20,600	2,060	Yes
Pyrene	18	12	67	10,000	0.036	1,400	140	Yes
<u>Pesticides</u>								
4,4'-DDD	17	12	71	0.027	0.0028	30	3.0	No
4,4'-DDE	17	14	82	0.14	0.0026	21	2.1	No
4,4'-DDT	17	16	94	1.5	0.016	21	2.1	No
Aldrin	17	4	24	0.051	0.0039	0.30	0.030	Yes
alpha Endosulfan	17	6	35	0.17	0.0011	610 g	61	No
alpha-BHC	16	7	44	2	0.0003	1.2	0.12	Yes
alpha-Chlordane	17	10	59	2	0.00032	19 h	1.9	Yes
beta Endosulfan	17	5	29	0.099	0.00036	610 g	61	No
beta-BHC	17	4	24	0.027	0.0014	4	0.4	No
delta-BHC	15	5	33	1.7	0.0034	1.2 i	0.12	Yes
Dieldrin	17	3	18	0.027	0.027	0.32	0.032	No
Endosulfan Sulfate	17	9	53	0.027	0.00066	610 g	61	No
Endrin	17	5	29	3.5	0.0018	2.0	0.20	Yes
Endrin Aldehyde	17	12	71	2.9	0.00037	2.0 j	0.20	Yes
Endrin ketone	9	4	44	2.2	0.0026	2.0 j	0.20	Yes
gamma-BHC (Lindane)	17	6	35	0.095	0.0038	5.6	0.56	No
gamma-Chlordane	17	5	29	0.027	0.0024	19 h	1.9	No
Heptachlor	17	7	41	0.3	0.0016	1.3	0.13	Yes
Heptachlor Epoxide	17	4	24	0.027	0.00064	0.63	0.063	No
Methoxychlor	17	6	35	0.67	0.0027	320	32	No
Toxaphene	17	4	24	1.7	1.3	7.5	0.75	Yes
<u>Petroleum Hydrocarbons</u>								
Diesel Range Organics (DRO)	18	18	100	200,000	19	10,250 k	10,250	Yes
Gasoline Range Organics (GRO)	18	6	33	18	2.9	1,400 k	1,400	No
Residual Range Organics (RRO)	18	18	100	160,000	104	10,000 k	10,000	Yes

Notes:

4,4'-DDD - dichlorodiphenyldichloroethane mg/Kg - Milligram per kilogram.

4,4'-DDE - dichlorodiphenyldichloroethylene NA - Not applicable.

Table B-18 Selection of Chemicals of Potential Concern for Human Health - Surface Soil at Site SS11

Constituent	Surface Soil Data					Regulatory Criteria ^a (mg/Kg)	COPC Screening Benchmark ^b (mg/Kg)	COPC?
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
4,4'-DDT - dichlorodiphenyltrichloroethane			na - Not available.					
COPC - Chemical of Potential Concern			NC - Not calculated.					

^aRegulatory Criteria is derived from the following hierarchy

1. Minimum of the Direct Contact and Inhalation pathways listed in 18 AAC 75, Tables B1 and B2, Under 40 inch Zone (ADEC, 2008a).
2. Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites - Residential Soil (USEPA, 2008a).

^b COPC Screening Benchmark is based on cancer risk of 1×10^{-6} or a hazard index of 0.1.

^c This analyte is excluded as a COPC due to status as an essential nutrient.

^dBased on residential cleanup value calculated according to Risk Assessment Procedures Manual guidance (18 AAC 75.340). Lead is not included in the cumulative hazard estimate, therefore the regulatory criterion was not modified (ie., not divided by 10).

^e Total xylenes used as a surrogate chemical.

^f Isopropylbenzene used as a surrogate chemical.

^g Endosulfan used as a surrogate chemical.

^h Chlordane used as a surrogate chemical.

ⁱ alpha-BHC used as a surrogate chemical.

^j Endrin used as a surrogate chemical.

^k Because petroleum hydrocarbons are not included in the cumulative hazard estimate, the regulatory criterion was used unmodified (ie. not divided by 10).

Table B-19 Selection of Chemicals of Potential Concern for Human Health - Subsurface Soil at Site SS011

Constituent	Subsurface Soil Data					Regulatory Criteria ^a (mg/Kg)	COPC Screening Benchmark ^b (mg/Kg)	COPC?
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
Inorganics, Total								
Arsenic	2	2	100	59	51	4.5	0.45	Yes
Barium	2	2	100	140	120	20,300	2,030	No
Chromium	2	2	100	43	36	300	30	Yes
Lead	2	2	100	12	11	400 ^c	40	No
Volatile Organic Compounds								
Acetone	2	1	200	0.13	0.130	68,600	6,860	No
Semi-Volatile Organic Compounds								
Di-n-Butyl Phthalate	2	1	200	0.041	0.0410	7,900	790	No
Polynuclear Aromatic Hydrocarbons								
Chrysene	2	1	200	0.1	0.0580	490	49	No
Fluoranthene	2	1	200	0.1	0.076	1,900	190	No
Pyrene	2	1	200	0.1	0.0810	1,400	140	No
Pesticides								
4,4'-DDD	2	1	200	0.0047	0.0047	30	3.0	No
4,4'-DDT	2	2	100	0.038	0.025	21	2.1	No
Petroleum Hydrocarbons								
Diesel Range Organics (DRO)	2	2	100	180	88	10,250 ^d	10,250	No
Residual Range Organics (RRO)	2	2	100	940	540	10,000 ^d	10,000	No

Notes:

COPC - Chemical of Potential Concern

DDD - 1,1-bis(chlorophenyl)-2,2-dichloroethane

DDE - 1,1-bis(chlorophenyl)-2,2-dichloroethene

DDT - 1,1-bis(chlorophenyl)-2,2,2-trichloroethane

mg/Kg - Milligram per kilogram.

NA - Not applicable.

na - Not available.

NC - Not calculated.

^a Regulatory Criteria is derived from the following hierarchy:

1. Minimum of the Direct Contact and Inhalation pathways listed in 18 AAC 75, Tables B1 and B2, Under 40 inch Zone (ADEC, 2008a).
2. Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites - Residential Soil (USEPA, 2008a).

^b COPC Screening Benchmark is based on cancer risk of 1 x 10⁻⁶ or a hazard index of 0.1.

^c Based on residential cleanup value calculated according to Risk Assessment Procedures Manual guidance (18 AAC 75.340). Lead is not included in the cumulative hazard estimate, therefore the regulatory criterion was not modified (ie., not divided by 10).

^d Because petroleum hydrocarbons are not included in the cumulative hazard estimate, the regulatory criterion was used unmodified (ie. not

Table B-20 Selection of Chemicals of Potential Concern for Human Health - Sediment at SS11

Constituent	Sediment Data					Regulatory Criteria ^a (mg/Kg)	COPC Screening Benchmark ^b (mg/Kg)	COPC?
	Number of	Number of	Detection	Maximum Detected	Minimum Detected			
	Samples	Detects	Frequency	Concentration (mg/Kg)	Concentration (mg/Kg)			
<u>Inorganics, Total</u>								
Arsenic	6	4	67	12	1.1	4.5	0.45	Yes
Barium	6	6	100	184	12	20,300	2,030	No
Cadmium	6	3	50	0.29	0.25	79	7.9	No
Chromium	6	6	100	34	1.8	300	30	Yes
Lead	6	6	100	14	0.65	400 ^c	40	No
Mercury	6	5	83	0.13	0.042	18	1.8	No
Selenium	6	3	50	5.6	3.3	510	51	No
Silver	6	3	50	0.19	0.16	510	51	No
<u>Polynuclear Aromatic Hydrocarbons</u>								
Acenaphthene	6	1	17	0.0076	0.0076	2,800	280	No
Acenaphthylene	6	1	17	0.0076	0.0076	2,800	280	No
Anthracene	6	1	17	0.0008	0.0008	20,600	2,060	No
Benzo(a)anthracene	6	1	17	0.0003	0.0003	4.9	0.49	No
Benzo(a)pyrene	6	1	17	0.0005	0.0005	0.49	0.049	No
Benzo(b)fluoranthene	6	1	17	0.0005	0.0005	4.9	0.49	No
Benzo(g,h,i)perylene	6	3	50	0.00097	0.00043	1,400	140	No
Benzo(k)fluoranthene	6	1	17	0.0005	0.0005	49	4.9	No
Chrysene	6	2	33	0.0007	0.00046	490	49	No
Dibenz(a,h)anthracene	6	1	17	0.00083	0.00083	0.49	0.049	No
Fluoranthene	6	3	50	0.001	0.00066	1,900	190	No
Fluorene	6	1	17	0.0006	0.0006	2,300	230	No
Indeno(1,2,3-cd)Pyrene	6	3	50	0.0011	0.00040	4.9	0.49	No
Naphthalene	6	3	50	0.00090	0.00064	28	2.8	No
Phenanthrene	6	3	50	0.00170	0.00080	20,600	2,060	No
Pyrene	6	3	50	0.0007	0.00046	1,400	140	No
<u>Pesticides</u>								
4,4'-DDT	3	3	100	0.0057	0.0051	21	2.1	No
<u>Petroleum Hydrocarbons</u>								
Residual Range Organics (RRO)	3	3	100	342	236	10,000 ^d	10,000	No

Table B-20 Selection of Chemicals of Potential Concern for Human Health - Sediment at SS11

Constituent	Sediment Data					Regulatory Criteria ^a (mg/Kg)	COPC Screening Benchmark ^b (mg/Kg)	COPC?
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			

Notes:

4,4'-DDT - dichlorodiphenyltrichloroethane

na - Not available.

COPC - Chemical of Potential Concern

NC - Not calculated.

mg/Kg - Milligram per kilogram.

^aRegulatory Criteria is derived from the following hierarchy:

1. Minimum of the Direct Contact and Inhalation pathways listed in 18 AAC 75, Tables B1 and B2, Under 40 inch Zone (ADEC, 2008a).
2. Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites - Residential Soil (USEPA, 2008a).

^b COPC Screening Benchmark is based on cancer risk of 1×10^{-6} or a hazard index of 0.1.

^cBased on residential cleanup value calculated according to Risk Assessment Procedures Manual guidance (18 AAC 75.340). Lead is not included in the cumulative hazard estimate, therefore the regulatory criterion was not modified (ie., not divided by 10)

^d Because petroleum hydrocarbons are not included in the cumulative hazard estimate, the regulatory criterion was used unmodified (ie. not divided by 10).

Table B-21 Selection of Chemicals of Potential Concern for Human Health - Surface Water at Site SS11

Constituent	Surface Water Data					Regulatory Criteria ^b (mg/L)	COPC Screening Benchmark ^c (mg/L)	COPC?
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)			
<u>Inorganics, Total</u>								
Barium	3	3	100	0.032	0.010	2.0	0.20	No
Chromium	3	1	33	0.0042	0.0042	0.10	0.010	No
<u>Volatile Organic Compounds</u>								
Chloromethane	5	1	20	0.0011	0.0011	0.066	0.0066	No
Toluene	5	2	40	0.00022	0.00018	1.0	0.10	No
Carbon Disulfide	3	3	100	0.019	0.0059	3.7	0.37	No
<u>Polynuclear Aromatic Hydrocarbons</u>								
Anthracene	5	1	20	0.000002	0.000002	11	1.1	No
Benzo(a)anthracene	5	2	40	0.0000027	0.0000024	0.0012	0.00012	No
Benzo(a)pyrene	5	1	20	0.0000033	0.0000033	0.00020	0.000020	No
Benzo(b)fluoranthene	5	1	20	0.0000045	0.0000045	0.0010	0.00010	No
Benzo(g,h,i)perylene	5	1	20	0.000007	0.000007	1.1	0.11	No
Benzo(k)fluoranthene	5	1	20	0.0000045	0.0000045	0.012	0.0012	No
Chrysene	5	1	20	0.0000033	0.0000033	0.12	0.012	No
Dibenz(a,h)anthracene	5	1	20	0.000004	0.000004	0.00012	0.000012	No
Fluoranthene	5	1	20	0.000004	0.000004	1.5	0.15	No
Indeno(1,2,3-cd)Pyrene	5	1	20	0.0000057	0.0000057	0.0012	0.00012	No
Naphthalene	4	1	25	0.0000044	0.0000044	0.73	0.073	No
Phenanthrene	5	1	20	0.0000046	0.0000046	11	1.1	No
Pyrene	5	1	20	0.0000041	0.0000041	1.1	0.11	No

Notes:

COPC - Chemical of potential concern.

na - Not available.

mg/L - Milligram per liter.

^a Regulatory Criteria was selected according to the following hierarchy:

- ADEC Water Quality Standards 18 AAC 70 (ADEC, 2008b).
- 18 AAC 75, Table C Groundwater Cleanup Levels (ADEC, 2008).

- Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites - Tap Water (USEPA, 2008a).

^b COPC Screening benchmark is based on cancer risk of 1×10^{-6} or a hazard index of 0.1.

Table B-22 Selection of Chemicals of Potential Concern for Ecological Receptors - Surface Soil at Site SS11

Constituent	Surface Soil Data					Regulatory Criteria ^a (mg/Kg)	COPEC Screening Benchmark ^b (mg/Kg)	COPEC?	
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)				
<u>Inorganics, Total</u>									
Aluminum ^c	4	4	100	22,700	14,200	5	5	No	
Antimony	4	2	50	1	1	0.27	0.27	Yes	
Arsenic	18	18	100	20	1.63	0.25	d	0.25	Yes
Barium	18	18	100	3,680	114	5		5	Yes
Beryllium	4	4	100	0.4	0.2	2.42		2.42	No
Cadmium	18	15	83	0.7	0.092	0.2		0.2	Yes
Calcium	4	4	100	2,820	1,380	NA	e	NA	No
Chromium	18	18	100	47.4	5.92	0.018	f	0.018	Yes
Cobalt	4	4	100	20	4	13		13	Yes
Copper	4	4	100	58	10	1		1	Yes
Iron	4	4	100	41,900	14,100	NA	e	NA	No
Lead	18	18	100	462	4.9	9.36		9.36	Yes
Magnesium	4	4	100	7,000	2,340	NA	e	NA	No
Manganese	4	4	100	1,080	107	100		100	Yes
Mercury	18	17	94	0.13	0.027	0.3	g	0.3	No
Molybdenum	4	3	75	3	1	2		2	Yes
Nickel	4	4	100	40	11	25		25	Yes
Potassium	4	4	100	1,800	920	NA	e	NA	No
Selenium	18	7	39	1.3	0.3	0.02		0.02	Yes
Silver	18	16	89	1	0.049	2		2	No
Sodium	4	4	100	120	80	NA	e	NA	No
Thallium	4	3	75	0.3	0.1	0.01		0.01	Yes
Tin	4	1	25	11	11	5		5	Yes
Titanium	4	4	100	1,460	423	1,000		1,000	Yes
Vanadium	4	4	100	68	35	2		2	Yes
Zinc	4	4	100	91	29	0.9		0.9	Yes
<u>Volatile Organic Compounds</u>									
1,2,4-Trimethylbenzene	16	3	19	17	0.058	0.0068	h	0.0068	Yes
1,3,5-Trimethylbenzene	16	2	13	4.4	0.032	0.0068	h	0.0068	Yes
2-Butanone (MEK)	16	4	25	0.51	0.033	6487		6487	No
4-Methyl-2-pentanone	15	1	7	0.0051	0.0051	91.6		91.6	No
Acetone	17	15	88	32	0.024	20		20	Yes
Chloroform	17	5	29	0.099	0.0014	150		150	No
Ethylbenzene	16	1	6	0.076	0.076	0.018		0.018	Yes

Table B-22 Selection of Chemicals of Potential Concern for Ecological Receptors - Surface Soil at Site SS11

Constituent	Surface Soil Data					Regulatory Criteria ^a (mg/Kg)	COPEC Screening Benchmark ^b (mg/Kg)	COPEC?
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
Isopropylbenzene	16	1	6	0.043	0.043	0.0068 ^h	0.0068	Yes
Methylene Chloride	18	3	17	0.043	0.0056	183	183	No
m,p-Xylenes	14	1	7	0.15	0.15	0.1 ⁱ	0.1	Yes
n-Butylbenzene	16	1	6	0.13	0.13	0.0068 ^h	0.0068	Yes
o-Xylene	14	1	7	2	2	1	1	Yes
p-Isopropyltoluene	16	3	19	0.19	0.017	0.0068 ^h	0.0068	Yes
Toluene	18	11	61	0.034	0.00029	0.08	0.08	No
Total xylenes	2	1	50	0.0012	0.0012	0.1	0.1	No
Trichloroethene	17	2	12	0.0041	0.001	0.1	0.1	No
Trichlorofluoromethane	17	1	6	0.0034	0.0034	na	na	Yes
<u>Semi-Volatile Organic Compounds</u>								
2-Methylphenol	13	1	8	21	21	50	50	No
2,4-Dimethylphenol	13	1	8	25	25	20	20	Yes
4-Methylphenol	9	1	11	46	46	50 ^j	50	No
Benzoic Acid	11	1	9	0.37	0.37	na	na	Yes
Dibenzofuran	18	8	44	1,700	0.003	na	na	Yes
DiethylPhthalate	13	1	8	0.2	0.2	53	53	No
Di-n-Butyl Phthalate	13	4	31	0.18	0.055	0.91	0.91	No
Phenol	13	1	8	16	16	3.8	3.8	Yes
<u>Polynuclear Aromatic Hydrocarbons</u>								
2-Methylnaphthalene	13	6	46	8,600	0.037	na ^k	na	Yes
Acenaphthene	18	10	56	9,200	0.0011	na ^k	na	Yes
Acenaphthylene	18	5	28	120	0.00046	na ^k	na	Yes
Anthracene	18	9	50	7,300	0.0018	1.6 ^k	1.6	Yes
Benzo(a)anthracene	18	9	50	3,100	0.0068	0.1 ^l	0.1	Yes
Benzo(a)pyrene	18	7	39	1,800	0.0068	0.1 ^l	0.1	Yes
Benzo(b)fluoranthene	18	9	50	2,300	0.019	0.1 ^l	0.1	Yes
Benzo(g,h,i)perylene	18	8	44	740	0.0063	33 ^l	33	Yes
Benzo(k)fluoranthene	14	5	36	790	0.0085	0.1 ^l	0.1	Yes
Chrysene	18	10	56	3,500	0.049	35 ^k	35	Yes
Dibenz(a,h)anthracene	18	6	33	210	0.0025	0.1 ^l	0.1	Yes
Fluoranthene	18	9	50	10,000	0.017	260 ^k	260	Yes
Fluorene	18	9	50	5,700	0.0028	30 ^k	30	Yes
Indeno(1,2,3-cd)pyrene	18	6	33	640	0.007	0.1 ^l	0.1	Yes
Naphthalene	20	11	55	13,000	0.0016	0.1 ^k	0.1	Yes

Table B-22 Selection of Chemicals of Potential Concern for Ecological Receptors - Surface Soil at Site SS11

Constituent	Surface Soil Data					Regulatory Criteria ^a (mg/Kg)		COPEC Screening Benchmark ^b (mg/Kg)		COPEC?
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)					
Phenanthrene	18	10	56	17,000	0.012	0.1	k	0.1		Yes
Pyrene	18	12	67	10,000	0.036	0.1	h	0.1		Yes
Low MW PAHs	NA	NA	NA	39,320	0.0182	29	m	29		NA
High MW PAHs	NA	NA	NA	32,440	0.152	1.1	n	1.1		NA
<u>Pesticides</u>										
4,4'-DDD	17	12	71	0.027	0.0028	34		34		No
4,4'-DDE	17	14	82	0.14	0.0026	1.3		1.3		No
4,4'-DDT	17	16	94	1.5	0.016	0.7		0.7		Yes
Aldrin	17	4	24	0.051	0.0039	0.22		0.22		No
alpha Endosulfan	17	6	35	0.17	0.0011	0.55	o	0.55		No
alpha-BHC	16	7	44	2	0.0003	17		17		No
alpha-Chlordane	17	10	59	2	0.00032	4	p	4		No
beta Endosulfan	17	5	29	0.099	0.00036	0.55	o	0.55		No
beta-BHC	17	4	24	0.027	0.0014	7.33		7.33		No
delta-BHC	15	5	33	1.7	0.0034	1.2	q	1.2		Yes
Dieldrin	17	3	18	0.027	0.027	0.011		0.011		Yes
Endosulfan Sulfate	17	9	53	0.027	0.00066	0.55	o	0.55		No
Endrin	17	5	29	3.5	0.0018	0.083		0.083		Yes
Endrin Aldehyde	17	12	71	2.9	0.00037	0.083	r	0.083		Yes
Endrin ketone	9	4	44	2.2	0.0026	0.083	q	0.083		Yes
gamma-BHC (Lindane)	17	6	35	0.095	0.0038	1.2		1.2		No
gamma-Chlordane	17	5	29	0.027	0.0024	4	p	4		No
Heptachlor	17	7	41	0.28	0.0016	4		4		No
Heptachlor Epoxide	17	4	24	0.027	0.00064	4		4		No
Methoxychlor	17	6	35	0.67	0.0027	29.3		29.3		No
Toxaphene	17	4	24	1.7	1.3	29.3		29.3		No
<u>Petroleum Hydrocarbons</u>										
Diesel Range Organics (DRO)	18	18	100	200,000	19	na		na		Yes
Gasoline Range Organics (GRO)	18	6	33	18	2.9	na		na		Yes
Residual Range Organics (RRO)	18	18	100	160,000	104	na		na		Yes

Notes:

4,4'-DDD - dichlorodiphenyldichloroethane

4,4'-DDE - dichlorodiphenyldichloroethylene

4,4'-DDT - dichlorodiphenyltrichloroethane

mg/Kg - Milligram per kilogram.

NA - Not applicable.

na - Not available.

Table B-22 Selection of Chemicals of Potential Concern for Ecological Receptors - Surface Soil at Site SS11

Constituent	Surface Soil Data				Regulatory Criteria ^a (mg/Kg)	COPEC Screening Benchmark ^b (mg/Kg)	COPEC?
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)		

COPEC - Chemical of Potential Ecological Concern.

NC - Not calculated.

^a Regulatory Criterion selected based on the following hierarchy:

- 1) ADEC Ecoscoping Guidance (ADEC, 2008- Appendix D).
- 2) Eco-SSLs - Ecological Soil Screening Level Guidance. Office of Emergency and Remedial Response. (USEPA, 2005f).
- 3) The lower of ORNL plant (ONRL, 1997c - Table 1) or soil invertebrate (ORNL, 1997b - Table 1) benchmarks.
- 4) The lower of ORNL mammalian or avian dietary wildlife benchmarks, assuming diet consists of 100 percent soil (ORNL, 1996b - Appendix D Table 12).

^b COPEC Screening Benchmark is equal to the indicated regulatory criteria.

^c According to USEPA's Ecological Soil Screening Level Guidance (USEPA, 2003c), aluminum is only a COC when soil/sediment pH < 5.5; therefore, aluminum was not selected as a COPEC.

^d Screening value is for Arsenic III

^e Soil Screening Criteria are not available for this essential nutrient. This analyte is excluded as a COPEC based on essential nutrient status.

^f Screening value is for Chromium VI

^g Screening value is for Inorganic Mercury

^h Benzene used as a surrogate chemical.

ⁱ Total Xylenes used as a surrogate.

^j Total cresols used as surrogate

^k Individual low MW PAH isomers are summed and screened against low MW PAH criteria

^l Individual high MW PAH isomers are summed and screened against high MW PAH criteria.

^m Value represents lowest Eco-SSL for low MW PAH (EPA, 2007). For risk assessment purposes, low MW PAHs are summed and compared to regulatory criteria.

ⁿ Value represents lowest Eco-SSL for high MW PAH (EPA, 2007). For risk assessment purposes, high MW PAHs are summed and compared to regulatory criteria.

^o Endosulfan used as a surrogate chemical.

^p Chlordane used as a surrogate

^q Gamma BHC is used as a surrogate

^r Endrin used as a surrogate chemical.

Table B-23 Selection of Chemicals of Potential Concern for Ecological Receptors - Sediment at Site SS11

Constituent	Sediment Data					Regulatory Criteria ^a (mg/Kg)	COPEC Screening Benchmark ^b (mg/Kg)	COPEC?
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
<u>Inorganics, Total</u>								
Arsenic	6	4	67	12.1	1.09	5.9	5.9	Yes
Barium	6	6	100	184	12.4	na	na	Yes
Cadmium	6	3	50	0.29	0.25	0.583	0.583	No
Chromium	6	6	100	34	1.84	36.3	36.3	No
Lead	6	6	100	14.1	0.653	35	35	No
Mercury	6	5	83	0.13	0.0421	0.174	0.174	No
Selenium	6	3	50	5.6	3.3	na	na	Yes
Silver	6	3	50	0.19	0.16	1	1	No
<u>Polynuclear Aromatic Hydrocarbons</u>								
Acenaphthene	6	1	17	0.0076	0.0076	NA ^c	NA	No
Acenaphthylene	6	1	17	0.0076	0.0076	NA ^c	NA	No
Anthracene	6	1	17	0.0008	0.0008	0.01	0.01	No
Benzo(a)anthracene	6	1	17	0.0003	0.0003	0.01572 ^d	0.01572	No
Benzo(a)pyrene	6	1	17	0.0005	0.0005	0.0319 ^d	0.0319	No
Benzo(b)fluoranthene	6	1	17	0.0005	0.0005	NA ^d	NA	No
Benzo(g,h,i)perylene	6	3	50	0.0010	0.00043	NA ^d	NA	No
Benzo(k)fluoranthene	6	1	17	0.0005	0.0005	0.0272 ^d	0.0272	No
Chrysene	6	2	33	0.0007	0.0005	0.02683 ^d	0.02683	No
Dibenz(a,h)anthracene	6	1	17	0.00083	0.00083	0.01 ^d	0.01	No
Fluoranthene	6	3	50	0.0010	0.00066	0.03146 ^d	0.03146	No
Fluorene	6	1	17	0.0006	0.0006	0.01 ^c	0.01	No
Indeno(1,2,3-cd)Pyrene	6	3	50	0.00110	0.0004	0.01732 ^d	0.01732	No
Naphthalene	6	3	50	0.00090	0.0006	0.01465 ^c	0.01465	No
Phenanthrene	6	3	50	0.00170	0.0008	0.01873 ^c	0.01873	No
Pyrene	6	3	50	0.0007	0.00046	0.04427 ^d	0.04427	No
Low MW PAHs	NA	NA	NA	0.0165	0.0165	0.07642	0.08	No
High MW PAHs	NA	NA	NA	0.0073	0.0052	0.19295	0.19	No
<u>Pesticides</u>								
4,4'-DDT	3	3	100	0.0057	0.0051	0.00416	0.0042	Yes
<u>Petroleum Hydrocarbons</u>								
Residual Range Organics (RRO)	3	3	100	342	236	na	na	Yes

Table B-23 Selection of Chemicals of Potential Concern for Ecological Receptors - Sediment at Site SS11

Constituent	Sediment Data					Regulatory Criteria ^a (mg/Kg)	COPEC Screening Benchmark ^b (mg/Kg)	COPEC?
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			

Notes:

4,4'-DDT - dichlorodiphenyltrichloroethane

na - Not available.

COPEC - Chemical of Potential Ecological Concern.

NC - Not calculated.

mg/Kg - Milligram per kilogram.

^a Regulatory Criteria selected based on the following hierarchy:

1) The lower of value between Threshold Effects Level (TEL) and ARCS TEL- Sediment Quality Guidelines in Screening Quick Reference Tables (SQuiRTs) (Buchman, 2006).

2) Consensus-based Freshwater Threshold Effect Concentrations per MacDonald et al. (2000 - Table 2). Sediment quality guidelines for metals in freshwater ecosystems that reflect TECs (i.e., below which harmful effects are unlikely to be observed).

3) Assessment and Remediation of Contaminated Sediment Program - TEC (ORNL, 1997a - Table 4).

4) Ontario Ministry of the Environment: Lowest effect level (ORNL, 1997a - Table 4).

5) EPA OSWER Value per ORNL, 1997a - Table 5.

6) NOAA ER-L per ORNL, 1997a - Table 1.

7) Florida Department of Environmental Protection (FDEP) TEL Value per ORNL, 1997a - Table 1.

^b COPEC Screening Benchmark is equal to the ecological benchmark criterion.

^c Is included as part of total low MW PAHs in COPEC screening analysis.

^d Is included as part of total high MW PAHs in COPEC screening analysis.

Table B-24 Selection of Chemicals of Potential Concern for Ecological Receptors - Surface Water at Site SS11

Constituent	Surface Water Data					Regulatory Criteria ^a (mg/L)	COPEC Screening Benchmark ^b (mg/L)	COPEC?
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)			
<u>Inorganics, Total</u>								
Barium	3	3	100	0.0315	0.01	0.0039	0.0039	Yes
Chromium	3	1	33	0.00424	0.00424	0.000266 c	0.000266	Yes
<u>Volatile Organic Compounds</u>								
Chloromethane	5	1	20	0.00112	0.00112	na	na	Yes
Toluene	5	2	40	0.00022	0.00018	0.002	0.002	No
Carbon Disulfide	3	3	100	0.0194	0.00594	0.00092	0.00092	Yes
<u>Polynuclear Aromatic Hydrocarbons</u>								
Anthracene	5	1	20	0.0000015	0.0000015	0.000012 d	0.000012	No
Benzo(a)anthracene	5	2	40	0.0000027	0.0000024	0.000018 e	0.000018	No
Benzo(a)pyrene	5	1	20	0.0000033	0.0000033	0.000014 e	0.000014	No
Benzo(b)fluoranthene	5	1	20	0.0000045	0.0000045	na e	na	No
Benzo(g,h,i)perylene	5	1	20	0.0000073	0.0000073	na e	na	No
Benzo(k)fluoranthene	5	1	20	0.0000045	0.0000045	na e	na	No
Chrysene	5	1	20	0.0000033	0.0000033	na e	na	No
Dibenz(a,h)anthracene	5	1	20	0.000004	0.000004	0.000027 e	0.000027	No
Fluoranthene	5	1	20	0.000004	0.000004	0.00004 e	0.00004	No
Indeno(1,2,3-cd)Pyrene	5	1	20	0.0000057	0.0000057	NA e	NA	No
Naphthalene	4	1	25	0.0000044	0.0000044	0.0011 d	0.0011	No
Phenanthrene	5	1	20	0.0000046	0.0000046	0.0004 d	0.0004	No
Pyrene	5	1	20	0.0000041	0.0000041	0.000025 e	0.000025	No
Low MW PAHs	NA	NA	NA	0.0000105	0.0000105	0.3 f	0.03	No
High MW PAHs	NA	NA	NA	0.0000434	0.0000431	0.3 g	0.03	No

Notes:

COPEC - Chemical of potential ecological concern.
mg/L - Milligram per liter.

NA - Not applicable
na - Not available.

^a Regulatory Criteria selected based on the following hierarchy:

1) ADEC Ecoscoping Guidance (ADEC, 2008- Appendix D).

Tatalina LRRS

SS03, SS08, and SS11 HHERA Report - Appendix B

Table B-24 Selection of Chemicals of Potential Concern for Ecological Receptors - Surface Water at Site SS11

Constituent	Surface Water Data					Regulatory Criteria ^a (mg/L)	COPEC Screening Benchmark ^b (mg/L)	COPEC?
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)			

2) NAWQC - Freshwater Chronic Value. SQuiRT (Buchman, 2006).

3) NAWQC - Marine Chronic Value. SQuiRT (Buchman, 2006).

4) NAWQC - Freshwater Acute Value divided by 10. SQuiRT (Buchman, 2006).

5) EPA NAWQC - Marine Acute Value divided by 10. SQuiRT (Buchman, 2006).

6) Lowest Chronic Value observed in freshwater daphnids (ORNL, 1996a - Table 1).

^b COPEC Screening Benchmark is equal to the ecological benchmark criterion.

^c Chromium VI screening value used.

^d Is included as part of total low MW PAHs in COPEC screening analysis.

^e Is included as part of total high MW PAHs in COPEC screening analysis.

^f Benchmark Criteria Derived from NAWQC - Freshwater Acute Value for low MW PAH divided by 10 (Buchman, 2006).

^g Benchmark Criteria Derived from NAWQC - Freshwater Acute Value for high MW PAH divided by 10 (Buchman, 2006).

APPENDIX C

Ecological Checklist

APPENDIX C ECOLOGICAL CHECKLIST

Figure C.1 ECOLOGICAL CHECKLIST #1: GENERAL

1. **SITE NAME:** Tatalina Long Range Radar Station
ADEC LC: Not applicable.
2. **LOCATION:** Lower Camp at Tatalina LRRS (SS03, SS08, and SS11).
3. **LATITUDE:** 65.5339 N
4. **LONGITUDE:** 155.3855 W
5. **APPROXIMATE SITE AREA:** SS03 occupies approximately 4.3 acres, SS08 occupies approximately 4.0 acres, and SS11 occupies approximately 3.7 acres, for a total combined area of 12 acres. Overall, the entire Tatalina LRRS Site covers 4,968 acres along the eastern flank of the Kuskokwim Mountains in southcentral Alaska.
6. **DATES OF SITE VISITS:**
 - August 1992
 - November 1995
 - May and August 1996
 - June to October 1997
 - May to June 2003
 - August 2004
 - August 2007

☐ **ATTACH USGS TOPOGRAPHIC MAP** (Not applicable).

☒ **ATTACH AVAILABLE MAPS:** (Refer to Figures 1-1, 1-2 and 1-3).
7. **LAND USE ON THE SITE** (The following refers to the Lower Camp, proper)

0	% RESIDENTIAL
0	% RURAL
0	% URBAN
90	% INDUSTRIAL/COMMERCIAL (mostly disturbed with buildings, gravel roads, gravel pads, and paved areas)
0	% AGRICULTURAL
0	% RECREATIONAL
5	% FOREST/WOODED
0	% WETLANDS
0	% UNDISTURBED
5	% OTHER (scrub/shrub)
8. **LAND USE SURROUNDING THE SITE**

0	% RESIDENTIAL
0	% RURAL
0	% URBAN
0	% INDUSTRIAL/COMMERCIAL
0	% AGRICULTURAL
0	% RECREATIONAL
80	% FOREST/WOODED
0	% WETLANDS
0	% UNDISTURBED

20 % OTHER (scrub/shrub)

9. **DESCRIBE MOVEMENT OF SOIL ON THE SITE**

- ☐ AGRICULTURAL USE
- ☐ NATURAL EVENTS
- ☒ EROSION
- ☒ HEAVY EQUIPMENT
- ☐ MINING
- ☐ OTHER

10. **IDENTIFY SENSITIVE ENVIRONMENTS**

(Refer to Section 2.7 – Ecology, in the Draft HHERA WP):

- Tatalina LRRS is not located within or adjacent to any sensitive environments. This was confirmed based upon U.S. Geological Survey maps and State of Alaska, Department of Fish & Game (USAF, 1992).

11. **POTENTIAL ROUTES OF OFFSITE MIGRATION**

- ☐ SWALES
- ☒ RUNOFF
- ☐ DEPRESSIONS
- ☒ WINDBLOWN PARTICULATES
- ☒ DRAINAGE DITCHES
- ☒ VEHICULAR TRAFFIC
- ☒ **OTHER:** Subsurface water flow and seeps.

12. **DEPTH OF WATER TABLE: 8 to 28 ft. bgs.**

13. **IDENTIFY WATER BODIES ON THE VICINITY OF THE SITE**

- Kuskokwim River
- Takotna River
- Tatalina River
- Candle Creek
- Camp Creek

14. **EVIDENCE OF FLOODING**

- ☐ YES
- ☒ NO

Figure C.2 ECOLOGICAL CHECKLIST #2: TERRESTRIAL

A. Wooded Areas

1. **ARE THERE WOODED AREAS AT THE SITE**
 - ☒ **YES** (Predominately upland spruce/hardwood forest including white and black spruce, quaking aspen, and paper birch.)
 - ☐ **NO**
2. **PERCENTAGE OF SITE WOODED**
 - **5 %**
 - **(~0.6 acres.)**
3. **DOMINANT TYPE OF VEGETATION**
 - ☐ **DECIDUOUS**
 - ☒ **MIXED** (spruce, birch, willow, and aspen.)
 - ☐ **OTHER**
4. **DOMINANT TREE SIZE BY DIAMETER**
 - ☒ **0-6 INCH**
 - ☐ **6-12 INCH**
 - ☐ **> 12 INCH**

B. SHRUB/SCRUB

1. **IS THERE SHRUB/SCRUB VEGETATION PRESENT AT THE SITE**
 - ☒ **YES**
 - ☐ **NO**
2. **PERCENTAGE OF SITE COVERED WITH SHRUB/SCRUB**
 - **5 %**
 - **(~0.6 acres.)**
3. **DOMINANT TYPE OF VEGETATION**
 - ☒ **Sedges, low willows.**
4. **DOMINANT HEIGHT OF SHRUB/SCRUB VEGETATION**
 - ☒ **0-2 FEET**
 - ☐ **2-5 FEET**
 - ☐ **> 5 FEET**
5. **SHRUB/SCRUB DENSITY**
 - ☐ **DENSE**
 - ☐ **PATCHY**
 - ☒ **SPARSE**

C. OPEN AREAS

1. **ARE THERE OPEN (BARE, BARREN) FIELD AREAS PRESENT AT THE SITE**
 - ☒ **YES**
 - ☐ **NO**

2. **PERCENTAGE OF SITE OPEN FIELD**
- 30%
 - ~3.6 acres
3. **DOMINANT TYPE OF PLANT**
- Sedges, low willows
4. **DOMINANT HEIGHT OF DOMINANT PLANT**
- ☒ 0-2 FEET
 - ☐ 2-5 FEET
 - ☐ > 5 FEET
5. **SHRUB/SCRUB DENSITY**
- ☐ DENSE
 - ☐ PATCHY
 - ☒ SPARSE

Figure C.3 ECOLOGICAL CHECKLIST #3: AQUATIC-FLOWING SYSTEMS

1. TYPE OF FLOWING WATER SYSTEMS PRESENT AT SITE

- ☒ **RIVER** (The Tatalina River lies to the southeast of SS03/SS08/SS11. Ephemeral runoff from snow melt and rainfall empties into the drainage from Lower Camp into the Tatalina River.)
 ☒ **PERENNIAL**
 ☐ **INTERMITTENT**
- ☒ **STREAM**
 ☒ **PERENNIAL** (Surface water was observed within the drainage along the Eastern side of Lower Camp during the 1997 RI. The drainage upstream consists of an infiltration gallery installed to provide a water source for Lower Camp. The drainage eventually becomes a perennial stream down-gradient from the infiltration gallery. This drainage can potentially transport contaminants for sites such as WAA4 at SS08, the former truck fill stand and other sites along the north side of the ridge.)
 ☒ **INTERMITTENT** (There are two main drainages flowing toward the Tatalina River that could be affected by LRRS activities. The drainage originating from the southeastern side passes through the eastern boarder of the Lower Camp, continues on the northern side of the ridge and eventually enters the Tatalina River. The other drainage originating from the south region, west of Lower Camp, passes through the south side of Lower camp, merges with another creek from the Northern watershed and eventually enters the Tatalina River. During the 1997 RI, these drainages showed no surface water was observed from the southern side of Lower Camp, but some drainage was observed from the southeastern side of Lower Camp.)
- ☒ **CREEK** (Candle Creek and Camp Creek.)
- ☐ **BROOK**
- ☐ **DRY WASH**
- ☐ **MAN-MADE ARROYO**
- ☐ **CHANNELING SPARSE**
- ☐ **LAKE OR POND**
- ☐ **TIDAL STREAM**
- ☐ **BAY**
- ☐ **ESTUARY**
- ☒ **OTHER**

2. GENERAL COMPOSITION OF SUBSTRATE

- ☒ **BEDROCK** (Primarily andesitic volcanic unit.)
- ☒ **SAND**
- ☐ **SILT**
- ☒ **BOULDER**
- ☒ **COBBLE**
- ☒ **GRAVEL**
- ☐ **MARL**
- ☐ **CLAY**
- ☐ **MUCK**
- ☐ **DEBRIS**
- ☐ **CONCRETE**
- ☐ **OTHER**

3. CONDITION OF THE BANK - HEIGHT, SLOPE, ETC.

- The banks of the Tatalina river consist of grass/sedge embankments with little slope. The river bottom varies from from primarily muddy to gravel/sand river botton.

4. FLOW INTERMITTENT

- ☐ **YES**
- ☒ **NO**

5. DISCHARGE FROM SITE TO WATER BODY

- ☒ **YES** (The 1997 RI Report demonstrated that surface water drainage and subsurface water beneath SS03/SS08/SS11 is in communication with the Tatalina River).
- ☐ **NO**
6. **DISCHARGE FROM WATER BODY**
- ☒ **YES** (The July 1993 SI Report confirms that the Tatalina River empties into the Kuskokwim River more than 10 miles downstream.)
- ☐ **NO**
7. **TYPE OF AQUATIC VEGETATION PRESENT**
- ☒ **EMERGENT** (The banks of the Tatalina River are vegetated with primarily grass and sedges.)
- ☐ **SUBMERGENT**
- ☐ **FLOATING**
- ☐ **NONE**
8. **OTHER ORGANISMS PRESENT**
- ☒ **BENTHIC MACRO INVERTEBRATES** (There is a high probability that the mud and gravel/sand streambed supports benthic macroinvertebrates.)
- ☒ **FISH** (As documented in both 1993 SI Report and the 1997 RI Report, the Tatalina River provides spawning and rearing habitat for king, coho, and chum salmon as well as sheefish and whitefish. Additionally, sockeye and pink salmon, dolly vardon, arctic char, arctic grayling, and burbot are present seasonally in the Tatalina River.)
- ☐ **BIRDS**
- ☐ **MAMMALS**
- ☐ **OTHER**
- ☐ **NONE**

Figure C.4 ECOLOGICAL CHECKLIST #4: AQUATIC NON-FLOWING SYSTEMS

1. **TYPE OF OPEN WATER NON-FLOWING SYSTEMS PRESENT AT SITE**
 - ☐ **NATURAL** (No aquatic non-flowing systems are present at SS03/SS08/SS11.)
 - ☐ **MAN MADE**
2. **KNOWN USES OF WATER BODY** (Not applicable.)
 - ☐ **RECREATIONAL**
 - ☐ **NAVIGATIONAL**
 - ☐ **SUBSISTENCE**
 - ☐ **OTHER**
3. **APPROXIMATE SIZE OF WATER BODY**
 - Not applicable.
4. **TYPE OF AQUATIC VEGETATION PRESENT** (Not applicable.)
 - ☐ **EMERGENT**
 - ☐ **SUBMERGENT**
 - ☐ **FLOATING**
5. **DEPTH OF WATER**
 - Not applicable.
6. **GENERAL COMPOSITION OF SUBSTRATE** (Not applicable.)
 - ☐ **BEDROCK**
 - ☐ **SAND**
 - ☐ **SILT**
 - ☐ **BOULDER**
 - ☐ **COBBLE**
 - ☐ **GRAVEL**
 - ☐ **MARL**
 - ☐ **CLAY**
 - ☐ **MUCK**
 - ☐ **DEBRIS**
 - ☐ **CONCRETE**
 - ☐ **OTHER**
7. **SOURCE OF WATER IN THE WATER BODY** (Not applicable.)
 - ☐ **RIVER/STREAM/CREEK**
 - ☐ **GROUNDWATER**
 - ☐ **SURFACE RUNOFF**
 - ☐ **INDUSTRIAL DISCHARGE**
 - ☐ **OTHER**
8. **DISCHARGE FROM SITE TO WATER BODY** (Not applicable.)
 - ☐ **YES**
 - ☐ **NO**
9. **DISCHARGE FROM WATER BODY** (Not applicable.)

<input type="checkbox"/> RIVER STREAM	<input type="checkbox"/> ONSITE	<input type="checkbox"/> OFFSITE
<input type="checkbox"/> GROUNDWATER	<input type="checkbox"/> ONSITE	<input type="checkbox"/> OFFSITE
<input type="checkbox"/> WETLAND	<input type="checkbox"/> ONSITE	<input type="checkbox"/> OFFSITE
<input type="checkbox"/> IMPOUNDMENT	<input type="checkbox"/> ONSITE	<input type="checkbox"/> OFFSITE

Figure C.5 ECOLOGICAL CHECKLIST #5: WETLANDS

1. ANY DESIGNATED OR KNOWN WETLANDS AT THE SITE

- ☒ **YES** (No designated wetlands or permanent wetlands are present at the Site. However, the July 1993 SI Report determined that there is a wetlands area within the Tatalina River floodplain approximately 3 miles due east of the Site.)
- ☐ **NO**

2. ARE WETLAND HABITATS EXPECTED

- ☐ **YES**
- ☒ **NO** (Due to the ephemeral nature of creeks adjacent to SS03/SS08/SS11.)

3. TYPES OF VEGETATION PRESENT

- ☒ **EMERGENT**
- ☐ **SUBMERGENT**
- ☒ **SCRUB/SHRUB**
- ☒ **WOODED** (Alder, spruce, low willows)
- ☐ **OTHER**

4. DISCHARGE FROM SITE TO WETLANDS

- ☐ **YES**
- ☐ **NO** (Discharge from the Site drains south and southeast.)

5. DISCHARGE FROM WETLAND (Not applicable.)

- | | | |
|--|--|---|
| <input type="checkbox"/> RIVER STREAM | <input type="checkbox"/> ONSITE | <input type="checkbox"/> OFFSITE |
| <input type="checkbox"/> GROUNDWATER | <input type="checkbox"/> ONSITE | <input type="checkbox"/> OFFSITE |
| <input type="checkbox"/> LAKE/POND | <input type="checkbox"/> ONSITE | <input type="checkbox"/> OFFSITE |
| <input type="checkbox"/> MARINE | <input type="checkbox"/> ONSITE | <input type="checkbox"/> OFFSITE |

APPENDIX D

*Summary Statistics and 95% UCL
Calculations*

Table D-1 Summary Statistics and Derived 95% UCLs for Human Receptor:

Surface Soil Data								
Constituent	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)	Assumed Distribution	ProUCL 95% UCL (mg/kg) ^a	EPC (mg/kg) ^b
Inorganics, Total								
Aluminum	2	2	100	28800	24000	na	nc	^c 28800
Arsenic	2	2	100	16	11	na	nc	^c 16
Chromium	2	2	100	56	50	na	nc	^c 56
Cobalt	2	2	100	22	15	na	nc	^c 22
Lead	8	8	100	259	11	Non-parametric	180	180
Manganese	2	2	100	609	454	na	nc	^c 609
Titanium	2	2	100	1430	1070	na	nc	^c 1430
Vanadium	2	2	100	88	68	na	nc	^c 88
Volatile Organic Compounds								
1,2,4-Trimethylbenzene	18	9	50	1400	0.0014	Non-parametric	431	431
1,3,5-Trimethylbenzene	18	9	50	510	0.00078	Non-parametric	81	81
Benzene	18	4	22	13	0.00043	Non-parametric	2.1	2.1
Ethylbenzene	18	8	44	26	0.0019	Non-parametric	8.3	8.3
m,p-Xylenes	15	7	47	22	0.0012	Non-parametric	8.2	8.2
n-Butylbenzene	17	6	35	6.4	0.037	Non-parametric	1.7	1.7
n-Propylbenzene	17	7	41	8.4	0.041	Non-parametric	3.9	3.9
o-Xylene	15	6	40	7.9	0.029	Non-parametric	3.0	3.0
p-Isopropyltoluene	18	8	44	11	0.0015	Non-parametric	2.1	2.1
sec-Butylbenzene	17	6	35	6.4	0.034	Non-parametric	1.6	1.6
Tert-Butylbenzene	17	4	24	18	0.18	Non-parametric	3.4	3.4
Toluene	18	10	56	78	0.00064	Non-parametric	24	24
Total xylenes	3	3	100	2600	0.0081	na	nc	^c 2600
Polynuclear Aromatic Hydrocarbons								
2-Methylnaphthalene	3	2	67	33	4	na	nc	^c 33
Naphthalene	18	13	72	160	0.00064	Non-parametric	51	51
Petroleum Hydrocarbons								
Diesel Range Organics (DRO)	18	14	78	38000	8.6	Non-parametric	14251	14251
Gasoline Range Organics (GRO)	18	7	39	3500	0.95	Non-parametric	629	629

Notes:

^a Calculated using ProUCL ver. 4.00.02. If ProUCL 4.00.02 recommended the 97.5% or the 99% UCL, the comparable 95% UCL was selected.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

^c ProUCL did not calculate a EPC due to the low frequency of detection or sample size.

EPC - exposure point concentration

mg/Kg - Milligram per kilogram.

na - not applicable

nc - not calculated

UCL - upper confidence limit

Table D-2 Summary Statistics and Derived 95% UCLs for Human Receptors

Subsurface Soil Data								
Constituent	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)	Assumed Distribution	ProUCL 95% UCL (mg/kg) ^a	EPC (mg/kg) ^b
Volatile Organic Compounds								
1,2,4-Trimethylbenzene	13	8	62	13	0.00019	Non-parametric	4.6	4.6
1,3,5-Trimethylbenzene	13	7	54	5.6	0.038	Non-parametric	2.0	2.0
o-Xylene	15	8	53	7.7	0.0096	Non-parametric	1.9	1.9
Polynuclear Aromatic Hydrocarbons								
Naphthalene	13	10	77	56	0.011	Non-parametric	26	26
Petroleum Hydrocarbons								
Diesel Range Organics (DRO)	16	12	75	13000	13	Non-parametric	7436	7436

Notes:

^a Calculated using ProUCL ver. 4.00.02. If ProUCL 4.00.02 recommended the 97.5% or the 99% UCL, the comparable 95% UCL was selected.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

EPC - exposure point concentration

mg/Kg - Milligram per kilogram.

na - not applicable

nc - not calculated

UCL - upper confidence limit

Table D-3 Summary Statistics and Derived 95% UCLs for Human Receptor:

Constituent	Sediment Data					Assumed Distribution	ProUCL 95%		
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected	Minimum Detected		UCL (mg/kg) ^a	EPC (mg/kg) ^b	
				Concentration (mg/Kg)	Concentration (mg/Kg)				
Inorganics, Total									
Aluminum	1	1	100	27900	27900	na	nc	^c	27900
Arsenic	1	1	100	21	21	na	nc	^c	21
Chromium	1	1	100	62	62	na	nc	^c	62
Cobalt	1	1	100	23	23	na	nc	^c	23
Manganese	1	1	100	1320	1320	na	nc	^c	1320
Titanium	1	1	100	1160	1160	na	nc	^c	1160
Vanadium	1	1	100	107	107	na	nc	^c	107

Notes:

^a Calculated using ProUCL ver. 4.00.02. If ProUCL 4.00.02 recommended the 97.5% or the 99% UCL, the comparable 95% UCL was selected.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

^c ProUCL did not calculate a EPC due to the low frequency of detection or sample size.

EPC - exposure point concentration

mg/Kg - Milligram per kilogram.

na - not applicable

nc - not calculated

UCL - upper confidence limit

Table D-4 Summary Statistics and Derived 95% UCLs for Human Receptors

Subsurface Water Data								
Constituent	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)	Assumed Distribution	ProUCL 95% UCL (mg/L) ^a	EPC (mg/L) ^b
Volatile Organic Compounds								
1,2,4-Trimethylbenzene	22	21	95	0.355	0.00026	Non-parametric	0.13	0.13
Benzene	22	21	95	0.34	0.0028	Non-parametric	0.12	0.12
Ethylbenzene	22	20	91	0.41	0.00049	Non-parametric	0.14	0.14
Semi-Volatile Organic Compounds								
2-Nitrophenol	3	1	33	0.00040	0.00040	na	nc ^c	0.00040
3,3'-Dichlorobenzidine	3	1	33	0.0050	0.0050	na	nc ^c	0.0050
4-Chloroaniline	3	1	33	0.0030	0.0030	na	nc ^c	0.0030
Bis(2-chloroethyl) Ether	3	1	33	0.0005	0.0005	na	nc ^c	0.00050
Hexachlorobutadiene	23	1	4	0.0030	0.0030	na	nc ^c	0.0030
Polynuclear Aromatic Hydrocarbons								
Naphthalene	23	22	96	0.18	0.000033	Non-parametric	0.092	0.092
Petroleum Hydrocarbons								
Diesel Range Organics (DRO)	22	21	95	6.4	0.19	Non-parametric	3.5	3.5
Gasoline Range Organics (GRO)	22	21	95	7.5	0.115	Non-parametric	3.4	3.4
Residual Range Organics (RRO)	12	4	33	6.9	0.085	Non-parametric	3.4	3.4

Notes:

^a Calculated using ProUCL ver. 4.00.02. If ProUCL 4.00.02 recommended the 97.5% or the 99% UCL, the comparable 95% UCL was selected.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

^c ProUCL did not calculate a EPC due to the low frequency of detection or sample size.

EPC - exposure point concentration

mg/L - Milligram per kilogram.

na - not applicable

nc - not calculated

UCL - upper confidence limit

Table D-5 Summary Statistics and Derived 95% UCLs for Human Receptor:

Constituent	Surface Soil Data					Assumed Distribution	ProUCL		EPC (mg/kg) ^b
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)		95% UCL (mg/kg) ^a		
Inorganics, Total									
Aluminum	9	9	100	33200	19000	Normal	28655		28655
Arsenic	9	9	100	22.9	10.4	Normal	19		19.44
Chromium	9	9	100	60	31	Normal	54		54.26
Cobalt	9	9	100	25	11.6	Normal	22		21.59
Manganese	9	9	100	1190	441	Normal	1030		1030
Titanium	6	6	100	1320	428	Normal	1271		1271
Vanadium	9	9	100	97	52.9	Normal	83		83.05
Volatile Organic Compounds									
1,3,5-Trimethylbenzene	5	1	20	4.6	4.6	na	nc	^c	4.6
Trichloroethene	5	2	40	0.1	0.0073	Non-parametric	0.13		0.1
Semi-Volatile Organic Compounds									
2-Nitroaniline	5	1	20	0.06	0.06	na	nc	^c	0.06
3-Nitroaniline	5	1	20	0.09	0.09	na	nc	^c	0.09
4-Chloro-3-methylphenol	5	1	20	0.1	0.1	na	nc	^c	0.1
Polynuclear Aromatic Hydrocarbons									
Benzo(a)pyrene	5	1	20	0.08	0.08	na	nc	^c	0.08
Pesticides									
4,4'-DDT	9	9	100	4.81	0.008	Gamma	3.8		3.832
Polychlorinated Biphenyls									
Arochlor 1260	8	7	88	17	0.02	Non-parametric	12		11.52

Notes:^a Calculated using ProUCL ver. 4.00.02. If ProUCL 4.00.02 recommended the 97.5% or the 99% UCL, the comparable 95% UCL was selected.^b The EPC is based on either the 95% UCL or the maximum concentration, whichever is lower.^c ProUCL did not calculate a EPC due to the low frequency of detection or sample size.

EPC - exposure point concentration

mg/Kg - Milligram per kilogram.

na - not applicable

nc - not calculated

UCL - upper confidence limit

Table D-6 Summary Statistics and Derived 95% UCLs for Human Receptor:

Constituent	Subsurface Soil Data					Assumed Distribution	ProUCL 95%	
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected (mg/Kg)	Minimum Detected (mg/Kg)		UCL (mg/kg) ^a	EPC (mg/kg) ^b
Inorganics, Total								
Aluminum	9	9	100	35700	21000	Normal	29175	29175
Arsenic	11	11	100	20	8.6	Normal	16	16
Chromium	11	11	100	57	36	Normal	52	52
Cobalt	9	9	100	43	15	Normal	26	26
Lead	15	15	100	114	9.0	Non-parametric	63	63
Manganese	9	9	100	1040	566	Normal	949	949
Titanium	7	7	100	1350	268	Normal	1087	1087
Vanadium	9	9	100	93	59	Normal	80	80
Polynuclear Aromatic Hydrocarbons								
Benzo(a)pyrene	7	2	29	0.057	0.014	Non-parametric	0.077	0.057
Pesticides								
Dieldrin	8	1	13	0.040	0.040	na	nc	^c 0.040
Polychlorinated Biphenyls								
Arochlor 1260	8	2	25	1.6	0.20	Non-parametric	1.6	1.6
Petroleum Hydrocarbons								
Diesel Range Organics (DRO)	13	11	85	23900	6.0	Non-parametric	12310	12310
Residual Range Organics (RRO)	8	7	88	13200	31	Non-parametric	8973	8973

Notes:

^a Calculated using ProUCL ver. 4.00.02. If ProUCL 4.00.02 recommended the 97.5% or the 99% UCL, the comparable 95% UCL was selected.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

^c ProUCL did not calculate a EPC due to the low frequency of detection or sample size.

EPC - exposure point concentration

mg/Kg - Milligram per kilogram.

na - not applicable

nc - not calculated

UCL - upper confidence limit

Table D-7 Summary Statistics and Derived 95% UCLs for Human Receptor:

Constituent	Sediment Data				Assumed Distribution	ProUCL 95% UCL (mg/kg) ^a	EPC (mg/kg) ^b	
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/Kg)				
Inorganics, Total								
Aluminum	3	3	100	35000	na	nc	^c	35000
Arsenic	6	6	100	24	Normal	21		21
Chromium	6	6	100	78	Normal	62		62
Cobalt	3	3	100	32	na	nc	^c	32
Lead	6	6	100	69	Gamma	51		51
Manganese	3	3	100	1300	na	nc	^c	1300
Titanium	1	1	100	1470	na	nc	^c	1470
Vanadium	3	3	100	106	na	nc	^c	106
Polynuclear Aromatic Hydrocarbons								
Benzo(a)pyrene	4	2	50	0.063	na	nc	^c	0.063
Pesticides								
4,4'-DDT	6	6	100	2.5	Normal	2.0		2.0
Polychlorinated Biphenyls								
Arochlor 1260	5	3	60	0.19	Non-parametric	0.17		0.17

Notes:

^a Calculated using ProUCL ver. 4.00.02. If ProUCL 4.00.02 recommended the 97.5% or the 99% UCL, the comparable 95% UCL was selected.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

^c ProUCL did not calculate a EPC due to the low frequency of detection or sample size.

4,4'-DDT - dichlorodiphenyltrichloroethane

EPC - exposure point concentration

mg/Kg - Milligram per kilogram.

na - not applicable

nc - not calculated

UCL - upper confidence limit

Table D-8 Summary Statistics and Derived 95% UCLs for Human Receptor:

Constituent	Subsurface Water Data					Assumed Distribution	ProUCL 95%	
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected (mg/L)	Minimum Detected (mg/L)		UCL (mg/L) ^a	EPC (mg/L) ^b
Inorganics, Total								
Aluminum	5	5	100	176	0.090	Non-parametric	189	176
Antimony	5	1	20	0.0030	0.0030	na	nc	^c 0.0030
Arsenic	31	21	68	0.31	0.0038	Non-parametric	0.082	0.082
Barium	31	31	100	2.2	0.0060	Gamma	0.53	0.53
Beryllium	5	1	20	0.0068	0.0068	na	nc	^c 0.0068
Cadmium, water	31	18	58	0.0095	0.00013	Non-parametric	0.0024	0.0024
Chromium	31	26	84	0.37	0.0047	Non-parametric	0.13	0.13
Cobalt	5	1	20	0.19	0.19	na	nc	^c 0.19
Copper	5	5	100	0.51	0.0040	na	nc	^c 0.51
Lead	31	26	84	0.33	0.0010	Non-parametric	0.087	0.087
Manganese	5	5	100	16	0.036	Non-parametric	17	16
Mercury	30	11	37	0.00060	0.00011	Non-parametric	0.00024	0.00024
Nickel	5	1	20	0.45	0.45	na	nc	^c 0.45
Selenium	30	10	33	0.025	0.0032	Non-parametric	0.013	0.013
Thallium	5	1	20	0.0013	0.0013	na	nc	^c 0.0013
Titanium	4	4	100	0.038	0.0020	na	nc	^c 0.038
Vanadium	5	1	20	0.50	0.50	na	nc	^c 0.50
Zinc	5	3	60	0.88	0.0060	Non-parametric	1.0	0.88
Volatile Organic Compounds								
1,2-Dibromoethane	20	1	5	0.0010	0.0010	na	nc	^c 0.0010
2-Chloroethyl Vinyl Ether	2	1	50	0.00019	0.00019	na	nc	^c 0.00019
Benzene	21	1	5	0.0010	0.0010	na	nc	^c 0.0010
Toluene	20	8	40	0.12	0.00010	Non-parametric	0.033	0.033
Polynuclear Aromatic Hydrocarbons								
2-Methylnaphthalene	3	1	33	0.46	0.46	na	nc	^c 0.46
Naphthalene	23	18	78	0.14	0.0000051	Non-parametric	0.033	0.033
Petroleum Hydrocarbons								
Diesel Range Organics (DRO)	29	15	52	190	0.036	Non-parametric	36	36

Notes:

^a Calculated using ProUCL ver. 4.00.02. If ProUCL 4.00.02 recommended the 97.5% or the 99% UCL, the comparable 95% UCL was selected.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

^c ProUCL did not calculate a EPC due to the low frequency of detection or sample size.

EPC - exposure point concentration

mg/L - Milligram per liter.

na - not applicable

nc - not calculated

UCL - upper confidence limit

Table D-9 Summary Statistics and Derived 95% UCLs for Human Receptor:

Constituent	Surface Soil Data					Assumed Distribution	ProUCL 95%		EPC (mg/kg) ^b
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)		UCL (mg/kg) ^a		
Inorganics, Total									
Aluminum	4	4	100	22700	14200	na	nc	^c	22700
Arsenic	18	18	100	20	1.6	Normal	10		10
Barium	18	18	100	3680	114	Non-parametric	1256		1256
Chromium	18	18	100	47	5.9	Normal	40		40
Cobalt	4	4	100	20	4	na	nc	^c	20
Lead	18	18	100	462	4.9	Gamma	120		120
Manganese	4	4	100	1080	107	na	nc	^c	1080
Titanium	4	4	100	1460	423	na	nc	^c	1460
Volatile Organic Compounds									
1,2,4-Trimethylbenzene	16	3	19	17	0.058	Non-parametric	6.6		6.6
1,3,5-Trimethylbenzene	16	2	13	4.4	0.032	Non-parametric	1.9		1.9
Semi-Volatile Organic Compounds									
4-Methylphenol	9	1	11	46	46	na	nc	^c	46
Dibenzofuran	18	8	44	1700	0.0030	Non-parametric	267		267
Polynuclear Aromatic Hydrocarbons									
2-Methylnaphthalene	13	6	46	8600	0.037	Non-parametric	3697		3697
Acenaphthene	18	10	56	9200	0.0011	Non-parametric	2800		2800
Anthracene	18	9	50	7300	0.0018	Non-parametric	2230		2230
Benzo(a)anthracene	18	9	50	3100	0.0068	Non-parametric	950		950
Benzo(a)pyrene	18	7	39	1800	0.0068	Non-parametric	286		286
Benzo(b)fluoranthene	18	9	50	2300	0.019	Non-parametric	705		705
Benzo(g,h,i)perylene	18	8	44	740	0.0063	Non-parametric	229		229
Benzo(k)fluoranthene	14	5	36	790	0.0085	Non-parametric	166		166
Chrysene	18	10	56	3500	0.049	Non-parametric	1066		1066
Dibenz(a,h)anthracene	18	6	33	210	0.0025	Non-parametric	34		34
Fluoranthene	18	9	50	10000	0.017	Non-parametric	3063		3063
Fluorene	18	9	50	5700	0.0028	Non-parametric	1744		1744
Indeno(1,2,3-cd)pyrene	18	6	33	640	0.0070	Non-parametric	103		103
Naphthalene	20	11	55	13000	0.0016	Non-parametric	3555		3555
Phenanthrene	18	10	56	17000	0.012	Non-parametric	5177		5177
Pyrene	18	12	67	10000	0.036	Non-parametric	3029		3029
Pesticides									
Aldrin	17	4	24	0.051	0.0039	Non-parametric	0.017		0.017
alpha-BHC	16	7	44	2	0.00030	Non-parametric	0.70		0.70
alpha-Chlordane	17	10	59	2	0.00032	Non-parametric	0.65		0.65
delta-BHC	15	5	33	1.7	0.0034	Non-parametric	0.65		0.65
Endrin	17	5	29	3.5	0.0018	Non-parametric	0.61		0.61
Endrin Aldehyde	17	12	71	2.9	0.00037	Non-parametric	0.94		0.94
Endrin Ketone	9	4	44	2.2	0.0026	Non-parametric	0.75		0.75
Heptachlor	17	7	41	0.28	0.0016	Non-parametric	0.055		0.055
Toxaphene	17	4	24	1.7	1.3	Non-parametric	1.5		1.5
Petroleum Hydrocarbons									
Diesel Range Organics (DRO)	18	18	100	200000	19	Gamma	79575		79575
Residual Range Organics (RRO)	18	18	100	160000	104	Gamma	60057		60057

Notes:^a Calculated using ProUCL ver. 4.00.02. If ProUCL 4.00.02 recommended the 97.5% or the 99% UCL, the comparable 95% UCL was selected.^b The EPC is based on either the 95% UCL or the maximum concentration, whichever is lower.^c ProUCL did not calculate a EPC due to the low frequency of detection or sample size.

EPC - exposure point concentration

mg/Kg - Milligram per kilogram.

na - not applicable

nc - not calculated

UCL - upper confidence limit

Table D-10 Summary Statistics and Derived 95% UCLs for Human Receptors

Constituent	Subsurface Soil Data							EPC (mg/kg) ^b	
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)	Assumed Distribution	ProUCL 95% UCL (mg/kg) ^a		
Inorganics, Total									
Arsenic	2	2	100	59	51	na	nc	^c	59
Chromium	2	2	100	43	36	na	nc	^c	43

Notes:

^a Calculated using ProUCL ver. 4.00.02. If ProUCL 4.00.02 recommended the 97.5% or the 99% UCL, the comparable 95% UCL was selected.

^b The EPC is based on either the 95% UCL or the maximum concentration, whichever is lower.

^c ProUCL did not calculate a EPC due to the low frequency of detection or sample size.

EPC - exposure point concentration

mg/Kg - Milligram per kilogram.

na - not applicable

nc - not calculated

UCL - upper confidence limit

Table D-11 Summary Statistics and Derived 95% UCLs for Human Receptors

Constituent	Sediment Data					Assumed Distribution	ProUCL 95% UCL (mg/kg) ^a	EPC (mg/kg) ^b
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
Inorganics, Total								
Arsenic	6	4	67	12	1.1	Non-parametric	8.8	8.8
Chromium	6	6	100	34	1.8	Normal	26	26

Notes:

^a Calculated using ProUCL ver. 4.00.02. If ProUCL 4.00.02 recommended the 97.5% or the 99% UCL, the comparable 95% UCL was selected.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

^c ProUCL did not calculate a EPC due to the low frequency of detection or sample size.

EPC - exposure point concentration

mg/Kg - Milligram per kilogram.

na - not applicable

nc - not calculated

UCL - upper confidence limit

Table D-12 Summary Statistics and Derived 95% UCLs for Ecological Receptors

Surface Soil Data								
Constituent	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)	Assumed Distribution	ProUCL 95% UCL (mg/kg) ^a	EPC (mg/kg) ^b
Inorganics, Total								
Aluminum	2	2	100	28800	24000	na	nc	^c 28800
Antimony	2	2	100	2.0	1.0	na	nc	^c 2.0
Arsenic	2	2	100	16	11	na	nc	^c 16
Barium	2	2	100	258	178	na	nc	^c 258
Cadmium	2	2	100	4.0	0.70	na	nc	^c 4.0
Chromium	2	2	100	56	50	na	nc	^c 56
Cobalt	2	2	100	22	15	na	nc	^c 22
Copper	2	2	100	95	51	na	nc	^c 95
Lead	8	8	100	259	11	Non-parametric	180	180
Manganese	2	2	100	609	454	na	nc	^c 609
Mercury	2	2	100	1.59	0.83	na	nc	^c 1.59
Nickel	2	2	100	41	37	na	nc	^c 41
Selenium	2	2	100	2.0	1.3	na	nc	^c 2.0
Silver	2	2	100	6.0	1.2	na	nc	^c 6.0
Tin	2	2	100	50	12	na	nc	^c 50
Titanium	2	2	100	1430	1070	na	nc	^c 1430
Vanadium	2	2	100	88	68	na	nc	^c 88
Zinc	2	2	100	518	156	na	nc	^c 518
Volatile Organic Compounds								
1,2,4-Trimethylbenzene	18	9	50	1400	0.0014	Non-parametric	431	431
1,3,5-Trimethylbenzene	18	9	50	510	0.00078	Non-parametric	81	81
1,4-Dichlorobenzene	18	1	6	1.2	1.2	na	nc	^c 1.2
Benzene	18	4	22	13	0.00043	Non-parametric	2.1	2.1
Ethylbenzene	18	8	44	26	0.0019	Non-parametric	8.3	8.3
Isopropylbenzene	17	8	47	3.5	0.012	Non-parametric	1.5	1.5
m,p-Xylenes	15	7	47	22	0.0012	Non-parametric	8.2	8.2
n-Butylbenzene	17	6	35	6.4	0.037	Non-parametric	1.7	1.7
n-Propylbenzene	17	7	41	8.4	0.041	Non-parametric	3.9	3.9
o-Xylene	15	6	40	7.9	0.029	Non-parametric	3.0	3.0
p-Isopropyltoluene	18	8	44	11	0.0015	Non-parametric	2.1	2.1
sec-Butylbenzene	17	6	35	6.4	0.034	Non-parametric	1.6	1.6
Tert-Butylbenzene	17	4	24	18	0.18	Non-parametric	3.4	3.4
Toluene	18	10	56	78	0.00064	Non-parametric	24	24
Total xylenes	3	3	100	2600	0.0081	na	nc	^c 2600
Semi-Volatile Organic Compounds								
Dibenzofuran	13	9	69	2.8	0.00021	Non-parametric	0.71	0.71
Petroleum Hydrocarbons								
Diesel Range Organics (DRO)	18	14	78	38000	8.6	Non-parametric	14251	14251
Gasoline Range Organics (GRO)	18	7	39	3500	0.95	Non-parametric	629	629
Residual Range Organics (RRO)	13	12	92	1260	12	Non-parametric	605	605

Notes:^a Calculated using ProUCL ver. 4.00.02. If ProUCL 4.00.02 recommended the 97.5% or the 99% UCL, the comparable 95% UCL was selected.^b The EPC is based on either the 95% UCL or the maximum concentration, whichever is lower.^c ProUCL did not calculate a EPC due to the low frequency of detection or sample size.

EPC - exposure point concentration

mg/Kg - Milligram per kilogram.

na - not applicable

nc - not calculated

UCL - upper confidence limit

Table D-13 Summary Statistics and Derived 95% UCLs for Ecological Receptors

Constituent	Sediment Data					Assumed Distribution	ProUCL 95% UCL		EPC
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)		(mg/kg) ^a	(mg/kg) ^b	
Inorganics, Total									
Aluminum	1	1	100	27900	27900	na	nc	^c	27900
Arsenic	1	1	100	21	21	na	nc	^c	21
Barium	1	1	100	146	146	na	nc	^c	146
Beryllium	1	1	100	0.5	0.5	na	nc	^c	0.50
Cadmium	1	1	100	1.0	1.0	na	nc	^c	1.0
Chromium	1	1	100	62	62	na	nc	^c	62
Cobalt	1	1	100	23	23	na	nc	^c	23
Copper	1	1	100	55	55	na	nc	^c	55
Manganese	1	1	100	1320	1320	na	nc	^c	1320
Nickel	1	1	100	65	65	na	nc	^c	65
Selenium	1	1	100	1.7	1.7	na	nc	^c	1.7
Silver	1	1	100	2.0	2.0	na	nc	^c	2.0
Titanium	1	1	100	1160	1160	na	nc	^c	1160
Vanadium	1	1	100	107	107	na	nc	^c	107
Zinc	1	1	100	218	218	na	nc	^c	218
Volatile Organic Compounds									
1,2,3-Trichlorobenzene	1	1	100	0.00025	0.00025	na	nc	^c	0.00025
1,2,3-Trichloropropane	1	1	100	0.00021	0.00021	na	nc	^c	0.00021
cis-1,3-Dichloropropene	1	1	100	0.00017	0.00017	na	nc	^c	0.00017
Methylene Chloride	1	1	100	0.013	0.013	na	nc	^c	0.013
trans-1,3-Dichloropropene	1	1	100	0.00013	0.00013	na	nc	^c	0.00013
Semi-Volatile Organic Compounds									
3-and 4-Methylphenol Coelution	1	1	100	0.20	0.20	na	nc	^c	0.20
Bis(2-ethylhexyl) Phthalate	1	1	100	0.90	0.90	na	nc	^c	0.90
Phenol	1	1	100	0.10	0.10	na	nc	^c	0.10
Pesticides									
4,4'-DDD	1	1	100	0.0080	0.0080	na	nc	^c	0.0080
4,4'-DDT	1	1	100	0.0095	0.0095	na	nc	^c	0.0095
Endosulfan Sulfate	1	1	100	0.0033	0.0033	na	nc	^c	0.0033
Petroleum Hydrocarbons									
Diesel Range Organics (DRO)	1	1	100	161	161	na	nc	^c	161
Gasoline Range Organics (GRO)	1	1	100	5.8	5.8	na	nc	^c	5.8

Notes:^a Calculated using ProUCL ver. 4.00.02. If ProUCL 4.00.02 recommended the 97.5% or the 99% UCL, the comparable 95% UCL was selected.^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.^c ProUCL did not calculate a EPC due to the low frequency of detection or sample size.

