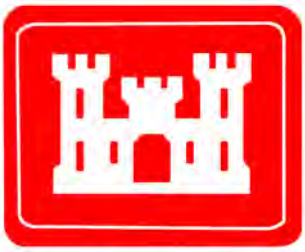
FINAL

SUPPLEMENTAL BASELINE HUMAN HEALTH RISK ASSESSMENT

FOR

LOAD LINE 1 ALTERNATIVE RECEPTORS AT THE RAVENNA ARMY AMMUNITION PLANT, RAVENNA, OHIO



US Army Corps of Engineers®

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DELIVERY ORDER 0001

July 2004

Shaw® Shaw E & I

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Supplemental Baseline Human Health Risk Assessment for Load Line 1 Alternative Receptors at the Ravenna Army Ammunition Plant, Ravenna, Ohio

July 2004

Prepared for

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contributed to the preparation of this document and should not be considered eligible contractors for its review.

CONTRACTOR STATEMENT OF INDEPENDENT TECHNICAL REVIEW

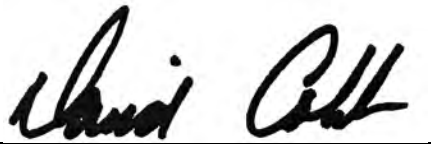
Science Applications International Corporation (SAIC) has completed the Final Report for the *Supplemental Baseline Human Health Risk Assessment for Load Line 1 Alternative Receptors at the Ravenna Army Ammunition Plant, Ravenna, Ohio*. Notice is hereby given that an independent technical review has been conducted that is appropriate to the level of risk and complexity inherent in the project. During the independent technical review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of data quality objectives; technical assumptions; methods, procedures, and materials to be used; the appropriateness of data used and level of data obtained; and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing Corps policy.

Sharon K Robers — 6/25/04

Sharon Robers, SAIC — Date
Study/Design Team Leader

Sam Stinnette — 6/25/04

Sam Stinnette, SAIC — Date
Technical Reviewer

 — 6/25/04

David Cobb, Shaw E&I Inc. — Date
Project Manager

Significant concerns and the explanation of the resolution are as follows:

> Internal SAIC Independent Technical Review comments are recorded on a Document Review Record per SAIC quality assurance procedure QAAP 3.1. This Document Review Record is maintained in the project file. Changes to the report addressing the comments have been verified by the Study/Design Team Leader.

As noted above, all concerns resulting from independent technical review of the project have been considered.

Mike Fitzgerald — 6/29/04

Principal w/ A-E firm — Date

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FIGURES

TABLES

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ACRONYMS

AOC	area of concern
bgs	below ground surface
BHHRA	Baseline Human Health Risk Assessment
COC	chemical of concern
COPC	chemical of potential concern
cPAH	carcinogenic polycyclic aromatic hydrocarbon
CSF	cancer slope factor
DAD	dermally absorbed dose
DDE	dichlorodiphenyldichloroethylene
DLF	dust-loading factor
DNT	dinitrotoluene
DQA	data quality assessment
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
EU	exposure unit
FS	feasibility study
FWHHRAM	Facility-wide Human Health Risk Assessor Manual
GAF	gastrointestinal absorption factor
HEAST	Health Effects Assessment Summary Tables
HI	hazard index
HQ	hazard quotient
IEUBK	Integrated Exposure Uptake Biokinetic (model)
ILCR	incremental lifetime cancer risk
IRIS	Integrated Risk Information System
LOAEL	lowest-observed-adverse-effect level
MDC	maximum detected concentration
MDL	method detection limit
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NOAEL	no-observed-adverse-effect level
OHARNG	Ohio Army National Guard
OSC	Office of Species Conservation
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PEF	particulate emission factor
PRG	preliminary remediation goal
QA	Quality Assurance
QC	Quality Control
RAGS	*Risk Assessment Guidance for Superfund*
RDA	recommended daily allowance
RDI	recommended daily intake
RDX	hexahydro-1,3,5-trinitro-1,3,5-triazine
RfC	reference concentration
RfD	reference dose
RGO	remedial goal option
RI	Remedial Investigation
RME	reasonable maximum exposure
RTLS	Ravenna Training and Logistics Site
RVAAP	Ravenna Army Ammunition Plant

SVOC	semivolatile organic compound
TEF	toxicity equivalency factor
THI	target hazard index
TNT	2,4,6-trinitrotoluene
TR	target risk
UCL_{95}	95% upper confidence limit
VOC	volatile organic compound
WOE	weight of evidence

EXECUTIVE SUMMARY

This Supplemental Baseline Human Health Risk Assessment (BHHRA) was conducted to evaluate risks and hazards associated with contaminated media at the Ravenna Army Ammunition Plant (RVAAP) Load Line 1 area of concern (AOC) for three potential future use scenarios: National Guard use, recreational use, and residential use. Results are presented for all scenarios and exposure pathways. This Supplemental BHHRA is a supplement to the BHHRA presented in the *Final Phase II Remedial Investigation Report for Load Line I at the Ravenna Army Ammunition Plant, Ravenna, Ohio* (SAIC 2004) and reflects recent land use decisions by the Ohio Army National Guard and release of RVAAP's Facility-wide Human Health Risk Assessor Manual (USACE 2004). The following steps were used to generate conclusions regarding human health risks and hazards associated with contaminated media at Load Line 1:

- identification of chemicals of potential concern (COPCs),
- calculation of risks and hazards,
- identification of chemicals of concern (COCs), and
- calculation of remedial goal options (RGOs).

Risks and hazards are evaluated and RGOs are calculated for National Guard receptors (Trainee, Security Guard/Maintenance Worker, and Fire/Dust Suppression Worker), recreational receptors (Hunter/Trapper/Fisher), and residential receptors (adult and child Resident Subsistence Farmer). Results are summarized below and in Table ES-1.

GROUNDWATER

Arsenic and manganese are identified as COCs for both the National Guard Trainee (arsenic only) and the Resident Subsistence Farmer scenarios. Arsenic and manganese are naturally present in groundwater in the Ravenna area. The background risks and hazards for arsenic and manganese are similar to the estimated site-related risks and hazards.

Groundwater is not currently used at Load Line 1 but is evaluated in this BHHRA for potential future exposure. Five COCs were identified for the National Guard exposure to groundwater: 2,4-dinitrotoluene (DNT); 2,6-DNT; hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX); 4,4'-dichlorodiphenyldichloroethylene; and arsenic. In addition to these five, two additional COCs were identified for the residential exposure to groundwater: 2,4,6-trinitrotoluene (TNT) and manganese.

SURFACE WATER AND SEDIMENT

Arsenic is identified as the only COC for both National Guard receptors at Outlet C and Charlie's Pond. Arsenic is identified as the only COC for the National Guard Trainee and for the Resident Subsistence Farmer at Outlet C and Charlie's Pond and at Outlets D, E, and F, and Criggy's Pond. No surface water COCs are identified for the Hunter/Trapper/Fisher at either of these exposure units (EUs). The National Guard Security Guard/Maintenance Worker is not exposed to surface water. Arsenic was identified as a COC for waterfowl ingestion by the Hunter/Trapper/Fisher at both of these EUs and for fish ingestion at both of these EUs.

Arsenic and manganese are identified as COCs in sediment for National Guard Trainee use of the Outlet C and Charlie's Pond EU. No sediment COCs are identified for the National Guard Fire/Dust

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Table ES-1. Receptor/Medium/Exposure Unit Combinations with COCs at Load Line 1

COC	Groundwater		Surface Water[a]				Sediment[a]				Surface Soil[b]					Subsurface Soil
	National Guard Trainee	Resident Farmer[c]	National Guard			Resident Farmer[c]	National Guard			Resident Farmer[c]	National Guard				Resident Farmer[c]	Resident Farmer[c]
			Trainee	Fire/Dust Control	Hunt/ Trap/Fish		Trainee	Fire/Dust Control	Hunt/ Trap/Fish		Trainee	Sec. Guard/ Maint. Worker	Fire/Dust Control	Hunt/ Trap/Fish		
Metals																
Antimony					E[d]					E					3	13
Arsenic	LL1	LL1	C,E	C	C[d],E[d]	C[e],E[e]	A,C,E			A,C,E	3,4,13,14,CH,P	3,4,13,14,CH,P			3,4,13,14,CH,P	
Cadmium							A									
Manganese		LL1					C,E			E	3,4,13,14,CH,P					
Explosives																
2,4,6-Trinitrotoluene		LL1									4	4			4,13	4
2,4-Dinitrotoluene	LL1	LL1								A					13	
2,6-Dinitrotoluene	LL1	LL1													4	
RDX	LL1	LL1									4	4,14			4,14	4
PCBs																
PCB-1254					C[d]					A,C	3,4,14	3,4,13,14	4	4	3,4,13,14	
Pesticides																
4,4'-DDE	LL1	LL1														
Dieldrin												4			3,4	
PAHs																
Benz(*a*)anthracene										A	3	3			3,4,14	
Benzo(*a*)pyrene					C[d]		A	A	A	A,C	3	3,4,13,14	3	3	3,4,13,14,CH	
Benzo(*b*)fluoranthene							A			A	3	3			3,4,14	
Dibenz(*a,h*)anthracene							A			A	3	3,14			3,4,14	
Indeno(1,2,3-*cd*)pyrene										A		3			3,14	

Groundwater Exposure Unit
LL1 = Load Line 1 Bedrock aquifer.

Surface Water and Sediment Exposure Units
C = Outlet C and Charlie's Pond.
A = Outlets A and B.
E = Outlets D, E, and F, and Criggy's Pond.

Soil Exposure Units
3 = CB-3 and -801.
4 = CB-4/4A and CA-6/6A.
13 = CB-13 and -10.
14 = CB-14, CB-17, and CA-15.
CH = Change Houses (CB-12, -23, -8, -22).
P = Perimeter Area.

[a] Chemicals listed are for direct contact with surface water or sediment unless otherwise noted.
[b] Surface soil is defined as 0 to 3 ft below ground surface (bgs) for the National Guard Trainee and 0 to 1 ft bgs for all other receptors.
[c] Results for both adult and child Resident Subsistence Farmer.
[d] Chemical is a COC for waterfowl/fish ingestion only.
[e] Chemical is a COC for both direct contact and waterfowl/fish ingestion.
COC = Chemical of concern.
DDE = Dichlorodiphenyldichloroethylene.
PAH = Polycyclic aromatic hydrocarbon.
PCB = Polychlorinated biphenyl.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.

Suppression Worker and Hunter/Trapper/Fisher at this EU. Arsenic, polychlorinated biphenyl (PCB) 1254, and benzo(*a*)pyrene are identified as COCs for residential use at this EU. Benzo(*a*)pyrene, PCB-1254, and arsenic are COCs for waterfowl ingestion by the Hunter/Trapper/Fisher at Outlet C and Charlie's Pond.

Various polycyclic aromatic hydrocarbons (PAHs) [benzo(*a*)pyrene, benzo(*b*)fluoranthene, and dibenz(*a,h*)anthracene], arsenic, and cadmium are identified as COCs at the Outlets A and B EU for the National Guard receptors. Benzo(*a*)pyrene is the only COC identified at the Outlets A and B EU for Recreational use. Arsenic; 2,4-DNT; PCB-1254; and several PAHs [benz(*a*)anthracene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, dibenz(*a,h*)anthracene, and indeno(1,2,3-*cd*)pyrene] are identified as COCs for the Resident Subsistence Farmer at this EU.

Arsenic and manganese are identified as COCs for the National Guard Trainee at the Outlets D, E, and F, and Criggy's Pond EU. No sediment COCs are identified for the National Guard Fire/Dust Suppression Worker and Hunter/Trapper/Fisher at this EU. Antimony, arsenic, and manganese are identified as COCs for residential use at this EU. Arsenic and antimony are COCs for waterfowl ingestion by the Hunter/Trapper/Fisher at this AOC.

SOIL

Potential human health risks/hazards were evaluated for exposure to COPCs in soil at seven EUs. Direct contact (i.e., ingestion, dermal contact, and inhalation) with shallow surface soil [0 to 1 ft below ground surface (bgs)] was evaluated for the National Guard Security Guard/Maintenance Worker and Fire/Dust Suppression Worker, recreational Hunter/Trapper/Fisher, and Resident Subsistence Farmer. Direct contact with deep surface soil (0 to 3 ft bgs) was evaluated for the National Guard Trainee. Direct contact with subsurface soil (1 to 3 ft bgs) and indirect contact (i.e., ingestion of food) were evaluated for the Resident Subsistence Farmer.

Two metals (arsenic and manganese), two explosives (TNT and RDX), five PAHs [benz(*a*)anthracene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, dibenz(*a,h*)anthracene, and indeno(1,2,3-*cd*)pyrene], and PCB-1254 were identified as COCs for the National Guard receptors at several EUs. Only the Water Tower EU had no COCs for these receptors. Two COCs [benzo(*a*)pyrene at Buildings CB-3 and -801 and PCB-1254 at Buildings CB-4/4A and CA-6/6A] were identified for the recreational receptors.

Two metals (arsenic and antimony), four explosives (TNT; 2,4-DNT; 2,6-DNT; and RDX), five PAHs [benz(*a*)anthracene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, dibenz(*a,h*)anthracene, and indeno(1,2,3-*cd*)pyrene], dieldrin, and PCB-1254 were identified as COCs for direct exposure by the Resident Subsistence Farmer at several EUs. Only the Water Tower EU had no COCs for these receptors. Additional metals, explosives, PAHs, and pesticides were identified for indirect exposure to surface soil via ingestion of vegetables, beef, and dairy products by the Resident Subsistence Farmer.

Two explosives (2,4,6-TNT and RDX) were identified as COCs in subsurface soil for the Resident Subsistence Farmer at Buildings CB-4/4A and CA-6/6A. Antimony is the only subsurface soil COC identified at Buildings CB-13 and -10.

1.0 INTRODUCTION

This Supplemental Baseline Human Health Risk Assessment (BHHRA) documents the potential health risks to humans resulting from exposure to contamination within the Load Line 1 Area of Concern (AOC) at the Ravenna Army Ammunition Plant (RVAAP) in Ravenna, Ohio. Load Line 1 was in operation from 1941 until 1971. During World War II and the Korean War, Load Line 1 was used to melt and load 2,4,6-trinitrotoluene (2,4,6-TNT) and Composition B explosives into large-caliber shells. The load lines were rehabilitated in 1951 (USATHAMA 1978) to remove and replace soils contaminated with accumulated explosives and to remove and replace contaminated overhead storm drains. More recently, Load Line 1 was the site of munitions rehabilitation activities following the Vietnam War. Load Line 1 buildings were recently demolished and removed. Floor slabs and most below-grade infrastructure remain in place. This risk assessment is prepared as a supplement to the *Final Phase II RI Report for Load Line 1 at the Ravenna Army Ammunition Plant, Ravenna, Ohio* (Final LL1 RIR) (SAIC 2004). This Supplemental BHHRA is a result of recent land use decisions by the Ohio Army National Guard (OHARNG) and release of the RVAAP's Facility-wide Human Health Risk Assessor Manual (FWHHRAM) (USACE 2004).

The objective of this baseline risk assessment is to evaluate and document the potential risks to human health associated with predicted future exposures to contaminants if no remedial action is taken. Thus, this assessment represents the risks for the "no-action" alternative in a feasibility study (FS).

The Load Line 1 BHHRA is conducted per the FWHHRAP (USACE 2004). The methodology presented in the FWHHRAM is based on *Risk Assessment Guidance for Superfund* (RAGS) (EPA 1989, 1991, and 2002a) and additional methodology taken from *Dermal Exposure Assessment: Principles and Applications* (EPA 1992a); *Exposure Factors Handbook* (EPA 1997a); Integrated Risk Information System (IRIS) (EPA 2004, updated approximately monthly); and Health Effects Assessment Summary Tables (HEAST) (EPA 1997b). The inorganic and organic chemicals of potential concern (COPCs) found in the various environmental media are quantitatively analyzed (when possible) to characterize the potential risks to human health from exposure to these contaminants. The results of the BHHRA are used to (1) document and evaluate risks to human health; (2) determine the need, if any, for remedial action; and (3) identify chemicals of concern (COCs) that may require the development of chemical-specific remediation levels. This Load Line 1 BHHRA evaluates potential risks from exposure to the following environmental media: surface soil (shallow and deep), subsurface soil, sediment, surface water, and groundwater.

This risk assessment is organized into six major sections. The screening process used to identify COPCs is discussed in Chapter 2.0. The exposure assessment, which is performed to identify the exposure pathways by which receptors may be exposed to contaminants and calculate potential intakes, is presented in Chapter 3.0. The toxicity assessment for the Load Line 1 COPCs is presented in Chapter 4.0. The results of the risk characterization are presented in Chapter 5.0. Remedial goal options (RGOs) are presented in Chapter 6.0, and the conclusions of the BHHRA are summarized in Chapter 7.0.

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2.0 DATA EVALUATION

This chapter provides a description of the data evaluation process used to identify COPCs for Load Line 1. The purpose of the BHHRA data evaluation screening process is to eliminate chemicals for which no further risk evaluation is needed. Data collected at Load Line 1 are aggregated by environmental medium (i.e., groundwater, surface water, sediment, and soil). Soil data are further aggregated by depth interval—shallow surface soil from 0 to 1 ft below ground surface (bgs), deep surface soil from 0 to 3 ft bgs, and subsurface soil from 1 to 3 ft bgs. Due to the presence of shallow bedrock at Load Line 1, soil samples were taken to a maximum of 3 ft bgs.

Groundwater data are available from sampling events in 1996, 1999, and 2000. Only data from the 1999 and 2000 sampling events are included in the BHHRA since these data better represent current and potential future conditions than data that are greater than 5 years old. Qualitative evaluation of data from these various sampling events indicates that chemical concentrations are similar for all three sampling events. Groundwater data are aggregated as

1. Load Line 1 Building Area: all wells completed in sandstone bedrock.

2. Wells MW-64 and -65 located north and south of Criggy's Pond: wells completed in unconsolidated glacial sediment.

Surface water and sediment data are aggregated by conveyance. Five conveyances were identified

3. Outlets D, E, and F, and Criggy's Pond;
4. Outlet C and Charlie's Pond;
5. Outlets A and B;
6. the North area; and
7. Off-AOC.

Surface water and sediment from the Off-AOC aggregate are not included in this BHHRA because these samples represent contaminant migration from AOCs other than Load Line 1 and are more appropriately evaluated in a site-wide surface water evaluation. Surface water and sediment aggregates are shown in Figure 2-1. Samples collected from manholes, sanitary sewers, and storm sewers are not included in the BHHRA.

Soil data are aggregated into exposure units (EUs) based on historical use and geographic proximity as described in Section 4.1.2 of the Final LL1 RIR (SAIC 2004). The purpose of combining areas with similar use and geography is to characterize maximum concentrations of expected contamination. If areas with dissimilar histories are aggregated, there is a potential to screen out contaminants that should be carried through the process. The aggregates selected to divide the Load Line 1 AOC into EUs achieve the intent of being protective of human and environmental health. Soil data are grouped into the following seven EUs:

1. Buildings CB-3 and -801;
2. Buildings CB-4/4A and CA-6/6A;
3. Buildings CB-13 and -10;
4. Buildings CB-14, CB-17, and CA-15;
5. the Water Tower;
6. the Change Houses (CB-12, -23, -8, and -22); and
7. the Perimeter Area.

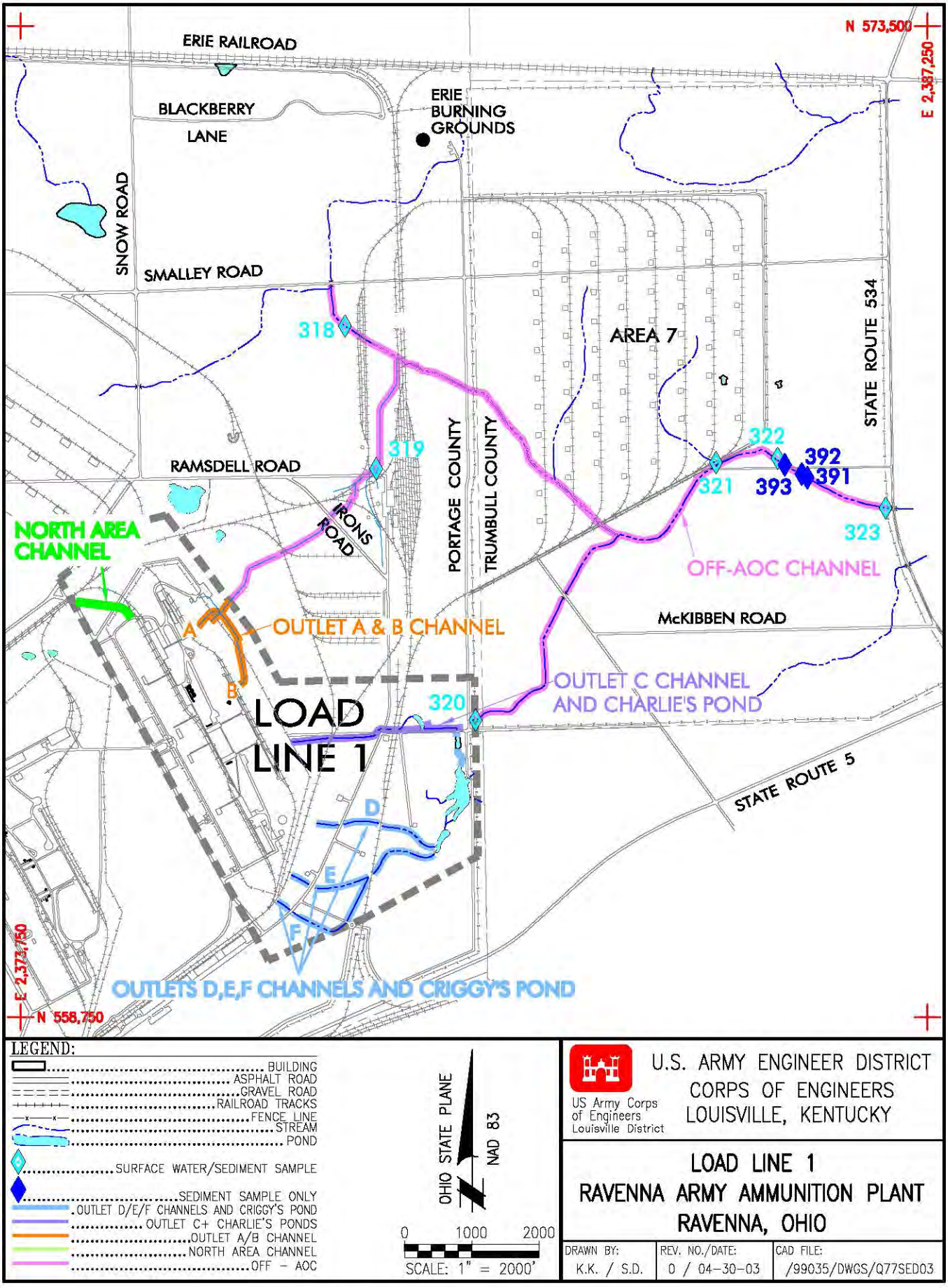

Figure 2-1. Load Line 1 Surface Water and Sediment Aggregates by Drainage Area

Soil aggregates are shown in Figure 2-2. Data from samples collected from railroad bed locations are not evaluated as part of the BHHRA. These samples are more representative of slag than soil. These railroad bed samples were collected at the same time as the Phase II RI but were collected for the purpose of evaluating the potential use of the area for clean, hard fill disposal rather than as part of the Phase II nature and extent characterization. Further, it is likely OHARNG will remove the slag to protect it for re-use prior to conducting any activity at the railroad bed. Further evaluation of the railroad beds is not required because the slag material is (1) highly weathered; (2) applied as a building material or in a similar manner (not disposal); (3) will likely remain intact at the load line (after removal of the slabs); and (4) no exposure pathway to the troops should occur. Although these samples are not included in the BHHRA, summary data are presented in Tables 2-1 and 2-2 for informational purposes; full presentation of the railroad bed sample data is included in the Final Load Line 1 RI Report (SAIC 2004).

Section 2.1 provides a summary of the COPC selection process and the data assumptions used during that process. Section 2.2 presents the results of the COPC screening process.

2.1 CHEMICAL OF POTENTIAL CONCERN SCREENING

This section provides a description of the screening process used to identify COPCs and the data assumptions used in the process.

COPCs are identified for each EU dataset for each medium. This data evaluation consists of five steps: (1) a data quality assessment (DQA), (2) frequency-of-detection/weight-of-evidence (WOE) screening, (3) screening of essential human nutrients, (4) risk-based screening, and (5) background screening.

1. **Data Quality Assessment** – Analytical results were reported by the laboratory in electronic form and loaded into a Load Line 1 database. Site data were extracted from the database so that only one result is used for each station and depth sampled. Quality control (QC) data, such as sample splits and duplicates, and laboratory re-analyses and dilutions, were not included in the determination of COPCs for this risk assessment. Field-screening data that were considered in the evaluation of nature and extent of contamination at Load Line 1 are not included in the dataset for the risk assessment. Samples rejected in the validation process are also excluded from the risk assessment. The percentage of rejected data is less than 1%. A complete summary of data quality issues is presented in the DQA (Appendix G) of the Final LL1 RIR (SAIC 2004).

2. **Frequency-of-Detection/Weight-of-Evidence Screen** – Each chemical for each environmental medium is evaluated to determine its frequency of detection. Chemicals that were never detected are eliminated as COPCs. For sample aggregations with at least 20 samples and a frequency of detection of less than 5%, a WOE approach is used to determine if the chemical is AOC-related. The magnitudes and locations (clustering) of the detections and potential source of the chemical were evaluated. If the detected results showed no clustering, the chemical is not a COPC in another medium at that location, the concentrations are not substantially elevated relative to the detection limit, and the chemical was not used in the area under investigation, then the chemical is considered spurious and is eliminated from further consideration. This screen is applied to all organic and inorganic chemicals with the exception of explosives and propellants. All detected explosives and propellants are included in the list of COPCs regardless of their frequency of detection.

3. **Essential Nutrients** – Chemicals that are considered essential nutrients (i.e., calcium, chloride, iodine, iron, magnesium, potassium, phosphorus, and sodium) are an integral part of the human food supply and are often added to foods as supplements. The U.S. Environmental Protection Agency

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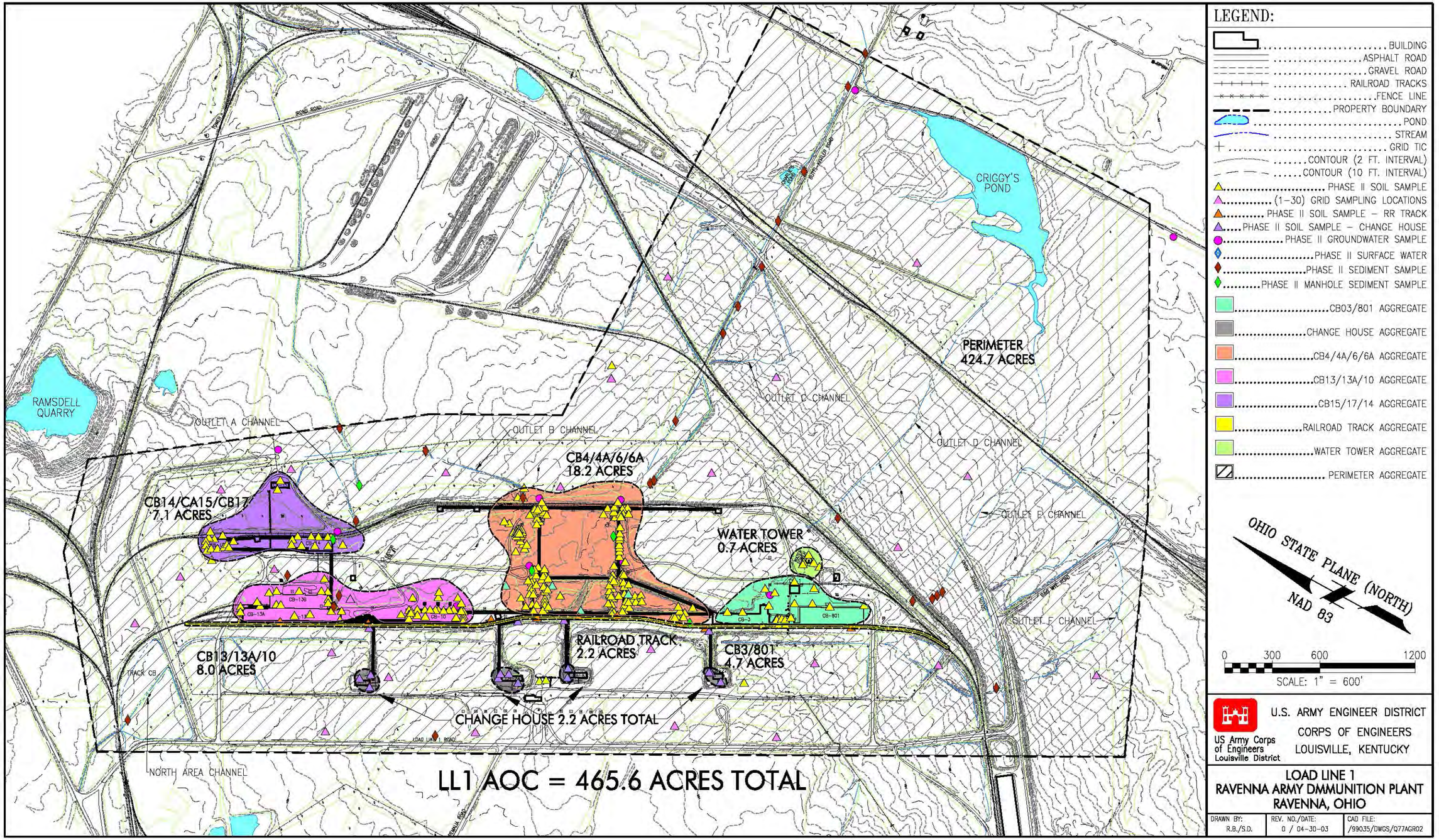

Figure 2-2. Load Line 1 Soil Aggregates

Table 2-1. Analytical Results for Load Line 1 Railroad Bed Slag Sampling Locations – Explosives and Propellants

Location		Railroad Bed Locations	Railroad Bed Locations	Railroad Bed Locations	Railroad Bed Locations	Railroad Bed Locations	Railroad Bed Locations	Railroad Bed Locations	Railroad Bed Locations
Station		LL1-238	LL1-240	LL1-241	LL1-241	LL1-242	LL1-242	LL1-243	LL1-243
Sample ID		LL11342	LL11340	LL11293	LL11339	LL11294	LL11338	LL11292	LL11337
Customer ID		LL1so-238-1342-SO	LL1so-240-1340-SO	LL1so-241-1293-SO	LL1so-241-1339-SO	LL1so-242-1294-SO	LL1so-242-1338-SO	LL1so-243-1292-SO	LL1so-243-1337-SO
Date		10/03/2000	10/03/2000	10/03/2000	10/03/2000	10/03/2000	10/03/2000	10/03/2000	10/03/2000
Depth (ft)		2 - 2	2 - 2	2 - 2	2 - 2	2 - 2	2 - 2	2 - 2	2 - 2
Field Type		Grab	Grab	Field Duplicate	Grab	Field Duplicate	Grab	Field Duplicate	Grab
Analyte	Units								
1,3,5-Trinitrobenzene	mg/kg	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
1,3-Dinitrobenzene	mg/kg	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,4,6-Trinitrotoluene	mg/kg	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,4-Dinitrotoluene	mg/kg	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,6-Dinitrotoluene	mg/kg	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2-Amino-4,6-dinitrotoluene	mg/kg	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2-Nitrotoluene	mg/kg	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
3-Nitrotoluene	mg/kg	0.25 U	0.25 U	0.25 U	0.17 J	0.25 U	0.25 U	0.25 U	0.25 U
4-Amino-2,6-dinitrotoluene	mg/kg	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
4-Nitrotoluene	mg/kg	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
HMX	mg/kg	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Nitrobenzene	mg/kg	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Nitrocellulose	mg/kg	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Nitroglycerin	mg/kg	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Nitroguanidine	mg/kg	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
RDX	mg/kg	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Tetryl	mg/kg	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U

HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.
ID = Identifier.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.
U = Not detected.