4,4'-DDD - dichlorodiphenyldichloroethane

4,4'-DDE - dichlorodiphenyldichloroethylene

EPC - exposure point concentration

mg/Kg - Milligram per kilogram.

na - not applicable

nc - not calculated

UCL - upper confidence limit

Table D-14 Summary Statistics and Derived 95% UCLs for Ecological Receptors

Constituent	Surface Water Data					Assumed Distribution	ProUCL		EPC
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected	Minimum Detected		95% UCL		
				Concentration (mg/Kg)	Concentration (mg/Kg)				
Inorganics, Total									
Barium	1	1	100	0.008	0.008	na	nc	^c	0.0080
Titanium	1	1	100	0.004	0.004	na	nc	^c	0.0040
Semi-Volatile Organic Compounds									
DiethylPhthalate	1	1	100	0.0005	0.0005	na	nc	^c	0.00050
Petroleum Hydrocarbons									
Diesel Range Organics (DRO)	1	1	100	0.062	0.062	na	nc	^c	0.062

Notes:

^a Calculated using ProUCL ver. 4.00.02. If ProUCL 4.00.02 recommended the 97.5% or the 99% UCL, the comparable 95% UCL was selected.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

^c ProUCL did not calculate a EPC due to the low frequency of detection or sample size.

EPC - exposure point concentration

mg/Kg - Milligram per kilogram.

na - not applicable

nc - not calculated

UCL - upper confidence limit

Table D-15 Summary Statistics and Derived 95% UCLs for Ecological Receptors

Constituent	Surface Soil Data						ProUCL 95% UCL (mg/kg) ^a	EPC (mg/kg) ^b
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)	Assumed Distribution		
Inorganics, Total								
Aluminum	9	9	100	33200	19000	Normal	28655	28655
Antimony	9	9	100	3.0	0.46	Lognormal	1.6	1.6
Arsenic	9	9	100	23	10.4	Normal	19	19
Barium	9	9	100	307	101	Normal	261	261
Cadmium	9	7	78	2.0	0.60	Non-parametric	1.2	1.2
Chromium	9	9	100	60	31	Normal	54	54
Cobalt	9	9	100	25	12	Normal	22	22
Copper	9	9	100	76	22	Normal	65	65
Lead	10	10	100	39	9.4	Normal	28	28
Manganese	9	9	100	1190	441	Normal	1030	1030
Nickel	9	9	100	74	24	Normal	58	58
Selenium	6	3	50	1.3	0.80	Non-parametric	1.1	1.1
Thallium	8	5	63	0.24	0.10	Non-parametric	0.18	0.18
Tin	6	2	33	11	7.0	Non-parametric	9.4	9.4
Titanium	6	6	100	1320	428	Normal	1271	1271
Vanadium	9	9	100	97	53	Normal	83	83
Zinc	9	9	100	150	61	Normal	135	135
Volatile Organic Compounds								
1,3,5-Trimethylbenzene	5	1	20	4.6	4.6	na	nc	^c 4.6
Trichlorofluoromethane	6	1	17	0.00034	0.00034	na	nc	^c 0.00034
Carbon Disulfide	6	1	17	0.00054	0.00054	na	nc	^c 0.00054
Semi-Volatile Organic Compounds								
2-Nitroaniline	5	1	20	0.060	0.060	na	nc	^c 0.060
3,3'-Dichlorobenzidine	5	1	20	0.050	0.050	na	nc	^c 0.050
4-Chloro-3-methylphenol	5	1	20	0.10	0.10			
Pesticides								
4,4'-DDT	9	9	100	4.8	0.0080	Gamma	3.8	3.8
Polychlorinated Biphenyls								
Arochlor 1260	8	7	88	17	0.020	Non-parametric	12	12
Petroleum Hydrocarbons								
Diesel Range Organics (DRO)	9	9	100	2500	4.0	Gamma	2159	2159
Gasoline Range Organics (GRO)	6	6	100	630	0.98	Gamma	2288	630
Residual Range Organics (RRO)	5	5	100	529	43	Normal	535	529

Notes:

^a Calculated using ProUCL ver. 4.00.02. If ProUCL 4.00.02 recommended the 97.5% or the 99% UCL, the comparable 95% UCL was selected.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

^c ProUCL did not calculate a EPC due to the low frequency of detection or sample size.

4,4'-DDT - dichlorodiphenyltrichloroethane

EPC - exposure point concentration

mg/Kg - Milligram per kilogram.

na - not applicable

nc - not calculated

UCL - upper confidence limit

Table D-16 Summary Statistics and Derived 95% UCLs for Ecological Receptors

Sediment Data								
Constituent	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)	Assumed Distribution	ProUCL 95% UCL (mg/kg) ^a	EPC (mg/kg) ^b
Inorganics, Total								
Aluminum	3	3	100	35000	28900	na	nc	^c 35000
Arsenic	6	6	100	24	11	Normal	21	21
Barium	6	6	100	258	188	Normal	240	240
Beryllium	3	3	100	1.2	0.60	na	nc	^c 1.2
Cadmium	6	5	83	1.9	0.31	Non-parametric	1.4	1.4
Chromium	6	6	100	78	37	Normal	62	62
Cobalt	3	3	100	32	19	na	nc	^c 32
Copper	3	3	100	122	49	na	nc	^c 122
Lead	6	6	100	69	16	Gamma	51	51
Manganese	3	3	100	1300	857	na	nc	^c 1300
Mercury	6	6	100	0.26	0.079	Normal	0.20	0.20
Molybdenum	1	1	100	3.0	3.0	na	nc	^c 3.0
Nickel	3	3	100	110	39.2	na	nc	^c 110
Selenium	5	2	40	1.5	0.31	Non-parametric	1.5	1.5
Thallium	3	3	100	0.30	0.28	na	nc	^c 0.30
Titanium	1	1	100	1470	1470	na	nc	^c 1470
Vanadium	3	3	100	106	86	na	nc	^c 106
Zinc	3	3	100	273	102	na	nc	^c 273
Volatile Organic Compounds								
m,p-Xylenes	4	2	50	0.079	0.0031	na	nc	^c 0.079
Methylene Chloride	4	1	25	0.0018	0.0018	na	nc	^c 0.0018
3,3'-Dichlorobenzidine	1	1	100	0.080	0.080	na	nc	^c 0.080
4-Chloroaniline	1	1	100	0.20	0.20	na	nc	^c 0.20
Polynuclear Aromatic Hydrocarbons								
Acenaphthene	4	1	25	0.010	0.010	na	nc	^c 0.0100
Acenaphthylene	4	1	25	0.0074	0.0074	na	nc	^c 0.0074
Anthracene	4	2	50	0.079	0.012	na	nc	^c 0.079
Benzo(a)anthracene	4	2	50	0.063	0.022	na	nc	^c 0.063
Benzo(a)pyrene	4	2	50	0.063	0.023	na	nc	^c 0.063
Benzo(b)fluoranthene	4	2	50	0.063	0.035	na	nc	^c 0.063
Benzo(g,h,i)perylene	4	2	50	0.044	0.017	na	nc	^c 0.044
Benzo(k)fluoranthene	3	2	67	0.042	0.028	na	nc	^c 0.042
Chrysene	4	2	50	0.12	0.068	na	nc	^c 0.12
Dibenz(a,h)anthracene	4	1	25	0.015	0.015	na	nc	^c 0.015
Fluoranthene	4	2	50	0.13	0.12	na	nc	^c 0.13
Fluorene	4	1	25	0.015	0.015	na	nc	^c 0.01
Indeno(1,2,3-cd)Pyrene	4	2	50	0.033	0.016	na	nc	^c 0.033
Naphthalene	4	2	50	0.055	0.0078	na	nc	^c 0.055
Phenanthrene	4	3	75	0.17	0.012	na	nc	^c 0.17
Pyrene	4	2	50	0.18	0.084	na	nc	^c 0.18
Pesticides								
4,4'-DDD	6	6	100	0.67	0.0062	Normal	0.42	0.42
4,4'-DDE	6	5	83	0.26	0.028	Non-parametric	0.21	0.21
4,4'-DDT	6	6	100	2.5	0.056	Normal	2.0	2.0
Endosulfan Sulfate	4	1	25	0.0042	0.0042	na	nc	^c 0.0042

Table D-16 Summary Statistics and Derived 95% UCLs for Ecological Receptors

Sediment Data								
Constituent	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)	Assumed Distribution	ProUCL 95% UCL (mg/kg) ^a	EPC (mg/kg) ^b
Polychlorinated Biphenyls								
Arochlor 1260	5	3	60	0.19	0.055	Non-parametric	0.17	0.17
Petroleum Hydrocarbons								
Diesel Range Organics (DRO)	6	5	83	2740	26	Non-parametric	2506	2506
Gasoline Range Organics (GRO)	5	3	60	4.2	2.0	Non-parametric	3.6	3.6
Residual Range Organics (RRO)	5	5	100	1190	119	Normal	871	871

Notes:

^a Calculated using ProUCL ver. 4.00.02. If ProUCL 4.00.02 recommended the 97.5% or the 99% UCL, the comparable 95% UCL was selected.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

^c ProUCL did not calculate a EPC due to the low frequency of detection or sample size.

4,4'-DDD - dichlorodiphenyldichloroethane

4,4'-DDE - dichlorodiphenyldichloroethylene

4,4'-DDT - dichlorodiphenyltrichloroethane

EPC - exposure point concentration

mg/Kg - Milligram per kilogram.

na - not applicable

nc - not calculated

UCL - upper confidence limit

Table D-17 Summary Statistics and Derived 95% UCLs for Ecological Receptors

Constituent	Surface Water Data					Assumed Distribution	ProUCL 95% UCL (mg/kg) ^a	EPC (mg/kg) ^b
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)			
Inorganics, Total								
Aluminum	3	2	67	1.21	0.576	na	nc	^c 1.2
Barium	4	4	100	0.0152	0.005	na	nc	^c 0.015
Chromium	4	2	50	0.005	0.004	na	nc	^c 0.0050
Copper	2	1	50	0.0028	0.0028	na	nc	^c 0.0028
Lead	4	2	50	0.0011	0.001	na	nc	^c 0.0011
Selenium	3	1	33	0.0012	0.0012	na	nc	^c 0.0012
Silver	3	1	33	0.003	0.003	na	nc	^c 0.0030
Titanium	1	1	100	0.002	0.002	na	nc	^c 0.0020
Volatile Organic Compounds								
1,1-Dichloropropene	2	1	50	0.00029	0.00029	na	nc	^c 0.00029
1-Chlorohexane	1	1	100	0.00024	0.00024	na	nc	^c 0.00024
2,2-Dichloropropane	2	1	50	0.00025	0.00025	na	nc	^c 0.00025
2-Chloroethyl Vinyl Ether	2	1	50	0.00019	0.00019	na	nc	^c 0.00019
Bromomethane	3	1	33	0.00015	0.00015	na	nc	^c 0.00015
Chloroethane	2	1	50	0.00031	0.00031	na	nc	^c 0.00031
Chloromethane	2	1	50	0.00031	0.00031	na	nc	^c 0.00031
Isopropylbenzene	2	1	50	0.00021	0.00021	na	nc	^c 0.00021
Carbon Disulfide	2	1	50	0.0025	0.0025	na	nc	^c 0.0025
Pesticides								
4,4'-DDD	1	1	100	0.0000022	0.0000022	na	nc	^c 0.0000022
4,4'-DDE	1	1	100	0.0000041	0.0000041	na	nc	^c 0.0000041
4,4'-DDT	2	2	100	0.000031	0.0000298	na	nc	^c 0.000031

Notes:^a Calculated using ProUCL ver. 4.00.02. If ProUCL 4.00.02 recommended the 97.5% or the 99% UCL, the comparable 95% UCL was selected.^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.^c ProUCL did not calculate a EPC due to the low frequency of detection or sample size.

4,4'-DDD - dichlorodiphenyldichloroethane
 4,4'-DDE - dichlorodiphenyldichloroethylene
 4,4'-DDT - dichlorodiphenyltrichloroethane
 EPC - exposure point concentration
 mg/Kg - Milligram per kilogram.
 na - not applicable
 nc - not calculated
 UCL - upper confidence limit

Table D-18 Summary Statistics and Derived 95% UCLs for Ecological Receptors

Constituent	Surface Soil Data					Assumed Distribution	ProUCL 95%	
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)		UCL (mg/kg) ^a	EPC (mg/kg) ^b
Inorganics, Total								
Aluminum	4	4	100	22700	14200	na	nc	^c 22700
Antimony	4	2	50	1.0	1.0	na	nc	^c 1.0
Arsenic	18	18	100	20	1.6	Normal	10	10
Barium	18	18	100	3680	114	Non-parametric	1256	1256
Cadmium	18	15	83	0.70	0.092	Non-parametric	0.37	0.37
Chromium	18	18	100	47	5.9	Normal	40	40
Cobalt	4	4	100	20	4.0	na	nc	^c 20
Copper	4	4	100	58	10	na	nc	^c 58
Lead	18	18	100	462	4.9	Gamma	120	120
Manganese	4	4	100	1080	107	na	nc	^c 1080
Molybdenum	4	3	75	3.0	1.0	na	nc	^c 3.0
Nickel	4	4	100	40	11	na	nc	^c 40
Selenium	18	7	39	1.3	0.30	Non-parametric	0.74	0.74
Thallium	4	3	75	0.30	0.10	na	nc	^c 0.30
Tin	4	1	25	11	11	na	nc	^c 11
Titanium	4	4	100	1460	423	na	nc	^c 1460
Vanadium	4	4	100	68	35	na	nc	^c 68
Zinc	4	4	100	91	29	na	nc	^c 91
Volatile Organic Compounds								
1,2,4-Trimethylbenzene	16	3	19	17	0.058	Non-parametric	6.6	6.6
1,3,5-Trimethylbenzene	16	2	13	4.4	0.032	Non-parametric	1.9	1.9
Acetone	17	15	88	32	0.024	Non-parametric	11	11
Ethylbenzene	16	1	6	0.076	0.076	na	nc	^c 0.076
Isopropylbenzene	16	1	6	0.043	0.043	na	nc	^c 0.043
m,p-Xylenes	14	1	7	0.15	0.15	na	nc	^c 0.15
n-Butylbenzene	16	1	6	0.13	0.13	na	nc	^c 0.13
o-Xylene	14	1	7	2.0	2.0	na	nc	^c 2.0
p-Isopropyltoluene	16	3	19	0.19	0.017	Non-parametric	0.077	0.077
Trichlorofluoromethane	17	1	6	0.0034	0.0034	na	nc	^c 0.0034
Semi-Volatile Organic Compounds								
2,4-Dimethylphenol	13	1	8	25	25	na	nc	^c 25
Benzoic Acid	11	1	9	0.37	0.37	na	nc	^c 0.37
Dibenzofuran	18	8	44	1700	0.0030	Non-parametric	267	267
Phenol	13	1	8	16	16	na	nc	^c 16
Polynuclear Aromatic Hydrocarbons								
Fluoranthene	18	9	50	10000	0.017	Non-parametric	3063	3063
Pesticides								
4,4'-DDT	17	16	94	1.5	0.016	Non-parametric	0.76	0.76
delta-BHC	15	5	33	1.7	0.0034	Non-parametric	0.65	0.65
Dieldrin	17	3	18	0.027	0.027	na	nc	^c 0.027
Endrin	17	5	29	3.5	0.0018	Non-parametric	0.61	0.61
Endrin Aldehyde	17	12	71	2.9	0.00037	Non-parametric	0.94	0.94
Endrin Ketone	9	4	44	2.2	0.0026	Non-parametric	0.75	0.75

Table D-18 Summary Statistics and Derived 95% UCLs for Ecological Receptors

Constituent	Surface Soil Data					Assumed Distribution	ProUCL 95% UCL (mg/kg) ^a	EPC (mg/kg) ^b
	Number of Samples	Number of Detects	Detection Frequency	Maximum Detected Concentration (mg/Kg)	Minimum Detected Concentration (mg/Kg)			
Petroleum Hydrocarbons								
Diesel Range Organics (DRO)	18	18	100	200000	19	Gamma	79575	79575
Gasoline Range Organics (GRO)	18	6	33	18	2.9	Non-parametric	7.1	7.1
Residual Range Organics (RRO)	18	18	100	160000	104	Gamma	60057	60057

Notes:

^a Calculated using ProUCL ver. 4.00.02. If ProUCL 4.00.02 recommended the 97.5% or the 99% UCL, the comparable 95% UCL was selected.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

^c ProUCL did not calculate a EPC due to the low frequency of detection or sample size.

4,4'-DDT - dichlorodiphenyltrichloroethane

EPC - exposure point concentration

mg/Kg - Milligram per kilogram.

na - not applicable

nc - not calculated

UCL - upper confidence limit

Table D-19 Summary Statistics and Derived 95% UCLs for Ecological Receptors

Constituent	Sediment Data						ProUCL 95%		EPC (mg/kg) ^b
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected	Minimum Detected	Assumed Distribution	UCL		
				Concentration (mg/Kg)	Concentration (mg/Kg)		(mg/kg) ^a		
Inorganics, Total									
Arsenic	6	4	67	12	1.1	Non-parametric	8.8		8.8
Barium	6	6	100	184	12	Normal	150		150
Selenium	6	3	50	5.6	3.3	Non-parametric	4.7		4.7
Pesticides									
4,4'-DDT	3	3	100	0.0057	0.0051	na	nc	^c	0.0057
Petroleum Hydrocarbons									
Residual Range Organics (RRO)	3	3	100	342	236	na	nc	^c	342

Notes:

^a Calculated using ProUCL ver. 4.00.02. If ProUCL 4.00.02 recommended the 97.5% or the 99% UCL, the comparable 95% UCL was selected.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

^c ProUCL did not calculate a EPC due to the low frequency of detection or sample size.

4,4'-DDT - dichlorodiphenyltrichloroethane

EPC - exposure point concentration

mg/Kg - Milligram per kilogram.

na - not applicable

nc - not calculated

UCL - upper confidence limit

Table D-20 Summary Statistics and Derived 95% UCLs for Ecological Receptors

Constituent	Surface Water Data					Assumed Distribution	ProUCL 95% UCL		EPC
	Number of Samples	Number of Detects	Frequency of Detection	Maximum Detected	Minimum Detected		(mg/kg) ^a		
				Concentration (mg/L)	Concentration (mg/L)				
Inorganics, Total									
Barium	3	3	100	0.032	0.010	na	nc	^c	0.032
Chromium	3	1	33	0.0042	0.0042	na	nc	^c	0.0042
Volatile Organic Compounds									
Chloromethane	5	1	20	0.0011	0.0011	na	nc	^c	0.0011
Carbon Disulfide	3	3	100	0.019	0.0059	na	nc	^c	0.019

Notes:

^a Calculated using ProUCL ver. 4.00.02. If ProUCL 4.00.02 recommended the 97.5% or the 99% UCL, the comparable 95% UCL was selected.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

^c ProUCL did not calculate a EPC due to the low frequency of detection or sample size.

EPC - exposure point concentration

mg/Kg - Milligram per kilogram.

na - not applicable

nc - not calculated

UCL - upper confidence limit

APPENDIX E

*Human Health Exposure Dose
Equations and Sample Risk
Calculations*

APPENDIX E HUMAN HEALTH EXPOSURE DOSE EQUATIONS

Exposure Assessment Equations and Parameters:

Ingestion intake for soil/ sediment/dust (carcinogenic chemicals):	Ingestion intake for soil/sediment/dust (non-carcinogenic chemicals):
$I = \frac{CS \times IR \times CF \times EF \times ED}{BW \times AT_c}$	$I = \frac{CS \times IR \times CF \times EF \times ED}{BW \times AT_n}$

Where:

I = intake (mg/kg-day)
 CS = concentration in soil/sediment (mg/kg)
 IR = soil ingestion rate (mg/day)
 CF = conversion factor (10^{-6} kg/mg)
 EF = exposure frequency (yr)
 ED = exposure duration (yr)
 BW = body weight (kg)
 AT_c = averaging time for carcinogens (days)
 AT_n = averaging time for non-carcinogens (days)

Inhalation intake of soil/sediment/dust (carcinogenic chemicals):	Inhalation intake of soil/sediment/dust (non-carcinogenic chemicals):
$I = \frac{CS \times (1/VF \text{ or } PEF^*) \times InhR \times EF \times ED}{BW \times AT_c}$	$I = \frac{CS \times (1/VF \text{ or } PEF^*) \times InhR \times EF \times ED}{BW \times AT_n}$

Where:

I = intake (mg/kg-day)
 CS = concentration in soil/sediment (mg/kg)
 VF = volatilization factor (m³/ kg)
 PEF* = particulate emission factor (m³/ kg)
 InhR = inhalation rate (m³/day)
 EF = exposure frequency (d/yr)
 ED = exposure duration (yr)
 AT_c = averaging time for carcinogens (days)
 AT_n = averaging time for non-carcinogens (days)
 BW = body weight (kg)

Volatilization Factor (m³/kg):

$$VF = \frac{(Q/C \times 3.14 \times D_A \times T)^{0.5} \times 10^{-4} \text{ m}^2/\text{cm}^2}{2 \times \rho_b \times D_A}$$

Where:

$$D_A = \frac{[(\theta_a^{10/3} D_i H' + \theta_w^{10/3} D_w)/n^2]}{\rho_b K_d + \theta_w + \theta_a H'}$$

θ_a = air-filled soil porosity (0.284)

θ_w = water-filled soil porosity (0.15)

ρ_b = dry soil bulk density (1.5 g/cm³)

C = concentration of chemical in soil

D_A = apparent diffusivity (cm²/s)

D_i = diffusivity in air (cm²/s)

D_w = diffusivity in water (cm²/s)

H' = dimensionless Henry's law constant (chemical specific [unitless])

K_d = soil-water partition coefficient (chemical specific [unitless])

n = total soil porosity ($L_{\text{pore}}/L_{\text{soil}}$)

Q/C_{vf} = Inverse of the mean conc. At the center of a 0.5 acre² source (g/m²-s per kg/m³)

T = exposure interval(s) (9.5×10^8 s)

* Use VFs for volatile chemicals (defined as having a Henry's Law Constant [atm-m³/mol] greater than 10^{-5} and a molecular weight less than 200 grams/mol) or PEF for non-volatile compounds.

<p>Dermal intake for soil/sediment/dust (carcinogenic chemicals):</p> $I = \frac{CS \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT_c}$	<p>Dermal intake for soil/sediment/dust (non-carcinogenic chemicals):</p> $I = \frac{CS \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT_n}$
--	--

Where:

I = intake (mg/kg-day)

CS = concentration in soil (mg/kg)

CF = conversion factor (10^{-6} kg/mg)

SA = surface area (cm²)

AF = soil-to-dermal adherence factor (mg/cm²)

ABS = absorption fraction through skin for chemicals in soil (unitless)

EF = exposure factor (d/yr)

ED = exposure duration (yr)

BW = body weight (kg)

AT_c = averaging time for carcinogens (days)

AT_n = averaging time for non-carcinogens (days)

Ingestion of surface water (incidental) or subsurface water for potable uses (carcinogenic chemicals):	Ingestion of surface water (incidental) or subsurface water for potable uses (non-carcinogenic chemicals):
$I = \frac{CW \times IR \times EF \times ED}{BW \times AT_c}$	$I = \frac{CW \times IR \times EF \times ED}{BW \times AT_n}$

Where:

I = intake (mg/kg-day)
 CW = concentration in water (mg/L)
 IR = ingestion rate (liters water/day)
 EF = exposure frequency (days/yr)
 ED = exposure duration (years)
 BW = body weight (kg)
 AT_c = averaging time for carcinogens (days)
 AT_n = averaging time for non-carcinogens (days)

Inhalation intake for VOCs in water while bathing (carcinogenic chemicals):	Inhalation intake for VOCs in water while bathing (non-carcinogenic chemicals):
$I = \frac{CW \times CF \times VF \times 1/24 \times InhR \times ET \times EF \times ED}{BW \times AT_c}$	$I = \frac{CW \times CF \times VF \times 1/24 \times InhR \times ET \times EF \times ED}{BW \times AT_n}$

Where:

I = intake (mg/kg-day)
 CW = concentration in water (mg/L)
 CF = Conversion factor (1000L/m³)
 VF = volatility factor (unitless)
 InhR = inhalation rate (m³/day)
 ET = exposure time (hours/day)
 EF = exposure frequency (days/yr)
 ED = exposure duration (years)
 BW = body weight (kg)
 AT_c = averaging time for carcinogens (days)
 AT_n = averaging time for non-carcinogens (days)

Dermal intake for surface water (incidental) or subsurface water while bathing (carcinogenic chemicals):	Dermal intake for surface water (incidental) or subsurface water while bathing (non-carcinogenic chemicals):
$I = \frac{DA_{event} \times EV \times SA \times EF \times ED}{BW \times AT_c}$	$I = \frac{DA_{event} \times EV \times SA \times EF \times ED}{BW \times AT_c}$

Where:

I = intake (mg/kg-day)
 DAevent = Absorbed dose per event (mg/cm²-event)*
 EV = event frequency (1 event/day)
 SA = skin surface area exposed (cm²)
 EF = exposure frequency (days/yr)
 ED = exposure duration (years)
 BW = body weight (kg)
 AT_c = averaging time for carcinogens (days)
 AT_n = averaging time for non-carcinogens (days)

Absorbed dose per event (DAevent)(mg/cm²-event)*

DAevent for Inorganic Compounds = K_p x C_w x t_{event}

Where:

K_p = Dermal permeability coefficient of compound in water (cm/hr)
 C_w = Chemical concentration in water (mg/cm³)
 T_{event} = Event duration (hr/event)

DAevent for Organic Compounds = 2 FA x K_p x C_w $\sqrt{\frac{6 \tau_{\text{event}} \times t_{\text{event}}}{\pi}}$

Where:

FA = Fraction absorbed water (dimensionless)
 C_w = Chemical concentration in water (mg/cm³)
 τ_{event} = Lag time per event (hr/event)
 t_{event} = Event duration (hr/event)

APPENDIX F

Human Health Risk and Hazard Calculations

TABLE F-1
CANCER CALCULATION FOR A CURRENT/FUTURE SITE WORKER
SS03 - SURFACE SOIL (0-2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Soil Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor (mg/kg- URF						Pathway-Specific Cancer Risk				Chemical- Specific Risk	
						d)-1			(ug/m3)								
												Soil		Dust			VOC
						Oral	Dermal	Inhalation	Ingestion	Dermal	Inhalation	Inhalation					
INORGANICS																	
Arsenic	16	2.8E-06	1.1E-06	8.6E-10	na	1.5E+00	I	1.5E+00	R	4.3E-03	I	4.2E-06	1.7E-06	1.3E-08	na	5.9E-06	
Chromium	56	9.8E-06	1.3E-06	3.0E-09	na	na		na		na	na	na	na	na	na	0.0E+00	
Cobalt	22	3.8E-06	5.1E-07	1.2E-09	na	na		na		9.0E-03	P	na	na	3.7E-08	na	3.7E-08	
VOCs																	
Benzene	2	3.7E-07	na	na	2.8E-05	5.5E-02	I	5.5E-02	R	7.8E-06	I	2.1E-08	na	na	7.6E-07	7.8E-07	
Ethylbenzene	8	1.4E-06	na	na	6.6E-05	1.1E-02	C	1.1E-02	R	2.5E-06	C	1.6E-08	na	na	5.8E-07	6.0E-07	
POLYNUCLEAR AROMATIC HYDROCARBONS																	
Naphthalene	51	8.9E-06	1.5E-05	2.7E-09	4.9E-05	na		na		3.4E-05	C	na	na	3.3E-10	5.8E-06	5.8E-06	
															ILCR	1E-05	

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
URF Unit risk factor

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

TABLE F-2
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE SITE WORKER
SS03 - SURFACE SOIL (0-2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m ³ /kg-d)	Reference Dose (mg/kg-d) ^b			RfC (mg/m3) ^b			Pathway-Specific Hazard			Chemical-Specific HQ
						Oral	Dermal	Inhalation	Soil Ingestion	Dermal	Inhalation	VOC Inhalation			
INORGANICS															
Aluminum	28800	1.4E-02	1.9E-03	4.3E-06	na	1.0E+00	1.0E+00	4.9E-03	1.4E-02	1.9E-03	3.1E-03	nc		0.019	
Arsenic	16	7.8E-06	3.1E-06	2.4E-09	na	3.0E-04	3.0E-04	3.0E-05	2.6E-02	1.0E-02	2.8E-04	nc		0.037	
Chromium	56	2.7E-05	3.6E-06	8.4E-09	na	1.5E+00	2.0E-02	na	1.8E-05	1.9E-04	nc	nc		0.00020	
Cobalt	22	1.1E-05	1.4E-06	3.3E-09	na	3.0E-04	3.0E-04	6.0E-06	3.6E-02	4.7E-03	1.9E-03	nc		0.043	
Manganese	609	3.0E-04	3.9E-05	9.2E-08	na	2.4E-02	9.6E-04	5.0E-05	1.2E-02	4.1E-02	6.4E-03	nc		0.060	
Vanadium	88	4.3E-05	5.7E-06	1.3E-08	na	5.0E-03	1.3E-04	na	8.6E-03	4.4E-02	nc	nc		0.052	
VOCs															
1,2,4-Trimethylbenzene	431	2.1E-04	na	na	6.9E-03	na	na	7.0E-03	nc	nc	nc	3.5E+00		3.5	
1,3,5-Trimethylbenzene	81	4.0E-05	na	na	1.5E-03	5.0E-02	5.0E-02	6.0E-03	7.9E-04	nc	nc	9.1E-01		0.91	
Benzene	2.1	1.0E-06	na	na	7.8E-05	4.0E-03	4.0E-03	3.0E-02	2.6E-04	nc	nc	9.1E-03		0.0094	
Ethylbenzene	8.3	4.0E-06	na	na	1.9E-04	1.0E-01	1.0E-01	1.0E+00	4.0E-05	nc	nc	6.4E-04		0.00068	
m,p-Xylenes	8.2	4.0E-06	na	na	1.9E-04	2.0E-01	2.0E-01	1.0E-01	2.0E-05	nc	nc	6.7E-03		0.0067	
n-Butylbenzene	1.7	8.4E-07	na	na	2.7E-05	1.0E-01	1.0E-01	4.0E-01	8.4E-06	nc	nc	2.3E-04		0.00024	
n-Propylbenzene	3.9	1.9E-06	na	na	7.1E-05	4.0E-02	4.0E-02	1.4E-01	4.8E-05	nc	nc	1.8E-03		0.0018	
o-Xylene	3.0	1.5E-06	na	na	5.9E-05	2.0E+00	2.0E+00	1.0E-01	7.3E-07	nc	nc	2.1E-03		0.0021	
p-Isopropyltoluene	2.1	1.0E-06	na	na	3.1E-05	1.0E-01	1.0E-01	4.0E-01	1.0E-05	nc	nc	2.7E-04		0.00028	
sec-Butylbenzene	1.6	7.8E-07	na	na	3.2E-05	1.0E-01	1.0E-01	4.0E-01	7.8E-06	nc	nc	2.8E-04		0.00029	
Tert-Butylbenzene	3.4	1.6E-06	na	na	5.8E-05	1.0E-01	1.0E-01	4.0E-01	1.6E-05	nc	nc	5.0E-04		0.00052	
Toluene	24	1.2E-05	na	na	7.1E-04	8.0E-02	8.0E-02	5.0E+00	1.5E-04	nc	nc	5.0E-04		0.00064	
POLYNUCLEAR AROMATIC HYDROCARBONS															
2-Methylnaphthalene	33	1.6E-05	2.8E-05	5.0E-09	7.1E-05	4.0E-03	4.0E-03	na	4.0E-03	6.9E-03	nc	nc		0.011	
Naphthalene	51	2.5E-05	4.3E-05	7.6E-09	1.4E-04	2.0E-02	2.0E-02	3.0E-03	1.2E-03	2.1E-03	8.9E-06	1.6E-01			
												HI	5		
PETROLEUM HYDROCARBONS															
Diesel Range Organics (DRO)	14251	na	na	na	na	na	na	na	nc	nc	nc	nc		nc	
Diesel Range Organics (DRO), Aliphatic	11401	5.6E-03	na	1.7E-06	na	1.0E-01	na	1.0E+00	5.6E-02	nc	6.0E-06	nc		0.056	
Diesel Range Organics (DRO), Aromatic	5700	2.8E-03	na	8.6E-07	na	4.0E-02	na	2.0E-01	7.0E-02	nc	1.5E-05	nc		0.070	
Gasoline Range Organics (GRO)	629	na	na	na	na	na	na	na	nc	nc	nc	nc		nc	
Gasoline Range Organics (GRO), Aliphatic	440	2.2E-04	na	6.6E-08	na	5.0E+00	na	1.8E+01	4.3E-05	nc	1.3E-08	nc		0.000043	
Gasoline Range Organics (GRO), Aromatic	315	1.5E-04	na	4.7E-08	na	2.0E-01	na	4.0E-01	7.7E-04	nc	4.1E-07	nc		0.00077	
												HI	0.1		

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.

1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI Hazard index.
HQ Hazard quotient.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
nc Not calculated.
RfC Reference concentration

TABLE F-3
CANCER CALCULATION FOR A CURRENT/FUTURE SITE WORKER
SS03 - SUBSURFACE SOIL (>2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a	Soil Ingestion Dose	Soil Dermal Dose	Dust Inhalation Dose	VOC Inhalation Dose	Cancer Slope Factor (mg/kg- URF d)-1			(ug/m3)	Pathway-Specific Cancer Risk				Chemical-Specific Risk
	(mg/kg)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)				1	Soil	Dust	VOC	Risk	
						Oral	Dermal	Inhalation		Ingestion	Dermal	Inhalation		Inhalation
POLYNUCLEAR AROMATIC HYDROCARBONS														
Naphthalene	26	4.6E-06	7.8E-06	1.4E-09	2.5E-05	na	na	0.000034	C	na	na	1.7E-10	3.0E-06	3.0E-06
													ILCR	3E-06

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
URF Unit risk factor

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

TABLE F-4
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE SITE WORKER
SS03 - SUBSURFACE SOIL (>2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m³/kg-d)	Reference Dose ^d b		(mg/kg- RfC (mg/m3) b	Pathway-Specific Hazard				Chemical- Specific HQ
						Oral	Dermal		Inhalation	Soil	Dust	VOC	
VOCs													
1,2,4-Trimethylbenzene	4.6	2.3E-06	na	na	7.4E-05	na	na	7.0E-03	nc	nc	nc	3.7E-02	0.037
1,3,5-Trimethylbenzene	2.0	9.8E-07	na	na	3.2E-05	5.0E-02	5.0E-02	6.0E-03	2.0E-05	nc	nc	1.9E-02	0.019
o-Xylene	1.9	9.4E-07	na	na	3.1E-05	2.0E+00	2.0E+00	1.0E-01	4.7E-07	nc	nc	1.1E-03	0.0011
POLYNUCLEAR AROMATIC HYDROCARBONS													
Naphthalene	26	1.3E-05	2.2E-05	3.9E-09	4.2E-04	2.0E-02	2.0E-02	3.0E-03	6.4E-04	1.1E-03	4.6E-06	4.9E-01	0.49
												HI	0.5
PETROLEUM HYDROCARBONS													
Diesel Range Organics (DRO)	7436	na	na	na	na	na	na	na	nc	nc	nc	nc	nc
Diesel Range Organics (DRO), Aliphatic	5949	2.9E-03	na	9.0E-07	na	1.0E-01	na	1.0E+00	2.9E-02	nc	3.1E-06	nc	0.029
Diesel Range Organics (DRO), Aromatic	2974	1.5E-03	na	4.5E-07	na	4.0E-02	na	2.0E-01	3.6E-02	nc	7.8E-06	nc	0.036
												HI	0.07

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.

1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI Hazard index.
HQ Hazard quotient.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
nc Not calculated.
RfC Reference concentration

TABLE F-5
CANCER CALCULATION FOR A CURRENT/FUTURE SITE WORKER
SS03 - SEDIMENT
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Sediment Concentration ^a (mg/kg)	Sediment Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor (mg/kg- URF			(ug/m3): 1	Pathway-Specific Cancer Risk			Chemical- Specific Risk
						d)-1				Sediment	Dust	VOC	
						Oral	Dermal	Inhalation					
INORGANICS													
Arsenic	21	3.7E-06	1.5E-06	1.1E-09	na	1.5E+00	1.5E+00	4.3E-03	5.5E-06	2.2E-06	1.7E-08	na	7.7E-06
Cobalt	23	4.0E-06	5.3E-07	1.2E-09	na	na	na	9.0E-03	na	na	3.9E-08	na	3.9E-08
												ILCR	8E-06

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
ug/m³ Microgram per cubic meter.
URF Unit risk factor
VOC Volatile Organic Compound

TABLE F-6
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE SITE WORKER
SS03 - SEDIMENT
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Sediment Concentration ^a (mg/kg)	Sediment Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m ³ /kg-d)	Reference Dose (mg/kg-d) ^b								Chemical- Specific HQ
						(mg/kg- d) ^b			RfC (mg/m3) ^b	Pathway-Specific Hazard				
						Oral	Dermal	Inhalation		Sediment Ingestion	Dust Dermal	VOC Inhalation		
INORGANICS														
Aluminum	27900	1.4E-02	1.8E-03	4.2E-06	na	1.0E+00	1.0E+00	4.9E-03	1.4E-02	1.8E-03	3.0E-03	nc	0.018	
Arsenic	21	1.0E-05	4.1E-06	3.2E-09	na	3.0E-04	3.0E-04	3.0E-05	3.4E-02	1.4E-02	3.7E-04	nc	0.048	
Chromium	62	3.0E-05	4.0E-06	9.3E-09	na	1.5E+00	2.0E-02	na	2.0E-05	2.1E-04	nc	nc	0.00023	
Cobalt	23	1.1E-05	1.5E-06	3.5E-09	na	3.0E-04	3.0E-04	6.0E-06	3.8E-02	5.0E-03	2.0E-03	nc	0.044	
Manganese	1320	6.5E-04	8.5E-05	2.0E-07	na	2.4E-02	9.6E-04	5.0E-05	2.7E-02	8.9E-02	1.4E-02	nc	0.13	
Vanadium	107	5.2E-05	6.9E-06	1.6E-08	na	5.0E-03	1.3E-04	na	1.0E-02	5.3E-02	nc	nc	0.064	
												HI	0.3	

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.

1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI Hazard index.
 HQ Hazard quotient.
 mg/kg Milligrams per kilogram.
 mg/kg-d Milligrams per kilogram per day.
 mg/m3 Milligram per cubic meter.
 na Not available.
 nc Not calculated.
 RfC Reference concentration
 VOC Volatile Organic Compound

TABLE F-7
CANCER RISK CALCULATIONS FOR A FUTURE SITE WORKER
SS03 - GROUNDWATER
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Groundwater Concentration ^a (mg/L)	Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor		URF (ug/m3)-1	Pathway-Specific Cancer Risk			Chemical- Specific Risk
					(mg/kg-d)-1			Ingestion	Dermal	Inhalation	
					Oral	Dermal					
VOCs											
1,2-Dichloroethane	0.00070	6.9E-06	2.2E-07	8.1E-07	9.1E-02	9.1E-02	2.6E-05	6.3E-07	2.0E-08	7.3E-08	7.2E-07
Benzene	0.12	1.1E-03	1.2E-04	6.4E-04	5.5E-02	5.5E-02	7.8E-06	6.3E-05	6.3E-06	1.8E-05	8.7E-05
Ethylbenzene	0.14	1.4E-03	5.3E-04	1.1E-03	1.1E-02	1.1E-02	2.5E-06	1.5E-05	5.9E-06	9.2E-06	3.0E-05
SVOCs											
3,3'-Dichlorobenzidine	0.0050	4.9E-05	1.3E-05	na	4.5E-01	4.5E-01	na	2.2E-05	5.9E-06	nc	2.8E-05
4-Chloroaniline	0.0030	2.9E-05	1.3E-06	na	2.1E-02	na	na	6.2E-07	na	nc	6.2E-07
Bis(2-chloroethyl) Ether	0.00050	4.9E-06	8.9E-08	na	1.1E+00	1.1E+00	3.3E-04	5.4E-06	9.8E-08	nc	5.5E-06
Hexachlorobutadiene	0.0030	2.9E-05	4.7E-05	na	7.8E-02	7.8E-02	2.2E-05	2.3E-06	3.6E-06	nc	5.9E-06
POLYNUCLEAR AROMATIC HYDROCARBONS											
Naphthalene	0.092	9.0E-04	3.9E-04	4.0E-05	na	na	3.4E-05	na	na	4.7E-06	4.7E-06
										ILCR	2E-04

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

ILCR	Incremental lifetime cancer risk.
Inc	Incomplete pathway.
mg/kg-d	Milligrams per kilogram per day.
mg/L	Milligrams per liter.
na	Not available.
nc	Not calculated.
VOCs	Volatile organic compounds.
SVOCs	Semi-volatile organic compounds.
ug/m3	Microgram per cubic meter.
URF	Unit Risk Factor

TABLE F-8
NONCANCER HAZARD CALCULATIONS FOR A FUTURE SITE WORKER
SS03 - GROUNDWATER
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Groundwater Concentration ^a (mg/L)	Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	VOC	Reference Dose		RfC	Pathway-Specific Hazard			Chemical- Specific HQ
				Inhalation	(mg/kg-d)		(mg/m3)	Ingestion	Dermal	Inhalation	
				Dose (mg/kg-d)	Oral	Dermal	Inhalation				
VOCs											
1,2,4-Trimethylbenzene	0.13	3.5E-03	2.7E-03	2.1E-03	na	na	7.0E-03	nc	nc	1.1E+00	1.1
1,2-Dichloroethane	0.00070	1.9E-05	6.2E-07	2.3E-06	2.0E-02	2.0E-02	2.4E+00	9.6E-04	3.1E-05	3.3E-06	0.0010
Benzene	0.12	3.2E-03	3.2E-04	1.8E-03	4.0E-03	4.0E-03	3.0E-02	8.0E-01	8.1E-02	2.1E-01	1.1
Ethylbenzene	0.14	3.8E-03	1.5E-03	3.0E-03	1.0E-01	1.0E-01	1.0E+00	3.8E-02	1.5E-02	1.0E-02	0.063
SVOCs											
2-Nitrophenol	0.00040	1.1E-05	4.4E-07	na	5.0E-04	5.0E-04	2.0E-03	2.2E-02	8.8E-04	nc	0.023
4-Chloroaniline	0.0030	8.2E-05	3.8E-06	na	4.0E-03	4.0E-03	na	2.1E-02	9.4E-04	nc	0.021
Hexachlorobutadiene	0.0030	8.2E-05	1.3E-04	na	1.0E-03	1.0E-03	na	8.2E-02	1.3E-01	nc	0.21
POLYNUCLEAR AROMATIC HYDROCARBONS											
Naphthalene	0.092	2.5E-03	1.1E-03	1.1E-04	2.0E-02	2.0E-02	3.0E-03	1.3E-01	5.5E-02	1.3E-01	0.31
										HI	3
PETROLEUM HYDROCARBONS											
Diesel Range Organics (DRO)	3.5	na	na	na	na	na	na	nc	nc	nc	nc
Diesel Range Organics (DRO), Aliphatic	2.8	7.7E-02	na	na	1.0E-01	na	1.0E+00	7.7E-01	nc	nc	0.77
Diesel Range Organics (DRO), Aromatic	1.4	3.9E-02	na	na	4.0E-02	na	2.0E-01	9.6E-01	nc	nc	0.96
Gasoline Range Organics (GRO)	3.4	na	na	na	na	na	na	nc	nc	nc	nc
Gasoline Range Organics (GRO), Aliphatic	2.4	6.5E-02	na	na	5.0E+00	na	1.8E+01	1.3E-02	nc	nc	0.013
Gasoline Range Organics (GRO), Aromatic	1.7	4.7E-02	na	na	2.0E-01	na	4.0E-01	2.3E-01	nc	nc	0.23
Residual Range Organics (RRO)	3.4	na	na	na	na	na	na	nc	nc	nc	nc
Residual Range Organics (RRO), Aliphatic	3.1	8.4E-02	na	na	2.0E+00	na	na	4.2E-02	nc	nc	0.042
Residual Range Organics (RRO), Aromatic	1.0	2.8E-02	na	na	3.0E-02	na	na	9.3E-01	nc	nc	0.93
										HI	3

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

- 1) Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI	Hazard index.
HQ	Hazard quotient.
Inc	Incomplete pathway.
mg/kd-d	Milligrams per kilogram per day.
mg/L	Milligrams per liter.
mg/m3	Milligram per cubic meter.
na	Not applicable.
nc	Not calculated
RfC	Reference Concentration
SVOCs	Semi-volatile organic compounds.
VOCs	Volatile organic compounds.

TABLE F-9
CANCER CALCULATION FOR A CURRENT/FUTURE SITE WORKER/RECREATIONAL HUNTER
SS03- SURFACE SOIL (0-2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Soil Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor (mg/kg- URF (ug/m3)-1)										Chemical-Specific Risk			
						d)-1					1						Pathway-Specific Cancer Risk		
						Soil		Dust		VOC	Soil		Dust		VOC				
						Oral	Dermal	Inhalation	Ingestion	Dermal	Inhalation	Inhalation							
INORGANICS																			
Arsenic	16	6.0E-06	7.2E-07	9.3E-10	na	1.5	I	1.5	R	0.0043	I	9.1E-06	1.1E-06	1.4E-08	na	1.0E-05			
Cobalt	22	8.3E-06	3.3E-07	1.3E-09	na	na		na		0.009	P	na	na	4.0E-08	na	4.0E-08			
VOCs																			
Benzene	2	8.1E-07	na	na	3.0E-05	5.5E-02	I	5.5E-02	R	0.0000078	I	4.4E-08	na	na	8.2E-07	8.7E-07			
Ethylbenzene	8	3.1E-06	na	na	7.2E-05	1.1E-02	C	1.1E-02	R	0.0000025	C	3.4E-08	na	na	6.3E-07	6.6E-07			
POLYNUCLEAR AROMATIC HYDROCARBONS																			
Naphthalene	51	1.9E-05	9.9E-06	3.0E-09	5.3E-05	na		na		0.000034	C	na	na	3.5E-10	6.3E-06	6.3E-06			
															ILCR	2E-05			

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
URF Unit risk factor

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

TABLE F-10
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE SITE WORKER/RECREATIONAL HUNTER
SS03 - SURFACE SOIL (0-2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil	Soil	Dermal	Dust	VOCs	Reference Dose	(mg/kg-	RfC	Pathway-Specific Hazard				Chemical-Specific
	Concentration ^a	Ingestion	Dose	Inhalation	Inhalation				Dose	d) b	(mg/m3) b	Soil	
	(mg/kg)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(m ³ /kg-d)	Oral	Dermal	Inhalation	Ingestion	Dermal	Inhalation	Inhalation	HQ
INORGANICS													
Aluminum	28800	3.0E-02	1.2E-03	4.7E-06	na	1.0E+00	1.0E+00	4.9E-03	3.0E-02	1.2E-03	3.3E-03	nc	0.035
Arsenic	16	1.7E-05	2.0E-06	2.6E-09	na	3.0E-04	3.0E-04	3.0E-05	5.6E-02	6.7E-03	3.0E-04	nc	0.063
Chromium	56	5.9E-05	2.4E-06	9.1E-09	na	1.5E+00	2.0E-02	na	3.9E-05	1.2E-04	nc	nc	0.00016
Cobalt	22	2.3E-07	9.3E-07	3.6E-09	na	3.0E-04	3.0E-04	6.0E-06	7.7E-02	3.1E-03	2.1E-03	nc	0.083
Manganese	609	6.4E-04	2.6E-05	9.9E-08	na	2.4E-02	9.6E-04	5.0E-05	2.7E-02	2.7E-02	6.9E-03	nc	0.060
Vanadium	88	9.3E-05	3.7E-06	1.4E-08	na	5.0E-03	1.3E-04	na	1.9E-02	2.9E-02	nc	nc	0.047
VOCs													
1,2,4-Trimethylbenzene	431	4.6E-04	na	na	7.5E-03	na	na	7.0E-03	nc	nc	nc	3.7E+00	3.7
1,3,5-Trimethylbenzene	81	8.5E-05	na	na	1.7E-03	5.0E-02	5.0E-02	6.0E-03	1.7E-03	nc	nc	9.8E-01	0.99
Benzene	2.1	2.3E-06	na	na	8.4E-05	4.0E-03	4.0E-03	3.0E-02	5.7E-04	nc	nc	9.8E-03	0.0104
Ethylbenzene	8.3	8.7E-06	na	na	2.0E-04	1.0E-01	1.0E-01	1.0E+00	8.7E-05	nc	nc	6.9E-04	0.00078
m,p-Xylenes	8.2	8.6E-06	na	na	2.1E-04	2.0E-01	2.0E-01	1.0E-01	4.3E-05	nc	nc	7.2E-03	0.0073
n-Butylbenzene	1.7	1.8E-06	na	na	2.9E-05	1.0E-01	1.0E-01	4.0E-01	1.8E-05	nc	nc	2.5E-04	0.00027
n-Propylbenzene	3.9	4.2E-06	na	na	7.7E-05	4.0E-02	4.0E-02	1.4E-01	1.0E-04	nc	nc	1.9E-03	0.0020
o-Xylene	3.0	3.1E-06	na	na	6.4E-05	2.0E+00	2.0E+00	1.0E-01	1.6E-06	nc	nc	2.2E-03	0.0022
p-Isopropyltoluene	2.1	2.2E-06	na	na	3.3E-05	1.0E-01	1.0E-01	4.0E-01	2.2E-05	nc	nc	2.9E-04	0.00031
sec-Butylbenzene	1.6	1.7E-06	na	na	3.4E-05	1.0E-01	1.0E-01	4.0E-01	1.7E-05	nc	nc	3.0E-04	0.00032
Tert-Butylbenzene	3.4	3.6E-06	na	na	6.2E-05	1.0E-01	1.0E-01	4.0E-01	3.6E-05	nc	nc	5.5E-04	0.00058
Toluene	24	2.5E-05	na	na	7.7E-04	8.0E-02	8.0E-02	5.0E+00	3.1E-04	nc	nc	5.4E-04	0.00085
POLYNUCLEAR AROMATIC HYDROCARBONS													
2-Methylnaphthalene	33	3.5E-05	1.8E-05	5.4E-09	7.7E-05	4.0E-03	4.0E-03	na	8.7E-03	4.5E-03	nc	nc	0.013
Naphthalene	51	5.4E-05	2.8E-05	8.3E-09	1.5E-04	2.0E-02	2.0E-02	3.0E-03	2.7E-03	1.4E-03	9.6E-06	1.7E-01	0.18
												HI	5
PETROLEUM HYDROCARBONS													
Diesel Range Organics (DRO)	14251	na	na	na	na	na	na	na	nc	nc	nc	nc	nc
Diesel Range Organics (DRO), Aliphatic	11401	1.2E-02	na	1.9E-06	na	1.0E-01	na	1.0E+00	1.2E-01	nc	6.5E-06	nc	0.12
Diesel Range Organics (DRO), Aromatic	5700	6.0E-03	na	9.3E-07	na	4.0E-02	na	2.0E-01	1.5E-01	nc	1.6E-05	nc	0.15
Gasoline Range Organics (GRO)	629	na	na	na	na	na	na	na	nc	nc	nc	nc	nc
Gasoline Range Organics (GRO), Aliphatic	440	4.7E-04	na	7.2E-08	na	5.0E+00	na	1.8E+01	9.3E-05	nc	1.4E-08	nc	0.000093
Gasoline Range Organics (GRO), Aromatic	315	3.3E-04	na	5.1E-08	na	2.0E-01	na	4.0E-01	1.7E-03	nc	4.5E-07	nc	0.0017
												HI	0.3

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.

1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI Hazard index.
HQ Hazard quotient.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
nc Not calculated.
RfC Reference concentration

TABLE F-11
CANCER CALCULATION FOR A CURRENT/FUTURE SITE WORKER/RECREATIONAL HUNTER
SS03 - SUBSURFACE SOIL (>2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a	Soil Ingestion Dose	Soil Dermal Dose	Dust Inhalation Dose	VOC Inhalation Dose	Cancer Slope Factor (mg/kg- URF d)-1			(ug/m3)	Pathway-Specific Cancer Risk				Chemical-Specific Risk
	(mg/kg)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	Oral	Dermal	Inhalation	C	Soil	Dust	VOC		
										Ingestion	Dermal	Inhalation		
													Inhalation	
POLYNUCLEAR AROMATIC HYDROCARBONS														
Naphthalene	26	9.9E-06	5.1E-06	1.5E-09	2.7E-05	na	na	0.000034	C	na	na	1.8E-10	3.2E-06	3.2E-06
													ILCR	3E-06

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
URF Unit risk factor

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

TABLE F-12
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE SITE WORKER/RECREATIONAL HUNTER
SS03 - SUBSURFACE SOIL (>2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m ³ /kg-d)	Reference Dose			Pathway-Specific Hazard				Chemical-Specific HQ	
						d) b	(mg/kg- d)	RfC (mg/m3) b	Soil	Dust	VOC			
												Oral		Dermal
VOCs														
1,2,4-Trimethylbenzene	4.6	4.9E-06	na	na	8.0E-05	na	na	7.0E-03	nc	nc	nc	4.0E-02	0.040	
1,3,5-Trimethylbenzene	2.0	2.1E-06	na	na	3.5E-05	5.0E-02	5.0E-02	6.0E-03	4.2E-05	nc	nc	2.0E-02	0.020	
o-Xylene	1.9	2.0E-06	na	na	3.3E-05	2.0E+00	2.0E+00	1.0E-01	1.0E-06	nc	nc	1.2E-03	0.0012	
POLYNUCLEAR AROMATIC HYDROCARBONS														
Naphthalene	26	2.8E-05	1.4E-05	4.2E-09	4.5E-04	2.0E-02	2.0E-02	3.0E-03	1.4E-03	7.2E-04	5.0E-06	5.3E-01	0.53	
													HI	0.6
PETROLEUM HYDROCARBONS														
Diesel Range Organics (DRO)	7436	na	na	na	na	na	na	na	nc	nc	nc	nc	nc	
Diesel Range Organics (DRO), Aliphatic	5949	6.3E-03	na	9.7E-07	na	1.0E-01	na	1.0E+00	6.3E-02	nc	3.4E-06	nc	0.063	
Diesel Range Organics (DRO), Aromatic	2974	3.1E-03	na	4.8E-07	na	4.0E-02	na	2.0E-01	7.9E-02	nc	8.5E-06	nc	0.079	
													HI	0.1

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.

1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI Hazard index.
HQ Hazard quotient.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
nc Not calculated.
RfC Reference concentration

TABLE F-13
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE SITE WORKER/RECREATIONAL HUNTER
SS03 - SEDIMENT
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Sediment Concentration ^a (mg/kg)	Sediment Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m ³ /kg-d)	Reference Dose		(mg/kg- d) b	RfC (mg/m3) b	Pathway-Specific Hazard				Chemical- Specific HQ		
						Oral	Dermal			Inhalation	Sediment Ingestion	Dermal	Dust Inhalation		VOC Inhalation	
INORGANICS																
Aluminum	27900	2.9E-02	1.2E-03	4.5E-06	na	1.0E+00	1.0E+00	4.9E-03	2.9E-02	1.2E-03	3.2E-03	nc	0.034			
Arsenic	21	2.2E-05	2.7E-06	3.4E-09	na	3.0E-04	3.0E-04	3.0E-05	7.4E-02	8.9E-03	4.0E-04	nc	0.083			
Chromium	62	6.6E-05	2.6E-06	1.0E-08	na	1.5E+00	2.0E-02	na	4.4E-05	1.3E-04	nc	nc	0.00018			
Cobalt	23	2.4E-05	9.7E-07	3.7E-09	na	3.0E-04	3.0E-04	6.0E-06	8.1E-02	3.2E-03	2.2E-03	nc	0.086			
Manganese	1320	1.4E-03	5.6E-05	2.1E-07	na	2.4E-02	9.6E-04	5.0E-05	5.8E-02	5.8E-02	1.5E-02	nc	0.13			
Vanadium	107	1.1E-04	4.5E-06	1.7E-08	na	5.0E-03	1.3E-04	na	2.3E-02	3.5E-02	nc	nc	0.057			
												HI	0.4			

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.

1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI Hazard index.
HQ Hazard quotient.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
mg/m3 Milligram per cubic meter.
na Not available.
nc Not calculated.
RfC Reference concentration
VOC Volatile Organic Compound

TABLE F-14
CANCER CALCULATION FOR A CURRENT/FUTURE SITE WORKER/RECREATIONAL HUNTER
SS03 - SEDIMENT
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Sediment Concentration ^a (mg/kg)	Sediment Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor (mg/kg- URF			(ug/m3) 1	Pathway-Specific Cancer Risk				Chemical- Specific Risk
						d)-1				Sediment Ingestion	Dust Dermal	VOC Inhalation		
						Oral	Dermal	Inhalation						
INORGANICS														
Arsenic	21	7.9E-06	9.5E-07	1.2E-09	na	1.5E+00	1.5E+00	4.3E-03	1.2E-05	1.4E-06	1.8E-08	na	1.3E-05	
Cobalt	23	8.7E-06	3.5E-07	1.3E-09	na	na	na	9.0E-03	na	na	4.2E-08	na	4.2E-08	
												ILCR	1E-05	

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
ug/m3 Microgram per cubic meter.
URF Unit risk factor
VOC Volatile Organic Compound

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

TABLE F-15
CANCER RISK CALCULATIONS FOR A FUTURE SITE WORKER/RECREATIONAL HUNTER
SS03 - GROUNDWATER
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Groundwater Concentration ^a (mg/L)	Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor		URF (ug/m3)-1	Pathway-Specific Cancer Risk			Chemical- Specific Risk
					(mg/kg-d)-1			Ingestion	Dermal	Inhalation	
					Oral	Dermal					
VOCs											
1,2-Dichloroethane	0.00070	6.9E-06	2.2E-07	8.1E-07	9.1E-02	9.1E-02	2.6E-05	6.3E-07	2.0E-08	7.3E-08	7.2E-07
Benzene	0.12	1.1E-03	1.2E-04	6.4E-04	5.5E-02	5.5E-02	7.8E-06	6.3E-05	6.3E-06	1.8E-05	8.7E-05
Ethylbenzene	0.14	1.4E-03	5.3E-04	1.1E-03	1.1E-02	1.1E-02	2.5E-06	1.5E-05	5.9E-06	9.2E-06	3.0E-05
SVOCs											
3,3'-Dichlorobenzidine	0.0050	4.9E-05	1.3E-05	na	4.5E-01	4.5E-01	na	2.2E-05	5.9E-06	nc	2.8E-05
4-Chloroaniline	0.0030	2.9E-05	1.3E-06	na	2.1E-02	na	na	6.2E-07	na	nc	6.2E-07
Bis(2-chloroethyl) Ether	0.00050	4.9E-06	8.9E-08	na	1.1E+00	1.1E+00	3.3E-04	5.4E-06	9.8E-08	nc	5.5E-06
Hexachlorobutadiene	0.0030	2.9E-05	4.7E-05	na	7.8E-02	7.8E-02	2.2E-05	2.3E-06	3.6E-06	nc	5.9E-06
POLYNUCLEAR AROMATIC HYDROCARBONS											
Naphthalene	0.092	9.0E-04	3.9E-04	4.0E-05	na	na	3.4E-05	na	na	4.7E-06	4.7E-06
										ILCR	2E-04

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

ILCR	Incremental lifetime cancer risk.
Inc	Incomplete pathway.
mg/kg-d	Milligrams per kilogram per day.
mg/L	Milligrams per liter.
na	Not available.
nc	Not calculated.
VOCs	Volatile organic compounds.
SVOCs	Semi-volatile organic compounds.
ug/m3	Microgram per cubic meter.
URF	Unit Risk Factor

TABLE F-16
NONCANCER HAZARD CALCULATIONS FOR A FUTURE SITE WORKER/RECREATIONAL HUNTER
SS03 - GROUNDWATER
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Groundwater Concentration ^a (mg/L)	Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	VOC	Reference Dose		RfC	Pathway-Specific Hazard			Chemical- Specific HQ
				Inhalation	(mg/kg-d)		(mg/m3)	Ingestion	Dermal	Inhalation	
				(mg/kg-d)	Oral	Dermal	Inhalation				
VOCs											
1,2,4-Trimethylbenzene	0.13	3.5E-03	2.7E-03	2.1E-03	na	na	7.0E-03	nc	nc	1.1E+00	1.1
1,2-Dichloroethane	0.00070	1.9E-05	6.2E-07	2.3E-06	2.0E-02	2.0E-02	2.4E+00	9.6E-04	3.1E-05	3.3E-06	0.0010
Benzene	0.12	3.2E-03	3.2E-04	1.8E-03	4.0E-03	4.0E-03	3.0E-02	8.0E-01	8.1E-02	2.1E-01	1.1
Ethylbenzene	0.14	3.8E-03	1.5E-03	3.0E-03	1.0E-01	1.0E-01	1.0E+00	3.8E-02	1.5E-02	1.0E-02	0.063
SVOCs											
2-Nitrophenol	0.00040	1.1E-05	4.4E-07	na	5.0E-04	5.0E-04	2.0E-03	2.2E-02	8.8E-04	nc	0.023
4-Chloroaniline	0.0030	8.2E-05	3.8E-06	na	4.0E-03	4.0E-03	na	2.1E-02	9.4E-04	nc	0.021
Hexachlorobutadiene	0.0030	8.2E-05	1.3E-04	na	1.0E-03	1.0E-03	na	8.2E-02	1.3E-01	nc	0.21
POLYNUCLEAR AROMATIC HYDROCARBONS											
Naphthalene	0.092	2.5E-03	1.1E-03	1.1E-04	2.0E-02	2.0E-02	3.0E-03	1.3E-01	5.5E-02	1.3E-01	0.31
										HI	3
PETROLEUM HYDROCARBONS											
Diesel Range Organics (DRO)	3.5	na	na	na	na	na	na	nc	nc	nc	nc
Diesel Range Organics (DRO), Aliphatic	2.8	7.7E-02	na	na	1.0E-01	na	1.0E+00	7.7E-01	nc	nc	0.77
Diesel Range Organics (DRO), Aromatic	1.4	3.9E-02	na	na	4.0E-02	na	2.0E-01	9.6E-01	nc	nc	0.96
Gasoline Range Organics (GRO)	3.4	na	na	na	na	na	na	nc	nc	nc	nc
Gasoline Range Organics (GRO), Aliphatic	2.4	6.5E-02	na	na	5.0E+00	na	1.8E+01	1.3E-02	nc	nc	0.013
Gasoline Range Organics (GRO), Aromatic	1.7	4.7E-02	na	na	2.0E-01	na	4.0E-01	2.3E-01	nc	nc	0.23
Residual Range Organics (RRO)	3.4	na	na	na	na	na	na	nc	nc	nc	nc
Residual Range Organics (RRO), Aliphatic	3.1	8.4E-02	na	na	2.0E+00	na	na	4.2E-02	nc	nc	0.042
Residual Range Organics (RRO), Aromatic	1.0	2.8E-02	na	na	3.0E-02	na	na	9.3E-01	nc	nc	0.93
										HI	3

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

- 1) Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI	Hazard index.
HQ	Hazard quotient.
Inc	Incomplete pathway.
mg/kd-d	Milligrams per kilogram per day.
mg/L	Milligrams per liter.
mg/m3	Milligram per cubic meter.
na	Not applicable.
nc	Not calculated
RfC	Reference Concentration
SVOCs	Semi-volatile organic compounds.
VOCs	Volatile organic compounds.

TABLE F-17
CANCER CALCULATION FOR A CURRENT/FUTURE TRENCH WORKER
SS03 - SURFACE SOIL (0-2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Soil Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor (mg/kg- URF (ug/m3)-1)										Chemical-Specific Risk
						d)-1			1			Pathway-Specific Cancer Risk				
									Soil			Dust		VOC		
						Oral	Dermal	Inhalation	Ingestion	Dermal	Inhalation	Inhalation				
INORGANICS																
Arsenic	16	2.2E-07	4.4E-08	3.4E-11	na	1.5E+00	I	1.5E+00	R	4.3E-03	I	3.4E-07	6.6E-08	5.2E-10	na	4.0E-07
Cobalt	22	3.1E-07	2.0E-08	4.7E-11	na	na		na		9.0E-03	P	na	na	1.5E-09	na	1.5E-09
VOCs																
Benzene	2.1	3.0E-08	na	na	1.1E-06	5.5E-02	I	5.5E-02	R	7.8E-06	I	1.6E-09	na	na	3.0E-08	3.2E-08
Ethylbenzene	8.3	1.2E-07	na	na	2.6E-06	1.1E-02	C	1.1E-02	R	2.5E-06	C	1.3E-09	na	na	2.3E-08	2.4E-08
POLYNUCLEAR AROMATIC HYDROCARBONS																
Naphthalene	51	7.1E-07	6.1E-07	1.1E-10	2.0E-06	na		na		3.4E-05	C	na	na	1.3E-11	2.3E-07	2.3E-07
															ILCR	7E-07

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
URF Unit risk factor

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

TABLE F-18
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE TRENCH WORKER
SS03 - SURFACE SOIL (0-2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil	Soil	Dermal	Dust	VOCs	Reference Dose	(mg/kg-	RfC	Pathway-Specific Hazard				Chemical-Specific
	Concentration ^a	Ingestion	Dose	Inhalation	Inhalation				Dose	Dose	Dose	Soil	
	(mg/kg)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(m ³ /kg-d)	d) b	Dermal	Inhalation	Ingestion	Dermal	Inhalation	Inhalation	HQ
INORGANICS													
Aluminum	28800	2.8E-02	1.9E-03	4.3E-06	na	1.0E+00	1.0E+00	4.9E-03	2.8E-02	1.9E-03	3.1E-03	nc	0.033
Arsenic	16	1.6E-05	3.1E-06	2.4E-09	na	3.0E-04	3.0E-04	3.0E-05	5.2E-02	1.0E-02	2.8E-04	nc	0.063
Chromium	56	5.5E-05	3.6E-06	8.4E-09	na	1.5E+00	2.0E-02	na	3.7E-05	1.9E-04	nc	nc	0.00022
Cobalt	22	2.2E-05	1.4E-06	3.3E-09	na	3.0E-04	3.0E-04	6.0E-06	7.2E-02	4.7E-03	1.9E-03	nc	0.078
Manganese	609	6.0E-04	3.9E-05	9.2E-08	na	2.4E-02	9.6E-04	5.0E-05	2.5E-02	4.1E-02	6.4E-03	nc	0.072
Vanadium	88	8.6E-05	5.7E-06	1.3E-08	na	5.0E-03	1.3E-04	na	1.7E-02	4.4E-02	nc	nc	0.061
VOCs													
1,2,4-Trimethylbenzene	431	4.2E-04	na	na	6.9E-03	na	na	7.0E-03	nc	nc	nc	3.5E+00	3.5
1,3,5-Trimethylbenzene	81	7.9E-05	na	na	1.5E-03	5.0E-02	5.0E-02	6.0E-03	1.6E-03	nc	nc	9.1E-01	0.91
Benzene	2.1	2.1E-06	na	na	7.8E-05	4.0E-03	4.0E-03	3.0E-02	5.2E-04	nc	nc	9.1E-03	0.0096
Ethylbenzene	8.3	8.1E-06	na	na	1.9E-04	1.0E-01	1.0E-01	1.0E+00	8.1E-05	nc	nc	6.4E-04	0.00072
m,p-Xylenes	8.2	8.0E-06	na	na	1.9E-04	2.0E-01	2.0E-01	1.0E-01	4.0E-05	nc	nc	6.7E-03	0.0067
n-Butylbenzene	1.7	1.7E-06	na	na	2.7E-05	1.0E-01	1.0E-01	4.0E-01	1.7E-05	nc	nc	2.3E-04	0.00025
n-Propylbenzene	3.9	3.9E-06	na	na	7.1E-05	4.0E-02	4.0E-02	1.4E-01	9.6E-05	nc	nc	1.8E-03	0.0019
o-Xylene	3.0	2.9E-06	na	na	5.9E-05	2.0E+00	2.0E+00	1.0E-01	1.5E-06	nc	nc	2.1E-03	0.0021
p-Isopropyltoluene	2.1	2.0E-06	na	na	3.1E-05	1.0E-01	1.0E-01	4.0E-01	2.0E-05	nc	nc	2.7E-04	0.00029
sec-Butylbenzene	1.6	1.6E-06	na	na	3.2E-05	1.0E-01	1.0E-01	4.0E-01	1.6E-05	nc	nc	2.8E-04	0.00029
Tert-Butylbenzene	3.4	3.3E-06	na	na	5.8E-05	1.0E-01	1.0E-01	4.0E-01	3.3E-05	nc	nc	5.0E-04	0.00054
Toluene	24	2.3E-05	na	na	7.1E-04	8.0E-02	8.0E-02	5.0E+00	2.9E-04	nc	nc	5.0E-04	0.00079
POLYNUCLEAR AROMATIC HYDROCARBONS													
2-Methylnaphthalene	33	3.2E-05	2.8E-05	5.0E-09	7.1E-05	4.0E-03	4.0E-03	na	8.1E-03	6.9E-03	nc	nc	0.015
Naphthalene	51	5.0E-05	4.3E-05	7.6E-09	1.4E-04	2.0E-02	2.0E-02	3.0E-03	2.5E-03	2.1E-03	8.9E-06	1.6E-01	0.16
												HI	5
PETROLEUM HYDROCARBONS													
Diesel Range Organics (DRO)	14251	na	na	na	na	na	na	na	nc	nc	nc	nc	nc
Diesel Range Organics (DRO), Aliphatic	11401	1.1E-02	na	1.7E-06	na	1.0E-01	na	1.0E+00	1.1E-01	nc	6.0E-06	nc	0.11
Diesel Range Organics (DRO), Aromatic	5700	5.6E-03	na	8.6E-07	na	4.0E-02	na	2.0E-01	1.4E-01	nc	1.5E-05	nc	0.14
Gasoline Range Organics (GRO)	629	na	na	na	na	na	na	na	nc	nc	nc	nc	nc
Gasoline Range Organics (GRO), Aliphatic	440	4.3E-04	na	6.6E-08	na	5.0E+00	na	1.8E+01	8.6E-05	nc	1.3E-08	nc	0.00009
Gasoline Range Organics (GRO), Aromatic	315	3.1E-04	na	4.7E-08	na	2.0E-01	na	4.0E-01	1.5E-03	nc	4.1E-07	nc	0.0015
												HI	0.3

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.

1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI Hazard index.
HQ Hazard quotient.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
nc Not calculated.
RfC Reference concentration

TABLE F-19
CANCER CALCULATION FOR A CURRENT/FUTURE TRENCH WORKER
SS03 - SUBSURFACE SOIL (>2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a	Soil Ingestion Dose	Soil Dermal Dose	Dust Inhalation Dose	VOC Inhalation Dose	Cancer Slope Factor (mg/kg- URF d)-1				(ug/m3)	Pathway-Specific Cancer Risk				Chemical-Specific Risk
	(mg/kg)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	Oral	Dermal	Inhalation	C	Soil Ingestion	Dermal	Dust Inhalation	VOC Inhalation		
POLYNUCLEAR AROMATIC HYDROCARBONS															
Naphthalene	26	3.7E-07	3.1E-07	5.6E-11	1.0E-06	na	na	3.4E-05	C	na	na	6.7E-12	1.2E-07	1.2E-07	
													ILCR	1E-07	

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
URF Unit risk factor

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

TABLE F-20
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE TRENCH WORKER
SS03 - SUBSURFACE SOIL (>2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m ³ /kg-d)	Reference Dose d) b		RfC (mg/m3) b	Pathway-Specific Hazard				Chemical-Specific HQ	
						(mg/kg-	(mg/kg-		Soil	Dust	VOC			
						Oral	Dermal	Inhalation	Ingestion	Dermal	Inhalation	Inhalation		
VOCs														
1,2,4-Trimethylbenzene	4.6	4.5E-06	na	na	7.4E-05	na	na	7.0E-03	nc	nc	nc	3.7E-02	0.037	
1,3,5-Trimethylbenzene	2.0	2.0E-06	na	na	3.2E-05	5.0E-02	5.0E-02	6.0E-03	3.9E-05	nc	nc	1.9E-02	0.019	
o-Xylene	1.9	1.9E-06	na	na	3.1E-05	2.0E+00	2.0E+00	1.0E-01	9.4E-07	nc	nc	1.1E-03	0.0011	
POLYNUCLEAR AROMATIC HYDROCARBONS														
Naphthalene	26	2.6E-05	2.2E-05	3.9E-09	4.2E-04	2.0E-02	2.0E-02	3.0E-03	1.3E-03	1.1E-03	4.6E-06	4.9E-01	0.49	
													HI	0.5
PETROLEUM HYDROCARBONS														
Diesel Range Organics (DRO)	7436	na	na	na	na	na	na	na	nc	nc	nc	nc	nc	
Diesel Range Organics (DRO), Aliphatic	5949	5.8E-03	na	9.0E-07	na	1.0E-01	na	1.0E+00	5.8E-02	nc	3.1E-06	nc	0.058	
Diesel Range Organics (DRO), Aromatic	2974	2.9E-03	na	4.5E-07	na	4.0E-02	na	2.0E-01	7.3E-02	nc	7.8E-06	nc	0.073	
													HI	0.1

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.

1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI Hazard index.
HQ Hazard quotient.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
nc Not calculated.
RfC Reference concentration

TABLE F-21
CANCER CALCULATION FOR A CURRENT/FUTURE TRENCH WORKER
SS03 - SEDIMENT
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Sediment	Sediment	Dermal	Dust	VOC	Cancer Slope Factor (mg/kg- URF			Pathway-Specific Cancer Risk				Chemical-
	Concentration ^a	Ingestion				Inhalation	d)-1	1	Sediment	Dust	VOC		
	(mg/kg)	Dose	Dose	Dose	Dose	Oral	Dermal	Inhalation	Ingestion	Dermal	Inhalation	Inhalation	
	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)								
INORGANICS													
Arsenic	21	2.9E-07	5.8E-08	4.5E-11	na	1.5E+00	1.5E+00	4.3E-03	4.4E-07	8.7E-08	6.8E-10	na	5.3E-07
Cobalt	23	3.2E-07	2.1E-08	4.9E-11	na	na	na	9.0E-03	na	na	1.6E-09	na	1.6E-09
												ILCR	5E-07

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
ug/m³ Microgram per cubic meter.
URF Unit risk factor
VOC Volatile Organic Compound

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

TABLE F-22
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE TRENCH WORKER
SS03 - SEDIMENT
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Sediment Concentration ^a (mg/kg)	Sediment Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m ³ /kg-d)	Reference Dose (mg/kg-d) ^b			RfC (mg/m3) ^b			Pathway-Specific Hazard			Chemical- Specific HQ
						Oral	Dermal	Inhalation	Sediment	Dermal	Inhalation	Inhalation			
INORGANICS															
Aluminum	27900	2.7E-02	1.8E-03	4.2E-06	na	1.0E+00	1.0E+00	4.9E-03	2.7E-02	1.8E-03	3.0E-03	nc	0.032		
Arsenic	21	2.1E-05	4.1E-06	3.2E-09	na	3.0E-04	3.0E-04	3.0E-05	6.8E-02	1.4E-02	3.7E-04	nc	0.082		
Chromium	62	6.1E-05	4.0E-06	9.3E-09	na	1.5E+00	2.0E-02	na	4.0E-05	2.1E-04	nc	nc	0.00025		
Cobalt	23	2.3E-05	1.5E-06	3.5E-09	na	3.0E-04	3.0E-04	6.0E-06	7.5E-02	5.0E-03	2.0E-03	nc	0.082		
Manganese	1320	1.3E-03	8.5E-05	2.0E-07	na	2.4E-02	9.6E-04	5.0E-05	5.4E-02	8.9E-02	1.4E-02	nc	0.16		
Vanadium	107	1.0E-04	6.9E-06	1.6E-08	na	5.0E-03	1.3E-04	na	2.1E-02	5.3E-02	nc	nc	0.074		
												HI		0.4	

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.

1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI Hazard index.
HQ Hazard quotient.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
mg/m3 Milligram per cubic meter.
na Not available.
nc Not calculated.
RfC Reference concentration
VOC Volatile Organic Compound

TABLE F-23
CANCER RISK CALCULATIONS FOR A FUTURE TRENCH WORKER
SS03 - GROUNDWATER
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Groundwater Concentration ^a (mg/L)	Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor (mg/kg-d)-1		URF (ug/m3)-1 Inhalation	Pathway-Specific Cancer Risk			Chemical- Specific Risk
					Oral	Dermal		Ingestion	Dermal	Inhalation	
VOCs											
1,2-Dichloroethane	0.00070	2.8E-07	8.9E-09	3.2E-08	9.1E-02	9.1E-02	2.6E-05	2.5E-08	8.1E-10	2.9E-09	2.9E-08
Benzene	0.12	4.6E-05	4.6E-06	2.6E-05	5.5E-02	5.5E-02	7.8E-06	2.5E-06	2.5E-07	7.0E-07	3.5E-06
Ethylbenzene	0.14	5.4E-05	2.1E-05	4.2E-05	1.1E-02	1.1E-02	2.5E-06	5.9E-07	2.3E-07	3.7E-07	1.2E-06
SVOCs											
3,3'-Dichlorobenzidine	0.0050	2.0E-06	5.2E-07	na	4.5E-01	4.5E-01	na	8.8E-07	2.3E-07	nc	1.1E-06
4-Chloroaniline	0.0030	1.2E-06	5.4E-08	na	2.1E-02	na	na	2.5E-08	na	nc	2.5E-08
Bis(2-chloroethyl) Ether	0.00050	2.0E-07	3.6E-09	na	1.1E+00	1.1E+00	3.3E-04	2.2E-07	3.9E-09	nc	2.2E-07
Hexachlorobutadiene	0.0030	1.2E-06	1.9E-06	na	7.8E-02	7.8E-02	2.2E-05	9.2E-08	1.5E-07	nc	2.4E-07
POLYNUCLEAR AROMATIC HYDROCARBONS											
Naphthalene	0.092	3.6E-05	1.6E-05	1.6E-06	na	na	3.4E-05	na	na	1.9E-07	1.9E-07
										ILCR	6E-06

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

ILCR	Incremental lifetime cancer risk.
Inc	Incomplete pathway.
mg/kg-d	Milligrams per kilogram per day.
mg/L	Milligrams per liter.
na	Not available.
nc	Not calculated.
VOCs	Volatile organic compounds.
SVOCs	Semi-volatile organic compounds.
ug/m3	Microgram per cubic meter.
URF	Unit Risk Factor

TABLE F-24
NONCANCER HAZARD CALCULATIONS FOR A FUTURE TRENCH WORKER
SS03 - GROUNDWATER
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Groundwater Concentration ^a (mg/L)	Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Inhalation Dose (mg/kg-d)	VOC			Pathway-Specific Hazard			Chemical- Specific HQ
					Reference Dose (mg/kg-d)		RfC (mg/m3)	Ingestion	Dermal	Inhalation	
					Oral	Dermal	Inhalation				
VOCs											
1,2,4-Trimethylbenzene	0.13	3.5E-03	2.7E-03	2.1E-03	na	na	7.0E-03	nc	nc	1.1E+00	1.1
1,2-Dichloroethane	0.00070	1.9E-05	6.2E-07	2.3E-06	2.0E-02	2.0E-02	2.4E+00	9.6E-04	3.1E-05	3.3E-06	0.0010
Benzene	0.12	3.2E-03	3.2E-04	1.8E-03	4.0E-03	4.0E-03	3.0E-02	8.0E-01	8.1E-02	2.1E-01	1.1
Ethylbenzene	0.14	3.8E-03	1.5E-03	3.0E-03	1.0E-01	1.0E-01	1.0E+00	3.8E-02	1.5E-02	1.0E-02	0.063
SVOCs											
2-Nitrophenol	0.00040	1.1E-05	4.4E-07	na	5.0E-04	5.0E-04	2.0E-03	2.2E-02	8.8E-04	nc	0.023
4-Chloroaniline	0.0030	8.2E-05	3.8E-06	na	4.0E-03	4.0E-03	na	2.1E-02	9.4E-04	nc	0.021
Hexachlorobutadiene	0.0030	8.2E-05	1.3E-04	na	1.0E-03	1.0E-03	na	8.2E-02	1.3E-01	nc	0.21
POLYNUCLEAR AROMATIC HYDROCARBONS											
Naphthalene	0.092	2.5E-03	1.1E-03	1.1E-04	2.0E-02	2.0E-02	3.0E-03	1.3E-01	5.5E-02	1.3E-01	0.31
										HI	3
PETROLEUM HYDROCARBONS											
Diesel Range Organics (DRO)	3.5	na	na	na	na	na	na	nc	nc	nc	nc
Diesel Range Organics (DRO), Aliphatic	2.8	7.7E-02	na	na	1.0E-01	na	1.0E+00	7.7E-01	nc	nc	0.77
Diesel Range Organics (DRO), Aromatic	1.4	3.9E-02	na	na	4.0E-02	na	2.0E-01	9.6E-01	nc	nc	0.96
Gasoline Range Organics (GRO)	3.4	na	na	na	na	na	na	nc	nc	nc	nc
Gasoline Range Organics (GRO), Aliphatic	2.4	6.5E-02	na	na	5.0E+00	na	1.8E+01	1.3E-02	nc	nc	0.013
Gasoline Range Organics (GRO), Aromatic	1.7	4.7E-02	na	na	2.0E-01	na	4.0E-01	2.3E-01	nc	nc	0.23
Residual Range Organics (RRO)	3.4	na	na	na	na	na	na	nc	nc	nc	nc
Residual Range Organics (RRO), Aliphatic	3.1	8.4E-02	na	na	2.0E+00	na	na	4.2E-02	nc	nc	0.042
Residual Range Organics (RRO), Aromatic	1.0	2.8E-02	na	na	3.0E-02	na	na	9.3E-01	nc	nc	0.93
										HI	3

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

- 1) Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI	Hazard index.
HQ	Hazard quotient.
Inc	Incomplete pathway.
mg/kd-d	Milligrams per kilogram per day.
mg/L	Milligrams per liter.
mg/m3	Milligram per cubic meter.
na	Not applicable.
nc	Not calculated
RfC	Reference Concentration
SVOCs	Semi-volatile organic compounds.
VOCs	Volatile organic compounds.

TABLE F-25
CANCER CALCULATION FOR A CURRENT/FUTURE SITE WORKER
SS03 - SURFACE SOIL (0-2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Soil Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor (mg/kg- URF (ug/m3)-						Pathway-Specific Cancer Risk				Chemical-Specific Risk
						d)-1			1			Soil Ingestion	Dust		VOC	
						Oral	Dermal	Inhalation	Ingestion	Dermal	Inhalation		Inhalation			
INORGANICS																
Arsenic	16	1.6E-07	6.2E-08	4.8E-11	na	1.5E+00	I	1.5E+00	R	4.3E-03	I	2.3E-07	9.3E-08	7.2E-10	na	3.3E-07
Cobalt	22	2.2E-07	2.8E-08	6.6E-11	na	na		na		9.0E-03	P	na	na	2.1E-09	na	2.1E-09
VOCs																
Benzene	2.1	2.1E-08	na	na	1.6E-06	5.5E-02	I	5.5E-02	R	7.8E-06	I	1.2E-09	na	na	4.3E-08	4.4E-08
Ethylbenzene	8.3	8.1E-08	na	na	3.7E-06	1.1E-02	C	1.1E-02	R	2.5E-06	C	8.9E-10	na	na	3.2E-08	3.3E-08
POLYNUCLEAR AROMATIC HYDROCARBONS																
Naphthalene	51	5.0E-07	8.5E-07	1.5E-10	2.7E-06	na		na		3.4E-05	C	na	na	1.8E-11	3.3E-07	3.3E-07
															ILCR	7E-07

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
URF Unit risk factor

TABLE F-26
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE SITE VISITOR
SS03 - SURFACE SOIL (0-2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m ³ /kg-d)	Reference Dose (mg/kg-d) ^b		RfC (mg/m3) ^b	Pathway-Specific Hazard				Chemical-Specific HQ
						Oral	Dermal		Soil Ingestion	Dermal	Dust Inhalation	VOC Inhalation	
INORGANICS													
Aluminum	28800	7.9E-04	1.0E-04	2.4E-07	na	1.0E+00	1.0E+00	4.9E-03	7.9E-04	1.0E-04	1.7E-04	nc	0.0011
Arsenic	16	4.4E-07	1.7E-07	1.3E-10	na	3.0E-04	3.0E-04	3.0E-05	1.5E-03	5.8E-04	1.6E-05	nc	0.0021
Chromium	56	1.5E-06	2.0E-07	4.7E-10	na	1.5E+00	2.0E-02	na	1.0E-06	1.0E-05	nc	nc	0.000011
Cobalt	22	6.0E-07	8.0E-08	1.9E-10	na	3.0E-04	3.0E-04	6.0E-06	2.0E-03	2.7E-04	1.1E-04	nc	0.0024
Manganese	609	1.7E-05	2.2E-06	5.1E-09	na	2.4E-02	9.6E-04	5.0E-05	7.0E-04	2.3E-03	3.6E-04	nc	0.0033
Vanadium	88	2.4E-06	3.2E-07	7.4E-10	na	5.0E-03	1.3E-04	na	4.8E-04	2.4E-03	nc	nc	0.0029
VOCs													
1,2,4-Trimethylbenzene	431	1.2E-05	na	na	3.9E-04	na	na	7.0E-03	nc	nc	nc	1.9E-01	0.19
1,3,5-Trimethylbenzene	81	2.2E-06	na	na	8.7E-05	5.0E-02	5.0E-02	6.0E-03	4.4E-05	nc	nc	5.1E-02	0.051
Benzene	2.1	5.9E-08	na	na	4.4E-06	4.0E-03	4.0E-03	3.0E-02	1.5E-05	nc	nc	5.1E-04	0.00053
Ethylbenzene	8.3	2.3E-07	na	na	1.0E-05	1.0E-01	1.0E-01	1.0E+00	2.3E-06	nc	nc	3.6E-05	0.000038
m,p-Xylenes	8.2	2.2E-07	na	na	1.1E-05	2.0E-01	2.0E-01	1.0E-01	1.1E-06	nc	nc	3.7E-04	0.00037
n-Butylbenzene	1.7	4.7E-08	na	na	1.5E-06	1.0E-01	1.0E-01	4.0E-01	4.7E-07	nc	nc	1.3E-05	0.000014
n-Propylbenzene	3.9	1.1E-07	na	na	4.0E-06	4.0E-02	4.0E-02	1.4E-01	2.7E-06	nc	nc	1.0E-04	0.000102
o-Xylene	3.0	8.2E-08	na	na	3.3E-06	2.0E+00	2.0E+00	1.0E-01	4.1E-08	nc	nc	1.2E-04	0.000115
p-Isopropyltoluene	2.1	5.7E-08	na	na	1.7E-06	1.0E-01	1.0E-01	4.0E-01	5.7E-07	nc	nc	1.5E-05	0.000016
sec-Butylbenzene	1.6	4.3E-08	na	na	1.8E-06	1.0E-01	1.0E-01	4.0E-01	4.3E-07	nc	nc	1.6E-05	0.000016
Tert-Butylbenzene	3.4	9.2E-08	na	na	3.2E-06	1.0E-01	1.0E-01	4.0E-01	9.2E-07	nc	nc	2.8E-05	0.000029
Toluene	24	6.5E-07	na	na	4.0E-05	8.0E-02	8.0E-02	5.0E+00	8.2E-06	nc	nc	2.8E-05	0.000036
POLYNUCLEAR AROMATIC HYDROCARBONS													
2-Methylnaphthalene	33	9.0E-07	1.6E-06	2.8E-10	4.0E-06	4.0E-03	4.0E-03	na	2.3E-04	3.9E-04	nc	nc	0.00061
Naphthalene	51	1.4E-06	2.4E-06	4.3E-10	7.7E-06	2.0E-02	2.0E-02	3.0E-03	7.0E-05	1.2E-04	5.0E-07	9.0E-03	0.0092
												HI	0.3
PETROLEUM HYDROCARBONS													
Diesel Range Organics (DRO)	14251	na	na	na	na	na	na	na	nc	nc	nc	nc	nc
Diesel Range Organics (DRO), Aliphatic	11401	3.1E-04	na	9.6E-08	na	1.0E-01	na	1.0E+00	3.1E-03	nc	3.4E-07	nc	0.0031
Diesel Range Organics (DRO), Aromatic	5700	1.6E-04	na	4.8E-08	na	4.0E-02	na	2.0E-01	3.9E-03	nc	8.4E-07	nc	0.0039
Gasoline Range Organics (GRO)	629	na	na	na	na	na	na	na	nc	nc	nc	nc	nc
Gasoline Range Organics (GRO), Aliphatic	440	1.2E-05	na	3.7E-09	na	5.0E+00	na	1.8E+01	2.4E-06	nc	7.1E-10	nc	0.0000024
Gasoline Range Organics (GRO), Aromatic	314.60	8.6E-06	na	2.7E-09	na	2.0E-01	na	4.0E-01	4.3E-05	nc	2.3E-08	nc	0.000043
												HI	0.007

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.

1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI Hazard index.
HQ Hazard quotient.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
nc Not calculated.
RfC Reference concentration

TABLE F-27
CANCER CALCULATION FOR A CURRENT/FUTURE SITE VISITOR
SS03 - SUBSURFACE SOIL (>2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Soil Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor (mg/kg- URF d)-1			(ug/m3)	Pathway-Specific Cancer Risk				Chemical-Specific Risk
						Oral	Dermal	Inhalation		Soil Ingestion	Dust Inhalation	VOC Inhalation		
POLYNUCLEAR AROMATIC HYDROCARBONS														
Naphthalene	26.13	2.6E-07	4.4E-07	7.9E-11	1.4E-06	na	na	0.000034	C	na	na	9.4E-12	1.7E-07	1.7E-07
													ILCR	2E-07

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

ILCR	Incremental lifetime cancer risk.
mg/kg	Milligrams per kilogram.
mg/kg-d	Milligrams per kilogram per day.
na	Not available.
URF	Unit risk factor

TABLE F-28
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE SITE VISITOR
SS03 - SUBSURFACE SOIL (>2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m ³ /kg-d)	Reference Dose		RfC (mg/m3) b	Pathway-Specific Hazard				Chemical-Specific HQ	
						d) b	(mg/kg-		Soil	Dust	VOC			
						Oral	Dermal	Inhalation	Ingestion	Dermal	Inhalation	Inhalation		
VOCs														
1,2,4-Trimethylbenzene	4.6	1.3E-07	na	na	4.2E-06	na	na	7.0E-03	nc	nc	nc	2.1E-03	0.0021	
1,3,5-Trimethylbenzene	2.0	5.5E-08	na	na	1.8E-06	5.0E-02	5.0E-02	6.0E-03	1.1E-06	nc	nc	1.1E-03	0.0011	
o-Xylene	1.9	5.3E-08	na	na	1.7E-06	2.0E+00	2.0E+00	1.0E-01	2.6E-08	nc	nc	6.0E-05	0.000060	
POLYNUCLEAR AROMATIC HYDROCARBONS														
Naphthalene	26	7.2E-07	1.2E-06	2.2E-10	2.3E-05	2.0E-02	2.0E-02	3.0E-03	3.6E-05	6.1E-05	2.6E-07	2.7E-02	0.027	
												HI	0.03	
PETROLEUM HYDROCARBONS														
Diesel Range Organics (DRO)	7436	na	na	na	na	na	na	na	nc	nc	nc	nc	nc	
Diesel Range Organics (DRO), Aliphatic	5949	1.6E-04	na	5.0E-08	na	1.0E-01	na	1.0E+00	1.6E-03	nc	1.8E-07	nc	0.0016	
Diesel Range Organics (DRO), Aromatic	2974	8.1E-05	na	2.5E-08	na	4.0E-02	na	2.0E-01	2.0E-03	nc	4.4E-07	nc	0.0020	
												HI	0.004	

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.

1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI Hazard index.
HQ Hazard quotient.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
nc Not calculated.
RfC Reference concentration

TABLE F-29
CANCER CALCULATION FOR A CURRENT/FUTURE SITE VISITOR
SS03 - SEDIMENT
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Sediment Concentration ^a (mg/kg)	Sediment Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor (mg/kg- URF			(ug/m3): 1	Pathway-Specific Cancer Risk			Chemical- Specific Risk
						d)-1				Sediment	Dust	VOC	
						Oral	Dermal	Inhalation					
INORGANICS													
Arsenic	21	2.1E-07	8.1E-08	6.3E-11	na	1.5E+00	1.5E+00	4.3E-03	3.1E-07	1.2E-07	9.5E-10	na	4.3E-07
Cobalt	23	2.3E-07	3.0E-08	6.9E-11	na	na	na	9.0E-03	na	na	2.2E-09	na	2.2E-09
												ILCR	4E-07

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
ug/m³ Microgram per cubic meter.
URF Unit risk factor
VOC Volatile Organic Compound

TABLE F-30
NONCANCER HAZARD CALCULATIONS FOR CURRENT/FUTURE A SITE VISITOR
SS03 - SEDIMENT
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Sediment Concentration ^a (mg/kg)	Sediment Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m³/kg-d)	Reference Dose		(mg/kg- d) b	RfC (mg/m3) b	Pathway-Specific Hazard				Chemical- Specific HQ
						Oral	Dermal			Inhalation	Sediment Ingestion	Dust Dermal	VOC Inhalation	
INORGANICS														
Aluminum	27900	7.6E-04	1.0E-04	2.4E-07	na	1.0E+00	1.0E+00	4.9E-03	7.6E-04	1.0E-04	1.7E-04	nc	0.0010	
Arsenic	21	5.8E-07	2.3E-07	1.8E-10	na	3.0E-04	3.0E-04	3.0E-05	1.9E-03	7.6E-04	2.1E-05	nc	0.0027	
Chromium	62	1.7E-06	2.2E-07	5.2E-10	na	1.5E+00	2.0E-02	na	1.1E-06	1.1E-05	nc	nc	0.000013	
Cobalt	23	6.3E-07	8.3E-08	1.9E-10	na	3.0E-04	3.0E-04	6.0E-06	2.1E-03	2.8E-04	1.1E-04	nc	0.0025	
Manganese	1320	3.6E-05	4.8E-06	1.1E-08	na	2.4E-02	9.6E-04	5.0E-05	1.5E-03	5.0E-03	7.8E-04	nc	0.0073	
Vanadium	107	2.9E-06	3.9E-07	9.0E-10	na	5.0E-03	1.3E-04	na	5.9E-04	3.0E-03	nc	nc	0.0036	
												HI	0.02	

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.

1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI Hazard index.
 HQ Hazard quotient.
 mg/kg Milligrams per kilogram.
 mg/kg-d Milligrams per kilogram per day.
 mg/m3 Milligram per cubic meter.
 na Not available.
 nc Not calculated.
 RfC Reference concentration
 VOC Volatile Organic Compound

TABLE F-31
CANCER RISK CALCULATIONS FOR A FUTURE SITE VISITOR
SS03 - GROUNDWATER
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Groundwater Concentration ^a (mg/L)	Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor		URF (ug/m3)- 1	Pathway-Specific Cancer Risk			Chemical- Specific Risk
					(mg/kg-d)-1			Ingestion	Dermal	Inhalation	
					Oral	Dermal	Inhalation				
VOCs											
1,2-Dichloroethane	0.00070	2.8E-07	8.9E-09	3.2E-08	9.1E-02	9.1E-02	2.6E-05	2.5E-08	8.1E-10	2.9E-09	2.9E-08
Benzene	0.12	4.6E-05	4.6E-06	2.6E-05	5.5E-02	5.5E-02	7.8E-06	2.5E-06	2.5E-07	7.0E-07	3.5E-06
Ethylbenzene	0.14	5.4E-05	2.1E-05	4.2E-05	1.1E-02	1.1E-02	2.5E-06	5.9E-07	2.3E-07	3.7E-07	1.2E-06
SVOCs											
3,3'-Dichlorobenzidine	0.0050	2.0E-06	5.2E-07	na	4.5E-01	4.5E-01	na	8.8E-07	2.3E-07	nc	1.1E-06
4-Chloroaniline	0.0030	1.2E-06	5.4E-08	na	2.1E-02	na	na	2.5E-08	na	nc	2.5E-08
Bis(2-chloroethyl) Ether	0.00050	2.0E-07	3.6E-09	na	1.1E+00	1.1E+00	3.3E-04	2.2E-07	3.9E-09	nc	2.2E-07
Hexachlorobutadiene	0.0030	1.2E-06	1.9E-06	na	7.8E-02	7.8E-02	2.2E-05	9.2E-08	1.5E-07	nc	2.4E-07
POLYNUCLEAR AROMATIC HYDROCARBONS											
Naphthalene	0.0922000	3.6E-05	1.6E-05	1.6E-06	na	na	3.4E-05	na	na	1.9E-07	1.9E-07
										ILCR	6E-06

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

ILCR	Incremental lifetime cancer risk.
Inc	Incomplete pathway.
mg/kg-d	Milligrams per kilogram per day.
mg/L	Milligrams per liter.
na	Not available.
nc	Not calculated.
VOCs	Volatile organic compounds.
SVOCs	Semi-volatile organic compounds.
ug/m3	Microgram per cubic meter.
URF	Unit Risk Factor

TABLE F-32
NONCANCER HAZARD CALCULATIONS FOR A FUTURE SITE VISITOR
SS03 - GROUNDWATER
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Groundwater Concentration ^a (mg/L)	Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Reference Dose (mg/kg-d)		RfC (mg/m3)	Pathway-Specific Hazard			Chemical- Specific HQ
					Oral	Dermal		Ingestion	Dermal	Inhalation	
VOCs											
1,2-Dichloroethane	0.00070	7.7E-07	2.5E-08	9.0E-08	2.0E-02	2.0E-02	2.4E+00	3.9E-05	1.2E-06	1.3E-07	0.000040
1,2,4-Trimethylbenzene	0.13	1.4E-04	1.1E-04	8.6E-05	na	na	7.0E-03	nc	nc	4.3E-02	0.043
Benzene	0.12	1.3E-04	1.3E-05	7.2E-05	4.0E-03	4.0E-03	3.0E-02	3.2E-02	3.2E-03	8.4E-03	0.044
Ethylbenzene	0.14	1.5E-04	6.0E-05	1.2E-04	1.0E-01	1.0E-01	1.0E+00	1.5E-03	6.0E-04	4.1E-04	0.0025
SVOCs											
2-Nitrophenol	0.00040	4.4E-07	1.8E-08	na	5.0E-04	5.0E-04	2.0E-03	8.8E-04	3.5E-05	nc	0.00091
4-Chloroaniline	0.0030	3.3E-06	1.5E-07	na	4.0E-03	4.0E-03	na	8.2E-04	3.8E-05	nc	0.00086
Hexachlorobutadiene	0.0030	3.3E-06	5.2E-06	na	1.0E-03	1.0E-03	na	3.3E-03	5.2E-03	nc	0.0085
POLYNUCLEAR AROMATIC HYDROCARBONS											
Naphthalene	0.092	1.0E-04	4.4E-05	4.4E-06	2.0E-02	2.0E-02	3.0E-03	5.1E-03	2.2E-03	5.2E-03	0.012
										HI	0.1
PETROLEUM HYDROCARBONS											
Diesel Range Organics (DRO)	3.5	na	na	na	na	na	na	nc	nc	nc	nc
Diesel Range Organics (DRO), Aliphatic	2.8	3.1E-03	na	na	1.0E-01	na	1.0E+00	3.1E-02	nc	nc	0.031
Diesel Range Organics (DRO), Aromatic	1.4	1.5E-03	na	na	4.0E-02	na	2.0E-01	3.9E-02	nc	nc	0.039
Gasoline Range Organics (GRO)	3.4	na	na	na	na	na	na	nc	nc	nc	nc
Gasoline Range Organics (GRO), Aliphatic	2.4	2.6E-03	na	na	5.0E+00	na	1.8E+01	5.2E-04	nc	nc	0.00052
Gasoline Range Organics (GRO), Aromatic	1.7	1.9E-03	na	na	2.0E-01	na	4.0E-01	9.3E-03	nc	nc	0.0093
Residual Range Organics (RRO)	3.4	na	na	na	na	na	na	nc	nc	nc	nc
Residual Range Organics (RRO), Aliphatic	3.1	3.4E-03	na	na	2.0E+00	na	na	1.7E-03	nc	nc	0.0017
Residual Range Organics (RRO), Aromatic	1.0	1.1E-03	na	na	3.0E-02	na	na	3.7E-02	nc	nc	0.037
										HI	0.12

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

- 1) Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI	Hazard index.
HQ	Hazard quotient.
Inc	Incomplete pathway.
mg/kd-d	Milligrams per kilogram per day.
mg/L	Milligrams per liter.
mg/m3	Milligram per cubic meter.
na	Not applicable.
nc	Not calculated
RfC	Reference Concentration
SVOCs	Semi-volatile organic compounds.
VOCs	Volatile organic compounds.

TABLE F-33
CANCER CALCULATION FOR A CURRENT/FUTURE SITE WORKER
SS08 - SURFACE SOIL (0-2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Soil Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor (mg/kg- URF d)-1						Pathway-Specific Cancer Risk				Chemical-Specific Risk	
												Soil		Dust			VOC
						Oral	Dermal	Inhalation	Ingestion	Dermal	Inhalation	Inhalation					
INORGANICS																	
Arsenic	19	3.4E-06	1.3E-06	1.0E-09	na	1.5E+00	I	1.5E+00	R	4.3E-03	I	5.1E-06	2.0E-06	1.6E-08	na	7.1E-06	
Cobalt	22	3.8E-06	5.0E-07	1.2E-09	na	na		na		9.0E-03	P	na	na	3.7E-08	na	3.7E-08	
VOCs																	
Trichloroethene	0.10	1.7E-08	na	na	2.1E-06	1.3E-02	C	1.3E-02	R	2.0E-06	C	2.3E-10	na	na	1.5E-08	1.5E-08	
SVOCs																	
3-Nitroaniline	0.090	1.6E-08	2.1E-08	4.8E-12	na	2.1E-02	P	2.1E-02	R	na		3.3E-10	4.4E-10	na	na	7.7E-10	
POLYNUCLEAR AROMATIC HYDROCARBONS																	
Benzo(a)pyrene	0.080	1.4E-08	2.4E-08	4.3E-12	na	7.3E+00	I	7.3E+00	R	1.1E-03	C	1.0E-07	1.8E-07	1.7E-11	na	2.8E-07	
PESTICIDES																	
4,4'-DDT	3.8	6.7E-07	2.7E-07	2.1E-10	na	3.4E-01	I	3.4E-01	I	9.7E-05	I	2.3E-07	9.0E-08	7.0E-11	na	3.2E-07	
POLYCHLORINATED BIPHENYLS																	
Arochlor 1260	12	2.0E-06	3.7E-06	6.2E-10	na	2.0E+00	I	2.0E+00	R	1.0E-04	I	4.0E-06	7.4E-06	2.2E-10	na	1.1E-05	
															ILCR	2E-05	

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
URF Unit risk factor

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

TABLE F-34
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE SITE WORKER
SS08 - SURFACE SOIL (0-2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m ³ /kg-d)	Reference Dose d) b		(mg/kg- RfC (mg/m3) b	Pathway-Specific Hazard				Chemical- Specific HQ
						Oral	Dermal		Soil	Dust	VOC		
INORGANICS													
Aluminum	28655	1.4E-02	1.9E-03	4.3E-06	na	1.0E+00	1.0E+00	4.9E-03	1.4E-02	1.9E-03	3.1E-03	nc	0.019
Arsenic	19	9.5E-06	3.8E-06	2.9E-09	na	3.0E-04	3.0E-04	3.0E-05	3.2E-02	1.3E-02	3.4E-04	nc	0.045
Chromium	54	2.7E-05	3.5E-06	8.2E-09	na	1.5E+00	2.0E-02	na	1.8E-05	1.8E-04	nc	nc	0.00020
Cobalt	22	1.1E-05	1.4E-06	3.3E-09	na	3.0E-04	3.0E-04	6.0E-06	3.5E-02	4.6E-03	1.9E-03	nc	0.042
Manganese	1030	5.0E-04	6.7E-05	1.6E-07	na	2.4E-02	9.6E-04	5.0E-05	2.1E-02	6.9E-02	1.1E-02	nc	0.10
Vanadium	83	4.1E-05	5.4E-06	1.3E-08	na	5.0E-03	1.3E-04	na	8.1E-03	4.1E-02	nc	nc	0.049
VOCs													
1,3,5-Trimethylbenzene	4.6	2.3E-06	na	na	8.8E-05	5.0E-02	5.0E-02	6.0E-03	4.5E-05	nc	nc	5.2E-02	0.052
SVOCs													
2-Nitroaniline	0.060	2.9E-08	3.9E-08	9.0E-12	na	3.0E-03	3.0E-03	3.0E-05	9.8E-06	1.3E-05	1.1E-06	nc	0.000024
3-Nitroaniline	0.090	4.4E-08	5.8E-08	1.4E-11	na	3.0E-04	3.0E-04	1.0E-03	1.5E-04	1.9E-04	4.7E-08	nc	0.00034
PESTICIDES													
4,4'-DDT	3.8	1.9E-06	7.4E-07	5.8E-10	na	5.0E-04	5.0E-04	na	3.7E-03	1.5E-03	nc	nc	0.0052
												HI	0.3

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.

1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI Hazard index.
HQ Hazard quotient.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
nc Not calculated.
RfC Reference concentration

TABLE F-35
CANCER CALCULATION FOR A CURRENT/FUTURE SITE WORKER
SS08 - SUBSURFACE SOIL (>2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Soil Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor (mg/kg- URF d)-1						Pathway-Specific Cancer Risk				Chemical-Specific Risk	
						1			(ug/m3)			Soil		Dust			VOC
						Oral	Dermal	Inhalation	Ingestion	Dermal	Inhalation	Inhalation					
INORGANICS																	
Arsenic	16	2.8E-06	1.1E-06	8.8E-10	na	1.5E+00	I	1.5E+00	R	4.3E-03	I	4.3E-06	1.7E-06	1.3E-08	na	6.0E-06	
Cobalt	26	4.6E-06	6.0E-07	1.4E-09	na	na		na		9.0E-03	P	na	na	4.4E-08	na	4.4E-08	
POLYNUCLEAR AROMATIC HYDROCARBONS																	
Benzo(a)pyrene	0.057	1.0E-08	1.7E-08	3.1E-12	na	7.3E+00	I	7.3E+00	R	1.1E-03	C	7.3E-08	1.2E-07	1.2E-11	na	2.0E-07	
PESTICIDES																	
Dieldrin	0.040	7.0E-09	9.2E-09	2.2E-12	na	1.6E-01	I	1.6E-01	R	4.6E-03		1.1E-09	1.5E-09	3.5E-11	na	2.6E-09	
POLYCHLORINATED BIPHENYLS																	
Arochlor 1260	1.6	2.8E-07	5.3E-07	8.8E-11	na	2.0E+00	I	2.0E+00	R	1.0E-04	I	5.7E-07	1.1E-06	3.1E-11	na	1.6E-06	
															ILCR		8E-06

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
URF Unit risk factor

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

TABLE F-36
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE SITE WORKER
SS08 - SUBSURFACE SOIL (>2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m ³ /kg-d)	Reference Dose		(mg/kg- d) b	RfC (mg/m3) b	Pathway-Specific Hazard				Chemical- Specific HQ
						Oral	Dermal			Soil Ingestion	Dust Inhalation	VOC Inhalation		
INORGANICS														
Aluminum	29175	1.4E-02	1.9E-03	4.4E-06	na	1.0E+00	1.0E+00	4.9E-03	1.4E-02	1.9E-03	3.1E-03	nc	0.019	
Arsenic	16	8.0E-06	3.2E-06	2.5E-09	na	3.0E-04	3.0E-04	3.0E-05	2.7E-02	1.1E-02	2.9E-04	nc	0.037	
Chromium	52	2.6E-05	3.4E-06	7.9E-09	na	1.5E+00	2.0E-02	na	1.7E-05	1.7E-04	nc	nc	0.00019	
Cobalt	26	1.3E-05	1.7E-06	3.9E-09	na	3.0E-04	3.0E-04	6.0E-06	4.3E-02	5.6E-03	2.3E-03	nc	0.051	
Manganese	949	4.6E-04	6.1E-05	1.4E-07	na	2.4E-02	9.6E-04	5.0E-05	1.9E-02	6.4E-02	1.0E-02	nc	0.093	
Vanadium	80	3.9E-05	5.2E-06	1.2E-08	na	5.0E-03	1.3E-04	na	7.8E-03	4.0E-02	nc	nc	0.047	
PESTICIDES														
Dieldrin	0.040	2.0E-08	2.6E-08	6.0E-12	na	5.0E-05	5.0E-05	na	3.9E-04	5.2E-04	nc	nc	0.00091	
													HI	0.2
PETROLEUM HYDROCARBONS														
Diesel Range Organics (DRO)	12310	na	na	na	na	na	na	na	nc	nc	nc	nc	nc	
Diesel Range Organics (DRO), Aliphatic	9848	4.8E-03	na	1.5E-06	na	1.0E-01	na	1.0E+00	4.8E-02	nc	5.2E-06	nc	0.048	
Diesel Range Organics (DRO), Aromatic	4924	2.4E-03	na	7.4E-07	na	4.0E-02	na	2.0E-01	6.0E-02	nc	1.3E-05	nc	0.060	
Residual Range Organics (RRO)	8973	na	na	na	na	na	na	na	nc	nc	nc	nc	nc	
Residual Range Organics (RRO), Aliphatic	8076	4.0E-03	na	1.2E-06	na	2.0E+00	na	na	2.0E-03	nc	nc	nc	0.0020	
Residual Range Organics (RRO), Aromatic	2692	1.3E-03	na	4.1E-07	na	3.0E-02	na	na	4.4E-02	nc	nc	nc	0.044	
													HI	0.2

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.

1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI	Hazard index.
HQ	Hazard quotient.
mg/kg	Milligrams per kilogram.
mg/kd-d	Milligrams per kilogram per day.
na	Not available.
nc	Not calculated.
RfC	Reference concentration

TABLE F-37
CANCER CALCULATION FOR A CURRENT/FUTURE SITE WORKER
SS08 - SEDIMENT
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Sediment Concentration ^a (mg/kg)	Sediment Ingestion Dose (mg/kg-d)	Soil Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor (mg/kg- URF (ug/m3):										Chemical- Specific Risk	
						d)-1			1			Pathway-Specific Cancer Risk					
									Soil			Dust		VOC			
						Oral	Dermal	Inhalation	Ingestion	Dermal	Inhalation	Inhalation					
INORGANICS																	
Arsenic	21	3.7E-06	1.4E-06	1.1E-09	na	1.5E+00	I	1.5E+00	R	4.3E-03	I	5.5E-06	2.2E-06	1.7E-08	na	7.7E-06	
Cobalt	32	5.5E-06	7.3E-07	1.7E-09	na	na		na		9.0E-03	P	na	na	5.3E-08	na	5.3E-08	
POLYNUCLEAR AROMATIC HYDROCARBONS																	
Benzo(a)pyrene	0.063	1.1E-08	1.9E-08	3.4E-12	na	7.3E+00	I	7.3E+00	R	1.1E-03	C	8.1E-08	1.4E-07	1.3E-11	na	2.2E-07	
PESTICIDES																	
4,4'-DDT	2.0	3.5E-07	1.4E-07	1.1E-10	na	3.4E-01	I	3.4E-01	I	9.7E-05	I	1.2E-07	4.7E-08	3.6E-11	na	1.7E-07	
POLYCHLORINATED BIPHENYLS																	
Arochlor 1260	0.17	2.9E-08	5.4E-08	9.0E-12	na	2.0E+00	I	2.0E+00	R	1.0E-04	I	5.9E-08	1.1E-07	3.2E-12	na	1.7E-07	
															ILCR	8E-06	

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
URF Unit risk factor

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

TABLE F-38
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE SITE WORKER
SS08 - SEDIMENT
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Sediment Concentration ^a (mg/kg)	Sediment Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m ³ /kg-d)	Reference Dose d) b		(mg/kg- Inhalation	RFC (mg/m3) b	Pathway-Specific Hazard				Chemical- Specific HQ
						Oral	Dermal			Soil	Dust	VOC		
						Ingestion	Dermal	Inhalation	Inhalation					
INORGANICS														
Aluminum	35000	1.7E-02	2.3E-03	5.3E-06	na	1.0E+00	1.0E+00	4.9E-03	1.7E-02	2.3E-03	3.8E-03	nc	0.023	
Arsenic	21	1.0E-05	4.1E-06	3.1E-09	na	3.0E-04	3.0E-04	3.0E-05	3.4E-02	1.4E-02	3.7E-04	nc	0.048	
Chromium	62	3.0E-05	4.0E-06	9.3E-09	na	1.5E+00	2.0E-02	na	2.0E-05	2.0E-04	nc	nc	0.00023	
Cobalt	32	1.5E-05	2.0E-06	4.7E-09	na	3.0E-04	3.0E-04	6.0E-06	5.1E-02	6.8E-03	2.8E-03	nc	0.061	
Manganese	1300	6.4E-04	8.4E-05	2.0E-07	na	2.4E-02	9.6E-04	5.0E-05	2.7E-02	8.7E-02	1.4E-02	nc	0.13	
Vanadium	106	5.2E-05	6.8E-06	1.6E-08	na	5.0E-03	1.3E-04	na	1.0E-02	5.3E-02	nc	nc	0.063	
PESTICIDES														
4,4'-DDT	2.0	9.7E-07	3.9E-07	3.0E-10	na	5.0E-04	5.0E-04	na	1.9E-03	7.7E-04	nc	nc	0.0027	
												HI	0.3	

Notes:

- ^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.
- ^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.
- 1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI Hazard index.
 HQ Hazard quotient.
 mg/kg Milligrams per kilogram.
 mg/kg-d Milligrams per kilogram per day.
 na Not available.
 nc Not calculated.
 RfC Reference concentration

TABLE F-39
CANCER RISK CALCULATIONS FOR A FUTURE SITE WORKER
SS08 - GROUNDWATER
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Groundwater Concentration ^a (mg/L)	Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor		URF (ug/m3)-1	Pathway-Specific Cancer Risk			Chemical- Specific Risk
					(mg/kg-d)-1			Ingestion	Dermal	Inhalation	
					Oral	Dermal					
INORGANICS											
Arsenic	0.082	8.0E-04	1.8E-06	na	1.5E+00	1.5E+00	4.3E-03	1.2E-03	2.7E-06	nc	1.2E-03
VOCs											
1,2-Dibromoethane	0.0010	9.8E-06	3.7E-07	6.4E-07	2.0E+00	2.0E+00	6.0E-04	2.0E-05	7.4E-07	1.4E-06	2.2E-05
Benzene	0.0010	9.8E-06	9.8E-07	5.5E-06	5.5E-02	5.5E-02	7.8E-06	5.4E-07	5.4E-08	1.5E-07	7.4E-07
POLYNUCLEAR AROMATIC HYDROCARBONS											
Naphthalene	0.033	3.2E-04	1.4E-04	1.4E-05	na	na	3.4E-05	na	na	1.7E-06	1.7E-06
										ILCR	1E-03

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

ILCR	Incremental lifetime cancer risk.
Inc	Incomplete pathway.
mg/kg-d	Milligrams per kilogram per day.
mg/L	Milligrams per liter.
na	Not available.
nc	Not calculated.
VOCs	Volatile organic compounds.
SVOCs	Semi-volatile organic compounds.
ug/m3	Microgram per cubic meter.
URF	Unit Risk Factor

TABLE F-40
NONCANCER HAZARD CALCULATIONS FOR A FUTURE SITE WORKER
SS08 - GROUNDWATER
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Groundwater Concentration ^a (mg/L)	Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Reference Dose (mg/kg-d)		RfC (mg/m3)	Pathway-Specific Hazard			Chemical- Specific HQ
					Oral	Dermal		Ingestion	Dermal	Inhalation	
INORGANICS											
Aluminum	176	4.8E+00	1.1E-02	na	1.0E+00	1.0E+00	4.9E-03	4.8E+00	1.1E-02	nc	4.8
Antimony	0.0030	8.2E-05	1.8E-07	na	4.0E-04	6.0E-05	na	2.1E-01	3.1E-03	nc	0.21
Arsenic	0.082	2.2E-03	5.0E-06	na	3.0E-04	3.0E-04	3.0E-05	7.5E+00	1.7E-02	nc	7.5
Barium	0.53	1.4E-02	3.2E-05	na	2.0E-01	1.4E-02	4.9E-04	7.2E-02	2.3E-03	nc	0.074
Beryllium	0.0068	1.9E-04	4.2E-07	na	2.0E-03	1.4E-05	2.0E-05	9.3E-02	3.0E-02	nc	0.12
Cadmium	0.0024	6.7E-05	1.5E-07	na	5.0E-04	2.5E-05	na	1.3E-01	6.0E-03	nc	0.14
Chromium	0.13	3.5E-03	7.9E-06	na	1.5E+00	2.0E-02	na	2.3E-03	4.0E-04	nc	0.0027
Cobalt	0.19	5.2E-03	1.2E-05	na	3.0E-04	3.0E-04	6.0E-06	1.7E+01	3.9E-02	nc	17
Copper	0.51	1.4E-02	3.1E-05	na	4.0E-02	4.0E-02	na	3.5E-01	7.8E-04	nc	0.35
Manganese	16	4.3E-01	9.7E-04	na	2.4E-02	9.6E-04	5.0E-05	1.8E+01	1.0E+00	nc	19
Mercury	0.00024	6.6E-06	1.5E-08	na	3.0E-04	2.1E-05	3.0E-04	2.2E-02	7.1E-04	nc	0.023
Nickel	0.45	1.2E-02	5.6E-06	na	2.0E-02	8.0E-04	na	6.2E-01	7.0E-03	nc	0.62
Selenium	0.013	3.6E-04	8.0E-07	na	5.0E-03	1.5E-03	na	7.1E-02	5.3E-04	nc	0.072
Thallium	0.0013	3.6E-05	8.0E-08	na	8.0E-05	8.0E-05	na	4.5E-01	1.0E-03	nc	0.45
Vanadium	0.50	1.4E-02	3.1E-05	na	5.0E-03	1.3E-04	na	2.7E+00	2.4E-01	nc	3.0
Zinc	0.88	2.4E-02	3.3E-05	na	3.0E-01	3.0E-01	na	8.1E-02	1.1E-04	nc	0.081
VOCs											
1,2-Dibromoethane	0.0010	2.7E-05	1.0E-06	1.8E-06	9.0E-03	9.0E-03	9.0E-03	3.0E-03	1.2E-04	7.0E-04	0.0039
Benzene	0.0010	2.7E-05	2.8E-06	1.5E-05	4.0E-03	4.0E-03	3.0E-02	6.8E-03	6.9E-04	1.8E-03	0.0093
Toluene	0.033	9.2E-04	2.1E-04	6.0E-04	8.0E-02	8.0E-02	5.0E+00	1.1E-02	2.6E-03	4.2E-04	0.014
POLYNUCLEAR AROMATIC HYDROCARBONS											
2-Methylnaphthalene	0.46	1.3E-02	1.2E-02	6.5E-04	4.0E-03	4.0E-03	na	3.2E+00	3.0E+00	nc	6.1
Naphthalene	0.033	9.1E-04	3.9E-04	4.0E-05	2.0E-02	2.0E-02	3.0E-03	4.5E-02	2.0E-02	4.7E-02	0.11
										HI	60

TABLE F-40
NONCANCER HAZARD CALCULATIONS FOR A FUTURE SITE WORKER
SS08 - GROUNDWATER
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Groundwater Concentration ^a (mg/L)	Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Reference Dose (mg/kg-d)		RfC (mg/m3)	Pathway-Specific Hazard			Chemical- Specific HQ
					Oral	Dermal		Inhalation	Ingestion	Dermal	
PETROLEUM HYDROCARBONS											
Diesel Range Organics (DRO)	36	na	na	na	na	na	na	nc	nc	nc	nc
Diesel Range Organics (DRO), Aliphatic	29	7.9E-01	na	na	1.0E-01	na	1.0E+00	7.9E+00	nc	nc	7.9
Diesel Range Organics (DRO), Aromatic	14	3.9E-01	na	na	4.0E-02	na	2.0E-01	9.8E+00	nc	nc	9.8
										HI	18

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

- 1) Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI	Hazard index.
HQ	Hazard quotient.
Inc	Incomplete pathway.
mg/kg-d	Milligrams per kilogram per day.
mg/L	Milligrams per liter.
mg/m3	Milligram per cubic meter.
na	Not applicable.
nc	Not calculated
RfC	Reference Concentration
SVOCs	Semi-volatile organic compounds.
VOCs	Volatile organic compounds.

TABLE F-41
CANCER CALCULATION FOR A CURRENT/FUTURE SITE WORKER/RECREATIONAL HUNTER
SS08 - SURFACE SOIL (0-2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Soil Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor (mg/kg- URF (ug/m3)-1)						Pathway-Specific Cancer Risk				Chemical-Specific Risk	
						d)-1			1			Soil		Dust			VOC
						Oral	Dermal	Inhalation	Ingestion	Dermal	Inhalation	Inhalation	Inhalation				
INORGANICS																	
Arsenic	19	7.3E-06	8.8E-07	1.1E-09	na	1.5E+00	I	1.5E+00	R	4.3E-03	I	1.1E-05	1.3E-06	1.7E-08	na	1.2E-05	
Cobalt	22	8.1E-06	3.3E-07	1.3E-09	na	na		na		9.0E-03	P	na	na	3.9E-08	na	3.9E-08	
VOCs																	
Trichloroethene	0.10	3.8E-08	na	na	2.3E-06	1.3E-02	C	1.3E-02	R	2.0E-06	C	4.9E-10	na	na	1.6E-08	1.7E-08	
SVOCs																	
3-Nitroaniline	0.090	3.4E-08	1.4E-08	5.2E-12	na	2.1E-02	P	2.1E-02	R	na		7.1E-10	2.8E-10	na	na	1.0E-09	
POLYNUCLEAR AROMATIC HYDROCARBONS																	
Benzo(a)pyrene	0.080	3.0E-08	1.6E-08	4.6E-12	na	7.3E+00	I	7.3E+00	R	1.1E-03	C	2.2E-07	1.1E-07	1.8E-11	na	3.3E-07	
PESTICIDES																	
4,4'-DDT	3.8	1.4E-06	1.7E-07	2.2E-10	na	3.4E-01	I	3.4E-01	I	9.7E-05	I	4.9E-07	5.9E-08	7.6E-11	na	5.5E-07	
POLYCHLORINATED BIPHENYLS																	
Arochlor 1260	12	4.3E-06	2.4E-06	6.7E-10	na	2.0E+00	I	2.0E+00	R	1.0E-04	I	8.7E-06	4.9E-06	2.3E-10	na	1.4E-05	
															ILCR	3E-05	

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
URF Unit risk factor

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

TABLE F-42
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE SITE WORKER/RECREATIONAL HUNTER
SS08 - SURFACE SOIL (0-2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m ³ /kg-d)	Reference Dose ^b		(mg/kg-d)	RFC (mg/m ³) ^b	Pathway-Specific Hazard				Chemical-Specific HQ
						Oral	Dermal			Soil Ingestion	Dermal	Dust Inhalation	VOC Inhalation	
INORGANICS														
Aluminum	28655	3.0E-02	1.2E-03	4.7E-06	na	1.0E+00	1.0E+00	4.9E-03	3.0E-02	1.2E-03	3.3E-03	nc	0.035	
Arsenic	19	2.1E-05	2.5E-06	3.2E-09	na	3.0E-04	3.0E-04	3.0E-05	6.8E-02	8.2E-03	3.7E-04	nc	0.077	
Chromium	54	5.7E-05	2.3E-06	8.8E-09	na	1.5E+00	2.0E-02	na	3.8E-05	1.2E-04	nc	nc	0.00016	
Cobalt	22	2.3E-05	9.1E-07	3.5E-09	na	3.0E-04	3.0E-04	6.0E-06	7.6E-02	3.0E-03	2.0E-03	nc	0.081	
Manganese	1030	1.1E-03	4.3E-05	1.7E-07	na	2.4E-02	9.6E-04	5.0E-05	4.5E-02	4.5E-02	1.2E-02	nc	0.10	
Vanadium	83	8.8E-05	3.5E-06	1.4E-08	na	5.0E-03	1.3E-04	na	1.8E-02	2.7E-02	nc	nc	0.044	
VOCs														
1,3,5-Trimethylbenzene	4.6	4.9E-06	na	na	9.5E-05	5.0E-02	5.0E-02	6.0E-03	9.7E-05	nc	nc	5.6E-02	0.056	
SVOCs														
2-Nitroaniline	0.060	6.3E-08	2.5E-08	9.8E-12	na	3.0E-03	3.0E-03	3.0E-05	2.1E-05	8.4E-06	1.1E-06	nc	0.000031	
3-Nitroaniline	0.090	9.5E-08	3.8E-08	1.5E-11	na	3.0E-04	3.0E-04	1.0E-03	3.2E-04	1.3E-04	5.1E-08	nc	0.00044	
PESTICIDES														
4,4'-DDT	3.8	4.0E-06	4.8E-07	6.2E-10	na	5.0E-04	5.0E-04	na	8.1E-03	9.7E-04	nc	nc	0.0091	
													HI	0.4

Notes:

- ^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.
- ^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.
- 1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI Hazard index.
 HQ Hazard quotient.
 mg/kg Milligrams per kilogram.
 mg/kg-d Milligrams per kilogram per day.
 na Not available.
 nc Not calculated.
 RfC Reference concentration

TABLE F-43
CANCER CALCULATION FOR A CURRENT/FUTURE SITE WORKER/RECREATIONAL HUNTER
SS08 - SUBSURFACE SOIL (>2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Soil Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor (mg/kg- URF (ug/m3)-1)						Pathway-Specific Cancer Risk				Chemical- Specific Risk
						d)-1		1		Soil		Dust		VOC		
						Oral	Dermal	Inhalation		Ingestion	Dermal	Inhalation	Inhalation			
INORGANICS																
Arsenic	16	6.2E-06	7.4E-07	9.5E-10	na	1.5E+00	I	1.5E+00	R	4.3E-03	I	9.2E-06	1.1E-06	1.4E-08	na	1.0E-05
Cobalt	26	9.9E-06	3.9E-07	1.5E-09	na	na		na		9.0E-03	P	na	na	4.8E-08	na	4.8E-08
POLYNUCLEAR AROMATIC HYDROCARBONS																
Benzo(a)pyrene	0.057	2.2E-08	1.1E-08	3.3E-12	na	7.3E+00	I	7.3E+00	R	1.1E-03	C	1.6E-07	8.1E-08	1.3E-11	na	2.4E-07
PESTICIDES																
Dieldrin	0.040	1.5E-08	6.0E-09	2.3E-12	na	1.6E-01	I	1.6E-01	R	4.6E-03		2.4E-09	9.6E-10	3.7E-11	na	3.4E-09
POLYCHLORINATED BIPHENYLS																
Arochlor 1260	1.6	6.2E-07	3.4E-07	9.5E-11	na	2.0E+00	I	2.0E+00	R	1.0E-04	I	1.2E-06	6.9E-07	3.3E-11	na	1.9E-06
															ILCR	1E-05

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
URF Unit risk factor

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

TABLE F-44
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE SITE WORKER/RECREATIONAL HUNTER
SS08 - SUBSURFACE SOIL (>2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m ³ /kg-d)	Reference Dose		(mg/kg-d) b	RFC (mg/m3) b	Pathway-Specific Hazard				Chemical-Specific HQ
						Oral	Dermal			Soil Ingestion	Dust Inhalation	VOC Inhalation		
INORGANICS														
Aluminum	29175	3.1E-02	1.2E-03	4.7E-06	na	1.0E+00	1.0E+00	4.9E-03	3.1E-02	1.2E-03	3.4E-03	nc	0.035	
Arsenic	16	1.7E-05	2.1E-06	2.7E-09	na	3.0E-04	3.0E-04	3.0E-05	5.7E-02	6.9E-03	3.1E-04	nc	0.065	
Chromium	52	5.5E-05	2.2E-06	8.5E-09	na	1.5E+00	2.0E-02	na	3.7E-05	1.1E-04	nc	nc	0.00015	
Cobalt	26	2.8E-05	1.1E-06	4.3E-09	na	3.0E-04	3.0E-04	6.0E-06	9.2E-02	3.7E-03	2.5E-03	nc	0.099	
Manganese	949	1.0E-03	4.0E-05	1.5E-07	na	2.4E-02	9.6E-04	5.0E-05	4.2E-02	4.2E-02	1.1E-02	nc	0.094	
Vanadium	80	8.4E-05	3.4E-06	1.3E-08	na	5.0E-03	1.3E-04	na	1.7E-02	2.6E-02	nc	nc	0.043	
PESTICIDES														
Dieldrin	0.040	4.2E-08	1.7E-08	6.5E-12	na	5.0E-05	5.0E-05	na	8.5E-04	3.4E-04	nc	nc	0.0012	
													HI	0.3
PETROLEUM HYDROCARBONS														
Diesel Range Organics (DRO)	12310	na	na	na	na	na	na	na	nc	nc	nc	nc	nc	
Diesel Range Organics (DRO), Aliphatic	9848	1.0E-02	na	1.6E-06	na	1.0E-01	na	1.0E+00	1.0E-01	nc	5.6E-06	nc	0.10	
Diesel Range Organics (DRO), Aromatic	4924	5.2E-03	na	8.0E-07	na	4.0E-02	na	2.0E-01	1.3E-01	nc	1.4E-05	nc	0.13	
Residual Range Organics (RRO)	8973	na	na	na	na	na	na	na	nc	nc	nc	nc	nc	
Residual Range Organics (RRO), Aliphatic	8076	8.5E-03	na	1.3E-06	na	2.0E+00	na	na	4.3E-03	nc	nc	nc	0.004	
Residual Range Organics (RRO), Aromatic	2692	2.8E-03	na	4.4E-07	na	3.0E-02	na	na	9.5E-02	nc	nc	nc	0.095	
													HI	0.3

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.

1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI	Hazard index.
HQ	Hazard quotient.
mg/kg	Milligrams per kilogram.
mg/kd-d	Milligrams per kilogram per day.
na	Not available.
nc	Not calculated.
RfC	Reference concentration

TABLE F-45
CANCER CALCULATION FOR A CURRENT/FUTURE SITE WORKER/RECREATIONAL HUNTER
SS08 - SEDIMENT
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Sediment Concentration ^a (mg/kg)	Sediment Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor (mg/kg- URF			(ug/m3) 1	Pathway-Specific Cancer Risk				Chemical- Specific Risk
						d)-1	1	Sediment		Dust	VOC			
												Oral	Dermal	
INORGANICS														
Arsenic	21	7.9E-06	9.5E-07	1.2E-09	na	1.5	1.5	0.0043	1.2E-05	1.4E-06	1.8E-08	na	1.3E-05	
Cobalt	32	1.2E-05	4.7E-07	1.8E-09	na	na	na	0.009	na	na	5.8E-08	na	5.8E-08	
POLYNUCLEAR AROMATIC HYDROCARBONS														
Benzo(a)pyrene	0	2.4E-08	1.2E-08	3.7E-12	na	7.3E+00	7.3E+00	0.0011	1.7E-07	9.0E-08	1.4E-11	na	2.6E-07	
PESTICIDES														
4,4'-DDT	2	7.5E-07	9.0E-08	1.2E-10	na	3.4E-01	3.4E-01	9.71429E-05	2.6E-07	3.1E-08	3.9E-11	na	2.9E-07	
POLYCHLORINATED BIPHENYLS														
Arochlor 1260	0	6.3E-08	3.5E-08	9.8E-12	na	2.0E+00	2.0E+00	0.0001	1.3E-07	7.1E-08	3.4E-12	na	2.0E-07	
												ILCR	1E-05	

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
URF Unit risk factor

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

TABLE F-46
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE SITE WORKER/RECREATIONAL HUNTER
SS08 - SEDIMENT
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Sediment Concentration ^a (mg/kg)	Sediment Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m ³ /kg-d)	Reference Dose d) b		(mg/kg- Inhalation	RFC (mg/m3) b	Pathway-Specific Hazard				Chemical- Specific HQ
						Oral	Dermal			Soil	Dust	VOC		
						Ingestion	Dermal	Inhalation	Inhalation					
INORGANICS														
Aluminum	35000	3.7E-02	1.5E-03	5.7E-06	na	1.0E+00	1.0E+00	4.9E-03	3.7E-02	1.5E-03	4.1E-03	nc	0.043	
Arsenic	21	2.2E-05	2.6E-06	3.4E-09	na	3.0E-04	3.0E-04	3.0E-05	7.4E-02	8.8E-03	4.0E-04	nc	0.083	
Chromium	62	6.5E-05	2.6E-06	1.0E-08	na	1.5E+00	2.0E-02	na	4.4E-05	1.3E-04	nc	nc	0.00018	
Cobalt	32	3.3E-05	1.3E-06	5.1E-09	na	3.0E-04	3.0E-04	6.0E-06	1.1E-01	4.4E-03	3.0E-03	nc	0.12	
Manganese	1300	1.4E-03	5.5E-05	2.1E-07	na	2.4E-02	9.6E-04	5.0E-05	5.7E-02	5.7E-02	1.5E-02	nc	0.13	
Vanadium	106	1.1E-04	4.5E-06	1.7E-08	na	5.0E-03	1.3E-04	na	2.2E-02	3.4E-02	nc	nc	0.057	
PESTICIDES														
4,4'-DDT	2.0	2.1E-06	2.5E-07	3.2E-10	na	5.0E-04	5.0E-04	na	4.2E-03	5.0E-04	nc	nc	0.0047	
												HI	0.4	

Notes:

- ^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.
- ^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.
- 1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI Hazard index.
HQ Hazard quotient.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
nc Not calculated.
RfC Reference concentration

TABLE F-47
CANCER RISK CALCULATIONS FOR A FUTURE SITE WORKER/RECREATIONAL HUNTER
SS08 - GROUNDWATER
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Groundwater Concentration ^a (mg/L)	Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor		URF (ug/m3)-1	Pathway-Specific Cancer Risk			Chemical- Specific Risk
					(mg/kg-d)-1			Ingestion	Dermal	Inhalation	
					Oral	Dermal					
INORGANICS											
Arsenic	0.082	8.0E-04	1.8E-06	na	1.5E+00	1.5E+00	4.3E-03	1.2E-03	2.7E-06	nc	1.2E-03
VOCs											
1,2-Dibromoethane	0.0010	9.8E-06	3.7E-07	6.4E-07	2.0E+00	2.0E+00	6.0E-04	2.0E-05	7.4E-07	1.4E-06	2.2E-05
Benzene	0.0010	9.8E-06	9.8E-07	5.5E-06	5.5E-02	5.5E-02	7.8E-06	5.4E-07	5.4E-08	1.5E-07	7.4E-07
POLYNUCLEAR AROMATIC HYDROCARBONS											
Naphthalene	0.033	3.2E-04	1.4E-04	1.4E-09	na	na	3.4E-05	na	na	1.6E-10	1.6E-10
										ILCR	1E-03

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

ILCR	Incremental lifetime cancer risk.
Inc	Incomplete pathway.
mg/kg-d	Milligrams per kilogram per day.
mg/L	Milligrams per liter.
na	Not available.
nc	Not calculated.
VOCs	Volatile organic compounds.
SVOCs	Semi-volatile organic compounds.
ug/m3	Microgram per cubic meter.
URF	Unit Risk Factor

TABLE F-48
NONCANCER HAZARD CALCULATIONS FOR A FUTURESITE WORKER/RECREATIONAL HUNTER
SS08 - GROUNDWATER
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Groundwater Concentration ^a (mg/L)	Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Reference Dose (mg/kg-d)		RfC (mg/m3)	Pathway-Specific Hazard			Chemical- Specific HQ
					Oral	Dermal		Ingestion	Dermal	Inhalation	
INORGANICS											
Aluminum	176	4.8E+00	1.1E-02	na	1.0E+00	1.0E+00	4.9E-03	4.8E+00	1.1E-02	nc	4.8
Antimony	0.0030	8.2E-05	1.8E-07	na	4.0E-04	6.0E-05	na	2.1E-01	3.1E-03	nc	0.21
Arsenic	0.082	2.2E-03	5.0E-06	na	3.0E-04	3.0E-04	3.0E-05	7.5E+00	1.7E-02	nc	7.5
Barium	0.53	1.4E-02	3.2E-05	na	2.0E-01	1.4E-02	4.9E-04	7.2E-02	2.3E-03	nc	0.074
Beryllium	0.0068	1.9E-04	4.2E-07	na	2.0E-03	1.4E-05	2.0E-05	9.3E-02	3.0E-02	nc	0.12
Cadmium	0.0024	6.7E-05	1.5E-07	na	5.0E-04	2.5E-05	na	1.3E-01	6.0E-03	nc	0.14
Chromium	0.13	3.5E-03	7.9E-06	na	1.5E+00	2.0E-02	na	2.3E-03	4.0E-04	nc	0.0027
Cobalt	0.19	5.2E-03	1.2E-05	na	3.0E-04	3.0E-04	6.0E-06	1.7E+01	3.9E-02	nc	17
Copper	0.51	1.4E-02	3.1E-05	na	4.0E-02	4.0E-02	na	3.5E-01	7.8E-04	nc	0.35
Manganese	16	4.3E-01	9.7E-04	na	2.4E-02	9.6E-04	5.0E-05	1.8E+01	1.0E+00	nc	19
Mercury	0.00024	6.6E-06	1.5E-08	na	3.0E-04	2.1E-05	3.0E-04	2.2E-02	7.1E-04	nc	0.023
Nickel	0.45	1.2E-02	5.6E-06	na	2.0E-02	8.0E-04	na	6.2E-01	7.0E-03	nc	0.62
Selenium	0.013	3.6E-04	8.0E-07	na	5.0E-03	1.5E-03	na	7.1E-02	5.3E-04	nc	0.072
Thallium	0.0013	3.6E-05	8.0E-08	na	8.0E-05	8.0E-05	na	4.5E-01	1.0E-03	nc	0.45
Vanadium	0.50	1.4E-02	3.1E-05	na	5.0E-03	1.3E-04	na	2.7E+00	2.4E-01	nc	3.0
Zinc	0.88	2.4E-02	3.3E-05	na	3.0E-01	3.0E-01	na	8.1E-02	1.1E-04	nc	0.081
VOCs											
1,2-Dibromoethane	0.0010	2.7E-05	1.0E-06	1.8E-06	9.0E-03	9.0E-03	9.0E-03	3.0E-03	1.2E-04	7.0E-04	0.0039
Benzene	0.0010	2.7E-05	2.8E-06	1.5E-05	4.0E-03	4.0E-03	3.0E-02	6.8E-03	6.9E-04	1.8E-03	0.0093
Toluene	0.033	9.2E-04	2.1E-04	6.0E-04	8.0E-02	8.0E-02	5.0E+00	1.1E-02	2.6E-03	4.2E-04	0.014
POLYNUCLEAR AROMATIC HYDROCARBONS											
2-Methylnaphthalene	0.46	1.3E-02	1.2E-02	6.5E-04	4.0E-03	4.0E-03	na	3.2E+00	3.0E+00	nc	6.1
Naphthalene	0.033	9.1E-04	3.9E-04	4.0E-05	2.0E-02	2.0E-02	3.0E-03	4.5E-02	2.0E-02	4.7E-02	0.11
										HI	60

TABLE F-48
NONCANCER HAZARD CALCULATIONS FOR A FUTURESITE WORKER/RECREATIONAL HUNTER
SS08 - GROUNDWATER
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Groundwater Concentration ^a (mg/L)	Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Reference Dose (mg/kg-d)		RfC (mg/m3)	Pathway-Specific Hazard			Chemical- Specific HQ
					Oral	Dermal		Inhalation	Ingestion	Dermal	
PETROLEUM HYDROCARBONS											
Diesel Range Organics (DRO)	36	na	na	na	na	na	na	nc	nc	nc	nc
Diesel Range Organics (DRO), Aliphatic	29	7.9E-01	na	na	1.0E-01	na	1.0E+00	7.9E+00	nc	nc	7.9
Diesel Range Organics (DRO), Aromatic	14	3.9E-01	na	na	4.0E-02	na	2.0E-01	9.8E+00	nc	nc	9.8
										HI	18

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

- 1) Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI	Hazard index.
HQ	Hazard quotient.
Inc	Incomplete pathway.
mg/kg-d	Milligrams per kilogram per day.
mg/L	Milligrams per liter.
mg/m3	Milligram per cubic meter.
na	Not applicable.
nc	Not calculated
RfC	Reference Concentration
SVOCs	Semi-volatile organic compounds.
VOCs	Volatile organic compounds.