Table 2-2. Analytical Results for Load Line 1 Railroad Bed Slag Sampling Locations – Inorganics

Location Station Sample ID Customer ID Date Depth (ft) Field Type Analyte	Units	Railroad Bed Locations LL1-237 LL11343 LL1so-237-1343-SO 10/03/2000 2 - 2 Grab	Railroad Bed Locations LL1-238 LL11342 LL1so-238-1342-SO 10/03/2000 2 - 2 Grab	Railroad Bed Locations LL1-239 LL11341 LL1so-239-1341-SO 10/03/2000 2 - 2 Grab	Railroad Bed Locations LL1-240 LL11340 LL1so-240-1340-SO 10/03/2000 2 - 2	Railroad Bed Locations LL1-241 LL11293 LL1so-241-1293-SO 10/03/2000 2 - 2 Field Duplicate	Railroad Bed Locations LL1-241 LL11339 LL1so-241-1339-SO 10/03/2000 2 - 2 Grab
Cyanide	mg/kg	NA	NA	NA	NA	NA	NA
Chromium, hexavalent	mg/kg	NA	NA	NA	NA	NA	NA
Aluminum	mg/kg	6,470 =	3,720 =	5,720 =	3,100 =	3,320 =	4,510 =
Antimony	mg/kg	1 UJ	1.1 UJ	1.1 UJ	1.1 UJ	1.1 UJ	1.1 UJ
Arsenic	mg/kg	10.3 =	4.5 =	4.8 = Grab	4.7 =	4.5 =	3.6 =
Barium	mg/kg	30.7 =	34.6 =	58.5 =	26.2 =	38.3 =	54 =
Beryllium	mg/kg	0.24 U	0.24 J	0.41 J	0.25 U	0.29 U	0.38 J
Cadmium	mg/kg	0.073 J *	0.54 U	0.07 J *	0.54 U	0.051 J *	0.54 U
Calcium	mg/kg	2,970 =	6,060 J	12,200 J	2,980 =	5,680 =	12,400 J
Chromium	mg/kg	9.2 =	5.4 =	7.7 =	6.8 =	5.6 =	5.2 =
Cobalt	mg/kg	5.3 =	4.4 J	3.8 J	3.5 J	3.3 J	2.6 J
Copper	mg/kg	17.6 =	5.1 =	7.4 =	4.6 =	6.1 =	4.6 =
Iron	mg/kg	17,400 =	9,810 =	11,200 =	19,600 =	10,100 =	8,320 =
Lead	mg/kg	13.4 =	4 =	10.9 =	12.8 =	10.3 =	7.2 =
Magnesium	mg/kg	2,110 =	1,310 =	1,890 =	739 =	1,090 =	1,860 =
Manganese	mg/kg	298 =	497 =	660 =	765 =	553 =	758 =
Mercury	mg/kg	0.01 J	0.11 U	0.11 U	0.11 U	0.11 U	0.011 J
Nickel	mg/kg	12.8 =	7.6 =	7.5 =	7.7 =	6.1 =	5 =
Potassium	mg/kg	1,020 =	471 J	745 =	557 =	503 J	548 =
Selenium	mg/kg	0.52 U	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U
Silver	mg/kg	1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
Sodium	mg/kg	524 U	65.9 U	97.7 U	542 U	53.9 J	116 U
Thallium	mg/kg	0.46 J	0.54 U	0.23 J	0.36 J	0.33 J	0.27 J
Vanadium	mg/kg	11.7 =	6.5 =	8.3 =	7.4 =	6.3 =	6 =
Zinc	mg/kg	63.6 =	16.2 =	38 =	67.2 =	50.3 =	56.5 =

Table 2-2. Analytical Results for Load Line 1 Railroad Bed Slag Sampling Locations – Inorganics (continued)

Location Station Sample ID Customer ID Date Depth (ft) Field Type Analyte	Units	Railroad Bed Locations LL1-242 LL11294 LL1so-242-1294-SO 10/03/2000 2 - 2 Field Duplicate	Railroad Bed Locations LL1-242 LL11338 LL1so-242-1338-SO 10/03/2000 2 - 2 Grab	Railroad Bed Locations LL1-243 LL11292 LL1so-243-1292-SO 10/03/2000 2 - 2 Field Duplicate	Railroad Bed Locations LL1-243 LL11337 LL1so-243-1337-SO 10/03/2000 2 - 2 Grab	Railroad Bed Locations LL1-244 LL11336 LL1so-244-1336-SO 10/03/2000 2 - 2 Grab
Cyanide	mg/kg	NA	NA	NA	NA	NA
Chromium, hexavalent	mg/kg	NA	NA	NA	NA	NA
Aluminum	mg/kg	3,370 =	7,540 =	3,590 =	3,560 =	2,810 =
Antimony	mg/kg	1.1 UJ	1.1 UJ	1.1 UJ	1.1 UJ	1.1 UJ
Arsenic	mg/kg	4.9 =	4.7 =	6.6 =	5.1 =	4.8 =
Barium	mg/kg	32.7 =	51.1 =	37.2 =	39.9 =	31.6 =
Beryllium	mg/kg	0.3 U	0.77 =	0.31 U	0.29 J	0.24 J
Cadmium	mg/kg	0.055 J *	0.072 J *	0.091 J *	0.079 J *	0.1 J *
Calcium	mg/kg	4,940 =	23,100 J	4,880 =	5,370 J	3,220 J
Chromium	mg/kg	6.7 =	6.5 =	7 =	6 =	5.9 =
Cobalt	mg/kg	3.4 J	3.1 J	4.4 J	3.5 J	3.6 J
Copper	mg/kg	7.1 =	7.3 =	9.3 =	8.1 =	5.5 =
Iron	mg/kg	13,000 =	11,000 =	15,800 =	15,600 =	16,600 =
Lead	mg/kg	9.1 =	11.2 =	19 =	11 =	7.7 =
Magnesium	mg/kg	992 =	3,710 =	989 =	1,090 =	747 =
Manganese	mg/kg	569 =	767 =	583 =	619 =	781 =
Mercury	mg/kg	0.11 U	0.11 U	0.017 J	0.0095 J	0.11 U
Nickel	mg/kg	7.3 =	6.9 =	9.1 =	7.8 =	8.3 =
Potassium	mg/kg	657 =	635 =	603 =	544 J	544 =
Selenium	mg/kg	0.35 J	0.54 U	0.55 U	0.56 U	0.35 J
Silver	mg/kg	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
Sodium	mg/kg	546 U	147 U	555 U	67.4 U	54.7 U
Thallium	mg/kg	0.28 J	0.54 U	0.41 J	0.13 J	0.13 J
Vanadium	mg/kg	7.3 =	6.4 =	7.4 =	6.8 =	7.2 =
Zinc	mg/kg	31.9 =	33.4 =	52.3 =	45.3 =	99.6 = *

ID - Identifier.
NA - Not analyzed.
* - Exceeds site-wide background criteria.
U - Not detected.
= - Detected.
J - Estimated value less than reporting limits.

(EPA) recommends that these chemicals not be evaluated as COPCs so long as they are (1) present at low concentrations (i.e., only slightly elevated above naturally occurring levels) and (2) toxic at very high doses (i.e., much higher than those that could be associated with contact at the site). Recommended daily allowance (RDA) and recommended daily intake (RDI) values are available for seven of these metals. Based on these RDA/RDI values, a receptor ingesting 100 mg of soil per day would receive less than the RDA/RDI of calcium, magnesium, phosphorous, potassium, and sodium, even if the soil consisted of the pure mineral (i.e., soil concentrations > 1,000,000 mg/kg). Receptors ingesting 100 mg of soil per day would require soil concentrations of 1,500 mg/kg of iodine and 100,000 to 180,000 mg/kg of iron to meet their RDA/RDI for these metals. Concentrations of essential nutrients do not exceed these levels at Load Line 1; thus, these constituents are not addressed as COPCs.

4. **Risk-based Screen** – The objective of this evaluation is to identify COPCs that may pose a potentially significant risk to human health. The risk-based screening values are conservative values published by EPA. The maximum detected concentration (MDC) of each chemical in each environmental medium is compared against the appropriate risk-based screening value. Chemicals detected below these concentrations are screened from further consideration. The risk-based screening values for each environmental medium are described in Section 2.1.1. Detected chemicals without risk-based screening values are not eliminated from the COPC list.

5. **Background Screen** – For each inorganic constituent detected, concentrations in Load Line 1 samples are screened against available, naturally occurring background levels. This screening step, which applies only to the inorganics, is used to determine if detected inorganics are site related or naturally occurring. If the MDC of a constituent exceeds the background value, the constituent is considered AOC-related. All detected organic compounds are considered to be above background. Inorganic chemicals whose MDCs are below background levels are eliminated from the COPC list.

2.1.1 Risk-based Screening Values

The risk-based screening values are conservative values published by EPA.

- For surface soil and sediment, a conservative screen is performed using the most current residential preliminary remediation goals (PRGs) published by EPA Region 9 (EPA 2002a). To account for the potential effects of multiple chemicals, PRGs based on non-cancer endpoints are divided by 10. These screening values are very conservative [based on a 10^{-6} risk level and a hazard quotient (HQ) of 0.1]. For information purposes only, data from these same media are also compared against the Region 9 industrial soil PRGs. Region 9 PRGs can be found on the EPA Region 9 World Wide Web site (http://www.epa.gov/region09/waste/sfund/prg/index.html).

- Surface water and groundwater data are screened using the EPA Region 9 tap water PRGs, which are also available at http://www.epa.gov/region09/waste/sfund/prg/index.html.

2.1.2 Background Screening Values

The Load Line 1 Phase II RI does not include determination of Load Line 1-specific background data. Analytical results are screened against the final facility-wide background values for RVAAP, published in the *Final Phase II Remedial Investigation Report for Winklepeck Burning Grounds at Ravenna Army Ammunition Plant, Ravenna, Ohio* (USACE 2001). Background values for soil are available for two soil depths: surface (0 to 1 ft bgs) and subsurface (1 to 12 ft bgs). Soil data at Load Line 1 are aggregated into three depth intervals: shallow surface soil (0 to 1 ft bgs), deep surface soil (0 to 3 ft bgs), and subsurface

soil (1 to 3 ft bgs). The following background depth intervals are used for identifying COPCs in Load Line 1 soil.

- For shallow surface soil (0 to 1 ft bgs) the background screen is performed using background values for surface soil (0 to 1 ft bgs).

- For deep surface soil (0 to 3 ft bgs) the background screen is performed using background values for either surface soil (0 to 1 ft bgs) or subsurface soil (1 to 12 ft bgs), whichever is lower.

- For subsurface soil (1 to 3 ft bgs) the background screen is performed using background values for subsurface soil (1 to 12 ft bgs).

2.1.3 Chemical of Potential Concern Screening Assumptions

The dataset used to determine COPCs includes data collected from Phase II and some data collected from Phase I. Many Phase I soil sampling locations were excavated, graded over, or otherwise disturbed during building demolition activities at Load Line 1. Data from these sampling stations are not included in the dataset used for this BHHRA. Specific assumptions applied to these data can be found in Chapter 4.0, Nature and Extent of Contamination, of the Final LL1 RIR (SAIC 2004). The following assumptions, used in the development of COPCs for the BHHRA, are noted:

- Chemicals not detected in a medium are not considered to be COPCs.

- Physical chemical data (e.g., alkalinity, pH, etc.) are not considered to be COPCs for Load Line 1.

- Total chromium is evaluated conservatively by screening against the EPA Region 9 PRGs for hexavalent chromium. This is a conservative assumption since (1) chromium VI was analyzed for and was detected at lower concentrations than total chromium, (2) hexavalent chromium is more toxic than trivalent chromium, and (3) hexavalent chromium is a less commonly occurring form of the metal.

- Alpha-chlordane and gamma-chlordane are evaluated by screening against the EPA Region 9 PRGs for chlordane.

2.2 CHEMICAL OF POTENTIAL CONCERN SCREENING RESULTS

The COPC screening process and results are summarized in Appendix A for each medium and EU (Tables A-1 through A-6). These tables include

- summary statistics, including frequency of detection, range of detected concentrations, arithmetic average concentration, and upper 95% confidence limit (UCL_{95}) on the mean concentration;

- all screening values (background concentrations and PRGs, as appropriate); and

- final COPC status.

The datasets and COPCs for groundwater, surface water, sediment, shallow surface soil, and subsurface soil are the same for this supplemental BHHRA as those evaluated in the BHHRA included in the Draft Final Phase II RI Report for the Load Line 1 AOC (USACE 2002). The dataset and COPCs for deep surface soil are unique to this supplemental BHHRA.

3.0 EXPOSURE ASSESSMENT

The objectives of the exposure assessment are to estimate the magnitude, frequency, and duration of potential human exposure to COPCs. The four primary steps of the exposure assessment are to

1. characterize the proposed land use to identify the potentially exposed human receptors, their activity patterns, and any other characteristics that might increase or decrease their likelihood of exposure;

2. identify each exposure pathway by which a receptor may be exposed to the COPCs (e.g., surface water ingestion);

3. identify the concentrations of COPCs to which the receptors may be exposed; and

4. quantify each receptor's potential intake of each COPC.

The output of the exposure assessment is used in conjunction with the output of the toxicity assessment (Chapter 4.0) to quantify risks and hazards to receptors in the risk characterization (Chapter 5.0).

This chapter is organized in the following manner:

- define potential future land use and human receptors,

- identify exposure pathways associated with each land use/receptor combination,

- identify the exposure models and model parameter values used to quantify the potential exposures to each identified receptor, and

- quantify potential intakes.

3.1 LAND USE AND POTENTIAL RECEPTORS

Land use within the RVAAP is restricted access. OHARNG currently occupies parts of RVAAP and conducts training exercises. Personnel from OHARNG may occasionally travel through AOCs at RVAAP but generally restrict training to areas outside of AOCs. No training exercises are known to be currently conducted within Load Line 1. This BHHRA focuses on the potential future land use at Load Line 1.

Potential human receptors are identified for three future land uses: National Guard, Recreational, and Residential. National Guard use includes three receptor types: National Guard Trainee, National Guard Security Guard/Maintenance Worker, and National Guard Fire/Dust Suppression Worker. Recreational use includes a receptor engaged in hunting, trapping, and fishing. Residential use is included to provide a baseline scenario and evaluates a Resident Subsistence Farmer (adult and child).

3.2 EXPOSURE PATHWAYS

An exposure pathway is made up of the following components:

- source,
- release mechanism (e.g., volatilization),
- transport pathway,
- exposure point,

- exposure route, and
- receptor.

Potential exposure pathways associated with each receptor and land use category are identified in Table 3-1.

Table 3-1. Receptors and Exposure Pathways for RVAAP Load Line 1

Exposure Pathways	Exposure Media					
	Groundwater	Surface Water	Sediment	Surface Soil		Subsurface Soil
				Shallow[a]	Deep[b]	
National Guard – Trainee						
Ingestion	✔	✔	✔	--	✔	--
Dermal	✔	✔	✔	--	✔	--
Inhalation						
Vapor	✔	--[d]	✔	--	✔	--
Dust	--	--	✔	--	✔	--
Ingestion of food	--	--	--	--	--	--
National Guard – Security Guard/Maintenance Worker						
Ingestion	--	--	--	✔	--	--
Dermal	--	--	--	✔	--	--
Inhalation						
Vapor	--	--	--	✔	--	--
Dust	--	--	--	✔	--	--
Ingestion of food	--	--	--	--	--	--
National Guard – Fire/Dust Suppression Worker						
Ingestion	--	✔	✔	✔	--	--
Dermal	--	✔	✔	✔	--	--
Inhalation						
Vapor	--	--[d]	✔	✔	--	--
Dust	--	--	✔	✔	--	--
Ingestion of food	--	--	--	--	--	--
Hunter/Trapper/Fisher						
Ingestion	--	✔	✔	✔	--	--
Dermal	--	✔	✔	✔	--	--
Inhalation						
Vapor	--	--[d]	✔	✔	--	--
Dust	--	--	✔	✔	--	--
Ingestion of food	--	✔ [ef]	✔ [e]	--	--	--
Resident Subsistence Farmer (adult and child)						
Ingestion	✔	✔	✔	✔	--	✔
Dermal	✔	✔	✔	✔	--	✔
Inhalation						
Vapor	✔	--[d]	✔	✔	--	✔
Dust	--	--	✔	✔	--	✔
Ingestion of food	--	✔ [f]	--	✔ [g]	--	--

✔ = Receptor is exposed to chemicals of potential concern (COPCs) in this exposure medium.
-- = Receptor is not exposed to COPCs in this exposure medium.
[a] Shallow surface soil is defined as 0 to 1 ft below ground surface (bgs).
[b] Deep surface soil is defined as 0 to 3 ft bgs.
[c] Subsurface soil is defined as 1 to 3 ft bgs.
[d] No volatile organic compounds are COPCs in Load Line 1 surface water.
[e] Hunter/Trapper/Fisher ingests waterfowl that feed on surface water, aquatic plants, sediment, and sediment-dwelling invertebrates and fish exposed to surface water.
[f] Hunter/Trapper/Fisher and Resident Subsistence Farmer ingest fish exposed to surface water.
[g] Resident Subsistence Farmer ingests beef, milk, vegetables, and venison exposed to COPCs in soil.
RVAAP = Ravenna Army Ammunition Plant.

A discussion of each land use/receptor/pathway combination is provided below. The exposure parameters for each pathway are provided in Table 3-2.

3.2.1 National Guard Land Use

National Guard receptors are assumed to be exposed to four media: soil, surface water, sediment, and groundwater.

Three receptor categories have been identified under this land use. Each of these receptors is described below. Parameter values used to evaluate the National Guard receptors in this BHHRA are provided in Table 3-2.

National Guard Trainee

National Guard Trainees may be present at the site up to 24 h/d for 24 d/year on inactive duty training and/or 24 h/d for 15 d/year during annual training. As a conservative estimate for this BHHRA, it is assumed that the same individual is present at Load Line 1 for both inactive duty training (24 d/year) and annual training (15 d/year) for a total exposure frequency of 39 d/year. This receptor is assumed to belong to the National Guard for 25 years (default worker exposure duration) and to use Load Line 1 for training every year of his/her enlistment.

Load Line 1 will be used for mounted training. Digging and occupying fighting positions, tank defilade positions, tank ditches, and battle positions that extend below ground surface will be prohibited. Tracked and wheeled operations may result in maneuver damage up to 4 ft bgs. Because of this maneuver damage, the National Guard Trainee is assumed to be exposed to deep surface soil defined as 0 to 3 ft bgs. Due to the presence of shallow bedrock at Load Line 1, soil samples were taken to a maximum depth of 3 ft bgs. This receptor is exposed to soil via incidental ingestion, dermal contact, and inhalation of vapors and fugitive dust.

The National Guard Trainee is also assumed to be exposed to surface water and sediment during training. Exposure to these media is assumed to occur daily (i.e., 39 d/year) via incidental ingestion, dermal contact, and inhalation of vapors and fugitive dust. According to Ravenna Training and Logistics Site (RTLS) staff, all potable water will come from the local municipal water supply. There are currently no plans to obtain water from groundwater wells. However, groundwater is included as a conservative assumption since the municipal water supply is not currently in place.

National Guard Security Guard/Maintenance Worker

Current government activities at Load Line 1 are limited to maintenance activities (including checking on beaver damage) and environmental remediation activities. The buildings at Load Line 1 previously were demolished, and this area is not mowed. Security patrols occur daily across the installation, but not within Load Line 1; patrolmen usually remain within their vehicles during these patrols. Although the security guard is not currently exposed to contaminated media at Load Line 1 on a daily basis, the potential exposure of this receptor is evaluated in this BHHRA. Therefore, as a worst-case assumption, it is assumed that a security guard leaves his or her vehicle on a daily basis and is exposed to surface soil. Parameter values used to assess exposure to this receptor in the BHHRA are provided in Table 3-2.

The Security Guard/Maintenance Worker is the same as that previously evaluated in the RI. However, the approach used to calculate risk to this receptor, specifically for dermal exposure to soil, has changed per the FWHHRAM (USACE 2004), as described in Section 4.3.

Table 3-2. Parameters Used to Quantify Exposures for Each Medium and Receptor at Load Line 1

Exposure Pathway and Parameter	Units	Potential Receptor					
		National Guard Personnel			Recreator	Resident Subsistence Farmer	
		Security Guard/ Maintenance Worker	Dust/Fire Control	Trainee	Hunter/ Fisher	Adult	Child
Surface Soil[a]							
Incidental Ingestion							
Soil ingestion rate	kg/d	0.0001[b]	0.0001[b]	0.0001[b]	0.0001[b]	0.0001[b]	0.0002[b]
Exposure time	h/d	1[c]	[c]	24[c]	4.57[d]	24[b]	24[b]
Exposure frequency	d/year	250[b]	15[c]	39[c]	7[d]	350[b]	350[b]
Exposure duration	years	25[b]	25[c]	25[c]	30[c]	30[b]	[b]
Body weight	kg	70[b]	70[b]	70[b]	70[b]	70[b]	15[b]
Carcinogen averaging time	d	25,550[b]	25,550[b]	25,550[b]	25,550[b]	25,550[b]	25,550[b]
Non-carcinogen averaging time	d	9,125[b]	9,125[b]	9,125[b]	10,950[b]	10,950[b]	2,190[b]
Fraction ingested	Unitless	1[c]	[c]	[c]	[c]	[b]	1[b]
Conversion factor	d/h	0.042	0.042	0.042	0.042	0.042	0.042
Dermal Contact							
Skin area	m^2/event	0.33[e]	0.33[e]	0.33[e]	0.57[e]	0.57[e]	0.22[g]
Adherence factor	mg/cm^2	0.7[f]	0.3[f]	0.3[f]	0.3[f]	0.4[f]	0.2[g]
Absorption fraction	Unitless	Chemical Specific – See Table A-7					
Exposure frequency	events/year	250[a]	15[c]	39[c]	[d]	350[b]	350[b]
Exposure duration	years	25[a]	25[c]	25[c]	30[c]	30[b]	[b]
Body weight	kg	70[a]	70[b]	70[b]	70[b]	70[b]	15[b]
Carcinogen averaging time	d	25,550[a]	25,550[b]	25,550[b]	25,550[b]	25,550[b]	25,550[b]
Non-carcinogen averaging time	d	9,125[a]	9,125[b]	9,125[b]	10,950[b]	10,950[b]	2,190[b]
Conversion factor	$(kg\text{-}cm^2)/(mg\text{-}m^2)$	0.01	0.01	0.01	0.01	0.01	0.01
Inhalation of VOCs and Dust							
Inhalation rate	m^3/d	20[a]	44.4[g]	44.4[g]	20[b]	20[b]	10[h]
Exposure time	h/d	1[b]	[c]	24[c]	4.57[d]	24[b]	24[b]
Exposure frequency	d/year	250[a]	15[c]	39[c]	[d]	350[b]	350[b]
Exposure duration	years	25[a]	25[c]	25[c]	30[c]	30[b]	[b]
Body weight	kg	70[a]	70[b]	70[b]	70[b]	70[b]	15[b]
Carcinogen averaging time	d	25,550[a]	25,550[b]	25,550[b]	25,550[b]	25,550[b]	25,550[b]
Non-carcinogen averaging time	d	9,125[a]	9,125[b]	9,125[b]	10,950[b]	10,950[b]	2,190[b]
Conversion factor	d/h	0.042	0.042	0.042	0.042	0.042	0.042

Table 3-2. Parameters Used to Quantify Exposures for Each Medium and Receptor at Load Line 1 (continued)

Exposure Pathway and Parameter	Units	Potential Receptor					
		National Guard Personnel			Recreator	Resident Subsistence Farmer	
		Security Guard/ Maintenance Worker	Dust/Fire Control	Trainee	Hunter/ Fisher	Adult	Child
Subsurface Soil							
Incidental Ingestion							
Soil ingestion rate	kg/d	NA	NA	NA	NA	0.0001[b]	0.0002[b]
Exposure time	h/d	NA	NA	NA	NA	24	24
Exposure frequency	d/year	NA	NA	NA	NA	350[b]	350[b]
Exposure duration	years	NA	NA	NA	NA	30[b]	[b]
Body weight	kg	NA	NA	NA	NA	70[b]	15[b]
Carcinogen averaging time	d	NA	NA	NA	NA	25,550[b]	25,550[b]
Non-carcinogen averaging time	d	NA	NA	NA	NA	10,950[b]	2,190[b]
Fraction ingested	Unitless	NA	NA	NA	NA	1[b]	1[b]
Conversion factor	d/h	NA	NA	NA	NA	0.042	0.042
Dermal Contact							
Skin area	m^2/event	NA	NA	NA	NA	0.57[r]	0.22[g]
Adherence factor	mg/cm^2	NA	NA	NA	NA	0.4[g]	0.2[g]
Absorption fraction	Unitless	NA	NA	NA	NA	Chem. Spec. See Table A-7	
Exposure frequency	events/year	NA	NA	NA	NA	350[b]	350[b]
Exposure duration	years	NA	NA	NA	NA	30[b]	[b]
Body weight	kg	NA	NA	NA	NA	70[b]	15[b]
Carcinogen averaging time	d	NA	NA	NA	NA	25,550[b]	25,550[b]
Non-carcinogen averaging time	d	NA	NA	NA	NA	10,950[b]	2,190[b]
Conversion factor	(kg-cm^2)/(mg-m^2)	NA	NA	NA	NA	0.01	0.01
Inhalation of VOCs and Dust							
Inhalation rate	m^3/d	NA	NA	NA	NA	20[b]	10[h]
Exposure time	h/d	NA	NA	NA	NA	24[b]	24[b]
Exposure frequency	d/year	NA	NA	NA	NA	350[b]	350[b]
Exposure duration	years	NA	NA	NA	NA	30[b]	[b]
Body weight	kg	NA	NA	NA	NA	70[b]	15[b]
Carcinogen averaging time	d	NA	NA	NA	NA	25,550[b]	25,550[b]
Non-carcinogen averaging time	d	NA	NA	NA	NA	10,950[b]	2,190[b]
Conversion factor	d/h	NA	NA	NA	NA	0.042	0.042

Table 3-2. Parameters Used to Quantify Exposures for Each Medium and Receptor at Load Line 1 (continued)

Exposure Pathway and Parameter	Units	Potential Receptor					
		National Guard Personnel			Recreator	Resident Subsistence Farmer	
		Security Guard/ Maintenance Worker	Dust/Fire Control	Trainee	Hunter/ Fisher	Adult	Child
Sediment							
Incidental Ingestion							
Soil ingestion rate	kg/d	NA	0.0001[b]	0.0001[b]	0.0001[b]	0.0001[b]	0.0002[b]
Exposure time	h/d	NA	4[c]	24[c]	4.57[d]	24[b]	24[b]
Exposure frequency	d/year	NA	15[c]	39[c]	[d]	350[b]	350[b]
Exposure duration	years	NA	25[c]	25[c]	30[c]	30[b]	[b]
Body weight	kg	NA	70[b]	70[b]	70[g]	70[b]	15[b]
Carcinogen averaging time	d	NA	25,550[b]	25,550[b]	25,550[g]	25,550[b]	25,550[b]
Non-carcinogen averaging time	d	NA	9,125[b]	9,125[b]	10,950[g]	10,950[b]	2,190[b]
Fraction ingested	Unitless	NA	1[c]	[c]	[c]	[b]	[b]
Conversion factor	d/h	NA	0.042	0.042	0.042	0.042	0.042
Dermal Contact							
Skin area	m^2/event	NA	0.33[e]	0.33[e]	0.52[e]	0.57[e]	0.22[g]
Adherence factor	mg/cm^2	NA	0.3[e]	0.3[f]	0.3[f]	0.4[f]	0.2[g]
Absorption fraction	Unitless	NA	Chemical Specific – See Table A-7				
Exposure frequency	events/year	NA	15[c]	39[c]	[d]	350[b]	350[b]
Exposure duration	years	NA	25[c]	25[c]	30[c]	30[b]	[b]
Body weight	kg	NA	70[b]	70[b]	70[b]	70[b]	15[b]
Carcinogen averaging time	d	NA	25,550[b]	25,550[b]	25,550[b]	25,550[b]	25,550[b]
Non-carcinogen averaging time	d	NA	9,125[b]	9,125[b]	10,950[b]	10,950[b]	2,190[b]
Conversion factor	$(kg\text{-}cm^2)/(mg\text{-}m^2)$	NA	0.01	0.01	0.01	0.01	0.01
Inhalation of VOCs and Dust							
Inhalation rate	m^3/d	NA	44.4[g]	44.4[g]	20[b]	20[b]	10[h]
Exposure time	h/d	NA	4[c]	24[c]	4.57[d]	24[b]	24[b]
Exposure frequency	d/year	NA	15[c]	39[c]	[d]	350[b]	350[b]
Exposure duration	years	NA	25[c]	25[c]	30[c]	30[b]	[b]
Body weight	kg	NA	70[b]	70[b]	70[b]	70[b]	15[b]
Carcinogen averaging time	d	NA	25,550[b]	25,550[b]	25,550[g]	25,550[b]	25,550[b]
Non-carcinogen averaging time	d	NA	9,125[b]	9,125[b]	10,950[g]	10,950[b]	2,190[b]
Conversion factor	d/h	NA	0.042	0.042	0.042	0.042	0.042