TABLE F-49
CANCER CALCULATION FOR A CURRENT/FUTURE TRENCH WORKER
SS08 - SURFACE SOIL (0-2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Soil Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor (mg/kg- URF d)-1						Pathway-Specific Cancer Risk				Chemical-Specific Risk
						(ug/m3)			Soil	Dust	VOC					
						Oral	Dermal	Inhalation				Ingestion	Dermal	Inhalation	Inhalation	
INORGANICS																
Arsenic	19	2.7E-07	5.4E-08	4.2E-11	na	1.5E+00	I	1.5E+00	R	4.3E-03	I	4.1E-07	8.1E-08	6.3E-10	na	4.9E-07
Cobalt	22	3.0E-07	2.0E-08	4.6E-11	na	na		na		9.0E-03	P	na	na	1.5E-09	na	1.5E-09
VOCs																
Trichloroethene	0.10	1.4E-09	na	na	8.5E-08	1.3E-02	C	1.3E-02	R	2.0E-06	C	1.8E-11	na	na	6.0E-10	6.1E-10
SVOCs																
3-Nitroaniline	0.090	1.3E-09	8.3E-10	1.9E-13	na	2.1E-02	P	2.1E-02	R	na		2.6E-11	1.7E-11	na	na	4.4E-11
POLYNUCLEAR AROMATIC HYDROCARBONS																
Benzo(a)pyrene	0.080	1.1E-09	9.6E-10	1.7E-13	na	7.3E+00	I	7.3E+00	R	1.1E-03	C	8.2E-09	7.0E-09	6.6E-13	na	1.5E-08
PESTICIDES																
4,4'-DDT	3.8	5.4E-08	1.1E-08	8.2E-12	na	3.4E-01	I	3.4E-01	I	9.7E-05	I	1.8E-08	3.6E-09	2.8E-12	na	2.2E-08
POLYCHLORINATED BIPHENYLS																
Arochlor 1260	12	1.6E-07	1.5E-07	2.5E-11	na	2.0E+00	I	2.0E+00	R	1.0E-04	I	3.2E-07	3.0E-07	8.7E-12	na	6.2E-07
															ILCR	1E-06

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
URF Unit risk factor

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

TABLE F-50
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE TRENCH WORKER
SS08 - SURFACE SOIL (0-2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m ³ /kg-d)	Reference Dose d) b		(mg/kg- d) b	RFC (mg/m3) b	Pathway-Specific Hazard				Chemical- Specific HQ
						Oral	Dermal			Soil	Dust	VOC		
													Ingestion	
INORGANICS														
Aluminum	28655	2.8E-02	1.9E-03	4.3E-06	na	1.0E+00	1.0E+00	4.9E-03	2.8E-02	1.9E-03	3.1E-03	nc	0.033	
Arsenic	19	1.9E-05	3.8E-06	2.9E-09	na	3.0E-04	3.0E-04	3.0E-05	6.3E-02	1.3E-02	3.4E-04	nc	0.076	
Chromium	54	5.3E-05	3.5E-06	8.2E-09	na	1.5E+00	2.0E-02	na	3.5E-05	1.8E-04	nc	nc	0.00022	
Cobalt	22	2.1E-05	1.4E-06	3.3E-09	na	3.0E-04	3.0E-04	6.0E-06	7.0E-02	4.6E-03	1.9E-03	nc	0.077	
Manganese	1030	1.0E-03	6.7E-05	1.6E-07	na	2.4E-02	9.6E-04	5.0E-05	4.2E-02	6.9E-02	1.1E-02	nc	0.12	
Vanadium	83	8.1E-05	5.4E-06	1.3E-08	na	5.0E-03	1.3E-04	na	1.6E-02	4.1E-02	nc	nc	0.058	
VOCs														
1,3,5-Trimethylbenzene	4.6	4.5E-06	na	na	8.8E-05	5.0E-02	5.0E-02	6.0E-03	9.0E-05	nc	nc	5.2E-02	0.052	
SVOCs														
2-Nitroaniline	0.060	5.9E-08	3.9E-08	9.0E-12	na	3.0E-03	3.0E-03	3.0E-05	2.0E-05	1.3E-05	1.1E-06	nc	0.000034	
3-Nitroaniline	0.090	8.8E-08	5.8E-08	1.4E-11	na	3.0E-04	3.0E-04	1.0E-03	2.9E-04	1.9E-04	4.7E-08	nc	0.00049	
PESTICIDES														
4,4'-DDT	3.8	3.7E-06	7.4E-07	5.8E-10	na	5.0E-04	5.0E-04	na	7.5E-03	1.5E-03	nc	nc	0.0090	
													HI	0.4

Notes:

- ^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.
- ^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.
- 1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI Hazard index.
HQ Hazard quotient.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
nc Not calculated.
RfC Reference concentration

TABLE F-51
CANCER CALCULATION FOR A CURRENT/FUTURE TRENCH WORKER
SS08 - SUBSURFACE SOIL (>2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Soil Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor (mg/kg- URF (ug/m3)-1)						Pathway-Specific Cancer Risk				Chemical- Specific Risk	
						d)-1			1	Soil		Dust		VOC			
						Oral	Dermal	Inhalation	Ingestion	Dermal	Inhalation	Inhalation					
INORGANICS																	
Arsenic	16	2.3E-07	4.5E-08	3.5E-11	na	1.5	I	1.5	R	0.0043	I	3.4E-07	6.8E-08	5.3E-10	na	4.1E-07	
Cobalt	26	3.7E-07	2.4E-08	5.6E-11	na	na		na		0.009	P	na	na	1.8E-09	na	1.8E-09	
POLYNUCLEAR AROMATIC HYDROCARBONS																	
Benzo(a)pyrene	0.057	8.0E-10	6.8E-10	1.2E-13	na	7.3E+00	I	7.3E+00	R	0.0011	C	5.8E-09	5.0E-09	4.7E-13	na	1.1E-08	
PESTICIDES																	
Dieldrin	0.040	5.6E-10	3.7E-10	8.6E-14	na	1.6E-01	I	1.6E-01	R	0.0046		8.9E-11	5.9E-11	1.4E-12	na	1.5E-10	
POLYCHLORINATED BIPHENYLS																	
Arochlor 1260	1.6	2.3E-08	2.1E-08	3.5E-12	na	2.0E+00	I	2.0E+00	R	0.0001	I	4.6E-08	4.2E-08	1.2E-12	na	8.8E-08	
															ILCR		5E-07

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
URF Unit risk factor

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

TABLE F-52
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE TRENCH WORKER
SS08 - SUBSURFACE SOIL (>2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m ³ /kg-d)	Reference Dose d) b		(mg/kg- d)	RFC (mg/m3) b	Pathway-Specific Hazard				Chemical- Specific HQ
						Oral	Dermal			Soil Ingestion	Dust Inhalation	VOC Inhalation		
INORGANICS														
Aluminum	29175	2.9E-02	1.9E-03	4.4E-06	na	1.0E+00	1.0E+00	4.9E-03	2.9E-02	1.9E-03	3.1E-03	nc	0.034	
Arsenic	16	1.6E-05	3.2E-06	2.5E-09	na	3.0E-04	3.0E-04	3.0E-05	5.3E-02	1.1E-02	2.9E-04	nc	0.064	
Chromium	52	5.1E-05	3.4E-06	7.9E-09	na	1.5E+00	2.0E-02	na	3.4E-05	1.7E-04	nc	nc	0.00021	
Cobalt	26	2.6E-05	1.7E-06	3.9E-09	na	3.0E-04	3.0E-04	6.0E-06	8.6E-02	5.6E-03	2.3E-03	nc	0.094	
Manganese	949	9.3E-04	6.1E-05	1.4E-07	na	2.4E-02	9.6E-04	5.0E-05	3.9E-02	6.4E-02	1.0E-02	nc	0.11	
Vanadium	80	7.8E-05	5.2E-06	1.2E-08	na	5.0E-03	1.3E-04	na	1.6E-02	4.0E-02	nc	nc	0.055	
PESTICIDES														
Dieldrin	0.040	3.9E-08	2.6E-08	6.0E-12	na	5.0E-05	5.0E-05	na	7.8E-04	5.2E-04	nc	nc	0.0013	
													HI	0.4
PETROLEUM HYDROCARBONS														
Diesel Range Organics (DRO)	12310	na	na	na	na	na	na	na	nc	nc	nc	nc	nc	
Diesel Range Organics (DRO), Aliphatic	9848	9.6E-03	na	1.5E-06	na	1.0E-01	na	1.0E+00	9.6E-02	nc	5.2E-06	nc	0.096	
Diesel Range Organics (DRO), Aromatic	4924	4.8E-03	na	7.4E-07	na	4.0E-02	na	2.0E-01	1.2E-01	nc	1.3E-05	nc	0.12	
Residual Range Organics (RRO)	8973	na	na	na	na	na	na	na	nc	nc	nc	nc	nc	
Residual Range Organics (RRO), Aliphatic	8076	7.9E-03	na	1.2E-06	na	2.0E+00	na	na	4.0E-03	nc	nc	nc	0.0040	
Residual Range Organics (RRO), Aromatic	2692	2.6E-03	na	4.1E-07	na	3.0E-02	na	na	8.8E-02	nc	nc	nc	0.088	
													HI	0.3

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.

1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI	Hazard index.
HQ	Hazard quotient.
mg/kg	Milligrams per kilogram.
mg/kd-d	Milligrams per kilogram per day.
na	Not available.
nc	Not calculated.
RfC	Reference concentration

TABLE F-53
CANCER CALCULATION FOR A CURRENT/FUTURE TRENCH WORKER
SS08 - SEDIMENT
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Sediment Concentration ^a (mg/kg)	Sediment Ingestion Dose (mg/kg-d)	Soil Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor (mg/kg- URF (ug/m3)-1)						Pathway-Specific Cancer Risk				Chemical- Specific Risk	
						d)-1			1			Soil		Dust			VOC
						Oral	Dermal	Inhalation	Ingestion	Dermal	Inhalation	Inhalation	Inhalation				
INORGANICS																	
Arsenic	21	2.9E-07	5.8E-08	4.5E-11	na	1.5E+00	I	1.5E+00	R	4.3E-03	I	4.4E-07	8.7E-08	6.8E-10	na	5.3E-07	
Cobalt	32	4.4E-07	2.9E-08	6.8E-11	na	na		na		9.0E-03	P	na	na	2.1E-09	na	2.1E-09	
POLYNUCLEAR AROMATIC HYDROCARBONS																	
Benzo(a)pyrene	0.063	8.8E-10	7.6E-10	1.4E-13	na	7.3E+00	I	7.3E+00	R	1.1E-03	C	6.5E-09	5.5E-09	5.2E-13	na	1.2E-08	
PESTICIDES																	
4,4'-DDT	2.0	2.8E-08	5.5E-09	4.3E-12	na	3.4E-01	I	3.4E-01	I	9.7E-05	I	9.5E-09	1.9E-09	1.5E-12	na	1.1E-08	
POLYCHLORINATED BIPHENYLS																	
Arochlor 1260	0.17	2.3E-09	2.2E-09	3.6E-13	na	2.0E+00	I	2.0E+00	R	1.0E-04	I	4.7E-09	4.3E-09	1.3E-13	na	9.0E-09	
															ILCR		6E-07

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
URF Unit risk factor

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

TABLE F-54
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE TRENCH WORKER
SS08 - SEDIMENT
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Sediment Concentration ^a (mg/kg)	Sediment Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m ³ /kg-d)	Reference Dose d) b		(mg/kg- Inhalation	RFC (mg/m3) b	Pathway-Specific Hazard				Chemical- Specific HQ
						Oral	Dermal			Soil	Dust	VOC		
						Oral	Dermal	Inhalation	Ingestion	Dermal	Inhalation	Inhalation		
INORGANICS														
Aluminum	35000	3.4E-02	2.3E-03	5.3E-06	na	1.0E+00	1.0E+00	4.9E-03	3.4E-02	2.3E-03	3.8E-03	nc	0.040	
Arsenic	21	2.0E-05	4.1E-06	3.1E-09	na	3.0E-04	3.0E-04	3.0E-05	6.8E-02	1.4E-02	3.7E-04	nc	0.082	
Chromium	62	6.1E-05	4.0E-06	9.3E-09	na	1.5E+00	2.0E-02	na	4.0E-05	2.0E-04	nc	nc	0.00025	
Cobalt	32	3.1E-05	2.0E-06	4.7E-09	na	3.0E-04	3.0E-04	6.0E-06	1.0E-01	6.8E-03	2.8E-03	nc	0.11	
Manganese	1300	1.3E-03	8.4E-05	2.0E-07	na	2.4E-02	9.6E-04	5.0E-05	5.3E-02	8.7E-02	1.4E-02	nc	0.15	
Vanadium	106	1.0E-04	6.8E-06	1.6E-08	na	5.0E-03	1.3E-04	na	2.1E-02	5.3E-02	nc	nc	0.073	
PESTICIDES														
4,4'-DDT	2.0	1.9E-06	3.9E-07	3.0E-10	na	5.0E-04	5.0E-04	na	3.9E-03	7.7E-04	nc	nc	0.0047	
												HI	0.5	

Notes:

- ^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.
- ^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.
- 1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI Hazard index.
HQ Hazard quotient.
mg/kg Milligrams per kilogram.
mg/kg-d-d Milligrams per kilogram per day.
na Not available.
nc Not calculated.
RfC Reference concentration

TABLE F-55
CANCER RISK CALCULATIONS FOR A FUTURE TRENCH WORKER
SS08 - GROUNDWATER
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Groundwater Concentration ^a (mg/L)	Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor		URF (ug/m3)-1	Pathway-Specific Cancer Risk			Chemical- Specific Risk
					(mg/kg-d)-1			Ingestion	Dermal	Inhalation	
					Oral	Dermal					
INORGANICS											
Arsenic	0.082	3.2E-05	7.2E-08	na	1.5E+00	1.5E+00	4.3E-03	4.8E-05	1.1E-07	nc	4.8E-05
VOCs											
1,2-Dibromoethane	0.0010	3.9E-07	1.5E-08	2.6E-08	2.0E+00	2.0E+00	6.0E-04	7.8E-07	3.0E-08	5.4E-08	8.7E-07
Benzene	0.0010	3.9E-07	3.9E-08	2.2E-07	5.5E-02	5.5E-02	7.8E-06	2.2E-08	2.2E-09	6.0E-09	3.0E-08
POLYNUCLEAR AROMATIC HYDROCARBONS											
Naphthalene	0.033	1.3E-05	5.6E-06	5.7E-07	na	na	3.4E-05	na	na	6.8E-08	6.8E-08
										ILCR	5E-05

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

ILCR	Incremental lifetime cancer risk.
Inc	Incomplete pathway.
mg/kg-d	Milligrams per kilogram per day.
mg/L	Milligrams per liter.
na	Not available.
nc	Not calculated.
VOCs	Volatile organic compounds.
SVOCs	Semi-volatile organic compounds.
ug/m3	Microgram per cubic meter.
URF	Unit Risk Factor

TABLE F-56
NONCANCER HAZARD CALCULATIONS FOR A FUTURE TRENCH WORKER
SS08 - GROUNDWATER
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Groundwater Concentration ^a (mg/L)	Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Reference Dose (mg/kg-d)		RfC (mg/m3)	Pathway-Specific Hazard			Chemical- Specific HQ
					Oral	Dermal		Ingestion	Dermal	Inhalation	
INORGANICS											
Aluminum	176	4.8E+00	1.1E-02	na	1.0E+00	1.0E+00	4.9E-03	4.8E+00	1.1E-02	nc	4.8
Antimony	0.0030	8.2E-05	1.8E-07	na	4.0E-04	6.0E-05	na	2.1E-01	3.1E-03	nc	0.21
Arsenic	0.082	2.2E-03	5.0E-06	na	3.0E-04	3.0E-04	3.0E-05	7.5E+00	1.7E-02	nc	7.5
Barium	0.53	1.4E-02	3.2E-05	na	2.0E-01	1.4E-02	4.9E-04	7.2E-02	2.3E-03	nc	0.074
Beryllium	0.0068	1.9E-04	4.2E-07	na	2.0E-03	1.4E-05	2.0E-05	9.3E-02	3.0E-02	nc	0.12
Cadmium	0.0024	6.7E-05	1.5E-07	na	5.0E-04	2.5E-05	na	1.3E-01	6.0E-03	nc	0.14
Chromium	0.13	3.5E-03	7.9E-06	na	1.5E+00	2.0E-02	na	2.3E-03	4.0E-04	nc	0.0027
Cobalt	0.19	5.2E-03	1.2E-05	na	3.0E-04	3.0E-04	6.0E-06	1.7E+01	3.9E-02	nc	17
Copper	0.51	1.4E-02	3.1E-05	na	4.0E-02	4.0E-02	na	3.5E-01	7.8E-04	nc	0.35
Manganese	16	4.3E-01	9.7E-04	na	2.4E-02	9.6E-04	5.0E-05	1.8E+01	1.0E+00	nc	19
Mercury	0.00024	6.6E-06	1.5E-08	na	3.0E-04	2.1E-05	3.0E-04	2.2E-02	7.1E-04	nc	0.023
Nickel	0.45	1.2E-02	5.6E-06	na	2.0E-02	8.0E-04	na	6.2E-01	7.0E-03	nc	0.62
Selenium	0.013	3.6E-04	8.0E-07	na	5.0E-03	1.5E-03	na	7.1E-02	5.3E-04	nc	0.072
Thallium	0.0013	3.6E-05	8.0E-08	na	8.0E-05	8.0E-05	na	4.5E-01	1.0E-03	nc	0.45
Vanadium	0.50	1.4E-02	3.1E-05	na	5.0E-03	1.3E-04	na	2.7E+00	2.4E-01	nc	3.0
Zinc	0.88	2.4E-02	3.3E-05	na	3.0E-01	3.0E-01	na	8.1E-02	1.1E-04	nc	0.081
VOCs											
1,2-Dibromoethane	0.0010	2.7E-05	1.0E-06	1.8E-06	9.0E-03	9.0E-03	9.0E-03	3.0E-03	1.2E-04	7.0E-04	0.0039
Benzene	0.0010	2.7E-05	2.8E-06	1.5E-05	4.0E-03	4.0E-03	3.0E-02	6.8E-03	6.9E-04	1.8E-03	0.0093
Toluene	0.033	9.2E-04	2.1E-04	6.0E-04	8.0E-02	8.0E-02	5.0E+00	1.1E-02	2.6E-03	4.2E-04	0.014
POLYNUCLEAR AROMATIC HYDROCARBONS											
2-Methylnaphthalene	0.46	1.3E-02	1.2E-02	6.5E-04	4.0E-03	4.0E-03	na	3.2E+00	3.0E+00	nc	6.1
Naphthalene	0.033	9.1E-04	3.9E-04	4.0E-05	2.0E-02	2.0E-02	3.0E-03	4.5E-02	2.0E-02	4.7E-02	0.11
										HI	60

TABLE F-56
NONCANCER HAZARD CALCULATIONS FOR A FUTURE TRENCH WORKER
SS08 - GROUNDWATER
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Groundwater Concentration ^a (mg/L)	Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Reference Dose		RfC	Pathway-Specific Hazard			Chemical- Specific HQ
					(mg/kg-d)		(mg/m3)	Ingestion	Dermal	Inhalation	
					Oral	Dermal	Inhalation				
PETROLEUM HYDROCARBONS											
Diesel Range Organics (DRO)	36	na	na	na	na	na	na	nc	nc	nc	nc
Diesel Range Organics (DRO), Aliphatic	29	7.9E-01	na	na	1.0E-01	na	1.0E+00	7.9E+00	nc	nc	7.9
Diesel Range Organics (DRO), Aromatic	14	3.9E-01	na	na	4.0E-02	na	2.0E-01	9.8E+00	nc	nc	9.8
										HI	18

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

- 1) Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI	Hazard index.
HQ	Hazard quotient.
Inc	Incomplete pathway.
mg/kg-d	Milligrams per kilogram per day.
mg/L	Milligrams per liter.
mg/m3	Milligram per cubic meter.
na	Not applicable.
nc	Not calculated
RfC	Reference Concentration
SVOCs	Semi-volatile organic compounds.
VOCs	Volatile organic compounds.

TABLE F-57
CANCER CALCULATION FOR A CURRENT/FUTURE SITE VISITOR
SS08 - SURFACE SOIL (0-2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Soil Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor (mg/kg- URF d)-1						Pathway-Specific Cancer Risk				Chemical-Specific Risk
						(ug/m3)			Soil Ingestion	Dust Dermal	Dust Inhalation	VOC Inhalation				
						Oral	Dermal	Inhalation								
INORGANICS																
Arsenic	19	1.9E-07	7.5E-08	5.9E-11	na	1.5E+00	I	1.5E+00	R	4.3E-03	I	2.9E-07	1.1E-07	8.8E-10	na	4.0E-07
Cobalt	22	2.1E-07	2.8E-08	6.5E-11	na	na		na		9.0E-03	P	na	na	2.0E-09	na	2.0E-09
VOCs																
Trichloroethene	0.10	9.8E-10	na	na	1.2E-07	1.3E-02	C	1.3E-02	R	2.0E-06	C	1.3E-11	na	na	8.3E-10	8.5E-10
SVOCs																
3-Nitroaniline	0.090	8.8E-10	1.2E-09	2.7E-13	na	2.1E-02	P	2.1E-02	R	na		1.8E-11	2.4E-11	na	na	4.3E-11
POLYNUCLEAR AROMATIC HYDROCARBONS																
Benzo(a)pyrene	0.080	7.8E-10	1.3E-09	2.4E-13	na	7.3E+00	I	7.3E+00	R	1.1E-03	C	5.7E-09	9.8E-09	9.3E-13	na	1.6E-08
PESTICIDES																
4,4'-DDT	3.8	3.7E-08	1.5E-08	1.2E-11	na	3.4E-01	I	3.4E-01	I	9.7E-05	I	1.3E-08	5.0E-09	3.9E-12	na	1.8E-08
POLYCHLORINATED BIPHENYLS																
Arochlor 1260	12	1.1E-07	2.1E-07	3.5E-11	na	2.0E+00	I	2.0E+00	R	1.0E-04	I	2.3E-07	4.2E-07	1.2E-11	na	6.4E-07
															ILCR	1E-06

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
URF Unit risk factor

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

TABLE F-58
NONCANCER HAZARD CALCULATIONS FOR CURRENT/FUTURE A SITE VISITOR
SS08 - SURFACE SOIL (0-2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m ³ /kg-d)	Reference Dose d) b		(mg/kg- d)	RFC (mg/m3) b	Pathway-Specific Hazard				Chemical- Specific HQ
						Oral	Dermal			Soil Ingestion	Dust Inhalation	VOC Inhalation		
INORGANICS														
Aluminum	28655	7.9E-04	1.0E-04	2.4E-07	na	1.0E+00	1.0E+00		4.9E-03	7.9E-04	1.0E-04	1.7E-04	nc	0.0011
Arsenic	19	5.3E-07	2.1E-07	1.6E-10	na	3.0E-04	3.0E-04		3.0E-05	1.8E-03	7.0E-04	1.9E-05	nc	0.0025
Chromium	54	1.5E-06	2.0E-07	4.6E-10	na	1.5E+00	2.0E-02		na	9.9E-07	1.0E-05	nc	nc	0.000011
Cobalt	22	5.9E-07	7.8E-08	1.8E-10	na	3.0E-04	3.0E-04		6.0E-06	2.0E-03	2.6E-04	1.1E-04	nc	0.0023
Manganese	1030	2.8E-05	3.7E-06	8.7E-09	na	2.4E-02	9.6E-04		5.0E-05	1.2E-03	3.9E-03	6.1E-04	nc	0.0057
Vanadium	83	2.3E-06	3.0E-07	7.0E-10	na	5.0E-03	1.3E-04		na	4.6E-04	2.3E-03	nc	nc	0.0028
VOCs														
1,3,5-Trimethylbenzene	4.6	1.3E-07	na	na	4.9E-06	5.0E-02	5.0E-02		6.0E-03	2.5E-06	nc	nc	2.9E-03	0.0029
SVOCs														
2-Nitroaniline	0.060	1.6E-09	2.2E-09	5.1E-13	na	3.0E-03	3.0E-03		3.0E-05	5.5E-07	7.2E-07	5.9E-08	nc	0.0000013
3-Nitroaniline	0.090	2.5E-09	3.3E-09	7.6E-13	na	3.0E-04	3.0E-04		1.0E-03	8.2E-06	1.1E-05	2.7E-09	nc	0.000019
PESTICIDES														
4,4'-DDT	3.8	1.0E-07	4.2E-08	3.2E-11	na	5.0E-04	5.0E-04		na	2.1E-04	8.3E-05	nc	nc	0.00029
													HI	0.02

Notes:

- ^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.
- ^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.
- 1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI Hazard index.
HQ Hazard quotient.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
nc Not calculated.
RfC Reference concentration

TABLE F-59
CANCER CALCULATION FOR A CURRENT/FUTURE SITE VISITOR
SS08 - SUBSURFACE SOIL (>2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Soil Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor (mg/kg- URF						Pathway-Specific Cancer Risk						Chemical- Specific Risk	
						d)-1			1			Soil			Dust				VOC
						Oral	Dermal	Inhalation	Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation	Inhalation				
						Oral	Dermal	Inhalation	Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation	Inhalation				
INORGANICS																			
Arsenic	16	1.6E-07	6.3E-08	4.9E-11	na	1.5E+00	I	1.5E+00	R	4.3E-03	I	2.4E-07	9.5E-08	7.4E-10	na	3.3E-07			
Cobalt	26	2.6E-07	3.4E-08	7.9E-11	na	na		na		9.0E-03	P	na	na	2.5E-09	na	2.5E-09			
POLYNUCLEAR AROMATIC HYDROCARBONS																			
Benzo(a)pyrene	0.057	5.6E-10	9.6E-10	1.7E-13	na	7.3E+00	I	7.3E+00	R	1.1E-03	C	4.1E-09	7.0E-09	6.6E-13	na	1.1E-08			
PESTICIDES																			
Dieldrin	0.040	3.9E-10	5.2E-10	1.2E-13	na	1.6E-01	I	1.6E-01	R	4.6E-03		6.3E-11	8.3E-11	1.9E-12	na	1.5E-10			
POLYCHLORINATED BIPHENYLS																			
Arochlor 1260	1.6	1.6E-08	2.9E-08	4.9E-12	na	2.0E+00	I	2.0E+00	R	1.0E-04	I	3.2E-08	5.9E-08	1.7E-12	na	9.1E-08			
															ILCR		4E-07		

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
URF Unit risk factor

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

TABLE F-60
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE SITE VISITOR
SS08 - SUBSURFACE SOIL (>2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m ³ /kg-d)	Reference Dose		(mg/kg-d) b	RFC (mg/m3) b	Pathway-Specific Hazard				Chemical-Specific HQ
						Oral	Dermal			Soil Ingestion	Dust Inhalation	VOC Inhalation		
INORGANICS														
Aluminum	29175	8.0E-04	1.1E-04	2.5E-07	na	1.0E+00	1.0E+00	4.9E-03	8.0E-04	1.1E-04	1.8E-04	nc	0.0011	
Arsenic	16	4.5E-07	1.8E-07	1.4E-10	na	3.0E-04	3.0E-04	3.0E-05	1.5E-03	5.9E-04	1.6E-05	nc	0.0021	
Chromium	52	1.4E-06	1.9E-07	4.4E-10	na	1.5E+00	2.0E-02	na	9.6E-07	9.7E-06	nc	nc	0.000011	
Cobalt	26	7.2E-07	9.5E-08	2.2E-10	na	3.0E-04	3.0E-04	6.0E-06	2.4E-03	3.2E-04	1.3E-04	nc	0.0028	
Manganese	949	2.6E-05	3.4E-06	8.0E-09	na	2.4E-02	9.6E-04	5.0E-05	1.1E-03	3.6E-03	5.6E-04	nc	0.0052	
Vanadium	80	2.2E-06	2.9E-07	6.7E-10	na	5.0E-03	1.3E-04	na	4.4E-04	2.2E-03	nc	nc	0.0027	
PESTICIDES														
Dieldrin	0.040	1.1E-09	1.4E-09	3.4E-13	na	5.0E-05	5.0E-05	na	2.2E-05	2.9E-05	nc	nc	0.000051	
													HI	0.01
PETROLEUM HYDROCARBONS														
Diesel Range Organics (DRO)	12310	na	na	na	na	na	na	na	nc	nc	nc	nc	nc	
Diesel Range Organics (DRO), Aliphatic	9848	2.7E-04	na	8.3E-08	na	1.0E-01	na	1.0E+00	2.7E-03	nc	2.9E-07	nc	0.0027	
Diesel Range Organics (DRO), Aromatic	4924	1.3E-04	na	4.2E-08	na	4.0E-02	na	2.0E-01	3.4E-03	nc	7.3E-07	nc	0.0034	
Residual Range Organics (RRO)	8973	na	na	na	na	na	na	na	nc	nc	nc	nc	nc	
Residual Range Organics (RRO), Aliphatic	8076	2.2E-04	na	6.8E-08	na	2.0E+00	na	na	1.1E-04	nc	nc	nc	0.00011	
Residual Range Organics (RRO), Aromatic	2692	7.4E-05	na	2.3E-08	na	3.0E-02	na	na	2.5E-03	nc	nc	nc	0.0025	
													HI	0.009

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.

1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI	Hazard index.
HQ	Hazard quotient.
mg/kg	Milligrams per kilogram.
mg/kd-d	Milligrams per kilogram per day.
na	Not available.
nc	Not calculated.
RfC	Reference concentration

TABLE F-61
CANCER CALCULATION FOR A CURRENT/FUTURE SITE VISITOR
SS08 - SEDIMENT
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Sediment Concentration ^a (mg/kg)	Sediment Ingestion Dose (mg/kg-d)	Soil Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor (mg/kg- URF						Pathway-Specific Cancer Risk						Chemical- Specific Risk
						d)-1		1				Soil		Dust		VOC		
						Oral	Dermal	Inhalation	Ingestion	Dermal	Inhalation	Inhalation						
INORGANICS																		
Arsenic	21	2.0E-07	8.1E-08	6.3E-11	na	1.5E+00	I	1.5E+00	R	4.3E-03	I	3.1E-07	1.2E-07	9.5E-10	na	4.3E-07		
Cobalt	32	3.1E-07	4.1E-08	9.5E-11	na	na		na		9.0E-03	P	na	na	3.0E-09	na	3.0E-09		
POLYNUCLEAR AROMATIC HYDROCARBONS																		
Benzo(a)pyrene	0.063	6.2E-10	1.1E-09	1.9E-13	na	7.3E+00	I	7.3E+00	R	1.1E-03	C	4.5E-09	7.8E-09	7.3E-13	na	1.2E-08		
PESTICIDES																		
4,4'-DDT	2.0	1.9E-08	7.7E-09	6.0E-12	na	3.4E-01	I	3.4E-01	I	9.7E-05	I	6.6E-09	2.6E-09	2.0E-12	na	9.2E-09		
POLYCHLORINATED BIPHENYLS																		
Arochlor 1260	0.17	1.6E-09	3.0E-09	5.1E-13	na	2.0E+00	I	2.0E+00	R	1.0E-04	I	3.3E-09	6.1E-09	1.8E-13	na	9.4E-09		
															ILCR		5E-07	

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
URF Unit risk factor

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

TABLE F-62
NONCANCER HAZARD CALCULATIONS FOR CURRENT/FUTURE A SITE VISITOR
SS08 - SEDIMENT
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Sediment Concentration ^a (mg/kg)	Sediment Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m ³ /kg-d)	Reference Dose d) b		(mg/kg- Inhalation	RFC (mg/m3) b	Pathway-Specific Hazard				Chemical- Specific HQ
						Oral	Dermal			Soil	Dust	VOC		
						Oral	Dermal	Inhalation	Ingestion	Dermal	Inhalation	Inhalation		
INORGANICS														
Aluminum	35000	9.6E-04	1.3E-04	3.0E-07	na	1.0E+00	1.0E+00	4.9E-03	9.6E-04	1.3E-04	2.1E-04	nc	0.0013	
Arsenic	21	5.7E-07	2.3E-07	1.8E-10	na	3.0E-04	3.0E-04	3.0E-05	1.9E-03	7.6E-04	2.1E-05	nc	0.0027	
Chromium	62	1.7E-06	2.2E-07	5.2E-10	na	1.5E+00	2.0E-02	na	1.1E-06	1.1E-05	nc	nc	0.000013	
Cobalt	32	8.6E-07	1.1E-07	2.7E-10	na	3.0E-04	3.0E-04	6.0E-06	2.9E-03	3.8E-04	1.5E-04	nc	0.0034	
Manganese	1300	3.6E-05	4.7E-06	1.1E-08	na	2.4E-02	9.6E-04	5.0E-05	1.5E-03	4.9E-03	7.7E-04	nc	0.0071	
Vanadium	106	2.9E-06	3.8E-07	8.9E-10	na	5.0E-03	1.3E-04	na	5.8E-04	2.9E-03	nc	nc	0.0035	
PESTICIDES														
4,4'-DDT	2.0	5.5E-08	2.2E-08	1.7E-11	na	5.0E-04	5.0E-04	na	1.1E-04	4.3E-05	nc	nc	0.00015	
												HI	0.02	

Notes:

- ^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.
- ^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.
- 1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI Hazard index.
HQ Hazard quotient.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
nc Not calculated.
RfC Reference concentration

TABLE F-63
CANCER RISK CALCULATIONS FOR A FUTURE SITE VISITOR
SS08 - GROUNDWATER
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Groundwater Concentration ^a (mg/L)	Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor		URF (ug/m3)-1	Pathway-Specific Cancer Risk			Chemical- Specific Risk
					(mg/kg-d)-1			Ingestion	Dermal	Inhalation	
					Oral	Dermal					
INORGANICS											
Arsenic	0.082	3.2E-05	7.2E-08	na	1.5E+00	1.5E+00	4.3E-03	4.8E-05	1.1E-07	nc	4.8E-05
VOCs											
1,2-Dibromoethane	0.0010	3.9E-07	1.5E-08	2.6E-08	2.0E+00	2.0E+00	6.0E-04	7.8E-07	3.0E-08	5.4E-08	8.7E-07
Benzene	0.0010	3.9E-07	3.9E-08	2.2E-07	5.5E-02	5.5E-02	7.8E-06	2.2E-08	2.2E-09	6.0E-09	3.0E-08
POLYNUCLEAR AROMATIC HYDROCARBONS											
Naphthalene	0.033	1.3E-05	5.6E-06	5.7E-07	na	na	3.4E-05	na	na	6.8E-08	6.8E-08
										ILCR	5E-05

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

ILCR	Incremental lifetime cancer risk.
Inc	Incomplete pathway.
mg/kg-d	Milligrams per kilogram per day.
mg/L	Milligrams per liter.
na	Not available.
nc	Not calculated.
VOCs	Volatile organic compounds.
SVOCs	Semi-volatile organic compounds.
ug/m3	Microgram per cubic meter.
URF	Unit Risk Factor

TABLE F-64
NONCANCER HAZARD CALCULATIONS FOR A FUTURE SITE VISITOR
SS08 - GROUNDWATER
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	VOC										Chemical-Specific HQ
	Groundwater Concentration ^a (mg/L)	Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Inhalation Dose (mg/kg-d)	Reference Dose (mg/kg-d)		RfC (mg/m3)	Pathway-Specific Hazard			
					Oral	Dermal	Inhalation	Ingestion	Dermal	Inhalation	
INORGANICS											
Aluminum	176	1.9E-01	4.3E-04	na	1.0E+00	1.0E+00	4.9E-03	1.9E-01	4.3E-04	nc	0.19
Antimony	0.0030	3.3E-06	7.4E-09	na	4.0E-04	6.0E-05	na	8.2E-03	1.2E-04	nc	0.0083
Arsenic	0.082	9.0E-05	2.0E-07	na	3.0E-04	3.0E-04	3.0E-05	3.0E-01	6.7E-04	nc	0.30
Barium	0.53	5.8E-04	1.3E-06	na	2.0E-01	1.4E-02	4.9E-04	2.9E-03	9.2E-05	nc	0.0030
Beryllium	0.0068	7.5E-06	1.7E-08	na	2.0E-03	1.4E-05	2.0E-05	3.7E-03	1.2E-03	nc	0.0049
Cadmium	0.0024	2.7E-06	6.0E-09	na	5.0E-04	2.5E-05	na	5.3E-03	2.4E-04	nc	0.0056
Chromium	0.13	1.4E-04	3.2E-07	na	1.5E+00	2.0E-02	na	9.4E-05	1.6E-05	nc	0.00011
Cobalt	0.19	2.1E-04	4.7E-07	na	3.0E-04	3.0E-04	6.0E-06	6.9E-01	1.6E-03	nc	0.69
Copper	0.51	5.5E-04	1.2E-06	na	4.0E-02	4.0E-02	na	1.4E-02	3.1E-05	nc	0.014
Manganese	16	1.7E-02	3.9E-05	na	2.4E-02	9.6E-04	5.0E-05	7.2E-01	4.1E-02	nc	0.76
Mercury	0.00024	2.7E-07	6.0E-10	na	3.0E-04	2.1E-05	3.0E-04	8.8E-04	2.8E-05	nc	0.00091
Nickel	0.45	4.9E-04	2.2E-07	na	2.0E-02	8.0E-04	na	2.5E-02	2.8E-04	nc	0.025
Selenium	0.013	1.4E-05	3.2E-08	na	5.0E-03	1.5E-03	na	2.8E-03	2.1E-05	nc	0.0029
Thallium	0.0013	1.4E-06	3.2E-09	na	8.0E-05	8.0E-05	na	1.8E-02	4.0E-05	nc	0.018
Vanadium	0.50	5.5E-04	1.2E-06	na	5.0E-03	1.3E-04	na	1.1E-01	9.5E-03	nc	0.12
Zinc	0.88	9.7E-04	1.3E-06	na	3.0E-01	3.0E-01	na	3.2E-03	4.3E-06	nc	0.0032
VOCs											
1,2-Dibromoethane	0.0010	1.1E-06	4.1E-08	7.2E-08	9.0E-03	9.0E-03	9.0E-03	1.2E-04	4.6E-06	2.8E-05	0.00015
Benzene	0.0010	1.1E-06	1.1E-07	6.2E-07	4.0E-03	4.0E-03	3.0E-02	2.7E-04	2.8E-05	7.2E-05	0.00037
Toluene	0.033	3.7E-05	8.3E-06	2.4E-05	8.0E-02	8.0E-02	5.0E+00	4.6E-04	1.0E-04	1.7E-05	0.00058
POLYNUCLEAR AROMATIC HYDROCARBONS											
2-Methylnaphthalene	0.46	5.1E-04	4.7E-04	2.6E-05	4.0E-03	4.0E-03	na	1.3E-01	1.2E-01	nc	0.25
Naphthalene	0.033	3.6E-05	1.6E-05	1.6E-06	2.0E-02	2.0E-02	3.0E-03	1.8E-03	7.9E-04	1.9E-03	0.0045
										HI	2
PETROLEUM HYDROCARBONS											
Diesel Range Organics (DRO)	36	na	na	na	na	na	na	nc	nc	nc	nc
Diesel Range Organics (DRO), Aliphatic	29	3.1E-02	na	na	1.0E-01	na	1.0E+00	3.1E-01	nc	nc	0.31
Diesel Range Organics (DRO), Aromatic	14	1.6E-02	na	na	4.0E-02	na	2.0E-01	3.9E-01	nc	nc	0.39
										HI	0.7

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

- 1) Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.

HI	Hazard index.
HQ	Hazard quotient.
Inc	Incomplete pathway.
mg/kd-d	Milligrams per kilogram per day.
mg/L	Milligrams per liter.

TABLE F-64
NONCANCER HAZARD CALCULATIONS FOR A FUTURE SITE VISITOR
SS08 - GROUNDWATER
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Groundwater Concentration ^a (mg/L)	Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Inhalation Dose (mg/kg-d)	VOC			Pathway-Specific Hazard			Chemical- Specific HQ
					Reference Dose (mg/kg-d)		RfC (mg/m3)	Ingestion	Dermal	Inhalation	
					Oral	Dermal	Inhalation				
3) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.								mg/m3	Milligram per cubic meter.		
								na	Not applicable.		
								nc	Not calculated		
								RfC	Reference Concentration		
								SVOCs	Semi-volatile organic compounds.		
								VOCs	Volatile organic compounds.		

TABLE F-65
CANCER CALCULATION FOR A CURRENT/FUTURE SITE WORKER
SS11 - SURFACE SOIL (0-2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Soil Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor (mg/kg- URF					(ug/m3)	Pathway-Specific Cancer Risk				Chemical-Specific Risk
						d)-1		1				Soil Ingestion	Dust Dermal	Dust Inhalation	VOC Inhalation	
						Oral	Dermal	Inhalation	I	P						
INORGANICS																
Arsenic	10	1.8E-06	7.0E-07	5.4E-10	na	1.5E+00	I	1.5E+00	R	4.3E-03	I	2.6E-06	1.0E-06	8.1E-09	na	3.7E-06
Cobalt	20	3.5E-06	4.6E-07	1.1E-09	na	na		na		9.0E-03	P	na	na	3.4E-08	na	3.4E-08
POLYNUCLEAR AROMATIC HYDROCARBONS																
Benzo(a)anthracene	950	1.7E-04	2.8E-04	5.1E-08	na	7.3E-01	I	7.3E-01	R	1.1E-04	C	1.2E-04	2.1E-04	2.0E-08	na	3.3E-04
Benzo(a)pyrene	286	5.0E-05	8.6E-05	1.5E-08	na	7.3E+00	I	7.3E+00	R	1.1E-03	C	3.6E-04	6.2E-04	5.9E-08	na	9.9E-04
Benzo(b)fluoranthene	705	1.2E-04	2.1E-04	3.8E-08	na	7.3E-01	I	7.3E-01	R	1.1E-04	C	9.0E-05	1.5E-04	1.5E-08	na	2.4E-04
Benzo(k)fluoranthene	166	2.9E-05	5.0E-05	8.9E-09	na	7.3E-02	I	7.3E-02	R	1.1E-04	C	2.1E-06	3.6E-06	3.4E-09	na	5.8E-06
Chrysene	1066	1.9E-04	3.2E-04	5.7E-08	na	7.3E-03	I	7.3E-03	R	1.1E-05	C	1.4E-06	2.3E-06	2.2E-09	na	3.7E-06
Dibenz(a,h)anthracene	34	5.9E-06	1.0E-05	1.8E-09	na	7.3E+00	I	7.3E+00	R	1.2E-03	C	4.3E-05	7.4E-05	7.6E-09	na	1.2E-04
Indeno(1,2,3-cd)pyrene	103	1.8E-05	3.1E-05	5.5E-09	na	7.3E-01		7.3E-01	R	1.1E-04	C	1.3E-05	2.3E-05	2.1E-09	na	3.6E-05
Naphthalene	3555	6.2E-04	1.1E-03	1.9E-07	3.4E-03	na		na		3.4E-05	C	na	na	2.3E-08	4.1E-04	4.1E-04
PESTICIDES																
Aldrin	0.017	2.9E-09	3.9E-09	9.0E-13	na	1.7E+01	I	1.7E+01	R	4.9E-03	I	5.0E-08	6.5E-08	1.5E-11	na	1.2E-07
Alpha-BHC	0.70	1.2E-07	1.6E-07	3.8E-11	na	6.3E+00	I	6.3E+00	R	1.8E-03	I	7.7E-07	1.0E-06	2.4E-10	na	1.8E-06
Alpha-Chlordane	0.65	1.1E-07	6.0E-08	3.5E-11	na	3.5E-01	I	3.5E-01	R	1.0E-04	I	4.0E-08	2.1E-08	1.2E-11	na	6.1E-08
Delta-BHC	0.65	1.1E-07	1.5E-07	3.5E-11	na	1.8E+00	I	1.8E+00	R	5.1E-04	I	2.1E-07	2.7E-07	6.3E-11	na	4.8E-07
Heptachlor	0.055	9.6E-09	1.3E-08	2.9E-12	na	4.5E+00	I	4.5E+00	R	1.3E-03	I	4.3E-08	5.7E-08	1.3E-11	na	1.0E-07
Toxaphene	1.5	2.5E-07	3.3E-07	7.8E-11	na	1.1E+00	I	1.1E+00	R	3.1E-04	I	2.8E-07	3.7E-07	8.6E-11	na	6.5E-07
															ILCR	2E-03

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
URF Unit risk factor

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

TABLE F-66
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE SITE WORKER
SSXX - SURFACE SOIL (0-2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m ³ /kg-d)	Reference Dose d) b		(mg/kg- d) b	RfC (mg/m3) b	Pathway-Specific Hazard				Chemical- Specific HQ
						Oral	Dermal			Soil Ingestion	Dust Inhalation	VOC Inhalation		
INORGANICS														
Aluminum	22700	1.1E-02	1.5E-03	3.4E-06	na	1.0E+00	1.0E+00	4.9E-03	1.1E-02	1.5E-03	2.4E-03	nc	0.015	
Arsenic	10	4.9E-06	1.9E-06	1.5E-09	na	3.0E-04	3.0E-04	3.0E-05	1.6E-02	6.5E-03	1.8E-04	nc	0.023	
Barium	1256	6.1E-04	8.1E-05	1.9E-07	na	2.0E-01	1.4E-02	4.9E-04	3.1E-03	5.8E-03	1.4E-03	nc	0.010	
Chromium	40	2.0E-05	2.6E-06	6.1E-09	na	1.5E+00	2.0E-02	na	1.3E-05	1.3E-04	nc	nc	0.00015	
Cobalt	20	9.8E-06	1.3E-06	3.0E-09	na	3.0E-04	3.0E-04	6.0E-06	3.3E-02	4.3E-03	1.8E-03	nc	0.039	
Manganese	1080	5.3E-04	7.0E-05	1.6E-07	na	2.4E-02	9.6E-04	5.0E-05	2.2E-02	7.3E-02	1.1E-02	nc	0.11	
VOCs														
1,2,4-Trimethylbenzene	6.6	3.2E-06	na	na	1.1E-04	na	na	7.0E-03	nc	nc	nc	5.3E-02	0.053	
1,3,5-Trimethylbenzene	1.9	9.5E-07	na	na	3.7E-05	5.0E-02	5.0E-02	6.0E-03	1.9E-05	nc	nc	2.2E-02	0.022	
SVOCs														
4-Methylphenol	46	2.3E-05	3.0E-05	6.9E-09	na	5.0E-03	5.0E-03	na	4.5E-03	5.9E-03	nc	nc	0.010	
Dibenzofuran	267	1.3E-04	1.7E-04	4.0E-08	na	2.0E-03	2.0E-03	na	6.5E-02	8.6E-02	nc	nc	0.15	
POLYNUCLEAR AROMATIC HYDROCARBONS														
2-Methylnaphthalene	3697	1.8E-03	3.1E-03	5.6E-07	7.9E-03	4.0E-03	4.0E-03	na	4.5E-01	7.8E-01	nc	nc	1.2	
Acenaphthene	2800	1.4E-03	2.4E-03	4.2E-07	2.4E-03	6.0E-02	6.0E-02	na	2.3E-02	3.9E-02	nc	nc	0.062	
Anthracene	2230	1.1E-03	1.9E-03	3.4E-07	5.2E-04	3.0E-01	3.0E-01	na	3.6E-03	6.2E-03	nc	nc	0.0099	
Benzo(g,h,i)perylene	229	1.1E-04	1.9E-04	3.4E-08	na	3.0E-02	3.0E-02	na	3.7E-03	6.4E-03	nc	nc	0.010	
Fluoranthene	3063	1.5E-03	2.6E-03	4.6E-07	na	4.0E-02	4.0E-02	na	3.7E-02	6.4E-02	nc	nc	0.10	
Fluorene	1744	8.5E-04	1.5E-03	2.6E-07	7.6E-04	4.0E-02	4.0E-02	na	2.1E-02	3.7E-02	nc	nc	0.058	
Naphthalene	3555	1.7E-03	3.0E-03	5.4E-07	9.6E-03	2.0E-02	2.0E-02	3.0E-03	8.7E-02	1.5E-01	6.2E-04	1.1E+01	11	
Phenanthrene	5177	2.5E-03	4.3E-03	7.8E-07	na	3.0E-01	3.0E-01	na	8.4E-03	1.4E-02	nc	nc	0.023	
Pyrene	3029	1.5E-03	2.5E-03	4.6E-07	1.5E-04	3.0E-02	3.0E-02	na	4.9E-02	8.5E-02	nc	nc	0.13	
PESTICIDES														
Aldrin	0.017	8.2E-09	1.1E-08	2.5E-12	na	3.0E-05	3.0E-05	na	2.7E-04	3.6E-04	nc	nc	0.00063	
Alpha-Chlordane	0.65	3.2E-07	4.2E-07	9.8E-11	na	5.0E-04	5.0E-04	7.0E-04	6.4E-04	8.4E-04	4.9E-07	nc	0.0015	
Endrin	0.61	3.0E-07	3.9E-07	9.1E-11	na	3.0E-04	3.0E-04	na	9.9E-04	1.3E-03	nc	nc	0.0023	
Endrin Aldehyde	0.94	4.6E-07	6.1E-07	1.4E-10	na	3.0E-04	3.0E-04	na	1.5E-03	2.0E-03	nc	nc	0.0036	
Endrin ketone	0.75	3.7E-07	4.8E-07	1.1E-10	na	3.0E-04	3.0E-04	na	1.2E-03	1.6E-03	nc	nc	0.0028	
Heptachlor	0.055	2.7E-08	3.5E-08	8.2E-12	na	5.0E-04	5.0E-04	na	5.4E-05	7.1E-05	nc	nc	0.00012	
													HI	14
PETROLEUM HYDROCARBONS														
Diesel Range Organics (DRO)	79575	na	na	na	na	na	na	na	nc	nc	nc	nc	nc	
Diesel Range Organics (DRO), Aliphatic	63660	3.1E-02	na	9.6E-06	na	1.0E-01	na	1.0E+00	3.1E-01	nc	3.4E-05	nc	0.31	
Diesel Range Organics (DRO), Aromatic	31830	1.6E-02	na	4.8E-06	na	4.0E-02	na	2.0E-01	3.9E-01	nc	8.4E-05	nc	0.39	
Residual Range Organics (RRO)	60057	na	na	na	na	na	na	na	nc	nc	nc	nc	nc	
Residual Range Organics (RRO), Aliphatic	54051	2.6E-02	na	8.1E-06	na	2.0E+00	na	na	1.3E-02	nc	nc	nc	0.013	
Residual Range Organics (RRO), Aromatic	18017	8.8E-03	na	2.7E-06	na	3.0E-02	na	na	2.9E-01	nc	nc	nc	0.29	
													HI	1

TABLE F-66
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE SITE WORKER
SSXX - SURFACE SOIL (0-2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil	Soil	Dermal	Dust	VOCs	Reference Dose	(mg/kg-	RfC	Pathway-Specific Hazard				Chemical-
	Concentration ^a	Ingestion	Dose	Inhalation	Inhalation	d) b		(mg/m3) b	Soil	Dust	VOC	Specific	
	(mg/kg)	Dose	(mg/kg-d)	Dose	Dose				Ingestion	Dermal	Inhalation		
		(mg/kg-d)		(mg/kg-d)	(m ³ /kg-d)	Oral	Dermal	Inhalation			Inhalation	HQ	

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.

1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI Hazard index.
 HQ Hazard quotient.
 mg/kg Milligrams per kilogram.
 mg/kd-d Milligrams per kilogram per day.
 na Not available.
 nc Not calculated.
 RfC Reference concentration

TABLE F-67
CANCER CALCULATION FOR A CURRENT/FUTURE SITE WORKER
SS11 - SUBSURFACE SOIL (>2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a	Soil Ingestion Dose	Soil Dermal Dose	Dust Inhalation Dose	VOC Inhalation Dose	Cancer Slope Factor (mg/kg- URF (ug/m3)-1)						Pathway-Specific Cancer Risk				Chemical-Specific Risk
	(mg/kg)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	d)-1		1		Soil		Dust		VOC		
						Oral	Dermal	Inhalation	Ingestion	Dermal	Inhalation	Inhalation				
INORGANICS																
Arsenic	59	1.0E-05	4.1E-06	3.2E-09	na	1.5E+00	I	1.5E+00	R	4.3E-03	I	1.5E-05	6.1E-06	4.8E-08	na	2.2E-05
															ILCR	2E-05

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
URF Unit risk factor

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

TABLE F-68
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE SITE WORKER
SSXX - SUBSURFACE SOIL (>2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m ³ /kg-d)	Reference Dose (mg/kg-d) b								Chemical-Specific HQ
						RfC (mg/m3) b			Pathway-Specific Hazard					
						Oral	Dermal	Inhalation	Soil Ingestion	Dermal	Dust Inhalation	VOC Inhalation		
INORGANICS														
Arsenic	59	2.9E-05	1.1E-05	8.9E-09	na	3.0E-04	3.0E-04	3.0E-05	9.6E-02	3.8E-02	1.0E-03	nc	0.14	
Chromium	43	2.1E-05	2.8E-06	6.5E-09	na	1.5E+00	2.0E-02	na	1.4E-05	1.4E-04	nc	nc	0.00016	
												HI	0.1	

Notes:

- ^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.
- ^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.
- 1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI Hazard index.

HQ Hazard quotient.

mg/kg Milligrams per kilogram.

mg/kg-d Milligrams per kilogram per day.

na Not available.

nc Not calculated.

RfC Reference concentration

TABLE F-69
CANCER CALCULATION FOR A CURRENT/FUTURE SITE WORKER
SS11 - SEDIMENT
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Sediment Concentration ^a (mg/kg)	Sediment Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor (mg/kg- URF			Pathway-Specific Cancer Risk			Chemical- Specific Risk	
						d)-1			(ug/m3)				
						Oral	Dermal	Inhalation	Sediment	Dust	VOC		
INORGANICS													
Arsenic	8.8	1.5E-06	6.1E-07	4.7E-10	na	1.5	1.5	0.0043	2.3E-06	9.1E-07	7.1E-09	na	3.2E-06
												ILCR	3E-06

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
URF Unit risk factor

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

TABLE F-70
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE SITE WORKER
SS11 - SEDIMENT
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Sediment Concentration ^a (mg/kg)	Sediment Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m ³ /kg-d)	Reference Dose		RfC (mg/m3) b	Pathway-Specific Hazard				Chemical- Specific HQ						
						d) b	(mg/kg-		Sediment	Dust	VOC								
												Oral		Dermal	Inhalation	Ingestion	Dermal	Inhalation	Inhalation
INORGANICS																			
Arsenic	8.8	4.3E-06	1.7E-06	1.3E-09	na	3.0E-04	3.0E-04	3.0E-05	1.4E-02	5.7E-03	1.5E-04	nc	0.020						
Chromium	26	1.3E-05	1.7E-06	4.0E-09	na	1.5E+00	2.0E-02	na	8.6E-06	8.7E-05	nc	nc	0.00010						
												HI	0.02						

Notes:

- ^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.
- ^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.
- 1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI Hazard index.

HQ Hazard quotient.

mg/kg Milligrams per kilogram.

mg/kg-d Milligrams per kilogram per day.

na Not available.

nc Not calculated.

RfC Reference concentration

TABLE F-71
CANCER CALCULATION FOR A CURRENT/FUTURE SITE WORKER/RECREATIONAL HUNTER
SS11 - SURFACE SOIL (0-2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Soil Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor (mg/kg- URF (ug/m3)-1)						Pathway-Specific Cancer Risk				Chemical-Specific Risk		
						d)-1		1		Soil		Dust		VOC				
						Oral	Dermal	Inhalation			Ingestion	Dermal	Inhalation	Inhalation				
INORGANICS																		
Arsenic	10	3.8E-06	4.5E-07	5.8E-10	na	1.5E+00	I	1.5E+00	R	4.3E-03	I	5.7E-06	6.8E-07	8.8E-09	na	6.4E-06		
Cobalt	20	7.5E-06	3.0E-07	1.2E-09	na	na		na		9.0E-03	P	na	na	3.7E-08	na	3.7E-08		
POLYNUCLEAR AROMATIC HYDROCARBONS																		
Benzo(a)anthracene	950	3.6E-04	1.9E-04	5.5E-08	na	7.3E-01	I	7.3E-01	R	1.1E-04	C	2.6E-04	1.4E-04	2.1E-08	na	4.0E-04		
Benzo(a)pyrene	286	1.1E-04	5.6E-05	1.7E-08	na	7.3E+00	I	7.3E+00	R	1.1E-03	C	7.9E-04	4.1E-04	6.4E-08	na	1.2E-03		
Benzo(b)fluoranthene	705	2.7E-04	1.4E-04	4.1E-08	na	7.3E-01	I	7.3E-01	R	1.1E-04	C	1.9E-04	1.0E-04	1.6E-08	na	2.9E-04		
Benzo(k)fluoranthene	166	6.3E-05	3.3E-05	9.6E-09	na	7.3E-02	I	7.3E-02	R	1.1E-04	C	4.6E-06	2.4E-06	3.7E-09	na	7.0E-06		
Chrysene	1066	4.0E-04	2.1E-04	6.2E-08	na	7.3E-03	I	7.3E-03	R	1.1E-05	C	2.9E-06	1.5E-06	2.4E-09	na	4.5E-06		
Dibenz(a,h)anthracene	34	1.3E-05	6.6E-06	2.0E-09	na	7.3E+00	I	7.3E+00	R	1.2E-03	C	9.3E-05	4.8E-05	8.2E-09	na	1.4E-04		
Indeno(1,2,3-cd)pyrene	103	3.9E-05	2.0E-05	6.0E-09	na	7.3E-01		7.3E-01	R	1.1E-04	C	2.8E-05	1.5E-05	2.3E-09	na	4.3E-05		
Naphthalene	3555	1.3E-03	7.0E-04	2.1E-07	3.7E-03	na		na		3.4E-05	C	na	na	2.5E-08	4.4E-04	4.4E-04		
PESTICIDES																		
Aldrin	0.017	6.3E-09	2.5E-09	9.7E-13	na	1.7E+01	I	1.7E+01	R	4.9E-03	I	1.1E-07	4.3E-08	1.6E-11	na	1.5E-07		
Alpha-BHC	0.70	2.6E-07	1.1E-07	4.1E-11	na	6.3E+00	I	6.3E+00	R	1.8E-03	I	1.7E-06	6.6E-07	2.6E-10	na	2.3E-06		
Alpha-Chlordane	0.65	2.5E-07	3.9E-08	3.8E-11	na	3.5E-01	I	3.5E-01	R	1.0E-04	I	8.6E-08	1.4E-08	1.3E-11	na	1.0E-07		
Delta-BHC	0.65	2.5E-07	9.8E-08	3.8E-11	na	1.8E+00	I	1.8E+00	R	5.1E-04	I	4.4E-07	1.8E-07	6.8E-11	na	6.2E-07		
Heptachlor	0.055	2.1E-08	8.2E-09	3.2E-12	na	4.5E+00	I	4.5E+00	R	1.3E-03	I	9.3E-08	3.7E-08	1.4E-11	na	1.3E-07		
Toxaphene	1.5	5.5E-07	2.2E-07	8.4E-11	na	1.1E+00	I	1.1E+00	R	3.1E-04	I	6.0E-07	2.4E-07	9.3E-11	na	8.4E-07		
															ILCR		3E-03	

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
URF Unit risk factor

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

TABLE F-72
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE SITE WORKER
SS11 - SURFACE SOIL (0-2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m ³ /kg-d)	Reference Dose		(mg/kg-d) b	RfC (mg/m3) b	Pathway-Specific Hazard				Chemical-Specific HQ
						Oral	Dermal			Inhalation	Ingestion	Dermal	Inhalation	
INORGANICS														
Aluminum	22700	2.4E-02	9.6E-04	3.7E-06	na	1.0E+00	1.0E+00	4.9E-03	2.4E-02	9.6E-04	2.6E-03	nc	0.028	
Arsenic	10	1.1E-05	1.3E-06	1.6E-09	na	3.0E-04	3.0E-04	3.0E-05	3.5E-02	4.2E-03	1.9E-04	nc	0.040	
Barium	1256	1.3E-03	5.3E-05	2.0E-07	na	2.0E-01	1.4E-02	4.9E-04	6.6E-03	3.8E-03	1.5E-03	nc	0.012	
Chromium	40	4.3E-05	1.7E-06	6.6E-09	na	1.5E+00	2.0E-02	na	2.9E-05	8.7E-05	nc	nc	0.00012	
Cobalt	20	2.1E-05	8.4E-07	3.3E-09	na	3.0E-04	3.0E-04	6.0E-06	7.0E-02	2.8E-03	1.9E-03	nc	0.075	
Manganese	1080	1.1E-03	4.6E-05	1.8E-07	na	2.4E-02	9.6E-04	5.0E-05	4.8E-02	4.7E-02	1.2E-02	nc	0.11	
VOCs														
1,2,4-Trimethylbenzene	6.6	7.0E-06	na	na	1.1E-04	na	na	7.0E-03	nc	nc	nc	5.7E-02	0.057	
1,3,5-Trimethylbenzene	1.9	2.0E-06	na	na	4.0E-05	5.0E-02	5.0E-02	6.0E-03	4.1E-05	nc	nc	2.4E-02	0.024	
SVOCs														
4-Methylphenol	46	4.9E-05	1.9E-05	7.5E-09	na	5.0E-03	5.0E-03	na	9.7E-03	3.9E-03	nc	nc	0.014	
Dibenzofuran	267	2.8E-04	1.1E-04	4.3E-08	na	2.0E-03	2.0E-03	na	1.4E-01	5.6E-02	nc	nc	0.20	
POLYNUCLEAR AROMATIC HYDROCARBONS														
2-Methylnaphthalene	3697	3.9E-03	2.0E-03	6.0E-07	na	4.0E-03	4.0E-03	na	9.8E-01	5.1E-01	nc	nc	1.5	
Acenaphthene	2800	3.0E-03	1.5E-03	4.6E-07	2.6E-03	6.0E-02	6.0E-02	na	4.9E-02	2.6E-02	nc	nc	0.075	
Anthracene	2230	2.4E-03	1.2E-03	3.6E-07	5.6E-04	3.0E-01	3.0E-01	na	7.9E-03	4.1E-03	nc	nc	0.012	
Benzo(g,h,i)perylene	229	2.4E-04	1.3E-04	3.7E-08	na	3.0E-02	3.0E-02	na	8.1E-03	4.2E-03	nc	nc	0.012	
Fluoranthene	3063	3.2E-03	1.7E-03	5.0E-07	na	4.0E-02	4.0E-02	na	8.1E-02	4.2E-02	nc	nc	0.12	
Fluorene	1744	1.8E-03	9.6E-04	2.8E-07	8.2E-04	4.0E-02	4.0E-02	na	4.6E-02	2.4E-02	nc	nc	0.070	
Naphthalene	3555	3.8E-03	1.9E-03	5.8E-07	1.0E-02	2.0E-02	2.0E-02	3.0E-03	1.9E-01	9.7E-02	6.7E-04	1.2E+01	12	
Phenanthrene	5177	5.5E-03	2.8E-03	8.4E-07	na	3.0E-01	3.0E-01	na	1.8E-02	9.5E-03	nc	nc	0.028	
Pyrene	3029	3.2E-03	1.7E-03	4.9E-07	1.7E-04	3.0E-02	3.0E-02	na	1.1E-01	5.5E-02	nc	nc	0.16	
PESTICIDES														
Aldrin	0.017	1.8E-08	7.0E-09	2.7E-12	na	3.0E-05	3.0E-05	na	5.9E-04	2.3E-04	nc	nc	0.00082	
Alpha-Chlordane	0.65	6.9E-07	2.7E-07	1.1E-10	na	5.0E-04	5.0E-04	7.0E-04	1.4E-03	5.5E-04	5.3E-07	nc	0.0019	
Endrin	0.61	6.4E-07	2.6E-07	9.8E-11	na	3.0E-04	3.0E-04	na	2.1E-03	8.5E-04	nc	nc	0.0030	
Endrin Aldehyde	0.94	9.9E-07	4.0E-07	1.5E-10	na	3.0E-04	3.0E-04	na	3.3E-03	1.3E-03	nc	nc	0.0046	
Endrin ketone	0.75	7.9E-07	3.2E-07	1.2E-10	na	3.0E-04	3.0E-04	na	2.6E-03	1.1E-03	nc	nc	0.0037	
Heptachlor	0.055	5.8E-08	2.3E-08	8.9E-12	na	5.0E-04	5.0E-04	na	1.2E-04	4.6E-05	nc	nc	0.00016	
													HI	15
PETROLEUM HYDROCARBONS														
Diesel Range Organics (DRO)	79575	na	na	na	na	na	na	na	nc	nc	nc	nc	nc	
Diesel Range Organics (DRO), Aliphatic	63660	6.7E-02	na	1.0E-05	na	1.0E-01	na	1.0E+00	6.7E-01	nc	3.6E-05	nc	0.67	
Diesel Range Organics (DRO), Aromatic	31830	3.4E-02	na	5.2E-06	na	4.0E-02	na	2.0E-01	8.4E-01	nc	9.1E-05	nc	0.84	
Residual Range Organics (RRO)	60057	na	na	na	na	na	na	na	nc	nc	nc	nc	nc	
Residual Range Organics (RRO), Aliphatic	54051	5.7E-02	na	8.8E-06	na	2.0E+00	na	na	2.9E-02	nc	nc	nc	0.029	
Residual Range Organics (RRO), Aromatic	18017	1.9E-02	na	2.9E-06	na	3.0E-02	na	na	6.3E-01	nc	nc	nc	0.63	
													HI	2

TABLE F-72
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE SITE WORKER
SS11 - SURFACE SOIL (0-2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m ³ /kg-d)	Reference Dose (mg/kg-d) b								Chemical-Specific HQ
						Oral	Dermal	Inhalation	RFC (mg/m3) b	Pathway-Specific Hazard				
										Soil Ingestion	Dust Dermal	VOC Inhalation		

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.

1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI Hazard index.
HQ Hazard quotient.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
nc Not calculated.
RFC Reference concentration

TABLE F-73
CANCER CALCULATION FOR A CURRENT/FUTURE SITE WORKER/RECREATIONAL HUNTER
SS11 - SUBSURFACE SOIL (>2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Soil Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor (mg/kg- URF (ug/m3)-1)										Pathway-Specific Cancer Risk			Chemical-Specific Risk
						Oral		Dermal		Inhalation		Soil		Dust		VOC			
						I	R	I	R	I	R	I	R	I	R	I			
						I	R	I	R	I	R	I	R	I	R	I			
INORGANICS																			
Arsenic	59	2.2E-05	2.7E-06	3.4E-09	na	1.5E+00	I	1.5E+00	R	4.3E-03	I	3.3E-05	4.0E-06	5.2E-08	na	3.7E-05			
																ILCR	4E-05		

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
URF Unit risk factor

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

TABLE F-74
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE SITE WORKER/RECREATIONAL HUNTER
SSXX - SUBSURFACE SOIL (>2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m ³ /kg-d)	Reference Dose		RfC (mg/m3) b	Pathway-Specific Hazard				Chemical- Specific HQ
						d) b			Soil	Dust	VOC		
						Oral	Dermal						
												Inhalation	
INORGANICS													
Arsenic	59	6.2E-05	7.5E-06	9.6E-09	na	3.0E-04	3.0E-04	3.0E-05	2.1E-01	2.5E-02	1.1E-03	nc	0.23
Chromium	43	4.5E-05	1.8E-06	7.0E-09	na	1.5E+00	2.0E-02	na	3.0E-05	9.3E-05	nc	nc	0.00012
												HI	0.2

Notes:

- ^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.
- ^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.
- 1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI Hazard index.

HQ Hazard quotient.

mg/kg Milligrams per kilogram.

mg/kg-d Milligrams per kilogram per day.

na Not available.

nc Not calculated.

RfC Reference concentration

TABLE F-75
CANCER CALCULATION FOR A CURRENT/FUTURE SITE WORKER/RECREATIONAL HUNTER
SS11 - SEDIMENT
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Sediment Concentration ^a (mg/kg)	Sediment Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor (mg/kg- URF						Pathway-Specific Cancer Risk						Chemical- Specific Risk
						d)-1			1			Sediment		Dust		VOC		
						Oral	Dermal	Inhalation	Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation	Inhalation			
						INORGANICS												
Arsenic	8.8	3.3E-06	4.0E-07	5.1E-10	na	1.5E+00	I	1.5E+00	R	4.3E-03	I	5.0E-06	5.9E-07	7.7E-09	na	5.6E-06		
																ILCR	6E-06	

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
URF Unit risk factor

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

TABLE F-76
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE SITE WORKER/RECREATIONAL HUNTER
SS11 - SEDIMENT
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Sediment Concentration ^a (mg/kg)	Sediment Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m ³ /kg-d)	Reference Dose (mg/kg-d) ^b		RFC (mg/m3) ^b	Pathway-Specific Hazard				Chemical- Specific HQ	
						Oral	Dermal		Sediment Ingestion	Dust Inhalation	VOC Inhalation			
INORGANICS														
Arsenic	8.8	9.3E-06	1.1E-06	1.4E-09	na	3.0E-04	3.0E-04	3.0E-05	3.1E-02	3.7E-03	1.7E-04	nc	0.035	
Chromium	26	2.8E-05	1.1E-06	4.3E-09	na	1.5E+00	2.0E-02	na	1.9E-05	5.7E-05	nc	nc	0.000075	
												HI	0.03	

Notes:

- ^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.
- ^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.
- 1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI Hazard index.

HQ Hazard quotient.

mg/kg Milligrams per kilogram.

mg/kg-d Milligrams per kilogram per day.

na Not available.

nc Not calculated.

RfC Reference concentration

TABLE F-77
CANCER CALCULATION FOR A CURRENT/FUTURE TRENCH WORKER
SS11 - SURFACE SOIL (0-2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Soil Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor (mg/kg- URF (ug/m3)-						Pathway-Specific Cancer Risk				Chemical-Specific Risk
						d)-1		1		Soil		Dust		VOC		
						Oral	Dermal	Inhalation	Ingestion	Dermal	Inhalation	Inhalation				
INORGANICS																
Arsenic	10	1.4E-07	2.8E-08	2.2E-11	na	1.5E+00	I	1.5E+00	R	4.3E-03	I	2.1E-07	4.2E-08	3.3E-10	na	2.5E-07
Cobalt	20	2.8E-07	1.8E-08	4.3E-11	na	na		na		9.0E-03	P	na	na	1.4E-09	na	1.4E-09
POLYNUCLEAR AROMATIC HYDROCARBONS																
Benzo(a)anthracene	950	1.3E-05	1.1E-05	2.0E-09	na	7.3E-01	I	7.3E-01	R	1.1E-04	C	9.7E-06	8.3E-06	7.9E-10	na	1.8E-05
Benzo(a)pyrene	286	4.0E-06	3.4E-06	6.1E-10	na	7.3E+00	I	7.3E+00	R	1.1E-03	C	2.9E-05	2.5E-05	2.4E-09	na	5.4E-05
Benzo(b)fluoranthene	705	9.8E-06	8.4E-06	1.5E-09	na	7.3E-01	I	7.3E-01	R	1.1E-04	C	7.2E-06	6.2E-06	5.8E-10	na	1.3E-05
Benzo(k)fluoranthene	166	2.3E-06	2.0E-06	3.6E-10	na	7.3E-02	I	7.3E-02	R	1.1E-04	C	1.7E-07	1.5E-07	1.4E-10	na	3.2E-07
Chrysene	1066	1.5E-05	1.3E-05	2.3E-09	na	7.3E-03	I	7.3E-03	R	1.1E-05	C	1.1E-07	9.3E-08	8.8E-11	na	2.0E-07
Dibenz(a,h)anthracene	34	4.7E-07	4.1E-07	7.3E-11	na	7.3E+00	I	7.3E+00	R	1.2E-03	C	3.4E-06	3.0E-06	3.1E-10	na	6.4E-06
Indeno(1,2,3-cd)pyrene	103	1.4E-06	1.2E-06	2.2E-10	na	7.3E-01		7.3E-01	R	1.1E-04	C	1.1E-06	9.0E-07	8.5E-11	na	2.0E-06
Naphthalene	3555	5.0E-05	4.3E-05	7.6E-09	1.4E-04	na		na		3.4E-05	C	na	na	9.1E-10	1.6E-05	1.6E-05
PESTICIDES																
Aldrin	0.017	2.3E-10	1.5E-10	3.6E-14	na	1.7E+01	I	1.7E+01	R	4.9E-03	I	4.0E-09	2.6E-09	6.1E-13	na	6.6E-09
Alpha-BHC	0.70	9.8E-09	6.4E-09	1.5E-12	na	6.3E+00	I	6.3E+00	R	1.8E-03	I	6.2E-08	4.1E-08	9.5E-12	na	1.0E-07
Alpha-Chlordane	0.65	9.1E-09	2.4E-09	1.4E-12	na	3.5E-01	I	3.5E-01	R	1.0E-04	I	3.2E-09	8.4E-10	4.9E-13	na	4.0E-09
Delta-BHC	0.65	9.1E-09	6.0E-09	1.4E-12	na	1.8E+00	I	1.8E+00	R	5.1E-04	I	1.6E-08	1.1E-08	2.5E-12	na	2.7E-08
Heptachlor	0.055	7.6E-10	5.0E-10	1.2E-13	na	4.5E+00	I	4.5E+00	R	1.3E-03	I	3.4E-09	2.3E-09	5.4E-13	na	5.7E-09
Toxaphene	1.5	2.0E-08	1.3E-08	3.1E-12	na	1.1E+00	I	1.1E+00	R	3.1E-04	I	2.2E-08	1.5E-08	3.4E-12	na	3.7E-08
															ILCR	1E-04

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
URF Unit risk factor

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

TABLE F-78
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE TRENCH WORKER
SS11 - SURFACE SOIL (0-2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil	Soil	Dermal	Inhalation	VOCs	Reference Dose	(mg/kg-	RFC	Pathway-Specific Hazard				Chemical-Specific
	Concentration ^a	Ingestion							Dose	Dose	Dose	d) b	
	(mg/kg)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(m ³ /kg-d)	Oral	Dermal	Inhalation	Ingestion	Dermal	Inhalation	Inhalation	HQ
INORGANICS													
Aluminum	22700	2.2E-02	1.5E-03	3.4E-06	na	1.0E+00	1.0E+00	4.9E-03	2.2E-02	1.5E-03	2.4E-03	nc	0.026
Arsenic	10	9.8E-06	1.9E-06	1.5E-09	na	3.0E-04	3.0E-04	3.0E-05	3.3E-02	6.5E-03	1.8E-04	nc	0.039
Barium	1256	1.2E-03	8.1E-05	1.9E-07	na	2.0E-01	1.4E-02	4.9E-04	6.1E-03	5.8E-03	1.4E-03	nc	0.013
Chromium	40	4.0E-05	2.6E-06	6.1E-09	na	1.5E+00	2.0E-02	na	2.6E-05	1.3E-04	nc	nc	0.00016
Cobalt	20	2.0E-05	1.3E-06	3.0E-09	na	3.0E-04	3.0E-04	6.0E-06	6.5E-02	4.3E-03	1.8E-03	nc	0.071
Manganese	1080	1.1E-03	7.0E-05	1.6E-07	na	2.4E-02	9.6E-04	5.0E-05	4.4E-02	7.3E-02	1.1E-02	nc	0.13
VOCs													
1,2,4-Trimethylbenzene	6.6	6.5E-06	na	na	1.1E-04	na	na	7.0E-03	nc	nc	nc	5.3E-02	0.053
1,3,5-Trimethylbenzene	1.9	1.9E-06	na	na	3.7E-05	5.0E-02	5.0E-02	6.0E-03	3.8E-05	nc	nc	2.2E-02	0.022
SVOCs													
4-Methylphenol	46	4.5E-05	3.0E-05	6.9E-09	na	5.0E-03	5.0E-03	na	9.0E-03	5.9E-03	nc	nc	0.015
Dibenzofuran	267	2.6E-04	1.7E-04	4.0E-08	na	2.0E-03	2.0E-03	na	1.3E-01	8.6E-02	nc	nc	0.22
POLYNUCLEAR AROMATIC HYDROCARBONS													
2-Methylnaphthalene	3697	3.6E-03	3.1E-03	5.6E-07	7.9E-03	4.0E-03	4.0E-03	na	9.0E-01	7.8E-01	nc	nc	1.7
Acenaphthene	2800	2.7E-03	2.4E-03	4.2E-07	2.4E-03	6.0E-02	6.0E-02	na	4.6E-02	3.9E-02	nc	nc	0.085
Anthracene	2230	2.2E-03	1.9E-03	3.4E-07	5.2E-04	3.0E-01	3.0E-01	na	7.3E-03	6.2E-03	nc	nc	0.014
Benzo(g,h,i)perylene	229	2.2E-04	1.9E-04	3.4E-08	na	3.0E-02	3.0E-02	na	7.5E-03	6.4E-03	nc	nc	0.014
Fluoranthene	3063	3.0E-03	2.6E-03	4.6E-07	na	4.0E-02	4.0E-02	na	7.5E-02	6.4E-02	nc	nc	0.14
Fluorene	1744	1.7E-03	1.5E-03	2.6E-07	7.6E-04	4.0E-02	4.0E-02	na	4.3E-02	3.7E-02	nc	nc	0.079
Naphthalene	3555	3.5E-03	3.0E-03	5.4E-07	9.6E-03	2.0E-02	2.0E-02	3.0E-03	1.7E-01	1.5E-01	6.2E-04	1.1E+01	12
Phenanthrene	5177	5.1E-03	4.3E-03	7.8E-07	na	3.0E-01	3.0E-01	na	1.7E-02	1.4E-02	nc	nc	0.031
Pyrene	3029	3.0E-03	2.5E-03	4.6E-07	1.5E-04	3.0E-02	3.0E-02	na	9.9E-02	8.5E-02	nc	nc	0.18
PESTICIDES													
Aldrin	0.017	1.6E-08	1.1E-08	2.5E-12	na	3.0E-05	3.0E-05	na	5.4E-04	3.6E-04	nc	nc	0.00090
Alpha-Chlordane	0.65	6.4E-07	4.2E-07	9.8E-11	na	5.0E-04	5.0E-04	7.0E-04	1.3E-03	8.4E-04	4.9E-07	nc	0.0021
Endrin	0.61	5.9E-07	3.9E-07	9.1E-11	na	3.0E-04	3.0E-04	na	2.0E-03	1.3E-03	nc	nc	0.0033
Endrin Aldehyde	0.94	9.2E-07	6.1E-07	1.4E-10	na	3.0E-04	3.0E-04	na	3.1E-03	2.0E-03	nc	nc	0.0051
Endrin ketone	0.75	7.3E-07	4.8E-07	1.1E-10	na	3.0E-04	3.0E-04	na	2.4E-03	1.6E-03	nc	nc	0.0041
Heptachlor	0.055	5.4E-08	3.5E-08	8.2E-12	na	5.0E-04	5.0E-04	na	1.1E-04	7.1E-05	nc	nc	0.00018
												HI	14

TABLE F-78
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE TRENCH WORKER
SS11 - SURFACE SOIL (0-2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m ³ /kg-d)	Reference Dose d) b		(mg/kg- d)	RfC (mg/m3) b	Pathway-Specific Hazard				Chemical- Specific HQ
						Oral	Dermal			Soil	Dust	VOC		
						Ingestion	Dermal	Inhalation	Inhalation					
PETROLEUM HYDROCARBONS														
Diesel Range Organics (DRO)	79575	na	na	na	na	na	na	na	na	nc	nc	nc	nc	nc
Diesel Range Organics (DRO), Aliphatic	63660	6.2E-02	na	9.6E-06	na	1.0E-01	na	1.0E+00	6.2E-01	nc	3.4E-05	nc	nc	0.62
Diesel Range Organics (DRO), Aromatic	31830	3.1E-02	na	4.8E-06	na	4.0E-02	na	2.0E-01	7.8E-01	nc	8.4E-05	nc	nc	0.78
Residual Range Organics (RRO)	60057	na	na	na	na	na	na	na	nc	nc	nc	nc	nc	nc
Residual Range Organics (RRO), Aliphatic	54051	5.3E-02	na	8.1E-06	na	2.0E+00	na	na	2.6E-02	nc	nc	nc	nc	0.026
Residual Range Organics (RRO), Aromatic	18017	1.8E-02	na	2.7E-06	na	3.0E-02	na	na	5.9E-01	nc	nc	nc	nc	0.59
													HI	2

Notes:

- ^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.
- ^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.
- 1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI Hazard index.

HQ Hazard quotient.

mg/kg Milligrams per kilogram.

mg/kg-d Milligrams per kilogram per day.

na Not available.

nc Not calculated.

RfC Reference concentration

TABLE F-79
CANCER CALCULATION FOR A CURRENT/FUTURE TRENCH WORKER
SS11 - SUBSURFACE SOIL (>2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil	Soil	Soil	Dust	VOC	Cancer Slope Factor (mg/kg- URF						Pathway-Specific Cancer Risk					Chemical-Specific Risk
	Concentration ^a	Ingestion Dose	Dermal Dose	Inhalation Dose	Inhalation Dose	d)-1			1			Soil	Dust	VOC			
	(mg/kg)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	Oral	Dermal	Inhalation	Ingestion	Dermal	Inhalation	Inhalation					
INORGANICS																	
Arsenic	59	8.2E-07	1.6E-07	1.3E-10	na	1.5E+00	I	1.5E+00	R	4.3E-03	I	1.2E-06	2.4E-07	1.9E-09	na	1.5E-06	
																ILCR	1E-06

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
URF Unit risk factor

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

TABLE F-80
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE TRENCH WORKER
SS11 - SUBSURFACE SOIL (>2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m ³ /kg-d)	Reference Dose (mg/kg-d) ^b								Chemical- Specific HQ
						RfC (mg/m3) ^b			Pathway-Specific Hazard					
						Oral	Dermal	Inhalation	Soil Ingestion	Dust Inhalation	VOC Inhalation			
INORGANICS														
Arsenic	59	5.8E-05	1.1E-05	8.9E-09	na	3.0E-04	3.0E-04	3.0E-05	1.9E-01	3.8E-02	1.0E-03	nc	0.23	
Chromium	43	4.2E-05	2.8E-06	6.5E-09	na	1.5E+00	2.0E-02	na	2.8E-05	1.4E-04	nc	nc	0.00017	
												HI	0.2	

Notes:

- ^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.
- ^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.
- 1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI Hazard index.

HQ Hazard quotient.

mg/kg Milligrams per kilogram.

mg/kg-d Milligrams per kilogram per day.

na Not available.

nc Not calculated.

RfC Reference concentration

TABLE F-81
CANCER CALCULATION FOR A CURRENT/FUTURE TRENCH WORKER
SS11 - SEDIMENT
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Sediment Concentration ^a (mg/kg)	Sediment	Dermal Dose (mg/kg-d)	Dust	VOC	Cancer Slope Factor (mg/kg- URF			Pathway-Specific Cancer Risk				Chemical- Specific Risk
		Ingestion		Inhalation	Inhalation	d)-1	(ug/m3)						
		Dose		Dose	Dose		1	Sediment	Dust	VOC			
		(mg/kg-d)		(mg/kg-d)	(mg/kg-d)	Oral	Dermal	Inhalation	Ingestion	Dermal	Inhalation	Inhalation	
INORGANICS													
Arsenic	8.8	1.2E-07	2.4E-08	1.9E-11	na	1.5	1.5	0.0043	1.8E-07	3.6E-08	2.8E-10	na	2.2E-07
												ILCR	2E-07

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
URF Unit risk factor

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

TABLE F-82
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE TRENCH WORKER
SS11 - SEDIMENT
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Sediment Concentration ^a (mg/kg)	Sediment Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m ³ /kg-d)	Reference Dose		(mg/kg- d) b	RFC (mg/m3) b	Pathway-Specific Hazard				Chemical- Specific HQ
						Oral	Dermal			Sediment Ingestion	Dust Inhalation	VOC Inhalation		
INORGANICS														
Arsenic	8.8	8.6E-06	1.7E-06	1.3E-09	na	3.0E-04	3.0E-04	3.0E-05	2.9E-02	5.7E-03	1.5E-04	nc	0.034	
Chromium	26	2.6E-05	1.7E-06	4.0E-09	na	1.5E+00	2.0E-02	na	1.7E-05	8.7E-05	nc	nc	0.00010	
													HI	0.03

Notes:

- ^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.
- ^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.
- 1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI Hazard index.
HQ Hazard quotient.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
nc Not calculated.
RfC Reference concentration

TABLE F-83
CANCER CALCULATION FOR A CURRENT/FUTURE SITE VISITOR
SS11 - SURFACE SOIL (0-2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Soil Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor (mg/kg- URF d)-1										Pathway-Specific Cancer Risk				Chemical-Specific Risk
						1			Soil		Dust		VOC							
						Oral	Dermal	Inhalation	Ingestion	Dermal	Inhalation	Inhalation	Inhalation							
INORGANICS																				
Arsenic	10	9.8E-08	3.9E-08	3.0E-11	na	1.5E+00	I	1.5E+00	R	4.3E-03	I	1.5E-07	5.8E-08	4.6E-10	na	2.1E-07				
Cobalt	20	2.0E-07	2.6E-08	6.0E-11	na	na		na		9.0E-03	P	na	na	1.9E-09	na	1.9E-09				
POLYNUCLEAR AROMATIC HYDROCARBONS																				
Benzo(a)anthracene	950	9.3E-06	1.6E-05	2.9E-09	na	7.3E-01	I	7.3E-01	R	1.1E-04	C	6.8E-06	1.2E-05	1.1E-09	na	1.8E-05				
Benzo(a)pyrene	286	2.8E-06	4.8E-06	8.6E-10	na	7.3E+00	I	7.3E+00	R	1.1E-03	C	2.0E-05	3.5E-05	3.3E-09	na	5.5E-05				
Benzo(b)fluoranthene	705	6.9E-06	1.2E-05	2.1E-09	na	7.3E-01	I	7.3E-01	R	1.1E-04	C	5.0E-06	8.6E-06	8.2E-10	na	1.4E-05				
Benzo(k)fluoranthene	166	1.6E-06	2.8E-06	5.0E-10	na	7.3E-02	I	7.3E-02	R	1.1E-04	C	1.2E-07	2.0E-07	1.9E-10	na	3.2E-07				
Chrysene	1066	1.0E-05	1.8E-05	3.2E-09	na	7.3E-03	I	7.3E-03	R	1.1E-05	C	7.6E-08	1.3E-07	1.2E-10	na	2.1E-07				
Dibenz(a,h)anthracene	34	3.3E-07	5.7E-07	1.0E-10	na	7.3E+00	I	7.3E+00	R	1.2E-03	C	2.4E-06	4.1E-06	4.3E-10	na	6.6E-06				
Indeno(1,2,3-cd)pyrene	103	1.0E-06	1.7E-06	3.1E-10	na	7.3E-01		7.3E-01	R	1.1E-04	C	7.4E-07	1.3E-06	1.2E-10	na	2.0E-06				
Naphthalene	3555	3.5E-05	6.0E-05	1.1E-08	1.9E-04	na		na		3.4E-05	C	na	na	1.3E-09	2.3E-05	2.3E-05				
PESTICIDES																				
Aldrin	0.017	1.6E-10	2.2E-10	5.0E-14	na	1.7E+01	I	1.7E+01	R	4.9E-03	I	2.8E-09	3.7E-09	8.5E-13	na	6.4E-09				
Alpha-BHC	0.70	6.8E-09	9.0E-09	2.1E-12	na	6.3E+00	I	6.3E+00	R	1.8E-03	I	4.3E-08	5.7E-08	1.3E-11	na	1.0E-07				
Alpha-Chlordane	0.65	6.4E-09	3.4E-09	2.0E-12	na	3.5E-01	I	3.5E-01	R	1.0E-04	I	2.2E-09	1.2E-09	6.8E-13	na	3.4E-09				
Delta-BHC	0.65	6.4E-09	8.4E-09	2.0E-12	na	1.8E+00	I	1.8E+00	R	5.1E-04	I	1.2E-08	1.5E-08	3.5E-12	na	2.7E-08				
Heptachlor	0.055	5.4E-10	7.1E-10	1.6E-13	na	4.5E+00	I	4.5E+00	R	1.3E-03	I	2.4E-09	3.2E-09	7.5E-13	na	5.6E-09				
Toxaphene	1.5	1.4E-08	1.9E-08	4.4E-12	na	1.1E+00	I	1.1E+00	R	3.1E-04	I	1.6E-08	2.1E-08	4.8E-12	na	3.6E-08				
															ILCR	1E-04				

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
URF Unit risk factor

TABLE F-84
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE SITE VISITOR
SS11 - SURFACE SOIL (0-2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil	Soil	Dermal	Dust	VOCs	Reference Dose	(mg/kg-	RFC	Pathway-Specific Hazard				Chemical-Specific
	Concentration ^a	Ingestion							Dose	Inhalation	Dose	Dose	
	(mg/kg)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)	(m ³ /kg-d)	Oral	Dermal	Inhalation	Ingestion	Dermal	Inhalation	Inhalation	HQ
INORGANICS													
Aluminum	22700	6.2E-04	8.2E-05	1.9E-07	na	1.0E+00	1.0E+00	4.9E-03	6.2E-04	8.2E-05	1.4E-04	nc	0.00084
Arsenic	10	2.8E-07	1.1E-07	8.5E-11	na	3.0E-04	3.0E-04	3.0E-05	9.2E-04	3.6E-04	9.9E-06	nc	0.0013
Barium	1256	3.4E-05	4.5E-06	1.1E-08	na	2.0E-01	1.4E-02	4.9E-04	1.7E-04	3.2E-04	7.6E-05	nc	0.00057
Chromium	40	1.1E-06	1.5E-07	3.4E-10	na	1.5E+00	2.0E-02	na	7.4E-07	7.5E-06	nc	nc	0.0000082
Cobalt	20	5.5E-07	7.2E-08	1.7E-10	na	3.0E-04	3.0E-04	6.0E-06	1.8E-03	2.4E-04	9.8E-05	nc	0.0022
Manganese	1080	3.0E-05	3.9E-06	9.1E-09	na	2.4E-02	9.6E-04	5.0E-05	1.2E-03	4.1E-03	6.4E-04	nc	0.0059
VOCs													
1,2,4-Trimethylbenzene	6.6	1.8E-07	na	na	5.9E-06	na	na	7.0E-03	nc	nc	nc	3.0E-03	0.0030
1,3,5-Trimethylbenzene	1.9	5.3E-08	na	na	2.1E-06	5.0E-02	5.0E-02	6.0E-03	1.1E-06	nc	nc	1.2E-03	0.0012
SVOCs													
4-Methylphenol	46	1.3E-06	1.7E-06	3.9E-10	na	5.0E-03	5.0E-03	na	2.5E-04	3.3E-04	nc	nc	0.00058
Dibenzofuran	267	7.3E-06	9.7E-06	2.3E-09	na	2.0E-03	2.0E-03	na	3.7E-03	4.8E-03	nc	nc	0.0085
POLYNUCLEAR AROMATIC HYDROCARBONS													
2-Methylnaphthalene	3697	1.0E-04	1.7E-04	3.1E-08	4.4E-04	4.0E-03	4.0E-03	na	2.5E-02	4.3E-02	nc	nc	0.069
Acenaphthene	2800	7.7E-05	1.3E-04	2.4E-08	1.4E-04	6.0E-02	6.0E-02	na	1.3E-03	2.2E-03	nc	nc	0.0035
Anthracene	2230	6.1E-05	1.0E-04	1.9E-08	2.9E-05	3.0E-01	3.0E-01	na	2.0E-04	3.5E-04	nc	nc	0.00055
Benzo(g,h,i)perylene	229	6.3E-06	1.1E-05	1.9E-09	na	3.0E-02	3.0E-02	na	2.1E-04	3.6E-04	nc	nc	0.00057
Fluoranthene	3063	8.4E-05	1.4E-04	2.6E-08	na	4.0E-02	4.0E-02	na	2.1E-03	3.6E-03	nc	nc	0.0057
Fluorene	1744	4.8E-05	8.2E-05	1.5E-08	4.3E-05	4.0E-02	4.0E-02	na	1.2E-03	2.0E-03	nc	nc	0.0032
Naphthalene	3555	9.7E-05	1.7E-04	3.0E-08	5.4E-04	2.0E-02	2.0E-02	3.0E-03	4.9E-03	8.4E-03	3.5E-05	6.3E-01	0.64
Phenanthrene	5177	1.4E-04	2.4E-04	4.4E-08	na	3.0E-01	3.0E-01	na	4.7E-04	8.1E-04	nc	nc	0.0013
Pyrene	3029	8.3E-05	1.4E-04	2.6E-08	8.6E-06	3.0E-02	3.0E-02	na	2.8E-03	4.7E-03	nc	nc	0.0075
PESTICIDES													
Aldrin	0.017	4.6E-10	6.0E-10	1.4E-13	na	3.0E-05	3.0E-05	na	1.5E-05	2.0E-05	nc	nc	0.000035
Alpha-Chlordane	0.65	1.8E-08	2.4E-08	5.5E-12	na	5.0E-04	5.0E-04	7.0E-04	3.6E-05	4.7E-05	2.7E-08	nc	0.000083
Endrin	0.61	1.7E-08	2.2E-08	5.1E-12	na	3.0E-04	3.0E-04	na	5.5E-05	7.3E-05	nc	nc	0.00013
Endrin Aldehyde	0.94	2.6E-08	3.4E-08	7.9E-12	na	3.0E-04	3.0E-04	na	8.6E-05	1.1E-04	nc	nc	0.00020
Endrin ketone	0.75	2.1E-08	2.7E-08	6.3E-12	na	3.0E-04	3.0E-04	na	6.8E-05	9.0E-05	nc	nc	0.00016
Heptachlor	0.055	1.5E-09	2.0E-09	4.6E-13	na	5.0E-04	5.0E-04	na	3.0E-06	4.0E-06	nc	nc	0.0000070
HI													0.8

TABLE F-84
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE SITE VISITOR
SS11 - SURFACE SOIL (0-2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m ³ /kg-d)	Reference Dose (mg/kg-d) ^b		(mg/kg- d)	RfC (mg/m3) ^b	Pathway-Specific Hazard				Chemical- Specific HQ
						Oral	Dermal			Soil	Dust	VOC		
						Ingestion	Dermal	Inhalation	Inhalation					
PETROLEUM HYDROCARBONS														
Diesel Range Organics (DRO)	79575	na	na	na	na	na	na	na	na	nc	nc	nc	nc	nc
Diesel Range Organics (DRO), Aliphatic	63660	1.7E-03	na	5.4E-07	na	1.0E-01	na	1.0E+00	1.7E-02	nc	nc	1.9E-06	nc	0.017
Diesel Range Organics (DRO), Aromatic	31830	8.7E-04	na	2.7E-07	na	4.0E-02	na	2.0E-01	2.2E-02	nc	nc	4.7E-06	nc	0.022
Residual Range Organics (RRO)	60057	na	na	na	na	na	na	na	nc	nc	nc	nc	nc	nc
Residual Range Organics (RRO), Aliphatic	54051	1.5E-03	na	4.6E-07	na	2.0E+00	na	na	7.4E-04	nc	nc	nc	nc	0.00074
Residual Range Organics (RRO), Aromatic	18017	4.9E-04	na	1.5E-07	na	3.0E-02	na	na	1.6E-02	nc	nc	nc	nc	0.016
													HI	0.06

Notes:

- ^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.
- ^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.
- 1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI Hazard index.
HQ Hazard quotient.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
nc Not calculated.
RfC Reference concentration

TABLE F-85
CANCER CALCULATION FOR A CURRENT/FUTURE SITE VISITOR
SS11 - SUBSURFACE SOIL (>2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Soil Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor (mg/kg- URF (ug/m3)-)										Chemical-Specific Risk	
						d)-1		1		Pathway-Specific Cancer Risk							
										Soil		Dust		VOC			
						Oral	Dermal	Inhalation			Ingestion	Dermal	Inhalation	Inhalation			
INORGANICS																	
Arsenic	59	5.8E-07	2.3E-07	1.8E-10	na	1.5E+00	I	1.5E+00	R	4.3E-03	I	8.7E-07	3.4E-07	2.7E-09	na	1.2E-06	
																ILCR	1E-06

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
URF Unit risk factor

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

TABLE F-86
NONCANCER HAZARD CALCULATIONS FOR A CURRENT/FUTURE SITE VISITOR
SS11 - SUBSURFACE SOIL (>2 ft bgs)
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Soil Concentration ^a (mg/kg)	Soil Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m ³ /kg-d)	Reference Dose (mg/kg-d) b		RfC (mg/m3) b	Pathway-Specific Hazard				Chemical-Specific HQ	
						Oral	Dermal		Soil Ingestion	Dermal	Dust Inhalation	VOC Inhalation		
INORGANICS														
Arsenic	59	1.6E-06	6.4E-07	5.0E-10	na	3.0E-04	3.0E-04	3.0E-05	5.4E-03	2.1E-03	5.8E-05	nc	0.0076	
Chromium	43	1.2E-06	1.6E-07	3.6E-10	na	1.5E+00	2.0E-02	na	7.9E-07	8.0E-06	nc	nc	0.0000088	
												HI	0.008	

Notes:

- ^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.
- ^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.
- 1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI Hazard index.
 HQ Hazard quotient.
 mg/kg Milligrams per kilogram.
 mg/kg-d Milligrams per kilogram per day.
 na Not available.
 nc Not calculated.
 RfC Reference concentration

TABLE F-87
CANCER CALCULATION FOR A CURRENT/FUTURE SITE VISITOR
SS11 - SEDIMENT
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Sediment Concentration ^a (mg/kg)	Sediment Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOC Inhalation Dose (mg/kg-d)	Cancer Slope Factor (mg/kg- URF			(ug/m3)	Pathway-Specific Cancer Risk			Chemical- Specific Risk
						d)-1				Sediment	Dust	VOC	
						Oral	Dermal	Inhalation					
INORGANICS													
Arsenic	8.8	8.6E-08	3.4E-08	2.6E-11	na	1.5	1.5	0.0043	1.3E-07	5.1E-08	4.0E-10	na	1.8E-07
												ILCR	2E-07

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

ILCR Incremental lifetime cancer risk.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
URF Unit risk factor

- 1) Doses and cancer risks shown only for carcinogenic chemicals with available toxicity values.
- 2) Absorbed doses were calculated for dermal contact with the medium, and intakes were calculated for ingestion or inhalation of a medium.
- 3) Cancer risks are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Cancer Risk = Exposure Dose x Cancer Slope Factor.

TABLE F-88
NONCANCER HAZARD CALCULATIONS FOR CURRENT/FUTURE SITE VISITOR
SS11 - SEDIMENT
TATALINA LONG RANGE RADAR STATION, ALASKA

Constituent	Sediment Concentration ^a (mg/kg)	Sediment Ingestion Dose (mg/kg-d)	Dermal Dose (mg/kg-d)	Dust Inhalation Dose (mg/kg-d)	VOCs Inhalation Dose (m ³ /kg-d)	Reference Dose d) b		RfC (mg/m3) b	Pathway-Specific Hazard				Chemical- Specific HQ
						Oral	Dermal		Sediment Ingestion	Dust Inhalation	VOC Inhalation		
INORGANICS													
Arsenic	8.8	2.4E-07	9.5E-08	7.4E-11	na	3.0E-04	3.0E-04	3.0E-05	8.0E-04	3.2E-04	8.6E-06	nc	0.0011
Chromium	26	7.2E-07	9.5E-08	2.2E-10	na	1.5E+00	2.0E-02	na	4.8E-07	4.9E-06	nc	nc	0.0000054
												HI	0.001

Notes:

^a Based on the maximum or 95 percent upper confidence limit (95% UCL) on the mean concentration detected at the site.

^b Doses and noncancer hazards shown only for noncarcinogenic chemicals with available toxicity values.

1) Noncancer hazards are unitless values which represent the probability of incurring an adverse health effect. They are calculated using the following formula: Noncancer HI = Exposure Dose/Reference dose.

HI Hazard index.
HQ Hazard quotient.
mg/kg Milligrams per kilogram.
mg/kg-d Milligrams per kilogram per day.
na Not available.
nc Not calculated.
RfC Reference concentration

Table F-89
Summary of Human Health Risk Estimates for a Current/Future Site Worker
Site SS03 - Surface Soil

Surface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Aluminum	28,800	nc	28,800	na	0.019
Arsenic	16	nc	16	5.9E-06	0.037
Chromium	56	nc	56	na	0.00020
Cobalt	22	nc	22	3.7E-08	0.043
Lead	259	180	180	na	na
Manganese	609	nc	609	na	0.060
Titanium	1,430	nc	1,430	na	na
Vanadium	88	nc	88	na	0.052
Volatile Organic Compounds					
1,2,4-Trimethylbenzene	1,400	431	431	na	3.5
1,3,5-Trimethylbenzene	510	81	81	na	0.91
Benzene	13	2.1	2	7.8E-07	0.0094
Ethylbenzene	26	8.3	8	6.0E-07	0.00068
m,p-Xylenes	22	8.2	8	na	0.0067
n-Butylbenzene	6	1.7	2	na	0.00024
n-Propylbenzene	8	3.9	4	na	0.0018
o-Xylene	8	3.0	3	na	0.0021
p-Isopropyltoluene	11	2.1	2	na	0.00028
sec-Butylbenzene	6	1.6	2	na	0.00029
Tert-Butylbenzene	18	3.4	3	na	0.00052
Toluene	78	24	24	na	0.00064
Polynuclear Aromatic Hydrocarbons					
2-Methylnaphthalene	33	nc	33	na	0.011
Naphthalene	160	51	51	5.8E-06	0.16
Cumulative ILCR/HQ:				1E-05	5

Table F-89
Summary of Human Health Risk Estimates for a Current/Future Site Worker
Site SS03 - Surface Soil

Surface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	38,000	14,251	14,251	na	nc
Diesel Range Organics (DRO), Aliphatic	na	na	11,401	na	0.056
Diesel Range Organics (DRO), Aromatic	na	na	5,700	na	0.070
Gasoline Range Organics (GRO)	3,500	629	629	na	nc
Gasoline Range Organics (GRO), Aliphatic	na	na	440	na	0.000043
Gasoline Range Organics (GRO), Aromatic	na	na	315	na	0.00077
Cumulative ILCR/HQ:				na	0.1
ADEC Risk Range:				10 ⁻⁵	1
EPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in surface soil samples.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-90
Summary of Human Health Risk Estimates for a Current/Future Site Worker/Recreational Hunter
Site SS03 - Surface Soil

Surface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Aluminum	28,800	nc	28,800	na	0.035
Arsenic	16	nc	16	1.0E-05	0.063
Chromium	56	nc	56	na	0.00016
Cobalt	22	nc	22	4.0E-08	0.083
Lead	259	180	180	na	na
Manganese	609	nc	609	na	0.060
Titanium	1,430	nc	1,430	na	na
Vanadium	88	nc	88	na	0.047
Volatile Organic Compounds					
1,2,4-Trimethylbenzene	1,400	431	431	na	3.7
1,3,5-Trimethylbenzene	510	81	81	na	0.99
Benzene	13	2.1	2	8.7E-07	0.010
Ethylbenzene	26	8.3	8	6.6E-07	0.00078
m,p-Xylenes	22	8.2	8	na	0.0073
n-Butylbenzene	6	1.7	2	na	0.00027
n-Propylbenzene	8	3.9	4	na	0.0020
o-Xylene	8	3.0	3	na	0.0022
p-Isopropyltoluene	11	2.1	2	na	0.00031
sec-Butylbenzene	6	1.6	2	na	0.00032
Tert-Butylbenzene	18	3.4	3	na	0.00058
Toluene	78	24	24	na	0.00085
Polynuclear Aromatic Hydrocarbons					
2-Methylnaphthalene	33	nc	33	na	0.013
Naphthalene	160	51	51	6.3E-06	0.18
Cumulative ILCR/HQ:				2E-05	5

Table F-90
Summary of Human Health Risk Estimates for a Current/Future Site Worker/Recreational Hunter
Site SS03 - Surface Soil

Surface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	38,000	14251	14,251	na	nc
Diesel Range Organics (DRO), Aliphatic	na	na	11,401	na	0.12
Diesel Range Organics (DRO), Aromatic	na	na	5,700	na	0.15
Gasoline Range Organics (GRO)	3,500	629	629	na	nc
Gasoline Range Organics (GRO), Aliphatic	na	na	440	na	0.000093
Gasoline Range Organics (GRO), Aromatic	na	na	315	na	0.0017
Cumulative ILCR/HQ:				na	0.3
ADEC Risk Range:				10 ⁻⁵	1
EPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in surface soil samples.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-91
Summary of Human Health Risk Estimates for a Current/Future Trench Worker
Site SS03 - Surface Soil

Surface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Aluminum	28,800	nc	28,800	na	0.033
Arsenic	16	nc	16	4.0E-07	0.063
Chromium	56	nc	56	na	0.00022
Cobalt	22	nc	22	1.5E-09	0.078
Lead	259	180	180	na	na
Manganese	609	nc	609	na	0.072
Titanium	1,430	nc	1,430	na	na
Vanadium	88	nc	88	na	0.061
Volatile Organic Compounds					
1,2,4-Trimethylbenzene	1,400	431	431	na	3.5
1,3,5-Trimethylbenzene	510	81	81	na	0.91
Benzene	13	2.1	2	3.2E-08	0.0096
Ethylbenzene	26	8.3	8	2.4E-08	0.00072
m,p-Xylenes	22	8.2	8	na	0.0067
n-Butylbenzene	6	1.7	2	na	0.00025
n-Propylbenzene	8	3.9	4	na	0.0019
o-Xylene	8	3.0	3	na	0.0021
p-Isopropyltoluene	11	2.1	2	na	0.00029
sec-Butylbenzene	6	1.6	2	na	0.00029
Tert-Butylbenzene	18	3.4	3	na	0.00054
Toluene	78	24	24	na	0.00079
Polynuclear Aromatic Hydrocarbons					
2-Methylnaphthalene	33	nc	33	na	0.015
Naphthalene	160	51	51	2.3E-07	0.16
Cumulative ILCR/HQ:				7E-07	5

Table F-91
Summary of Human Health Risk Estimates for a Current/Future Trench Worker
Site SS03 - Surface Soil

Surface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	38,000	14251	14,251	na	nc
Diesel Range Organics (DRO), Aliphatic	na	na	11,401	na	0.11
Diesel Range Organics (DRO), Aromatic	na	na	5,700	na	0.14
Gasoline Range Organics (GRO)	3,500	629	629	na	nc
Gasoline Range Organics (GRO), Aliphatic	na	na	440	na	0.000086
Gasoline Range Organics (GRO), Aromatic	na	na	315	na	0.0015
Cumulative ILCR/HQ:				na	0.3
ADEC Risk Range:				10 ⁻⁵	1
EPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in surface soil samples.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-92
Summary of Human Health Risk Estimates for a Current/Future Site Visitor
Site SS03 - Surface Soil

Surface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Aluminum	28,800	nc	28,800	na	0.0011
Arsenic	16	nc	16	3.3E-07	0.0021
Chromium	56	nc	56	na	0.000011
Cobalt	22	nc	22	2.1E-09	0.0024
Lead	259	180	180	na	na
Manganese	609	nc	609	na	0.0033
Titanium	1,430	nc	1,430	na	na
Vanadium	88	nc	88	na	0.0029
Volatile Organic Compounds					
1,2,4-Trimethylbenzene	1,400	431	431	na	0.19
1,3,5-Trimethylbenzene	510	81	81	na	0.051
Benzene	13	2.1	2	4.4E-08	0.00053
Ethylbenzene	26	8.3	8	3.3E-08	0.000038
m,p-Xylenes	22	8.2	8	na	0.00037
n-Butylbenzene	6	1.7	2	na	0.000014
n-Propylbenzene	8	3.9	4	na	0.00010
o-Xylene	8	3.0	3	na	0.00012
p-Isopropyltoluene	11	2.1	2	na	0.000016
sec-Butylbenzene	6	1.6	2	na	0.000016
Tert-Butylbenzene	18	3.4	3	na	0.000029
Toluene	78	24	24	na	0.000036
Polynuclear Aromatic Hydrocarbons					
2-Methylnaphthalene	33	nc	33	na	0.00061
Naphthalene	160	51	51	3.3E-07	0.0092
Cumulative ILCR/HQ:				7E-07	0.3
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	38,000	14251	14,251	na	nc
Diesel Range Organics (DRO), Aliphatic	na	na	11,401	na	0.0031
Diesel Range Organics (DRO), Aromatic	na	na	5,700	na	0.0039
Gasoline Range Organics (GRO)	3,500	629	629	na	nc
Gasoline Range Organics (GRO), Aliphatic	na	na	440	na	0.0000024
Gasoline Range Organics (GRO), Aromatic	na	na	315	na	0.000043
Cumulative ILCR/HQ:				na	0.007
ADEC Risk Range:				10 ⁻⁵	1
EPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Notes:

^aMaximum or 95% upper confidence limit (UCL) on the mean concentration measured in surface soil samples.

^bThe EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-93
Summary of Human Health Risk Estimates for a Current/Future Site Worker
Site SS03 - Subsurface Soil

Subsurface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Volatile Organic Compounds					
1,2,4-Trimethylbenzene	13	4.6	4.6	na	0.037
1,3,5-Trimethylbenzene	5.6	2.0	2.0	na	0.019
o-Xylene	7.7	1.9	1.9	na	0.0011
Polynuclear Aromatic Hydrocarbons					
Naphthalene	56	26	26	3.0E-06	0.49
Cumulative ILCR/HQ:				3E-06	0.5
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	13,000	7,436	7,436	na	nc
Diesel Range Organics (DRO), Aliphatic	na	na	5,949	na	0.029
Diesel Range Organics (DRO), Aromatic	na	na	2,974	na	0.036
Cumulative ILCR/HQ:				na	0.07
ADEC Risk Range:				10 ⁻⁵	1
USEPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in subsurface soil.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-94
Summary of Human Health Risk Estimates for a Current/Future Site Worker/Recreational Hunter
Site SS03 - Subsurface Soil

Subsurface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95 % UCL	EPC ^b	ILCR	HQ
Volatile Organic Compounds					
1,2,4-Trimethylbenzene	13	4.6	4.6	na	0.040
1,3,5-Trimethylbenzene	5.6	2.0	2.0	na	0.020
o-Xylene	7.7	1.9	1.9	na	0.0012
Polynuclear Aromatic Hydrocarbons					
Naphthalene	56	26	26	3.2E-06	0.53
Cumulative ILCR/HQ:				3E-06	0.6
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	13,000	7,436	7,436	na	nc
Diesel Range Organics (DRO), Aliphatic	na	na	5,949	na	0.063
Diesel Range Organics (DRO), Aromatic	na	na	2,974	na	0.079
Cumulative ILCR/HQ:				NA	0.1
ADEC Risk Range:				10 ⁻⁵	1
USEPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in subsurface soil.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-95
Summary of Human Health Risk Estimates for a Current/Future Trench Worker
Site SS03 - Subsurface Soil

Subsurface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95 % UCL	EPC ^b	ILCR	HQ
Volatile Organic Compounds					
1,2,4-Trimethylbenzene	13	4.6	4.6	na	0.037
1,3,5-Trimethylbenzene	5.6	2.0	2.0	na	0.019
o-Xylene	7.7	1.9	1.9	na	0.0011
Polynuclear Aromatic Hydrocarbons					
Naphthalene	56	26	26	1.2E-07	0.5
Cumulative ILCR/HQ:				1E-07	0.5
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	13,000	7,436	7,436	na	nc
Diesel Range Organics (DRO), Aliphatic	na	na	5,949	na	0.058
Diesel Range Organics (DRO), Aromatic	na	na	2,974	na	0.073
Cumulative ILCR/HQ:				NA	0.1
ADEC Risk Range:				10 ⁻⁵	1
USEPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in subsurface soil.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-96
Summary of Human Health Risk Estimates for a Current/Future Site Visitor
Site SS03 - Subsurface Soil

Subsurface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Volatile Organic Compounds					
1,2,4-Trimethylbenzene	13	4.6	4.6	na	0.0021
1,3,5-Trimethylbenzene	5.6	2.0	2.0	na	0.0011
o-Xylene	7.7	1.9	1.9	na	0.000060
Polynuclear Aromatic Hydrocarbons					
Naphthalene	56	26	26	1.7E-07	0.027
Cumulative ILCR/HQ:				2E-07	0.03
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	13,000	7,436	7,436	na	nc
Diesel Range Organics (DRO), Aliphatic	na	na	5,949	na	0.0016
Diesel Range Organics (DRO), Aromatic	na	na	2,974	na	0.0020
Cumulative ILCR/HQ:				na	0.004
ADEC Risk Range:				10 ⁻⁵	1
USEPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in subsurface soil.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-97
Summary of Human Health Risk Estimates for a Current/Future Site Worker
Site SS03 - Sediment

Subsurface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Aluminum	27,900	nc	27,900	na	0.018
Arsenic	21	nc	21	7.7E-06	0.048
Chromium	62	nc	62	na	0.00023
Cobalt	23	nc	23	3.9E-08	0.044
Manganese	1,320	nc	1,320	na	0.13
Titanium	1,160	nc	1,160	na	na
Vanadium	107	nc	107	na	0.064
Cumulative ILCR/HQ:				8E-06	0.3
ADEC Risk Range:				10 ⁻⁵	1
USEPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in sediment.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-98
Summary of Human Health Risk Estimates for a Current/Future Site Worker/Recreational Hunter
Site SS03 - Sediment

Subsurface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95 % UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Aluminum	27,900	nc	27,900	na	0.034
Arsenic	21	nc	21	1.3E-05	0.083
Chromium	62	nc	62	na	0.00018
Cobalt	23	nc	23	4.2E-08	0.086
Manganese	1,320	nc	1,320	na	0.13
Titanium	1,160	nc	1,160	na	na
Vanadium	107	nc	107	na	0.057
Cumulative ILCR/HQ:				1E-05	0.4
ADEC Risk Range:				10 ⁻⁵	1
USEPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in sediment.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-99
Summary of Human Health Risk Estimates for a Current/Future Trench Worker
Site SS03 - Sediment

Subsurface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95 % UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Aluminum	27,900	nc	27,900	na	0.032
Arsenic	21	nc	21	5.3E-07	0.082
Chromium	62	nc	62	na	0.00025
Cobalt	23	nc	23	1.6E-09	0.082
Manganese	1,320	nc	1,320	na	0.16
Titanium	1,160	nc	1,160	na	na
Vanadium	107	nc	107	na	0.074
Cumulative ILCR/HQ:				5E-07	0.4
ADEC Risk Range:				10 ⁻⁵	1
USEPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in sediment.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-100
Summary of Human Health Risk Estimates for a Current/Future Site Visitor
Site SS03 - Sediment

Subsurface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95 % UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Aluminum	27,900	nc	27,900	na	0.0010
Arsenic	21	nc	21	4.3E-07	0.0027
Chromium	62	nc	62	na	0.000013
Cobalt	23	nc	23	2.2E-09	0.0025
Manganese	1,320	nc	1,320	na	0.0073
Titanium	1,160	nc	1,160	na	na
Vanadium	107	nc	107	na	0.0036
Cumulative ILCR/HQ:				4E-07	0.02
ADEC Risk Range:				10 ⁻⁵	1
USEPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in sediment.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-101
Summary of Human Health Risk Estimates for a Future Site Worker
Site SS03 - Subsurface Water

Subsurface Water (mg/L)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Volatile Organic Compounds					
1,2,4-Trimethylbenzene	0.36	0.13	0.13	na	1.1
1,2-Dichloroethane	0.0023	0.00070	0.00070	7.2E-07	0.0010
Benzene	0.34	0.12	0.12	8.7E-05	1.1
Ethylbenzene	0.41	0.14	0.14	3.0E-05	0.063
Semi-Volatile Organic Compounds					
2-Nitrophenol	0.00040	nc	0.00040	na	0.023
3,3'-Dichlorobenzidine	0.0050	nc	0.0050	2.8E-05	na
4-Chloroaniline	0.0030	nc	0.0030	6.2E-07	0.021
Bis(2-chloroethyl) Ether	0.00050	nc	0.00050	5.5E-06	na
Hexachlorobutadiene	0.0030	nc	0.0030	5.9E-06	0.21
Polynuclear Aromatic Hydrocarbons					
Naphthalene	0.18	0.092	0.092	4.7E-06	0.31
Cumulative ILCR/HQ				2E-04	3
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	6.4	3.5	3.5	na	nc
Diesel Range Organics (DRO), Aliphatic	na	na	2.8	na	0.77
Diesel Range Organics (DRO), Aromatic	na	na	1.4	na	0.96
Gasoline Range Organics (GRO)	7.5	3.4	3.4	na	nc
Gasoline Range Organics (GRO), Aliphatic	na	na	2.4	na	0.013
Gasoline Range Organics (GRO), Aromatic	na	na	1.7	na	0.23
Residual Range Organics (RRO)	6.9	3.4	3.4	na	nc
Residual Range Organics (RRO), Aliphatic	na	na	3.1	na	0.042
Residual Range Organics (RRO), Aromatic	na	na	1.0	na	0.93
Cumulative ILCR/HQ:				na	3
ADEC Risk Range:				10 ⁻⁵	1
USEPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Table F-101
Summary of Human Health Risk Estimates for a Future Site Worker
Site SS03 - Subsurface Water

Subsurface Water (mg/L)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in subsurface water.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/L - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-102
Summary of Human Health Risk Estimates for a Future Site Worker/Recreational Hunter
Site SS03 - Subsurface Water

Subsurface Water (mg/L)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
1,2,4-Trimethylbenzene	0.36	0.13	0.13	na	1.1
1,2-Dichloroethane	0.0023	0.00070	0.00070	7.2E-07	0.0010
Benzene	0.34	0.12	0.12	8.7E-05	1.1
Ethylbenzene	0.41	0.14	0.14	3.0E-05	0.063
Semi-Volatile Organic Compounds					
2-Nitrophenol	0.00040	nc	0.00040	na	0.023
3,3'-Dichlorobenzidine	0.0050	nc	0.0050	2.8E-05	na
4-Chloroaniline	0.0030	nc	0.0030	6.2E-07	0.021
Bis(2-chloroethyl) Ether	0.00050	nc	0.00050	5.5E-06	na
Hexachlorobutadiene	0.0030	nc	0.0030	5.9E-06	0.21
Polynuclear Aromatic Hydrocarbons					
Naphthalene	0.18	0.092	0.092	4.7E-06	0.31
Cumulative ILCR/HQ				2E-04	3
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	6.4	3.5	3.5	nc	nc
Diesel Range Organics (DRO), Aliphatic	na	na	2.8	na	0.77
Diesel Range Organics (DRO), Aromatic	na	na	1.4	na	0.96
Gasoline Range Organics (GRO)	7.5	3.4	3.4	nc	nc
Gasoline Range Organics (GRO), Aliphatic	na	na	2.4	na	0.013
Gasoline Range Organics (GRO), Aromatic	na	na	1.7	na	0.23
Residual Range Organics (RRO)	6.9	3.4	3.4	nc	nc
Residual Range Organics (RRO), Aliphatic	na	na	3.1	na	0.042
Residual Range Organics (RRO), Aromatic	na	na	1.0	na	0.93
Cumulative ILCR/HQ:				NA	3
ADEC Risk Range:				10 ⁻⁵	1
USEPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Table F-102
Summary of Human Health Risk Estimates for a Future Site Worker/Recreational Hunter
Site SS03 - Subsurface Water

Subsurface Water (mg/L)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in subsurface water.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/L - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-103
Summary of Human Health Risk Estimates for a Future Trench Worker
Site SS03 - Subsurface Water

Subsurface Water (mg/L)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
1,2,4-Trimethylbenzene	0.36	0.13	0.13	na	1.1
1,2-Dichloroethane	0.0023	0.00070	0.00070	2.9E-08	0.0010
Benzene	0.34	0.12	0.12	3.5E-06	1.1
Ethylbenzene	0.41	0.14	0.14	1.2E-06	0.063
Semi-Volatile Organic Compounds					
2-Nitrophenol	0.00040	nc	0.00040	na	0.023
3,3'-Dichlorobenzidine	0.0050	nc	0.0050	1.1E-06	na
4-Chloroaniline	0.0030	nc	0.0030	2.5E-08	0.021
Bis(2-chloroethyl) Ether	0.00050	nc	0.00050	2.2E-07	na
Hexachlorobutadiene	0.0030	nc	0.0030	2.4E-07	0.21
Polynuclear Aromatic Hydrocarbons					
Naphthalene	0.18	0.092	0.092	1.9E-07	0.31
Cumulative ILCR/HQ				6E-06	3
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	6.4	3.5	3.5	na	nc
Diesel Range Organics (DRO), Aliphatic	na	na	2.8	na	0.77
Diesel Range Organics (DRO), Aromatic	na	na	1.4	na	0.96
Gasoline Range Organics (GRO)	7.5	3.4	3.4	na	nc
Gasoline Range Organics (GRO), Aliphatic	na	na	2.4	na	0.013
Gasoline Range Organics (GRO), Aromatic	na	na	1.7	na	0.23
Residual Range Organics (RRO)	6.9	3.4	3.4	na	nc
Residual Range Organics (RRO), Aliphatic	na	na	3.1	na	0.042
Residual Range Organics (RRO), Aromatic	na	na	1.0	na	0.93
Cumulative ILCR/HQ:				NA	3
ADEC Risk Range:				10 ⁻⁵	1
USEPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Table F-103
Summary of Human Health Risk Estimates for a Future Trench Worker
Site SS03 - Subsurface Water

Subsurface Water (mg/L)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in subsurface water.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/L - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-104
Summary of Human Health Risk Estimates for a Future Site Visitor
Site SS03 - Subsurface Water

Subsurface Water (mg/L)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Volatile Organic Compounds					
1,2,4-Trimethylbenzene	0.36	0.13	0.13	na	0.043
1,2-Dichloroethane	0.0023	0.00070	0.00070	2.9E-08	0.000040
Benzene	0.34	0.12	0.12	3.5E-06	0.044
Ethylbenzene	0.41	0.14	0.14	1.2E-06	0.0025
Semi-Volatile Organic Compounds					
2-Nitrophenol	0.00040	nc	0.00040	na	0.00091
3,3'-Dichlorobenzidine	0.0050	nc	0.0050	1.1E-06	na
4-Chloroaniline	0.0030	nc	0.0030	2.5E-08	0.00086
Bis(2-chloroethyl) Ether	0.00050	nc	0.00050	2.2E-07	na
Hexachlorobutadiene	0.0030	nc	0.0030	2.4E-07	0.0085
Polynuclear Aromatic Hydrocarbons					
Naphthalene	0.18	0.092	0.092	1.9E-07	0.012
Cumulative ILCR/HQ				6E-06	0.1
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	6.4	3.5	3.5	nc	nc
Diesel Range Organics (DRO), Aliphatic	na	na	2.8	na	0.031
Diesel Range Organics (DRO), Aromatic	na	na	1.4	na	0.039
Gasoline Range Organics (GRO)	7.5	3.4	3.4	nc	nc
Gasoline Range Organics (GRO), Aliphatic	na	na	2.4	na	0.00052
Gasoline Range Organics (GRO), Aromatic	na	na	1.7	na	0.0093
Residual Range Organics (RRO)	6.9	3.4	3.4	nc	nc
Residual Range Organics (RRO), Aliphatic	na	na	3.1	na	0.0017
Residual Range Organics (RRO), Aromatic	na	na	1.0	na	0.037
Cumulative ILCR/HQ:				NA	0.1
ADEC Risk Range:				10 ⁻⁵	1
USEPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Table F-104
Summary of Human Health Risk Estimates for a Future Site Visitor
Site SS03 - Subsurface Water

Subsurface Water (mg/L)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in subsurface water.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/L - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-105
Summary of Human Health Risk Estimates for a Current/Future Site Worker
Site SS08 - Surface Soil

Surface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Aluminum	33,200	28,655	28,655	na	0.019
Arsenic	23	19	19	7.1E-06	0.045
Chromium	60	54	54	na	0.00020
Cobalt	25	22	22	3.7E-08	0.042
Manganese	1,190	1,030	1,030	na	0.10
Titanium	1,320	1,271	1,271	na	na
Vanadium	97	83	83	na	0.049
Volatile Organic Compounds					
1,3,5-Trimethylbenzene	5	nc	5	na	0.052
Trichloroethene	0	0	0	1.5E-08	na
Semi-Volatile Organic Compounds					
2-Nitroaniline	0.06	nc	0.06	na	0.000024
3-Nitroaniline	0.09	nc	0.09	7.7E-10	0.00034
4-Chloro-3-methylphenol	0.10	nc	0.10	na	na
Polynuclear Aromatic Hydrocarbons					
Benzo(a)pyrene	0.08	nc	0.08	2.8E-07	na
Pesticides					
4,4'-DDT	5	4	4	3.2E-07	0.0052
Polychlorinated Biphenyls					
Arochlor 1260	17	12	12	1.1E-05	na
Cumulative ILCR/HQ:				2E-05	0.3
ADEC Risk Range:				10 ⁻⁵	1
EPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Table F-105
Summary of Human Health Risk Estimates for a Current/Future Site Worker
Site SS08 - Surface Soil

Surface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in surface soil samples.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-106
Summary of Human Health Risk Estimates for a Current/Future Site Worker/Recreational Hunter
Site SS08 - Surface Soil

Surface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Aluminum	33,200	28,655	28,655	na	0.035
Arsenic	23	19	19	1.2E-05	0.077
Chromium	60	54	54	na	0.00016
Cobalt	25	22	22	3.9E-08	0.081
Manganese	1,190	1,030	1,030	na	0.10
Titanium	1,320	1,271	1,271	na	na
Vanadium	97	83	83	na	0.044
Volatile Organic Compounds					
1,3,5-Trimethylbenzene	5	nc	5	na	0.056
Trichloroethene	0.10	0.13	0.10	1.7E-08	na
Semi-Volatile Organic Compounds					
2-Nitroaniline	0.06	nc	0.06	na	0.000031
3-Nitroaniline	0.09	nc	0.09	1.0E-09	0.00044
4-Chloro-3-methylphenol	0.10	nc	0.10	na	na
Polynuclear Aromatic Hydrocarbons					
Benzo(a)pyrene	0.08	nc	0.08	3.3E-07	na
Pesticides					
4,4'-DDT	5	4	4	5.5E-07	0.0091
Polychlorinated Biphenyls					
Arochlor 1260	17	12	12	1.4E-05	na
Cumulative ILCR/HQ:				3E-05	0.4
ADEC Risk Range:				10 ⁻⁵	1
EPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Table F-106
Summary of Human Health Risk Estimates for a Current/Future Site Worker/Recreational Hunter
Site SS08 - Surface Soil

Surface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in surface soil samples.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-107
Summary of Human Health Risk Estimates for a Current/Future Trench Worker
Site SS08 - Surface Soil

Surface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Aluminum	33,200	28,655	28,655	na	0.033
Arsenic	23	19	19	4.9E-07	0.076
Chromium	60	54	54	na	0.00022
Cobalt	25	22	22	1.5E-09	0.077
Manganese	1,190	1,030	1,030	na	0.12
Titanium	1,320	1,271	1,271	na	na
Vanadium	97	83	83	na	0.058
Volatile Organic Compounds					
1,3,5-Trimethylbenzene	5	nc	5	na	0.052
Trichloroethene	0.10	0.13	0.10	6.1E-10	na
Semi-Volatile Organic Compounds					
2-Nitroaniline	0.06	nc	0.06	na	0.000034
3-Nitroaniline	0.09	nc	0.09	4.4E-11	0.00049
4-Chloro-3-methylphenol	0.10	nc	0.10	na	na
Polynuclear Aromatic Hydrocarbons					
Benzo(a)pyrene	0.08	nc	0.08	1.5E-08	na
Pesticides					
4,4'-DDT	5	4	4	2.2E-08	0.0090
Polychlorinated Biphenyls					
Arochlor 1260	17	12	12	6.2E-07	na
Cumulative ILCR/HQ:				1E-06	0.4
ADEC Risk Range:				10 ⁻⁵	1

Table F-107
Summary of Human Health Risk Estimates for a Current/Future Trench Worker
Site SS08 - Surface Soil

Surface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
EPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in surface soil samples.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-108
Summary of Human Health Risk Estimates for a Current/Future Site Visitor
Site SS08 - Surface Soil

Surface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Aluminum	33,200	28,655	28,655	na	0.0011
Arsenic	23	19	19	4.0E-07	0.0025
Chromium	60	54	54	na	0.000011
Cobalt	25	22	22	2.0E-09	0.0023
Manganese	1,190	1,030	1,030	na	0.0057
Titanium	1,320	1,271	1,271	na	na
Vanadium	97	83	83	na	0.0028
Volatile Organic Compounds					
1,3,5-Trimethylbenzene	5	nc	5	na	0.0029
Trichloroethene	0.10	0.13	0.10	8.5E-10	na
Semi-Volatile Organic Compounds					
2-Nitroaniline	0.06	nc	0.06	na	0.0000013
3-Nitroaniline	0.09	nc	0.09	4.3E-11	0.000019
4-Chloro-3-methylphenol	0.10	nc	0.10	na	na
Polynuclear Aromatic Hydrocarbons					
Benzo(a)pyrene	0.08	nc	0.08	1.6E-08	na
Pesticides					
4,4'-DDT	5	4	4	1.8E-08	0.00029
Polychlorinated Biphenyls					
Arochlor 1260	17	12	12	6.4E-07	na
Cumulative ILCR/HQ:				1E-06	0.02
ADEC Risk Range:				10 ⁻⁵	1
EPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Table F-108
Summary of Human Health Risk Estimates for a Current/Future Site Visitor
Site SS08 - Surface Soil

Surface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in surface soil samples.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-109
Summary of Human Health Risk Estimates for a Current/Future Site Worker
Site SS08 - Subsurface Soil

Subsurface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Aluminum	35700	29175	29175	na	0.019
Arsenic	20	16	16	6.0E-06	0.037
Chromium	57	52	52	na	0.00019
Cobalt	43	26	26	4.4E-08	0.051
Lead	114	63	63	na	na
Manganese	1040	949	949	na	0.093
Titanium	1350	1087	1,087	na	na
Vanadium	93	80	80	na	0.047
Polynuclear Aromatic Hydrocarbons					
Benzo(a)pyrene	0.057	0.077	0.057	2.0E-07	na
Pesticides					
Dieldrin	0.040	nc	0.040	2.6E-09	0.00091
Polychlorinated Biphenyls					
Arochlor 1260	1.6	1.6	1.6	1.6E-06	na
Cumulative ILCR/HQ:				8E-06	0.2

Table F-109
Summary of Human Health Risk Estimates for a Current/Future Site Worker
Site SS08 - Subsurface Soil

Subsurface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	23,900	12,310	12,310	na	nc
Diesel Range Organics (DRO), Aliphatic	na	na	9,848	na	0.048
Diesel Range Organics (DRO), Aromatic	na	na	4,924	na	0.060
Residual Range Organics (RRO)	13,200	8,973	8,973	na	nc
Residual Range Organics (RRO), Aliphatic	na	na	8,076	na	0.0020
Residual Range Organics (RRO), Aromatic	na	na	2,692	na	0.044
Cumulative ILCR/HQ:				NA	0.2
ADEC Risk Range:				10 ⁻⁵	1
USEPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in subsurface soil.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-110
Summary of Human Health Risk Estimates for a Current/Future Site Worker/Recreational Hunter
Site SS08 - Subsurface Soil

Subsurface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Aluminum	35,700	29,175	29,175	na	0.035
Arsenic	20	16	16	1.0E-05	0.065
Chromium	57	52	52	na	0.00015
Cobalt	43	26	26	4.8E-08	0.099
Lead	114	63	63	na	na
Manganese	1,040	949	949	na	0.094
Titanium	1,350	1,087	1,087	na	na
Vanadium	93	80	80	na	0.043
Polynuclear Aromatic Hydrocarbons					
Benzo(a)pyrene	0.06	0.08	0.06	2.4E-07	na
Pesticides					
Dieldrin	0.04	nc	0.04	3.4E-09	0.001
Polychlorinated Biphenyls					
Arochlor 1260	1.63	2	1.63	1.9E-06	na
Cumulative ILCR/HQ:				1E-05	0.3

Table F-110
Summary of Human Health Risk Estimates for a Current/Future Site Worker/Recreational Hunter
Site SS08 - Subsurface Soil

Subsurface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	23,900	12,310	12,310	na	nc
Diesel Range Organics (DRO), Aliphatic	na	na	9,848	na	0.10
Diesel Range Organics (DRO), Aromatic	na	na	4,924	na	0.13
Residual Range Organics (RRO)	13,200	8,973	8,973	na	nc
Residual Range Organics (RRO), Aliphatic	na	na	8,076	na	0.0043
Residual Range Organics (RRO), Aromatic	na	na	2,692	na	0.095
Cumulative ILCR/HQ:				NA	0.3
ADEC Risk Range:				10 ⁻⁵	1
USEPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in subsurface soil.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-111
Summary of Human Health Risk Estimates for a Current/Future Trench Worker
Site SS08 - Subsurface Soil

Subsurface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Aluminum	35,700	29,175	29,175	na	0.034
Arsenic	20	16	16	4.1E-07	0.064
Chromium	57	52	52	na	0.00021
Cobalt	43	26	26	1.8E-09	0.094
Lead	114	63	63	na	na
Manganese	1,040	949	949	na	0.11
Titanium	1,350	1,087	1,087	na	na
Vanadium	93	80	80	na	0.055
Polynuclear Aromatic Hydrocarbons					
Benzo(a)pyrene	0.06	0.08	0.06	1.1E-08	na
Pesticides					
Dieldrin	0.04	nc	0.04	1.5E-10	0.0013
Polychlorinated Biphenyls					
Arochlor 1260	1.63	2	1.63	8.8E-08	na
Cumulative ILCR/HQ:				5E-07	0.4

Table F-111
Summary of Human Health Risk Estimates for a Current/Future Trench Worker
Site SS08 - Subsurface Soil

Subsurface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	23,900	12,310	12,310	na	nc
Diesel Range Organics (DRO), Aliphatic	na	na	9,848	na	0.096
Diesel Range Organics (DRO), Aromatic	na	na	4,924	na	0.12
Residual Range Organics (RRO)	13,200	8,973	8,973	na	nc
Residual Range Organics (RRO), Aliphatic	na	na	8,076	na	0.0040
Residual Range Organics (RRO), Aromatic	na	na	2,692	na	0.088
Cumulative ILCR/HQ:				NA	0.3
ADEC Risk Range:				10 ⁻⁵	1
USEPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in subsurface soil.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-112
Summary of Human Health Risk Estimates for a Current/Future Site Visitor
Site SS08 - Subsurface Soil

Subsurface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Aluminum	35,700	29,175	29,175	na	0.0011
Arsenic	20	16	16	3.3E-07	0.0021
Chromium	57	52	52	na	0.000011
Cobalt	43	26	26	2.5E-09	0.0028
Lead	114	63	63	na	na
Manganese	1,040	949	949	na	0.0052
Titanium	1,350	1,087	1,087	na	na
Vanadium	93	80	80	na	0.0027
Polynuclear Aromatic Hydrocarbons					
Benzo(a)pyrene	0.06	0.08	0.06	1.1E-08	na
Pesticides					
Dieldrin	0.04	nc	0.04	1.5E-10	0.000051
Polychlorinated Biphenyls					
Arochlor 1260	1.63	2	1.63	9.1E-08	na
Cumulative ILCR/HQ:				4E-07	0.01

Table F-112
Summary of Human Health Risk Estimates for a Current/Future Site Visitor
Site SS08 - Subsurface Soil

Subsurface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	23,900	12,310	12,310	na	nc
Diesel Range Organics (DRO), Aliphatic	na	na	9,848	na	0.0027
Diesel Range Organics (DRO), Aromatic	na	na	4,924	na	0.0034
Residual Range Organics (RRO)	13,200	8,973	8,973	na	nc
Residual Range Organics (RRO), Aliphatic	na	na	8,076	na	0.00011
Residual Range Organics (RRO), Aromatic	na	na	2,692	na	0.0025
Cumulative ILCR/HQ:				NA	0.009
ADEC Risk Range:				10 ⁻⁵	1
USEPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in subsurface soil.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-113
Summary of Human Health Risk Estimates for a Current/Future Site Worker
Site SS08 - Sediment

Subsurface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Aluminum	35,000	nc	35,000	na	0.023
Arsenic	24	21	21	7.7E-06	0.048
Chromium	78	62	62	na	0.00023
Cobalt	32	nc	32	5.3E-08	0.061
Lead	69	51	51	na	na
Manganese	1,300	nc	1,300	na	0.13
Titanium	1,470	nc	1,470	na	na
Vanadium	106	nc	106	na	0.063
Polynuclear Aromatic Hydrocarbons					
Benzo(a)pyrene	0	nc	0	2.2E-07	na
Pesticides					
4,4'-DDT	2.5	2.0	2.0	1.7E-07	0.0027
Polychlorinated Biphenyls					
Arochlor 1260	0.19	0.17	0.17	1.7E-07	na
Cumulative ILCR/HQ:				8E-06	0.3
ADEC Risk Range:				10 ⁻⁵	1
USEPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in sediment.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-114
Summary of Human Health Risk Estimates for a Current/Future Site Worker/Recreational Hunter
Site SS08 - Sediment

Subsurface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Aluminum	35,000	nc	35,000	na	0.043
Arsenic	24	21	21	1.3E-05	0.083
Chromium	78	62	62	na	0.00018
Cobalt	32	nc	32	5.8E-08	0.12
Lead	69	51	51	na	na
Manganese	1,300	nc	1,300	na	0.13
Titanium	1,470	nc	1,470	na	na
Vanadium	106	nc	106	na	0.057
Polynuclear Aromatic Hydrocarbons					
Benzo(a)pyrene	0.06	nc	0.06	2.6E-07	na
Pesticides					
4,4'-DDT	3	2.0	2	2.9E-07	0.0047
Polychlorinated Biphenyls					
Arochlor 1260	0.19	0.17	0.17	2.0E-07	na
Cumulative ILCR/HQ:				1E-05	0.4
ADEC Risk Range:				10 ⁻⁵	1
USEPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in sediment.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-115
Summary of Human Health Risk Estimates for a Current/Future Trench Worker
Site SS08 - Sediment

Subsurface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Aluminum	35,000	nc	35,000	na	0.040
Arsenic	24	21	21	5.3E-07	0.082
Chromium	78	62	62	na	0.00025
Cobalt	32	nc	32	2.1E-09	0.11
Lead	69	51	51	na	na
Manganese	1,300	nc	1,300	na	0.15
Titanium	1,470	nc	1,470	na	na
Vanadium	106	nc	106	na	0.073
Polynuclear Aromatic Hydrocarbons					
Benzo(a)pyrene	0.06	nc	0.06	1.2E-08	na
Pesticides					
4,4'-DDT	3	2.0	2	1.1E-08	0.0047
Polychlorinated Biphenyls					
Arochlor 1260	0.19	0.17	0.17	9.0E-09	na
Cumulative ILCR/HQ:				6E-07	0.5
ADEC Risk Range:				10 ⁻⁵	1
USEPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in sediment.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-116
Summary of Human Health Risk Estimates for a Current/Future Site Visitor
Site SS08 - Sediment

Subsurface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Aluminum	35,000	nc	35,000	na	0.0013
Arsenic	24	21	21	4.3E-07	0.0027
Chromium	78	62	62	na	0.000013
Cobalt	32	nc	32	3.0E-09	0.0034
Lead	69	51	51	na	na
Manganese	1,300	nc	1,300	na	0.0071
Titanium	1,470	nc	1,470	na	na
Vanadium	106	nc	106	na	0.0035
Polynuclear Aromatic Hydrocarbons					
Benzo(a)pyrene	0.06	nc	0.06	1.2E-08	na
Pesticides					
4,4'-DDT	3	2.0	2	9.2E-09	0.00015
Polychlorinated Biphenyls					
Arochlor 1260	0.19	0.17	0.17	9.4E-09	na
Cumulative ILCR/HQ:				5E-07	0.02
ADEC Risk Range:				10 ⁻⁵	1
USEPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in sediment.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-117
Summary of Human Health Risk Estimates for a Future Site Worker
Site SS08 - Subsurface Water

Subsurface Water (mg/L)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Aluminum	176	189	176	na	4.8
Antimony	0.0030	nc	0.0030	na	0.21
Arsenic	0.31	0.082	0.082	1.2E-03	7.5
Barium	2.2	0.53	0.53	na	0.074
Beryllium	0.0068	nc	0.0068	na	0.12
Cadmium, water	0.0095	0.0024	0.0024	na	0.14
Chromium	0.37	0.13	0.13	na	0.0027
Cobalt	0.19	nc	0.19	na	17
Copper	0.51	nc	0.51	na	0.35
Lead	0.33	0.087	0.087	nc	na
Manganese	16	17	16	na	19
Mercury	0.00060	0.00024	0.00024	na	0.023
Nickel	0.45	nc	0.45	na	0.62
Selenium	0.025	0.013	0.013	na	0.072
Thallium	0.0013	nc	0.0013	na	0.45
Titanium	0.038	nc	0.038	na	na
Vanadium	0.50	nc	0.50	na	3.0
Zinc	0.88	1.0	0.88	na	0.081
Volatile Organic Compounds					
1,2-Dibromoethane	0.0010	nc	0.0010	2.2E-05	0.0039
2-Chloroethyl Vinyl Ether	0.00019	nc	0.00019	na	na
Benzene	0.0010	nc	0.0010	7.4E-07	0.0093
Toluene	0.12	0.033	0.033	na	0.014
Polynuclear Aromatic Hydrocarbons					
2-Methylnaphthalene	0.46	nc	0.46	na	6.1
Naphthalene	0.14	0.033	0.033	1.7E-06	0.11
Cumulative ILCR/HQ				1E-03	60

Table F-117
Summary of Human Health Risk Estimates for a Future Site Worker
Site SS08 - Subsurface Water

Subsurface Water (mg/L)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	190	36	36	nc	nc
Diesel Range Organics (DRO), Aliphatic	na	na	29	na	7.9
Diesel Range Organics (DRO), Aromatic	na	na	14	na	9.8
Cumulative ILCR/HQ:				NA	18
ADEC Risk Range:				10 ⁻⁵	1
USEPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in subsurface water.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/L - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-118
Summary of Human Health Risk Estimates for a Future Site Worker/Recreational Hunter
Site SS08 - Subsurface Water

Subsurface Water (mg/L)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Aluminum	176	189	176	na	4.8
Antimony	0.0030	nc	0.0030	na	0.21
Arsenic	0.31	0.082	0.082	1.2E-03	7.5
Barium	2.2	0.53	0.53	na	0.074
Beryllium	0.0068	nc	0.0068	na	0.12
Cadmium, water	0.0095	0.0024	0.0024	na	0.14
Chromium	0.37	0.13	0.13	na	0.0027
Cobalt	0.19	nc	0.19	na	17
Copper	0.51	nc	0.51	na	0.35
Lead	0.33	0.087	0.087	nc	na
Manganese	16	17	16	na	19
Mercury	0.00060	0.00024	0.00024	na	0.023
Nickel	0.45	nc	0.45	na	0.62
Selenium	0.025	0.013	0.013	na	0.072
Thallium	0.0013	nc	0.0013	na	0.45
Titanium	0.038	nc	0.038	na	na
Vanadium	0.50	nc	0.50	na	3.0
Zinc	0.88	1.0	0.88	na	0.081
Volatile Organic Compounds					
1,2-Dibromoethane	0.0010	nc	0.0010	2.2E-05	0.0039
2-Chloroethyl Vinyl Ether	0.00019	nc	0.00019	na	na
Benzene	0.0010	nc	0.0010	7.4E-07	0.0093
Toluene	0.12	0.033	0.033	na	0.014
Polynuclear Aromatic Hydrocarbons					
2-Methylnaphthalene	0.46	nc	0.46	na	6.1
Naphthalene	0.14	0.033	0.033	1.6E-10	0.11
Cumulative ILCR/HQ				1E-03	60
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	190	36	36	nc	nc
Diesel Range Organics (DRO), Aliphatic	na	na	29	na	7.9
Diesel Range Organics (DRO), Aromatic	na	na	14	na	9.8
Cumulative ILCR/HQ:				NA	18
ADEC Risk Range:				10 ⁻⁵	1
USEPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Table F-118
Summary of Human Health Risk Estimates for a Future Site Worker/Recreational Hunter
Site SS08 - Subsurface Water

Subsurface Water (mg/L)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in subsurface water.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/L - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-119
Summary of Human Health Risk Estimates for a Future Trench Worker
Site SS08 - Subsurface Water

Subsurface Water (mg/L)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Aluminum	176	189	176	na	4.8
Antimony	0.0030	nc	0.0030	na	0.21
Arsenic	0.31	0.082	0.082	4.8E-05	7.5
Barium	2.2	0.53	0.53	na	0.074
Beryllium	0.0068	nc	0.0068	na	0.12
Cadmium, water	0.0095	0.0024	0.0024	na	0.14
Chromium	0.37	0.13	0.13	na	0.0027
Cobalt	0.19	nc	0.19	na	17
Copper	0.51	nc	0.51	na	0.35
Lead	0.33	0.087	0.087	nc	na
Manganese	16	17	16	na	19
Mercury	0.00060	0.00024	0.00024	na	0.023
Nickel	0.45	nc	0.45	na	0.62
Selenium	0.025	0.013	0.013	na	0.072
Thallium	0.0013	nc	0.0013	na	0.45
Titanium	0.038	nc	0.038	na	na
Vanadium	0.50	nc	0.50	na	3.0
Zinc	0.88	1.0	0.88	na	0.081
Volatile Organic Compounds					
1,2-Dibromoethane	0.0010	nc	0.0010	8.7E-07	0.0039
2-Chloroethyl Vinyl Ether	0.00019	nc	0.00019	na	na
Benzene	0.0010	nc	0.0010	3.0E-08	0.0093
Toluene	0.12	0.033	0.033	na	0.014
Polynuclear Aromatic Hydrocarbons					
2-Methylnaphthalene	0.46	nc	0.46	na	6.1
Naphthalene	0.14	0.033	0.033	6.8E-08	0.11
Cumulative ILCR/HQ				5E-05	60

Table F-119
Summary of Human Health Risk Estimates for a Future Trench Worker
Site SS08 - Subsurface Water

Subsurface Water (mg/L)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	190	36	36	nc	nc
Diesel Range Organics (DRO), Aliphatic	na	na	29	na	7.9
Diesel Range Organics (DRO), Aromatic	na	na	14	na	9.8
Cumulative ILCR/HQ:				NA	18
ADEC Risk Range:				10 ⁻⁵	1
USEPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in subsurface water.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/L - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-120
Summary of Human Health Risk Estimates for a Future Site Visitor
Site SS08 - Subsurface Water