Table 3-2. Parameters Used to Quantify Exposures for Each Medium and Receptor at Load Line 1 (continued)

Exposure Pathway and Parameter	Units	Potential Receptor					
		National Guard Personnel			Recreator	Resident Subsistence Farmer	
		Security Guard/ Maintenance Worker	Dust/Fire Control	Trainee	Hunter/ Fisher	Adult	Child
Surface Water							
Incidental Ingestion							
Incidental water ingestion rate	L/d	NA	0.1[i]	0.1[i]	0.05[i]	0.1[i]	0.1[i]
Exposure frequency	d/year	NA	15[c]	39[c]	[d]	350[b]	350[b]
Exposure duration	years	NA	25[c]	25[c]	30[e]	30[b]	[b]
Body weight	kg	NA	70[c]	70[b]	70[b]	70[b]	15[b]
Carcinogen averaging time	d	NA	25,550[b]	25,550[b]	25,550[b]	25,550[b]	25,550[b]
Non-carcinogen averaging time	d	NA	9,125[b]	9,125[7]	10,950[b]	10,950[b]	2,190[b]
Dermal Contact							
Skin area	m^2	NA	0.33[e]	0.33[e]	0.52[e]	0.57[e][6]	0.22[g]
Exposure time	h/d	NA	4[c]	24[c]	4.57[d]	2.5[j]	2.5[g]
Exposure frequency	d/year	NA	15[c]	39[c]	[d]	350[b]	350[b]
Exposure duration	years	NA	25[c]	25[c]	30[c]	30[b]	[b]
Body weight	kg	NA	70[b]	70[b]	70[b]	70[b]	15[b]
Carcinogen averaging time	d	NA	25,550[b]	25,550[b]	25,550[b]	25,550[b]	25,550[b]
Non-carcinogen averaging time	d	NA	9,125[b]	9,125[7]	10,950[b]	10,950[b]	2,190[b]
Conversion factor	(m/cm)(L/m^3)	NA	10	10	10	10[6]	10
Groundwater							
Drinking Water Ingestion							
Drinking water ingestion rate	L/d	NA	NA	2[b]	NA	2[b]	1.5[g]
Exposure frequency	d/year	NA	NA	39[c]	NA	350[b]	350[b]
Exposure duration	years	NA	NA	25[c]	NA	30[b]	[b]
Body weight	kg	NA	NA	70[b]	NA	70[b]	15[b]
Carcinogen averaging time	d	NA	NA	25,550[b]	NA	25,550[b]	25,550[b]
Non-carcinogen averaging time	d	NA	NA	9,125[b]	NA	10,950[b]	2,190[b]
Dermal Contact While Showering							
Skin area	m^2	NA	NA	1.94[k]	NA	1.94[k][6]	0.866[l]
Exposure time	h/d	NA	NA	0.25[b]	NA	0.25[b]	0.25[b]
Exposure frequency	d/year	NA	NA	39[c]	NA	350[b]	350[b]
Exposure duration	years	NA	NA	25[c]	NA	30[b]	[b]
Body weight	kg	NA	NA	70[b]	NA	70[b]	15[b]

Table 3-2. Parameters Used to Quantify Exposures for Each Medium and Receptor at Load Line 1 (continued)

Exposure Pathway and Parameter	Units	Potential Receptor					
		National Guard Personnel			Recreator	Resident Subsistence Farmer	
		Security Guard/ Maintenance Worker	Dust/Fire Control	Trainee	Hunter/ Fisher	Adult	Child
Carcinogen averaging time	d	NA	NA	25,550[b]	NA	25,550[b]	25,550[b]
Non-carcinogen averaging time	d	NA	NA	9,125[b]	NA	10,950[b]	2,190[b]
Conversion factor	(m/cm)(L/m^3)	NA	NA	10	NA	10	10
Inhalation of VOCs During Household Water Use							
Inhalation rate	m^3/d	NA	NA	20[b]	NA	20[b]	10[h]
Exposure frequency	d/year	NA	NA	39[c]	NA	350[b]	350[b]
Exposure duration	years	NA	NA	25[c]	NA	30[b]	[b]
Body weight	kg	NA	NA	70[b]	NA	70[b]	15[b]
Carcinogen averaging time	d	NA	NA	25550[b]	NA	25,550[b]	25,550[b]
Non-carcinogen averaging time	d	NA	NA	9125[b]	NA	10,950[b]	2,190[b]
Volatilization factor	L/m^3	NA	NA	0.5[b]	NA	0.5[b]	0.5[b]
Foodstuffs							
Ingestion of Fish							
Fish ingestion rate	kg/d	NA	NA	NA	0.054[m]	0.054[m]	0.054[m]
Fraction ingested	Unitless	NA	NA	NA	1[c]	1[b]	[b]
Exposure frequency	d/year	NA	NA	NA	365[c]	365[c]	365[c]
Exposure duration	years	NA	NA	NA	30[c]	30[b]	[b]
Body weight	kg	NA	NA	NA	70[b]	70[b]	15[b]
Carcinogen averaging time	d	NA	NA	NA	25,550[b]	25,550[b]	25,550[b]
Non-carcinogen averaging time	d	NA	NA	NA	10,950[b]	10,950[b]	2,190[b]
Ingestion of Waterfowl							
Waterfowl ingestion rate	kg/d	NA	NA	NA	0.0132[o]	NA	NA
Fraction ingested	Unitless	NA	NA	NA	1[c]	NA	NA
Exposure frequency	d/year	NA	NA	NA	365[c]	NA	NA
Exposure duration	years	NA	NA	NA	30[c]	NA	NA
Body weight	kg	NA	NA	NA	70[b]	NA	NA
Carcinogen averaging time	d	NA	NA	NA	25,550[b]	NA	NA
Non-carcinogen averaging time	d	NA	NA	NA	10,950[b]	NA	NA

[a] Deep (0 to 3 ft bgs) surface soil is used for National Guard Trainee; shallow (0 to 1 ft bgs) surface soil is used for all other receptors.
[b] RAGS, Part B (EPA 1991a).

Table 3-2. Parameters Used to Quantify Exposures for Each Medium and Receptor at Load Line 1 (continued)

[c] Site-specific (value obtained from site personnel). National Guard Trainee is assumed to be on-site 24 h/d for 24 d/year for inactive duty training and 24 h/d for 15 d/year for annual training. National Guard Fire/Dust Suppression receptor is assumed to spend 4 h/d for 5 d/year for fire suppression and 4 h/d for 10 days/year (i.e., 40 h/year) for dust suppression. Both National Guard Receptors are assumed to remain at RVAAP and at Load Line 1 for their entire 25-year enlistment. The Security Guard/Maintenance Worker is assumed to visit each AOC for 1 h/d for a standard worker default of 250 d/year and 25 years.
[d] The Hunter/Trapper/Fisher is assumed to hunt wildfowl on-site 6 h/d for 2 d/year, and fish on-site 4 h/d for 5 d/year. The combined exposure for hunting and fishing is 4.57 h/day for 7 d/year. The Hunter/Trapper/Fisher is assumed to hunt/fish as long as he/she resides in the area, so the residential default exposure duration is used.
[e] Security Guard/Maintenance Worker, National Guard Trainee, and National Guard Dust/Fire Control = Industrial Default; Hunter/Trapper/Fisher and Resident Farmer = Adult Residential Default. Exposure Factors Handbook (EPA 1997a). (Note: Dermal contact for Hunter/Trapper/Fisher during wading is 0.52 based on head, hands, forearms, and lower legs from Exposure Factors Handbook.)
[f] Security Guard/Maintenance Worker = Adult Groundskeeper (95th percentile); Hunter/Trapper = Residential Default; National Guard Trainee = Construction Worker (95th percentile); Resident Farmer Adult = Adult Farmer (95th percentile) (RAGS, Vol. 1 Part E, Supplemental Guidance for Dermal Risk Assessment, Interim) EPA/540/R/99/005.
[g] Per Ohio EPA comment 2002.
[h] Recommended value for child age 6 to 8 (EPA 1997a).
[i] National Guard Trainee and Resident Farmer are assumed to ingest 0.05 L/h [per RAGS Part A (EPA 1998)] for approximately 2 h/d spent in the surface water. National Guard Fire/Dust Suppression receptors are assumed to ingest 0.1 L/d due to direct exposure while setting pumps/hoses in surface water or from ingesting mist while spraying. Hunter/Trapper/Fisher are assumed to ingest 0.05 L/d due to splashing while setting traps or wading.
[j] Errata to FWHHRAM (USACE 2004).
[k] Average total body surface area for an adult (EPA 1992b).
[l] 50th percentile value for male child age 6 to 7 (EPA 1997a).
[m] Standard default Exposure Factors for recreational fish ingestion (EPA 1991b).
[o] Hunter/trapper is assumed to catch and eat the 1-day bag limit for ducks and geese each year.

AOC = Area of concern.
EPA = U. S. Environmental Protection Agency.
NA = Not applicable for this scenario.
RVAAP = Ravenna Army Ammunition Plant.
VOC = Volatile organic compound.

National Guard Fire/Dust Suppression Worker

National Guard personnel may use surface water for fire suppression with a frequency of 4 h/d for 5 d/year (for a total of 20 h/year), as well as dust suppression for up to 40 h/year. It is assumed that both of these activities will be conducted by the same individual for a total exposure period of 60 h/year or approximately 4 h/d for 15 d/year.

Use of surface water for fire and dust suppression is assumed to result in exposure to surface water via incidental ingestion and dermal contact while setting pumps and hoses in the surface water body and while spraying water. While no volatile organic compounds (VOCs) were identified as COPCs in surface water, it is possible that some inhalation of airborne surface water may occur as a result of spraying. Inhalation is not included in the surface water exposure model; however, the surface water ingestion rate (100 mL/d) is assumed to include potential incidental inhalation exposure.

This receptor is also assumed to be exposed to shallow surface soil and sediment via incidental ingestion, dermal contact, and inhalation of vapors and fugitive dust.

3.2.2 Recreational Land Use

Permitted recreational activities at Load Line 1 may include waterfowl hunting, trapping, and fishing. These activities are evaluated for a single recreational receptor, as described below. Parameter values used to evaluate the Recreational receptor in this BHHRA are provided in Table 3-2.

Hunting and Trapping

Permitted waterfowl hunting is managed jointly by the facility staff and the State Division of Wildlife. Waterfowl hunters are assumed to be on-site to hunt 4 h/d for 2 d/year and to check and clean wood duck boxes 1 h/d for 1 d/year for a total of approximately 9 h/year. The state of Ohio Department of Natural Resources currently permits the taking of six ducks (not to include more than three mallards, two wood ducks, one black duck, two red heads, one pintail, three mottled ducks or three scaup) and two Canada Geese per day. Separate bag limits exist for coots and mergansers, but these species are not hunted at RTSL. According to Tim Morgan, Office of Species Conservation (OSC) forester, the most likely species hunted at the RSTL are wood ducks, mallards, and Canada Geese, and it is unlikely that hunters would reach the state-mandated bag limits for these species (Morgan 2003).

Trapping takes place 3 months of the year (November through January) primarily to control beaver and raccoon populations. Trappers are assumed to be present at Load Line 1 for 2 h at the start of the season to scout and set traps and 0.5 h/d for 6 d/year to check traps, for a total of approximately 5 h/year. Traps are generally set near ponds (near existing dams) and along roadsides. According to Tim Morgan, OSC forester, the most common catches include beaver, mink, muskrat, weasel, raccoon, possum, rabbit, and squirrel (Morgan 2002).

It is assumed that waterfowl hunting and trapping are conducted by the same individual for a total exposure period of approximately 12 h/year (evaluated as 6 h/d for 2 d/year). This receptor is assumed to be exposed to shallow surface soil, surface water, and sediment via incidental ingestion, dermal contact, and inhalation of vapors and fugitive dust. The receptor is also assumed to ingest waterfowl. It is assumed that a hunter will harvest the 1-day bag limit of ducks and Canada Geese. Using the body weight for mallards, this results in an ingestion rate of 0.0132 kg/d (10.6 lbs/year) calculated as six mallard ducks weighing 1.134 kg (EPA 1993), each with 34% edible tissue and two Canada Geese weighing 3.8671 kg (EPA 1993), each with 32.6% edible tissue. This ingestion rate assumes (1) the hunter consumes his entire 1-day catch each year, (2) the ducks are all represented by the body weight of a mallard rather than

the smaller wood duck, and (3) there is no loss due to preparation and cooking. It is assumed that trapping is primarily for fur and population control of beaver and raccoon, and the trapper does not consume his catch.

Fishing

Catch and release fishing is allowed for personnel permanently assigned to RTLS and their guests (OHARNG 2001). Fishers are assumed to be present up to 4 h/d for 5 d/year. This receptor is assumed to be exposed to shallow surface soil, surface water, and sediment via incidental ingestion, dermal contact, and inhalation of vapors and fugitive dust. It is the goal, when the installation restoration program is done, to have unrestricted fishing and taking of fish from all ponds. Therefore, the Hunter/Trapper/Fisher receptor is also assumed to ingest fish caught on-site.

For this BHHRA it is assumed that hunting, trapping, and fishing are conducted by the same individual for a total exposure period of 4.57 h/d, 7 d/year (i.e., 6 h/d for 2 d/year to hunt and trap plus 4 h/d for 5 d/year to fish).

3.2.3 Residential Land Use

This land use scenario represents a true baseline assessment against which all decisions, including decisions to maintain institutional controls, can be made. It represents the worst-case exposures for all land use/receptor combinations. The adult and child resident farmer are assumed to be exposed chronically to all media, including groundwater and foodstuffs. It is assumed that the farmer lives on Load Line 1 land, raises livestock and vegetables, hunts, and digs into subsurface soils (see Table 3-2). Parameters used to represent activity patterns are listed in Table 3-2 and generally come from standard default values defined by the EPA (1991).

3.3 QUANTIFICATION OF INTAKE

Intake is defined as the amount of contaminant that could be in contact with the body (e.g., lungs, gut) per unit body weight per unit time. Dose is defined as the amount of contaminant that could be absorbed into the bloodstream per unit body weight per unit time. For the Load Line 1 BHHRA, the intakes (for inhalation and ingestion exposures) and doses (for dermal exposures) were quantified using the equations presented below for soil, surface water, sediment, groundwater, and ingestion of fish and waterfowl. The exposure parameters used in these equations are provided in Table 3-2. Parameter values were selected based on EPA guidance with input from the OHARNG and RVAAP facility staff. Intakes from ingestion of food by the Resident Subsistence Farmer (i.e., beef, milk, vegetables, and venison) were previously quantified in the Final LL1 RIR (SAIC 2004) and the methodology has not changed. For the details of exposure to these foods by the Resident Subsistence farmer see Section 6.3 and Table 6 2 of the Final LL1 RIR.

3.3.1 Soil and Sediment Exposure Pathways

Incidental ingestion of soil and sediment is estimated for chemicals using Equation 1:

$$\textit{Chemical Intake (mg/kg – d)} = \frac{C_s \times IR_s \times EF \times ED \times FI \times ET \times CF}{\text{BW} \times \text{AT}}, \qquad \textbf{(1)}$$

where

C_s = chemical concentration in soil or sediment (mg/kg),
IR_s = ingestion rate (kg/d),
EF = exposure frequency (d/year),
ED = exposure duration (years),
FI = fraction ingested (value of 1, unitless),
ET = exposure time (h/d),
CF = conversion factor for ET (d/h),
BW = body weight (kg),
AT = averaging time (days) for carcinogens or non-carcinogens.

The dermally absorbed dose (DAD) from chemicals in soil and sediment is calculated by using Equation 2.

$$\textit{Chemical DAD (mg/kg – d)} = \frac{C_s \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}, \quad \textbf{(2)}$$

where

C_s = chemical concentration in soil or sediment (mg/kg),
CF = conversion factor [$(10^{-6}$ kg/mg) × $(10^4$ cm^2/m^2)],
SA = skin surface area exposed to soil (m^2/event),
AF = soil to skin adherence factor (1 mg/cm^2),
ABS = chemical-specific absorption factor [Table A-7; when chemical-specific values are not available, the following defaults are used: 0.1% for inorganics, 1.0% for VOCs, and 10% for semivolatile organic compounds (SVOCs)],
EF = exposure frequency (events/year),
ED = exposure duration (years),
BW = body weight (kg),
AT = averaging time (days) for carcinogens or non-carcinogens.

Inhalation of soil or dry sediment is calculated using Equation 3:

$$\textit{Chemical Intake (mg/kg – day)} = \frac{C_s \times IR_a \times EF \times ED \times (VF^{-1} + PEF^{-1}) \times ET \times CF}{BW \times AT}, \quad \textbf{(3)}$$

where

C_s = chemical concentration in soil or sediment (mg/kg),
IR_a = inhalation rate (m^3/d),
EF = exposure frequency (d/year),
ED = exposure duration (years),
VF = volatilization factor (chemical-specific m^3/kg),
PEF = particulate emission factor (m^3/kg),
ET = exposure time (h/d),
CF = conversion factor for ET (d/h),
BW = body weight (kg),
AT = averaging time (days) for carcinogens or non-carcinogens.

The general PEF value used for all Load Line 1 receptors, except the National Guard Trainee, is the default value for Cleveland, Ohio, assuming a 0.5-acre source area (9.24E+08 m^3/kg). This PEF value was calculated using the EPA Soil Screening Guidance on-line at http://risk.lsd.ornl.gov/epa/ssl1.htm. The EUs ranged in size from approximately .25 acre (Water Tower) to more than 10 acres (Perimeter Area); however, the contamination tends to be limited to small areas around the buildings. Therefore, a 0.5-acre contaminated source area is considered appropriate. A smaller PEF value (1.67×10^6) is used for the National Guard Trainee scenario because the activities of this receptor are assumed to generate more dust. This PEF value was calculated from a dust-loading factor (DLF) of 600 µg/m^3 (DOE 1983) as:

$$\text{PEF} = 1/(\text{DLF} \times \text{Conversion Factor}) = 1/(600\ \mu g/m^3 \times 1\text{E-}09\ kg/\mu g) = 1.67\text{E+}06\ m^3/kg.$$

3.3.2 Groundwater and Surface Water Exposure Pathways

Ingestion of water is estimated using Equation 4:

$$\textit{Chemical Intake (mg/kg – d)} = \frac{C_w \times IR_w \times EF \times ED}{\text{BW} \times \text{AT}}, \quad \textbf{(4)}$$

where

C_w = chemical concentration in water (mg/L),
IR_w = ingestion rate (L/d),
EF = exposure frequency (d/year),
ED = exposure duration (years),
BW = body weight (kg),
AT = averaging time (days) for carcinogens or noncarcinogens.

The DAD from dermal contact with chemicals in water is calculated by using Equation 5:

$$\textit{Chemical DAD (mg/kg – d)} = \frac{C_w \times CF \times PC \times SA \times ET \times EF \times ED}{\text{BW} \times \text{AT}}, \quad \textbf{(5)}$$

where

C_w = chemical concentration in water (mg/L),
CF = conversion factor [(m/100 cm) × (1,000 L/m^3)],
PC = permeability constant (Table A-7, chemical-specific cm/h),
SA = skin surface area exposed to soil (m^2),
ET = exposure time (h/d),
EF = exposure frequency (days/year),
ED = exposure duration (years),
BW = body weight (kg),
AT = averaging time (days) for carcinogens and non-carcinogens.

Inhalation of VOCs from surface water is not quantified because no volatile COPCs have been identified in surface water. Inhalation of VOCs from groundwater during household water use is estimated using Equation 6:

$$\textit{Chemical Intake (mg/kg - day)} = \frac{C_w \times IR_w \times K \times EF \times ED \times ET \times CF}{BW \times AT}, \quad \textbf{(6)}$$

where

C_w	=	chemical concentration in water (mg/L),
IR_w	=	inhalation rate (m^3/d),
K	=	volatilization factor (0.0005 × 1,000 L/m^3),
EF	=	exposure frequency (d/year),
ED	=	exposure duration (years),
ET	=	exposure time adjustment (h/d),
CF	=	conversion factor for ET (d/h),
BW	=	body weight (kg),
AT	=	averaging time (days) for carcinogens or non-carcinogens.

3.3.3 Ingestion of Fish and Waterfowl

Ingestion of chemicals from the consumption of waterfowl is estimated by using Equation 7.

$$\textit{Chemical Intake (mg/kg – d)} = \frac{C_f \times IR_f \times EF \times ED}{BW \times AT}, \quad \textbf{(7)}$$

where

C_f	=	chemical concentration in fish or waterfowl (mg/kg),
IR_f	=	ingestion rate of fish or waterfowl (kg/d),
EF	=	exposure frequency (d/year),
ED	=	exposure duration (years),
BW	=	body weight (kg),
AT	=	averaging time (days) for carcinogens and noncarcinogens.

3.4 EXPOSURE POINT CONCENTRATIONS

The exposure point concentration (EPC) represents the chemical concentration a receptor is likely to come in contact with over the duration of exposure. Exposure concentrations from direct contact with environmental media (i.e., soil, sediment, surface water, and groundwater) are based on the sampling results of the media, as described in Section 3.4.1. Exposure concentrations for contaminants that have migrated into secondary media (i.e., fish and waterfowl) are modeled, as described in Section 3.4.2 and Appendix B.

3.4.1 Measured Exposure Point Concentrations

Exposure from direct contact pathways represents exposure to media at the source, and the EPC is based on data collected at the source. Current measured concentrations of chemicals were used to represent future concentrations in the media of interest.

The EPCs developed for each COPC represent a UCL_{95} on the mean, or the maximum detected value for all locations within the EU, whichever is smaller. EPCs were calculated using EPA guidance, *Supplemental Guidance to RAGS: Calculating the Concentration Term* (EPA 1992b). The data were tested using the Shapiro-Wilk test to determine distribution, normal or lognormal, of the concentrations. The UCL_{95} on the mean was calculated using the normal distribution equation (see Equation 8) when the concentrations are normally distributed, when concentrations are not judged to be normally or lognormally

distributed, when the dataset contains fewer than five detections, or when the frequency of detection is less than 50%. For these situations, the UCL_{95} on the mean is calculated using the following equation:

$$UCL_{95}(normal) = \bar{x}_n + \frac{(t)(s_x)}{\sqrt{n}}, \quad \textbf{(8)}$$

where

$\bar{x}_n$ = mean of the untransformed data,
t = student-t statistic,
s_x = standard deviation of the untransformed data,
n = number of sample results available.

For lognormally distributed concentrations, the UCL_{95} on the mean is calculated using the following equation:

$$UCL_{95}(log\ normal) = e\left[\overline{xl} + 0.5(s_i^{\,2}) + \frac{(s_i)(H)}{\sqrt{n-1}}\right], \quad \textbf{(9)}$$

where

e = constant (base of the natural log, equal to 2.718),
$\bar{x}_l$ = mean of the transformed data [l = log (x)],
s_i = standard deviation of the transformed data,
H = H-statistic,
n = number of sample results available.

3.4.2 Modeled Exposure Point Concentrations

Direct sampling results are not available for the evaluation of ingestion of fish and waterfowl. Exposure concentrations were modeled for fish exposed to COPCs in surface water, as described in Appendix B. Exposure concentrations were modeled for waterfowl assuming these animals ingest surface water, aquatic plants, sediment, and sediment-dwelling invertebrates from the Load Line 1 surface water aggregates, as described in Appendix B. The starting concentration of COPCs in surface water and sediment is equal to the EPC calculated for direct exposure pathways, as described in Section 3.4.1. Other parameter values are provided in Appendix B.

3.5 INTAKE RESULTS

Results of the exposure assessment are presented in tabular format in Chapter 5.0. These results are combined with information presented in Chapter 4.0, Toxicity Assessment, to estimate risks and hazards for each receptor.

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4.0 TOXICITY ASSESSMENT

The purpose of the toxicity assessment is to evaluate the potential for COPCs to cause adverse health effects in exposed individuals. Where possible, it provides an estimate of the relationship between the intake or dose of a COPC and the likelihood or severity of adverse health effects as a result of that exposure. Toxic effects have been evaluated extensively by EPA. This chapter provides the results of the EPA evaluation of the chemicals identified as COPCs at Load Line 1.

4.1 TOXICITY INFORMATION AND U.S. ENVIRONMENTAL PROTECTION AGENCY GUIDANCE FOR NON-CARCINOGENS

Non-carcinogenic effects are evaluated by comparing an exposure or intake/dose with a reference dose (RfD) or reference concentration (RfC). The RfD and RfCs are determined using available dose-response data for individual chemicals. Scientists determine the exposure concentration or intake/dose below which no adverse effects are seen and add a safety factor (from 10 to 1,000) to determine the RfD or RfC. RfDs and RfCs are identified by scientific committees supported by EPA. The RfDs available for the COPCs present in Load Line 1 media are listed in Appendix A, Table A-8 (EPA 1997b, 2004). In this BHHRA, RfCs, measured in milligrams per cubic meter, were converted to RfDs expressed in units of milligrams per kilogram body weight per day by using the default adult inhalation rate and body weight [i.e., (RfC × 20 m^3/d)/70 kg = RfD] (EPA 1989).

Chronic RfDs are developed for protection from long-term exposure to a chemical (from 7 years to a lifetime); subchronic RfDs are used to evaluate short-term exposure (from 2 weeks to 7 years) (EPA 1989). Since the potential receptors at Load Line 1 are not considered to have short-term exposures, a conservative approach has been taken for this BHHRA by using only chronic RfDs [chronic RfDs generally result in HQs that are at least as large as (sometimes larger than) HQs calculated from subchronic RfDs].

Toxic effects are diverse and measured in various target body organs (e.g., they range from eye irritation to kidney or liver damage). EPA is currently reviewing methods for accounting for the difference in severity of effects; however, existing RfDs do not address this issue.

4.2 TOXICITY INFORMATION AND U.S. ENVIRONMENTAL PROTECTION AGENCY GUIDANCE FOR CARCINOGENS

For carcinogens, risks are estimated as the probability that an individual will develop cancer over a lifetime as a result of exposure to the carcinogen. Cancer risk from exposure to contamination is expressed as excess or incremental cancer risk, which is cancer occurrence in addition to normally expected rates of cancer development. Excess cancer risk is estimated using a cancer slope factor (CSF). The CSF is defined as a plausible upper-bound estimate of the probability of a response (i.e., cancer) per unit intake of a chemical over a lifetime (EPA 1989).

EPA expresses inhalation cancer potency as the unit risk based on the chemical concentration in air [i.e., risk per microgram (μg) of chemical per cubic meter (m^3) of ambient air]. These unit risks were converted to CSFs expressed in units of risk per mg of chemical per kg body weight per day by using the default adult inhalation rate and body weight [i.e., (Unit Risk × 70 kg × 1,000 μg/mg)/20 m^3/d].

CSFs used in the evaluation of risk from carcinogenic COPCs are listed in Appendix A, Table A-9 (EPA 1997b, 2004).

4.3 ESTIMATED TOXICITY VALUES FOR DERMAL EXPOSURE

Oral and inhalation RfDs and CSFs are currently available. Dermal RfDs and CSFs were estimated from oral toxicity values using chemical-specific gastrointestinal absorption factors (GAFs) to calculate total absorbed dose. This conversion is necessary because most oral RfDs and CSFs are expressed as the amount of chemical administered per time and body weight; however, dermal exposure is expressed as an absorbed dose. Dermal toxicity factors are calculated from oral toxicity factors as shown below (EPA 1992a):

$$RfD_{dermal} = RfD_{oral} \times GAF$$

$$CSF_{dermal} = CSF_{oral}/GAF$$

Per FWHHRAM, dermal CSFs and RfDs are estimated from the oral toxicity values using chemical-specific GAFs to calculate the total absorbed dose only for chemicals with GAF values < 0.5. Chemical-specific GAF values available from EPA (2002b) are used whenever possible. Not all COPCs have specific GAF values. When quantitative data are insufficient, a default GAF is used. A default value of 1.0 for organic and inorganic chemicals is used (EPA 2002b).The GAF and resulting dermal toxicity values used in this BHHRA are listed in Appendix A, Tables A-8 and A-9.

4.4 ASSUMPTIONS USED IN THE TOXICITY ASSESSMENT

Assumptions made in assigning toxicity values for COPCs at Load Line 1 are

- Thallium, as a metal, is evaluated using the toxicity values for thallium carbonate. This is the form of thallium with the most conservative toxicity values.

- Total chromium is evaluated using the toxicity values for Chromium III. This is the form of chromium, other than Chromium VI (which is evaluated as a separate COPC), with the most conservative toxicity values.

- Gamma-chlordane is evaluated with the toxicity of chlordane.

- Endrin aldehyde is evaluated with the toxicity of endrin.

- Toxicity equivalency factors (TEFs) are applied to carcinogenic polycyclic aromatic hydrocarbons (cPAHs). The following TEFs are used to convert the cPAHs identified as COPCs at Load Line 1 to an equivalent concentration of benzo(*a*)pyrene.

cPAH	TEF
Benzo(*a*)pyrene	1
Benz(*a*)anthracene	0.1
Benzo(*b*)fluoranthene	0.1
Benzo(*k*)fluoranthene	0.01
Chrysene	0.001
Dibenzo(*a*,*h*)anthracene	1
Indeno(1,2,3-*cd*)pyrene	0.1

4.5 CHEMICALS WITHOUT U.S. ENVIRONMENTAL PROTECTION AGENCY TOXICITY VALUES

No RfDs or CSFs are available for some detected chemicals at Load Line 1 because the non-carcinogenic and/or carcinogenic effects of these chemicals have not yet been determined. Although these chemicals may contribute to health effects from exposure to contaminated media at Load Line 1, their effects cannot be quantified at the present time.

Previously withdrawn or provisional toxicity values are used for one COPC at Load Line 1: benzo(*a*)pyrene uses a provisional inhalation CSF. Without this provisional value, the inhalation pathway could not be quantitatively evaluated for this chemical.

No RfDs or CSFs are available for lead. EPA (1999) recommends the use of the Interim Adult Lead Methodology to support its goal of limiting risk of elevated fetal blood lead concentrations due to lead exposures to women of child-bearing age. This model is used to estimate the probability that the fetal blood lead level will exceed 10 μg/dL as a result of maternal exposure. This model is not appropriate for exposure frequencies less than 1 d/week because the first order elimination half-life of lead of approximately 30 d requires a constant lead intake over a duration of 90 days to reach quasi-steady state. Shorter exposures are expected to produce oscillations in blood lead concentrations due to absorption and subsequent clearance of lead between each exposure event (EPA 2003). Because of this limitation, lead exposures are evaluated for the Security Guard/Maintenance Worker and Resident Subsistence Farmer only. Complete documentation of the model is available at http://www.epa.gov/superfund/programs/lead/prods.htm. The model-supplied default values were used for all parameters, with the exception of the site-specific media concentration and exposure frequency. Input parameters and results of this model are provided in Appendix C, Tables C-1, C-3, C-4, C-6 through C-11, C-13, and C-14.

The Integrated Exposure Uptake Biokinetic (IEUBK) model for lead in children (available at http://www.epa.gov/superfund/programs/lead/ieubk.htm) was used to evaluate the On-Site Resident Farmer child. The IEUBK model is used to predict the risk of elevated blood lead levels in children (under the age of seven) that are exposed to environmental lead from many sources. The model also predicts the risk (e.g., probability) that a typical child, exposed to specified media lead concentrations, will have a blood lead level greater or equal to the level associated with adverse health effects (10 μg/dL). Results of this model are provided in Appendix C, Tables C-2, C-5, C-12, and C-15.

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5.0 RISK CHARACTERIZATION

The purpose of the risk characterization is to evaluate the information obtained through the exposure and toxicity assessments to estimate potential risks and hazards. Potential carcinogenic effects are characterized by using projected intakes and chemical-specific, dose-response data (i.e., CSFs) to estimate the probability that an individual will develop cancer over a lifetime. Potential non-carcinogenic effects are characterized by comparing projected intakes of contaminants to toxicity values (i.e., RfDs). The numerical risk and hazard estimates presented in this chapter must be interpreted in the context of the uncertainties and assumptions associated with the risk assessment process and with the data upon which the risk estimates are based.

This chapter is divided into three sections: methodology (Section 5.1), results (Section 5.2), and uncertainty (Section 5.3). The estimation of RGOs for COCs is presented in Chapter 6.0.

5.1 METHODOLOGY

Risk characterization integrates the findings of the exposure and toxicity assessments to estimate the potential for receptors to experience adverse effects as a result of exposure to contaminated media at Load Line 1.

5.1.1 Risk Characterization for Carcinogens

For carcinogens, risk is expressed as the probability that an individual will develop cancer over a lifetime as a result of exposure to the carcinogen. Cancer risk from exposure to contamination is expressed as the incremental lifetime cancer risk (ILCR), or the increased chance of cancer above the normal background rate of cancer. In the United States, the background chance of contracting cancer is a little more than 3 in 10, or 3×10^{-1} (American Cancer Society 2003). The calculated ILCRs are compared to the range specified in the National Oil and Hazardous Substances Pollution Contingency Plan of 10^{-6} to 10^{-4}, or 1-in-1 million to 1-in-10,000 exposed persons developing cancer (EPA 1990). ILCRs below 10^{-6} are considered acceptable; ILCRs above 10^{-4} are considered unacceptable. The range between 10^{-6} and 10^{-4} is of concern, and any decisions to address ILCRs further in this range, either through additional study or engineered control measures, should account for the uncertainty in the risk estimates.

The ILCR is calculated using the equation below (EPA 1989):

$$ILCR = I \times CSF \quad \textbf{(10)}$$

where

I = chronic daily intake or DAD calculated in the exposure assessment (mg/kg-d),
CSF = cancer slope factor $(mg/kg\text{-}d)^{-1}$.

For a given exposure pathway, the total risk to a receptor exposed to several carcinogenic COPCs is the sum of the ILCRs for each carcinogen, as shown in Equation 11 below:

$$ILCR_{total} = \Sigma ILCR_i \quad \textbf{(11)}$$

where

$ILCR_{total}$ = total probability of cancer incidence associated with all carcinogenic COPCs,
$ILCR_i$ = ILCR for the i^{th} COPC.

In addition to summing risks across all carcinogenic COPCs, risks are summed across all exposure pathways for a given environmental medium (e.g., ingestion, inhalation, and dermal contact with surface soil). Per EPA (1989) guidance, "there are two steps required to determine whether risks or hazard indices for two or more pathways should be combined for a single exposed individual or group of individuals. The first is to identify reasonable exposure pathway combinations. The second is to examine whether it is likely that the same individuals would consistently face the "reasonable maximum exposure" (RME) by more than one pathway." It is reasonable to assume the same individual may be exposed at the RME by multiple pathways to a given exposure medium. For example, a National Guard Trainee present at Load Line 1 can reasonably be assumed to both ingest surface soil and inhale contaminated dust from the same area.

Risks are not summed across multiple exposure media because it is not likely that the same individuals would consistently be exposed at the RME. Per EPA (1989) guidance "only if you can explain why the key RME assumptions for more than one pathway apply to the same individual or subpopulation should the RME risks for more than one pathway be combined." Two issues preclude exposure of the same individual to RME conditions for multiple exposure media.

- Exposure media are not always co-located and many EUs were evaluated. The Load Line 1 RI includes the evaluation of seven soil areas and four surface water/sediment areas.

- The RME estimate for each exposure pathway includes many conservative and upper-bound parameter values and assumptions. Combining these upper-bound exposures for various media would result in an overly conservative estimate of risk. For example, an upper-bound soil ingestion rate is used for all soil and sediment exposure media. A resident subsistence farmer child exposed to surface soil (200 mg/d), subsurface soil (200 mg/d), and sediment (200 mg/d) would be ingesting 600 mg of soil and/or sediment per day.

5.1.2 Risk Characterization for Non-carcinogens

In addition to developing cancer from exposure to contaminants, an individual may experience other toxic effects. The term "toxic effects" is used here to describe a wide variety of systemic effects ranging from minor irritations, such as eye irritation and headaches, to more substantial effects, such as kidney or liver disease and neurological damage. The risks associated with toxic (i.e., non-carcinogenic) chemicals are evaluated by comparing an estimated exposure (i.e., intake or dose) from site media to an acceptable exposure expressed as an RfD. The RfD is the threshold level below which no toxic effects are expected to occur in a population, including sensitive subpopulations. The ratio of intake over the RfD is the HQ (EPA 1989) and is calculated as:

$$HQ = I/RfD \quad \textbf{(12)}$$

where

I = daily intake or DAD of a COPC (mg/kg-d),
RfD = reference dose (mg/kg-d).

The HQs for each COPC are summed to obtain a hazard index (HI), as shown below:

$$HI = \Sigma HQ_i$$

where

HI = hazard index for all toxic effects,
HQ_i = hazard quotient for the i^{th} COPC.

An HI greater than 1 has been defined as the level of concern for potential adverse non-carcinogenic health effects (EPA 1989). This approach differs from the probabilistic approach used to evaluate carcinogens. An HQ of 0.01 does not imply a 1-in-100 chance of an adverse effect but indicates only that the estimated intake is 100 times less than the threshold level at which adverse health effects may occur.

In addition to summing hazards across all COPCs, hazards are summed across all exposure pathways for a given environmental medium. As described previously (Section 5.1.1), hazards are not summed across multiple exposure media because it is not likely that the same individuals would be consistently exposed at the RME.

5.1.3 Identification of Chemicals of Concern

COCs are defined for each medium as those contaminants that have an ILCR greater than 1×10^{-6} and/or an HI greater than 1 for a given receptor.

5.2 RISK CHARACTERIZATION RESULTS

Estimated risks for Load Line 1 are evaluated by EU and exposure medium for each land use/receptor combination. Four environmental media were evaluated for this BHHRA at Load Line 1: groundwater, surface water, sediment, and soil. Soil data are further aggregated by depth interval—shallow surface soil from 0 to 1 ft bgs, deep surface soil from 0 to 3 ft bgs, and subsurface soil from 1 to 3 ft bgs.

The EUs are evaluated to provide an estimate of risk from a RME. The RME incorporates a reasonable estimate of the concentration to which a receptor may be exposed (UCL_{95} on the mean). The use of the UCL_{95} on the mean as the EPC implies that a receptor may come into contact with contaminants throughout the EU.

Risks are characterized for each EU/exposure medium/land use/receptor combination. COCs are identified if the total ILCR for a chemical exceeds 10^{-6} or if total HIs exceed 1 for a land use/receptor combination.

5.2.1 Groundwater Results

Risks are estimated for the National Guard Trainee and Resident Subsistence Farmer receptors for data collected from monitoring wells within the Load Line 1 building area and completed in the sandstone bedrock. Hazard and risk results are presented in Tables A-10 and A-11, respectively, and are summarized in Table 5-1 below.

Table 5-1. Total Hazards/Risks and Chemicals of Concern in Groundwater

Receptor	Non-carcinogens		Carcinogens	
	HI	COCs	ILCR	COCs
National Guard Trainee	0.4		2E-05	2,4-DNT 2,6-DNT RDX 4,4'-DDE Arsenic
On-Site Resident Farmer (Adult)	3	Manganese	2E-04	2,4,6-TNT2,4-DNT 2,6-DNT RDX 4,4'-DDE Arsenic
On-Site Resident Farmer (Child)	11	Arsenic Manganese 2,4,6-TNT	2E-04	2,4,6-TNT 2,4-DNT 2,6-DNT RDX 4,4'-DDE Arsenic

COC = Chemical of concern.
DDE = Dichlorodiphenyldichloroethylene.
DNT = Dinitrotoluene.
HI = Hazard index.
ILCR = Incremental lifetime cancer risk.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.
TNT = Trinitrotoluene.

Arsenic is identified as a COC for both the National Guard and the On-Site Resident Farmer (adult and child) scenarios with risks of 1E-05 (National Guard) and 1E-04 (On-Site Resident Farmer Adult and Child) and an HI of 2.5 (On-Site Resident Farmer Child). Arsenic is naturally present in groundwater in the Ravenna area with reported background concentrations as follows:

Aquifer	Background Criteria[a, b] (µg/L)
Unconsolidated (filtered)	11.7
Unconsolidated (unfiltered)	215
Bedrock (filtered)	NA
Bedrock (unfiltered)	19.1

[a] Background criterion is the 95% upper tolerance limit (UTL).
[b] As reported in the *Phase II Remedial Investigation Report for the Winklepeck Burning Grounds at the Ravenna Army Ammunition Plant, Ravenna, Ohio* (USACE 2001).

The estimated risks from exposure of these receptors to background concentrations of arsenic are 2E-05 (filtered) and 3E-05 to 4E-04 (unfiltered) for the National Guard scenario and 1E-04 to 2E-04 (filtered) and 2E-04 to 4E-03 (unfiltered) for the On-Site Resident Farmer scenario. The estimated HIs from exposure of the On-Site Resident Farmer Child to background concentrations of arsenic are 4 (filtered) and 6 to 69 (unfiltered). The background risk and hazard for arsenic are similar to the estimated site-related risks and hazards.

Manganese is identified as a COC for the Resident Subsistence Farmer scenario with an HQ of 2 for the adult and 6 for the child. Manganese is naturally present in groundwater in the RVAAP area. The estimated HQs for a Resident Farmer Adult exposed to the background concentrations of manganese (1,020 to 2,868 µg/L for filtered and unfiltered samples) are 0.7 to 2. The estimated HQs for an On-Site Resident Farmer Child exposed to the background concentrations of manganese are 2 to 6. The background hazards for manganese are similar to the estimated site-related hazards for this metal.

Groundwater is not currently used at Load Line 1 but is evaluated in this BHHRA for potential future exposure. For the National Guard's potential future exposure to groundwater, total risk summed across all COPCs and all exposure pathways is estimated to be 2E-05. Five carcinogenic COCs were identified for the National Guard exposure to groundwater: 2,4-dinitrotoluene (DNT), 2,6-DNT, hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX), 4,4'-dichlorodiphenyldichloroethylene (DDE), and arsenic. The total HI summed across all COPCs and all exposure pathways is estimated to be <1 for this receptor; therefore, no non-carcinogenic COCs were identified for the National Guard scenario.

Evaluation of the On-Site Resident Farmer scenario results in total risks summed across all COPCs and all exposure pathways of 2E-04 (adult and child). Six carcinogenic COCs were identified for the residential exposure to groundwater at the Load Line 1 building area: 2,4,6-TNT, 2,4-DNT, 2,6-DNT, RDX, 4,4'-DDE, and arsenic. The total HIs summed across all COPCs and all exposure pathways are estimated to be 3 (adult) and 11 (child). The only non-carcinogenic COCs for residential exposure to groundwater are arsenic, manganese, and 2,4,6-TNT.

5.2.2 Surface Water and Sediment Results

Risks are estimated for four receptors [National Guard Trainee and Fire/Dust Suppression Worker, Recreational Hunter/Trapper/Fisher, and Resident Subsistence Farmer (adult and child)] for surface water and sediment at the following four EUs.

- Outlets D, E, and F, and Criggy's Pond;
- Outlet C and Charlie's Pond;
- Outlets A and B; and
- North area.

Surface Water – Direct Contact

Hazard and risk results for direct exposure to surface water via ingestion and dermal contact are presented in Tables A-12 and A-13, respectively, and summarized in Table 5-2 for the Outlet C and Charlie's Pond and Outlets D, E, and F, and Criggy's Pond EUs. Surface water samples were not collected at Outlets A and B or the North Area.

Table 5-2. Total Hazards/Risks and Chemicals of Concern for Surface Water – Direct Contact

Receptor	Non-carcinogens		Carcinogens	
	HI	COCs[a]	ILCR	COCs[a]
Outlet C and Charlie's Pond				
National Guard – Trainee	0.04	--	6E-06	Arsenic
National Guard – Fire/Dust Suppression	0.008	--	1E-06	Arsenic
Recreator – Hunter/Trapper/Fisher	0.003	--	5E-07	--
Resident Subsistence Farmer – Adult	0.2	--	4E-05	Arsenic
Resident Subsistence Farmer – Child	0.7	--	3E-05	Arsenic
Outlets D, E, and F and Criggy's Pond				
National Guard – Trainee	0.007	--	1E-06	Arsenic
National Guard – Fire/Dust Suppression	0.001	--	2E-07	--
Recreator – Hunter/Trapper/Fisher	0.0005	--	9E-08	--
Resident Subsistence Farmer – Adult	0.03	--	6E-06	Arsenic
Resident Subsistence Farmer – Child	0.1	--	5E-06	Arsenic

[a]Chemicals of potential concern are identified as chemicals of concern (COCs) if the total hazard index (HI) across all pathways is >1 or if the total incremental lifetime cancer risk (ILCR) is >1E-06.
-- = No COCs are identified for this receptor at this exposure unit.

Arsenic is identified as the only COC for the National Guard Trainee and for the Resident Subsistence Farmer (child and adult) at both Outlet C and Charlie's Pond and at Outlets D, E, and F, and Criggy's Pond. Arsenic is also a COC for the National Guard Fire/Dust Suppression Worker at Outlet C and Charlie's Pond. No surface water COCs are identified for the Hunter/Trapper/Fisher at either of these EUs. The National Guard Security Guard/Maintenance Worker is not exposed to surface water.

Hazard and risk results for sediment are presented in Tables A-14 and A-15, respectively, and summarized in Table 5-3 for the Outlet C and Charlie's Pond; Outlets A and B; and Outlets D, E, and F, and Criggy's Pond EUs. No sediment COPCs were identified at the North Area.

Table 5-3. Total Hazards/Risks and Chemicals of Concern for Sediment – Direct Contact

Receptor	Non-carcinogens		Carcinogens	
	HI	COCs[a]	ILCR	COCs[a]
Outlet C and Charlie's Pond				
National Guard – Trainee	7	Manganese	8E-06	Arsenic
National Guard – Fire/Dust Suppression	0.008	--	4E-07	--
Recreator – Hunter/Trapper/Fisher	0.005	--	4E-07	--
Resident Subsistence Farmer – Adult	0.6	--	4E-05	Arsenic PCB-1254, B(a)P
Resident Subsistence Farmer – Child	3	Arsenic	5E-05	Arsenic, PCB-1254
Outlets A and B				
National Guard – Trainee	0.4	--	2E-05	Arsenic, Cadmium B(a)P, B(b)F Dibenz(a,h)anthracene
National Guard – Fire/Dust Suppression	0.006	--	3E-06	B(a)P
Recreator – Hunter/Trapper/Fisher	0.004	--	3E-06	B(a)P
Resident Subsistence Farmer – Adult	0.4	--	3E-04	Arsenic, 2,4-DNT PCB-1254, B(a)A, B(a)P, B(b)F Dibenz(*a*,*h*)anthracene Indeno(1,2,3-*cd*)pyrene
Resident Subsistence Farmer – Child	2	--	2E-04	Arsenic, 2,4-DNT PCB-1254, B(a)A, B(a)P, B(b)F Dibenz(*a*,*h*)anthracene Indeno(1,2,3-*cd*)pyrene
Outlets D, E, and F and Criggy's Pond				
National Guard – Trainee	10	Manganese	7E-06	Arsenic
National Guard – Fire/Dust Suppression	0.03	--	3E-07	--
Recreator – Hunter/Trapper/Fisher	0.01	--	2E-07	--
Resident Subsistence Farmer – Adult	3	Antimony	3E-05	Arsenic
Resident Subsistence Farmer – Child	22	Antimony, Manganese	4E-05	Arsenic

[a]Chemicals of potential concern are identified as chemicals of concern (COCs) if the total hazard index (HI) across all pathways is >1 or if the total incremental lifetime cancer risk (ILCR) is >1E-06.
B(a)A = Benz(*a*)anthracene, B(a)P = Benzo(*a*)pyrene, and B(b)F = Benzo(*b*)fluoranthene.
PCB = Polychlorinated biphenyl.
-- = No COCs are identified for this receptor at this exposure unit.
DNT = Dinitrotoluene.

Arsenic and manganese are identified as COCs for National Guard Trainee use of the Outlet C and Charlie's Pond EU. No sediment COCs are identified for the National Guard Fire/Dust Suppression

Worker and Hunter/Trapper/Fisher at this EU. Arsenic, polychlorinated biphenyl (PCB) 1254, and benzo(*a*)pyrene are identified as COCs for residential use at this EU.

Various polycyclic aromatic hydrocarbons (PAHs) [benzo(*a*)pyrene, benzo(*b*)fluoranthene, and dibenz(*a,h*)anthracene], arsenic, and cadmium are identified as COCs at the Outlets A and B EU for the National Guard receptors. Benzo(*a*)pyrene is the only COC identified at the Outlets A and B EU for Recreational use. Arsenic, 2,4-DNT, PCB-1254, and several PAHs [benz(*a*)anthracene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, dibenz(*a,h*)anthracene, and indeno(1,2,3-*cd*)pyrene] are identified as COCs for the Resident Subsistence Farmer at this EU.

Arsenic and manganese are identified as COCs for the National Guard Trainee at the Outlets D, E, and F, and Criggy's Pond EU. No sediment COCs are identified for the National Guard Fire/Dust Suppression Worker and Hunter/Trapper/Fisher at this EU. Antimony, arsenic, and manganese are identified as COCs for residential use at this EU.

Surface Water and Sediment – Indirect Exposure

In addition to the direct contact pathways described above, the Hunter/Trapper/Fisher may be exposed to COPCs in surface water and sediment via ingestion of fish and waterfowl. Fish are assumed to bioaccumulate COPCs from surface water, as described in Appendix B. Waterfowl are assumed to accumulate contaminants via ingestion of surface water, aquatic plants, sediment, and sediment-dwelling invertebrates, as described in Appendix B. Hazard and risk results for ingestion of fish and waterfowl are presented in Tables A-16 and A-17, respectively, and summarized in Table 5-4 below for the Outlet C and Charlie's Pond, and Outlets D, E, and F, and Criggy's Pond EUs. Surface water samples were not collected at the Outlets A and B and North Area EUs. Because of the lack of surface water, these EUs are not considered viable habitat for fish or waterfowl.

Table 5-4. Total Hazards/Risks and Chemicals of Concern for Surface Water and Sediment – Fish and Waterfowl

Receptor	Non-carcinogens		Carcinogens	
	HI	COCs[a]	ILCR	COCs[a]
Outlet C and Charlie's Pond				
Recreator – Hunter/Trapper/Fisher				
Fish Ingestion	0.3	--	5E-05	Arsenic
Waterfowl Ingestion	189	Arsenic PCB-1254	4E-03	Arsenic B(a)P, PCB-1254
Resident Subsistence Farmer – Adult				
Fish Ingestion	0.3	--	5E-05	Arsenic
Resident Subsistence Farmer – Child				
Fish Ingestion	1	Arsenic	5E-05	Arsenic
Outlets D, E, and F and Criggy's Pond				
Recreator – Hunter/Trapper/Fisher				
Fish Ingestion	0.04	--	8E-06	Arsenic
Waterfowl Ingestion	14	Antimony Arsenic	2E-04	Arsenic
Resident Subsistence Farmer – Adult				
Fish Ingestion	0.04	--	8E-06	Arsenic
Resident Subsistence Farmer – Child				
Fish Ingestion	0.2	--	8E-06	Arsenic

[a]Chemicals of potential concern are identified as chemicals of concern (COCs) if the total hazard index (HI) across all pathways is >1 or if the total incremental lifetime cancer risk (ILCR) is >1E-06.
B(a)P = Benzo(*a*)pyrene.
PCB = Polychlorinated biphenyl.

With the exception of arsenic, all of the COCs listed in Table 5-4 are associated with sediment. Arsenic is associated with both sediment and surface water.

Surface Water and Sediment – Evaluation of Lead

Lead was identified as a COPC in surface water at Outlet C and Charlie's Pond. For the Resident Subsistence Farmer Adult exposed to surface water, the estimated probability of fetal blood lead concentrations exceeding acceptable levels was less than 1% at this EU (Table C-1). For the Resident Subsistence Farmer Child receptor, the estimated probability of exceeding the target blood lead level of 10 μg/dL at this EU is less than 90% (see Table C-2).

Lead was also identified as a COPC in sediment at Outlets A and B and at Outlets D, E, and F, and Criggy's Pond. For the Resident Subsistence Farmer Adult receptor exposed to sediment, the estimated probability of fetal blood lead concentrations exceeding acceptable levels was less than 9% at Outlets A and B (Table C-3) and less than 29% at Outlets D, E, and F, and Criggy's Pond (Table C-4). For the child receptor, the estimated probabilities of exceeding target blood lead levels were 51% at Outlets A and B and 90% at Outlets D, E, and F, and Criggy's Pond (Table C-5).

5.2.3 Soil Results

Risks were evaluated for seven EUs for surface soil (shallow and deep) and subsurface soil. The soil EUs are

- Buildings CB-3 and -801;
- Buildings CB-4/4A and CA-6/6A;
- Buildings CB-13 and -10;
- Buildings CB-14, CB-17, and CA-15;
- the Water Tower;
- the Change Houses (CB-12, -23, -8, and -22); and
- the Perimeter Area.

5.2.3.1 Surface soil – direct contact

Hazard and risk results for direct contact with COPCs in surface soil are presented in Tables A-18 and A-19 (shallow surface soil) and Tables A-20 and A-21 (deep surface soil). The National Guard Trainee is assumed to be exposed to deep surface soil. All other receptors are exposed to shallow surface soil. Results are summarized for all receptors in Table 5-5 below for the seven soil EUs.

Manganese is identified as a COC for the National Guard Trainee scenario at six EUs: Buildings CB-13 and -10; Buildings CB-14, CB-17, and CA-15; Buildings CB-3 and -801; Buildings CB-4/4A and CA-6/6A; the Change Houses; and the Perimeter Area, with HQs of 2 to 4. Manganese is naturally present in soils in the Ravenna area. The estimated HQ for a National Guard Trainee exposed to the background concentration of manganese (1,450 mg/kg) is 4. The HIs related to manganese at the Load Line 1 EPCs do not exceed that estimated for facility-wide background.

Arsenic is identified as a COC for the National Guard Trainee, National Guard Security Guard/Maintenance Worker, and Resident Subsistence Farmer scenarios at six EUs: Buildings CB-13 and -10; Buildings CB-14, CB-17, and CA-15; Buildings CB-3 and -801; Buildings CB-4/4A and CA-6/6A; Change Houses (CB-12, -23, -8, and -22); and the Perimeter Area. Arsenic is also naturally present in soils in the Ravenna area. The estimated risks from exposure of these receptors to the background concentration of arsenic (15.4 mg/kg)

Table 5-5. Total Hazards/Risks and Chemicals of Concern for Surface Soil[a]: Direct Contact

Receptor	Non-carcinogens		Carcinogens	
	HI	COCs[b]	ILCR	COCs[b]
CB-13 and -10				
National Guard – Trainee	4	Manganese	5E-06	Arsenic
National Guard – Security Guard/Maint.	0.4	--	1E-05	Arsenic, B(a)P, PCB-1254
National Guard – Fire/Dust Suppression	0.01	--	4E-07	--
Recreator – Hunter/Trapper/Fisher	0.01	--	4E-07	--
Resident Subsistence Farmer – Adult	1	--	4E-05	Arsenic, B(a)P, PCB-1254 2,4,6-TNT, 2,4-DNT
Resident Subsistence Farmer – Child	4	PCB-1254	3E-05	Arsenic, B(a)P, PCB-1254 2,4,6-TNT, 2,4-DNT
CB-14, CB-17, and CA-15				
National Guard – Trainee	4	Manganese	1E-05	Arsenic, PCB-1254
National Guard – Security Guard/Maint.	0.9	--	3E-05	Arsenic, B(a)P, PCB-1254 Dibenz(*a,h*)anthracene, RDX
National Guard – Fire/Dust Suppression	0.03	--	1E-06	--
Recreator – Hunter/Trapper/Fisher	0.02	--	9E-07	--
Resident Subsistence Farmer – Adult	2	PCB-1254	8E-05	Arsenic, B(a)A, B(a)P, B(b)F, PCB-1254, RDX Dibenz(*a,h*)anthracene, Indeno(1,2,3-*cd*)pyrene
Resident Subsistence Farmer – Child	6	PCB-1254	7E-05	Arsenic, B(a)P, B(b)F, Dibenz(*a,h*)anthracene, PCB-1254, RDX
CB-3 and -801				
National Guard – Trainee	4	Manganese	2E-05	Arsenic, B(a)A, B(a)P, B(b)F, PCB-1254 Dibenz(*a,h*)anthracene
National Guard – Security Guard/Maint.	0.8	--	2E-04	Arsenic B(a)A, B(a)P, B(b)F Dibenz(*a,h*)anthracene Indeno(1,2,3-*cd*)pyrene PCB-1254
National Guard – Fire/Dust Suppression	0.03	--	4E-06	B(a)P
Recreator – Hunter/Trapper/Fisher	0.02	--	4E-06	B(a)P
Resident Subsistence Farmer – Adult	2	PCB-1254	3E-04	Arsenic, Dieldrin B(a)A, B(a)P, B(b)F Dibenz(*a,h*)anthracene Indeno(1,2,3-*cd*)pyrene PCB-1254
Resident Subsistence Farmer – Child	9	Antimony, PCB-1254	2E-04	Arsenic, B(a)A, B(a)P, B(b)F Dibenz(*a,h*)anthracene Indeno(1,2,3-*cd*)pyrene PCB-1254
CB-4/4A and CA-6/6A				
National Guard – Trainee	23	Manganese PCB-1254	3E-04	Arsenic 2,4,6-TNT, RDX PCB-1254
National Guard – Security Guard/Maint.	178	2,4,6-TNT PCB-1254	3E-03	Arsenic, Dieldrin 2,4,6-TNT, RDX B(a)P, PCB-1254

Table 5-5. Total Hazards/Risks and Chemicals of Concern for Surface Soil[a]: Direct Contact (continued)

Receptor	Non-carcinogens		Carcinogens	
	HI	COCs[b]	ILCR	COCs[b]
National Guard – Fire/Dust Suppression	5	PCB-1254	7E-05	PCB-1254
Recreator – Hunter/Trapper/Fisher	4	PCB-1254	7E-05	PCB-1254
Resident Subsistence Farmer – Adult	319	PCB-1254, 2,4,6-TNT	5E-03	Arsenic, Dieldrin 2,4,6-TNT, 2,6-DNT, RDX B(a)A, B(a)P, B(b)F, PCB-1254, Dibenz(*a,h*)anthracene
Resident Subsistence Farmer – Child	932	PCB-1254, 2,4,6-TNT	3E-03	Arsenic, Dieldrin 2,4,6-TNT, RDX B(a)P, PCB-1254
Change Houses				
National Guard – Trainee	2	Manganese	4E-06	Arsenic
National Guard – Security Guard/Maint.	0.05	--	5E-06	Arsenic
National Guard – Fire/Dust Suppression	0.002	--	2E-07	--
Recreator – Hunter/Trapper/Fisher	0.001	--	2E-07	--
Resident Subsistence Farmer – Adult	0.2	--	2E-05	Arsenic, B(a)P
Resident Subsistence Farmer – Child	1	--	2E-05	Arsenic
Perimeter Area				
National Guard – Trainee	4	Manganese	4E-06	Arsenic
National Guard – Security Guard/Maint.	0.05	--	5E-06	Arsenic
National Guard – Fire/Dust Suppression	0.003	--	2E-07	--
Recreator – Hunter/Trapper/Fisher	0.002	--	2E-07	--
Resident Subsistence Farmer – Adult	0.2	--	2E-05	Arsenic
Resident Subsistence Farmer – Child	1	--	2E-05	Arsenic
Water Tower				
National Guard – Trainee	0.001	--	NA	--
National Guard – Security Guard/Maint.	0.0008	--	NA	--
National Guard – Fire/Dust Suppression	0.00009	--	NA	--
Recreator – Hunter/Trapper/Fisher	0.00005	--	NA	--
Resident Subsistence Farmer – Adult	0.01	--	NA	--
Resident Subsistence Farmer – Child	0.1	--	NA	--

[a] Deep [0 to 3 ft below ground surface (bgs)] surface soil is used for National Guard Trainee; shallow (0 to 1 ft bgs) surface soil is used for all other receptors.
[b] Chemicals of potential concern (COPCs) are identified as chemicals of concern (COCs) if the total hazard index (HI) across all pathways is >1 or if the total incremental lifetime cancer risk (ILCR) is >1E-06.
B(a)A = Benz(*a*)anthracene, B(a)P = Benzo(*a*)pyrene, B(b)F = Benzo(*b*)fluoranthene, and 2,4,6-TNT = 2,4,6-Trinitrotoluene.
DNT = Dinitrotoluene.
NA = Not Applicable; no carcinogenic COPCs were identified at this exposure unit.
PCB = polychlorinated biphenyl.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.
-- = No COCs are identified for this receptor at this exposure unit.

are 5E-06 for the Trainee, 6E-06 for the Security Guard/Maintenance Worker, and 2E-05 to 3E-05 for the Resident Subsistence Farmer. Estimated risks to these receptors from arsenic at these six EUs range from 4E-06 to 4E-05.