Subsurface Water (mg/L)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Aluminum	176	189	176	na	0.19
Antimony	0.0030	nc	0.0030	na	0.0083
Arsenic	0.31	0.082	0.082	4.8E-05	0.30
Barium	2.2	0.53	0.53	na	0.0030
Beryllium	0.0068	nc	0.0068	na	0.0049
Cadmium, water	0.0095	0.0024	0.0024	na	0.0056
Chromium	0.37	0.13	0.13	na	0.00011
Cobalt	0.19	nc	0.19	na	0.69
Copper	0.51	nc	0.51	na	0.014
Lead	0.33	0.087	0.087	nc	na
Manganese	16	17	16	na	0.76
Mercury	0.00060	0.00024	0.00024	na	0.00091
Nickel	0.45	nc	0.45	na	0.025
Selenium	0.025	0.013	0.013	na	0.0029
Thallium	0.0013	nc	0.0013	na	0.018
Titanium	0.038	nc	0.038	na	na
Vanadium	0.50	nc	0.50	na	0.12
Zinc	0.88	1.0	0.88	na	0.0032
Volatile Organic Compounds					
1,2-Dibromoethane	0.0010	nc	0.0010	8.7E-07	0.00015
2-Chloroethyl Vinyl Ether	0.00019	nc	0.00019	na	na
Benzene	0.0010	nc	0.0010	3.0E-08	0.00037
Toluene	0.12	0.033	0.033	na	0.00058
Polynuclear Aromatic Hydrocarbons					
2-Methylnaphthalene	0.46	nc	0.46	na	0.25
Naphthalene	0.14	0.033	0.033	6.8E-08	0.0045
Cumulative ILCR/HQ				5E-05	2
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	190	36	36	nc	nc
Diesel Range Organics (DRO), Aliphatic	na	na	29	na	0.31
Diesel Range Organics (DRO), Aromatic	na	na	14	na	0.39
Cumulative ILCR/HQ:				NA	0.7
ADEC Risk Range:				10 ⁻⁵	1
USEPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Table F-120
Summary of Human Health Risk Estimates for a Future Site Visitor
Site SS08 - Subsurface Water

Subsurface Water (mg/L)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in subsurface water.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/L - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-121
Summary of Human Health Risk Estimates for a Current/Future Site Worker
Site SS11 - Surface Soil

Surface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Aluminum	22700	nc	22700	na	0.015
Arsenic	20	10	10	3.7E-06	0.023
Barium	3680	1256	1256	na	0.010
Chromium	47	40	40	na	0.00015
Cobalt	20	nc	20	3.4E-08	0.039
Lead	462	120	120	na	na
Manganese	1080	nc	1080	na	0.11
Titanium	1460	nc	1460	na	na
Volatile Organic Compounds					
1,2,4-Trimethylbenzene	17	6.6	6.6	na	0.053
1,3,5-Trimethylbenzene	4.4	1.9	1.9	na	0.022
Semi-Volatile Organic Compounds					
4-Methylphenol	46	nc	46	na	0.010
Dibenzofuran	1700	267	267	na	0.15
Polynuclear Aromatic Hydrocarbons					
2-Methylnaphthalene	8600	3697	3697	na	1.2
Acenaphthene	9200	2800	2800	na	0.062
Anthracene	7300	2230	2230	na	0.0099
Benzo(a)anthracene	3100	950	950	3.3E-04	na
Benzo(a)pyrene	1800	286	286	9.9E-04	na
Benzo(b)fluoranthene	2300	705	705	2.4E-04	na
Benzo(g,h,i)perylene	740	229	229	na	0.010
Benzo(k)fluoranthene	790	166	166	5.8E-06	na
Chrysene	3500	1066	1066	3.7E-06	na
Dibenz(a,h)anthracene	210	34	34	1.2E-04	na
Fluoranthene	10000	3063	3063	na	0.10
Fluorene	5700	1744	1744	na	0.058
Indeno(1,2,3-cd)pyrene	640	103	103	3.6E-05	na
Naphthalene	13000	3555	3555	4.1E-04	11
Phenanthrene	17000	5177	5177	na	0.023
Pyrene	10000	3029	3029	na	0.13

Table F-121
Summary of Human Health Risk Estimates for a Current/Future Site Worker
Site SS11 - Surface Soil

Surface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Pesticides					
Aldrin	0.051	0.017	0.017	1.2E-07	0.00063
alpha-BHC	2.0	0.70	0.70	1.8E-06	na
alpha-Chlordane	2.0	0.65	0.65	6.1E-08	0.0015
delta-BHC	1.7	0.65	0.65	4.8E-07	na
Endrin	3.5	0.61	0.61	na	0.0023
Endrin Aldehyde	2.9	0.94	0.94	na	0.0036
Endrin Ketone	2.2	0.75	0.75	na	0.0028
Heptachlor	0.28	0.055	0.055	1.0E-07	0.00012
Toxaphene	1.7	1.5	1.5	6.5E-07	na
Cumulative ILCR/HQ:				2E-03	14
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	200000	79575	79575	na	nc
Diesel Range Organics (DRO), Aliphatic	na	na	63660	na	0.31
Diesel Range Organics (DRO), Aromatic	na	na	31830	na	0.39
Residual Range Organics (RRO)	160000	60057	60057	na	nc
Residual Range Organics (RRO), Aliphatic	na	na	54051	na	0.013
Residual Range Organics (RRO), Aromatic	na	na	18017	na	0.29
Cumulative ILCR/HQ:				na	1
ADEC Risk Range:				10 ⁻⁵	1
EPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in surface soil samples.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-122
Summary of Human Health Risk Estimates for a Current/Future Site Worker/Recreational Hunter
Site SS11 - Surface Soil

Surface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Aluminum	22700	nc	22700	na	0.028
Arsenic	20	10	10	6.4E-06	0.040
Barium	3680	1256	1256	na	0.012
Chromium	47	40	40	na	0.00012
Cobalt	20	nc	20	3.7E-08	0.075
Lead	462	120	120	na	na
Manganese	1080	nc	1080	na	0.11
Titanium	1460	nc	1460	na	na
Volatile Organic Compounds					
1,2,4-Trimethylbenzene	17	6.6	6.6	na	0.057
1,3,5-Trimethylbenzene	4.4	1.9	1.9	na	0.024
Semi-Volatile Organic Compounds					
4-Methylphenol	46	nc	46	na	0.014
Dibenzofuran	1700	267	267	na	0.20
Polynuclear Aromatic Hydrocarbons					
2-Methylnaphthalene	8600	3697	3697	na	1.5
Acenaphthene	9200	2800	2800	na	0.075
Anthracene	7300	2230	2230	na	0.012
Benzo(a)anthracene	3100	950	950	4.0E-04	na
Benzo(a)pyrene	1800	286	286	1.2E-03	na
Benzo(b)fluoranthene	2300	705	705	2.9E-04	na
Benzo(g,h,i)perylene	740	229	229	na	0.012
Benzo(k)fluoranthene	790	166	166	7.0E-06	na
Chrysene	3500	1066	1066	4.5E-06	na
Dibenz(a,h)anthracene	210	34	34	1.4E-04	na
Fluoranthene	10000	3063	3063	na	0.12
Fluorene	5700	1744	1744	na	0.070
Indeno(1,2,3-cd)pyrene	640	103	103	4.3E-05	na
Naphthalene	13000	3555	3555	4.4E-04	12
Phenanthrene	17000	5177	5177	na	0.028
Pyrene	10000	3029	3029	na	0.16

Table F-122
Summary of Human Health Risk Estimates for a Current/Future Site Worker/Recreational Hunter
Site SS11 - Surface Soil

Surface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Pesticides					
Aldrin	0.051	0.017	0.017	1.5E-07	0.00082
alpha-BHC	2.0	0.70	0.70	2.3E-06	na
alpha-Chlordane	2.0	0.65	0.65	1.0E-07	0.0019
delta-BHC	1.7	0.65	0.65	6.2E-07	na
Endrin	3.5	0.61	0.61	na	0.0030
Endrin Aldehyde	2.9	0.94	0.94	na	0.0046
Endrin Ketone	2.2	0.75	0.75	na	0.0037
Heptachlor	0.28	0.055	0.055	1.3E-07	0.00016
Toxaphene	1.7	1.5	1.5	8.4E-07	na
Cumulative ILCR/HQ:				3E-03	15
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	200000	79575	79575	na	nc
Diesel Range Organics (DRO), Aliphatic	na	na	63660	na	0.67
Diesel Range Organics (DRO), Aromatic	na	na	31830	na	0.84
Residual Range Organics (RRO)	160000	60057	60057	na	nc
Residual Range Organics (RRO), Aliphatic	na	na	54051	na	0.029
Residual Range Organics (RRO), Aromatic	na	na	18017	na	0.63
Cumulative ILCR/HQ:				na	2
ADEC Risk Range:				10 ⁻⁵	1
EPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in surface soil samples.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-123
Summary of Human Health Risk Estimates for a Current/Future Trench Worker
Site SS11 - Surface Soil

Surface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Aluminum	22700	nc	22700	na	0.026
Arsenic	20	10	10	2.5E-07	0.039
Barium	3680	1256	1256	na	0.013
Chromium	47	40	40	na	0.00016
Cobalt	20	nc	20	1.4E-09	0.071
Lead	462	120	120	na	na
Manganese	1080	nc	1080	na	0.13
Titanium	1460	nc	1460	na	na
Volatile Organic Compounds					
1,2,4-Trimethylbenzene	17	6.6	6.6	na	0.053
1,3,5-Trimethylbenzene	4.4	1.9	1.9	na	0.022
Semi-Volatile Organic Compounds					
4-Methylphenol	46	nc	46	na	0.015
Dibenzofuran	1700	267	267	na	0.22
Polynuclear Aromatic Hydrocarbons					
2-Methylnaphthalene	8600	3697	3697	na	1.7
Acenaphthene	9200	2800	2800	na	0.085
Anthracene	7300	2230	2230	na	0.014
Benzo(a)anthracene	3100	950	950	1.8E-05	na
Benzo(a)pyrene	1800	286	286	5.4E-05	na
Benzo(b)fluoranthene	2300	705	705	1.3E-05	na
Benzo(g,h,i)perylene	740	229	229	na	0.014
Benzo(k)fluoranthene	790	166	166	3.2E-07	na
Chrysene	3500	1066	1066	2.0E-07	na
Dibenz(a,h)anthracene	210	34	34	6.4E-06	na
Fluoranthene	10000	3063	3063	na	0.14
Fluorene	5700	1744	1744	na	0.079
Indeno(1,2,3-cd)pyrene	640	103	103	2.0E-06	na
Naphthalene	13000	3555	3555	1.6E-05	12
Phenanthrene	17000	5177	5177	na	0.031
Pyrene	10000	3029	3029	na	0.18

Table F-123
Summary of Human Health Risk Estimates for a Current/Future Trench Worker
Site SS11 - Surface Soil

Surface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Pesticides					
Aldrin	0.051	0.017	0.017	6.6E-09	0.00090
alpha-BHC	2.0	0.70	0.70	1.0E-07	na
alpha-Chlordane	2.0	0.65	0.65	4.0E-09	0.0021
delta-BHC	1.7	0.65	0.65	2.7E-08	na
Endrin	3.5	0.61	0.61	na	0.0033
Endrin Aldehyde	2.9	0.94	0.94	na	0.0051
Endrin Ketone	2.2	0.75	0.75	na	0.0041
Heptachlor	0.28	0.055	0.055	5.7E-09	0.00018
Toxaphene	1.7	1.5	1.5	3.7E-08	na
Cumulative ILCR/HQ:				1E-04	14
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	200000	79575	79575	na	nc
Diesel Range Organics (DRO), Aliphatic	na	na	63660	na	0.62
Diesel Range Organics (DRO), Aromatic	na	na	31830	na	0.78
Residual Range Organics (RRO)	160000	60057	60057	na	nc
Residual Range Organics (RRO), Aliphatic	na	na	54051	na	0.026
Residual Range Organics (RRO), Aromatic	na	na	18017	na	0.59
Cumulative ILCR/HQ:				na	2
ADEC Risk Range:				10 ⁻⁵	1
EPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in surface soil samples.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-124
Summary of Human Health Risk Estimates for a Current/Future Site Visitor
Site SS11 - Surface Soil

Surface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Aluminum	22700	nc	22700	na	0.00084
Arsenic	20	10	10	2.1E-07	0.0013
Barium	3680	1256	1256	na	0.00057
Chromium	47	40	40	na	0.0000082
Cobalt	20	nc	20	1.9E-09	0.0022
Lead	462	120	120	na	na
Manganese	1080	nc	1080	na	0.0059
Titanium	1460	nc	1460	na	na
Volatile Organic Compounds					
1,2,4-Trimethylbenzene	17	6.6	6.6	na	0.0030
1,3,5-Trimethylbenzene	4.4	1.9	1.9	na	0.0012
Semi-Volatile Organic Compounds					
4-Methylphenol	46	nc	46	na	0.00058
Dibenzofuran	1700	267	267	na	0.0085
Polynuclear Aromatic Hydrocarbons					
2-Methylnaphthalene	8600	3697	3697	na	0.069
Acenaphthene	9200	2800	2800	na	0.0035
Anthracene	7300	2230	2230	na	0.00055
Benzo(a)anthracene	3100	950	950	1.8E-05	na
Benzo(a)pyrene	1800	286	286	5.5E-05	na
Benzo(b)fluoranthene	2300	705	705	1.4E-05	na
Benzo(g,h,i)perylene	740	229	229	na	0.00057
Benzo(k)fluoranthene	790	166	166	3.2E-07	na
Chrysene	3500	1066	1066	2.1E-07	na
Dibenz(a,h)anthracene	210	34	34	6.6E-06	na
Fluoranthene	10000	3063	3063	na	0.0057
Fluorene	5700	1744	1744	na	0.0032
Indeno(1,2,3-cd)pyrene	640	103	103	2.0E-06	na
Naphthalene	13000	3555	3555	2.3E-05	0.64
Phenanthrene	17000	5177	5177	na	0.0013
Pyrene	10000	3029	3029	na	0.0075

Table F-124
Summary of Human Health Risk Estimates for a Current/Future Site Visitor
Site SS11 - Surface Soil

Surface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Pesticides					
Aldrin	0.051	0.017	0.017	6.4E-09	0.000035
alpha-BHC	2.0	0.70	0.70	1.0E-07	na
alpha-Chlordane	2.0	0.65	0.65	3.4E-09	0.000083
delta-BHC	1.7	0.65	0.65	2.7E-08	na
Endrin	3.5	0.61	0.61	na	0.00013
Endrin Aldehyde	2.9	0.94	0.94	na	0.00020
Endrin Ketone	2.2	0.75	0.75	na	0.00016
Heptachlor	0.28	0.055	0.055	5.6E-09	0.0000070
Toxaphene	1.7	1.5	1.5	3.6E-08	na
Cumulative ILCR/HQ:				1E-04	0.8
Petroleum Hydrocarbons					
Diesel Range Organics (DRO)	200000	79575	79575	na	nc
Diesel Range Organics (DRO), Aliphatic	na	na	63660	na	0.017
Diesel Range Organics (DRO), Aromatic	na	na	31830	na	0.022
Residual Range Organics (RRO)	160000	60057	60057	na	nc
Residual Range Organics (RRO), Aliphatic	na	na	54051	na	0.00074
Residual Range Organics (RRO), Aromatic	na	na	18017	na	0.016
Cumulative ILCR/HQ:				NA	0.06
ADEC Risk Range:				10 ⁻⁵	1
EPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in surface soil samples.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-125
Summary of Human Health Risk Estimates for a Current/Future Site Worker
Site SS11 - Subsurface Soil

Subsurface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Arsenic	59	nc	59	2.2E-05	0.14
Chromium	43	nc	43	na	0.00016
Cumulative ILCR/HQ:				2E-05	0.1
ADEC Risk Range:				10 ⁻⁵	1
USEPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in subsurface soil.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-126
Summary of Human Health Risk Estimates for a Current/Future Site Worker/Recreational Hunter
Site SS11 - Subsurface Soil

Subsurface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Arsenic	59	nc	59	3.7E-05	0.23
Chromium	43	nc	43	na	0.00012
Cumulative ILCR/HQ:				4E-05	0.2
ADEC Risk Range:				10 ⁻⁵	1
USEPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in subsurface soil.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-127
Summary of Human Health Risk Estimates for a Current/Future Trench Worker
Site SS11 - Subsurface Soil

Subsurface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Arsenic	59	nc	59	1.5E-06	0.23
Chromium	43	nc	43	na	0.00017
Cumulative ILCR/HQ:				1E-06	0.2
ADEC Risk Range:				10 ⁻⁵	1
USEPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in subsurface soil.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-128
Summary of Human Health Risk Estimates for a Current/Future Site Worker
Site SS11 - Sediment

Subsurface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Arsenic	12	8.8	8.8	3.2E-06	0.020
Chromium	34	26	26	na	0.00010
Cumulative ILCR/HQ:				3E-06	0.02
ADEC Risk Range:				10 ⁻⁵	1
USEPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in sediment.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-129
Summary of Human Health Risk Estimates for a Current/Future Site Worker/Recreational Hunter
Site SS11 - Sediment

Subsurface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Arsenic	12	8.8	8.8	5.6E-06	0.035
Chromium	34	26	26	na	0.000075
Cumulative ILCR/HQ:				6E-06	0.03
ADEC Risk Range:				10 ⁻⁵	1
USEPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in sediment.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-130
Summary of Human Health Risk Estimates for a Current/Future Trench Worker
Site SS11 - Sediment

Subsurface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Arsenic	12	8.8	8.8	2.2E-07	0.034
Chromium	34	26	26	na	0.00010
Cumulative ILCR/HQ:				2E-07	0.03
ADEC Risk Range:				10 ⁻⁵	1
USEPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in sediment.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

Table F-131
Summary of Human Health Risk Estimates for a Current/Future Site Visitor
Site SS11 - Sediment

Subsurface Soil (mg/kg)	Concentration ^a			Cancer Risk and Noncancer Hazard Estimates	
	Maximum	95% UCL	EPC ^b	ILCR	HQ
Inorganics, Total					
Arsenic	12	8.8	8.8	1.8E-07	0.0011
Chromium	34	26	26	na	0.0000054
Cumulative ILCR/HQ:				2E-07	0.001
ADEC Risk Range:				10 ⁻⁵	1
USEPA Risk Range:				10 ⁻⁶ - 10 ⁻⁴	1

Notes:

^a Maximum or 95% upper confidence limit (UCL) on the mean concentration measured in sediment.

^b The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Bold indicates exceedence of the USEPA's risk management range and/or Alaska Department of Environmental Conservation acceptable risk criteria.

% - Percent

EPC - Exposure point concentration

HQ - Hazard quotient.

ILCR - Incremental lifetime cancer risk.

mg/kg - Milligrams per kilogram.

NA - Not applicable

NC - Not calculated

USEPA - U. S. Environmental Protection Agency

APPENDIX F

Adult Lead Model

Calculations of Preliminary Remediation Goals (PRGs)

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/05

EDIT RED CELLS

Exposure Variable	Description of Exposure Variable	Units	Region OR Ethnic GSDi and PbBo Data from NHANES III Analysis							
			All/All	All/White	All/Black	All/Mexican	Northeast/All	Midwest/All	South/All	West/All
PbS	Soil lead concentration	ug/g or ppm	180	180	180	180	180	180	180	180
R _{fetal/maternal}	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
GSD _i	Geometric standard deviation PbB	--	2.1	2.1	2.2	2.3	2.0	2.2	2.1	2.1
PbB ₀	Baseline PbB	ug/dL	1.5	1.5	1.8	1.7	2.0	1.5	1.4	1.4
IR _S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
IR _{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	--	--	--	--	--	--
W _S	Weighting factor; fraction of IR _{S+D} ingested as outdoor soil	--	--	--	--	--	--	--	--	--
K _{SD}	Mass fraction of soil in dust	--	--	--	--	--	--	--	--	--
AF _{S,D}	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
EF _{S,D}	Exposure frequency (same for soil and dust)	days/yr	250	250	250	250	250	250	250	250
AT _{S,D}	Averaging time (same for soil and dust)	days/yr	365	365	365	365	365	365	365	365
PbB _{adult}	PbB of adult worker, geometric mean	ug/dL	1.8	1.7	2.1	2.0	2.3	1.8	1.7	1.7
PbB _{fetal, 0.95}	95th percentile PbB among fetuses of adult workers	ug/dL	5.6	5.3	6.6	7.0	6.4	5.9	5.0	5.2
PbB _t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
P(PbB _{fetal} > PbB _t)	Probability that fetal PbB > PbB _t , assuming lognormal distribution	%	0.8%	0.6%	1.5%	1.9%	1.1%	1.0%	0.5%	0.6%

¹ Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}).

When IR_S = IR_{S+D} and W_S = 1.0, the equations yield the same PbB_{fetal,0.95}.

Calculations of Preliminary Remediation Goals (PRGs)

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/05

EDIT RED CELLS

Exposure Variable	Description of Exposure Variable	Units	Region OR Ethnic GSDi and PbBo Data from NHANES III Analysis							
			All/All	All/White	All/Black	All/Mexican	Northeast/All	Midwest/All	South/All	West/All
PbS	Soil lead concentration	ug/g or ppm	180	180	180	180	180	180	180	180
$R_{\text{fetal/maternal}}$	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	2.1	2.1	2.2	2.3	2.0	2.2	2.1	2.1
PbB_0	Baseline PbB	ug/dL	1.5	1.5	1.8	1.7	2.0	1.5	1.4	1.4
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	--	--	--	--	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	--	--	--	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--	--	--	--	--	--	--
$AF_{S,D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
$EF_{S,D}$	Exposure frequency (same for soil and dust)	days/yr	270	270	270	270	270	270	270	270
$AT_{S,D}$	Averaging time (same for soil and dust)	days/yr	365	365	365	365	365	365	365	365
PbB_{adult}	PbB of adult worker, geometric mean	ug/dL	2.2	2.1	2.4	2.3	2.6	2.2	2.0	2.0
$PbB_{\text{fetal}, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	6.7	6.3	7.7	8.2	7.4	7.0	6.0	6.3
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
$P(PbB_{\text{fetal}} > PbB_t)$	Probability that fetal PbB > PbB_t, assuming lognormal distribution	%	1.4%	1.2%	2.4%	3.0%	1.9%	1.8%	1.0%	1.2%

¹ Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S , K_{SD}).

When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same $PbB_{\text{fetal}, 0.95}$.

Calculations of Preliminary Remediation Goals (PRGs)

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/05

EDIT RED CELLS

Exposure Variable	Description of Exposure Variable	Units	Region OR Ethnic GSDi and PbBo Data from NHANES III Analysis							
			All/All	All/White	All/Black	All/Mexican	Northeast/All	Midwest/All	South/All	West/All
PbS	Soil lead concentration	ug/g or ppm	180	180	180	180	180	180	180	180
$R_{\text{fetal/maternal}}$	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	2.1	2.1	2.2	2.3	2.0	2.2	2.1	2.1
PbB_0	Baseline PbB	ug/dL	1.5	1.5	1.8	1.7	2.0	1.5	1.4	1.4
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	--	--	--	--	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	--	--	--	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--	--	--	--	--	--	--
$AF_{S,D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
$EF_{S,D}$	Exposure frequency (same for soil and dust)	days/yr	250	250	250	250	250	250	250	250
$AT_{S,D}$	Averaging time (same for soil and dust)	days/yr	365	365	365	365	365	365	365	365
PbB_{adult}	PbB of adult worker, geometric mean	ug/dL	2.1	2.0	2.4	2.3	2.6	2.1	2.0	2.0
$PbB_{\text{fetal}, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	6.5	6.2	7.6	8.1	7.2	6.9	5.9	6.1
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
$P(PbB_{\text{fetal}} > PbB_t)$	Probability that fetal PbB > PbB_t, assuming lognormal distribution	%	1.3%	1.1%	2.2%	2.8%	1.7%	1.7%	0.9%	1.1%

¹ Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S , K_{SD}).

When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same $PbB_{\text{fetal}, 0.95}$.

Calculations of Preliminary Remediation Goals (PRGs)

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/05

EDIT RED CELLS

Exposure Variable	Description of Exposure Variable	Units	Region OR Ethnic GSDi and PbBo Data from NHANES III Analysis							
			All/All	All/White	All/Black	All/Mexican	Northeast/All	Midwest/All	South/All	West/All
PbS	Soil lead concentration	ug/g or ppm	180	180	180	180	180	180	180	180
R _{fetal/maternal}	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
GSD _i	Geometric standard deviation PbB	--	2.1	2.1	2.2	2.3	2.0	2.2	2.1	2.1
PbB ₀	Baseline PbB	ug/dL	1.5	1.5	1.8	1.7	2.0	1.5	1.4	1.4
IR _S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
IR _{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	--	--	--	--	--	--
W _S	Weighting factor; fraction of IR _{S+D} ingested as outdoor soil	--	--	--	--	--	--	--	--	--
K _{SD}	Mass fraction of soil in dust	--	--	--	--	--	--	--	--	--
AF _{S,D}	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
EF _{S,D}	Exposure frequency (same for soil and dust)	days/yr	14	14	14	14	14	14	14	14
AT _{S,D}	Averaging time (same for soil and dust)	days/yr	365	365	365	365	365	365	365	365
PbB _{adult}	PbB of adult worker, geometric mean	ug/dL	1.5	1.5	1.8	1.7	2.0	1.5	1.4	1.4
PbB _{fetal, 0.95}	95th percentile PbB among fetuses of adult workers	ug/dL	4.8	4.4	5.7	6.0	5.6	5.0	4.2	4.4
PbB _t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
P(PbB _{fetal} > PbB _t)	Probability that fetal PbB > PbB _t , assuming lognormal distribution	%	0.4%	0.3%	0.9%	1.2%	0.7%	0.6%	0.2%	0.3%

¹ Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}).

When IR_S = IR_{S+D} and W_S = 1.0, the equations yield the same PbB_{fetal,0.95}.

Calculations of Preliminary Remediation Goals (PRGs)

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/05

EDIT RED CELLS

Exposure Variable	Description of Exposure Variable	Units	Region OR Ethnic GSDi and PbBo Data from NHANES III Analysis							
			All/All	All/White	All/Black	All/Mexican	Northeast/All	Midwest/All	South/All	West/All
PbS	Soil lead concentration	ug/g or ppm	51	51	51	51	51	51	51	51
$R_{\text{fetal/maternal}}$	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	2.1	2.1	2.2	2.3	2.0	2.2	2.1	2.1
PbB_0	Baseline PbB	ug/dL	1.5	1.5	1.8	1.7	2.0	1.5	1.4	1.4
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	--	--	--	--	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	--	--	--	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--	--	--	--	--	--	--
$AF_{S,D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
$EF_{S,D}$	Exposure frequency (same for soil and dust)	days/yr	250	250	250	250	250	250	250	250
$AT_{S,D}$	Averaging time (same for soil and dust)	days/yr	365	365	365	365	365	365	365	365
PbB_{adult}	PbB of adult worker, geometric mean	ug/dL	1.6	1.5	1.9	1.8	2.1	1.6	1.5	1.5
$PbB_{\text{fetal}, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	5.0	4.6	6.0	6.3	5.8	5.2	4.4	4.6
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
$P(PbB_{\text{fetal}} > PbB_t)$	Probability that fetal PbB > PbB_t , assuming lognormal distribution	%	0.5%	0.4%	1.0%	1.4%	0.8%	0.7%	0.3%	0.4%

¹ Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S , K_{SD}).

When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same $PbB_{\text{fetal}, 0.95}$.

Calculations of Preliminary Remediation Goals (PRGs)

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/05

EDIT RED CELLS

Exposure Variable	Description of Exposure Variable	Units	Region OR Ethnic GSDi and PbBo Data from NHANES III Analysis							
			All/All	All/White	All/Black	All/Mexican	Northeast/All	Midwest/All	South/All	West/All
PbS	Soil lead concentration	ug/g or ppm	51	51	51	51	51	51	51	51
$R_{\text{fetal/maternal}}$	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	2.1	2.1	2.2	2.3	2.0	2.2	2.1	2.1
PbB_0	Baseline PbB	ug/dL	1.5	1.5	1.8	1.7	2.0	1.5	1.4	1.4
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	--	--	--	--	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	--	--	--	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--	--	--	--	--	--	--
$AF_{S,D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
$EF_{S,D}$	Exposure frequency (same for soil and dust)	days/yr	270	270	270	270	270	270	270	270
$AT_{S,D}$	Averaging time (same for soil and dust)	days/yr	365	365	365	365	365	365	365	365
PbB_{adult}	PbB of adult worker, geometric mean	ug/dL	1.7	1.6	2.0	1.9	2.2	1.7	1.6	1.6
$PbB_{\text{fetal}, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	5.3	4.9	6.3	6.6	6.1	5.5	4.7	4.9
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
$P(PbB_{\text{fetal}} > PbB_t)$	Probability that fetal PbB > PbB_t, assuming lognormal distribution	%	0.6%	0.5%	1.2%	1.6%	0.9%	0.8%	0.4%	0.5%

¹ Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S , K_{SD}).

When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same $PbB_{\text{fetal}, 0.95}$.

Calculations of Preliminary Remediation Goals (PRGs)

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/05

EDIT RED CELLS

Exposure Variable	Description of Exposure Variable	Units	Region OR Ethnic GSDi and PbBo Data from NHANES III Analysis							
			All/All	All/White	All/Black	All/Mexican	Northeast/All	Midwest/All	South/All	West/All
PbS	Soil lead concentration	ug/g or ppm	51	51	51	51	51	51	51	51
$R_{\text{fetal/maternal}}$	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	2.1	2.1	2.2	2.3	2.0	2.2	2.1	2.1
PbB_0	Baseline PbB	ug/dL	1.5	1.5	1.8	1.7	2.0	1.5	1.4	1.4
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	--	--	--	--	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	--	--	--	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--	--	--	--	--	--	--
$AF_{S,D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
$EF_{S,D}$	Exposure frequency (same for soil and dust)	days/yr	250	250	250	250	250	250	250	250
$AT_{S,D}$	Averaging time (same for soil and dust)	days/yr	365	365	365	365	365	365	365	365
PbB_{adult}	PbB of adult worker, geometric mean	ug/dL	1.7	1.6	1.9	1.9	2.1	1.7	1.6	1.6
$PbB_{\text{fetal}, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	5.2	4.9	6.2	6.6	6.0	5.5	4.6	4.8
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
$P(PbB_{\text{fetal}} > PbB_t)$	Probability that fetal PbB > PbB_t , assuming lognormal distribution	%	0.6%	0.4%	1.2%	1.6%	0.9%	0.8%	0.3%	0.4%

¹ Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S , K_{SD}).

When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same $PbB_{\text{fetal}, 0.95}$.

Calculations of Preliminary Remediation Goals (PRGs)

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/05

EDIT RED CELLS

Exposure Variable	Description of Exposure Variable	Units	Region OR Ethnic GSDi and PbBo Data from NHANES III Analysis							
			All/All	All/White	All/Black	All/Mexican	Northeast/All	Midwest/All	South/All	West/All
PbS	Soil lead concentration	ug/g or ppm	51	51	51	51	51	51	51	51
$R_{\text{fetal/maternal}}$	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	2.1	2.1	2.2	2.3	2.0	2.2	2.1	2.1
PbB_0	Baseline PbB	ug/dL	1.5	1.5	1.8	1.7	2.0	1.5	1.4	1.4
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	--	--	--	--	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	--	--	--	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--	--	--	--	--	--	--
$AF_{S,D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
$EF_{S,D}$	Exposure frequency (same for soil and dust)	days/yr	14	14	14	14	14	14	14	14
$AT_{S,D}$	Averaging time (same for soil and dust)	days/yr	365	365	365	365	365	365	365	365
PbB_{adult}	PbB of adult worker, geometric mean	ug/dL	1.5	1.5	1.8	1.7	2.0	1.5	1.4	1.4
$PbB_{\text{fetal}, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	4.7	4.4	5.7	6.0	5.6	5.0	4.2	4.3
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
$P(PbB_{\text{fetal}} > PbB_t)$	Probability that fetal PbB > PbB_t, assuming lognormal distribution	%	0.4%	0.3%	0.9%	1.2%	0.6%	0.6%	0.2%	0.3%

¹ Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S , K_{SD}).

When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same $PbB_{\text{fetal}, 0.95}$.

Calculations of Preliminary Remediation Goals (PRGs)

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/05

EDIT RED CELLS

Exposure Variable	Description of Exposure Variable	Units	Region OR Ethnic GSDi and PbBo Data from NHANES III Analysis							
			All/All	All/White	All/Black	All/Mexican	Northeast/All	Midwest/All	South/All	West/All
PbS	Soil lead concentration	ug/g or ppm	63	63	63	63	63	63	63	63
$R_{\text{fetal/maternal}}$	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	2.1	2.1	2.2	2.3	2.0	2.2	2.1	2.1
PbB_0	Baseline PbB	ug/dL	1.5	1.5	1.8	1.7	2.0	1.5	1.4	1.4
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	--	--	--	--	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	--	--	--	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--	--	--	--	--	--	--
$AF_{S,D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
$EF_{S,D}$	Exposure frequency (same for soil and dust)	days/yr	250	250	250	250	250	250	250	250
$AT_{S,D}$	Averaging time (same for soil and dust)	days/yr	365	365	365	365	365	365	365	365
PbB_{adult}	PbB of adult worker, geometric mean	ug/dL	1.6	1.6	1.9	1.8	2.1	1.6	1.5	1.5
$PbB_{\text{fetal}, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	5.0	4.7	6.0	6.3	5.9	5.3	4.4	4.6
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
$P(PbB_{\text{fetal}} > PbB_t)$	Probability that fetal PbB > PbB_t, assuming lognormal distribution	%	0.5%	0.4%	1.1%	1.4%	0.8%	0.7%	0.3%	0.4%

¹ Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S , K_{SD}).

When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same $PbB_{\text{fetal}, 0.95}$.

Calculations of Preliminary Remediation Goals (PRGs)

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/05

EDIT RED CELLS

Exposure Variable	Description of Exposure Variable	Units	Region OR Ethnic GSDi and PbBo Data from NHANES III Analysis							
			All/All	All/White	All/Black	All/Mexican	Northeast/All	Midwest/All	South/All	West/All
PbS	Soil lead concentration	ug/g or ppm	63	63	63	63	63	63	63	63
$R_{\text{fetal/maternal}}$	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	2.1	2.1	2.2	2.3	2.0	2.2	2.1	2.1
PbB_0	Baseline PbB	ug/dL	1.5	1.5	1.8	1.7	2.0	1.5	1.4	1.4
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	--	--	--	--	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	--	--	--	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--	--	--	--	--	--	--
$AF_{S,D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
$EF_{S,D}$	Exposure frequency (same for soil and dust)	days/yr	270	270	270	270	270	270	270	270
$AT_{S,D}$	Averaging time (same for soil and dust)	days/yr	365	365	365	365	365	365	365	365
PbB_{adult}	PbB of adult worker, geometric mean	ug/dL	1.8	1.7	2.0	1.9	2.2	1.8	1.6	1.6
$PbB_{\text{fetal}, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	5.4	5.1	6.4	6.8	6.2	5.7	4.8	5.0
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
$P(PbB_{\text{fetal}} > PbB_t)$	Probability that fetal PbB > PbB_t, assuming lognormal distribution	%	0.7%	0.5%	1.3%	1.7%	1.0%	0.9%	0.4%	0.5%

¹ Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S , K_{SD}).

When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same $PbB_{\text{fetal}, 0.95}$.

Calculations of Preliminary Remediation Goals (PRGs)

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/05

EDIT RED CELLS

Exposure Variable	Description of Exposure Variable	Units	Region OR Ethnic GSDi and PbBo Data from NHANES III Analysis							
			All/All	All/White	All/Black	All/Mexican	Northeast/All	Midwest/All	South/All	West/All
PbS	Soil lead concentration	ug/g or ppm	63	63	63	63	63	63	63	63
$R_{\text{fetal/maternal}}$	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	2.1	2.1	2.2	2.3	2.0	2.2	2.1	2.1
PbB_0	Baseline PbB	ug/dL	1.5	1.5	1.8	1.7	2.0	1.5	1.4	1.4
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	--	--	--	--	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	--	--	--	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--	--	--	--	--	--	--
$AF_{S,D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
$EF_{S,D}$	Exposure frequency (same for soil and dust)	days/yr	250	250	250	250	250	250	250	250
$AT_{S,D}$	Averaging time (same for soil and dust)	days/yr	365	365	365	365	365	365	365	365
PbB_{adult}	PbB of adult worker, geometric mean	ug/dL	1.7	1.7	2.0	1.9	2.2	1.7	1.6	1.6
$PbB_{\text{fetal}, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	5.3	5.0	6.3	6.7	6.2	5.6	4.8	4.9
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
$P(PbB_{\text{fetal}} > PbB_t)$	Probability that fetal PbB > PbB_t , assuming lognormal distribution	%	0.6%	0.5%	1.3%	1.7%	1.0%	0.9%	0.4%	0.5%

¹ Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S , K_{SD}).

When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same $PbB_{\text{fetal}, 0.95}$.

Calculations of Preliminary Remediation Goals (PRGs)

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/05

EDIT RED CELLS

Exposure Variable	Description of Exposure Variable	Units	Region OR Ethnic GSDi and PbBo Data from NHANES III Analysis							
			All/All	All/White	All/Black	All/Mexican	Northeast/All	Midwest/All	South/All	West/All
PbS	Soil lead concentration	ug/g or ppm	63	63	63	63	63	63	63	63
$R_{\text{fetal/maternal}}$	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	2.1	2.1	2.2	2.3	2.0	2.2	2.1	2.1
PbB_0	Baseline PbB	ug/dL	1.5	1.5	1.8	1.7	2.0	1.5	1.4	1.4
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	--	--	--	--	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	--	--	--	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--	--	--	--	--	--	--
$AF_{S,D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
$EF_{S,D}$	Exposure frequency (same for soil and dust)	days/yr	14	14	14	14	14	14	14	14
$AT_{S,D}$	Averaging time (same for soil and dust)	days/yr	365	365	365	365	365	365	365	365
PbB_{adult}	PbB of adult worker, geometric mean	ug/dL	1.5	1.5	1.8	1.7	2.0	1.5	1.4	1.4
$PbB_{\text{fetal}, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	4.7	4.4	5.7	6.0	5.6	5.0	4.2	4.3
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
$P(PbB_{\text{fetal}} > PbB_t)$	Probability that fetal PbB > PbB_t , assuming lognormal distribution	%	0.4%	0.3%	0.9%	1.2%	0.6%	0.6%	0.2%	0.3%

¹ Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S , K_{SD}).

When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same $PbB_{\text{fetal}, 0.95}$.

Calculations of Preliminary Remediation Goals (PRGs)

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/05

EDIT RED CELLS

Exposure Variable	Description of Exposure Variable	Units	Region OR Ethnic GSDi and PbBo Data from NHANES III Analysis							
			All/All	All/White	All/Black	All/Mexican	Northeast/All	Midwest/All	South/All	West/All
PbS	Soil lead concentration	ug/g or ppm	63	63	63	63	63	63	63	63
R _{fetal/maternal}	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
GSD _i	Geometric standard deviation PbB	--	2.1	2.1	2.2	2.3	2.0	2.2	2.1	2.1
PbB ₀	Baseline PbB	ug/dL	1.5	1.5	1.8	1.7	2.0	1.5	1.4	1.4
IR _S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
IR _{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	--	--	--	--	--	--
W _S	Weighting factor; fraction of IR _{S+D} ingested as outdoor soil	--	--	--	--	--	--	--	--	--
K _{SD}	Mass fraction of soil in dust	--	--	--	--	--	--	--	--	--
AF _{S,D}	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
EF _{S,D}	Exposure frequency (same for soil and dust)	days/yr	250	250	250	250	250	250	250	250
AT _{S,D}	Averaging time (same for soil and dust)	days/yr	365	365	365	365	365	365	365	365
PbB _{adult}	PbB of adult worker, geometric mean	ug/dL	1.6	1.6	1.9	1.8	2.1	1.6	1.5	1.5
PbB _{fetal, 0.95}	95th percentile PbB among fetuses of adult workers	ug/dL	5.0	4.7	6.0	6.3	5.9	5.3	4.4	4.6
PbB _t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
P(PbB _{fetal} > PbB _t)	Probability that fetal PbB > PbB _t , assuming lognormal distribution	%	0.5%	0.4%	1.1%	1.4%	0.8%	0.7%	0.3%	0.4%

¹ Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}).

When IR_S = IR_{S+D} and W_S = 1.0, the equations yield the same PbB_{fetal,0.95}.

Calculations of Preliminary Remediation Goals (PRGs)

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/05

EDIT RED CELLS

Exposure Variable	Description of Exposure Variable	Units	Region OR Ethnic GSDi and PbBo Data from NHANES III Analysis							
			All/All	All/White	All/Black	All/Mexican	Northeast/All	Midwest/All	South/All	West/All
PbS	Soil lead concentration	ug/g or ppm	120	120	120	120	120	120	120	120
$R_{\text{fetal/maternal}}$	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	2.1	2.1	2.2	2.3	2.0	2.2	2.1	2.1
PbB_0	Baseline PbB	ug/dL	1.5	1.5	1.8	1.7	2.0	1.5	1.4	1.4
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	--	--	--	--	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	--	--	--	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--	--	--	--	--	--	--
$AF_{S,D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
$EF_{S,D}$	Exposure frequency (same for soil and dust)	days/yr	270	270	270	270	270	270	270	270
$AT_{S,D}$	Averaging time (same for soil and dust)	days/yr	365	365	365	365	365	365	365	365
PbB_{adult}	PbB of adult worker, geometric mean	ug/dL	2.0	1.9	2.2	2.1	2.4	2.0	1.8	1.8
$PbB_{\text{fetal}, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	6.0	5.7	7.0	7.5	6.8	6.3	5.4	5.6
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
$P(PbB_{\text{fetal}} > PbB_t)$	Probability that fetal PbB > PbB_t, assuming lognormal distribution	%	1.0%	0.8%	1.8%	2.3%	1.4%	1.3%	0.6%	0.8%

¹ Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S , K_{SD}).

When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same $PbB_{\text{fetal}, 0.95}$.

Calculations of Preliminary Remediation Goals (PRGs)

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/05

EDIT RED CELLS

Exposure Variable	Description of Exposure Variable	Units	Region OR Ethnic GSDi and PbBo Data from NHANES III Analysis							
			All/All	All/White	All/Black	All/Mexican	Northeast/All	Midwest/All	South/All	West/All
PbS	Soil lead concentration	ug/g or ppm	120	120	120	120	120	120	120	120
$R_{\text{fetal/maternal}}$	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	2.1	2.1	2.2	2.3	2.0	2.2	2.1	2.1
PbB_0	Baseline PbB	ug/dL	1.5	1.5	1.8	1.7	2.0	1.5	1.4	1.4
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	--	--	--	--	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	--	--	--	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--	--	--	--	--	--	--
$AF_{S,D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
$EF_{S,D}$	Exposure frequency (same for soil and dust)	days/yr	250	250	250	250	250	250	250	250
$AT_{S,D}$	Averaging time (same for soil and dust)	days/yr	365	365	365	365	365	365	365	365
PbB_{adult}	PbB of adult worker, geometric mean	ug/dL	1.9	1.8	2.2	2.1	2.4	1.9	1.8	1.8
$PbB_{\text{fetal}, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	5.9	5.6	6.9	7.4	6.7	6.2	5.3	5.5
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
$P(PbB_{\text{fetal}} > PbB_t)$	Probability that fetal PbB > PbB_t , assuming lognormal distribution	%	0.9%	0.7%	1.7%	2.2%	1.3%	1.2%	0.6%	0.7%

¹ Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S , K_{SD}).

When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same $PbB_{\text{fetal}, 0.95}$.

Calculations of Preliminary Remediation Goals (PRGs)

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/05

EDIT RED CELLS

Exposure Variable	Description of Exposure Variable	Units	Region OR Ethnic GSDi and PbBo Data from NHANES III Analysis							
			All/All	All/White	All/Black	All/Mexican	Northeast/All	Midwest/All	South/All	West/All
PbS	Soil lead concentration	ug/g or ppm	120	120	120	120	120	120	120	120
$R_{\text{fetal/maternal}}$	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	2.1	2.1	2.2	2.3	2.0	2.2	2.1	2.1
PbB_0	Baseline PbB	ug/dL	1.5	1.5	1.8	1.7	2.0	1.5	1.4	1.4
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	--	--	--	--	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	--	--	--	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--	--	--	--	--	--	--
$AF_{S,D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
$EF_{S,D}$	Exposure frequency (same for soil and dust)	days/yr	14	14	14	14	14	14	14	14
$AT_{S,D}$	Averaging time (same for soil and dust)	days/yr	365	365	365	365	365	365	365	365
PbB_{adult}	PbB of adult worker, geometric mean	ug/dL	1.5	1.5	1.8	1.7	2.0	1.5	1.4	1.4
$PbB_{\text{fetal}, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	4.7	4.4	5.7	6.0	5.6	5.0	4.2	4.3
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
$P(PbB_{\text{fetal}} > PbB_t)$	Probability that fetal PbB > PbB_t , assuming lognormal distribution	%	0.4%	0.3%	0.9%	1.2%	0.7%	0.6%	0.2%	0.3%

¹ Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S , K_{SD}).

When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same $PbB_{\text{fetal}, 0.95}$.

APPENDIX G

Ecological Exposure Dose Equations

APPENDIX G ECOLOGICAL EXPOSURE DOSE EQUATIONS

Food Ingestion Rate Calculations

Food ingestion rates (FIR) for each indicator receptor were calculated using allometric equations provided in *Food Requirements of Wild Animals: Predictive Equations for Free-Living Mammals, Reptiles and Birds* (Nagy, 2001). Equations for deriving FIR values for ecological receptors provided in Nagy (2001) are based on established relationships between body size and metabolic requirements. Food ingestion rates expressed in grams of food (dry weight) per day for each receptor were calculated based on the following equations:

Tundra vole (equation for mammalian herbivore):

$$\text{FIR (g dry wt/day)} = 0.859 \times \text{Wt}^{0.628} \text{ (g)}$$

Masked shrew (equation for mammalian invertivore):

$$\text{FIR (g dry wt/day)} = 0.373 \times \text{Wt}^{0.622} \text{ (g)}$$

Least weasel (equation for mammalian carnivore):

$$\text{FIR (g dry wt/day)} = 0.153 \times \text{Wt}^{0.834} \text{ (g)}$$

Mink (equation for mammalian carnivore):

$$\text{FIR (g dry wt/day)} = 0.153 \times \text{Wt}^{0.834} \text{ (g)}$$

Dark-eyed junco (equation for avian herbivore):

$$\text{FIR (g dry wt/day)} = 0.670 \times \text{Wt}^{0.627} \text{ (g)}$$

American robin (equation for avian omnivore):

$$\text{FIR (g dry wt/day)} = 0.670 \times \text{Wt}^{0.627} \text{ (g)}$$

Northern shrike (equation for avian invertivore):

$$\text{FIR (g dry wt/day)} = 0.648 \times \text{Wt}^{0.651} \text{ (g)}$$

Mallard (equation for avian omnivore):

$$\text{FIR (g dry wt/day)} = 0.670 \times \text{Wt}^{0.627} \text{ (g)}$$

With the exception of the American robin (*Turdus migratorius*) and the mallard (*Anas platyrhynchos*), diets were assumed to be comprised of 100% plants (herbivores), 100% invertebrates (invertivores) or 100% meat (carnivores). The diet of the American robin was assumed to be comprised of 30% plant matter and 70% invertebrates, while the diet of the mallard was described to be comprised of 90% plant matter and 10% invertebrates, as described in *Wildlife Exposure Factors Handbook* (USEPA, 1993). Therefore, the total FIR for the American robin was multiplied by factors of 0.3 and 0.7 to derive plant and invertebrate FIR estimates, respectively, while the total FIR for the mallard was multiplied by factors of 0.9 and 0.1 to derive plant and invertebrate FIR estimates, respectively.

Water Ingestion Rate Calculations

The water ingestion (WI) rate is used to estimate exposure intake of COPECs through consumption of surface water. Water ingestion rates were calculated based on equations described in *Wildlife Exposure Factors Handbook* (USEPA, 1993b), as follows.

All mammals (Equation 3-17):

$$\text{WI (L/day)} = 0.099 \times \text{Wt}^{0.90} \text{ (kg)}$$

All birds (Equation 3-15):

$$\text{WI (L/day)} = 0.059 \times \text{Wt}^{0.67} \text{ (kg)}$$

Notes:

- WI = Water Ingestion Rate
- L/day = Liters per day
- kg = Kilograms
- Wt = Average weight of indicator receptor

Exposure Dose Calculations

The initial step in calculating exposure doses for indicator receptors is calculation of COPEC concentrations in food items.

Average Concentrations of COPECs in Food Items

Food items for indicator receptors include terrestrial plants, invertebrates, and animal prey items. In the absence of measured concentrations in food items, exposure point concentrations (EPCs) in dietary tissues were estimated based on guidance provided in *Guidance for Developing Ecological Soil Screening Levels (Eco-SSLs)*, Attachment 4-1: *Exposure Factors and Bioaccumulation Models for Derivation of Wildlife Eco-SSLs* (USEPA, 2007d), and *Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities* (USEPA, 1999). These guidance documents provide methods for estimating COPEC distribution between abiotic media (i.e., soil or surface water) and plant or animal tissues. Inter-media transfer factors, or bioconcentration factors (BCFs), presented in USEPA (1999, 2007d) are chemical- or chemical class-specific.

Contaminant Concentrations in Terrestrial Plant Tissues

For the ecological assessment, COPEC concentrations in terrestrial plants (C_{PLANTS}) were assumed to equal plant concentrations due to root uptake from soil or sediment. The equation used to compute COPEC concentrations in terrestrial plants due to root uptake is:

$$C_{\text{PLANTS}} = C_{\text{SOIL}} \times \text{BCF}_{\text{S-P}}$$

Where:

- C_{PLANTS} = Total COPEC concentration in plant tissue (mg COPEC/kg dry tissue).
 $C_{\text{SOIL/SEDIMENT}}$ = Concentration of COPEC in soil or sediment (mg COPEC/kg dry soil or sediment)
 $\text{BCF}_{\text{S-P}}$ = Bioconcentration factor between soil or sediment and plant tissue (mg COPEC/kg dry plant tissue divided by mg COPEC/kg dry soil or sediment; kg dry soil or sediment/kg dry tissue).

Values of $\text{BCF}_{\text{S-P}}$, or methods for calculating $\text{BCF}_{\text{S-P}}$, were derived from the following sources:

- *Guidance for Developing Ecological Soil Screening Levels (Eco-SSLs), Attachment 4-1: Exposure Factors and Bioaccumulation Models for Derivation of Wildlife Eco-SSLs* (USEPA, 2007d).
- *Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities* (USEPA, 1999).
- *Bioconcentration of Organics in Beef, Milk and Vegetation* (Travis and Arms, 1988).
- *A Review and Analysis of Parameters for Assessing Transport of Environmentally Released Radionuclides through Agriculture* (Baes et al., 1984).

Contaminant Concentrations in Invertebrate Prey Tissues

The ERA for SS03, SS08, and SS11 considers two invertevore receptors (i.e., the masked shrew and the Northern shrike) and two invertebrate consuming omnivore receptors (i.e., the American robin and the mallard). COPEC concentrations in invertebrate tissues are modeled based on the following equation:

$$C_{\text{INVERTS}} = C_{\text{SOIL/SEDIMENT}} \times \text{BCF}_{\text{S-I}}$$

Where:

- C_{INVERTS} = Total COPEC concentration in invertebrate tissue (mg COPEC/kg dry tissue).
 $C_{\text{SOIL/SEDIMENT}}$ = Concentration of COPEC in soil or sediment (mg COPEC/kg dry soil or sediment)
 $\text{BCF}_{\text{S-I}}$ = Bioconcentration factor between soil or sediment and invertebrate tissue (mg COPEC/kg dry invertebrate tissue divided by mg COPEC/kg dry soil or sediment; kg dry soil or sediment/kg dry tissue).

Values of $\text{BCF}_{\text{S-I}}$, or methods for calculating $\text{BCF}_{\text{S-I}}$, were derived from the following sources:

- *Guidance for Developing Ecological Soil Screening Levels (Eco-SSLs), Attachment 4-1: Exposure Factors and Bioaccumulation Models for Derivation of Wildlife Eco-SSLs* (USEPA, 2007d).
- *Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities* (USEPA, 1999).
- *Preliminary Remediation Goals for Ecological Endpoints* (ORNL, 1997d).
- Development of Validation of Bioaccumulation Models for Earthworms (Sample et al, 1998b).

Contaminant Concentrations in Mammalian Prey Tissues

The ERA for SS03, SS08, and SS11 considers two carnivorous receptors (i.e., the least weasel and the mink). COPEC concentrations in mammalian prey tissues are modeled based on the following equation:

$$C_{\text{MAMMAL}} = C_{\text{SOIL/SEDIMENT}} \times \text{BCF}_{\text{S-M}}$$

Where:

C_{MAMMAL}	= COPEC concentration in mammalian prey tissue (mg/kg dry tissue)
$C_{\text{SOIL/SEDIMENT}}$	= COPEC concentration in soil or sediment (mg/kg dry soil or sediment)
$\text{BCF}_{\text{S-M}}$	= Bioconcentration factor between soil or sediment and mammal tissue (mg COPEC/kg dry mammal tissue divided by mg COPEC/kg dry soil or sediment; kg dry soil or sediment/kg dry tissue).

Values of $\text{BCF}_{\text{S-M}}$, or methods for calculating $\text{BCF}_{\text{S-M}}$, were derived from the following sources:

- *Guidance for Developing Ecological Soil Screening Levels (Eco-SSLs), Attachment 4-1: Exposure Factors and Bioaccumulation Models for Derivation of Wildlife Eco-SSLs* (USEPA, 2005e).
- *Preliminary Remediation Goals for Ecological Endpoints* (ORNL, 1997d).

Ingestion Dose Calculation

Exposure dose calculation consolidates all exposure pathways and routes, exposure point concentrations (EPCs), and exposure parameters into an equation that provides an exposure dose estimate in units of mg/kg-day.

Ingestion dose estimates were calculated using the following general equations derived from USEPA's Wildlife Exposure Factors Handbook (USEPA, 1993b):

$$\text{Dose}_{\text{Ingestion}} = \frac{[(\text{IR}_{\text{Biotic}} \times \text{EPC}_{\text{Biotic}}) + (\text{IR}_{\text{Abiotic}} \times \text{EPC}_{\text{Abiotic}})] \times \text{ED} \times \text{SUF}}{\text{BW}}$$

Where:

$\text{Dose}_{\text{Ingestion}}$	= Estimated exposure dose from ingestion of food and ingestion of abiotic media (mg/kg-day)
$\text{IR}_{\text{Biotic}}$	= Food ingestion rate (kg tissue dry wt./day)
C_{Biotic}	= Concentration of COPEC in food items (mg COPEC/kg dry wt.)
$\text{IR}_{\text{Abiotic}}$	= Abiotic media ingestion rate (kg soil or sediment dry wt./day)
$\text{EPC}_{\text{Abiotic}}$	= Concentration of COPEC in abiotic media (kg COPEC /kg dry wt. soil or sediment)
ED	= Exposure duration (unitless)
SUF	= Site utilization factor (unitless)
BW	= Body weight (kg)

Ecological Hazard Calculation

Estimated exposure doses for each chemical and indicator receptor were compared to ecological TRVs to calculate a chemical-specific HQ and a total cumulative HI for each site. The equation for calculating HQ is:

$$HQ = \frac{\text{Dose}}{\text{TRV}}$$

Where:

HQ = Hazard quotient (unitless)

Dose = Modeled exposure dose for indicator species (mg/kg-day)

TRV = Toxicity reference value for the indicator species (mg/kg-day)

HI were calculated by summing the HQs obtained from food chain modeling for all COPECs identified at SS03, SS08, and SS11, for each indicator receptor.

APPENDIX H

Ecological Hazard Calculations

TABLE H-1
ECOLOGICAL HAZARD CALCULATIONS FOR TUNDRA VOLE
Site SS03
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C _{SOIL} (mg/kg)	Exposure Point Concentration C _{WATER} (mg/L)	BCF _{S-P} ^a	Exposure Point Concentration C _{PLANT} ^b (mg/kg)	Ingestion Dose c, d (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
Inorganics							
Antimony	2.0	0	0.20	0.40	8.8E-02	5.6E-02	1.6
Arsenic	16	0	0.040	0.64	2.0E-01	1.1E-01	1.8
Barium	258	0.0080	0.16	40	9.1E+00	8.2E-01	11
Cadmium	4.0	0	0.55	2.2	4.5E-01	1.6E+00	0.28
Chromium	56	0	0.041	2.3	7.2E-01	5.6E+00	0.13
Cobalt	22	0	0.0075	0.17	1.4E-01	1.2E+01	0.012
Copper	95	0	0.40	38	7.9E+00	2.4E+01	0.32
Lead	180	0	Regression	4.9	1.8E+00	7.6E+00	0.24
Manganese	609	0	0.079	48	1.2E+01	1.4E+02	0.09
Mercury	1.6	0	0.90	1.4	2.9E-01	2.1E+00	0.14
Nickel	41	0	Regression	1.7	5.4E-01	6.4E+01	0.0084
Selenium	2.0	0	Regression	1.1	2.2E-01	3.2E-01	0.70
Silver	6.0	0	0.40	2.4	5.0E-01	9.7E+00	0.052
Tin	50	0	0.030	1.5	5.3E-01	2.0E+01	0.026
Titanium	1,430	0.0040	0.0055	7.9	8.4E+00	na	--
Vanadium	88	0	0.0055	0.48	5.1E-01	3.4E+00	0.15
Zinc	518	0	Regression	154	3.3E+01	1.4E+02	0.23
Volatile Organic Compounds							
1,2,4-Trimethylbenzene	431	0	0.31	133	2.8E+01	4.2E+02	0.067
1,3,5-Trimethylbenzene	81	0	0.41	33	6.9E+00	4.2E+02	0.016
1,4-Dichlorobenzene	1.2	0	0.40	0.48	9.9E-02	na	--
Benzene	2.1	0	2.3	4.9	9.7E-01	4.2E+02	0.0023
Ethylbenzene	8.3	0	0.59	4.8	9.9E-01	4.2E+02	0.0023
Isopropylbenzene	1.5	0	0.30	0.44	9.3E-02	8.0E+02	0.00012
m,p-Xylenes	8.2	0	0.61	5.0	1.0E+00	8.0E+02	0.0013
n-Butylbenzene	1.7	0	0.11	0.20	4.7E-02	4.2E+02	0.00011
n-Propylbenzene	3.9	0	0.29	1.1	2.4E-01	4.2E+02	0.00057
o-Xylene	3.0	0	0.61	1.8	3.7E-01	8.0E+02	0.00046
p-Isopropyltoluene	2.1	0	0.30	0.62	1.3E-01	8.0E+02	0.00016
sec-Butylbenzene	1.6	0	0.088	0.14	3.5E-02	4.2E+02	0.000083
Tert-Butylbenzene	3.4	0	0.16	0.55	1.2E-01	4.2E+02	0.00029
Toluene	24	0	1.0	24	4.9E+00	2.3E+01	0.22

TABLE H-1

ECOLOGICAL HAZARD CALCULATIONS FOR TUNDRA VOLE
Site SS03
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C_{SOIL} (mg/kg)	Exposure Point Concentration C_{WATER} (mg/L)	BCF_{S-P}^a	Exposure Point Concentration C_{PLANT}^b (mg/kg)	Ingestion Dose c, d (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
Total xylenes	2,600	0	0.61	1,583	3.2E+02	8.0E+02	0.40
Semivolatile Organic Compounds							
Dibenzofuran	0.71	0	0.16	0.11	2.6E-02	na	--
DiethylPhthalate	0	0.00050	1.5	0	6.6E-05	4.0E+03	0.000000016
						HI	18
PHCs							
Diesel Range Organics (DRO)	14,251	0.062	0.0020	29	7.3E+01	8.0E+01	0.91
Gasoline Range Organics (GRO)	629	0	0.16	98	2.2E+01	2.3E+01	0.96
Residual Range Organics (RRO)	605	0	0.031	19	6.6E+00	8.7E+01	0.075
						HI	2

Notes:BCF_{S-P} - Bioconcentration factor from soil to plants.

COPEC - Chemical of potential ecological concern.

HI - Hazard index.

HQ - Hazard quotient.

mg/kg - Milligrams per kilogram.

mg/kg-day - Milligrams per kilogram per day.

mg/L - Milligrams per liter.

na - Not available.

Non-PHCs - Non-petroleum hydrocarbons.

PHCs - Petroleum hydrocarbons.

Exposure Parameters

Body Weight:	52.5	gm	0.0525	kg
Food Ingestion Rate (FIR):			0.010	kg (dry wt)/day
FIR_Plants (100%)			0.010	kg (dry wt)/day
FIR_Soil (2.4%)			0.00025	kg (dry wt)/day
Exposure Duration (ED):			1	unitless
Site Utilization Factor (SUF):			1	unitless
Home range:			0.067	acres
Exposure area:			4.3	acres
Water Ingestion Rate:			0.0069	L/day

^a The soil-to-plant bioaccumulation factor (BAF_{S-P}) was derived from Travis & Arms (1998) for organics and EcoSSL (USEPA 2007) for inorganics.^b The plant concentration (C_{PLANT}) was calculated from the soil concentration and the soil-to-plant bioconcentration factor (BCF_{S-P}) (USEPA 1999a).^c Ingestion doses were calculated as described in Appendix G.^d The ingestion dose for a tundra vole accounts for exposure to soil based upon foraging habits of the vole.

TABLE H-2
ECOLOGICAL HAZARD CALCULATIONS FOR MASKED SHREW
Site SS03
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C_{SOIL} (mg/kg)	Exposure Point Concentration C_{WATER} (mg/L)	$BCF_{\text{S-I}}$ ^a	Exposure Point Concentration C_{INVERTS} ^b (mg/kg)	Ingestion Dose ^{c, d} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
Inorganics							
Antimony	2.0	0	1.0	2.0	4.3E-01	1.0E-01	4.1
Arsenic	16	0	Regression	1.7	4.4E-01	2.0E-01	2.2
Barium	258	0.0080	0.091	23	6.3E+00	1.5E+00	4.1
Cadmium	4.0	0	Regression	25	5.3E+00	3.0E+00	1.8
Chromium	56	0	0.31	17	3.9E+00	1.0E+01	0.38
Cobalt	22	0	0.12	2.7	6.8E-01	2.2E+01	0.031
Copper	95	0	0.52	49	1.1E+01	4.5E+01	0.24
Lead	180	0	Regression	53	1.2E+01	1.4E+01	0.87
Manganese	609	0	Regression	35	1.1E+01	2.6E+02	0.040
Mercury	1.6	0	Regression	0.34	8.1E-02	3.9E+00	0.021
Nickel	41	0	na	0	2.1E-01	1.2E+02	0.0017
Selenium	2.0	0	Regression	1.5	3.4E-01	5.9E-01	0.57
Silver	6.0	0	2.0	12	2.6E+00	1.8E+01	0.15
Tin	50	0	na	0	2.5E-01	3.8E+01	0.0067
Titanium	1,430	0.0040	na	0	7.2E+00	na	--
Vanadium	88	0	0.042	3.7	1.2E+00	6.2E+00	0.20
Zinc	518	0	Regression	664	1.4E+02	2.7E+02	0.53
Volatile Organic Compounds							
1,2,4-Trimethylbenzene	431	0	13	5,406	1.1E+03	7.8E+02	1.5
1,3,5-Trimethylbenzene	81	0	8.4	679	1.4E+02	7.8E+02	0.18
1,4-Dichlorobenzene	1.2	0	14	17	3.6E+00	na	--
Benzene	2.1	0	2.7	5.8	1.2E+00	7.8E+02	0.0016
Ethylbenzene	8.3	0	6.6	55	1.2E+01	7.8E+02	0.015
Isopropylbenzene	1.5	0	12	17	3.7E+00	1.5E+03	0.0025
m,p-Xylenes	8.2	0	7.3	60	1.3E+01	1.5E+03	0.0085
n-Butylbenzene	1.7	0	23	40	8.4E+00	7.8E+02	0.011

TABLE H-2

ECOLOGICAL HAZARD CALCULATIONS FOR MASKED SHREW
Site SS03
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C_{SOIL} (mg/kg)	Exposure Point Concentration C_{WATER} (mg/L)	$BCF_{\text{S-I}}$ ^a	Exposure Point Concentration C_{INVERTS} ^b (mg/kg)	Ingestion Dose ^{c, d} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
n-Propylbenzene	3.9	0	11	42	8.9E+00	7.8E+02	0.011
o-Xylene	3.0	0	7.3	22	4.6E+00	1.5E+03	0.0031
p-Isopropyltoluene	2.1	0	12	24	5.2E+00	1.5E+03	0.0035
sec-Butylbenzene	1.6	0	37	59	1.3E+01	7.8E+02	0.016
Tert-Butylbenzene	3.4	0	20	67	1.4E+01	7.8E+02	0.018
Toluene	24	0	5.5	132	2.8E+01	4.2E+01	0.67
Total xylenes	2,600	0	7.3	19,004	4.0E+03	1.5E+03	2.7
Semivolatile Organic Compounds							
Dibenzofuran	0.71	0	2.1	1.5	3.2E-01	na	--
DiethylPhthalate	0	0.00050	6.3	0	8.4E-05	7.4E+03	0.000000011
						HI	20
PHCs							
Diesel Range Organics (DRO)	14,251	0.062	0.48	6,840	1.5E+03	1.5E+02	10
Gasoline Range Organics (GRO)	629	0	2.24	1,409	3.0E+02	4.2E+01	7.1
Residual Range Organics (RRO)	605	0	0.37	224	5.0E+01	1.6E+02	0.31
						HI	18

Notes:

BCF_{S-P} - Bioconcentration factor from soil to plants.
COPEC - Chemical of potential ecological concern.
HI - Hazard index.
HQ - Hazard quotient.
mg/kg - Milligrams per kilogram.
mg/kg-day - Milligrams per kilogram per day.
mg/L - Milligrams per liter.
na - Not available.

Exposure Parameters

Body Weight:	4.5	gm	0.0045	kg
Food Ingestion Rate (FIR):			0.00095	kg (dry wt)/day
FIR_Inverts (100%)			0.00095	kg (dry wt)/day
FIR_Soil (2.4%)			0.000023	kg (dry wt)/day
Exposure Duration (ED):			1	unitless
Site Utilization Factor (SUF):			1	unitless
Home range:			1.1	acres
Exposure area:			4.3	acres

TABLE H-2

ECOLOGICAL HAZARD CALCULATIONS FOR MASKED SHREW
Site SS03
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C_{SOIL} (mg/kg)	Exposure Point Concentration C_{WATER} (mg/L)	$BCF_{\text{S-I}}$ ^a	Exposure Point Concentration C_{INVERTS} ^b (mg/kg)	Ingestion Dose ^{c, d} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
Non-PHCs - Non-petroleum hydrocarbons.			Water Ingestion Rate:		0.00076	L/day	
PHCs - Petroleum hydrocarbons.							

^a The soil-to-invertebrate bioaccumulation factor (BAFS-I) was derived from Region 6 Draft SLERA Protocol for organics and EcoSSL (USEPA 2007) for inorganics.

^b The soil invertebrate concentration (CINVERT) was calculated from the soil concentration and the soil-to-invertebrate bioaccumulation factor (BAFS-I) (USEPA 1999a).

^c Ingestion doses were calculated as described in Appendix G.

^d The ingestion dose for a masked shrew accounts for exposure to soil based upon foraging habits of the shrew.

TABLE H-3
ECOLOGICAL HAZARD CALCULATIONS FOR LEAST WEASEL
Site SS03
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C _{SOIL} (mg/kg)	Exposure Point Concentration C _{WATER} (mg/L)	BCF _{S-M} ^a	Exposure Point Concentration C _{MAMMAL} ^b (mg/kg)	Ingestion Dose ^{c, d} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
Inorganics							
Antimony	2.0	0	na	0	4.6E-03	5.9E-02	0.078
Arsenic	16	0	Regression	0.076	4.3E-02	1.1E-01	0.38
Barium	258	0.0080	0.057	15	1.8E+00	8.5E-01	2.1
Cadmium	4.0	0	0.33	1.3	1.2E-01	1.7E+00	0.071
Chromium	56	0	Regression	4.5	5.0E-01	5.8E+00	0.085
Cobalt	22	0	Regression	0.65	1.0E-01	1.2E+01	0.0085
Copper	95	0	0.20	19	1.8E+00	2.5E+01	0.069
Lead	180	0	0.11	19	2.0E+00	7.8E+00	0.25
Manganese	609	0	0.021	12	2.4E+00	1.5E+02	0.017
Mercury	1.6	0	0.054	0.086	1.1E-02	2.2E+00	0.0050
Nickel	41	0	0.35	14	1.3E+00	6.7E+01	0.019
Selenium	2.0	0	Regression	0.86	7.5E-02	3.3E-01	0.22
Silver	6.0	0	0.0040	0.024	1.6E-02	1.0E+01	0.0016
Tin	50	0	na	0	1.2E-01	2.1E+01	0.0054
Titanium	1,430	0.0040	na	0	3.3E+00	na	--
Vanadium	88	0	0.012	1.1	2.9E-01	3.5E+00	0.083
Zinc	518	0	0.77	400	3.4E+01	1.5E+02	0.23
Volatile Organic Compounds							
1,2,4-Trimethylbenzene	431	0	0	0	9.9E-01	4.4E+02	0.0023
1,3,5-Trimethylbenzene	81	0	0	0	1.9E-01	4.4E+02	0.00042
1,4-Dichlorobenzene	1.2	0	0	0	2.8E-03	na	--
Benzene	2.1	0	0	0	4.9E-03	4.4E+02	0.000011
Ethylbenzene	8.3	0	0	0	1.9E-02	4.4E+02	0.000043
Isopropylbenzene	1.5	0	0	0	3.4E-03	8.3E+02	0.0000041
m,p-Xylenes	8.2	0	0	0	1.9E-02	8.3E+02	0.000023
n-Butylbenzene	1.7	0	0	0	4.0E-03	4.4E+02	0.0000090
n-Propylbenzene	3.9	0	0	0	9.1E-03	4.4E+02	0.000021
o-Xylene	3.0	0	0	0	6.9E-03	8.3E+02	0.0000082
p-Isopropyltoluene	2.1	0	0	0	4.8E-03	8.3E+02	0.0000058
sec-Butylbenzene	1.6	0	0	0	3.7E-03	4.4E+02	0.0000083
Tert-Butylbenzene	3.4	0	0	0	7.8E-03	4.4E+02	0.000018
Toluene	24	0	0	0	5.5E-02	2.3E+01	0.0023

TABLE H-3

ECOLOGICAL HAZARD CALCULATIONS FOR LEAST WEASEL
Site SS03
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C_{SOIL} (mg/kg)	Exposure Point Concentration C_{WATER} (mg/L)	$BCF_{\text{S-M}}^a$	Exposure Point Concentration C_{MAMMAL}^b (mg/kg)	Ingestion Dose c, d (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
Total xylenes	2,600	0	0	0	6.0E+00	8.3E+02	0.0072
Semivolatile Organic Compounds							
Dibenzofuran	0.71	0	0	0	1.6E-03	na	--
DiethylPhthalate	0	0.00050	0	0	6.8E-05	4.1E+03	0.000000016
						HI	4
PHCs							
Diesel Range Organics (DRO)	14,251	0.062	0	0	3.3E+01	8.3E+01	0.39
Gasoline Range Organics (GRO)	629	0	0	0	1.4E+00	2.4E+01	0.061
Residual Range Organics (RRO)	605	0	0	0	1.4E+00	9.0E+01	0.015
						HI	0.5

Notes:BCF_{S-P} - Bioconcentration factor from soil to plants.

COPEC - Chemical of potential ecological concern.

HI - Hazard index.

HQ - Hazard quotient.

mg/kg - Milligrams per kilogram.

mg/kg-day - Milligrams per kilogram per day.

mg/L - Milligrams per liter.

na - Not available.

Non-PHCs - Non-petroleum hydrocarbons.

PHCs - Petroleum hydrocarbons.

Exposure Parameters

Body Weight:	45	gm	0.045	kg
Food Ingestion Rate (FIR):			0.0037	kg (dry wt)/day
FIR_Mammals (100%)			0.0037	kg (dry wt)/day
FIR_Soil (2.8%)			0.00010	kg (dry wt)/day
Exposure Duration (ED):			1	unitless
Site Utilization Factor (SUF):			1	unitless
Home range:			2.9	acres
Exposure area:			4.3	acres
Water Ingestion Rate:			0.0061	L/day

^a The soil-to-small mammal bioaccumulation factor (BAFS-M) was derived from USEPA (2005).^b The mammalian prey item concentration (C_{MAMMAL}) was calculated from the soil concentration and the soil-to-small mammal bioconcentration factor ($BCF_{\text{S-M}}$).^c Ingestion doses were calculated as described in Appendix G.^d The ingestion dose for a least weasel accounts for exposure to soil based upon foraging habits of the weasel.