Arsenic is the only COC identified for the National Guard Trainee at Buildings CB-13 and -10. Three COCs are identified for the National Guard Security Guard/Maintenance Worker [arsenic, benzo(*a*)pyrene, and PCB-1254]. Two additional COCs (2,4,6-TNT and 2,4-DNT) are identified for the

Resident Subsistence Farmer scenario. No COCs are identified for the National Guard Fire/Dust Suppression Worker or Recreational receptors at this EU.

Three COCs (arsenic, manganese, and PCB-1254) are identified for the National Guard Trainee at Buildings CB-14, CB-17, and CA-15. Five COCs are identified for the National Guard Security Guard/Maintenance Worker [arsenic, RDX, benzo(*a*)pyrene, dibenz(*a*,*h*)anthracene, and PCB-1254]. These and an additional three COCs [benzo(*a*)anthracene, benzo(*b*)fluoranthene, and indeno(1,2,3-*cd*)pyrene] are identified for the Resident Subsistence Farmer scenario. No COCs are identified for National Guard Fire/Dust Suppression Worker or Recreational receptors at this EU.

Eight COCs are identified for one or more National Guard receptors (Trainee, Security Guard/Maintenance Worker, or Fire/Dust Suppression Worker) at Buildings CB-3 and-801 [arsenic, manganese, benz(*a*)anthracene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, dibenz(*a*,*h*)anthracene, indeno(1,2,3-*cd*)pyrene, and PCB-1254]. Nine COCs are identified for the Resident Subsistence Farmer [arsenic, antimony, benz(*a*)anthracene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, dibenz(*a*,*h*)anthracene, indeno(1,2,3-*cd*)pyrene, dieldrin, and PCB-1254]. Benzo(*a*)pyrene is also identified as a COC for the Hunter/Trapper/Fisher at this EU.

Seven COCs are identified for one or more National Guard receptors at Buildings CB-4/4A and CA-6/6A [arsenic, manganese, 2,4,6-TNT, RDX, benzo(*a*)pyrene, dieldrin, and PCB-1254]. Ten COCs are identified for the Resident Subsistence Farmer [arsenic, 2,4,6-TNT, 2,6-DNT, RDX benz(*a*)anthracene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, dibenz(*a*,*h*)anthracene, dieldrin, and PCB-1254]. PCB-1254 is also identified as a COC for the Hunter/Trapper/Fisher at this EU.

Arsenic, manganese, and benzo(*a*)pyrene (for the Resident Subsistence Farmer) are the only COCs identified at the Change Houses.

No COCs are identified at the Water Tower or Perimeter Areas (with the exception of arsenic and manganese related to background).

5.2.3.2 Surface soil – indirect contact

Risk and hazard results for indirect contact with COPCs in surface soil are presented in Tables 6-15 (a and b) in the Final LL1 RIR (SAIC 2004) and are summarized in Table 5-6 below for the seven soil EUs. Indirect contact includes ingestion of venison, beef, milk, and vegetables by the Resident Subsistence Farmer (adult and child). One metal, copper, was not quantitatively evaluated in the Final LL1 RIR because no toxicity value was available. An RfD has since become available for oral exposure to copper and hazards from indirect exposure to copper are included in the results shown in Table 5-6.

Arsenic and manganese are identified as COCs at Buildings CB-3 and -801; Buildings CB-4/4A and CA-6/6A; Buildings CB-13 and -10; Buildings CB-14, CB-17, and CA-15; Change Houses (CB-12, -23, -8, -22); and the Perimeter Area. Estimated HQs for ingestion of arsenic in foodstuffs range from 11 to 14 (adult) and 54 to 63 (child) at six of these EUs, with HQs of 23 (adult) and 105 (child) at Buildings CB-14, CB-17, and CA-15. Estimated risks for ingestion of arsenic in foodstuffs range from 2E-03 to 4E-03 for both adult and child. Estimated HQs for ingestion of manganese in foodstuffs range from 2 to 4 (adult) and 9 to 18 (child). These metals are naturally present in soils in the Ravenna area. The estimated hazard and risk from exposure of these receptors to arsenic via ingestion of foodstuffs to the background concentration of arsenic in soil (15.4 mg/kg) are 16 and 76 (adult and child HQs) and 3E-03 (both adult and child ILCR). The estimated HQs for the adult and child On-Site Resident Farmer receptor exposed to the background concentration of manganese (1,450 mg/kg) via ingestion of foodstuffs are 4 and 18.

Table 5-6. Total Hazards/Risks and Chemicals of Concern for Surface Soil: Ingestion of Foodstuffs

Receptor	Non-carcinogens		Carcinogens		
	HI	COCs	ILCR	COCs	
Buildings CB-3 and -801					
Resident Subsistence Farmer (Adult)	215	PCB-1254 Antimony Arsenic Cadmium Manganese Thallium	4E-02	PCB-1254 Arsenic Dieldrin	Benzo(*a*)anthracene Benzo(*a*)pyrene Benzo(*b*)fluoranthene Dibenz(*a*,*h*)anthracene Indeno(1,2,3-*cd*)pyrene
Resident Subsistence Farmer (Child)	1,086	PCB-1254 Antimony Arsenic Cadmium Manganese Thallium Dieldrin	4E-02	PCB-1254 Arsenic Dieldrin	Benzo(*a*)anthracene Benzo(*a*)pyrene Benzo(*b*)fluoranthene Dibenz(*a*,*h*)anthracene Indeno(1,2,3-*cd*)pyrene
Buildings CB-4/4A and CA-6/6A					
Resident Subsistence Farmer (Adult)	27,729	PCB-1254 Arsenic Copper Manganese Thallium Endrin Aldehyde 1,3-Dinitrobenzene 2,4,6-TNT 2,6-DNT RDX	4E-01	PCB-1254 Arsenic 2,4,6-TNT 2,6-DNT RDX 4,4'-DDE Dieldrin	Benzo(*a*)anthracene Benzo(*a*)pyrene Benzo(*b*)fluoranthene Dibenz(*a*,*h*)anthracene Heptachlor gamma-Chlordane
Resident Subsistence Farmer (Child)	150,325	PCB-1254 Arsenic Barium Cadmium Copper Manganese Mercury Thallium Vanadium Dieldrin Endrin Aldehyde gamma-Chlordane 1,3-Dinitrobenzene 2,4,6-TNT 2,6-DNT RDX	4E-01	PCB-1254 Arsenic 2,4,6-TNT 2,6-DNT RDX 4,4'-DDE Dieldrin	Benzo(*a*)anthracene Benzo(*a*)pyrene Benzo(*b*)fluoranthene Dibenz(*a*,*h*)anthracene Heptachlor gamma-Chlordane
Buildings CB-13 and -10					
Resident Subsistence Farmer (Adult)	104	PCB-1254 Arsenic Cadmium Copper Manganese Thallium 2,4,6-TNT	3E-03	PCB-1254 Arsenic 2,4,6-TNT 2,4-DNT RDX	Benzo(*a*)pyrene

Table 5-6. Total Hazards/Risks and Chemicals of Concern for Ingestion of Foodstuffs (continued)

Receptor	Non-carcinogens		Carcinogens		
	HI	COCs	ILCR	COCs	
Resident Subsistence Farmer (Child)	519	PCB-1254 Antimony Arsenic Cadmium Copper Manganese Thallium 2,4-DNT 2,4,6-TNT RDX	3E-03	PCB-1254 Arsenic 2,4,6-TNT 2,4-DNT RDX	Benzo(*a*)pyrene
Buildings CB-14, CB-17, and CA-15					
Resident Subsistence Farmer (Adult)	162	PCB-1254 Arsenic Cadmium Manganese Nickel Thallium Vanadium 2,4,6-TNT RDX	1E-02	PCB-1254 Arsenic 2,4,6-TNT RDX	Benzo(*a*)anthracene Benzo(*a*)pyrene Benzo(*b*)fluoranthene Dibenz(*a*,*h*)anthracene Indeno(1,2,3-*cd*)pyrene
Resident Subsistence Farmer (Child)	847	PCB-1254 Arsenic Barium Cadmium Manganese Nickel Thallium Vanadium 2,4,6-TNT RDX	1E-02	PCB-1254 Arsenic 2,4,6-TNT RDX	Benzo(*a*)anthracene Benzo(*a*)pyrene Benzo(*b*)fluoranthene Dibenz(*a*,*h*)anthracene Indeno(1,2,3-*cd*)pyrene
Water Tower					
Resident Subsistence Farmer (Adult)	4	Thallium	NA		
Resident Subsistence Farmer (Child)	18	Thallium	NA		
Change Houses (CB-12, -23, -8, and -22)					
Resident Subsistence Farmer (Adult)	21	Antimony Arsenic Cadmium Manganese Thallium	3E-03	Arsenic	Benzo(*a*)pyrene
Resident Subsistence Farmer (Child)	98	Antimony Arsenic Cadmium Manganese Thallium	2E-03	Arsenic	Benzo(*a*)pyrene

Table 5-6. Total Hazards/Risks and Chemicals of Concern for Ingestion of Foodstuffs (continued)

Receptor	Non-carcinogens		Carcinogens	
	HI	COCs	ILCR	COCs
Perimeter Area				
Resident Subsistence Farmer (Adult)	21	Arsenic Manganese Thallium	3E-03	Arsenic
Resident Subsistence Farmer (Child)	97	Arsenic Manganese Thallium	2E-03	Arsenic

COC = Chemical of concern.
DDE = Dichlorodiphenyldichloroethylene.
DNT = Dinitrotoluene.
HI = Hazard index.
ILCR = Incremental lifetime cancer risk.
NA = Not applicable; no carcinogenic COPCs were identified at this exposure unit.
PCB = Polychlorinated biphenyl.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.
TNT = Trinitrotoluene.

Vanadium is identified as a COC for the Resident Subsistence Farmer at Buildings CB-4/4A and CA-6/6A (child HQ = 4), and CB-14, CB-17, and CA-15 (adult HQ = 2, child HQ = 7). Vanadium is naturally present in soils in the Ravenna area. The estimated HQs for an Resident Subsistence Farmer receptors exposed to the background concentration of vanadium (31.1 mg/kg) are 1 (adult) and 6 (child).

Nickel is identified as a COC for the Resident Subsistence Farmer scenario at Buildings CB-14, CB-17, and CA-15 with HQs of 1 (adult) and 7 (child). Nickel is also naturally present in soils in the Ravenna area. The estimated HQs for Resident Subsistence Farmer receptors exposed to the background concentration of nickel (21.1 mg/kg) are 1 (adult) and 7 (child).

Antimony is identified as a COC for the Resident Subsistence Farmer scenario at Buildings CB-3 and -801 (adult HQ = 85, child HQ = 396), CB-13 and -10 (child HQ = 5), and Change Houses (adult HQ = 2, child HQ = 8). Antimony is naturally present in soils in the Ravenna area. The estimated HQs for Resident Subsistence Farmer receptors exposed to the background concentration of antimony (0.96 mg/kg) are 1 (adult) and 3 (child).

Barium is identified as a COC for the Resident Subsistence Farmer child scenario at Buildings CB-4/4A and CA-6/6A (HQ=3) and Buildings CB-14, CB-17, and CA-15 (HQ = 3). Barium is naturally present in soils in the Ravenna area. The estimated HQ for the Resident Subsistence Farmer child exposed to the background concentration of barium (88.4 mg/kg) is 2.

Mercury is identified as a COC for the Resident Subsistence Farmer child scenario at Buildings CB-4/4A and CA-6/6A (HQ=2). Mercury is naturally present in soils in the Ravenna area. The estimated HQ for the Resident Subsistence Farmer child exposed to the background concentration of mercury (0.036 mg/kg) is 0.2.

Copper is identified as a COC for the Resident Subsistence Farmer (adult and child) scenario at Buildings CB-4/4A and CA-6/6A (HQs = 2 for adult and 13 for child) and Buildings CB-13 and -10 (HQs = 1 for adult and 7 for child). Copper is naturally present in soils in the Ravenna area. The estimated HQs for the Resident Subsistence Farmer exposed to the background concentration of copper (18 mg/kg) are 0.2 (adult) and 1 (child).

Cadmium and thallium are identified as COCs for the Resident Subsistence Farmer (adult and child) scenarios at Buildings CB-3 and -801; Buildings CB-4/4A and CA-6/6A; Buildings CB-13 and -10; Buildings CB-14, CB-17, and CA-15; and the Change Houses (CB-12, -23, -8, -22). Thallium HQs for these EUs range from 2 to 5 (adult) and 12 to 25 (child). Cadmium HQs range from <1 to 3 (adult) and 4 to 16 (child). Site-specific background concentrations are not available for these two metals.

Thallium is the only COC identified at the Water Tower and Perimeter Areas (with the exception of manganese and arsenic related to background at the Perimeter Area) with HQs for the Resident Subsistence Farmer of 4 (adult) and 17 (child) for both of these EUs.

COCs identified for the Resident Subsistence Farmer at Buildings CB-3 and -801; Buildings CB-4/4A and CA-6/6A; Buildings CB-13 and -10; Buildings CB-14, CB-17, and CA-15; and the Change Houses (CB-12, -23, -8, -22) include explosives (2,4,6-TNT, 2,4-DNT, 2,6-DNT, 1,3-dinitrobenzene, and RDX), PAHs [benzo(*a*)anthracene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, benzo(*k*)fluoranthene, dibenz(*a*,*h*)anthracene, and indeno(1,2,3-*cd*)pyrene], PCB-1254, and pesticides (4,4'-DDE, dieldrin, gamma-chlordane, endrin aldehyde, and heptachlor).

Surface Soil – Evaluation of Lead

Lead was identified as a COPC in shallow surface soil at the following EUs: Buildings CB-3 and -801; Buildings CB-4/4A and CA-6/6A; Buildings CB-13 and -10; Buildings CB-14, CB-17, and CA-15; Change Houses (CB-12, -23, -8, -22); and the Water Tower.

For all adult receptors exposed to shallow surface soil, the estimated probability of fetal blood lead concentrations exceeding acceptable levels was less than 12% at Buildings CB-3 and -801 (Table C-6); less than 4% at Buildings CB-4/4A and CA-6/6A (Table C-7); less than 4% at Buildings CB-13 and -10 (Table C-8); less than 2% at Buildings CB-14, CB-17, and CA-15 (Table C-9); less than 3% at the Change Houses (Table C-10); and less than 65% at the Water Tower (Table C-11).

For the child receptor, the estimated probabilities of exceeding target blood lead levels were as follows: 61% at Buildings CB-3 and -801; 20% at Buildings CB-4/4A and CA-6/6A; 16% at Buildings CB-13 and -10; 2% at Buildings CB-14, CB-17, and CA-15; 8% at Change Houses (CB-12, -23, -8, -22); and 99% at the Water Tower (Table C-12).

5.2.3.3 Subsurface soil

Hazard and risk results for direct contact with COPCs in subsurface soil are presented in Tables A-22 and A-23, respectively, and summarized in Table 5-7 below for two soil EUs (Buildings CB-4/4A and CA-6/6A; and Buildings CB-13 and -10). No COPCs were identified at Buildings CB-14, CB-17, and CA-15 or at the Perimeter Area EU, and no subsurface samples were collected at the remaining soil EUs. Risks are presented for direct contact with subsurface soil by the Resident Subsistence Farmer (adult and child). Direct contact includes incidental ingestion of soil, inhalation of VOCs and particulates (i.e., dust), and dermal contact with soil.

Two explosives (2,4,6-TNT and RDX) are identified as COCs for the Resident Subsistence Farmer at Buildings CB-4/4A and CA-6/6A.

Antimony is the only COC identified at Buildings CB-13 and -10.

Table 5-7. Total Hazards/Risks and Chemicals of Concern for Direct Contact with Subsurface Soil

Receptor	Non-carcinogens		Carcinogens	
	HI	COCs	ILCR	COCs
Buildings CB-4/4A and CA-6/6A				
On-Site Resident Farmer (Adult)	9	2,4,6-TNT	7E-05	2,4,6-TNT RDX
On-Site Resident Farmer (Child)	32	2,4,6-TNT	5E-05	2,4,6-TNT RDX
Buildings CB-13 and -10				
On-Site Resident Farmer (Adult)	0.3		1E-08	
On-Site Resident Farmer (Child)	2	Antimony	6E-09	

COC = Chemical of concern.
HI = Hazard index.
ILCR = Incremental lifetime cancer risk.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.
TNT = Trinitrotoluene.

Lead was identified as a COPC in subsurface soil at Buildings CB-13 and -10 and at Buildings CB-14, CB-17 and CA-15. For all adult receptors exposed to subsurface soil, the estimated probability of fetal blood lead concentrations exceeding acceptable levels was less than 10% at both of these EUs (see Tables C-13 and C-14, respectively). For the child receptor, the estimated probabilities of exceeding target blood lead levels are 41% at Buildings CB-13 and -10 and 56% Buildings CB-14, CB-17 and CA-15 (Table C-15).

5.2.4 Summary of Chemicals of Concern for all Media and Receptors

Table 5-8 presents a summary of the receptor/medium combinations that have COCs (i.e., chemicals with risks > 10^{-6} or hazards > 1) in this BHHRA. RGOs are calculated and presented in Chapter 6.0 for the 16 COCs identified from direct exposure pathways in this BHHRA.

Table 5-8. Receptor/Medium/Exposure Unit Combinations with COCs at Load Line 1

COC	Groundwater		Surface Water[a]				Sediment[a]				Surface Soil[b]					Subsurface Soil
	National Guard		National Guard				National Guard				National Guard					
	National Guard Trainee	Resident Farmer[c]	Trainee	Fire/Dust Control	Hunt/ Trap/Fish	Resident Farmer[c]	Trainee	Fire/Dust Control	Hunt/ Trap/Fish	Resident Farmer[c]	Trainee	Sec. Guard/ Maint. Worker	Fire/Dust Control	Hunt/ Trap/Fish	Resident Farmer[c]	Resident Farmer[c]
Metals																
Antimony					E[d]					E					3	13
Arsenic	LL1	LL1	C,E	C	C[d],E[d]	C[e],E[e]	A,C,E			A,C,E	3,4,13,14,CH,P	3,4,13,14,CH,P			3,4,13,14,CH,P	
Cadmium							A									
Manganese		LL1					C,E			E	3,4,13,14,CH,P					
Explosives																
2,4,6-Trinitrotoluene		LL1									4	4			4,13	4
2,4-Dinitrotoluene	LL1	LL1								A					13	
2,6-Dinitrotoluene	LL1	LL1													4	
RDX	LL1	LL1									4	4,14			4,14	4
PCBs																
PCB-1254					C[d]					A,C	3,4,14	3,4,13,14	4	4	3,4,13,14	
Pesticides																
4,4'-DDE	LL1	LL1														
Dieldrin												4			3,4	
PAHs																
Benz(*a*)anthracene										A	3	3			3,4,14	
Benzo(*a*)pyrene					C[d]		A	A	A	A,C	3	3,4,13,14	3	3	3,4,13,14,CH	
Benzo(*b*)fluoranthene							A			A	3	3			3,4,14	
Dibenz(*a,h*)anthracene							A			A	3	3,14			3,4,14	
Indeno(1,2,3-*cd*)pyrene										A		3			3,14	

Groundwater Exposure Unit
LL1 = Load Line 1 Bedrock aquifer.

Surface Water and Sediment Exposure Units
C = Outlet C and Charlie's Pond.
A = Outlets A and B.
E = Outlets D, E, and F, and Criggy's Pond.

Soil Exposure Units
3 = CB-3 and -801.
4 = CB-4/4A and CA-6/6A.
13 = CB-13 and -10.
14 = CB-14, CB-17, and CA-15.
CH = Change Houses (CB-12, -23, -8, -22).
P = Perimeter Area.

[a] Chemicals listed are for direct contact with surface water or sediment unless otherwise noted.
[b] Surface soil is defined as 0 to 3 ft below ground surface (bgs) for the National Guard Trainee and 0 to 1 ft bgs for all other receptors.
[c] Results for both adult and child Resident Subsistence Farmer.
[d] Chemical is a COC for waterfowl/fish ingestion only.
[e] Chemical is a COC for both direct contact and waterfowl/fish ingestion.
COC = Chemical of concern.
DDE = Dichlorodiphenyldichloroethylene.
PAH = Polycyclic aromatic hydrocarbon.
PCB = Polychlorinated biphenyl.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.

5.3 UNCERTAINTY ANALYSIS

This section identifies the uncertainties associated with each step of the risk assessment process, where possible. Uncertainties are not cumulative and are not mutually exclusive. Uncertainties Associated with the Data Evaluation.

Although the data evaluation process used to select COPCs adheres to established procedures and guidance, it also requires making decisions and developing assumptions on the basis of historical information, disposal records, process knowledge, and best professional judgment about the data. Uncertainties are associated with all such assumptions. The background concentrations and PRGs used to screen analytes are also subject to uncertainty.

In addition, the determination of the chemical for certain analytes is subject to various assumptions. For example, it is assumed that all metallic thallium is present as the most toxic form (thallium carbonate).

Another area of uncertainty involves the qualitative evaluation (and elimination from further consideration) of essential nutrients, many of which have no available toxicity values. In addition, the toxicity values used in the derivation of PRGs are subject to change, as additional information becomes available from scientific research. These periodic changes in toxicity values may cause the PRG values to change as well.

Uncertainty can be introduced in the data aggregation process. Any changes to criteria governing how data are grouped affect the summary statistics. For example, if data from a single sample are removed from an aggregate, the MDC could change for that aggregate. This change could effect whether an analyte remains on, or is removed from, the COPC list for that aggregate (since the MDC is used in the PRG screening process). Other summary statistics could be affected as well.

Representative exposure concentrations are calculated in this BHHRA based on the assumption that the samples collected from each EU are truly random samples. In fact, only the samples collected from the perimeter EU were collected randomly. Sample locations for all other EUs were biased to identify areas of highest contaminant concentrations. Seasonal variations in the data may also exist (especially with the surface water and groundwater data), which may not have been captured in the calculation of the EPCs.

In addition, in the evaluation of the various media, environmental concentrations are assumed to be constant (i.e., concentrations are not reduced by loss due to natural removal processes such as volatilization, leaching, and/or biodegradation). Since the source of contamination (i.e., production and demilitarization of munitions) no longer exists at Load Line 1, this assumption is a source of uncertainty.

Some unavoidable uncertainty is associated with the contaminant concentrations detected and reported by the analytical laboratory. The quality of the analytical data used in the risk assessment depends on the adequacy of the set of procedures that specifies how samples are selected and handled and how strictly these procedures are followed. Quality assurance (QA)/QC procedures within the laboratories are used to minimize uncertainties; however, sampling errors, laboratory analysis errors, and data analysis errors can occur.

Some current analytical methods are limited in their ability to achieve detection limits at or below risk-based screening levels (i.e., PRG concentrations). Under these circumstances, it is uncertain whether the true concentration is above or below the PRGs, which are protective of human health. When analytes are on the COPC list and have a mixture of detected and non-detected concentrations, risk calculations may be affected by these detection limits. Risks may be overestimated as a result of some sample concentrations being reported as non-detected at the method detection limit (MDL), which may be greater than the PRG concentration (when the actual concentration may be much smaller than the MDL). Risks

may also be underestimated because some analytes that are not detected in any sample are removed from the COPC list. If the concentrations of these analytes are below the MDL but are above the PRG, the risk from these analytes would not be included in the risk assessment results.

Common laboratory contaminants [e.g., bis(2-ethylhexyl)phthalate] appear on the COPC list. In the data assessment process, elevated levels of these common laboratory contaminants can be evaluated to see if the detected concentrations are likely to be "false positives" (i.e., at high concentrations due to laboratory interference). This process involves a check against the concentrations detected in the associated laboratory method blank.

The selection of COPCs in this BHHRA relied primarily on analyte concentrations obtained as the result of field sampling of primary and secondary media assessed for the RI. The sources of COPCs are addressed in the selection of contaminants in exposure media for current environmental conditions. However, under future land use conditions, other contaminants not currently accounted for, particularly those that are either currently contained or that have slow transport velocities, may appear in secondary media at concentrations that could contribute to the calculated risk.

5.3.1 Uncertainties Associated with the Exposure Assessment

Uncertainty is also introduced through the data aggregation process of estimating representative exposure concentrations in the analyzed exposure media. Analytical results are used to calculate a mean concentration and the UCL_{95} on the mean concentration. The smaller of the MDC and the UCL_{95} concentration is used as the EPC for this BHHRA. This method may underestimate the EPC for small datasets from areas with a high degree of variability in contaminant concentrations.

Moderate uncertainty can be introduced in the data aggregation process for estimating a representative exposure concentration in the exposure media. A statistical test (the Shapiro-Wilk test) is performed to determine whether the concentration data are best described by a normal or lognormal distribution. Each COPC's mean and UCL_{95} on the mean concentrations are calculated using both detected values and one-half of the reported detection limit for samples without a detected concentration. The EPC is the smaller of the MDC or the calculated UCL_{95}. This method may moderately overestimate the exposure concentration. In addition, when the resulting individual contaminant risks are summed to provide a total ILCR or HI, the compounding conservatism of this method for estimating EPCs will likely result in an overestimate of the total risk.

As described previously, some uncertainty is associated with the contaminant concentrations detected and reported by the analytical laboratory. The quality of the analytical data used in the risk assessment depends on the adequacy of the set of procedures that specifies how samples are to be selected and handled and how strictly these procedures are followed. QA/QC procedures are used to minimize uncertainties; however, sampling errors, laboratory analysis errors, and data analysis errors can and do occur. Moreover, some current analytical methods are limited in their ability to achieve detection limits appropriate for use in risk assessment. Therefore, risks may be overestimated as a result of analyte concentrations being reported at the MDL, which may be greater than the concentration at which adverse health effects could occur. Additional uncertainties are introduced by detection limits that differ among the various datasets; these uncertainties are especially noticeable in the historical (i.e., Phase I) datasets. In addition, risks may be underestimated if chemical concentrations are above risk criteria but below detection limits and reported as non-detects.

At best, quantification of exposure provides an estimate of the chemical intake for various exposure pathways identified at the site. Several uncertainties associated with the various components of the

exposure assessment include uncertainties about the exposure pathway equations, exposure parameters, land use scenarios, representative exposure concentrations, and sampling and analysis of the media.

For each primary exposure pathway chosen for analysis in this BHHRA, assumptions are made concerning the exposure parameters (e.g., amount of contaminated media a receptor can be exposed to and intake rates for different routes of exposure) and the routes of exposure. In the absence of site-specific data, the assumptions used are consistent with EPA-approved default values, which are assumed to be representative of potentially exposed populations (EPA 1989, 1991). All contaminant exposures are assumed to be from site-related exposure media (i.e., no other sources contribute to the receptor's health risk).

Note that for the dermal contact with soil and sediment pathway, no exposure time is included in the equation. This is based on the assumption that the receptor may not bathe (i.e., remove the soil in contact with the skin surface) for 24 h following the initial exposure; therefore, the receptor is actually exposed to soil contaminants for 24 h/d. This may overestimate the risk associated with dermal contact with soil or sediment. This fact is especially important when the dermal pathway is the major contributor to the risks and/or hazards.

Most exposure parameters have been selected so that errors occur on the side of conservatism. When several of these upper-bound values are combined in estimating exposure for any one pathway, the resulting risks can be in excess of the 99th percentile and, therefore, outside of the range that may be reasonably expected. Therefore, the consistent conservatism employed in the estimation of these parameters generally leads to overestimation of the potential risks.

Uncertainties associated with the ingestion of waterfowl include assumptions made regarding frequency of exposure and quantity consumed, as well as added uncertainties in the bio-uptake factors used in these exposure models.

5.3.2 Uncertainties Associated with Toxicity Information

The methodology used to develop a non-carcinogenic toxicity value (RfD or RfC) involves identifying a threshold level below which adverse health effects are not expected to occur. The RfD and RfC values are generally based on studies of the most sensitive animal species tested (unless adequate human data are available) and the most sensitive endpoint measured. Uncertainties exist in the experimental dataset for such animal studies. These studies are used to derive the experimental exposure representing the highest dose level tested at which no adverse effects are demonstrated [i.e., the no-observed-adverse-effect level (NOAEL)]; in some cases, however, only a lowest-observed-adverse-effect level (LOAEL) is available. The RfD and/or RfC is derived from the NOAEL (or LOAEL) for the critical toxic effect by dividing the NOAEL (or LOAEL) by uncertainty factors. These factors usually are in multipliers of 10, with each factor representing a specific area of uncertainty in the extrapolation of the data. For example, an uncertainty factor of 100 is typically used when extrapolating animal studies to humans. Additional uncertainty factors are sometimes necessary when other experimental data limitations are found. Because of the large uncertainties (10 to 10,000) associated with some RfD or RfC toxicity values, exact safe levels of exposure for humans are not known. For non-carcinogenic effects, the amount of human variability in physical characteristics is important in determining the risks that can be expected at low exposures and in determining the NOAEL (EPA 1989).

The uncertainty associated with the toxicity factors for non-carcinogens is measured by the uncertainty factor, the modifying factor, and the confidence level. The toxicological data (CSFs and RfDs) for dose-response relationships of chemicals are frequently updated and revised, which can lead to overestimation or underestimation of risks. These values are often extrapolations from animals to humans,

and this can also causes uncertainties in toxicity values because differences can exist in chemical absorption, metabolism, excretion, and toxic response between animals and humans.

EPA considers differences in body weight, surface area, and pharmacokinetic relationships between animals and humans to minimize the potential to underestimate the dose-response relationship; as a result, more conservatism is usually incorporated into these steps. In particular, toxicity factors that have high uncertainties may change as new information is evaluated. Therefore, a number of the COCs—particularly those with high uncertainties—may be subject to change. Finally, the toxicity of a contaminant may vary significantly with the chemical form present in the exposure medium. For example, risks from metals may be overestimated because they are conservatively assumed to be in their most toxic forms.