TABLE H-4
ECOLOGICAL HAZARD CALCULATIONS FOR MINK
Site SS03
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C _{SEDIMENT} (mg/kg)	Exposure Point Concentration C _{WATER} (mg/L)	BCF _{S-M} ^a	Exposure Point Concentration C _{MAMMAL} ^b (mg/kg)	Ingestion Dose ^{c, d} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
Inorganics							
Arsenic	21	0	Regression	0.095	1.6E-02	4.9E-02	0.34
Barium	146	0.0080	0.057	8.3	3.0E-01	3.8E-01	0.78
Beryllium	0.50	0	na	0	3.3E-04	4.0E-01	0.00084
Cadmium	1.0	0	0.33	0.33	8.7E-03	7.5E-01	0.012
Chromium	62	0	Regression	4.8	1.6E-01	2.6E+00	0.060
Cobalt	23	0	Regression	0.69	3.2E-02	5.5E+00	0.0059
Copper	55	0	0.20	11	3.0E-01	1.1E+01	0.026
Manganese	1,320	0	0.021	27	1.5E+00	6.6E+01	0.023
Nickel	65	0	0.35	23	6.0E-01	3.0E+01	0.020
Selenium	1.7	0	Regression	0.81	2.1E-02	1.5E-01	0.14
Silver	2.0	0	0.0040	0.01	1.5E-03	4.5E+00	0.00034
Titanium	1,160	0.0040	na	0	7.8E-01	na	--
Vanadium	107	0	0.012	1.3	1.0E-01	1.6E+00	0.066
Zinc	218	0	0.77	168	4.2E+00	6.7E+01	0.063
Volatile Organic Compounds							
1,2,3-Trichlorobenzene	0.00025	0	0	0	1.7E-07	na	--
1,2,3-Trichloropropane	0.00021	0	0	0	1.4E-07	na	--
cis-1,3-Dichloropropene	0.00017	0	0	0	1.1E-07	na	--
Methylene Chloride	0.013	0	0	0	8.7E-06	4.4E+00	0.0000020
trans-1,3-Dichloropropene	0.00013	0	0	0	8.7E-08	na	--
Semivolatile Organic Compounds							
3-and 4-Methylphenol Coelution	0.20	0	0	0	1.3E-04	2.1E+02	0.00000063
Bis(2-ethylhexyl) Phthalate	0.90	0	0	0	6.0E-04	1.4E+01	0.000044
DiethylPhthalate	0	0.00050	0	0	2.5E-05	1.8E+03	0.000000013
Pesticides							
4,4'-DDD	0.0080	0	na	0	5.3E-06	6.0E-01	0.0000089
4,4'-DDT	0.0095	0	Regression	0.11	2.7E-03	6.0E-01	0.0045
Endosulfan Sulfate	0.0033	0	na	0	2.2E-06	7.5E-01	0.0000030
						HI	2
PHCs							

TABLE H-4

ECOLOGICAL HAZARD CALCULATIONS FOR MINK
Site SS03
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C_{SEDIMENT} (mg/kg)	Exposure Point Concentration C_{WATER} (mg/L)	BCF_{S-M}^a	Exposure Point Concentration C_{MAMMAL}^b (mg/kg)	Ingestion Dose c, d (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
Diesel Range Organics (DRO)	161	0.062	0	0	1.1E-01	3.7E+01	0.0030
Gasoline Range Organics (GRO)	5.8	0	0	0	3.9E-03	1.1E+01	0.00036
						HI	0.003

Notes:BCF_{S-P} - Bioconcentration factor from soil to plants.

COPEC - Chemical of potential ecological concern.

HI - Hazard index.

HQ - Hazard quotient.

mg/kg - Milligrams per kilogram.

mg/kg-day - Milligrams per kilogram per day.

mg/L - Milligrams per liter.

na - Not available.

Non-PHCs - Non-petroleum hydrocarbons.

PHCs - Petroleum hydrocarbons.

Exposure Parameters

Body Weight:	1354	gm	1.354	kg
Food Ingestion Rate (FIR):			0.063	kg (dry wt)/day
	FIR_Mammals (100%)		0.063	kg (dry wt)/day
	FIR_Sediment (2.8%)		0.00175	kg (dry wt)/day
Exposure Duration (ED):			1	unitless
Site Utilization Factor (SUF):			0.52	unitless
	Home range:		8.3	acres
	Exposure area:		4.3	acres
	Water Ingestion Rate:		0.13	L/day

^a The soil-to-small mammal bioaccumulation factor (BAFS-M) was derived from USEPA (2005).^b The mammalian prey item concentration (C_{MAMMAL}) was calculated from the soil concentration and the soil-to-small mammal bioconcentration factor (BCF_{S-M}).^c Ingestion doses were calculated as described in Appendix G.^d The ingestion dose for a mink accounts for exposure to sediment based upon foraging habits of the mink.

TABLE H-5
ECOLOGICAL HAZARD CALCULATIONS FOR DARK-EYED JUNCO
Site SS03
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C _{SOIL} (mg/kg)	Exposure Point Concentration C _{WATER} (mg/L)	BCF _{S-P} ^a	Exposure Point Concentration C _{PLANT} ^b (mg/kg)	Ingestion Dose ^{c, d} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
Inorganics							
Antimony	2.0	0	0.20	0.40	1.2E-02	2.9E+00	0.0041
Arsenic	16	0	0.040	0.64	3.0E-02	2.9E+00	0.010
Barium	258	0.0080	0.16	40	1.3E+00	3.1E+01	0.040
Cadmium	4.0	0	0.55	2.2	6.0E-02	3.7E+00	0.016
Chromium	56	0	0.041	2.3	1.1E-01	2.7E+00	0.040
Cobalt	22	0	0.0075	0.17	2.3E-02	2.2E+01	0.0010
Copper	95	0	0.40	38	1.1E+00	7.0E+01	0.015
Lead	180	0	Regression	4.9	2.8E-01	4.1E+00	0.067
Manganese	609	0	0.079	48	1.8E+00	1.6E+03	0.0011
Mercury	1.6	0	0.90	1.4	3.8E-02	7.1E-01	0.054
Nickel	41	0	Regression	1.7	8.0E-02	2.0E+02	0.00040
Selenium	2.0	0	Regression	1.1	3.0E-02	1.3E+00	0.024
Silver	6.0	0	0.40	2.4	6.7E-02	4.6E+00	0.014
Tin	50	0	0.030	1.5	8.1E-02	1.1E+01	0.0075
Titanium	1,430	0.0040	0.0055	7.9	1.4E+00	na	--
Vanadium	88	0	0.0055	0.48	8.7E-02	2.9E+01	0.0030
Zinc	518	0	Regression	155	4.4E+00	4.3E+01	0.10
Volatile Organic Compounds							
1,2,4-Trimethylbenzene	431	0	0.31	133	3.8E+00	na	--
1,3,5-Trimethylbenzene	81	0	0.41	33	9.2E-01	na	--
1,4-Dichlorobenzene	1.2	0	0.40	0.48	1.3E-02	na	--
Benzene	2.1	0	2.3	4.9	1.3E-01	na	--
Ethylbenzene	8.3	0	0.59	4.8	1.3E-01	na	--
Isopropylbenzene	1.5	0	0.30	0.44	1.3E-02	na	--
m,p-Xylenes	8.2	0	0.61	5.0	1.4E-01	na	--
n-Butylbenzene	1.7	0	0.11	0.20	6.5E-03	na	--
n-Propylbenzene	3.9	0	0.29	1.1	3.2E-02	na	--
o-Xylene	3.0	0	0.61	1.8	4.9E-02	na	--
p-Isopropyltoluene	2.1	0	0.30	0.62	1.8E-02	na	--
sec-Butylbenzene	1.6	0	0.088	0.14	5.0E-03	na	--
Tert-Butylbenzene	3.4	0	0.16	0.55	1.7E-02	na	--
Toluene	24	0	1.0	24	6.5E-01	na	--
Total xylenes	2,600	0	0.61	1,583	4.3E+01	na	--
Semivolatile Organic Compounds							
Dibenzofuran	0.71	0	0.16	0.11	3.6E-03	na	--
DiethylPhthalate	0	0.00050	1.5	0	1.3E-05	na	--
						HI	0.4

TABLE H-5

ECOLOGICAL HAZARD CALCULATIONS FOR DARK-EYED JUNCO
Site SS03
TATALINA LONG RANGE RADAR STATION, ALASKA

	Exposure Point Concentration C_{SOIL} (mg/kg)	Exposure Point Concentration C_{WATER} (mg/L)	BCF_{S-P}^a	Exposure Point Concentration C_{PLANT}^b (mg/kg)	Ingestion Dose c, d (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
COPEC							
Non-PHCs							
PHCs							
Diesel Range Organics (DRO)	14,251	0.062	0.0020	29	1.3E+01	na	--
Gasoline Range Organics (GRO)	629	0	0.16	98	3.0E+00	na	--
Residual Range Organics (RRO)	605	0	0.031	19	9.9E-01	na	--
						HI	0

Notes:

BCF_{S-P} - Bioconcentration factor from soil to plants.
 COPEC - Chemical of potential ecological concern.
 HI - Hazard index.
 HQ - Hazard quotient.
 mg/kg - Milligrams per kilogram.
 mg/kg-day - Milligrams per kilogram per day.
 mg/L - Milligrams per liter.
 na - Not available.
 Non-PHCs - Non-petroleum hydrocarbons.
 PHCs - Petroleum hydrocarbons.

Exposure Parameters

Body Weight:	24	gm	0.024	kg
Food Ingestion Rate (FIR):			0.0049	kg (dry wt)/day
	FIR_Plants (100%)		0.0049	kg (dry wt)/day
	FIR_Soil (3.3%)		0.00016	kg (dry wt)/day
Exposure Duration (ED):			0.5	unitless
Site Utilization Factor (SUF):			0.25	unitless
	Home range:		17	acres
	Exposure area:		4.3	acres
Water Ingestion Rate:			0.0048	L/day

^a The soil-to-plant bioaccumulation factor (BAF_{S-P}) was derived from Travis & Arms (1998) for organics and EcoSSL (USEPA 2007) for inorganics.

^b The plant concentration (C_{PLANT}) was calculated from the soil concentration and the soil-to-plant bioconcentration factor (BCF_{S-P}) (USEPA 1999a).

^c Ingestion doses were calculated as described in Appendix G.

^d The ingestion dose for the dark-eyed junco accounts for exposure to soil based upon foraging habits.

TABLE H-6
ECOLOGICAL HAZARD CALCULATIONS FOR AMERICAN ROBIN
Site SS03
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C _{SOIL} (mg/kg)	Exposure Point Concentration C _{WATER} (mg/L)	BCF _{S-P} ^a	Exposure Point Concentration C _{PLANT} ^b (mg/kg)	BCF _{S-I} ^c	Exposure Point Concentration C _{INVERTS} ^d	Ingestion Dose ^{e,f} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs									
Inorganics									
Antimony	2.0	0	0.20	0.40	1.0	2.0	2.2E-02	2.2E+00	0.010
Arsenic	16	0	0.040	0.64	Regression	1.7	3.8E-02	2.2E+00	0.018
Barium	258	0.0080	0.16	40	0.09	23	7.0E-01	2.3E+01	0.030
Cadmium	4.0	0	0.55	2.2	Regression	25	2.3E-01	2.7E+00	0.086
Chromium	56	0	0.041	2.3	0.31	17	2.3E-01	2.0E+00	0.12
Cobalt	22	0	0.0075	0.17	0.12	2.7	5.3E-02	1.6E+01	0.0033
Copper	95	0	0.40	38	0.52	49	7.0E-01	5.2E+01	0.014
Lead	180	0	Regression	4.9	Regression	53	7.2E-01	3.0E+00	0.24
Manganese	609	0	0.079	48	Regression	35	1.3E+00	1.2E+03	0.0011
Mercury	1.6	0	0.90	1.4	Regression	0.34	1.0E-02	5.2E-01	0.020
Nickel	41	0	Regression	1.7	na	0	6.0E-02	1.4E+02	0.00042
Selenium	2.0	0	Regression	1.1	Regression	1.5	2.0E-02	9.3E-01	0.022
Silver	6.0	0	0.40	2.4	2.0	12	1.2E-01	3.4E+00	0.037
Tin	50	0	0.030	1.5	na	0	7.1E-02	7.9E+00	0.0090
Titanium	1,430	0.0040	0.0055	7.9	na	0	1.9E+00	na	--
Vanadium	88	0	0.0055	0.48	0.042	3.7	1.5E-01	2.1E+01	0.0070
Zinc	518	0	Regression	155	Regression	664	7.1E+00	3.2E+01	0.22
Volatile Organic Compounds									
1,2,4-Trimethylbenzene	431	0	0.31	133	13	5,406	4.9E+01	na	--
1,3,5-Trimethylbenzene	81	0	0.41	33	8.4	679	6.2E+00	na	--
1,4-Dichlorobenzene	1.2	0	0.40	0.48	14.2	17	1.5E-01	na	--
Benzene	2.1	0	2.3	4.9	2.7	5.8	7.2E-02	na	--
Ethylbenzene	8.3	0	0.59	4.8	6.6	55	5.1E-01	na	--
Isopropylbenzene	1.5	0	0.30	0.44	12	17	1.6E-01	na	--
m,p-Xylenes	8.2	0	0.61	5.0	7.3	60	5.5E-01	na	--
n-Butylbenzene	1.7	0	0.11	0.20	23	40	3.5E-01	na	--
n-Propylbenzene	3.9	0	0.29	1.1	11	42	3.8E-01	na	--
o-Xylene	3.0	0	0.61	1.8	7.3	22	2.0E-01	na	--
p-Isopropyltoluene	2.1	0	0.30	0.6	12	24	2.2E-01	na	--
sec-Butylbenzene	1.6	0	0.088	0.1	37.4	59.4	5.2E-01	na	--
Tert-Butylbenzene	3.4	0	0.16	0.55	20	67	6.0E-01	na	--
Toluene	24	0	1.0	24	5.5	132	1.3E+00	na	--
Total xylenes	2,600	0	0.61	1,583	7.3	19,004	1.8E+02	na	--
Semivolatile Organic Compounds									
Dibenzofuran	0.71	0	0.16	0.11	2.1	1.5	1.5E-02	na	--
DiethylPhthalate	0	0.00050	1.5	0	6.3	0	6.5E-06	na	--
								HI	0.8

TABLE H-6

ECOLOGICAL HAZARD CALCULATIONS FOR AMERICAN ROBIN
Site SS03
TATALINA LONG RANGE RADAR STATION, ALASKA

	Exposure Point Concentration C _{SOIL} (mg/kg)	Exposure Point Concentration C _{WATER} (mg/L)	BCF _{S-P} ^a	Exposure Point Concentration C _{PLANT} ^b (mg/kg)	BCF _{S-I} ^c	Exposure Point Concentration C _{INVERTS} ^d	Ingestion Dose ^{e,f} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
COPEC									
Non-PHCs									
PHCs									
Diesel Range Organics (DRO)	14,251	0.062	0.0020	29	0.48	6,840	7.9E+01	na	--
Gasoline Range Organics (GRO)	629	0.0	0.16	98	2.2	1,409	1.4E+01	na	--
Residual Range Organics (RRO)	605	0	0.031	19	0.37	224	2.8E+00	na	--
								HI	0

Notes:

BCF_{S-P} - Bioconcentration factor from soil to plants.
 BCF_{S-I} - Bioconcentration factor from soil to invertebrates.
 COPEC - Chemical of potential ecological concern.
 HI - Hazard index.
 HQ - Hazard quotient.
 mg/kg - Milligrams per kilogram.
 mg/kg-day - Milligrams per kilogram per day.
 mg/L - Milligrams per liter.
 na - Not available.
 Non-PHCs - Non-petroleum hydrocarbons.
 PHCs - Petroleum hydrocarbons.

Exposure Parameters

Body Weight:	83.25	gm	0.08325	kg
Food Ingestion Rate (FIR):			0.0107	kg (dry wt)/day
FIR_Plants (30%)			0.0032	kg (dry wt)/day
FIR_Inverts (70%)			0.0075	kg (dry wt)/day
FIR_Soil (10.4%)			0.0011	kg (dry wt)/day
Exposure Duration (ED):			0.5	unitless
Site Utilization Factor (SUF):			0.20	unitless
Home range:			22	acres
Exposure area:			4.3	acres
Water Ingestion Rate:			0.011	L/day

^a The soil-to-plant bioaccumulation factor (BAF_{S-P}) was derived from Travis & Arms (1998) for organics and EcoSSL (USEPA 2007) for inorganics.

^b The plant concentration (C_{PLANT}) was calculated from the soil concentration and the soil-to-plant bioconcentration factor (BCF_{S-P}) (USEPA 1999a).

^c The soil-to-invertebrate bioaccumulation factor (BAFS-I) was derived from Region 6 Draft SLERA Protocol for organics and EcoSSL (USEPA 2007) for inorganics.

^d The soil invertebrate concentration (C_{INVERT}) was calculated from the soil concentration and the soil-to-invertebrate bioaccumulation factor (BAFS-I) (USEPA 1999a).

^e Ingestion doses were calculated as described in Appendix G.

^f The ingestion dose for the American robin accounts for exposure to soil based upon foraging habits.

TABLE H-7
ECOLOGICAL HAZARD CALCULATIONS FOR NORTHERN SHRIKE
Site SS03
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C _{SOIL} (mg/kg)	Exposure Point Concentration C _{WATER} (mg/L)	BCF _{S-I} ^a	Exposure Point Concentration C _{INVERTS} ^b (mg/kg)	Ingestion Dose ^{c,d} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
Inorganics							
Antimony	2.0	0	1.0	2.0	2.2E-03	2.3E+00	0.0010
Arsenic	16	0	Regression	1.7	2.3E-03	2.3E+00	0.0010
Barium	258	0.0080	0.091	23	3.3E-02	2.4E+01	0.0014
Cadmium	4.0	0	Regression	25	2.6E-02	2.8E+00	0.0092
Chromium	56	0	0.31	17	2.0E-02	2.1E+00	0.0096
Cobalt	22	0	0.12	2.7	3.6E-03	1.7E+01	0.00021
Copper	95	0	0.52	49	5.4E-02	5.4E+01	0.0010
Lead	180	0	Regression	53	6.2E-02	3.2E+00	0.019
Manganese	609	0	Regression	35	5.8E-02	1.2E+03	0.000048
Mercury	1.6	0	Regression	0.34	4.1E-04	5.5E-01	0.00075
Nickel	41	0	na	0	1.4E-03	1.5E+02	0.0000093
Selenium	2.0	0	Regression	1.5	1.7E-03	9.8E-01	0.0017
Silver	6.0	0	2.0	12	1.3E-02	3.6E+00	0.0036
Tin	50	0	na	0	1.7E-03	8.3E+00	0.00021
Titanium	1,430	0.0040	na	0	4.9E-02	na	--
Vanadium	88	0	0.042	3.7	6.9E-03	2.2E+01	0.00031
Zinc	518	0	Regression	664	7.1E-01	3.4E+01	0.021
Volatile Organic Compounds							
1,2,4-Trimethylbenzene	431	0	13	5,406	5.7E+00	na	--
1,3,5-Trimethylbenzene	81	0	8.4	679	7.1E-01	na	--
1,4-Dichlorobenzene	1.2	0	14	17	1.8E-02	na	--
Benzene	2.1	0	2.7	5.8	6.1E-03	na	--
Ethylbenzene	8.3	0	6.6	55	5.8E-02	na	--
Isopropylbenzene	1.5	0	12	17	1.8E-02	na	--
m,p-Xylenes	8.2	0	7.3	60	6.3E-02	na	--
n-Butylbenzene	1.7	0	23	40	4.1E-02	na	--
n-Propylbenzene	3.9	0	11	42	4.4E-02	na	--
o-Xylene	3.0	0	7.3	22	2.3E-02	na	--
p-Isopropyltoluene	2.1	0	12	24	2.6E-02	na	--
sec-Butylbenzene	1.6	0	37	59	6.2E-02	na	--
Tert-Butylbenzene	3.4	0	20	67	7.0E-02	na	--
Toluene	24	0	5.5	132	1.4E-01	na	--
Total xylenes	2,600	0	7.3	19,004	2.0E+01	na	--
Semivolatile Organic Compounds							
Dibenzofuran	0.71	0	2.1	1.5	1.6E-03	na	--
DiethylPhthalate	0	0.00050	6.3	0	4.8E-07	na	--
						HI	0.07

TABLE H-7

ECOLOGICAL HAZARD CALCULATIONS FOR NORTHERN SHRIKE
Site SS03
TATALINA LONG RANGE RADAR STATION, ALASKA

	Exposure Point Concentration C _{SOIL} (mg/kg)	Exposure Point Concentration C _{WATER} (mg/L)	BCF _{S-I} ^a	Exposure Point Concentration C _{INVERTS} ^b (mg/kg)	Ingestion Dose ^{c, d} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
COPEC							
Non-PHCs							
PHCs							
Diesel Range Organics (DRO)	14,251	0.062	0.48	6,840	7.6E+00	na	--
Gasoline Range Organics (GRO)	629	0	2.2	1,409	1.5E+00	na	--
Residual Range Organics (RRO)	605	0	0.37	224	2.5E-01	na	--
						HI	0

Notes:**Exposure Parameters**

BCF _{S-I} - Bioconcentration factor from soil to invertebrates.	Body Weight:	67.5	gm	0.0675	kg
COPEC - Chemical of potential ecological concern.	Food Ingestion Rate (FIR):			0.0105	kg (dry wt)/day
HI - Hazard index.	FIR_Inverts (100%)			0.0105	kg (dry wt)/day
HQ - Hazard quotient.	FIR_Soil (3.3%)			0.00035	kg (dry wt)/day
mg/kg - Milligrams per kilogram.	Exposure Duration (ED):			0.5	unitless
mg/kg-day - Milligrams per kilogram per day.	Site Utilization Factor (SUF):			0.013	unitless
mg/L - Milligrams per liter.	Home range:			320	acres
na - Not available.	Exposure area:			4.3	acres
Non-PHCs - Non-petroleum hydrocarbons.	Water Ingestion Rate:			0.0097	L/day
PHCs - Petroleum hydrocarbons.					

^a The soil-to-invertebrate bioaccumulation factor (BAFS-I) was derived from Region 6 Draft SLERA Protocol for organics and EcoSSL (USEPA 2007) for inorganics.

^b The soil invertebrate concentration (CINVERT) was calculated from the soil concentration and the soil-to-invertebrate bioaccumulation factor (BAFS-I) (USEPA 1999a).

^c Ingestion doses were calculated as described in Appendix G.

^d The ingestion dose for the Northern shrike accounts for exposure to soil based upon foraging habits.

TABLE H-8

ECOLOGICAL HAZARD CALCULATIONS FOR MALLARD
Site SS03
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C _{SEDIMENT} (mg/kg)	Exposure Point Concentration C _{WATER} (mg/L)	BCF _{S-P} ^a	Exposure Point Concentration C _{PLANT} ^b (mg/kg)	BCF _{S-I} ^c	Exposure Point Concentration C _{INVERTS} ^d	Ingestion Dose ^{e,f} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs									
Inorganics									
Arsenic	21	0	0.040	0.84	Regression	2.1	2.1E-06	1.1E+00	0.0000019
Barium	146	0.0080	0.16	23	0.091	13	3.4E-05	1.2E+01	0.0000029
Beryllium	0.50	0	Regression	0.35	0.045	0.023	4.3E-07	1.2E+01	0.00000036
Cadmium	1.0	0	0.55	0.55	Regression	8.3	1.7E-06	1.4E+00	0.0000012
Chromium	62	0	0.041	2.5	0.31	19	8.0E-06	1.0E+00	0.0000078
Cobalt	23	0	0.0075	0.17	0.12	2.8	1.5E-06	8.3E+00	0.00000019
Copper	55	0	0.40	22	0.52	28	3.1E-05	2.7E+01	0.0000012
Manganese	1,320	0	0.079	104	Regression	60	1.8E-04	6.0E+02	0.00000031
Nickel	65	0	Regression	2.5	na	0	5.6E-06	7.5E+01	0.00000075
Selenium	1.7	0	Regression	0.91	Regression	1.4	1.3E-06	4.8E-01	0.0000027
Silver	2.0	0	0.40	0.80	2.0	4.1	1.5E-06	1.8E+00	0.00000087
Titanium	1,160	0.0040	0.0055	6.4	na	0	5.7E-05	na	--
Vanadium	107	0	0.0055	0.59	0.042	4.5	5.8E-06	1.1E+01	0.00000052
Zinc	218	0	Regression	96	Regression	500	1.8E-04	1.7E+01	0.000011
Volatile Organic Compounds									
1,2,3-Trichlorobenzene	0.00025	0	0.18	0.000044	28	0.0071	9.8E-10	na	--
1,2,3-Trichloropropane	0.00021	0	1.9	0.00040	4.5	0.00095	5.9E-10	na	--
cis-1,3-Dichloropropene	0.00017	0	2.5	0.00042	4.8	0.00081	6.0E-10	na	--
Methylene Chloride	0.013	0	7.3	0.10	3.2	0.042	1.2E-07	na	--
trans-1,3-Dichloropropene	0.00013	0	2.6	0.00034	4.5	0.00059	4.7E-10	na	--
Semivolatile Organic Compounds									
3-and 4-Methylphenol Coelution	0.20	0	1.8	0.36	0.87	0.17	4.5E-07	na	--
Bis(2-ethylhexyl) Phthalate	0.90	0	0.0016	0.0014	155	140	1.8E-05	6.7E-02	0.00027
DiethylPhthalate	0	0.00050	1.5	0	6.3	0	8.1E-10	na	--
Pesticides									
4,4'-DDD	0.0080	0	0.013	0.00010	Regression	0.11	1.5E-08	3.7E-03	0.0000039
4,4'-DDT	0.0095	0	0.0039	0.000037	Regression	0.15	1.9E-08	3.7E-03	0.0000052
Endosulfan Sulfate	0.0033	0	0.30	0.0010	0.30	0.0010	1.4E-09	7.7E+00	0.0000000018
								HI	0.0003

TABLE H-8

ECOLOGICAL HAZARD CALCULATIONS FOR MALLARD
Site SS03
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C_{SEDIMENT} (mg/kg)	Exposure Point Concentration C_{WATER} (mg/L)	$BCF_{\text{S-P}}$ ^a	Exposure Point Concentration C_{PLANT} (mg/kg)	$BCF_{\text{S-I}}$ ^c	Exposure Point Concentration C_{INVERTS} ^d	Ingestion Dose ^{e,f} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs									
PHCs									
Diesel Range Organics (DRO)	161	0.062	0.0020	0.32	0.48	77	1.7E-05	na	--
Gasoline Range Organics (GRO)	5.8	0	0.16	0.90	2.2	13	3.0E-06	na	--
								HI	0

Notes:

BCF_{S-P} - Bioconcentration factor from soil to plants.
 BCF_{S-I} - Bioconcentration factor from soil to invertebrates.
 COPEC - Chemical of potential ecological concern.
 HI - Hazard index.
 HQ - Hazard quotient.
 mg/kg - Milligrams per kilogram.
 mg/kg-day - Milligrams per kilogram per day.
 mg/L - Milligrams per liter.
 na - Not available.
 Non-PHCs - Non-petroleum hydrocarbons.
 PHCs - Petroleum hydrocarbons.

Exposure Parameters

Body Weight:	1134	gm	1.134	kg
Food Ingestion Rate (FIR):			0.051	kg (dry wt)/day
FIR_Plants (90%)			0.046	kg (dry wt)/day
FIR_Inverts (10%)			0.0051	kg (dry wt)/day
FIR_Soil (3.3%)			0.0017	kg (dry wt)/day
Exposure Duration (ED):			0.5	unitless
Site Utilization Factor (SUF):			0.000057	unitless
Home range:			75,076	acres
Exposure area:			4.3	acres
Water Ingestion Rate:			0.064	L/day

^a The soil-to-plant bioaccumulation factor (BAF_{S-P}) was derived from Travis & Arms (1998) for organics and EcoSSL (USEPA 2007) for inorganics.

^b The plant concentration (C_{PLANT}) was calculated from the soil concentration and the soil-to-plant bioconcentration factor (BCF_{S-P}) (USEPA 1999a).

^c The soil-to-invertebrate bioaccumulation factor (BAFS-I) was derived from Region 6 Draft SLERA Protocol for organics and EcoSSL (USEPA 2007) for inorganics.

^d The soil invertebrate concentration (CINVERT) was calculated from the soil concentration and the soil-to-invertebrate bioaccumulation factor (BAFS-I) (USEPA 1999a).

^e Ingestion doses were calculated as described in Appendix G.

^f The ingestion dose for the mallard accounts for exposure to sediment based upon foraging habits.

TABLE H-9
ECOLOGICAL HAZARD CALCULATIONS FOR TUNDRA VOLE
Site SS08
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C _{SOIL} (mg/kg)	Exposure Point Concentration C _{WATER} (mg/L)	BCF _{S-P} ^a	Exposure Point Concentration C _{PLANT} ^b (mg/kg)	Ingestion Dose ^{c,d} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
Inorganics							
Aluminum	0	1.2	0.0040	0	1.6E-01	1.7E+00	0.095
Antimony	1.6	0	0.20	0.32	7.1E-02	5.6E-02	1.3
Arsenic	19	0	0.040	0.78	2.5E-01	1.1E-01	2.2
Barium	261	0.015	0.16	41	9.2E+00	8.2E-01	11
Cadmium	1.2	0	0.55	0.63	1.3E-01	1.6E+00	0.081
Chromium	54	0.0050	0.041	2.2	7.0E-01	5.6E+00	0.12
Cobalt	22	0	0.0075	0.16	1.3E-01	1.2E+01	0.011
Copper	65	0.0028	0.40	26	5.4E+00	2.4E+01	0.22
Lead	28	0.0011	Regression	1.7	4.7E-01	7.6E+00	0.062
Manganese	1,030	0	0.079	81	2.1E+01	1.4E+02	0.15
Nickel	58	0	Regression	2.3	7.2E-01	6.4E+01	0.011
Selenium	1.1	0.0012	Regression	0.57	1.2E-01	3.2E-01	0.36
Silver	0	0.0030	0.40	0	3.9E-04	9.7E+00	0.000041
Thallium	0.18	0	0.0040	0.00074	1.0E-03	1.2E-02	0.085
Tin	9.4	0	0.030	0.28	1.0E-01	2.0E+01	0.0049
Titanium	1,271	0.0020	0.0055	7.0	7.4E+00	na	--
Vanadium	83	0	0.0055	0.46	4.9E-01	3.4E+00	0.14
Zinc	135	0	Regression	73	1.5E+01	1.4E+02	0.10
Volatile Organic Compounds							
1,1-Dichloropropene	0	0.00029	1.5	0	3.8E-05	na	--
1,3,5-Trimethylbenzene	4.6	0	0.41	1.9	3.9E-01	4.2E+02	0.00092
1-Chlorohexane	0	0.00024	na	0	3.2E-05	na	--
2,2-Dichloropropane	0	0.00025	na	0	3.3E-05	na	--
2-Chloroethyl Vinyl Ether	0	0.00019	8.2	0	2.5E-05	na	--
Bromomethane	0	0.00015	7.9	0	2.0E-05	4.3E+01	0.0000004535
Carbon Disulfide	0.00054	0.0025	2.7	0.0015	6.2E-04	na	--
Chloroethane	0	0.00031	12	0	4.1E-05	na	--
Chloromethane	0	0.00031	12	0	4.1E-05	na	--
Isopropylbenzene	0	0.00021	0.30	0	2.8E-05	8.0E+02	0.000000034
Trichlorofluoromethane	0.00034	0	1.3	0.00045	9.1E-05	na	--
Semivolatile Organic Compounds							
2-Nitroaniline	0.060	0	3.3	0.20	3.9E-02	na	--

TABLE H-9

ECOLOGICAL HAZARD CALCULATIONS FOR TUNDRA VOLE
Site SS08
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C_{SOIL} (mg/kg)	Exposure Point Concentration C_{WATER} (mg/L)	BCF_{S-P}^a	Exposure Point Concentration C_{PLANT}^b (mg/kg)	Ingestion Dose c, d (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
3,3'-Dichlorobenzidine	0.050	0	0.36	0.018	3.8E-03	na	--
3-Nitroaniline	0.090	0	6.3	0.56	1.1E-01	na	--
Polynuclear Aromatic Hydrocarbons							
Pesticides							
4,4'-DDD	0	0.0000022	0.013	0	2.9E-07	1.3E+00	0.00000022
4,4'-DDE	0	0.0000041	0.0067	0	5.4E-07	1.3E+00	0.00000042
4,4'-DDT	3.8	0.000031	0.0039	0.015	2.1E-02	1.3E+00	0.016
Polychlorinated Biphenyls							
Arochlor 1260	12	0	0.00064	0.0074	5.6E-02	2.9E-01	0.1925
						HI	16
PHCs							
Diesel Range Organics (DRO)	2,159	0	0.0020	4.3	1.1E+01	8.0E+01	0.14
Gasoline Range Organics (GRO)	630	0	0.16	98	2.2E+01	2.3E+01	0.97
Residual Range Organics (RRO)	529	0	0.031	16	5.7E+00	8.7E+01	0.066
						HI	1

Notes:BCF_{S-P} - Bioconcentration factor from soil to plants.

COPEC - Chemical of potential ecological concern.

HI - Hazard index.

HQ - Hazard quotient.

mg/kg - Milligrams per kilogram.

mg/kg-day - Milligrams per kilogram per day.

mg/L - Milligrams per liter.

na - Not available.

Non-PHCs - Non-petroleum hydrocarbons.

PHCs - Petroleum hydrocarbons.

Exposure Parameters

Body Weight:	52.5	gm	0.0525	kg
Food Ingestion Rate (FIR):			0.010	kg (dry wt)/day
FIR_Plants (100%)			0.010	kg (dry wt)/day
FIR_Soil (2.4%)			0.00025	kg (dry wt)/day
Exposure Duration (ED):			1	unitless
Site Utilization Factor (SUF):			1	unitless
Home range:			0.067	acres
Exposure area:			4.0	acres
Water Ingestion Rate:			0.0069	L/day

^a The soil-to-plant bioaccumulation factor (BAF_{S-P}) was derived from Travis & Arms (1998) for organics and EcoSSL (USEPA 2007) for inorganics.^b The plant concentration (C_{PLANT}) was calculated from the soil concentration and the soil-to-plant bioconcentration factor (BCF_{S-P}) (USEPA 1999a).^c Ingestion doses were calculated as described in Appendix G.^d The ingestion dose for a tundra vole accounts for exposure to soil based upon foraging habits of the vole.

TABLE H-10

ECOLOGICAL HAZARD CALCULATIONS FOR MASKED SHREW
Site SS08
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C _{SOIL} (mg/kg)	Exposure Point Concentration C _{WATER} (mg/L)	BCF _{S-I} ^a	Exposure Point Concentration C _{INVERTS} ^b (mg/kg)	Ingestion Dose ^{c, d} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
Inorganics							
Aluminum	0	1.2	na	0	2.0E-01	3.1E+00	0.066
Antimony	1.6	0.0	1.0	1.6	3.5E-01	1.0E-01	3.3
Arsenic	19	0.0	Regression	2.0	5.1E-01	2.0E-01	2.5
Barium	261	0.015	0.091	24	6.3E+00	1.5E+00	4.2
Cadmium	1.2	0.0	Regression	9.3	2.0E+00	3.0E+00	0.66
Chromium	54	0.0050	0.31	17	3.8E+00	1.0E+01	0.36
Cobalt	22	0.0	0.12	2.6	6.7E-01	2.2E+01	0.031
Copper	65	0.0028	0.52	34	7.4E+00	4.5E+01	0.16
Lead	28	0.0011	Regression	12	2.7E+00	1.4E+01	0.19
Manganese	1080	0.0	Regression	52	1.6E+01	2.6E+02	0.063
Nickel	58	0.0	na	0	2.9E-01	1.2E+02	0.0025
Selenium	1.1	0.0012	Regression	1.0	2.2E-01	5.9E-01	0.36
Silver	0	0.0030	2.0	0	5.1E-04	1.8E+01	0.000028
Thallium	0.18	0.0	na	0	9.3E-04	2.2E-02	0.042
Tin	9.4	0.0	na	0	4.8E-02	3.8E+01	0.0013
Titanium	1460	0.0020	na	0	7.4E+00	na	--
Vanadium	83	0.0	0.042	3.5	1.2E+00	6.2E+00	0.19
Zinc	135	0.0	Regression	427	9.1E+01	2.7E+02	0.34
Volatile Organic Compounds							
1,1-Dichloropropene	0	0.00029	12	0	4.9E-05	na	--
1,3,5-Trimethylbenzene	4.6	0	8.4	39	8.2E+00	7.8E+02	0.010
1-Chlorohexane	0	0.00024	na	0	4.1E-05	na	--
2,2-Dichloropropane	0	0.00025	na	0	4.2E-05	na	--
2-Chloroethyl Vinyl Ether	0	0.00019	8.0	0	3.2E-05	na	--
Bromomethane	0	0.00015	43	0	2.5E-05	8.0E+01	0.00000032
Carbon Disulfide	0.00054	0.0025	na	0	4.2E-04	na	--
Chloroethane	0	0.00031	na	0	5.2E-05	na	--
Chloromethane	0	0.00031	na	0	5.2E-05	na	--
Isopropylbenzene	0	0.00021	12	0	3.5E-05	1.5E+03	0.000000024
Trichlorofluoromethane	0.00034	0	20	0.0069	1.5E-03	na	--
Semivolatile Organic Compounds							
2-Nitroaniline	0.060	0.0	4.8	0.29	6.1E-02	na	--

TABLE H-10

ECOLOGICAL HAZARD CALCULATIONS FOR MASKED SHREW
Site SS08
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C _{SOIL} (mg/kg)	Exposure Point Concentration C _{WATER} (mg/L)	BCF _{S-I} ^a	Exposure Point Concentration C _{INVERTS} ^b (mg/kg)	Ingestion Dose ^{c, d} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
3,3'-Dichlorobenzidine	0.050	0.0	0.94	0.047	1.0E-02	na	--
3-Nitroaniline	0.090	0.0	1.9	0.17	3.6E-02	na	--
Polynuclear Aromatic Hydrocarbons							
Pesticides							
4,4'-DDD	0	0.0000022	Regression	0	3.7E-07	2.4E+00	0.00000016
4,4'-DDE	0	0.0000041	Regression	0	6.9E-07	2.4E+00	0.00000029
4,4'-DDT	3.8	0.000031	Regression	27	5.7E+00	2.4E+00	2.4
Polychlorinated Biphenyls							
Arochlor 1260	12	0.0	6.7	77	1.6E+01	5.4E-01	30
						HI	45
PHCs							
Diesel Range Organics (DRO)	2,159	0.0	0.48	1,036	2.3E+02	1.5E+02	1.5
Gasoline Range Organics (GRO)	630	0.0	2.2	1,411	3.0E+02	4.2E+01	7.1
Residual Range Organics (RRO)	529	0.0	0.37	196	4.4E+01	1.6E+02	0.27
						HI	9

Notes:

BCF_{S-P} - Bioconcentration factor from soil to plants.
COPEC - Chemical of potential ecological concern.
HI - Hazard index.
HQ - Hazard quotient.
mg/kg - Milligrams per kilogram.
mg/kg-day - Milligrams per kilogram per day.
mg/L - Milligrams per liter.
na - Not available.
Non-PHCs - Non-petroleum hydrocarbons.
PHCs - Petroleum hydrocarbons.

Exposure Parameters

Body Weight:	4.5	gm	0.0045	kg
Food Ingestion Rate (FIR):			0.00095	kg (dry wt)/day
FIR_Inverts (100%)			0.00095	kg (dry wt)/day
FIR_Soil (2.4%)			0.000023	kg (dry wt)/day
Exposure Duration (ED):			1	unitless
Site Utilization Factor (SUF):			1	unitless
Home range:			1.1	acres
Exposure area:			4.0	acres
Water Ingestion Rate:			0.00076	L/day

^a The soil-to-invertebrate bioaccumulation factor (BAFS-I) was derived from Region 6 Draft SLERA Protocol for organics and EcoSSL (USEPA 2007) for inorganics.

^b The soil invertebrate concentration (CINVERT) was calculated from the soil concentration and the soil-to-invertebrate bioaccumulation factor (BAFS-I) (USEPA 1999a).

^c Ingestion doses were calculated as described in Appendix G.

^d The ingestion dose for a masked shrew accounts for exposure to soil based upon foraging habits of the shrew.

TABLE H-11
ECOLOGICAL HAZARD CALCULATIONS FOR LEAST WEASEL
Site SS08
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C _{SOIL} (mg/kg)	Exposure Point Concentration C _{WATER} (mg/L)	BCF _{S-M} ^a	Exposure Point Concentration C _{MAMMAL} ^b (mg/kg)	Ingestion Dose ^{c, d} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
Inorganics							
Aluminum	0	1.2	na	0	1.6E-01	1.7E+00	0.094
Antimony	1.6	0.0	na	0	3.7E-03	5.9E-02	0.063
Arsenic	19	0.0	Regression	0.089	5.2E-02	1.1E-01	0.46
Barium	261	0.0	0.057	15	1.8E+00	8.5E-01	2.1
Cadmium	1.2	0.0	0.33	0.38	3.4E-02	1.7E+00	0.02
Chromium	54	0.0	Regression	4.4	4.8E-01	5.8E+00	0.083
Cobalt	22	0.0	Regression	0.64	1.0E-01	1.2E+01	0.0083
Copper	65	0.0	0.20	13	1.2E+00	2.5E+01	0.047
Lead	28	0.0	0.11	3.0	3.1E-01	7.8E+00	0.039
Manganese	1,030	0.0	0.021	21	4.1E+00	1.5E+02	0.028
Nickel	58	0.0	0.35	20	1.8E+00	6.7E+01	0.027
Selenium	1.1	0.0	Regression	0.68	5.9E-02	3.3E-01	0.18
Silver	0	0.0030	0.0040	0	4.1E-04	1.0E+01	0.000040
Thallium	0.18	0.0	na	0	4.2E-04	1.2E-02	0.034
Tin	9.4	0.0	na	0	2.2E-02	2.1E+01	0.0010
Titanium	1,271	0.0	na	0	2.9E+00	na	--
Vanadium	83	0.0	0.012	1.0	2.8E-01	3.5E+00	0.078
Zinc	135	0.0	0.77	104	8.8E+00	1.5E+02	0.059
Volatile Organic Compounds							
1,1-Dichloropropene	0	0.00029	0	0	3.9E-05	na	--
1,3,5-Trimethylbenzene	4.6	0	0	0	1.1E-02	4.4E+02	0.000024
1-Chlorohexane	0	0.00024	0	0	3.3E-05	na	--
2,2-Dichloropropane	0	0.00025	0	0	3.4E-05	na	--
2-Chloroethyl Vinyl Ether	0	0.00019	0	0	2.6E-05	na	--
Bromomethane	0	0.00015	0	0	2.0E-05	4.5E+01	0.00000045
Carbon Disulfide	0.00054	0.0025	0	0	3.4E-04	na	--
Chloroethane	0	0.00031	0	0	4.2E-05	na	--
Chloromethane	0	0.00031	0	0	4.2E-05	na	--
Isopropylbenzene	0	0.00021	0	0	2.8E-05	8.3E+02	0.000000034
Trichlorofluoromethane	0.00034	0	0	0	7.8E-07	na	--

TABLE H-11

ECOLOGICAL HAZARD CALCULATIONS FOR LEAST WEASEL
Site SS08
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C_{SOIL} (mg/kg)	Exposure Point Concentration C_{WATER} (mg/L)	$BCF_{\text{S-M}}$ ^a	Exposure Point Concentration C_{MAMMAL} ^b (mg/kg)	Ingestion Dose ^{c, d} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
Semivolatile Organic Compounds							
2-Nitroaniline	0.060	0	0	0	1.4E-04	na	--
3,3'-Dichlorobenzidine	0.050	0	0	0	1.2E-04	na	--
3-Nitroaniline	0.090	0	0	0	2.1E-04	na	--
Pesticides							
4,4'-DDD	0	0.0000022	na	0	3.0E-07	1.3E+00	0.00000022
4,4'-DDE	0	0.0000041	Regression	0	5.6E-07	1.3E+00	0.00000042
4,4'-DDT	3.8	0.000031	Regression	8.6	7.2E-01	1.3E+00	0.54
Polychlorinated Biphenyls							
Arochlor 1260	12	0	1.2	14	1.2E+00	3.0E-01	3.8
						HI	8
PHCs							
Diesel Range Organics (DRO)	2,159	0	0	0	5.0E+00	8.3E+01	0.060
Gasoline Range Organics (GRO)	630	0	0	0	1.5E+00	2.4E+01	0.061
Residual Range Organics (RRO)	529	0	0	0	1.2E+00	9.0E+01	0.013
						HI	0.1

Notes:

BCF_{S-P} - Bioconcentration factor from soil to plants.
COPEC - Chemical of potential ecological concern.
HI - Hazard index.
HQ - Hazard quotient.
mg/kg - Milligrams per kilogram.
mg/kg-day - Milligrams per kilogram per day.
mg/L - Milligrams per liter.
na - Not available.

Exposure Parameters

Body Weight:	45	gm	0.045	kg
Food Ingestion Rate (FIR):			0.0037	kg (dry wt)/day
FIR_Mammals (100%)			0.0037	kg (dry wt)/day
FIR_Soil (2.8%)			0.00010	kg (dry wt)/day
Exposure Duration (ED):			1	unitless
Site Utilization Factor (SUF):			1	unitless
Home range:			2.9	acres
Exposure area:			4.0	acres

TABLE H-11

ECOLOGICAL HAZARD CALCULATIONS FOR LEAST WEASEL
Site SS08
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C_{SOIL} (mg/kg)	Exposure Point Concentration C_{WATER} (mg/L)	$BCF_{\text{S-M}}$ ^a	Exposure Point Concentration C_{MAMMAL} ^b (mg/kg)	Ingestion Dose ^{c, d} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
Non-PHCs - Non-petroleum hydrocarbons.			Water Ingestion Rate:		0.0061	L/day	
PHCs - Petroleum hydrocarbons.							

^a The soil-to-small mammal bioaccumulation factor (BAFS-M) was derived from USEPA (2005).

^b The mammalian prey item concentration (C_{MAMMAL}) was calculated from the soil concentration and the soil-to-small mammal bioconcentration factor ($BCF_{\text{S-M}}$).

^c Ingestion doses were calculated as described in Appendix G.

^d The ingestion dose for a least weasel accounts for exposure to soil based upon foraging habits of the weasel.

TABLE H-12
ECOLOGICAL HAZARD CALCULATIONS FOR MINK
Site SS08
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C _{SEDIMENT} (mg/kg)	Exposure Point Concentration C _{WATER} (mg/L)	BCF _{S-M} ^a	Exposure Point Concentration C _{MAMMAL} ^b (mg/kg)	Ingestion Dose ^{c, d} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
Inorganics							
Aluminum	0	1.2	na	0	5.6E-02	7.8E-01	0.072
Arsenic	21	0	Regression	0.095	1.5E-02	4.9E-02	0.31
Barium	240	0.015	0.057	14	4.5E-01	3.8E-01	1.2
Beryllium	1.2	0	na	0	7.5E-04	4.0E-01	0.0019
Cadmium	1.4	0	0.33	0.47	1.1E-02	7.5E-01	0.015
Chromium	62	0.0050	Regression	4.8	1.5E-01	2.6E+00	0.056
Cobalt	32	0	Regression	1.0	4.3E-02	5.5E+00	0.0079
Copper	122	0.0028	0.20	24	6.1E-01	1.1E+01	0.054
Lead	51	0.0011	0.11	5.4	1.5E-01	3.5E+00	0.044
Manganese	1,300	0	0.021	27	1.4E+00	6.6E+01	0.021
Mercury	0.201	0	0.054	0.011	3.7E-04	9.7E-01	0.00038
Molybdenum	3	0	0.0022	0.0066	2.0E-03	1.0E-01	0.019
Nickel	110	0	0.35	39	9.4E-01	3.0E+01	0.031
Selenium	1.5	0.0012	Regression	0.77	1.8E-02	1.5E-01	0.12
Silver	0	0.0030	0.0040	0	1.4E-04	4.5E+00	0.000031
Thallium	0.3	0	na	0	1.9E-04	5.6E-03	0.034
Titanium	1,470	0.0020	na	0	9.2E-01	na	--
Vanadium	106	0	0.012	1.3	9.5E-02	1.6E+00	0.061
Zinc	273	0	0.77	211	4.9E+00	6.7E+01	0.073
Volatile Organic Compounds							
1,1-Dichloropropene	0	0.00029	0	0	1.3E-05	na	--
1-Chlorohexane	0	0.00024	0	0	1.1E-05	na	--
2,2-Dichloropropane	0	0.00025	0	0	1.2E-05	na	--
2-Chloroethyl Vinyl Ether	0	0.00019	0	0	8.8E-06	na	--
Bromomethane	0	0.00015	0	0	6.9E-06	2.0E+01	0.00000034
Carbon Disulfide	0	0.0025	0	0	1.2E-04	na	--
Chloroethane	0	0.00031	0	0	1.4E-05	na	--
Chloromethane	0	0.00031	0	0	1.4E-05	na	--
Isopropylbenzene	0	0.00021	0	0	9.7E-06	3.7E+02	0.000000026
Methylene Chloride	0.0018	0	0	0	1.1E-06	4.4E+00	0.00000026

TABLE H-12

ECOLOGICAL HAZARD CALCULATIONS FOR MINK
Site SS08
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C_{SEDIMENT} (mg/kg)	Exposure Point Concentration C_{WATER} (mg/L)	BCF_{S-M}^a	Exposure Point Concentration C_{MAMMAL}^b (mg/kg)	Ingestion Dose c, d (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
m,p-Xylenes	0.079	0	0	0	4.9E-05	3.6E+02	0.00000014
Semivolatile Organic Compounds							
3,3'-Dichlorobenzidine	0.080	0	0	0	5.0E-05	na	--
4-Chloroaniline	0.20	0	0	0	1.2E-04	7.8E-01	0.00016
Polynuclear Aromatic Hydrocarbons							
Acenaphthene	0.010	0	0	0	6.2E-06	4.0E+01	0.00000015
Acenaphthylene	0.0074	0	0	0	4.6E-06	4.0E+01	0.00000011
Anthracene	0.079	0	0	0	4.9E-05	4.0E+01	0.00000012
Benzo(a)anthracene	0.063	0	0	0	3.9E-05	6.7E+01	0.00000058
Benzo(a)pyrene	0.063	0	0	0	3.9E-05	4.0E+01	0.00000010
Benzo(b)fluoranthene	0.063	0	0	0	3.9E-05	4.0E+01	0.00000010
Benzo(g,h,i)perylene	0.044	0	0	0	2.7E-05	4.0E+01	0.00000068
Benzo(k)fluoranthene	0.042	0	0	0	2.6E-05	4.0E+01	0.00000064
Chrysene	0.12	0	0	0	7.3E-05	4.0E+01	0.00000018
Dibenz(a,h)anthracene	0.015	0	0	0	9.2E-06	1.5E+00	0.00000062
Fluoranthene	0.13	0	0	0	8.2E-05	4.0E+01	0.00000020
Fluorene	0.015	0	0	0	9.1E-06	4.0E+01	0.00000023
Indeno(1,2,3-cd)pyrene	0.033	0	0	0	2.0E-05	4.0E+01	0.00000051
Naphthalene	0.055	0	0	0	3.5E-05	3.7E+01	0.00000093
Phenanthrene	0.17	0	0	0	1.1E-04	4.0E+01	0.00000026
Pyrene	0.18	0	0	0	1.1E-04	4.0E+01	0.00000028
Pesticides							
4,4'-DDD	0.42	0.0000022	na	0.0	2.6E-04	6.0E-01	0.00044
4,4'-DDE	0.21	0.0000041	Regression	0.01	3.2E-04	6.0E-01	0.00053
4,4'-DDT	2.0	0.000031	Regression	5.35	1.2E-01	6.0E-01	0.20
Endosulfan Sulfate	0.0042	0	na	0	2.6E-06	7.5E-01	0.0000035
Polychlorinated Biphenyls							
Arochlor 1260	0.17	0	1.2	0.20	4.6E-03	1.4E-01	0.034
						HI	2
PHCs							
Diesel Range Organics (DRO)	2,506	0	0	0	1.6E+00	3.7E+01	0.042

TABLE H-12

ECOLOGICAL HAZARD CALCULATIONS FOR MINK
Site SS08
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C_{SEDIMENT} (mg/kg)	Exposure Point Concentration C_{WATER} (mg/L)	BCF_{S-M}^a	Exposure Point Concentration C_{MAMMAL}^b (mg/kg)	Ingestion Dose c, d (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
Gasoline Range Organics (GRO)	3.6	0	0	0	2.2E-03	1.1E+01	0.00021
Residual Range Organics (RRO)	871	0	0	0	5.4E-01	4.0E+01	0.013
						HI	0.1

Notes:BCF_{S-P} - Bioconcentration factor from soil to plants.

COPEC - Chemical of potential ecological concern.

HI - Hazard index.

HQ - Hazard quotient.

mg/kg - Milligrams per kilogram.

mg/kg-day - Milligrams per kilogram per day.

mg/L - Milligrams per liter.

na - Not available.

Non-PHCs - Non-petroleum hydrocarbons.

PHCs - Petroleum hydrocarbons.

Exposure Parameters

Body Weight:	1354	gm	1.354	kg
Food Ingestion Rate (FIR):			0.063	kg (dry wt)/day
	FIR_Mammals (100%)		0.063	kg (dry wt)/day
	FIR_Sediment (2.8%)		0.00175	kg (dry wt)/day
Exposure Duration (ED):			1	unitless
Site Utilization Factor (SUF):			0.48	unitless
	Home range:		8.3	acres
	Exposure area:		4.0	acres
	Water Ingestion Rate:		0.13	L/day

^a The soil-to-small mammal bioaccumulation factor (BAFS-M) was derived from USEPA (2005).^b The mammalian prey item concentration (C_{MAMMAL}) was calculated from the soil concentration and the soil-to-small mammal bioconcentration factor (BCF_{S-M}).^c Ingestion doses were calculated as described in Appendix G.^d The ingestion dose for a mink accounts for exposure to sediment based upon foraging habits of the mink.

TABLE H-13

ECOLOGICAL HAZARD CALCULATIONS FOR DARK-EYED JUNCO
Site SS08
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C _{SOIL} (mg/kg)	Exposure Point Concentration C _{WATER} (mg/L)	BCF _{S-P} ^a	Exposure Point Concentration C _{PLANT} ^b (mg/kg)	Ingestion Dose ^{c,d} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
Inorganics							
Aluminum	0	1.2	0.0040	0	2.8E-02	1.7E+02	0.00016
Antimony	1.6	0	0.20	0.32	9.0E-03	2.9E+00	0.0031
Arsenic	19	0	0.040	0.78	3.4E-02	2.9E+00	0.012
Barium	261	0.015	0.16	41	1.2E+00	3.1E+01	0.038
Cadmium	1.2	0	0.55	0.63	1.6E-02	3.7E+00	0.0044
Chromium	54	0.0050	0.041	2.2	9.6E-02	2.7E+00	0.036
Cobalt	22	0	0.0075	0.16	2.1E-02	2.2E+01	0.0010
Copper	65	0.0028	0.40	26	6.8E-01	7.0E+01	0.010
Lead	28	0.0011	Regression	1.7	6.3E-02	4.1E+00	0.015
Manganese	1,030	0	0.079	81	2.8E+00	1.6E+03	0.0018
Nickel	58	0	Regression	2.3	1.0E-01	2.0E+02	0.0005
Selenium	1.1	0.0012	Regression	0.57	1.5E-02	1.3E+00	0.011
Silver	0	0.0030	0.40	0	7.1E-05	4.6E+00	0.000015
Thallium	0.18	0	0.0040	0	1.6E-04	na	--
Tin	9.4	0	0.030	0.28	1.4E-02	1.1E+01	0.0013
Titanium	1,271	0.0020	0.0055	7.0	1.2E+00	na	--
Vanadium	83	0	0.0055	0.46	7.6E-02	2.9E+01	0.0026
Zinc	135	0	Regression	73	1.9E+00	4.3E+01	0.043
Volatile Organic Compounds							
1,1-Dichloropropene	0	0.00029	1.5	0	6.8E-06	na	--
1,3,5-Trimethylbenzene	4.6	0	0.41	1.9	4.9E-02	na	--
1-Chlorohexane	0	0.00024	na	0	5.6E-06	na	--
2,2-Dichloropropane	0	0.00025	na	0	5.9E-06	na	--
2-Chloroethyl Vinyl Ether	0	0.00019	8.2	0	4.5E-06	na	--
Bromomethane	0	0.00015	7.9	0	3.5E-06	na	--
Carbon Disulfide	0.00054	0.0025	2.7	0	9.4E-05	na	--
Chloroethane	0	0.00031	12	0	7.3E-06	na	--
Chloromethane	0	0.00031	12	0	7.3E-06	na	--
Isopropylbenzene	0	0.00021	0.30	0	4.9E-06	na	--
Trichlorofluoromethane	0.00034	0	1.3	0	1.1E-05	na	--
Semivolatile Organic Compounds							
2-Nitroaniline	0.060	0	3.3	0.20	4.8E-03	na	--
3,3'-Dichlorobenzidine	0.050	0	0.36	0	4.7E-04	na	--

TABLE H-13

ECOLOGICAL HAZARD CALCULATIONS FOR DARK-EYED JUNCO
Site SS08
TATALINA LONG RANGE RADAR STATION, ALASKA

	Exposure Point Concentration C_{SOIL} (mg/kg)	Exposure Point Concentration C_{WATER} (mg/L)	BCF_{S-P}^a	Exposure Point Concentration C_{PLANT}^b (mg/kg)	Ingestion Dose c, d (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
COPEC							
Non-PHCs							
Pesticides				0			
4,4'-DDD	0	0.0000022	0.013	0	5.2E-08	9.7E-03	0.0000053
4,4'-DDE	0	0.0000041	0.0067	0	9.6E-08	9.7E-03	0.000010
4,4'-DDT	3.8	0.000031	0.0039	0	3.4E-03	9.7E-03	0.3
Polychlorinated Biphenyls							
Arochlor 1260	12	0	0.00064	0	9.2E-03	7.1E-01	0.013
						HI	1
PHCs							
Diesel Range Organics (DRO)	2,159	0	0.0020	4.3	1.8E+00	na	--
Gasoline Range Organics (GRO)	630	0	0.16	98	2.8E+00	na	--
Residual Range Organics (RRO)	529	0	0.031	16	8.1E-01	na	--
						HI	0

Notes:BCF_{S-P} - Bioconcentration factor from soil to plants.

COPEC - Chemical of potential ecological concern.

HI - Hazard index.

HQ - Hazard quotient.

mg/kg - Milligrams per kilogram.

mg/kg-day - Milligrams per kilogram per day.

mg/L - Milligrams per liter.

na - Not available.

Non-PHCs - Non-petroleum hydrocarbons.

PHCs - Petroleum hydrocarbons.

Exposure Parameters

Body Weight:	24	gm	0.024	kg
Food Ingestion Rate (FIR):			0.0049	kg (dry wt)/day
FIR_Plants (100%)			0.0049	kg (dry wt)/day
FIR_Soil (3.3%)			0.00016	kg (dry wt)/day
Exposure Duration (ED):			0.5	unitless
Site Utilization Factor (SUF):			0.24	unitless
Home range:			17	acres
Exposure area:			4.0	acres
Water Ingestion Rate:			0.0048	L/day

^a The soil-to-plant bioaccumulation factor (BAF_{S-P}) was derived from Travis & Arms (1998) for organics and EcoSSL (USEPA 2007) for inorganics.^b The plant concentration (C_{PLANT}) was calculated from the soil concentration and the soil-to-plant bioconcentration factor (BCF_{S-P}) (USEPA 1999a).^c Ingestion doses were calculated as described in Appendix G.^d The ingestion dose for the dark-eyed junco accounts for exposure to soil based upon foraging habits.

TABLE H-14

ECOLOGICAL HAZARD CALCULATIONS FOR AMERICAN ROBIN
Site SS08
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C _{SOIL} (mg/kg)	Exposure Point Concentration C _{WATER} (mg/L)	BCF _{S-P} ^a	Exposure Point Concentration C _{PLANT} ^b (mg/kg)	BCF _{S-I} ^c	Exposure Point Concentration C _{INVERTS} ^d	Ingestion Dose ^{e,f} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs									
Inorganics									
Aluminum	0	1.2	0.0040	0	na	0	1.5E-02	1.3E+02	0.00011
Antimony	1.6	0	0.20	0.32	1.0	1.6	1.6E-02	2.2E+00	0.0075
Arsenic	19	0	0.040	0.78	Regression	2.0	4.2E-02	2.2E+00	0.020
Barium	261	0.015	0.16	41	0.091	24	6.5E-01	2.3E+01	0.029
Beryllium	0	0	Regression	0.00	0.05	0.00	0.0E+00	2.28E+01	0.00
Cadmium	1.2	0	0.55	0.63	Regression	9.3	7.9E-02	2.7E+00	0.029
Chromium	54	0.0050	0.041	2.2	0.31	17	2.1E-01	2.0E+00	0.11
Cobalt	22	0	0.0075	0.16	0.12	2.6	4.8E-02	1.6E+01	0.0030
Copper	65	0.0028	0.40	26	0.52	34	4.4E-01	5.2E+01	0.0086
Lead	28	0.0011	Regression	1.7	Regression	12	1.4E-01	3.0E+00	0.045
Manganese	1,030	0	0.079	81	Regression	51	2.0E+00	1.2E+03	0.0017
Mercury	0	0	0.90	0.00	Regression	0.00	0.0E+00	5.21E-01	0.00
Molybdenum	0	0	0.25	0.0	0.95	0.0	0.0E+00	7.21E+00	0.00
Nickel	58	0	Regression	2.3	na	0	7.8E-02	1.4E+02	0.00054
Selenium	1.1	0.0012	Regression	0.57	Regression	1.0	1.2E-02	9.3E-01	0.012
Silver	0	0.0030	0.40	0	2.0	0	3.6E-05	3.4E+00	0.000011
Thallium	0.18	0	0.0040	0.00074	na	0	2.3E-04	na	--
Tin	9.4	0	0.030	0.28	na	0	1.2E-02	7.9E+00	0.0016
Titanium	1,271	0.0020	0.0055	7.0	na	0	1.6E+00	na	--
Vanadium	83	0	0.0055	0.46	0.042	3.5	1.3E-01	2.1E+01	0.0062
Zinc	135	0	Regression	73	Regression	427	3.9E+00	3.2E+01	0.12
Volatile Organic Compounds									
1,1-Dichloropropene	0	0.00029	1.5	0	12	0	3.5E-06	na	--
1,2,3-Trichlorobenzene	0	0	0.18	0.0	28.5	0.0	0.0E+00	na	--
1,2,3-Trichloropropane	0	0	1.9	0.0	4.5	0.0	0.0E+00	na	--
1,2,4-Trimethylbenzene	0	0	0.31	0.0	12.5	0.0	0.0E+00	9.15E-01	0.00
1,3,5-Trimethylbenzene	4.6	0	0.41	1.9	8.4	39	3.3E-01	na	--
1,4-Dichlorobenzene	0	0	0.40	0.0	14.2	0.0	0.0E+00	na	--
1-Chlorohexane	0	0.00024	na	0	na	0	2.9E-06	na	--
2,2-Dichloropropane	0	0.00025	na	0	na	0	3.0E-06	na	--
2-Chloroethyl Vinyl Ether	0	0.00019	8.2	0	8.0	0	2.3E-06	na	--
Benzene	0	0	2.3	0.0	2.7	0.0	0.0E+00	na	--
Bromomethane	0	0.00015	7.9	0	43	0	1.8E-06	na	--
Carbon Disulfide	0.00054	0.0025	2.7	0.0015	na	0	3.6E-05	na	--
Chloroethane	0	0.00031	12	0	na	0	3.7E-06	na	--
Chloromethane	0	0.00031	12	0	na	0	3.7E-06	na	--
cis-1,3-Dichloropropene	0	0	2.5	0.0	4.8	0.0	0.0E+00	na	--
Ethylbenzene	0	0	0.59	0.0	6.6	0.0	0.0E+00	na	--
Isopropylbenzene	0	0.00021	0.30	0	12	0	2.5E-06	na	--

TABLE H-14

ECOLOGICAL HAZARD CALCULATIONS FOR AMERICAN ROBIN
Site SS08
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C _{SOIL} (mg/kg)	Exposure Point Concentration C _{WATER} (mg/L)	BCF _{S-P} ^a	Exposure Point Concentration C _{PLANT} ^b (mg/kg)	BCF _{S-I} ^c	Exposure Point Concentration C _{INVERTS} ^d	Ingestion Dose ^{e,f} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs									
Methylene Chloride	0	0	7.3	0.0	3.2	0.0	0.0E+00	na	--
m,p-Xylenes	0	0	0.61	0.0	7.3	0.0	0.0E+00	na	--
n-Butylbenzene	0	0	0.11	0.0	23.0	0.0	0.0E+00	na	--
n-Propylbenzene	0	0	0.29	0.0	10.6	0.0	0.0E+00	na	--
o-Xylene	0	0	0.61	0.0	7.3	0.0	0.0E+00	na	--
p-Isopropyltoluene	0	0	0.30	0.0	11.7	0.0	0.0E+00	na	--
sec-Butylbenzene	0	0	0.088	0.0	37.4	0.0	0.0E+00	na	--
Styrene	0	0	0.76	0.0	4.4	0.0	0.0E+00	na	--
Tert-Butylbenzene	0	0	0.16	0.0	19.9	0.0	0.0E+00	na	--
Toluene	0	0	1.0	0.0	5.5	0.0	0.0E+00	na	--
Total xylenes	0	0	0.61	0.0	7.3	0.0	0.0E+00	na	--
trans-1,3-Dichloropropene	0	0	2.6	0.0	4.5	0.0	0.0E+00	na	--
Trichlorofluoromethane	0.00034	0	1.3	0.00045	20	0.0069	5.9E-05	na	--
Vinyl Acetate	0	0	15	0.0	4.4	0.0	0.0E+00	na	--
Semivolatile Organic Compounds									
2,4-Dimethylphenol	0	0	1.8	0.0	0.9	0.0	0.0E+00	na	--
2-Nitroaniline	0.060	0	3.3	0.20	4.8	0.29	3.1E-03	na	--
3-and 4-Methylphenol Coelution	0	0	1.8	0.0	0.9	0.0	0.0E+00	na	--
3,3'-Dichlorobenzidine	0.050	0	0.36	0.018	0.94	0.047	5.1E-04	na	--
3-Nitroaniline	0	0	6.3	0.00	1.9	0.00	0.0E+00	na	--
4-Chloro-3-methylphenol	0	0	0.63	0.000	4.3	0.00	0.0E+00	na	--
4-Chloroaniline	0	0	3.2	0.0	0.4	0.0	0.0E+00	3.93E-01	0.00
4-Methylphenol	0	0	1.8	0.0	0.9	0.0	0.0E+00	na	--
Benzoic Acid	0	0	3.2	0.0	18.3	0.0	0.0E+00	na	--
Bis(2-ethylhexyl) Phthalate	0	0	0.0016	0.0	155.0	0.0	0.0E+00	1.30E-01	0.00
Dibenzofuran	0	0	0.16	0.0	2.1	0.0	0.0E+00	na	--
DiethylPhthalate	0	0	1.5	0.0	6.3	0.0	0.0E+00	na	--
Phenol	0	0	5.5	0.0	0.4	0.0	0.0E+00	na	--
Polynuclear Aromatic Hydrocarbons									
2-Methylnaphthalene	0	0	0.23	0.0	4.4	0.0	0.0E+00	na	--
Acenaphthene	0	0	0.21	0.0	1.5	0.0	0.0E+00	na	--
Acenaphthylene	0	0	0.20	0.0	22.9	0.0	0.0E+00	na	--
Anthracene	0	0	0.10	0.0	2.4	0.0	0.0E+00	na	--
Benzo(a)anthracene	0	0	0.018	0.0	1.6	0.0	0.0E+00	na	--
Benzo(a)pyrene	0.000	0	0.011	0.00000	1.3	0.00	0.0E+00	na	--
Benzo(b)fluoranthene	0	0	0.018	0.0	2.6	0.0	0.0E+00	na	--
Benzo(g,h,i)perylene	0	0	0.0057	0.0	2.9	0.0	0.0E+00	na	--
Benzo(k)fluoranthene	0	0	0.011	0.0	2.6	0.0	0.0E+00	na	--
Chrysene	0	0	0.017	0.0	2.3	0.0	0.0E+00	na	--
Dibenz(a,h)anthracene	0	0	0.0049	0.0	2.3	0.0	0.0E+00	na	--

TABLE H-14

ECOLOGICAL HAZARD CALCULATIONS FOR AMERICAN ROBIN
 Site SS08
 TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C _{SOIL} (mg/kg)	Exposure Point Concentration C _{WATER} (mg/L)	BCF _{S-P} ^a	Exposure Point Concentration C _{PLANT} ^b (mg/kg)	BCF _{S-I} ^c	Exposure Point Concentration C _{INVERTS} ^d	Ingestion Dose ^{e,f} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs									
Fluoranthene	0	0	0.040	0.0	3.0	0.0	0.0E+00	na	--
Fluorene	0	0	0.15	0.0	9.6	0.0	0.0E+00	na	--
Indeno(1,2,3-cd)pyrene	0	0	0.005	0.0	2.9	0.0	0.0E+00	na	--
Naphthalene	0	0	0.48	0.0	4.4	0.0	0.0E+00	na	--
Phenanthrene	0	0	0.10	0.0	1.7	0.0	0.0E+00	na	--
Pyrene	0	0	0.059	0.0	1.8	0.0	0.0E+00	na	--

TABLE H-14

ECOLOGICAL HAZARD CALCULATIONS FOR AMERICAN ROBIN
Site SS08
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C _{SOIL} (mg/kg)	Exposure Point Concentration C _{WATER} (mg/L)	BCF _{S-P} ^a	Exposure Point Concentration C _{PLANT} ^b (mg/kg)	BCF _{S-I} ^c	Exposure Point Concentration C _{INVERTS} ^d	Ingestion Dose ^{e,f} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs									
Pesticides									
4,4'-DDD	0	0.0000022	0.013	0	Regression	0	2.6E-08	7.1E-03	0.0000037
4,4'-DDE	0	0.0000041	0.0067	0	Regression	0	4.9E-08	7.1E-03	0.0000069
4,4'-DDT	3.8	0.000031	0.0039	0.015	Regression	27	2.2E-01	7.1E-03	32
delta-BHC	0	0	na	0.0	na	0.0	0.0E+00	3.72E+00	0
Dieldrin	0	0	0.038	0.0	14.7	0.0	0.0E+00	1.18E-01	0
Endosulfan Sulfate	0	0	0.30	0.0	0.3	0.0	0.0E+00	1.48E+01	0
Endrin	0	0	0.038	0.0	19.7	0.0	0.0E+00	5.59E-01	0
Endrin aldehyde	0	0	0.038	0.0	19.7	0.0	0.0E+00	5.59E-01	0
Endrin ketone	0	0	0.038	0.0	19.7	0.0	0.0E+00	5.59E-01	0
Polychlorinated Biphenyls									
Arochlor 1260	12	0	0.00064	0.0074	6.7	77	6.4E-01	5.2E-01	1.2
								HI	33
PHCs									
Diesel Range Organics (DRO)	2,159	0	0.0020	4.3	0.48	1,036	1.1E+01	na	--
Gasoline Range Organics (GRO)	630	0	0.16	98	2.2	1,411	1.3E+01	na	--
Residual Range Organics (RRO)	529	0	0.031	16	0.37	196	2.3E+00	na	--
								HI	0

Notes:

BCF_{S-P} - Bioconcentration factor from soil to plants.
 BCF_{S-I} - Bioconcentration factor from soil to invertebrates.
 COPEC - Chemical of potential ecological concern.
 HI - Hazard index.
 HQ - Hazard quotient.
 mg/kg - Milligrams per kilogram.
 mg/kg-day - Milligrams per kilogram per day.
 mg/L - Milligrams per liter.
 na - Not available.
 Non-PHCs - Non-petroleum hydrocarbons.
 PHCs - Petroleum hydrocarbons.