The carcinogenic potential of a chemical can be estimated through a two-part evaluation involving (1) a WOE assessment to determine the likelihood that a chemical is a human carcinogen, and (2) a slope factor assessment to determine the quantitative dose-response relationship. Uncertainties occur with both assessments. Chemicals fall into one of five groups on the basis of WOE studies of humans and laboratory animals (EPA 2004): (1) Group A – known human carcinogen; (2) Group B – probable human carcinogen based on limited human data or sufficient evidence in animals, but inadequate or no evidence in humans; (3) Group C – possible human carcinogens; (4) Group D – not classified as to human carcinogenicity; and (5) Group E – evidence of no carcinogenic effects in humans.

The CSF for a chemical is a plausible upper-bound estimate of the probability of a response per unit intake of a chemical over a lifetime. It is used to estimate an upper-bound lifetime probability of an individual developing cancer as a result of exposure to a particular level of a potential carcinogen. The slope factor is derived by applying a mathematical model to extrapolate from a relatively high, administered dose to animals to the lower exposure levels expected for humans. The slope factor represents the UCL_{95} on the linear component of the slope (generally the low-dose region) of the tumorigenic dose-response curve. A number of low-dose extrapolation models have been developed, and EPA generally uses the linearized multistage model in the absence of adequate information to support other models.

For several analytes, no toxicity information for either the non-carcinogenic or carcinogenic health effects to humans is available in EPA's IRIS (EPA 2004) or HEAST (EPA 1997b). The carcinogenic potential has not been evaluated for some chemicals lacking EPA-approved toxicity values. In addition, some analytes have been assigned a WOE classification for carcinogenicity (EPA 1989) but have not been assigned a slope factor. Therefore, until and unless additional toxicity information allows the derivation of toxicity factors, potential risk from certain analytes cannot be quantified.

Uncertainties are associated with the GAF values used to modify the oral toxicity values to evaluate dermal toxicity. Similar uncertainties are associated with the TEF values used to estimate risks from exposure to PAHs. Many potential uncertainties are associated with the toxicity data used in this BHHRA and can affect the risk, hazard, and COC determinations.

In the absence of EPA-approved toxicity values for arsenic and benzo(*a*)pyrene, withdrawn or provisional values have been used in the risk characterization for these COPCs. The toxicity values for these two chemicals have larger uncertainties than other approved values. Because these COPCs are identified as COCs in this BHHRA, caution should be used, and a closer look at the withdrawn/provisional value(s) is appropriate when making remediation decisions for these COCs.

5.3.3 Uncertainties and Assumptions in the Risk Characterization

Risk assessment, as a scientific activity, is subject to uncertainty. This is true even though the methodology used in this BHHRA follows EPA guidelines. As noted previously, the risk evaluation in this report is subject to uncertainty pertaining to sampling and analysis, selection of COPCs, exposure estimates, and availability and quality of toxicity data.

Uncertainties related to the summation of HQs and ILCRs across chemicals and pathways are a primary uncertainty in the risk characterization. In the absence of information on the toxicity of specific chemical mixtures, it is assumed that ILCRs and HQs are additive (i.e., cumulative) (EPA 1989). The limitations of this approach for non-carcinogens are (1) the effects of a mixture of chemicals are generally unknown; it is possible that the interactions could be synergistic, antagonistic, or additive; (2) the RfDs have different accuracy and precision and are not based on the same severity or effect; and (3) HQ or intake summation is most properly applied to compounds that induce the same effects by the same mechanism. Therefore, the potential for occurrence of non-carcinogenic effects can be overestimated for chemicals that act by different mechanisms and on different target organs.

Limitations of the additive risk approach for multiple carcinogens are (1) the chemical-specific slope factors represent the upper 95th percentile estimate of potency; therefore, summing individual risks can result in an excessively conservative estimate of total lifetime cancer risk; and (2) the target organs of multiple carcinogens may be different, so the risks would not be additive. In the absence of data, additivity for ILCRs and HQs is assumed for this BHHRA. However, because total risks and HIs are usually driven by a few chemicals, segregation of risks and HIs by target organ would most likely not have resulted in significantly different outcomes.

Additional uncertainty can be associated with the method of selection of COCs. For this BHHRA, COCs are selected for a given medium/land use scenario as chemicals with individual ILCRs ≥ 1.0E-06 and/or individual HQs ≥ 1.0 for any medium/land use scenario.

Potential risks and hazards are not determined for the 8 COPCs [2-amino-4,6-DNT, 4-amino-2,6-DNT, 2-methylnaphthalene, benzo(*g*,*h*,*i*)perylene, nitrocellulose, nitroglycerin, phenanthrene, and lead] that could not be evaluated quantitatively due to the lack of toxicity information and/or values. This results in uncertainty that could underestimate the total risk/hazard to human health.

6.0 REMEDIAL GOAL OPTIONS

To support the remedial alternative selection process, RGOs were developed for each chemical identified as a COC in the direct exposure pathways for this Load Line 1 BHHRA. RGOs are calculated using the methodology presented in RAGS Part B (EPA 1991) while incorporating site-specific exposure parameters applicable to Load Line 1. These RGOs are risk-based concentrations that will be used in the FS to define the extent of contamination that must be remediated and will help cost various alternatives. RGOs are media- and chemical-specific concentrations and are calculated for COCs within each land use/receptor scenario for a given medium. The RGOs presented in this document are for protection of human health and may or may not be protective of ecological receptors. The process for calculating RGOs for this BHHRA is a rearrangement of the cancer risk or non-cancer hazard equations, with the goal of obtaining the concentration that will produce a specific risk or hazard level. For example, the RGO for RDX at the cancer risk level of $10^{-\backslash 5}$ for the National Guard Trainee is the concentration of RDX that produces a risk of 10^{-5} when using the exposure parameters specific to the National Guard Trainee receptor.

As discussed in Section 5.1, the cancer risk and non-cancer hazard are calculated as

$$\text{Risk} = (\text{Intake}) \times (\text{CSF}) \text{ and Hazard} = (\text{Intake}) / (\text{RfD}).$$

The pathway-specific (e.g., soil ingestion) equations for intake are provided in Section 3.3. Note that all of the intake equations shown in Section 3.3 include a concentration term multiplied by several other exposure parameters.

To obtain the RGO for a specific risk level (e.g., 10^{-5}), the risk equation is rearranged so that the equation is solved for C, the concentration term. Similarly, to obtain the RGO for a specific hazard level (e.g., 1.0), the hazard equation is rearranged so that the equation is solved for the concentration term.

To demonstrate the soil ingestion pathway, note that by using the soil ingestion intake equation from Section 3.3 (Equation 1) and the general risk equation from Section 5.1, the risk from ingestion of soil is calculated as

$$\text{Risk}_{\text{ing(soil)}} = (C_s \times IR_s \times EF \times ED \times FI \times ET \times CF \times CSF) / (BW \times AT).$$

To obtain the RGO at the 10^{-5} risk level for the ingestion of soil, a value of 10^{-5} is substituted in the equation above for $\text{Risk}_{\text{ing(soil)}}$, and the equation is rearranged to solve for C_s. Thus, the general RGO equation at the 10^{-5} risk level for the ingestion of soil is calculated as

$$\text{RGO}_{\text{ing(soil)}} \text{ at } 10^{-5} = (10^{-5} \times BW \times AT) / (IR_s \times EF \times ED \times FI \times ET \times CF \times CSF).$$

A similar rearrangement of the ingestion of soil hazard equation is made, producing the general RGO equation at the 1.0 hazard level for this pathway/medium:

$$\text{RGO}_{\text{ing(soil)}} \text{ at } 1.0 = (1.0 \times BW \times AT \times RfD) / (IR_s \times EF \times ED \times FI \times ET \times CF).$$

Thus, to obtain the ingestion of soil RGO at the 10^{-5} risk level for the National Guard Trainee receptor exposed to arsenic, the parameter values for the National Guard Trainee receptor (from Table 3-2) and the chemical-specific parameter (oral CSF, from Appendix A, Table A-9) for arsenic are used:

$$\text{RGO}_{\text{ing(soil)}} \text{ at } 10^{-5} \text{ for arsenic} = [(10^{-5})(70)(25550)] / (0.0001)(39)(25)(1)(24)(0.042)(1.5)] = 122 \text{ mg/kg}.$$

In this example, the RGO calculated is 122 mg/kg, which will produce a soil ingestion risk of 10^{-5} for the National Guard Trainee receptor exposed to arsenic.

Note that if a calculated RGO is not physically possible (e.g., more than the pure chemical), then the RGO is adjusted accordingly. For example, if the calculated RGO is 5.5E+06 mg/kg, then the RGO is adjusted downward to 1.0E+06 mg/kg.

For this BHHRA, RGOs are calculated for each exposure route (e.g., ingestion), as well as for the total chemical risk or hazard across all appropriate exposure routes. Carcinogenic RGOs are calculated and presented in this BHHRA at a target risk (TR) level of 10^{-5}. To obtain the carcinogenic RGO at another risk level, one should adjust the RGO at 10^{-5} accordingly, taking care to check the resulting concentration against the physical limits discussed above (e.g., 1.0E+06 mg/kg). For example, to obtain the RGO at the 10^{-4} risk level, one should multiply the RGO at the 10^{-5} risk level by 10 (and then check the result to ensure that the concentration is physically possible). Non-carcinogenic RGOs are calculated and presented in this BHHRA for a target hazard index (THI) level of 1.0. To find the non-carcinogenic RGO at another hazard level, one should adjust the RGO at the 1.0 hazard level accordingly, taking care to check the resulting concentration against the physical limits discussed above (e.g., 1.0E+06 mg/kg). For example, to obtain the RGO at the 3.0 hazard level, one should multiply the RGO at the 1.0 hazard level by 3 (and then check the result to ensure that the concentration is physically possible).

Exposure to multiple COCs may require downward adjustment of the TR and target hazard used to calculate final remedial levels. The TR and THI are dependent on several factors, including the number of carcinogenic and non-carcinogenic COCs and the target organs and toxic endpoints of these COCs. For example, if numerous (i.e., more than 10) non-carcinogenic COCs with similar toxic endpoints are present, it may be appropriate to use chemical-specific RGOs with a THI of 0.1 to account for exposure to multiple contaminants.

As described previously, COCs were identified for groundwater, surface water, sediment, surface soil (shallow and deep), and subsurface soil. A combined list of COCs (i.e., all chemicals with total risk $>10^{-6}$ or total HI >1) from all receptors was used to determine which RGOs are calculated on a medium-by-medium basis. For completeness, RGOs were calculated for all receptor/medium combinations evaluated in this BHHRA. For example, even though antimony is not a shallow surface soil COC for the National Guard receptors, shallow surface soil RGOs for antimony are calculated for all receptors exposed to shallow surface soil because antimony is a shallow surface soil COC for at least one receptor scenario.

RGOs for COCs in groundwater, surface water, sediment, surface soil (shallow and deep), and subsurface soil are presented in Tables 6-1 through 6-6.

Table 6-1. Groundwater Remedial Goal Options (μg/L) for Chemicals of Concern

COC	Ingestion RGO		Dermal RGO		Inhalation RGO		Total RGO	
	HQ = 1.0	Risk = 10^{-5}	HQ = 1.0	Risk = 10^{-5}	HQ = 1.0	Risk = 10^{-5}	HQ = 1.0	Risk = 10^{-5}
National Guard Trainee								
Arsenic	9.8E+01	6.1E+00	2.1E+04	1.3E+03	--	--	9.8E+01	6.1E+00
Manganese	1.5E+04	--	1.9E+05	--	--	--	1.4E+04	--
2,4,6-Trinitrotoluene	1.6E+02	3.1E+02	6.3E+04	1.2E+05	--	--	1.6E+02	3.0E+02
2,4-Dinitrotoluene	6.6E+02	1.3E+01	7.2E+04	1.5E+03	--	--	6.5E+02	1.3E+01
2,6-Dinitrotoluene	3.3E+02	1.3E+01	3.0E+04	1.2E+03	--	--	3.2E+02	1.3E+01
4,4'-DDE	--	2.7E+01	--	1.2E+01	--	--	--	8.4E+00
RDX	9.8E+02	8.3E+01	1.2E+06	9.9E+04	--	--	9.8E+02	8.3E+01
Resident Farmer Adult								
Arsenic	1.1E+01	5.7E-01	2.3E+03	1.2E+02	--	--	1.1E+01	5.7E-01
Manganese	1.7E+03	--	2.2E+04	--	--	--	1.6E+03	--
2,4,6-Trinitrotoluene	1.8E+01	2.8E+01	7.0E+03	1.1E+04	--	--	1.8E+01	2.8E+01
2,4-Dinitrotoluene	7.3E+01	1.3E+00	8.0E+03	1.4E+02	--	--	7.2E+01	1.2E+00
2,6-Dinitrotoluene	3.7E+01	1.3E+00	3.3E+03	1.1E+02	--	--	3.6E+01	1.2E+00
4,4'-DDE	--	2.5E+00	--	1.1E+00	--	--	--	7.8E-01
RDX	1.1E+02	7.7E+00	1.3E+05	9.1E+03	--	--	1.1E+02	7.7E+00
Resident Farmer Child								
Arsenic	3.1E+00	8.1E-01	1.1E+03	2.9E+02	--	--	3.1E+00	8.1E-01
Manganese	4.8E+02	--	1.0E+04	--	--	--	4.6E+02	--
2,4,6-Trinitrotoluene	5.2E+00	4.1E+01	3.4E+03	2.6E+04	--	--	5.2E+00	4.0E+01
2,4-Dinitrotoluene	2.1E+01	1.8E+00	3.8E+03	3.3E+02	--	--	2.1E+01	1.8E+00
2,6-Dinitrotoluene	1.0E+01	1.8E+00	1.6E+03	2.7E+02	--	--	1.0E+01	1.8E+00
4,4'-DDE	--	3.6E+00	--	2.7E+00	--	--	--	1.5E+00
RDX	3.1E+01	1.1E+01	6.2E+04	2.2E+04	--	--	3.1E+01	1.1E+01

COC = Chemical of concern.
DDE = Dichlorodiphenyldichloroethylene.
HQ = Hazard quotient.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.
RGO = Remedial goal option.
-- Not applicable; no toxicity data are available for this exposure pathway or toxic endpoint.

Table 6-2. Surface Water Remedial Goal Options (μg/L) for Chemicals of Concern

COC	Ingestion RGO		Dermal RGO		Inhalation RGO		Total RGO	
	HQ = 1.0	Risk = 10^{-5}	HQ = 1.0	Risk = 10^{-5}	HQ = 1.0	Risk = 10^{-5}	HQ = 1.0	Risk = 10^{-5}
Dust/Fire Control Worker								
Arsenic	5.1E+03	3.2E+02	2.0E+04	1.2E+03	--	--	4.1E+03	2.5E+02
Hunter/Trapper/Fisher								
Arsenic	2.2E+04	1.1E+03	2.4E+04	1.2E+03	--	--	1.1E+04	5.9E+02
National Guard Trainee								
Arsenic	2.0E+03	1.2E+02	1.3E+03	8.0E+01	--	--	7.8E+02	4.8E+01
Resident Farmer Adult								
Arsenic	2.2E+02	1.1E+01	8.0E+02	4.1E+01	--	--	1.7E+02	8.9E+00
Resident Farmer Child								
Arsenic	4.7E+01	1.2E+01	4.4E+02	1.1E+02	--	--	4.2E+01	1.1E+01

COC = Chemical of concern.
HQ = Hazard quotient.
RGO = Remedial goal option.
-- Not applicable; no toxicity data are available for this exposure pathway or toxic endpoint.

Table 6-3. Sediment Remedial Goal Options (mg/kg) for Chemicals of Concern

COC	Ingestion RGO		Dermal RGO		Inhalation RGO		Total RGO	
	HQ = 1.0	Risk = 10^{-5}	HQ = 1.0	Risk = 10^{-5}	HQ = 1.0	Risk = 10^{-5}	HQ = 1.0	Risk = 10^{-5}
Dust/Fire Control Worker								
Antimony	4.1E+04	--	1.0E+05	--	--	--	2.9E+04	--
Arsenic	3.1E+04	1.9E+03	1.7E+04	1.1E+03	--	4.0E+05	1.1E+04	6.8E+02
Cadmium	1.0E+05	--	4.3E+04	--	--	9.4E+05	3.0E+04	9.4E+05
Manganese	1.0E+06	--	1.0E+06	--	1.0E+06	--	1.0E+06	--
2,4-Dinitrotoluene	2.0E+05	4.2E+03	3.4E+04	7.1E+02	--	--	2.9E+04	6.1E+02
Benz(*a*)anthracene	--	3.9E+03	--	5.1E+02	--	1.0E+06	--	4.5E+02
Benzo(*a*)pyrene	--	3.9E+02	--	5.1E+01	--	1.0E+06	--	4.5E+01
Benzo(*b*)fluoranthene	--	3.9E+03	--	5.1E+02	--	1.0E+06	--	4.5E+02
Dibenz(*a,h*)anthracene	--	3.9E+02	--	5.1E+01	--	1.0E+06	--	4.5E+01
Indeno(1,2,3-*cd*)pyrene	--	3.9E+03	--	5.1E+02	--	1.0E+06	--	4.5E+02
PCB-1254	2.0E+03	1.4E+03	2.5E+02	1.7E+02	--	1.0E+06	2.2E+02	1.5E+02
Hunter/Trapper/Fisher								
Antimony	7.7E+04	--	1.4E+05	--	--	--	5.0E+04	--
Arsenic	5.7E+04	3.0E+03	2.3E+04	1.2E+03	--	1.0E+06	1.7E+04	8.6E+02
Cadmium	1.9E+05	--	5.8E+04	--	--	1.0E+06	4.5E+04	1.0E+06
Manganese	1.0E+06	--	1.0E+06	--	1.0E+06	--	1.0E+06	--
2,4-Dinitrotoluene	3.8E+05	6.6E+03	4.7E+04	8.0E+02	--	--	4.2E+04	7.2E+02
Benz(*a*)anthracene	--	6.1E+03	--	5.8E+02	--	1.0E+06	--	5.3E+02
Benzo(*a*)pyrene	--	6.1E+02	--	5.8E+01	--	1.0E+06	--	5.3E+01
Benzo(*b*)fluoranthene	--	6.1E+03	--	5.8E+02	--	1.0E+06	--	5.3E+02
Dibenz(*a,h*)anthracene	--	6.1E+02	--	5.8E+01	--	1.0E+06	--	5.3E+01
Indeno(1,2,3-*cd*)pyrene	--	6.1E+03	--	5.8E+02	--	1.0E+06	--	5.3E+02
PCB-1254	3.8E+03	2.2E+03	3.3E+02	1.9E+02	--	1.0E+06	3.1E+02	1.8E+02
National Guard Trainee								
Antimony	2.6E+03	--	4.0E+04	--	--	--	2.5E+03	--
Arsenic	2.0E+03	1.2E+02	6.6E+03	4.1E+02	--	4.6E+01	1.5E+03	3.1E+01
Cadmium	6.6E+03	--	1.7E+04	--	--	1.1E+02	4.7E+03	1.1E+02
Manganese	3.0E+05	--	1.0E+06	--	3.5E+02	--	3.5E+02	--
2,4-Dinitrotoluene	1.3E+04	2.7E+02	1.3E+04	2.7E+02	--	--	6.6E+03	1.4E+02
Benz(*a*)anthracene	--	2.5E+02	--	2.0E+02	--	2.2E+03	--	1.0E+02
Benzo(*a*)pyrene	--	2.5E+01	--	2.0E+01	--	2.2E+02	--	1.0E+01
Benzo(*b*)fluoranthene	--	2.5E+02	--	2.0E+02	--	2.2E+03	--	1.0E+02
Dibenz(*a,h*)anthracene	--	2.5E+01	--	2.0E+01	--	2.2E+02	--	1.0E+01
Indeno(1,2,3-*cd*)pyrene	--	2.5E+02	--	2.0E+02	--	2.2E+03	--	1.0E+02
PCB-1254	1.3E+02	9.2E+01	9.5E+01	6.6E+01	--	3.4E+02	5.5E+01	3.5E+01
Resident Farmer Adult								
Antimony	2.9E+02	--	1.9E+03	--	--	--	2.5E+02	--
Arsenic	2.2E+02	1.1E+01	3.2E+02	1.7E+01	--	5.2E+03	1.3E+02	6.7E+00
Cadmium	7.3E+02	--	8.0E+02	--	--	1.2E+04	3.8E+02	1.2E+04
Manganese	3.4E+04	--	5.9E+04	--	4.8E+04	--	1.5E+04	--
2,4-Dinitrotoluene	1.5E+03	2.5E+01	6.4E+02	1.1E+01	--	--	4.5E+02	7.6E+00
Benz(*a*)anthracene	--	2.3E+01	--	7.9E+00	--	2.5E+05	--	5.9E+00
Benzo(*a*)pyrene	--	2.3E+00	--	7.9E-01	--	2.5E+04	--	5.9E-01
Benzo(*b*)fluoranthene	--	2.3E+01	--	7.9E+00	--	2.5E+05	--	5.9E+00
Dibenz(*a,h*)anthracene	--	2.3E+00	--	7.9E-01	--	2.5E+04	--	5.9E-01
Indeno(1,2,3-*cd*)pyrene	--	2.3E+01	--	7.9E+00	--	2.5E+05	--	5.9E+00
PCB-1254	1.5E+01	8.5E+00	4.6E+00	2.7E+00	--	3.9E+04	3.5E+00	2.0E+00

Table 6-3. Sediment Remedial Goal Options (mg/kg) for Chemicals of Concern (continued)

COC	Ingestion RGO		Dermal RGO		Inhalation RGO		Total RGO	
	HQ = 1.0	Risk = 10^{-5}	HQ = 1.0	Risk = 10^{-5}	HQ = 1.0	Risk = 10^{-5}	HQ = 1.0	Risk = 10^{-5}
Resident Farmer Child								
Antimony	3.1E+01	--	2.1E+03	--	--	--	3.1E+01	--
Arsenic	2.3E+01	6.1E+00	3.6E+02	9.2E+01	--	1.1E+04	2.2E+01	5.7E+00
Cadmium	7.8E+01	--	8.9E+02	--	--	2.7E+04	7.2E+01	2.7E+04
Manganese	3.6E+03	--	6.5E+04	--	2.1E+04	--	2.9E+03	--
2,4-Dinitrotoluene	1.6E+02	1.3E+01	7.1E+02	6.1E+01	--	--	1.3E+02	1.1E+01
Benz(*a*)anthracene	--	1.3E+01	--	4.4E+01		5.4E+05	--	9.7E+00
Benzo(*a*)pyrene	--	1.3E+00	--	4.4E+00		5.4E+04	--	9.7E-01
Benzo(*b*)fluoranthene	--	1.3E+01	--	4.4E+01		5.4E+05	--	9.7E+00
Dibenz(*a*,*h*)anthracene	--	1.3E+00	--	4.4E+00		5.4E+04	--	9.7E-01
Indeno(1,2,3-*cd*)pyrene	--	1.3E+01	--	4.4E+01		5.4E+05	--	9.7E+00
PCB-1254	1.6E+00	4.6E+00	5.1E+00	1.5E+01		8.4E+04	1.2E+00	3.5E+00

COC = Chemical of concern.
HQ = Hazard quotient.
PCB = Polychlorinated biphenyl.
RGO = Remedial goal option.
-- Not applicable; no toxicity data are available for this exposure pathway or toxic endpoint.

Table 6-4. Shallow Surface Soil Remedial Goal Options (mg/kg) for Chemicals of Concern

COC	Ingestion RGO		Dermal RGO		Inhalation RGO		Total RGO	
	HQ = 1.0	Risk = 10^{-5}	HQ = 1.0	Risk = 10^{-5}	HQ = 1.0	Risk = 10^{-5}	HQ = 1.0	Risk = 10^{-5}
Security Guard/Maintenance Worker								
Antimony	9.8E+03	--	2.7E+03	--	--	--	2.1E+03	
Arsenic	7.4E+03	4.6E+02	4.4E+02	2.8E+01	--	2.1E+05	4.2E+02	2.6E+01
2,4,6-Trinitrotoluene	1.2E+04	2.3E+04	2.2E+02	4.1E+02	--	--	2.2E+02	4.1E+02
2,4-Dinitrotoluene	4.9E+04	1.0E+03	8.8E+02	1.8E+01	--	--	8.7E+02	1.8E+01
2,6-Dinitrotoluene	2.5E+04	1.0E+03	4.4E+02	1.8E+01	--	--	4.3E+02	1.8E+01
Benz(*a*)anthracene	--	9.4E+02	--	1.3E+01	--	1.0E+06	--	1.3E+01
Benzo(*a*)pyrene	--	9.4E+01	--	1.3E+00	--	1.0E+06	--	1.3E+00
Benzo(*b*)fluoranthene	--	9.4E+02	--	1.3E+01	--	1.0E+06	--	1.3E+01
Dibenz(*a,h*)anthracene	--	9.4E+01	--	1.3E+00	--	1.0E+06	--	1.3E+00
Dieldrin	1.2E+03	4.3E+01	2.2E+01	7.7E-01	--	2.0E+05	2.2E+01	7.6E-01
Indeno(1,2,3-*cd*)pyrene	--	9.4E+02	--	1.3E+01	--	1.0E+06	--	1.3E+01
PCB-1254	4.9E+02	3.4E+02	6.3E+00	4.4E+00	--	1.0E+06	6.2E+00	4.4E+00
RDX	7.4E+04	6.2E+03	1.3E+03	1.1E+02	--	--	1.3E+03	1.1E+02
Dust/Fire Control Worker								
Antimony	4.1E+04	--	1.0E+05	--	--	--	2.9E+04	--
Arsenic	3.1E+04	1.9E+03	1.7E+04	1.1E+03	--	4.0E+05	1.1E+04	6.8E+02
2,4,6-Trinitrotoluene	5.1E+04	9.5E+04	8.6E+03	1.6E+04	--	--	7.4E+03	1.4E+04
2,4-Dinitrotoluene	2.0E+05	4.2E+03	3.4E+04	7.1E+02	--	--	2.9E+04	6.1E+02
2,6-Dinitrotoluene	1.0E+05	4.2E+03	1.7E+04	7.1E+02	--	--	1.5E+04	6.1E+02
Benz(*a*)anthracene	--	3.9E+03	--	5.1E+02	--	1.0E+06	--	4.5E+02
Benzo(*a*)pyrene	--	3.9E+02	--	5.1E+01	--	1.0E+06	--	4.5E+01
Benzo(*b*)fluoranthene	--	3.9E+03	--	5.1E+02	--	1.0E+06	--	4.5E+02
Dibenz(*a,h*)anthracene	--	3.9E+02	--	5.1E+01	--	1.0E+06	--	4.5E+01
Dieldrin	5.1E+03	1.8E+02	8.6E+02	3.0E+01	--	3.7E+05	7.4E+02	2.6E+01
Indeno(1,2,3-*cd*)pyrene	--	3.9E+03	--	5.1E+02	--	1.0E+06	--	4.5E+02
PCB-1254	2.0E+03	1.4E+03	2.5E+02	1.7E+02	--	1.0E+06	2.2E+02	1.5E+02
RDX	3.1E+05	2.6E+04	5.2E+04	4.4E+03	--	--	4.4E+04	3.7E+03
Hunter/Trapper/Fisher								
Antimony	7.7E+04	--	1.3E+05	--	--	--	4.8E+04	--
Arsenic	5.7E+04	3.0E+03	2.1E+04	1.1E+03	--	1.0E+06	1.6E+04	8.1E+02
2,4,6-Trinitrotoluene	9.6E+04	1.5E+05	1.1E+04	1.7E+04	--	--	9.6E+03	1.5E+04
2,4-Dinitrotoluene	3.8E+05	6.6E+03	4.3E+04	7.3E+02	--	--	3.8E+04	6.6E+02
2,6-Dinitrotoluene	1.9E+05	6.6E+03	2.1E+04	7.3E+02	--	--	1.9E+04	6.6E+02
Benz(*a*)anthracene	--	6.1E+03	--	5.2E+02	--	1.0E+06	--	4.8E+02
Benzo(*a*)pyrene	--	6.1E+02	--	5.2E+01	--	1.0E+06	--	4.8E+01
Benzo(*b*)fluoranthene	--	6.1E+03	--	5.2E+02	--	1.0E+06	--	4.8E+02
Dibenz(*a,h*)anthracene	--	6.1E+02	--	5.2E+01	--	1.0E+06	--	4.8E+01
Dieldrin	9.6E+03	2.8E+02	1.1E+03	3.1E+01	--	1.0E+06	9.6E+02	2.8E+01
Indeno(1,2,3-*cd*)pyrene	--	6.1E+03	--	5.2E+02	--	1.0E+06	--	4.8E+02
PCB-1254	3.8E+03	2.2E+03	3.0E+02	1.8E+02	--	1.0E+06	2.8E+02	1.6E+02
RDX	5.7E+05	4.1E+04	6.4E+04	4.5E+03	--	--	5.8E+04	4.1E+03
Resident Farmer Adult								
Antimony	2.9E+02	--	1.9E+03	--	--	--	2.5E+02	--
Arsenic	2.2E+02	1.1E+01	3.2E+02	1.7E+01	--	5.2E+03	1.3E+02	6.7E+00
2,4,6-Trinitrotoluene	3.7E+02	5.7E+02	1.6E+02	2.5E+02	--	--	1.1E+02	1.7E+02
2,4-Dinitrotoluene	1.5E+03	2.5E+01	6.4E+02	1.1E+01	--	--	4.5E+02	7.6E+00
2,6-Dinitrotoluene	7.3E+02	2.5E+01	3.2E+02	1.1E+01	--	--	2.2E+02	7.6E+00

Table 6-4. Shallow Surface Soil Remedial Goal Options (mg/kg) for Chemicals of Concern (continued)

COC	Ingestion RGO		Dermal RGO		Inhalation RGO		Total RGO	
	HQ = 1.0	Risk = 10^{-5}	HQ = 1.0	Risk = 10^{-5}	HQ = 1.0	Risk = 10^{-5}	HQ = 1.0	Risk = 10^{-5}
Benz(*a*)anthracene	--	2.3E+01	--	7.9E+00	--	2.5E+05	--	5.9E+00
Benzo(*a*)pyrene	--	2.3E+00	--	7.9E-01	--	2.5E+04	--	5.9E-01
Benzo(*b*)fluoranthene	--	2.3E+01	--	7.9E+00	--	2.5E+05	--	5.9E+00
Dibenz(*a*,*h*)anthracene	--	2.3E+00	--	7.9E-01	--	2.5E+04	--	5.9E-01
Dieldrin	3.7E+01	1.1E+00	1.6E+01	4.7E-01	--	4.9E+03	1.1E+01	3.2E-01
Indeno(1,2,3-*cd*)pyrene	--	2.3E+01	--	7.9E+00	--	2.5E+05	--	5.9E+00
PCB-1254	1.5E+01	8.5E+00	4.6E+00	2.7E+00	--	3.9E+04	3.5E+00	2.0E+00
RDX	2.2E+03	1.5E+02	9.6E+02	6.8E+01	--	--	6.7E+02	4.7E+01
Resident Farmer Child								
Antimony	3.1E+01	--	2.1E+03	--	--	--	3.1E+01	--
Arsenic	2.3E+01	6.1E+00	3.6E+02	9.2E+01	--	1.1E+04	2.2E+01	5.7E+00
2,4,6-Trinitrotoluene	3.9E+01	3.0E+02	1.8E+02	1.4E+03	--	--	3.2E+01	2.5E+02
2,4-Dinitrotoluene	1.6E+02	1.3E+01	7.1E+02	6.1E+01	--	--	1.3E+02	1.1E+01
2,6-Dinitrotoluene	7.8E+01	1.3E+01	3.6E+02	6.1E+01	--	--	6.4E+01	1.1E+01
Benz(*a*)anthracene	--	1.3E+01	--	4.4E+01	--	5.4E+05	--	9.7E+00
Benzo(*a*)pyrene	--	1.3E+00	--	4.4E+00	--	5.4E+04	--	9.7E-01
Benzo(*b*)fluoranthene	--	1.3E+01	--	4.4E+01	--	5.4E+05	--	9.7E+00
Dibenz(*a*,*h*)anthracene	--	1.3E+00	--	4.4E+00	--	5.4E+04	--	9.7E-01
Dieldrin	3.9E+00	5.7E-01	1.8E+01	2.6E+00	--	1.0E+04	3.2E+00	4.7E-01
Indeno(1,2,3-*cd*)pyrene	--	1.3E+01	--	4.4E+01	--	5.4E+05	--	9.7E+00
PCB-1254	1.6E+00	4.6E+00	5.1E+00	1.5E+01	--	8.4E+04	1.2E+00	3.5E+00
RDX	2.3E+02	8.3E+01	1.1E+03	3.8E+02	--	--	1.9E+02	6.8E+01

COC = Chemical of concern.
HQ = Hazard quotient.
PCB = Polychlorinated biphenyl.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.
RGO = Remedial goal option.
-- Not applicable; no toxicity data are available for this exposure pathway or toxic endpoint.

Table 6-5. Deep Surface Soil Remedial Goal Options (mg/kg) for Chemicals of Concern

COC	Ingestion RGO		Dermal RGO		Inhalation RGO		Total RGO	
	HQ = 1.0	Risk = 10^{-5}	HQ = 1.0	Risk = 10^{-5}	HQ = 1.0	Risk = 10^{-5}	HQ = 1.0	Risk = 10^{-5}
National Guard Trainee								
Arsenic	2.0E+03	1.2E+02	6.6E+03	4.1E+02	--	4.6E+01	1.5E+03	3.1E+01
Manganese	3.0E+05	--	1.0E+06	--	3.5E+02	--	3.5E+02	--
2,4,6-Trinitrotoluene	3.3E+03	6.1E+03	3.3E+03	6.2E+03	--	--	1.6E+03	3.1E+03
Benz(*a*)anthracene	--	2.5E+02	--	2.0E+02	--	2.2E+03	--	1.0E+02
Benzo(*a*)pyrene	--	2.5E+01	--	2.0E+01	--	2.2E+02	--	1.0E+01
Benzo(*b*)fluoranthene	--	2.5E+02	--	2.0E+02	--	2.2E+03	--	1.0E+02
Dibenz(*a*,*h*)anthracene	--	2.5E+01	--	2.0E+01	--	2.2E+02	--	1.0E+01
PCB-1254	1.3E+02	9.2E+01	9.5E+01	6.6E+01	--	3.4E+02	5.5E+01	3.5E+01
RDX	2.0E+04	1.7E+03	2.0E+04	1.7E+03	--	--	9.9E+03	8.4E+02

COC = Chemical of concern.
HQ = Hazard quotient.
PCB = Polychlorinated biphenyl.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.
RGO = Remedial goal option.
-- Not applicable; no toxicity data are available for this exposure pathway or toxic endpoint.

Table 6-6. Subsurface Soil Remedial Goal Options (mg/kg) for Chemicals of Concern

COC	Ingestion RGO		Dermal RGO		Inhalation RGO		Total RGO	
	HQ = 1.0	Risk = 10^{-5}	HQ = 1.0	Risk = 10^{-5}	HQ = 1.0	Risk = 10^{-5}	HQ = 1.0	Risk = 10^{-5}
Resident Farmer Adult								
Antimony	2.9E+02	--	1.9E+03	--	--	--	2.5E+02	--
2,4,6-Trinitrotoluene	3.7E+02	5.7E+02	1.6E+02	2.5E+02	--	--	1.1E+02	1.7E+02
RDX	2.2E+03	1.5E+02	9.6E+02	6.8E+01	--	--	6.7E+02	4.7E+01
Resident Farmer Child								
Antimony	3.1E+01	--	2.1E+03	--	--	--	3.1E+01	--
2,4,6-Trinitrotoluene	3.9E+01	3.0E+02	1.8E+02	1.4E+03	--	--	3.2E+01	2.5E+02
RDX	2.3E+02	8.3E+01	1.1E+03	3.8E+02	--	--	1.9E+02	6.8E+01

COC = Chemical of concern.
HQ = Hazard quotient.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.
RGO = Remedial goal option.
-- Not applicable; no toxicity data are available for this exposure pathway or toxic endpoint.

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7.0 SUMMARY AND CONCLUSIONS

This BHHRA was conducted to evaluate risks and hazards associated with contaminated media at the RVAAP Load Line 1 AOC for three potential future use scenarios: National Guard use, recreational use, and residential use. Results have been presented for all scenarios and exposure pathways. The following steps were used to generate conclusions regarding human health risks and hazards associated with contaminated media at Load Line 1:

- identification of COPCs,
- calculation of risks and hazards,
- identification of COCs, and
- calculation of RGOs.

Risks and hazards are evaluated and RGOs calculated for National Guard receptors (Trainee, Security Guard/Maintenance Worker, and Fire/Dust Suppression Worker), recreational receptors (Hunter/Trapper/Fisher), and residential receptors (adult and child Resident Subsistence Farmer). Results are summarized below.

7.1 GROUNDWATER

Arsenic and manganese are identified as COCs for both the National Guard Trainee (arsenic only) and the Resident Subsistence Farmer scenarios. Arsenic and manganese are naturally present in groundwater in the Ravenna area. The background risks and hazards for arsenic and manganese are similar to the estimated site-related risks and hazards.

Groundwater is not currently used at Load Line 1 but is evaluated in this BHHRA for potential future exposure. Five COCs were identified for the National Guard exposure to groundwater: 2,4-DNT; 2,6-DNT; RDX; 4,4'-DDE; and arsenic. In addition to these five, two additional COCs were identified for the residential exposure to groundwater: 2,4,6-TNT and manganese.

7.2 SURFACE WATER AND SEDIMENT

Arsenic is identified as the only COC for both National Guard receptors at Outlet C and Charlie's Pond. Arsenic is identified as the only COC for the National Guard Trainee and for the Resident Subsistence Farmer at Outlet C and Charlie's Pond and at Outlets D, E, and F, and Criggy's Pond. No surface water COCs are identified for the Hunter/Trapper/Fisher at either of these EUs. The National Guard Security Guard/Maintenance Worker is not exposed to surface water. Arsenic was identified as a COC for waterfowl ingestion by the Hunter/Trapper/Fisher at both of these EUs and for fish ingestion at both of these EUs.

Arsenic and manganese are identified as COCs in sediment for National Guard Trainee use of the Outlet C and Charlie's Pond EU. No sediment COCs are identified for the National Guard Fire/Dust Suppression Worker and Hunter/Trapper/Fisher at this EU. Arsenic, PCB 1254, and benzo(*a*)pyrene are identified as COCs for residential use at this EU. Benzo(*a*)pyrene, PCB-1254, and arsenic are COCs for waterfowl ingestion by the Hunter/Trapper/Fisher at Outlet C and Charlie's Pond.

Various PAHs [benzo(*a*)pyrene, benzo(*b*)fluoranthene, and dibenz(*a,h*)anthracene], arsenic, and cadmium are identified as COCs at the Outlets A and B EU for the National Guard receptors. Benzo(*a*)pyrene is the

only COC identified at the Outlets A and B EU for Recreational use. Arsenic; 2,4-DNT; PCB-1254; and several PAHs [benz(*a*)anthracene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, dibenz(*a,h*)anthracene, and indeno(1,2,3-*cd*)pyrene] are identified as COCs for the Resident Subsistence Farmer at this EU.

Arsenic and manganese are identified as COCs for the National Guard Trainee at the Outlets D, E, and F, and Criggy's Pond EU. No sediment COCs are identified for the National Guard Fire/Dust Suppression Worker and Hunter/Trapper/Fisher at this EU. Antimony, arsenic, and manganese are identified as COCs for residential use at this EU. Arsenic and antimony are COCs for waterfowl ingestion by the Hunter/Trapper/Fisher at this AOC.

7.3 SOIL

Potential human health risks/hazards were evaluated for exposure to COPCs in soil at seven EUs. Direct contact (i.e., ingestion, dermal contact, and inhalation) with shallow surface soil was evaluated for the National Guard Security Guard/Maintenance Worker and Fire/Dust Suppression Worker, recreational Hunter/Trapper/Fisher, and Resident Subsistence Farmer. Direct contact with deep surface soil was evaluated for the National Guard Trainee. Direct contact with subsurface soil and indirect contact (i.e., ingestion of food) were evaluated for the Resident Subsistence Farmer.

Two metals (arsenic and manganese), two explosives (TNT and RDX), five PAHs [benz(*a*)anthracene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, dibenz(*a,h*)anthracene, and indeno(1,2,3-*cd*)pyrene], and PCB-1254 were identified as COCs for the National Guard receptors at several EUs. Only the Water Tower EU had no COCs for these receptors. Two COCs [benzo(*a*)pyrene at Buildings CB-3 and -801 and PCB-1254 at Buildings CB-4/4A and CA-6/6A] were identified for the recreational receptors.

Two metals (arsenic and antimony), four explosives (TNT; 2,4-DNT; 2,6-DNT; and RDX), five PAHs [benz(*a*)anthracene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, dibenz(*a,h*)anthracene, and indeno(1,2,3-*cd*)pyrene], dieldrin, and PCB-1254 were identified as COCs for direct exposure by the Resident Subsistence Farmer at several EUs. Only the Water Tower EU had no COCs for these receptors. Additional metals, explosives, PAHs, and pesticides were identified for indirect exposure to surface soil via ingestion of vegetables, beef, and dairy products by the Resident Subsistence Farmer.

Two explosives (2,4,6-TNT and RDX) were identified as COCs in subsurface soil for the Resident Subsistence Farmer at Buildings CB-4/4A and CA-6/6A. Antimony is the only subsurface soil COC identified at Buildings CB-13 and -10.

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APPENDIX A
SUPPORTING TABLES FOR SUPPLEMENTAL BASELINE HUMAN HEALTH RISK ASSESSMENT

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Table A-1. Summary of COPC Screening for Load Line 1 Groundwater

Analyte	CAS Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria	Region 9 Tap Water Criteria	COPC?
Load Line 1 Building Area (Bedrock Aquifer)											
Explosives											
1,3,5-Trinitrobenzene	99-35-4	µg/L	6/ 18	2.0E+00	1.1E-01	1.2E+01	3.4E+00	3.4E+00		1.1E+03	No
1,3-Dinitrobenzene	99-65-0	µg/L	10/ 18	3.0E-01	4.5E-02	1.3E+00	4.6E-01	4.6E-01		3.6E+00	No
2,4,6-Trinitrotoluene	118-96-7	µg/L	8/ 18	3.1E+00	8.5E-02	1.6E+01	5.4E+00	5.4E+00		2.2E+00	Yes
2,4-Dinitrotoluene	121-14-2	µg/L	8/ 18	1.4E+00	6.0E-02	7.9E+00	2.4E+00	2.4E+00		9.9E-02	Yes
2,6-Dinitrotoluene	606-20-2	µg/L	1/ 18	9.1E-01	3.8E+00	3.8E+00	1.5E+00	1.5E+00		9.9E-02	Yes
2-Amino-4,6-dinitrotoluene	35572-78-2	µg/L	5/ 9	6.9E+00	3.0E-01	2.9E+01	1.4E+01	1.4E+01			Yes
3-Nitrotoluene	99-08-1	µg/L	2/ 18	2.0E-01	1.4E-01	1.6E-01	2.9E-01	1.6E-01		6.1E+01	No
4-Amino-2,6-dinitrotoluene	19406-51-0	µg/L	5/ 9	6.7E+00	3.0E-01	2.5E+01	1.3E+01	1.3E+01			Yes
HMX	2691-41-0	µg/L	2/ 18	1.4E+00	9.2E-01	1.2E+01	2.5E+00	2.5E+00		1.8E+03	No
Nitroglycerin	55-63-0	µg/L	2/ 18	5.0E+00	4.2E+00	2.7E+01	8.6E+00	8.6E+00		4.8E+00	Yes
RDX	121-82-4	µg/L	8/ 18	5.5E+00	1.5E-01	8.8E+01	1.4E+01	1.4E+01		6.1E-01	Yes
Tetryl	479-45-8	µg/L	2/ 18	1.9E-01	1.2E-01	1.4E-01	2.8E-01	1.4E-01		3.6E+02	No
Metals											
Aluminum	7429-90-5	µg/L	6/ 16	4.0E+02	9.6E+01	2.5E+03	7.1E+02	7.1E+02		3.6E+04	No
Antimony	7440-36-0	µg/L	1/ 18	2.5E+00	2.2E+00	2.2E+00	2.5E+00	2.2E+00		1.5E+01	No
Arsenic	7440-38-2	µg/L	4/ 18	5.5E+00	4.4E+00	2.6E+01	7.8E+00	7.8E+00		4.5E-02	Yes
Barium	7440-39-3	µg/L	18/ 18	2.6E+01	3.8E+00	7.5E+01	4.3E+01	4.3E+01	2.6E+02	2.6E+03	No
Cadmium	7440-43-9	µg/L	2/ 18	2.5E+00	1.1E+00	3.0E+00	2.6E+00	2.6E+00		1.8E+01	No
Calcium	7440-70-2	µg/L	18/ 18	6.7E+04	1.9E+04	4.0E+05	1.0E+05	1.0E+05	5.3E+04		No
Cobalt	7440-48-4	µg/L	12/ 18	3.7E+01	1.6E+00	2.6E+02	1.2E+02	1.2E+02		7.3E+02	No
Copper	7440-50-8	µg/L	1/ 18	1.3E+01	1.8E+01	1.8E+01	1.3E+01	1.3E+01		1.5E+03	No
Cyanide	57-12-5	µg/L	1/ 17	5.0E+00	5.1E+00	5.1E+00	5.1E+00	5.1E+00		7.3E+02	No
Iron	7439-89-6	µg/L	10/ 18	1.2E+03	6.7E+01	9.0E+03	2.1E+03	2.1E+03	1.4E+03	1.1E+04	No
Magnesium	7439-95-4	µg/L	18/ 18	1.3E+04	2.9E+03	2.6E+04	1.8E+04	1.8E+04	1.5E+04		No
Manganese	7439-96-5	µg/L	18/ 18	1.1E+03	6.1E+01	4.8E+03	2.9E+03	2.9E+03	1.3E+03	8.8E+02	Yes
Nickel	7440-02-0	µg/L	17/ 18	4.1E+01	4.9E+00	1.3E+02	8.1E+01	8.1E+01	8.3E+01	7.3E+02	No
Potassium	7440-09-7	µg/L	18/ 18	3.1E+03	1.2E+03	8.8E+03	4.0E+03	4.0E+03	5.8E+03		No
Selenium	7782-49-2	µg/L	1/ 18	2.6E+00	4.1E+00	4.1E+00	2.7E+00	2.7E+00		1.8E+02	No

Table A-1. Summary of COPC Screening for Load Line 1 Groundwater (continued)

Analyte	CAS Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria	Region 9 Tap Water Criteria	COPC?
Sodium	7440-23-5	µg/L	18/ 18	7.0E+03	9.8E+02	3.7E+04	1.1E+04	1.1E+04	5.1E+04		No
Thallium	6533-73-9	µg/L	1/ 18	9.8E-01	6.0E-01	6.0E-01	1.0E+00	6.0E-01		2.4E+00	No
Zinc	7440-66-6	µg/L	13/ 18	1.5E+02	1.3E+01	6.2E+02	6.1E+02	6.1E+02	5.2E+01	1.1E+04	No
Organics-Pesticide/PCB											
4,4'-DDE	72-55-9	µg/L	1/ 11	1.2E+00	1.3E+01	1.3E+01	3.4E+00	3.4E+00		2.0E-01	Yes
Organics-Semivolatile											
Bis(2-ethylhexyl)phthalate	117-81-7	µg/L	1/ 11	4.9E+00	3.6E+00	3.6E+00	5.1E+00	3.6E+00		4.8E+00	No
Organics-Volatile											
Chloroform	67-66-3	µg/L	1/ 11	2.4E+00	1.2E+00	1.2E+00	2.6E+00	1.2E+00		6.2E+00	No
Methylene Chloride	75-09-2	µg/L	6/ 11	2.4E+00	2.1E+00	2.7E+00	2.5E+00	2.5E+00		4.3E+00	No
Toluene	108-88-3	µg/L	1/ 11	2.3E+00	7.7E-01	7.7E-01	2.6E+00	7.7E-01		7.2E+02	No
North and South of Criggy's Pond (Unconsolidated Aquifer)											
Metals											
Arsenic	7440-38-2	µg/L	2/ 4	3.4E+00	3.8E+00	4.7E+00	4.6E+00	4.6E+00	1.2E+01	4.5E-02	No
Barium	7440-39-3	µg/L	4/ 4	5.7E+01	4.9E+01	6.2E+01	6.4E+01	6.2E+01	8.2E+01	2.6E+03	No
Calcium	7440-70-2	µg/L	4/ 4	6.9E+04	5.9E+04	7.8E+04	8.5E+04	7.8E+04	1.2E+05		No
Cobalt	7440-48-4	µg/L	1/ 4	1.9E+01	1.5E+00	1.5E+00	3.3E+01	1.5E+00		7.3E+02	No
Iron	7439-89-6	µg/L	3/ 4	4.2E+02	2.5E+02	7.1E+02	8.0E+02	7.1E+02	2.8E+02	1.1E+04	No
Magnesium	7439-95-4	µg/L	4/ 4	1.3E+04	9.4E+03	1.8E+04	1.9E+04	1.8E+04	4.3E+04		No
Manganese	7439-96-5	µg/L	4/ 4	2.5E+02	1.4E+02	4.2E+02	4.1E+02	4.1E+02	1.0E+03	8.8E+02	No
Potassium	7440-09-7	µg/L	3/ 4	8.4E+02	6.9E+02	1.2E+03	1.2E+03	1.2E+03	2.9E+03		No
Sodium	7440-23-5	µg/L	4/ 4	7.6E+03	4.9E+03	1.0E+04	1.5E+04	1.0E+04	4.6E+04		No
Zinc	7440-66-6	µg/L	1/ 3	7.3E+01	2.0E+02	2.0E+02	2.6E+02	2.0E+02	6.1E+01	1.1E+04	No
Organics-Volatile											
Methylene Chloride	75-09-2	µg/L	1/ 2	2.4E+00	2.3E+00	2.3E+00	3.0E+00	2.3E+00		4.3E+00	No

CAS = Chemical Abstracts Service.
COPC = Contaminant of potential concern.
DDE = Dichlorodiphenyldichloroethylene.
HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.
PCB = Polychlorinated biphenyl.
RDX = = Hexahydro-1,3,5-trinitro-1,3,5-triazine.
UCL = Upper confidence level.

Table A-2. Summary of COPC Screening for Load Line 1 Surface Water

Analyte	CAS Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria	Region 9 Tap Water Criteria	COPC?
Outlet C and Charlie's Pond											
Explosives											
3-Nitrotoluene	99-08-1	µg/L	1/ 1	1.7E-01	1.7E-01	1.7E-01		1.7E-01		6.1E+01	No
Metals											
Aluminum	7429-90-5	µg/L	1/ 1	1.3E+03	1.3E+03	1.3E+03		1.3E+03	3.4E+03	3.6E+04	No
Arsenic	7440-38-2	µg/L	1/ 1	3.1E+01	3.1E+01	3.1E+01		3.1E+01	3.2E+00	4.5E-02	Yes
Barium	7440-39-3	µg/L	1/ 1	4.9E+01	4.9E+01	4.9E+01		4.9E+01	4.8E+01	2.6E+03	No
Calcium	7440-70-2	µg/L	1/ 1	1.4E+04	1.4E+04	1.4E+04		1.4E+04	4.1E+04		No
Chromium	7440-47-3	µg/L	1/ 1	2.4E+00	2.4E+00	2.4E+00		2.4E+00			Yes
Iron	7439-89-6	µg/L	1/ 1	1.0E+04	1.0E+04	1.0E+04		1.0E+04	2.6E+03	1.1E+04	No
Lead	7439-92-1	µg/L	1/ 1	3.1E+00	3.1E+00	3.1E+00		3.1E+00			Yes
Magnesium	7439-95-4	µg/L	1/ 1	3.6E+03	3.6E+03	3.6E+03		3.6E+03	1.1E+04		No
Manganese	7439-96-5	µg/L	1/ 1	5.1E+02	5.1E+02	5.1E+02		5.1E+02	3.9E+02	8.8E+02	No
Nickel	7440-02-0	µg/L	1/ 1	4.2E+00	4.2E+00	4.2E+00		4.2E+00		7.3E+02	No
Potassium	7440-09-7	µg/L	1/ 1	3.7E+03	3.7E+03	3.7E+03		3.7E+03	3.2E+03		No
Sodium	7440-23-5	µg/L	1/ 1	2.6E+03	2.6E+03	2.6E+03		2.6E+03	2.1E+04		No
Vanadium	7440-62-2	µg/L	1/ 1	2.6E+00	2.6E+00	2.6E+00		2.6E+00		2.6E+02	No
Zinc	7440-66-6	µg/L	1/ 1	2.9E+01	2.9E+01	2.9E+01		2.9E+01	4.2E+01	1.1E+04	No
Outlets D, E, and F and Criggy's Pond											
Metals											
Arsenic	7440-38-2	µg/L	1/ 1	5.1E+00	5.1E+00	5.1E+00		5.1E+00	3.2E+00	4.5E-02	Yes
Barium	7440-39-3	µg/L	1/ 1	2.7E+01	2.7E+01	2.7E+01		2.7E+01	4.8E+01	2.6E+03	No
Calcium	7440-70-2	µg/L	1/ 1	1.7E+04	1.7E+04	1.7E+04		1.7E+04	4.1E+04		No
Iron	7439-89-6	µg/L	1/ 1	3.2E+02	3.2E+02	3.2E+02		3.2E+02	2.6E+03	1.1E+04	No
Magnesium	7439-95-4	µg/L	1/ 1	4.6E+03	4.6E+03	4.6E+03		4.6E+03	1.1E+04		No
Manganese	7439-96-5	µg/L	1/ 1	1.7E+02	1.7E+02	1.7E+02		1.7E+02	3.9E+02	8.8E+02	No
Potassium	7440-09-7	µg/L	1/ 1	2.5E+03	2.5E+03	2.5E+03		2.5E+03	3.2E+03		No
Sodium	7440-23-5	µg/L	1/ 1	2.7E+03	2.7E+03	2.7E+03		2.7E+03	2.1E+04		No

CAS = Chemical Abstracts Service.
COPC = Contaminant of potential concern.
UCL = Upper confidence level.

Table A-3 Summary of COPC Screening for Load Line 1 Sediment

Analyte	Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria	Region 9 Residential PRG[a]	Region 9 Industrial [a]	COPC?
North Area												
Metals												
Aluminum	7429-90-5	mg/kg	1/ 1	1.2E+04	1.2E+04	1.2E+04		1.2E+04	1.4E+04	7.6E+03	9.2E+04	No
Arsenic	7440-38-2	mg/kg	1/ 1	8.5E+00	8.5E+00	8.5E+00		8.5E+00	2.0E+01	3.9E-01	1.6E+00	No
Barium	7440-39-3	mg/kg	1/ 1	1.3E+02	1.3E+02	1.3E+02		1.3E+02	1.2E+02	5.4E+02	6.7E+03	No
Beryllium	7440-41-7	mg/kg	1/ 1	8.4E-01	8.4E-01	8.4E-01		8.4E-01	3.8E-01	1.5E+01	1.9E+02	No
Cadmium	7440-43-9	mg/kg	1/ 1	4.4E-01	4.4E-01	4.4E-01		4.4E-01		3.7E+00	4.5E+01	No
Calcium	7440-70-2	mg/kg	1/ 1	2.6E+03	2.6E+03	2.6E+03		2.6E+03	5.5E+03			No
Chromium	7440-47-3	mg/kg	1/ 1	1.6E+01	1.6E+01	1.6E+01		1.6E+01	1.8E+01	2.1E+02	4.5E+02	No
Cobalt	7440-48-4	mg/kg	1/ 1	1.0E+01	1.0E+01	1.0E+01		1.0E+01	9.1E+00	1.4E+02	1.3E+03	No
Copper	7440-50-8	mg/kg	1/ 1	1.8E+01	1.8E+01	1.8E+01		1.8E+01	2.8E+01	3.1E+02	4.1E+03	No
Iron	7439-89-6	mg/kg	1/ 1	2.0E+04	2.0E+04	2.0E+04		2.0E+04	2.8E+04	2.3E+03	3.1E+04	No
Lead	7439-92-1	mg/kg	1/ 1	2.8E+01	2.8E+01	2.8E+01		2.8E+01	2.7E+01	4.0E+02	7.5E+02	No
Magnesium	7439-95-4	mg/kg	1/ 1	2.1E+03	2.1E+03	2.1E+03		2.1E+03	2.8E+03			No
Manganese	7439-96-5	mg/kg	1/ 1	7.6E+02	7.6E+02	7.6E+02		7.6E+02	2.0E+03	1.8E+02	1.9E+03	No
Mercury	7487-94-6	mg/kg	1/ 1	9.0E-02	9.0E-02	9.0E-02		9.0E-02	5.9E-02	2.3E+00	3.1E+01	No
Nickel	7440-02-0	mg/kg	1/ 1	2.5E+01	2.5E+01	2.5E+01		2.5E+01	1.8E+01	1.6E+02	2.0E+03	No
Potassium	7440-09-7	mg/kg	1/ 1	1.2E+03	1.2E+03	1.2E+03		1.2E+03	2.0E+03			No
Selenium	7782-49-2	mg/kg	1/ 1	1.6E+00	1.6E+00	1.6E+00		1.6E+00	1.7E+00	3.9E+01	5.1E+02	No
Thallium	6533-73-9	mg/kg	1/ 1	7.0E-01	7.0E-01	7.0E-01		7.0E-01	8.9E-01	5.2E-01	6.7E+00	No
Vanadium	7440-62-2	mg/kg	1/ 1	2.2E+01	2.2E+01	2.2E+01		2.2E+01	2.6E+01	5.5E+01	7.2E+02	No
Zinc	7440-66-6	mg/kg	1/ 1	2.2E+02	2.2E+02	2.2E+02		2.2E+02	5.3E+02	2.3E+03	3.1E+04	No
Outlet C and Charlie's Pond												
Explosives												
2,4,6-Trinitrotoluene	118-96-7	mg/kg	2/ 5	2.6E-01	3.7E-01	5.4E-01	4.4E-01	4.4E-01		3.1E+00	3.1E+01	No
2,6-Dinitrotoluene	606-20-2	mg/kg	1/ 5	1.3E-01	1.4E-01	1.4E-01	1.3E-01	1.3E-01		7.2E-01	2.5E+00	No
2-Amino-4,6-Dinitrotoluene	35572-78-2	mg/kg	2/ 5	2.0E-01	1.9E-01	4.4E-01	3.3E-01	3.3E-01				Yes
4-Amino-2,6-Dinitrotoluene	19406-51-0	mg/kg	2/ 5	2.4E-01	3.7E-01	4.5E-01	3.9E-01	3.9E-01				Yes

Table A-3 Summary of COPC Screening for Load Line 1 Sediment (continued)