Exposure Parameters

Body Weight:	83.25	gm	0.08325	kg
Food Ingestion Rate (FIR):			0.0107	kg (dry wt)/day
	FIR_Plants (30%)		0.0032	kg (dry wt)/day
	FIR_Inverts (70%)		0.0075	kg (dry wt)/day
	FIR_Soil (10.4%)		0.0011	kg (dry wt)/day
Exposure Duration (ED):			0.5	unitless
Site Utilization Factor (SUF):			0.18	unitless
	Home range:		22	acres
	Exposure area:		4.0	acres
Water Ingestion Rate:			0.011	L/day

^a The soil-to-plant bioaccumulation factor (BAF_{S-P}) was derived from Travis & Arms (1998) for organics and EcoSSL (USEPA 2007) for inorganics.

^b The plant concentration (C_{PLANT}) was calculated from the soil concentration and the soil-to-plant bioconcentration factor (BCF_{S-P}) (USEPA 1999a).

^c The soil-to-invertebrate bioaccumulation factor (BAFS-I) was derived from Region 6 Draft SLERA Protocol for organics and EcoSSL (USEPA 2007) for inorganics.

^d The soil invertebrate concentration (C_{INVERT}) was calculated from the soil concentration and the soil-to-invertebrate bioaccumulation factor (BAFS-I) (USEPA 1999a).

^e Ingestion doses were calculated as described in Appendix G.

^f The ingestion dose for the American robin accounts for exposure to soil based upon foraging habits.

TABLE H-15

ECOLOGICAL HAZARD CALCULATIONS FOR NORTHERN SHRIKE
Site SS08
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C _{SOIL} (mg/kg)	Exposure Point Concentration C _{WATER} (mg/L)	BCF _{S-I} ^a	Exposure Point Concentration C _{INVERTS} ^b (mg/kg)	Ingestion Dose ^{c, d} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
Inorganics							
Aluminum	0	1.2	na	0	1.1E-03	1.4E+02	0.0000080
Antimony	1.6	0	1.0	1.6	1.6E-03	2.3E+00	0.00071
Arsenic	19	0	Regression	2.0	2.5E-03	2.3E+00	0.0011
Barium	261	0.015	0.091	24	3.1E-02	2.4E+01	0.0013
Cadmium	1.2	0	Regression	9.3	9.0E-03	2.8E+00	0.0032
Chromium	54	0.0050	0.31	17	1.8E-02	2.1E+00	0.0086
Cobalt	22	0	0.12	2.6	3.3E-03	1.7E+01	0.00019
Copper	65	0.0028	0.52	34	3.5E-02	5.4E+01	0.00064
Lead	28	0.0011	Regression	12	1.2E-02	3.2E+00	0.0039
Manganese	1,030	0	Regression	51	8.2E-02	1.2E+03	0.000067
Nickel	58	0	na	0	1.9E-03	1.5E+02	0.000012
Selenium	1.1	0.0012	Regression	1.0	1.0E-03	9.8E-01	0.0010
Silver	0	0.0030	2.0	0	2.7E-06	3.6E+00	0.00000075
Thallium	0.18	0	na	0	5.9E-06	na	--
Tin	9.4	0	na	0	3.0E-04	8.3E+00	0.000036
Titanium	1,271	0.0020	na	0	4.1E-02	na	--
Vanadium	83	0	0.042	3.5	6.1E-03	2.2E+01	0.00027
Zinc	135	0	Regression	427	4.2E-01	3.4E+01	0.013
Volatile Organic Compounds							
1,1-Dichloropropene	0	0.00029	12	0	2.6E-07	na	--
1,3,5-Trimethylbenzene	4.6	0	8.4	39	3.8E-02	na	--
1-Chlorohexane	0	0.00024	na	0	2.2E-07	na	--
2,2-Dichloropropane	0	0.00025	na	0	2.2E-07	na	--
2-Chloroethyl Vinyl Ether	0	0.00019	8.0	0	1.7E-07	na	--
Bromomethane	0	0.00015	43	0	1.3E-07	na	--

TABLE H-15

ECOLOGICAL HAZARD CALCULATIONS FOR NORTHERN SHRIKE
Site SS08
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C _{SOIL} (mg/kg)	Exposure Point Concentration C _{WATER} (mg/L)	BCF _{S-I} ^a	Exposure Point Concentration C _{INVERTS} ^b (mg/kg)	Ingestion Dose ^{c, d} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
Carbon Disulfide	0.00054	0.0025	na	0	2.3E-06	na	--
Chloroethane	0	0.00031	na	0	2.8E-07	na	--
Chloromethane	0	0.00031	na	0	2.8E-07	na	--
Isopropylbenzene	0	0.00021	12	0	1.9E-07	na	--
Trichlorofluoromethane	0.00034	0	20	0.0069	6.8E-06	na	--
Semivolatile Organic Compounds							
2-Nitroaniline	0.060	0	4.8	0.29	2.8E-04	na	--
3,3'-Dichlorobenzidine	0.050	0	0.94	0.047	4.8E-05	na	--
Pesticides							
4,4'-DDD	0	0.0000022	Regression	0	2.0E-09	7.5E-03	0.00000026
4,4'-DDE	0	0.0000041	Regression	0	3.7E-09	7.5E-03	0.00000049
4,4'-DDT	3.8	0.000031	Regression	27	2.6E-02	7.5E-03	3.5
Polychlorinated Biphenyls							
Arochlor 1260	12	0	6.7	77	7.5E-02	5.2E-01	0
						HI	4
PHCs							
Diesel Range Organics (DRO)	2,159	0	0.48	1,036	1.1E+00	na	--
Gasoline Range Organics (GRO)	630	0	2.2	1,411	1.4E+00	na	--
Residual Range Organics (RRO)	529	0	0.37	196	2.1E-01	na	--
						HI	0

Notes:

BCF_{S-I} - Bioconcentration factor from soil to invertebrates.
COPEC - Chemical of potential ecological concern.
HI - Hazard index.
HQ - Hazard quotient.

Exposure Parameters

Body Weight:	67.5	gm	0.0675	kg
Food Ingestion Rate (FIR):			0.0105	kg (dry wt)/day
	FIR_Inverts (100%)		0.0105	kg (dry wt)/day
	FIR_Soil (3.3%)		0.00035	kg (dry wt)/day

TABLE H-15

ECOLOGICAL HAZARD CALCULATIONS FOR NORTHERN SHRIKE
Site SS08
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C_{SOIL} (mg/kg)	Exposure Point Concentration C_{WATER} (mg/L)	$BCF_{\text{S-I}}$ ^a	Exposure Point Concentration C_{INVERTS} ^b (mg/kg)	Ingestion Dose ^{c, d} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
mg/kg - Milligrams per kilogram.			Exposure Duration (ED):		0.5	unitless	
mg/kg-day - Milligrams per kilogram per day.			Site Utilization Factor (SUF):		0.013	unitless	
mg/L - Milligrams per liter.			Home range:		320	acres	
na - Not available.			Exposure area:		4.0	acres	
Non-PHCs - Non-petroleum hydrocarbons.			Water Ingestion Rate:		0.0097	L/day	
PHCs - Petroleum hydrocarbons.							

^a The soil-to-invertebrate bioaccumulation factor (BAFS-I) was derived from Region 6 Draft SLERA Protocol for organics and EcoSSL (USEPA 2007) for inorganics.

^b The soil invertebrate concentration (CINVERT) was calculated from the soil concentration and the soil-to-invertebrate bioaccumulation factor (BAFS-I) (USEPA 1999a).

^c Ingestion doses were calculated as described in Appendix G.

^d The ingestion dose for the Northern shrike accounts for exposure to soil based upon foraging habits.

TABLE H-16

ECOLOGICAL HAZARD CALCULATIONS FOR MALLARD
Site SS08
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C _{SEDIMENT} (mg/kg)	Exposure Point Concentration C _{WATER} (mg/L)	BCF _{S-P} ^a	Exposure Point Concentration C _{PLANT} ^b (mg/kg)	BCF _{S-I} ^c	Exposure Point Concentration C _{INVERTS} ^d	Ingestion Dose ^{e,f} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs									
Inorganics									
Aluminum	0	1.2	0.0040	0	na	0	1.8E-06	6.7E+01	0.000000027
Arsenic	21	0	0.040	0.84	Regression	2.1	2.0E-06	1.1E+00	0.0000018
Barium	240	0.015	0.16	37	0.091	22	5.2E-05	1.2E+01	0.0000044
Beryllium	1.2	0	Regression	0.67	0.045	0.054	7.7E-07	1.2E+01	0.000000065
Cadmium	1.4	0	0.55	0.78	Regression	11	2.2E-06	1.4E+00	0.0000016
Chromium	62	0.0050	0.041	2.5	0.31	19	7.4E-06	1.0E+00	0.0000073
Cobalt	32	0	0.0075	0.24	0.12	3.8	2.0E-06	8.3E+00	0.00000024
Copper	122	0.0028	0.40	49	0.52	63	6.5E-05	2.7E+01	0.0000024
Lead	51	0.0011	Regression	2.4	Regression	19	6.9E-06	1.6E+00	0.0000044
Manganese	1,300	0	0.079	103	Regression	59	1.7E-04	6.0E+02	0.00000028
Mercury	0.20	0	0.90	0.18	Regression	0.11	2.2E-07	2.7E-01	0.00000079
Molybdenum	3.0	0	0.25	0.75	0.95	2.9	1.3E-06	3.8E+00	0.00000034
Nickel	110	0	Regression	3.6	na	0	8.3E-06	7.5E+01	0.00000011
Selenium	1.5	0.0012	Regression	0.80	Regression	1.2	1.1E-06	4.8E-01	0.0000022
Silver	0	0.0030	0.40	0	2.0	0	4.5E-09	1.8E+00	0.000000026
Thallium	0.30	0	0.0040	0.0012	na	0	1.3E-08	na	--
Titanium	1,470	0.0020	0.0055	8.1	na	0	6.7E-05	na	--
Vanadium	106	0	0.0055	0.58	0.04	4.5	5.3E-06	1.1E+01	0.00000048
Zinc	273	0	Regression	109	Regression	539	1.9E-04	1.7E+01	0.000012
Volatile Organic Compounds									
1,1-Dichloropropene	0	0.00029	1.5	0	12	0	4.4E-10	na	--
1-Chlorohexane	0	0.00024	na	0	na	0	3.6E-10	na	--
2,2-Dichloropropane	0	0.00025	na	0	na	0	3.8E-10	na	--
2-Chloroethyl Vinyl Ether	0	0.00019	8.2	0	8.0	0	2.9E-10	na	--
Bromomethane	0	0.00015	7.9	0	43	0	2.3E-10	na	--
Carbon Disulfide	0	0.0025	2.7	0	na	0	3.8E-09	na	--
Chloroethane	0	0.00031	12	0	na	0	4.7E-10	na	--
Chloromethane	0	0.00031	12	0	na	0	4.7E-10	na	--
Isopropylbenzene	0	0.00021	0.30	0	12	0	3.2E-10	na	--
Methylene Chloride	0.0018	0	7.3	0.013	3.2	0.0058	1.5E-08	na	--
m,p-Xylenes	0.079	0	0.61	0.048	7.3	0.58	1.2E-07	na	--
Semivolatile Organic Compounds									
3,3'-Dichlorobenzidine	0.080	0	0.36	0.029	0.94	0.076	4.3E-08	na	--
4-Chloroaniline	0.20	0	3.2	0.63	0.38	0.075	7.0E-07	2.0E-01	0.0000034

TABLE H-16

ECOLOGICAL HAZARD CALCULATIONS FOR MALLARD
Site SS08
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C _{SEDIMENT} (mg/kg)	Exposure Point Concentration C _{WATER} (mg/L)	BCF _{S-P} ^a	Exposure Point Concentration C _{PLANT} ^b (mg/kg)	BCF _{S-I} ^c	Exposure Point Concentration C _{INVERTS} ^d	Ingestion Dose ^{e,f} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs									
Polynuclear Aromatic Hydrocarbons									
Acenaphthene	0.010	0	0.21	0.0021	1.5	0.015	4.4E-09	na	--
Acenaphthylene	0.0074	0	0.20	0.0015	23	0.17	2.2E-08	na	--
Anthracene	0.079	0	0.10	0.0082	2.4	0.19	3.5E-08	na	--
Benzo(a)anthracene	0.063	0	0.018	0.0011	1.6	0.10	1.6E-08	na	--
Benzo(a)pyrene	0.063	0	0.011	0.00070	1.3	0.084	1.3E-08	na	--
Benzo(b)fluoranthene	0.063	0	0.018	0.0011	2.6	0.16	2.3E-08	na	--
Benzo(g,h,i)perylene	0.044	0	0.0057	0.00025	2.9	0.13	1.7E-08	na	--
Benzo(k)fluoranthene	0.042	0	0.011	0.00047	2.6	0.11	1.5E-08	na	--
Chrysene	0.12	0	0.017	0.0020	2.3	0.27	3.9E-08	na	--
Dibenz(a,h)anthracene	0.015	0	0.0049	0.000072	2.3	0.034	4.7E-09	na	--
Fluoranthene	0.13	0	0.040	0.0053	3.0	0.40	5.9E-08	na	--
Fluorene	0.015	0	0.15	0.0022	9.6	0.14	2.0E-08	na	--
Indeno(1,2,3-cd)pyrene	0.033	0	0.0052	0.00017	2.9	0.094	1.3E-08	na	--
Naphthalene	0.055	0	0.48	0.027	4.4	0.24	6.0E-08	na	--
Phenanthrene	0.17	0	0.10	0.017	1.7	0.29	6.0E-08	na	--
Pyrene	0.18	0	0.059	0.011	1.8	0.32	5.7E-08	na	--
Pesticides									
4,4'-DDD	0.42	0.0000022	0.013	0.0054	Regression	1.8	2.3E-07	3.7E-03	0.000063
4,4'-DDE	0.21	0.0000041	0.0067	0.0014	Regression	0.051	1.6E-08	3.7E-03	0.0000043
4,4'-DDT	2.0	0.000031	0.0039	0.0078	Regression	15	1.9E-06	3.7E-03	0.00051
Endosulfan Sulfate	0.0042	0	0.30	0.0012	0.30	0.0012	1.7E-09	7.7E+00	0.00000000021
Polychlorinated Biphenyls									
Arochlor 1260	0.17	0	0.00064	0.00011	6.7	1.1	1.4E-07	2.7E-01	0.00000052
								HI	0.0006
PHCs									
Diesel Range Organics (DRO)	2,506	0	0.0020	5.0	0.48	1,203	2.5E-04	na	--
Gasoline Range Organics (GRO)	3.6	0	0.16	0.56	2.2	8.1	1.7E-06	na	--
Residual Range Organics (RRO)	871	0	0.031	27	0.37	322	1.0E-04	na	--
								HI	0

Notes:

BCF_{S-P} - Bioconcentration factor from soil to plants.
 BCF_{S-I} - Bioconcentration factor from soil to invertebrates.
 COPEC - Chemical of potential ecological concern.
 HI - Hazard index.
 HQ - Hazard quotient.
 mg/kg - Milligrams per kilogram.
 mg/kg-day - Milligrams per kilogram per day.

Exposure Parameters

Body Weight:	1134	gm	1.134	kg
Food Ingestion Rate (FIR):	0.051		kg (dry wt)/day	
FIR_Plants (90%)	0.046		kg (dry wt)/day	
FIR_Inverts (10%)	0.0051		kg (dry wt)/day	
FIR_Soil (3.3%)	0.0017		kg (dry wt)/day	
Exposure Duration (ED):	0.5		unitless	
Site Utilization Factor (SUF):	0.000053		unitless	

TABLE H-16

ECOLOGICAL HAZARD CALCULATIONS FOR MALLARD
Site SS08
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C _{SEDIMENT} (mg/kg)	Exposure Point Concentration C _{WATER} (mg/L)	BCF _{S-P} ^a	Exposure Point Concentration C _{PLANT} ^b (mg/kg)	BCF _{S-I} ^c	Exposure Point Concentration C _{INVERTS} ^d	Ingestion Dose ^{e,f} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs									
	mg/L - Milligrams per liter.				Home range:		75,076	acres	
	na - Not available.				Exposure area:		4.0	acres	
	Non-PHCs - Non-petroleum hydrocarbons.				Water Ingestion Rate:		0.064	L/day	
	PHCs - Petroleum hydrocarbons.								

^a The soil-to-plant bioaccumulation factor (BAF_{S-P}) was derived from Travis & Arms (1998) for organics and EcoSSL (USEPA 2007) for inorganics.

^b The plant concentration (C_{PLANT}) was calculated from the soil concentration and the soil-to-plant bioconcentration factor (BCF_{S-P}) (USEPA 1999a).

^c The soil-to-invertebrate bioaccumulation factor (BAFS-I) was derived from Region 6 Draft SLERA Protocol for organics and EcoSSL (USEPA 2007) for inorganics.

^d The soil invertebrate concentration (C_{INVERT}) was calculated from the soil concentration and the soil-to-invertebrate bioaccumulation factor (BAFS-I) (USEPA 1999a).

^e Ingestion doses were calculated as described in Appendix G.

^f The ingestion dose for the mallard accounts for exposure to sediment based upon foraging habits.

TABLE H-17

ECOLOGICAL HAZARD CALCULATIONS FOR TUNDRA VOLE
Site SS11
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C_{SOIL} (mg/kg)	Exposure Point Concentration C_{WATER} (mg/L)	$BCF_{\text{S-P}}^a$	Exposure Point Concentration C_{PLANT}^b (mg/kg)	Ingestion Dose c, d (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
Inorganics							
Antimony	1.0	0	0.20	0.20	4.4E-02	5.6E-02	0.78
Arsenic	10	0	0.04	0.40	1.3E-01	1.1E-01	1.2
Barium	1,256	0.032	0.16	196	4.4E+01	8.2E-01	54
Cadmium	0.37	0	0.55	0.20	4.1E-02	1.6E+00	0.026
Chromium	40	0.0042	0.041	1.7	5.2E-01	5.6E+00	0.092
Cobalt	20	0	0.0075	0.15	1.2E-01	1.2E+01	0.011
Copper	58	0	0.40	23	4.8E+00	2.4E+01	0.20
Lead	120	0	Regression	3.9	1.3E+00	7.6E+00	0.18
Manganese	1,080	0	0.079	85	2.2E+01	1.4E+02	0.15
Molybdenum	3.0	0	0.25	0.75	1.6E-01	2.3E-01	0.71
Nickel	40	0	Regression	1.7	5.3E-01	6.4E+01	0.0082
Selenium	0.74	0	Regression	0.37	7.5E-02	3.2E-01	0.23
Thallium	0.30	0	0.0040	0.0012	1.7E-03	1.2E-02	0.14
Tin	11	0	0.030	0.33	1.2E-01	2.0E+01	0.0058
Titanium	1,460	0	0.0055	8.0	8.5E+00	na	--
Vanadium	68	0	0.0055	0.37	4.0E-01	3.4E+00	0.12
Zinc	91	0	Regression	59	1.2E+01	1.4E+02	0.083
Volatile Organic Compounds							
1,2,4-Trimethylbenzene	6.6	0	0.31	2.0	4.3E-01	4.2E+02	0.0010
1,3,5-Trimethylbenzene	1.9	0	0.41	0.79	1.6E-01	4.2E+02	0.00039
Acetone	11	0	28	310	6.1E+01	1.6E+01	3.8
Carbon Disulfide	0	0.019	2.7	0	2.5E-03	na	--
Chloromethane	0	0.0011	12	0	1.5E-04	na	--
Ethylbenzene	0.076	0	0.59	0.044	9.1E-03	4.2E+02	0.000022
Isopropylbenzene	0.043	0	0.30	0.013	2.7E-03	8.0E+02	0.000003
m,p-Xylenes	0.15	0	0.61	0.091	1.9E-02	8.0E+02	0.000023
n-Butylbenzene	0.13	0	0.11	0.015	3.5E-03	4.2E+02	0.000008
o-Xylene	2.0	0	0.61	1.2	2.5E-01	8.0E+02	0.000309
p-Isopropyltoluene	0.077	0	0.30	0.023	4.9E-03	8.0E+02	0.000006
Trichlorofluoromethane	0.0034	0	1.3	0.0045	9.1E-04	na	--

TABLE H-17

ECOLOGICAL HAZARD CALCULATIONS FOR TUNDRA VOLE
Site SS11
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C _{SOIL} (mg/kg)	Exposure Point Concentration C _{WATER} (mg/L)	BCF _{S-P} ^a	Exposure Point Concentration C _{PLANT} ^b (mg/kg)	Ingestion Dose ^{c, d} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
Semivolatile Organic Compounds							
2,4-Dimethylphenol	25	0	1.8	45	9.0E+00	na	--
Benzoic Acid	0.37	0	3.2	1.2	2.4E-01	na	--
Dibenzofuran	267	0	0.16	43	9.7E+00	na	--
Phenol	16	0	5.5	89	1.7E+01	na	--
Polynuclear Aromatic Hydrocarbons							
2-Methylnaphthalene	3,697	0	0.23	841	1.8E+02	8.0E+01	2.3
Acenaphthene	2,800	0	0.21	588	1.3E+02	8.7E+01	1.5
Anthracene	2,230	0	0.10	231	5.6E+01	8.7E+01	0.64
Benzo(a)anthracene	950	0	0.018	17	7.9E+00	1.5E+02	0.054
Benzo(a)pyrene	286	0	0.011	3.2	2.0E+00	8.7E+01	0.023
Benzo(b)fluoranthene	705	0	0.018	12	5.8E+00	8.7E+01	0.067
Benzo(g,h,i)perylene	229	0	0.0057	1.3	1.3E+00	8.7E+01	0.015
Benzo(k)fluoranthene	166	0	0.011	1.9	1.2E+00	8.7E+01	0.013
Chrysene	1,066	0	0.017	18	8.6E+00	8.7E+01	0.099
Dibenz(a,h)anthracene	34	0	0.0049	0.16	1.9E-01	3.2E+00	0.060
Fluoranthene	3,063	0	0.040	124	3.9E+01	7.7E+01	0.50
Fluorene	1,744	0	0.15	259	5.9E+01	8.7E+01	0.68
Indeno(1,2,3-cd)pyrene	103	0	0.005	0.53	6.0E-01	8.7E+01	0.0068
Naphthalene	3,555	0	0.48	1,704	3.5E+02	8.0E+01	4.4
Phenanthrene	5,177	0	0.10	530	1.3E+02	8.7E+01	1.5
Pyrene	3,029	0	0.059	177	4.9E+01	8.7E+01	0.57
Pesticides							
4,4'-DDT	0.76	0	0.0039	0.0030	4.2E-03	1.3E+00	0.0032
delta-BHC	0.65	0	na	0	3.1E-03	3.9E+00	0.00081
Dieldrin	0.027	0	0.038	0.0010	3.3E-04	3.2E-02	0.010
Endrin	0.61	0	0.038	0.023	7.4E-03	8.0E-02	0.093
Endrin aldehyde	0.94	0	0.038	0.036	1.2E-02	8.0E-02	0.14
Endrin ketone	0.75	0	0.038	0.029	9.2E-03	8.0E-02	0.11
						HI	75
PHCs							

TABLE H-17

ECOLOGICAL HAZARD CALCULATIONS FOR TUNDRA VOLE
Site SS11
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C_{SOIL} (mg/kg)	Exposure Point Concentration C_{WATER} (mg/L)	$\text{BCF}_{\text{S-P}}^{\text{a}}$	Exposure Point Concentration $C_{\text{PLANT}}^{\text{b}}$ (mg/kg)	Ingestion Dose c, d (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
Diesel Range Organics (DRO)	79,575	0	0.0020	159	4.1E+02	8.0E+01	5.1
Gasoline Range Organics (GRO)	7.1	0	0.16	1.1	2.5E-01	2.3E+01	0.011
Residual Range Organics (RRO)	60,057	0	0.031	1,862	6.5E+02	8.7E+01	7.5
						HI	13

Notes:

$\text{BCF}_{\text{S-P}}$ - Bioconcentration factor from soil to plants.

COPEC - Chemical of potential ecological concern.

HI - Hazard index.

HQ - Hazard quotient.

mg/kg - Milligrams per kilogram.

mg/kg-day - Milligrams per kilogram per day.

mg/L - Milligrams per liter.

na - Not available.

Non-PHCs - Non-petroleum hydrocarbons.

PHCs - Petroleum hydrocarbons.

Exposure Parameters

Body Weight:	52.5	gm	0.0525	kg
Food Ingestion Rate (FIR):			0.010	kg (dry wt)/day
FIR_Plants (100%)			0.010	kg (dry wt)/day
FIR_Soil (2.4%)			0.00025	kg (dry wt)/day
Exposure Duration (ED):			1	unitless
Site Utilization Factor (SUF):			1	unitless
Home range:			0.067	acres
Exposure area:			3.7	acres
Water Ingestion Rate:			0.0069	L/day

^a The soil-to-plant bioaccumulation factor ($\text{BAF}_{\text{S-P}}$) was derived from Travis & Arms (1998) for organics and EcoSSL (USEPA 2007) for inorganics.

^b The plant concentration (C_{PLANT}) was calculated from the soil concentration and the soil-to-plant bioconcentration factor ($\text{BCF}_{\text{S-P}}$) (USEPA 1999a).

^c Ingestion doses were calculated as described in Appendix G.

^d The ingestion dose for a tundra vole accounts for exposure to soil based upon foraging habits of the vole.

TABLE H-18

ECOLOGICAL HAZARD CALCULATIONS FOR MASKED SHREW
Site SS11
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C_{SOIL} (mg/kg)	Exposure Point Concentration C_{WATER} (mg/L)	BCF_{S-I}^a	Exposure Point Concentration C_{INVERTS}^b (mg/kg)	Ingestion Dose c, d (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
Inorganics							
Antimony	1.0	0	1.0	1.0	2.2E-01	1.0E-01	2.1
Arsenic	10	0	Regression	1.2	3.1E-01	2.0E-01	1.5
Barium	1,256	0.032	0.091	114	3.0E+01	1.5E+00	20
Cadmium	0.37	0	Regression	3.7	7.9E-01	3.0E+00	0.27
Chromium	40	0.0042	0.31	12	2.8E+00	1.0E+01	0.27
Cobalt	20	0	0.12	2.4	6.2E-01	2.2E+01	0.028
Copper	58	0	0.52	30	6.6E+00	4.5E+01	0.15
Lead	120	0	Regression	38	8.7E+00	1.4E+01	0.62
Manganese	1,080	0	Regression	52	1.6E+01	2.6E+02	0.063
Molybdenum	3.0	0	0.95	2.9	6.2E-01	4.2E-01	1.5
Nickel	40	0	na	0	2.0E-01	1.2E+02	0.0017
Selenium	0.74	0	Regression	0.75	1.6E-01	5.9E-01	0.27
Thallium	0.30	0	na	0	1.5E-03	2.2E-02	0.068
Tin	11	0	na	0	5.6E-02	3.8E+01	0.00148
Titanium	1,460	0	na	0	7.4E+00	na	--
Vanadium	68	0	0.04	2.9	9.5E-01	6.2E+00	0.15
Zinc	91	0	Regression	376	8.0E+01	2.7E+02	0.30
Volatile Organic Compounds							
1,2,4-Trimethylbenzene	6.6	0	13	83	1.8E+01	7.8E+02	0.022
1,3,5-Trimethylbenzene	1.9	0	8.4	16	3.4E+00	7.8E+02	0.0044
Acetone	11	0	5.1	56	1.2E+01	3.0E+01	0.40
Carbon Disulfide	0	0.019	na	0	3.3E-03	na	--
Chloromethane	0	0.0011	na	0	1.9E-04	na	--
Ethylbenzene	0.076	0	6.6	0.50	1.1E-01	7.8E+02	0.00014
Isopropylbenzene	0.043	0	12	0.50	1.1E-01	1.5E+03	0.000072
m,p-Xylenes	0.15	0	7.3	1.1	2.3E-01	1.5E+03	0.00016
n-Butylbenzene	0.13	0	23	3.0	6.3E-01	7.8E+02	0.00081
o-Xylene	2.0	0	7.3	15	3.1E+00	1.5E+03	0.0021
p-Isopropyltoluene	0.077	0	12	0.90	1.9E-01	1.5E+03	0.00013
Trichlorofluoromethane	0.0034	0	20	0.069	1.5E-02	na	--

TABLE H-18

ECOLOGICAL HAZARD CALCULATIONS FOR MASKED SHREW
Site SS11
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C_{SOIL} (mg/kg)	Exposure Point Concentration C_{WATER} (mg/L)	$BCF_{\text{S-I}}$ ^a	Exposure Point Concentration C_{INVERTS} ^b (mg/kg)	Ingestion Dose ^{c, d} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
Semivolatile Organic Compounds							
2,4-Dimethylphenol	25	0	0.87	22	4.7E+00	na	--
Benzoic Acid	0.37	0	18	6.8	1.4E+00	na	--
Dibenzofuran	267	0	2.1	568	1.2E+02	na	--
Phenol	16	0	0.43	6.95	1.5E+00	na	--
Polynuclear Aromatic Hydrocarbons							
2-Methylnaphthalene	3,697	0	4.4	16,267	3.5E+03	1.5E+02	23
Acenaphthene	2,800	0	1.5	4,116	8.8E+02	1.6E+02	5.5
Anthracene	2,230	0	2.4	5,397	1.2E+03	1.6E+02	7.2
Benzo(a)anthracene	950	0	1.6	1,510	3.2E+02	2.7E+02	1.2
Benzo(a)pyrene	286	0	1.3	380	8.2E+01	1.6E+02	0.51
Benzo(b)fluoranthene	705	0	2.6	1,832	3.9E+02	1.6E+02	2.4
Benzo(g,h,i)perylene	229	0	2.9	672	1.4E+02	1.6E+02	0.89
Benzo(k)fluoranthene	166	0	2.6	432	9.2E+01	1.6E+02	0.57
Chrysene	1,066	0	2.3	2,441	5.2E+02	1.6E+02	3.2
Dibenz(a,h)anthracene	34	0	2.3	78	1.7E+01	5.9E+00	2.8
Fluoranthene	3,063	0	3.0	9,312	2.0E+03	1.6E+02	12
Fluorene	1,744	0	9.6	16,690	3.5E+03	1.6E+02	22
Indeno(1,2,3-cd)pyrene	103	0	2.9	295	6.3E+01	1.6E+02	0.39
Naphthalene	3,555	0	4.4	15,642	3.3E+03	1.5E+02	22
Phenanthrene	5,177	0	1.7	8,904	1.9E+03	1.6E+02	12
Pyrene	3,029	0	1.8	5,301	1.1E+03	1.6E+02	7.1
Pesticides							
4,4'-DDT	0.76	0	Regression	6.56	1.4E+00	2.4E+00	0.58
delta-BHC	0.65	0	na	0	3.3E-03	7.1E+00	0.00046
Dieldrin	0.027	0	15	0.40	8.4E-02	5.9E-02	1.4
Endrin	0.61	0	20	12	2.5E+00	1.5E-01	17
Endrin aldehyde	0.94	0	20	19	3.9E+00	1.5E-01	26
Endrin ketone	0.75	0	20	15	3.1E+00	1.5E-01	21
						HI	218
PHCs							

TABLE H-18

ECOLOGICAL HAZARD CALCULATIONS FOR MASKED SHREW
Site SS11
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C_{SOIL} (mg/kg)	Exposure Point Concentration C_{WATER} (mg/L)	$BCF_{\text{S-I}}$ ^a	Exposure Point Concentration C_{INVERTS} ^b (mg/kg)	Ingestion Dose ^{c, d} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
Diesel Range Organics (DRO)	79,575	0	0.48	38,196	8.5E+03	1.5E+02	57
Gasoline Range Organics (GRO)	7.1	0	2.24	16	3.4E+00	4.2E+01	0.080
Residual Range Organics (RRO)	60,057	0	0.37	22,221	5.0E+03	1.6E+02	31
						HI	88

Notes:

$BCF_{\text{S-P}}$ - Bioconcentration factor from soil to plants.

COPEC - Chemical of potential ecological concern.

HI - Hazard index.

HQ - Hazard quotient.

mg/kg - Milligrams per kilogram.

mg/kg-day - Milligrams per kilogram per day.

mg/L - Milligrams per liter.

na - Not available.

Non-PHCs - Non-petroleum hydrocarbons.

PHCs - Petroleum hydrocarbons.

Exposure Parameters

Body Weight:	4.5	gm	0.0045	kg
Food Ingestion Rate (FIR):			0.00095	kg (dry wt)/day
FIR_Inverts (100%)			0.00095	kg (dry wt)/day
FIR_Soil (2.4%)			0.000023	kg (dry wt)/day
Exposure Duration (ED):			1	unitless
Site Utilization Factor (SUF):			1	unitless
Home range:			1.1	acres
Exposure area:			3.7	acres
Water Ingestion Rate:			0.00076	L/day

^a The soil-to-invertebrate bioaccumulation factor (BAFS-I) was derived from Region 6 Draft SLERA Protocol for organics and EcoSSL (USEPA 2007) for inorganics.

^b The soil invertebrate concentration (CINVERT) was calculated from the soil concentration and the soil-to-invertebrate bioaccumulation factor (BAFS-I) (USEPA 1999a).

^c Ingestion doses were calculated as described in Appendix G.

^d The ingestion dose for a masked shrew accounts for exposure to soil based upon foraging habits of the shrew.

TABLE H-19
ECOLOGICAL HAZARD CALCULATIONS FOR LEAST WEASEL
Site SS11
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C _{SOIL} (mg/kg)	Exposure Point Concentration C _{WATER} (mg/L)	BCF _{S-M} ^a	Exposure Point Concentration C _{MAMMAL} ^b (mg/kg)	Ingestion Dose ^{c, d} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
Inorganics							
Antimony	1.0	0	na	0	2.3E-03	5.9E-02	0.039
Arsenic	10	0	Regression	0.052	2.7E-02	1.1E-01	0.24
Barium	1,256	0.032	0.057	71	8.7E+00	8.5E-01	10
Cadmium	0.37	0	0.33	0.12	1.1E-02	1.7E+00	0.0065
Chromium	40	0.0042	Regression	3.5	3.8E-01	5.8E+00	0.065
Cobalt	20	0	Regression	0.58	9.3E-02	1.2E+01	0.0076
Copper	58	0	0.20	11	1.1E+00	2.5E+01	0.042
Lead	120	0	0.11	13	1.3E+00	7.8E+00	0.17
Manganese	1,080	0	0.021	22	4.3E+00	1.5E+02	0.029
Molybdenum	3.0	0	0.0022	0.0066	7.4E-03	2.3E-01	0.032
Nickel	40	0	0.35	14	1.3E+00	6.7E+01	0.019
Selenium	0.74	0	Regression	0.59	5.0E-02	3.3E-01	0.15
Thallium	0.30	0	na	0	6.9E-04	1.2E-02	0.055
Tin	11	0	na	0	2.5E-02	2.1E+01	0.0012
Titanium	1,460	0	na	0	3.4E+00	na	--
Vanadium	68	0	0.012	0.84	2.3E-01	3.5E+00	0.064
Zinc	91	0	0.77	70	6.0E+00	1.5E+02	0.040
Volatile Organic Compounds							
1,2,4-Trimethylbenzene	6.6	0	0	0	1.5E-02	4.4E+02	0.000035
1,3,5-Trimethylbenzene	1.9	0	0	0	4.5E-03	4.4E+02	0.000010
Acetone	11	0	0	0	2.5E-02	1.7E+01	0.0015
Carbon Disulfide	0	0.019	0	0	2.6E-03	na	--
Chloromethane	0	0.0011	0	0	1.5E-04	na	--
Ethylbenzene	0.076	0	0	0	1.7E-04	4.4E+02	0.00000040
Isopropylbenzene	0.043	0	0	0	9.9E-05	8.3E+02	0.00000012
m,p-Xylenes	0.15	0	0	0	3.5E-04	8.3E+02	0.00000041
n-Butylbenzene	0.13	0	0	0	3.0E-04	4.4E+02	0.00000068
o-Xylene	2.0	0	0	0	4.6E-03	8.3E+02	0.0000055
p-Isopropyltoluene	0.077	0	0	0	1.8E-04	8.3E+02	0.00000021
Trichlorofluoromethane	0.0034	0	0	0	7.8E-06	na	--

TABLE H-19

ECOLOGICAL HAZARD CALCULATIONS FOR LEAST WEASEL
Site SS11
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C_{SOIL} (mg/kg)	Exposure Point Concentration C_{WATER} (mg/L)	$BCF_{\text{S-M}}^a$	Exposure Point Concentration C_{MAMMAL}^b (mg/kg)	Ingestion Dose c, d (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
Semivolatile Organic Compounds							
2,4-Dimethylphenol	25	0	0	0	5.8E-02	na	--
Benzoic Acid	0.37	0	0	0	8.5E-04	na	--
Dibenzofuran	267	0	0	0	6.2E-01	na	--
Phenol	16	0	0.0	0.0	3.7E-02	na	--
Polynuclear Aromatic Hydrocarbons							
2-Methylnaphthalene	3,697	0	0	0	8.5E+00	8.3E+01	0.10
Acenaphthene	2,800	0	0	0	6.4E+00	9.0E+01	0.071
Anthracene	2,230	0	0	0	5.1E+00	9.0E+01	0.057
Benzo(a)anthracene	950	0	0	0	2.2E+00	1.5E+02	0.014
Benzo(a)pyrene	286	0	0	0	6.6E-01	9.0E+01	0.0073
Benzo(b)fluoranthene	705	0	0	0	1.6E+00	9.0E+01	0.018
Benzo(g,h,i)perylene	229	0	0	0	5.3E-01	9.0E+01	0.0058
Benzo(k)fluoranthene	166	0	0	0	3.8E-01	9.0E+01	0.0042
Chrysene	1,066	0	0	0	2.5E+00	9.0E+01	0.027
Dibenz(a,h)anthracene	34	0	0	0	7.8E-02	3.3E+00	0.023
Fluoranthene	3,063	0	0	0	7.1E+00	9.0E+01	0.078
Fluorene	1,744	0	0	0	4.0E+00	9.0E+01	0.044
Indeno(1,2,3-cd)pyrene	103	0	0	0	2.4E-01	9.0E+01	0.0026
Naphthalene	3,555	0	0	0	8.2E+00	8.3E+01	0.098
Phenanthrene	5,177	0	0	0	1.2E+01	9.0E+01	0.13
Pyrene	3,029	0	0	0	7.0E+00	9.0E+01	0.077
Pesticides							
4,4'-DDT	0.76	0	Regression	2.7	2.2E-01	1.3E+00	0.16
delta-BHC	0.65	0	na	0	1.5E-03	4.0E+00	0.00038
Dieldrin	0.027	0	1.2	0.032	2.7E-03	3.3E-02	0.082
Endrin	0.61	0	na	0	1.4E-03	8.3E-02	0.017
Endrin aldehyde	0.94	0	na	0	2.2E-03	8.3E-02	0.026
Endrin ketone	0.75	0	na	0	1.7E-03	8.3E-02	0.021
						HI	12
PHCs							

TABLE H-19

ECOLOGICAL HAZARD CALCULATIONS FOR LEAST WEASEL
Site SS11
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C_{SOIL} (mg/kg)	Exposure Point Concentration C_{WATER} (mg/L)	$BCF_{\text{S-M}}$ ^a	Exposure Point Concentration C_{MAMMAL} (mg/kg)	Ingestion Dose ^{c, d} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
Diesel Range Organics (DRO)	79,575	0	0	0	1.8E+02	8.3E+01	2.2
Gasoline Range Organics (GRO)	7.1	0	0	0	1.6E-02	2.4E+01	0.00068
Residual Range Organics (RRO)	60,057	0	0	0	1.4E+02	9.0E+01	1.5
						HI	4

Notes:BCF_{S-P} - Bioconcentration factor from soil to plants.

COPEC - Chemical of potential ecological concern.

HI - Hazard index.

HQ - Hazard quotient.

mg/kg - Milligrams per kilogram.

mg/kg-day - Milligrams per kilogram per day.

mg/L - Milligrams per liter.

na - Not available.

Non-PHCs - Non-petroleum hydrocarbons.

PHCs - Petroleum hydrocarbons.

Exposure Parameters

Body Weight:	45	gm	0.045	kg
Food Ingestion Rate (FIR):			0.0037	kg (dry wt)/day
	FIR_Mammals (100%)		0.0037	kg (dry wt)/day
	FIR_Sediment (2.8%)		0.00010	kg (dry wt)/day
Exposure Duration (ED):			1	unitless
Site Utilization Factor (SUF):			1	unitless
	Home range:		2.9	acres
	Exposure area:		3.7	acres
	Water Ingestion Rate:		0.0061	L/day

^a The soil-to-small mammal bioaccumulation factor (BAFS-M) was derived from USEPA (2005).^b The mammalian prey item concentration (C_{MAMMAL}) was calculated from the soil concentration and the soil-to-small mammal bioconcentration factor ($BCF_{\text{S-M}}$).^c Ingestion doses were calculated as described in Appendix G.^d The ingestion dose for a least weasel accounts for exposure to soil based upon foraging habits of the weasel.

TABLE H-20

ECOLOGICAL HAZARD CALCULATIONS FOR MINK
Site SS11
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C_{SEDIMENT} (mg/kg)	Exposure Point Concentration C_{WATER} (mg/L)	BCF_{S-M}^a	Exposure Point Concentration C_{MAMMAL}^b (mg/kg)	Ingestion Dose c, d (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
Inorganics							
Arsenic	8.8	0	Regression	0.046	6.0E-03	4.9E-02	0.12
Barium	150	0.032	0.057	8.5	2.6E-01	3.6E-01	0.7
Chromium	0	0.0042	Regression	0	1.8E-04	2.5E+00	0.000073
Selenium	4.7	0	Regression	1.2	2.7E-02	1.4E-01	0.19
Volatile Organic Compounds							
Carbon Disulfide	0	0.019	0	0	8.3E-04	na	--
Chloromethane	0	0.0011	0	0	4.8E-05	na	--
Pesticides							
4,4'-DDT	0.0057	0	Regression	0.077	1.6E-03	5.7E-01	0.0028
						HI	1
PHCs							
Residual Range Organics (RRO)	342	0	0	0	2.0E-01	3.9E+01	0.0051
						HI	0.01

Notes:

BCF_{S-P} - Bioconcentration factor from soil to plants.
COPEC - Chemical of potential ecological concern.
HI - Hazard index.
HQ - Hazard quotient.
mg/kg - Milligrams per kilogram.
mg/kg-day - Milligrams per kilogram per day.
mg/L - Milligrams per liter.
na - Not available.
Non-PHCs - Non-petroleum hydrocarbons.
PHCs - Petroleum hydrocarbons.

Exposure Parameters

Body Weight:	1354	gm	1.354	kg
Food Ingestion Rate (FIR):			0.063	kg (dry wt)/day
	FIR_Mammals (100%)		0.063	kg (dry wt)/day
	FIR_Sediment (2.8%)		0.00175	kg (dry wt)/day
Exposure Duration (ED):			1	unitless
Site Utilization Factor (SUF):			0.45	unitless
	Home range:		8.3	acres
	Exposure area:		3.7	acres
Water Ingestion Rate:			0.13	L/day

TABLE H-20

ECOLOGICAL HAZARD CALCULATIONS FOR MINK
Site SS11
TATALINA LONG RANGE RADAR STATION, ALASKA

	Exposure Point Concentration	Exposure Point Concentration		Exposure Point Concentration	Ingestion Dose ^{c, d}	Toxicity Reference Value	Ecological Hazard
COPEC	C _{SEDIMENT} (mg/kg)	C _{WATER} (mg/L)	BCF _{S-M} ^a	C _{MAMMAL} ^b (mg/kg)	(mg/kg)	(mg/kg-day)	HQ
Non-PHCs							

^a The soil-to-small mammal bioaccumulation factor (BAFS-M) was derived from USEPA (2005).

^b The mammalian prey item concentration (C_{MAMMAL}) was calculated from the soil concentration and the soil-to-small mammal bioconcentration factor (BCF_{S-M}).

^c Ingestion doses were calculated as described in Appendix G.

^d The ingestion dose for a mink accounts for exposure to sediment based upon foraging habits of the mink.

TABLE H-21
ECOLOGICAL HAZARD CALCULATIONS FOR DARK-EYED JUNCO
Site SS11
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C _{SOIL} (mg/kg)	Exposure Point Concentration C _{WATER} (mg/L)	BCF _{S-P} ^a	Exposure Point Concentration C _{PLANT} ^b (mg/kg)	Ingestion Dose ^{c, d} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
Inorganics							
Antimony	1.0	0	0.20	0.20	5.2E-03	2.9E+00	0.0018
Arsenic	10	0	0.040	0.40	1.6E-02	2.9E+00	0.0055
Barium	1,256	0.032	0.16	196	5.3E+00	3.1E+01	0.17
Cadmium	0.37	0	0.55	0.20	4.8E-03	3.7E+00	0.0013
Chromium	40	0.0042	0.041	1.7	6.6E-02	2.7E+00	0.025
Cobalt	20	0	0.0075	0.15	1.8E-02	2.2E+01	0.00082
Copper	58	0	0.40	23	5.6E-01	7.0E+01	0.0079
Lead	120	0	Regression	3.9	1.7E-01	4.1E+00	0.042
Manganese	1,080	0	0.079	85	2.7E+00	1.6E+03	0.0017
Molybdenum	3.0	0	0.25	0.75	1.9E-02	9.8E+00	0.0019
Nickel	40	0	Regression	1.7	6.7E-02	2.0E+02	0.00034
Selenium	0.74	0	Regression	0.37	8.7E-03	1.3E+00	0.0068
Thallium	0.30	0	0.0040	0.0012	2.4E-04	na	--
Tin	11	0	0.030	0.33	1.5E-02	1.1E+01	0.0014
Titanium	1,460	0	0.0055	8.0	1.2E+00	na	--
Vanadium	68	0	0.0055	0.37	5.8E-02	2.9E+01	0.0020
Zinc	91	0	Regression	59	1.4E+00	4.3E+01	0.032
Volatile Organic Compounds							
1,2,4-Trimethylbenzene	6.6	0	0.31	2.0	5.0E-02	na	--
1,3,5-Trimethylbenzene	1.9	0	0.41	0.79	1.9E-02	na	--
Acetone	11	0	28	310	6.9E+00	8.2E+04	0.000084
Carbon Disulfide	0	0.019	2.7	0	4.2E-04	na	--
Chloromethane	0	0.0011	12	0	2.4E-05	na	--
Ethylbenzene	0.076	0	0.59	0.044	1.0E-03	na	--
Isopropylbenzene	0.043	0	0.30	0.013	3.1E-04	na	--
m,p-Xylenes	0.15	0	0.61	0.091	2.1E-03	na	--
n-Butylbenzene	0.13	0	0.11	0.015	4.2E-04	na	--
o-Xylene	2.0	0	0.61	1.2	2.9E-02	na	--
p-Isopropyltoluene	0.077	0	0.30	0.023	5.7E-04	na	--
Trichlorofluoromethane	0.0034	0	1.3	0.0045	1.0E-04	na	--
Semivolatile Organic Compounds							
2,4-Dimethylphenol	25	0	1.8	45	1.0E+00	na	--
Benzoic Acid	0.37	0	3.2	1.2	2.7E-02	na	--
Dibenzofuran	267	0	0.16	43	1.2E+00	na	--
Phenol	16	0	5.5	89	2.0E+00	na	--
Polynuclear Aromatic Hydrocarbons							
2-Methylnaphthalene	3,697	0	0.23	841	2.1E+01	na	--
Acenaphthene	2,800	0	0.21	588	1.5E+01	na	--
Anthracene	2,230	0	0.10	231	6.8E+00	na	--

TABLE H-21

ECOLOGICAL HAZARD CALCULATIONS FOR DARK-EYED JUNCO
Site SS11
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C _{SOIL} (mg/kg)	Exposure Point Concentration C _{WATER} (mg/L)	BCF _{S-P} ^a	Exposure Point Concentration C _{PLANT} ^b (mg/kg)	Ingestion Dose ^{c,d} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
Benzo(a)anthracene	950	0	0.018	17	1.1E+00	na	--
Benzo(a)pyrene	286	0	0.011	3.2	2.8E-01	na	--
Benzo(b)fluoranthene	705	0	0.018	12	7.9E-01	na	--
Benzo(g,h,i)perylene	229	0	0.0057	1.3	1.9E-01	na	--
Benzo(k)fluoranthene	166	0	0.011	1.9	1.6E-01	na	--
Chrysene	1,066	0	0.017	18	1.2E+00	na	--
Dibenz(a,h)anthracene	34	0	0.0049	0.16	2.8E-02	na	--
Fluoranthene	3,063	0	0.040	124	5.0E+00	na	--
Fluorene	1,744	0	0.15	259	7.0E+00	na	--
Indeno(1,2,3-cd)pyrene	103	0	0.0052	0.53	8.7E-02	na	--
Naphthalene	3,555	0	0.48	1,704	4.0E+01	na	--
Phenanthrene	5,177	0	0.10	530	1.6E+01	na	--
Pyrene	3,029	0	0.059	177	6.1E+00	na	--
Pesticides							
4,4'-DDT	0.76	0	0.0039	0	6.1E-04	9.7E-03	0.063
delta-BHC	0.65	0	na	0	4.7E-04	5.1E+00	0.000093
Dieldrin	0.027	0	0.038	0	4.3E-05	1.6E-01	0.00026
Endrin	0.61	0	0.038	0	9.5E-04	7.6E-01	0.0013
Endrin aldehyde	0.94	0	0.038	0	1.5E-03	7.6E-01	0.0019
Endrin ketone	0.75	0	0.038	0	1.2E-03	7.6E-01	0.0015
						HI	0.4
PHCs							
Diesel Range Organics (DRO)	79,575	0	0.0020	159	6.1E+01	na	--
Gasoline Range Organics (GRO)	7.1	0	0.16	1.1	3.0E-02	na	--
Residual Range Organics (RRO)	60,057	0	0.031	1,862	8.5E+01	na	--
						HI	0

Notes:

BCF_{S-P} - Bioconcentration factor from soil to plants.
COPEC - Chemical of potential ecological concern.
HI - Hazard index.
HQ - Hazard quotient.
mg/kg - Milligrams per kilogram.
mg/kg-day - Milligrams per kilogram per day.
mg/L - Milligrams per liter.
na - Not available.
Non-PHCs - Non-petroleum hydrocarbons.
PHCs - Petroleum hydrocarbons.

Exposure Parameters

Body Weight:	24	gm	0.024	kg
Food Ingestion Rate (FIR):			0.0049	kg (dry wt)/day
FIR_Plants (100%)			0.0049	kg (dry wt)/day
FIR_Soil (3.3%)			0.00016	kg (dry wt)/day
Exposure Duration (ED):			0.5	unitless
Site Utilization Factor (SUF):			0.22	unitless
Home range:			17	acres
Exposure area:			3.7	acres
Water Ingestion Rate:			0.0048	L/day

TABLE H-21

ECOLOGICAL HAZARD CALCULATIONS FOR DARK-EYED JUNCO
Site SS11
TATALINA LONG RANGE RADAR STATION, ALASKA

	Exposure Point Concentration	Exposure Point Concentration		Exposure Point Concentration	Ingestion Dose ^{c, d}	Toxicity Reference Value	Ecological Hazard
COPEC	C _{SOIL} (mg/kg)	C _{WATER} (mg/L)	BCF _{S-P} ^a	C _{PLANT} ^b (mg/kg)	(mg/kg)	(mg/kg-day)	HQ

Non-PHCs

^a The soil-to-plant bioaccumulation factor (BAF_{S-P}) was derived from Travis & Arms (1998) for organics and EcoSSL (USEPA 2007) for inorganics.

^b The plant concentration (C_{PLANT}) was calculated from the soil concentration and the soil-to-plant bioconcentration factor (BCF_{S-P}) (USEPA 1999a).

^c Ingestion doses were calculated as described in Appendix G.

^d The ingestion dose for the dark-eyed junco accounts for exposure to soil based upon foraging habits.

TABLE H-22

ECOLOGICAL HAZARD CALCULATIONS FOR AMERICAN ROBIN
Site SS11
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C _{SOIL} (mg/kg)	Exposure Point Concentration C _{WATER} (mg/L)	BCF _{S-P} ^a	Exposure Point Concentration C _{PLANT} ^b (mg/kg)	BCF _{S-I} ^c	Exposure Point Concentration C _{INVERTS} ^d	Ingestion Dose ^{e,f} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs									
Inorganics									
Antimony	1.0	0	0.20	0.20	1.0	1.0	9.3E-03	2.2E+00	0.0043
Arsenic	10	0	0.040	0.40	Regression	1.2	2.2E-02	2.2E+00	0.010
Barium	1,256	0.032	0.16	196	0.091	114	2.9E+00	2.3E+01	0.13
Cadmium	0.37	0	0.55	0.20	Regression	3.7	2.9E-02	2.7E+00	0.011
Chromium	40	0.0042	0.041	1.7	0.31	12	1.4E-01	2.0E+00	0.073
Cobalt	20	0	0.0075	0.15	0.12	2.4	4.1E-02	1.6E+01	0.0026
Copper	58	0	0.40	23	0.52	30	3.7E-01	5.2E+01	0.0071
Lead	120	0	Regression	3.9	Regression	38	4.4E-01	3.0E+00	0.14
Manganese	1,080	0	0.079	85	Regression	52	1.9E+00	1.2E+03	0.0016
Molybdenum	3.0	0	0.25	0.75	0.95	2.9	2.7E-02	7.2E+00	0.0038
Nickel	40	0	Regression	1.7	na	0	5.1E-02	1.4E+02	0.00035
Selenium	0.74	0	Regression	0.37	Regression	0.75	7.7E-03	9.3E-01	0.0082
Thallium	0.30	0	0.0040	0.0012	na	0	3.4E-04	na	--
Tin	11	0	0.030	0.33	na	0	1.3E-02	7.9E+00	0.0017
Titanium	1,460	0	0.0055	8.0	na	0	1.7E+00	na	--
Vanadium	68	0	0.0055	0.37	0.042	2.9	9.9E-02	2.1E+01	0.0047
Zinc	91	0	Regression	59	Regression	376	3.1E+00	3.2E+01	0.098
Volatile Organic Compounds									
1,2,4-Trimethylbenzene	6.6	0	0.31	2.0	13	83	6.4E-01	na	--
1,3,5-Trimethylbenzene	1.9	0	0.41	0.79	8.4	16	1.3E-01	na	--
Acetone	11	0	28	310	5.1	56	1.4E+00	6.0E+04	0.000024
Carbon Disulfide	0	0.019	2.7	0	na	0	2.2E-04	na	--
Chloromethane	0	0.0011	12	0	na	0	1.2E-05	na	--
Ethylbenzene	0.076	0	0.59	0.044	6.6	0.50	4.0E-03	na	--
Isopropylbenzene	0.043	0	0.30	0.013	12	0.50	3.9E-03	na	--
m,p-Xylenes	0.15	0	0.61	0.091	7.3	1.1	8.8E-03	na	--
n-Butylbenzene	0.13	0	0.11	0.015	23	3.0	2.3E-02	na	--
o-Xylene	2.0	0	0.61	1.2	7.3	15	1.2E-01	na	--
p-Isopropyltoluene	0.077	0	0.30	0.023	12	0.90	7.0E-03	na	--
Trichlorofluoromethane	0.0034	0	1.3	0.0045	20	0.069	5.4E-04	na	--
Semivolatile Organic Compounds									
2,4-Dimethylphenol	25	0	1.8	45	0.87	22	3.4E-01	na	--
Benzoic Acid	0.37	0	3.2	1.2	18	6.8	5.5E-02	na	--
Dibenzofuran	267	0	0.16	43	2.1	568	4.7E+00	na	--
Phenol	16	0	5.5	88.8	0.4	7.0	3.6E-01	na	--
Polynuclear Aromatic Hydrocarbons									
2-Methylnaphthalene	3,697	0	0.23	841	4.4	16,267	1.3E+02	na	--
Acenaphthene	2,800	0	0.21	588	1.5	4,116	3.6E+01	na	--
Anthracene	2,230	0	0.10	231	2.4	5,397	4.4E+01	na	--

TABLE H-22

ECOLOGICAL HAZARD CALCULATIONS FOR AMERICAN ROBIN
Site SS11
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C _{SOIL} (mg/kg)	Exposure Point Concentration C _{WATER} (mg/L)	BCF _{S-P} ^a	Exposure Point Concentration C _{PLANT} ^b (mg/kg)	BCF _{S-I} ^c	Exposure Point Concentration C _{INVERTS} ^d	Ingestion Dose ^{e,f} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs									
Benzo(a)anthracene	950	0	0.018	17	1.6	1,510	1.3E+01	na	--
Benzo(a)pyrene	286	0	0.011	3.2	1.3	380	3.2E+00	na	--
Benzo(b)fluoranthene	705	0	0.018	12	2.6	1,832	1.5E+01	na	--
Benzo(g,h,i)perylene	229	0	0.0057	1.3	2.9	672	5.3E+00	na	--
Benzo(k)fluoranthene	166	0	0.011	1.9	2.6	432	3.5E+00	na	--
Chrysene	1,066	0	0.017	18	2.3	2,441	2.0E+01	na	--
Dibenz(a,h)anthracene	34	0	0.0049	0.16	2.3	78	6.3E-01	na	--
Fluoranthene	3,063	0	0.040	124	3.0	9,312	7.4E+01	na	--
Fluorene	1,744	0	0.15	259	9.6	16,690	1.3E+02	na	--
Indeno(1,2,3-cd)pyrene	103	0	0.0052	0.53	2.9	295	2.3E+00	na	--
Naphthalene	3,555	0	0.48	1,704	4.4	15,642	1.3E+02	na	--
Phenanthrene	5,177	0	0.10	530	1.7	8,904	7.5E+01	na	--
Pyrene	3,029	0	0.059	177	1.8	5,301	4.4E+01	na	--
Pesticides									
4,4'-DDT	0.76	0	0.0039	0.0030	Regression	6.6	5.0E-02	7.1E-03	7.1
delta-BHC	0.65	0	na	0	na	0	7.3E-04	3.7E+00	0.00020
Dieldrin	0.027	0	0.038	0.0010	15	0.40	3.0E-03	1.2E-01	0.026
Endrin	0.61	0	0.038	0.023	20	12	9.1E-02	5.6E-01	0.16
Endrin aldehyde	0.94	0	0.038	0.036	20	19	1.4E-01	5.6E-01	0.25
Endrin ketone	0.75	0	0.038	0.029	20	15	1.1E-01	5.6E-01	0.20
								HI	8.2
PHCs									
Diesel Range Organics (DRO)	79,575	0	0.0020	159	0.48	38,196	3.8E+02	na	--
Gasoline Range Organics (GRO)	7.1	0	0.16	1.1	2.2	16	1.3E-01	na	--
Residual Range Organics (RRO)	60,057	0	0.031	1,862	0.37	22,221	2.4E+02	na	--
								HI	0

Notes:

BCF_{S-P} - Bioconcentration factor from soil to plants.
 BCF_{S-I} - Bioconcentration factor from soil to invertebrates.
 COPEC - Chemical of potential ecological concern.
 HI - Hazard index.
 HQ - Hazard quotient.
 mg/kg - Milligrams per kilogram.
 mg/kg-day - Milligrams per kilogram per day.
 mg/L - Milligrams per liter.
 na - Not available.
 Non-PHCs - Non-petroleum hydrocarbons.

Exposure Parameters

Body Weight:	83.25	gm	0.08325	kg
Food Ingestion Rate (FIR):			0.0107	kg (dry wt)/day
FIR_Plants (30%)			0.0032	kg (dry wt)/day
FIR_Inverts (70%)			0.0075	kg (dry wt)/day
FIR_Soil (10.4%)			0.0011	kg (dry wt)/day
Exposure Duration (ED):			0.5	unitless
Site Utilization Factor (SUF):			0.17	unitless
Home range:			22	acres
Exposure area:			3.7	acres
Water Ingestion Rate:			0.011	L/day

TABLE H-22

ECOLOGICAL HAZARD CALCULATIONS FOR AMERICAN ROBIN
Site SS11
TATALINA LONG RANGE RADAR STATION, ALASKA

	Exposure Point Concentration	Exposure Point Concentration		Exposure Point Concentration		Exposure Point Concentration	Ingestion Dose ^{e,f}	Toxicity Reference Value	Ecological Hazard
COPEC	C _{SOIL} (mg/kg)	C _{WATER} (mg/L)	BCF _{S-P} ^a	C _{PLANT} ^b (mg/kg)	BCF _{S-I} ^c	C _{INVERTS} ^d	(mg/kg)	(mg/kg-day)	HQ

Non-PHCs

^a The soil-to-plant bioaccumulation factor (BAF_{S-P}) was derived from Travis & Arms (1998) for organics and EcoSSL (USEPA 2007) for inorganics.

^b The plant concentration (C_{PLANT}) was calculated from the soil concentration and the soil-to-plant bioconcentration factor (BCF_{S-P}) (USEPA 1999a).

^c The soil-to-invertebrate bioaccumulation factor (BAFS-I) was derived from Region 6 Draft SLERA Protocol for organics and EcoSSL (USEPA 2007) for inorganics.

^d The soil invertebrate concentration (C_{INVERT}) was calculated from the soil concentration and the soil-to-invertebrate bioaccumulation factor (BAFS-I) (USEPA 1999a).

^e Ingestion doses were calculated as described in Appendix G.

^f The ingestion dose for the American robin accounts for exposure to soil based upon foraging habits.

TABLE H-23

ECOLOGICAL HAZARD CALCULATIONS FOR NORTHERN SHRIKE
Site SS11
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C _{SOIL} (mg/kg)	Exposure Point Concentration C _{WATER} (mg/L)	BCF _{S-I} ^a	Exposure Point Concentration C _{INVERTS} ^b (mg/kg)	Ingestion Dose ^{c,d} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
Inorganics							
Antimony	1.0	0	1.0	1.0	9.3E-04	2.3E+00	0.00041
Arsenic	10	0	Regression	1.2	1.4E-03	2.3E+00	0.00062
Barium	1,256	0.032	0.091	114	1.4E-01	2.4E+01	0.0058
Cadmium	0.37	0	Regression	3.7	3.4E-03	2.8E+00	0.0012
Chromium	40	0.0042	0.31	12	1.2E-02	2.1E+00	0.0059
Cobalt	20	0	0.12	2.4	2.8E-03	1.7E+01	0.00017
Copper	58	0	0.52	30	2.9E-02	5.4E+01	0.00053
Lead	120	0	Regression	38	3.8E-02	3.2E+00	0.012
Manganese	1,080	0	Regression	52	7.9E-02	1.2E+03	0.000065
Molybdenum	3.0	0	0.95	2.9	2.7E-03	7.6E+00	0.00035
Nickel	40	0	na	0	1.2E-03	1.5E+02	0.0000078
Selenium	0.74	0	Regression	0.75	6.9E-04	9.8E-01	0.00071
Thallium	0.30	0	na	0	8.9E-06	na	--
Tin	11	0	na	0	3.3E-04	8.3E+00	0.000039
Titanium	1,460	0	na	0	4.3E-02	na	--
Vanadium	68	0	0.042	2.9	4.6E-03	2.2E+01	0.00021
Zinc	91	0	Regression	376	3.4E-01	3.4E+01	0.010
Volatile Organic Compounds							
1,2,4-Trimethylbenzene	6.6	0	13	83	7.5E-02	na	--
1,3,5-Trimethylbenzene	1.9	0	8.4	16	1.5E-02	na	--
Acetone	11	0	5.1	56	5.1E-02	6.3E+04	0.00000080
Carbon Disulfide	0	0.019	na	0	1.6E-05	na	--
Chloromethane	0	0.0011	na	0	9.3E-07	na	--
Ethylbenzene	0.076	0	6.6	0.50	4.6E-04	na	--
Isopropylbenzene	0.043	0	12	0.50	4.5E-04	na	--
m,p-Xylenes	0.15	0	7.3	1.1	9.9E-04	na	--
n-Butylbenzene	0.13	0	23	3.0	2.7E-03	na	--
o-Xylene	2.0	0	7.3	15	1.3E-02	na	--
p-Isopropyltoluene	0.077	0	12	0.90	8.2E-04	na	--
Trichlorofluoromethane	0.0034	0	20	0.069	6.3E-05	na	--
Semivolatile Organic Compounds							
2,4-Dimethylphenol	25	0	0.87	22	2.0E-02	na	--
Benzoic Acid	0.37	0	18	6.8	6.1E-03	na	--
Dibenzofuran	267	0	2.1	568	5.2E-01	na	--
Phenol	16	0	0.43	7.0	6.7E-03	na	--
Polynuclear Aromatic Hydrocarbons							
2-Methylnaphthalene	3,697	0	4.4	16,267	1.5E+01	na	--
Acenaphthene	2,800	0	1.5	4,116	3.8E+00	na	--
Anthracene	2,230	0	2.4	5,397	4.9E+00	na	--

TABLE H-23

ECOLOGICAL HAZARD CALCULATIONS FOR NORTHERN SHRIKE
Site SS11
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C _{SOIL} (mg/kg)	Exposure Point Concentration C _{WATER} (mg/L)	BCF _{S-I} ^a	Exposure Point Concentration C _{INVERTS} ^b (mg/kg)	Ingestion Dose ^{c,d} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs							
Benzo(a)anthracene	950	0	1.6	1,510	1.4E+00	na	--
Benzo(a)pyrene	286	0	1.3	380	3.5E-01	na	--
Benzo(b)fluoranthene	705	0	2.6	1,832	1.7E+00	na	--
Benzo(g,h,i)perylene	229	0	2.9	672	6.1E-01	na	--
Benzo(k)fluoranthene	166	0	2.6	432	3.9E-01	na	--
Chrysene	1,066	0	2.3	2,441	2.2E+00	na	--
Dibenz(a,h)anthracene	34	0	2.3	78	7.1E-02	na	--
Fluoranthene	3,063	0	3.0	9,312	8.5E+00	na	--
Fluorene	1,744	0	9.6	16,690	1.5E+01	na	--
Indeno(1,2,3-cd)pyrene	103	0	2.9	295	2.7E-01	na	--
Naphthalene	3,555	0	4.4	15,642	1.4E+01	na	--
Phenanthrene	5,177	0	1.7	8,904	8.2E+00	na	--
Pyrene	3,029	0	1.8	5,301	4.9E+00	na	--
Pesticides							
4,4'-DDT	0.76	0	Regression	6.6	5.9E-03	7.5E-03	0.79
delta-BHC	0.65	0	na	0	1.9E-05	3.9E+00	0.0000049
Dieldrin	0.027	0	15	0.40	3.6E-04	1.2E-01	0.0029
Endrin	0.61	0	20	12	1.1E-02	5.9E-01	0.018
Endrin aldehyde	0.94	0	20	19	1.7E-02	5.9E-01	0.028
Endrin ketone	0.75	0	20	15	1.3E-02	5.9E-01	0.023
						HI	0.9
PHCs							
Diesel Range Organics (DRO)	79,575	0	0.48	38,196	3.7E+01	na	--
Gasoline Range Organics (GRO)	7.1	0	2.2	16	1.4E-02	na	--
Residual Range Organics (RRO)	60,057	0	0.37	22,221	2.2E+01	na	--
						HI	0

Notes:

BCF_{S-I} - Bioconcentration factor from soil to invertebrates.
COPEC - Chemical of potential ecological concern.
HI - Hazard index.
HQ - Hazard quotient.
mg/kg - Milligrams per kilogram.
mg/kg-day - Milligrams per kilogram per day.
mg/L - Milligrams per liter.
na - Not available.
Non-PHCs - Non-petroleum hydrocarbons.
PHCs - Petroleum hydrocarbons.

Exposure Parameters

Body Weight:	67.5	gm	0.0675	kg
Food Ingestion Rate (FIR):			0.0105	kg (dry wt)/day
FIR_Inverts (100%)			0.0105	kg (dry wt)/day
FIR_Soil (3.3%)			0.00035	kg (dry wt)/day
Exposure Duration (ED):			0.5	unitless
Site Utilization Factor (SUF):			0.012	unitless
Home range:			320	acres
Exposure area:			3.7	acres
Water Ingestion Rate:			0.0097	L/day

TABLE H-23
ECOLOGICAL HAZARD CALCULATIONS FOR NORTHERN SHRIKE
Site SS11
TATALINA LONG RANGE RADAR STATION, ALASKA

	Exposure Point Concentration	Exposure Point Concentration		Exposure Point Concentration	Ingestion Dose ^{c, d}	Toxicity Reference Value	Ecological Hazard
COPEC	C _{SOIL} (mg/kg)	C _{WATER} (mg/L)	BCF _{S-I} ^a	C _{INVERTS} ^b (mg/kg)	(mg/kg)	(mg/kg-day)	HQ

Non-PHCs

^a The soil-to-invertebrate bioaccumulation factor (BAFS-I) was derived from Region 6 Draft SLERA Protocol for organics and EcoSSL (USEPA 2007) for inorganics.

^b The soil invertebrate concentration (CINVERT) was calculated from the soil concentration and the soil-to-invertebrate bioaccumulation factor (BAFS-I) (USEPA 1999a).

^c Ingestion doses were calculated as described in Appendix G.

^d The ingestion dose for the Northern shrike accounts for exposure to soil based upon foraging habits.

TABLE H-24

ECOLOGICAL HAZARD CALCULATIONS FOR MALLARD
Site SS11
TATALINA LONG RANGE RADAR STATION, ALASKA

COPEC	Exposure Point Concentration C _{SEDIMENT} (mg/kg)	Exposure Point Concentration C _{WATER} (mg/L)	BCF _{S-P} ^a	Exposure Point Concentration C _{PLANT} ^b (mg/kg)	BCF _{S-I} ^c	Exposure Point Concentration C _{INVERTS} ^d	Ingestion Dose ^{e,f} (mg/kg)	Toxicity Reference Value (mg/kg-day)	Ecological Hazard HQ
Non-PHCs									
Inorganics									
Arsenic	8.8	0	0.040	0.35	Regression	1.1	7.9E-07	1.1E+00	0.00000071
Barium	150	0.032	0.156	23	0.091	14	3.0E-05	1.2E+01	0.0000025
Chromium	0	0.0042	0.041	0	0.31	0	5.9E-09	1.0E+00	0.000000058
Selenium	4.7	0	Regression	2.8	Regression	2.9	3.3E-06	4.8E-01	0.0000068
Volatile Organic Compounds									
Carbon Disulfide	0	0.019	2.7	0	na	0	2.7E-08	na	--
Chloromethane	0	0.0011	12	0	na	0	1.6E-09	na	--
Pesticides									
4,4'-DDT	0.0057	0	0.0039	0.000022	Regression	0.094	1.1E-08	3.7E-03	0.0000029
								HI	0.00001
PHCs									
Residual Range Organics (RRO)	342	0	0.031	11	0.37	127	3.7E-05	na	--
								HI	0

Notes:BCF_{S-P} - Bioconcentration factor from soil to plants.BCF_{S-I} - Bioconcentration factor from soil to invertebrates.

COPEC - Chemical of potential ecological concern.

HI - Hazard index.

HQ - Hazard quotient.

mg/kg - Milligrams per kilogram.

mg/kg-day - Milligrams per kilogram per day.

mg/L - Milligrams per liter.

na - Not available.

Non-PHCs - Non-petroleum hydrocarbons.

PHCs - Petroleum hydrocarbons.

Exposure Parameters

Body Weight:	1134	gm	1.134	kg
Food Ingestion Rate (FIR):	0.051		0.051	kg (dry wt)/day
FIR_Plants (90%)	0.046		0.046	kg (dry wt)/day
FIR_Inverts (10%)	0.0051		0.0051	kg (dry wt)/day
FIR_Soil (3.3%)	0.0017		0.0017	kg (dry wt)/day
Exposure Duration (ED):	0.5		0.5	unitless
Site Utilization Factor (SUF):	0.000049		0.000049	unitless
Home range:	75,076		75,076	acres
Exposure area:	3.7		3.7	acres
Water Ingestion Rate:	0.064		0.064	L/day

^a The soil-to-plant bioaccumulation factor (BAF_{S-P}) was derived from Travis & Arms (1998) for organics and EcoSSL (USEPA 2007) for inorganics.^b The plant concentration (C_{PLANT}) was calculated from the soil concentration and the soil-to-plant bioconcentration factor (BCF_{S-P}) (USEPA 1999a).^c The soil-to-invertebrate bioaccumulation factor (BAFS-I) was derived from Region 6 Draft SLERA Protocol for organics and EcoSSL (USEPA 2007) for inorganics.^d The soil invertebrate concentration (C_{INVERT}) was calculated from the soil concentration and the soil-to-invertebrate bioaccumulation factor (BAFS-I) (USEPA 1999a).^e Ingestion doses were calculated as described in Appendix G.^f The ingestion dose for the mallard accounts for exposure to sediment based upon foraging habits.