Analyte	Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria	Region 9 Residential PRG[a]	Region 9 Industrial [a]	COPC?
Metals												
Aluminum	7429-90-5	mg/kg	8/ 8	9.4E+03	5.3E+03	1.4E+04	1.2E+04	1.2E+04	1.4E+04	7.6E+03	9.2E+04	No
Antimony	7440-36-0	mg/kg	1/ 8	8.2E-01	1.2E+00	1.2E+00	9.5E-01	9.5E-01		3.1E+00	4.1E+01	No
Arsenic	7440-38-2	mg/kg	8/ 8	1.5E+01	7.6E+00	5.1E+01	2.5E+01	2.5E+01	2.0E+01	3.9E-01	1.6E+00	Yes
Barium	7440-39-3	mg/kg	8/ 8	8.7E+01	5.8E+01	1.5E+02	1.1E+02	1.1E+02	1.2E+02	5.4E+02	6.7E+03	No
Beryllium	7440-41-7	mg/kg	7/ 8	6.1E-01	4.9E-01	9.4E-01	7.6E-01	7.6E-01	3.8E-01	1.5E+01	1.9E+02	No
Cadmium	7440-43-9	mg/kg	7/ 8	7.0E-01	1.4E-01	1.4E+00	1.0E+00	1.0E+00		3.7E+00	4.5E+01	No
Calcium	7440-70-2	mg/kg	8/ 8	3.9E+03	8.8E+02	8.5E+03	9.9E+03	8.5E+03	5.5E+03			No
Chromium	7440-47-3	mg/kg	8/ 8	1.3E+01	9.5E+00	2.1E+01	1.6E+01	1.6E+01	1.8E+01	2.1E+02	4.5E+02	No
Cobalt	7440-48-4	mg/kg	8/ 8	8.2E+00	6.0E+00	1.1E+01	9.8E+00	9.8E+00	9.1E+00	1.4E+02	1.3E+03	No
Copper	7440-50-8	mg/kg	8/ 8	1.6E+01	1.3E+01	2.0E+01	1.7E+01	1.7E+01	2.8E+01	3.1E+02	4.1E+03	No
Iron	7439-89-6	mg/kg	8/ 8	1.8E+04	1.2E+04	2.5E+04	2.1E+04	2.1E+04	2.8E+04	2.3E+03	3.1E+04	No
Lead	7439-92-1	mg/kg	8/ 8	2.9E+01	1.8E+01	5.6E+01	3.9E+01	3.9E+01	2.7E+01	4.0E+02	7.5E+02	No
Magnesium	7439-95-4	mg/kg	7/ 8	1.5E+03	1.1E+03	2.3E+03	1.9E+03	1.9E+03	2.8E+03			No
Manganese	7439-96-5	mg/kg	7/ 7	9.3E+02	2.4E+02	2.4E+03	3.1E+03	2.4E+03	2.0E+03	1.8E+02	1.9E+03	Yes
Mercury	7487-94-6	mg/kg	8/ 8	7.3E-02	3.1E-02	8.8E-02	8.5E-02	8.5E-02	5.9E-02	2.3E+00	3.1E+01	No
Nickel	7440-02-0	mg/kg	8/ 8	1.9E+01	1.3E+01	2.8E+01	2.3E+01	2.3E+01	1.8E+01	1.6E+02	2.0E+03	No
Potassium	7440-09-7	mg/kg	8/ 8	9.1E+02	6.8E+02	1.5E+03	1.1E+03	1.1E+03	2.0E+03			No
Selenium	7782-49-2	mg/kg	7/ 8	1.4E+00	5.5E-01	3.6E+00	2.4E+00	2.4E+00	1.7E+00	3.9E+01	5.1E+02	No
Sodium	7440-23-5	mg/kg	1/ 8	3.4E+02	8.4E+01	8.4E+01	4.2E+02	8.4E+01	1.1E+02			No
Thallium	6533-73-9	mg/kg	7/ 8	6.2E-01	5.3E-01	8.7E-01	7.4E-01	7.4E-01	8.9E-01	5.2E-01	6.7E+00	No
Vanadium	7440-62-2	mg/kg	8/ 8	1.9E+01	1.3E+01	2.6E+01	2.3E+01	2.3E+01	2.6E+01	5.5E+01	7.2E+02	No
Zinc	7440-66-6	mg/kg	8/ 8	1.4E+02	7.1E+01	2.2E+02	1.8E+02	1.8E+02	5.3E+02	2.3E+03	3.1E+04	No
Organics-Pesticide/PCB												
4,4'-DDE	72-55-9	mg/kg	1/ 2	1.2E-02	2.2E-02	2.2E-02	7.7E-02	2.2E-02		1.7E+00	7.0E+00	No
PCB-1254	11097-69-1	mg/kg	1/ 2	4.5E-01	8.7E-01	8.7E-01	3.1E+00	8.7E-01		1.1E-01	7.4E-01	Yes
Organics-Semivolatile												
Benz(*a*)anthracene	56-55-3	mg/kg	2/ 2	6.7E-02	5.6E-02	7.7E-02	1.3E-01	7.7E-02		6.2E-01	2.1E+00	No
Benzo(*a*)pyrene	50-32-8	mg/kg	2/ 2	7.0E-02	5.6E-02	8.4E-02	1.6E-01	8.4E-02		6.2E-02	2.1E-01	Yes
Benzo(*b*)fluoranthene	205-99-2	mg/kg	2/ 2	1.3E-01	7.1E-02	1.8E-01	4.7E-01	1.8E-01		6.2E-01	2.1E+00	No
Benzo(*g,h,i*)perylene	191-24-2	mg/kg	1/ 2	1.5E-01	5.8E-02	5.8E-02	7.1E-01	5.8E-02				Yes
Benzo(*k*)fluoranthene	207-08-9	mg/kg	1/ 2	1.4E-01	5.4E-02	5.4E-02	7.2E-01	5.4E-02		6.2E+00	2.1E+01	No

Table A-3 Summary of COPC Screening for Load Line 1 Sediment (continued)

Analyte	Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria	Region 9 Residential PRG[a]	Region 9 Industrial [a]	COPC?
Chrysene	218-01-9	mg/kg	1/ 2	1.8E-01	1.3E-01	1.3E-01	5.1E-01	1.3E-01		6.2E+01	2.1E+02	No
Fluoranthene	206-44-0	mg/kg	2/ 2	1.1E-01	7.3E-02	1.4E-01	3.2E-01	1.4E-01		2.3E+02	2.2E+03	No
Indeno(1,2,3-*cd*)pyrene	193-39-5	mg/kg	1/ 2	1.6E-01	7.6E-02	7.6E-02	6.6E-01	7.6E-02		6.2E-01	2.1E+00	No
Phenanthrene	85-01-8	mg/kg	1/ 2	1.5E-01	5.9E-02	5.9E-02	7.0E-01	5.9E-02				Yes
Pyrene	129-00-0	mg/kg	1/ 2	1.9E-01	1.5E-01	1.5E-01	4.6E-01	1.5E-01		2.3E+02	2.9E+03	No
Organics-Volatile												
1,2-Dichloroethene	549-59-0	mg/kg	1/ 2	6.8E-03	1.0E-02	1.0E-02	2.7E-02	1.0E-02		4.3E+00	1.5E+01	No
Acetone	67-64-1	mg/kg	1/ 2	8.1E-03	9.6E-03	9.6E-03	1.8E-02	9.6E-03		1.6E+02	6.0E+02	No
Outlets A and B												
Explosives												
1,3,5-Trinitrobenzene	99-35-4	mg/kg	1/ 4	1.4E-01	1.8E-01	1.8E-01	1.7E-01	1.7E-01		1.8E+02	1.8E+03	No
2,4,6-Trinitrotoluene	118-96-7	mg/kg	1/ 4	2.3E-01	5.5E-01	5.5E-01	4.8E-01	4.8E-01		3.1E+00	3.1E+01	No
2,4-Dinitrotoluene	121-14-2	mg/kg	2/ 4	6.6E-01	3.9E-01	2.0E+00	1.4E+03	2.0E+00		7.2E-01	2.5E+00	Yes
2-Amino-4,6-Dinitrotoluene	35572-78-2	mg/kg	1/ 4	2.7E-01	7.1E-01	7.1E-01	6.2E-01	6.2E-01				Yes
2-Nitrotoluene	88-72-2	mg/kg	1/ 4	1.4E-01	1.9E-01	1.9E-01	1.8E-01	1.8E-01		3.7E+01	1.8E+02	No
4-Amino-2,6-Dinitrotoluene	19406-51-0	mg/kg	1/ 4	3.0E-01	8.1E-01	8.1E-01	7.0E-01	7.0E-01				Yes
HMX	2691-41-0	mg/kg	1/ 4	3.3E-01	5.7E-01	5.7E-01	5.2E-01	5.2E-01		3.1E+02	3.1E+03	No
Nitrocellulose	9004-70-0	mg/kg	3/ 4	1.0E+02	4.2E+00	3.3E+02	4.5E+15	3.3E+02				Yes
Metals												
Aluminum	7429-90-5	mg/kg	9/ 9	1.1E+04	3.9E+03	1.6E+04	1.3E+04	1.3E+04	1.4E+04	7.6E+03	9.2E+04	Yes
Antimony	7440-36-0	mg/kg	6/ 9	2.0E+00	8.2E-01	7.4E+00	4.6E+00	4.6E+00		3.1E+00	4.1E+01	Yes
Arsenic	7440-38-2	mg/kg	9/ 9	1.4E+01	9.4E+00	2.9E+01	1.8E+01	1.8E+01	2.0E+01	3.9E-01	1.6E+00	Yes
Barium	7440-39-3	mg/kg	9/ 9	1.0E+02	3.6E+01	1.5E+02	1.2E+02	1.2E+02	1.2E+02	5.4E+02	6.7E+03	No
Beryllium	7440-41-7	mg/kg	5/ 9	6.4E-01	4.5E-01	1.1E+00	8.5E-01	8.5E-01	3.8E-01	1.5E+01	1.9E+02	No
Cadmium	7440-43-9	mg/kg	8/ 9	2.8E+00	1.5E-01	1.5E+01	2.3E+01	1.5E+01		3.7E+00	4.5E+01	Yes
Calcium	7440-70-2	mg/kg	9/ 9	6.1E+03	1.4E+03	1.1E+04	1.6E+04	1.1E+04	5.5E+03			No
Chromium	7440-47-3	mg/kg	9/ 9	3.3E+01	9.4E+00	1.5E+02	6.2E+01	6.2E+01	1.8E+01	2.1E+02	4.5E+02	No
Chromium, hexavalent	18540-29-9	mg/kg	1/ 2	3.1E+00	5.4E+00	5.4E+00	1.7E+01	5.4E+00		2.2E+01	6.4E+01	No

Table A-3 Summary of COPC Screening for Load Line 1 Sediment (continued)

Analyte	Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria	Region 9 Residential PRG[a]	Region 9 Industrial PRG[a]	COPC?
Cobalt	7440-48-4	mg/kg	9/ 9	1.0E+01	5.2E+00	1.8E+01	1.3E+01	1.3E+01	9.1E+00	1.4E+02	1.3E+03	No
Copper	7440-50-8	mg/kg	9/ 9	7.2E+01	1.5E+01	4.3E+02	1.6E+02	1.6E+02	2.8E+01	3.1E+02	4.1E+03	Yes
Iron	7439-89-6	mg/kg	9/ 9	2.4E+04	1.6E+04	4.6E+04	3.1E+04	3.1E+04	2.8E+04	2.3E+03	3.1E+04	No
Lead	7439-92-1	mg/kg	9/ 9	2.6E+02	3.3E+01	1.1E+03	5.1E+02	5.1E+02	2.7E+01	4.0E+02	7.5E+02	Yes
Magnesium	7439-95-4	mg/kg	9/ 9	3.3E+03	9.5E+02	1.6E+04	6.3E+03	6.3E+03	2.8E+03			No
Manganese	7439-96-5	mg/kg	9/ 9	1.1E+03	2.8E+02	1.8E+03	1.4E+03	1.4E+03	2.0E+03	1.8E+02	1.9E+03	No
Mercury	7487-94-6	mg/kg	9/ 9	1.7E-01	3.3E-02	5.4E-01	4.0E-01	4.0E-01	5.9E-02	2.3E+00	3.1E+01	No
Nickel	7440-02-0	mg/kg	9/ 9	2.9E+01	1.3E+01	1.0E+02	4.7E+01	4.7E+01	1.8E+01	1.6E+02	2.0E+03	No
Potassium	7440-09-7	mg/kg	9/ 9	1.1E+03	2.9E+02	2.0E+03	1.4E+03	1.4E+03	2.0E+03			No
Selenium	7782-49-2	mg/kg	7/ 9	1.8E+00	1.2E+00	3.8E+00	2.5E+00	2.5E+00	1.7E+00	3.9E+01	5.1E+02	No
Sodium	7440-23-5	mg/kg	4/ 9	2.6E+02	1.1E+02	5.4E+02	3.6E+02	3.6E+02	1.1E+02			No
Thallium	6533-73-9	mg/kg	9/ 9	7.2E-01	4.1E-01	1.1E+00	8.9E-01	8.9E-01	8.9E-01	5.2E-01	6.7E+00	Yes
Vanadium	7440-62-2	mg/kg	9/ 9	2.5E+01	1.4E+01	3.4E+01	2.8E+01	2.8E+01	2.6E+01	5.5E+01	7.2E+02	No
Zinc	7440-66-6	mg/kg	9/ 9	5.1E+02	8.6E+01	2.6E+03	1.0E+03	1.0E+03	5.3E+02	2.3E+03	3.1E+04	Yes
Organics-Pesticide/PCB												
Endrin	72-20-8	mg/kg	1/ 2	3.5E-02	5.4E-02	5.4E-02	1.6E-01	5.4E-02		1.8E+00	1.8E+01	No
PCB-1254	11097-69-1	mg/kg	2/ 2	3.5E-01	9.2E-02	6.1E-01	2.0E+00	6.1E-01		1.1E-01	7.4E-01	Yes
gamma-Chlordane	5103-74-2	mg/kg	1/ 2	2.3E-02	3.2E-02	3.2E-02	7.9E-02	3.2E-02		1.6E+00	6.5E+00	No
Organics-Semivolatile												
Acenaphthene	83-32-9	mg/kg	1/ 2	5.1E-01	7.0E-01	7.0E-01	1.7E+00	7.0E-01		3.7E+02	2.9E+03	No
Anthracene	120-12-7	mg/kg	1/ 2	1.3E+00	2.2E+00	2.2E+00	7.2E+00	2.2E+00		2.2E+03	2.4E+04	No
Benz(*a*)anthracene	56-55-3	mg/kg	2/ 2	4.7E+00	9.9E-02	9.2E+00	3.3E+01	9.2E+00		6.2E-01	2.1E+00	Yes
Benzo(*a*)pyrene	50-32-8	mg/kg	2/ 2	4.8E+00	9.8E-02	9.5E+00	3.4E+01	9.5E+00		6.2E-02	2.1E-01	Yes
Benzo(*b*)fluoranthene	205-99-2	mg/kg	2/ 2	6.1E+00	1.4E-01	1.2E+01	4.4E+01	1.2E+01		6.2E-01	2.1E+00	Yes
Benzo(*g,h,i*)perylene	191-24-2	mg/kg	1/ 2	2.9E+00	5.5E+00	5.5E+00	1.9E+01	5.5E+00				Yes
Benzo(*k*)fluoranthene	207-08-9	mg/kg	1/ 2	2.9E+00	5.4E+00	5.4E+00	1.9E+01	5.4E+00		6.2E+00	2.1E+01	No
Carbazole	86-74-8	mg/kg	1/ 2	9.6E-01	1.6E+00	1.6E+00	5.0E+00	1.6E+00		2.4E+01	8.6E+01	No
Chrysene	218-01-9	mg/kg	2/ 2	4.8E+00	1.4E-01	9.4E+00	3.4E+01	9.4E+00		6.2E+01	2.1E+02	No
Di-n-butyl phthalate	84-74-2	mg/kg	1/ 2	5.1E-01	7.1E-01	7.1E-01	1.8E+00	7.1E-01		6.1E+02	6.2E+03	No
Dibenz(*a,h*)anthracene	53-70-3	mg/kg	1/ 2	1.0E+00	1.7E+00	1.7E+00	5.4E+00	1.7E+00		6.2E-02	2.1E-01	Yes
Dibenzofuran	132-64-9	mg/kg	1/ 2	3.6E-01	4.1E-01	4.1E-01	6.8E-01	4.1E-01		2.9E+01	3.1E+02	No

Table A-3 Summary of COPC Screening for Load Line 1 Sediment (continued)

Analyte	Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria	Region 9 Residential PRG[a]	Region 9 Industrial [a]	COPC?
Fluoranthene	206-44-0	mg/kg	2/ 2	1.3E+01	1.9E-01	2.5E+01	9.1E+01	2.5E+01		2.3E+02	2.2E+03	No
Fluorene	86-73-7	mg/kg	1/ 2	7.1E-01	1.1E+00	1.1E+00	3.2E+00	1.1E+00		2.7E+02	2.6E+03	No
Indeno(1,2,3-*cd*)pyrene	193-39-5	mg/kg	1/ 2	3.5E+00	6.7E+00	6.7E+00	2.4E+01	6.7E+00		6.2E-01	2.1E+00	Yes
Naphthalene	91-20-3	mg/kg	1/ 2	3.5E-01	3.9E-01	3.9E-01	6.0E-01	3.9E-01		5.6E+00	1.9E+01	No
Phenanthrene	85-01-8	mg/kg	1/ 2	6.2E+00	1.2E+01	1.2E+01	4.3E+01	1.2E+01				Yes
Pyrene	129-00-0	mg/kg	2/ 2	7.6E+00	1.6E-01	1.5E+01	5.4E+01	1.5E+01		2.3E+02	2.9E+03	No
Organics-Volatile												
1,2-Dichloroethene	549-59-0	mg/kg	2/ 2	4.9E-03	2.2E-03	7.6E-03	2.2E-02	7.6E-03		4.3E+00	1.5E+01	No
Toluene	108-88-3	mg/kg	1/ 2	3.4E-03	2.5E-03	2.5E-03	8.7E-03	2.5E-03		6.6E+01	2.2E+02	No
Trichloroethene	79-01-6	mg/kg	1/ 2	8.1E-03	1.2E-02	1.2E-02	3.3E-02	1.2E-02		5.3E-02	1.1E-01	No
Outlets D, E, and F and Criggy's Pond												
Explosives												
2,4-Dinitrotoluene	121-14-2	mg/kg	1/ 2	9.8E-02	7.0E-02	7.0E-02	2.7E-01	7.0E-02		7.2E-01	2.5E+00	No
Nitrobenzene	98-95-3	mg/kg	1/ 2	1.3E-01	1.4E-01	1.4E-01	1.8E-01	1.4E-01		2.0E+00	1.0E+01	No
Metals												
Aluminum	7429-90-5	mg/kg	6/ 6	8.9E+03	5.3E+03	1.3E+04	1.1E+04	1.1E+04	1.4E+04	7.6E+03	9.2E+04	No
Antimony	7440-36-0	mg/kg	4/ 6	2.0E+02	2.0E+00	1.2E+03	5.9E+02	5.9E+02		3.1E+00	4.1E+01	Yes
Arsenic	7440-38-2	mg/kg	6/ 6	1.5E+01	9.5E+00	2.1E+01	2.1E+01	2.1E+01	2.0E+01	3.9E-01	1.6E+00	Yes
Barium	7440-39-3	mg/kg	6/ 6	1.1E+02	6.4E+01	1.7E+02	1.7E+02	1.7E+02	1.2E+02	5.4E+02	6.7E+03	No
Beryllium	7440-41-7	mg/kg	3/ 6	5.2E-01	5.5E-01	1.1E+00	1.2E+00	1.1E+00	3.8E-01	1.5E+01	1.9E+02	No
Cadmium	7440-43-9	mg/kg	6/ 6	1.5E+00	6.9E-01	2.4E+00	2.7E+00	2.4E+00		3.7E+00	4.5E+01	No
Calcium	7440-70-2	mg/kg	6/ 6	3.9E+03	9.9E+02	6.2E+03	5.4E+03	5.4E+03	5.5E+03			No
Chromium	7440-47-3	mg/kg	6/ 6	3.9E+01	1.1E+01	1.2E+02	2.1E+02	1.2E+02	1.8E+01	2.1E+02	4.5E+02	No
Chromium, hexavalent	18540-29-9	mg/kg	1/ 1	1.1E+01	1.1E+01	1.1E+01		1.1E+01		2.2E+01	6.4E+01	No
Cobalt	7440-48-4	mg/kg	6/ 6	1.2E+01	6.1E+00	1.7E+01	1.5E+01	1.5E+01	9.1E+00	1.4E+02	1.3E+03	No
Copper	7440-50-8	mg/kg	6/ 6	3.1E+02	9.5E+00	1.0E+03	1.1E+05	1.0E+03	2.8E+01	3.1E+02	4.1E+03	Yes
Iron	7439-89-6	mg/kg	6/ 6	2.6E+04	1.8E+04	3.2E+04	3.1E+04	3.1E+04	2.8E+04	2.3E+03	3.1E+04	No
Lead	7439-92-1	mg/kg	6/ 6	2.4E+02	2.2E+01	1.2E+03	1.2E+04	1.2E+03	2.7E+01	4.0E+02	7.5E+02	Yes
Magnesium	7439-95-4	mg/kg	6/ 6	1.5E+03	9.2E+02	2.4E+03	2.2E+03	2.2E+03	2.8E+03			No
Manganese	7439-96-5	mg/kg	6/ 6	1.7E+03	5.0E+02	3.4E+03	6.0E+03	3.4E+03	2.0E+03	1.8E+02	1.9E+03	Yes
Mercury	7487-94-6	mg/kg	6/ 6	2.1E-01	4.1E-02	4.0E-01	3.3E-01	3.3E-01	5.9E-02	2.3E+00	3.1E+01	No
Nickel	7440-02-0	mg/kg	6/ 6	2.8E+01	1.7E+01	4.3E+01	4.3E+01	4.3E+01	1.8E+01	1.6E+02	2.0E+03	No
Potassium	7440-09-7	mg/kg	6/ 6	7.8E+02	5.9E+02	1.1E+03	9.7E+02	9.7E+02	2.0E+03			No

Table A-3 Summary of COPC Screening for Load Line 1 Sediment (continued)

Analyte	Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria	Region 9 Residential PRG[a]	Region 9 Industrial [a]	COPC?
Selenium	7782-49-2	mg/kg	4/ 6	1.4E+00	1.5E+00	2.2E+00	2.0E+00	2.0E+00	1.7E+00	3.9E+01	5.1E+02	No
Sodium	7440-23-5	mg/kg	2/ 6	2.7E+02	7.1E+01	8.5E+01	4.6E+02	8.5E+01	1.1E+02			No
Thallium	6533-73-9	mg/kg	6/ 6	6.4E-01	5.8E-01	6.9E-01	6.8E-01	6.8E-01	8.9E-01	5.2E-01	6.7E+00	No
Vanadium	7440-62-2	mg/kg	6/ 6	2.1E+01	1.3E+01	3.2E+01	3.0E+01	3.0E+01	2.6E+01	5.5E+01	7.2E+02	No
Zinc	7440-66-6	mg/kg	6/ 6	4.6E+02	8.1E+01	8.1E+02	6.6E+02	6.6E+02	5.3E+02	2.3E+03	3.1E+04	No

PRG

CAS

[a] Value is Region 9 preliminary remediation goal (PRG) for a cancer risk level of 1E-06 or a non-cancer hazard quotient of 0.1, whichever is lower.
CAS = Chemical Abstracts Service.
COPC = Contaminant of potential concern.
DDE = Dichlorodiphenyldichloroethylene.
HMX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.
PCB = Polychlorinated biphenyl.
UCL = Upper confidence level.

Table A-4. Summary of COPC Screening for Load Line 1 Shallow Surface Soil

Analyte	Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria	Region 9 Residential PRG	Region 9 Industrial PRG	COPC?
CB-13 and -10												
Explosives												
2,4,6-Trinitrotoluene	118-96-7	mg/kg	17/ 26	1.0E+01	5.5E-02	2.3E+02	2.5E+01	2.5E+01		3.1E+00	3.1E+01	Yes
2,4-Dinitrotoluene	121-14-2	mg/kg	5/ 26	7.9E-01	2.1E-01	9.3E+00	1.5E+00	1.5E+00		7.2E-01	2.5E+00	Yes
2,6-Dinitrotoluene	606-20-2	mg/kg	5/ 26	4.0E-01	1.1E-01	6.0E-01	7.8E-01	6.0E-01		7.2E-01	2.5E+00	No
2-Amino-4,6-dinitrotoluene	35572-78-2	mg/kg	9/ 26	6.7E-01	9.1E-02	8.7E+00	1.2E+00	1.2E+00				Yes
4-Amino-2,6-dinitrotoluene	19406-51-0	mg/kg	5/ 26	5.9E-01	2.0E-01	1.9E+00	1.0E+00	1.0E+00				Yes
4-Nitrotoluene	99-99-0	mg/kg	1/ 26	3.9E-01	2.0E-01	2.0E-01	7.7E-01	2.0E-01			1.8E+02	No
HMX	2691-41-0	mg/kg	2/ 26	8.5E-01	7.8E-01	2.2E+00	1.7E+00	1.7E+00		3.1E+02	3.1E+03	No
Nitrocellulose	9004-70-0	mg/kg	8/ 26	1.1E+01	6.5E+00	1.0E+02	1.8E+01	1.8E+01				Yes
RDX	121-82-4	mg/kg	1/ 26	1.8E+00	2.7E+01	2.7E+01	3.7E+00	3.7E+00	3.7E+01	4.4E+00	1.6E+01	Yes
Metals												
Aluminum	7429-90-5	mg/kg	50/ 50	1.1E+04	3.4E+03	2.6E+04	1.3E+04	1.3E+04	1.8E+04	7.6E+03	9.2E+04	Yes
Antimony	7440-36-0	mg/kg	16/ 50	9.5E-01	5.5E-01	9.1E+00	1.3E+00	1.3E+00	9.6E-01	3.1E+00	4.1E+01	Yes
Arsenic	7440-38-2	mg/kg	50/ 50	1.0E+01	3.1E+00	1.8E+01	1.1E+01	1.1E+01	1.5E+01	3.9E-01	1.6E+00	Yes
Barium	7440-39-3	mg/kg	50/ 50	1.1E+02	2.4E+01	4.1E+02	1.4E+02	1.4E+02	8.8E+01	5.4E+02	6.7E+03	No
Beryllium	7440-41-7	mg/kg	25/ 50	7.4E-01	3.7E-01	3.4E+00	9.7E-01	9.7E-01	8.8E-01	1.5E+01	1.9E+02	No
Cadmium	7440-43-9	mg/kg	39/ 50	3.2E+00	6.2E-02	4.8E+01	6.2E+00	6.2E+00			4.5E+01	Yes
Calcium	7440-70-2	mg/kg	50/ 50	2.8E+04	2.2E+02	1.6E+05	4.0E+04	4.0E+04	1.6E+04			No
Chromium	7440-47-3	mg/kg	50/ 50	2.5E+01	5.2E+00	3.1E+02	3.5E+01	3.5E+01	1.7E+01	2.1E+02	4.5E+02	Yes
Cobalt	7440-48-4	mg/kg	50/ 50	8.7E+00	2.2E+00	3.2E+01	9.9E+00	9.9E+00	1.0E+00	1.4E+02	1.3E+03	No
Copper	7440-50-8	mg/kg	50/ 50	1.1E+02	5.3E+00	2.4E+03	1.9E+02	1.9E+02	1.8E+01	3.1E+02	4.1E+03	Yes
Cyanide	57-12-5	mg/kg	4/ 24	3.8E-01	6.7E-01	1.0E+00	4.6E-01	4.6E-01		1.2E+02	1.2E+03	No
Iron	7439-89-6	mg/kg	50/ 50	2.0E+04	5.2E+03	5.8E+04	2.3E+04	2.3E+04	2.3E+04	2.3E+03	3.1E+04	No
Lead	7439-92-1	mg/kg	50/ 50	1.7E+02	9.4E+00	1.8E+03	2.5E+02	2.5E+02	2.6E+01	4.0E+02	7.5E+02	Yes
Magnesium	7439-95-4	mg/kg	50/ 50	5.1E+03	8.0E+02	2.0E+04	6.5E+03	6.5E+03	3.0E+03			No
Manganese	7439-96-5	mg/kg	50/ 50	1.0E+03	2.3E+02	3.7E+03	1.3E+03	1.3E+03	1.5E+03	1.8E+02	1.9E+03	Yes
Mercury	7487-94-6	mg/kg	46/ 50	7.1E-02	1.2E-02	4.1E-01	9.0E-02	9.0E-02	3.6E-02	2.3E+00	3.1E+01	No
Nickel	7440-02-0	mg/kg	50/ 50	1.8E+01	3.3E+00	6.2E+01	2.1E+01	2.1E+01	2.1E+01	1.6E+02	2.0E+03	No
Potassium	7440-09-7	mg/kg	50/ 50	1.1E+03	4.0E+02	3.6E+03	1.3E+03	1.3E+03	9.3E+02			No
Selenium	7782-49-2	mg/kg	19/ 50	6.7E-01	3.9E-01	3.6E+00	8.3E-01	8.3E-01	1.4E+00	3.9E+01	5.1E+02	No
Silver	7440-22-4	mg/kg	2/ 50	5.9E-01	2.1E-01	2.3E-01	6.3E-01	2.3E-01		3.9E+01	5.1E+02	No
Sodium	7440-23-5	mg/kg	25/ 50	3.2E+02	6.3E+01	1.4E+03	3.8E+02	3.8E+02	1.2E+02			No
Thallium	6533-73-9	mg/kg	47/ 50	4.5E-01	2.4E-01	7.8E-01	4.9E-01	4.9E-01			6.7E+00	Yes
Vanadium	7440-62-2	mg/kg	50/ 50	1.5E+01	5.8E+00	3.8E+01	1.7E+01	1.7E+01	3.1E+01	5.5E+01	7.2E+02	No
Zinc	7440-66-6	mg/kg	50/ 50	3.4E+02	2.0E+01	2.1E+03	4.6E+02	4.6E+02	6.2E+01	2.3E+03	3.1E+04	No

5.2E-01

Table A-4. Summary of COPC Screening for Load Line 1 Shallow Surface Soil (continued)

Analyte	Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria	Region 9 Residential PRG	Region 9 Industrial PRG	COPC?
Organics-Pesticide/PCB												
4,4'-DDE	72-55-9	mg/kg	3/ 6	2.9E-02	2.2E-02	8.2E-02	3.8E+02	8.2E-02			7.0E+00	No
4,4'-DDT	50-29-3	mg/kg	1/ 6	6.3E-03	1.5E-02	1.5E-02	1.1E-02	1.1E-02			7.0E+00	No
Endrin Aldehyde	7421-93-4	mg/kg	3/ 6	2.1E-02	1.5E-02	5.3E-02	2.3E+01	5.3E-02		1.8E+00	1.8E+01	No
Heptachlor **CAS**	76-44-8	mg/kg	1/ 6	8.5E-03	2.8E-02	2.8E-02	1.7E-02	1.7E-02	1.7E+00		3.8E-01	No
PCB-1254	11097-69-1	mg/kg	3/ 6	8.6E-01	1.0E+00	2.4E+00	1.7E+00	1.7E+00	1.7E+00	1.1E-01	7.4E-01	Yes
gamma-Chlordane	5103-74-2	mg/kg	2/ 6	1.0E-02	1.4E-02	3.5E-02	2.1E-02	2.1E-02		1.6E+00	6.5E+00	No
Organics-Semivolatile									1.1E-01			
2-Methylnaphthalene	91-57-6	mg/kg	1/ 6	1.8E-01	1.4E-01	1.4E-01	2.0E-01	1.4E-01				Yes
Anthracene	120-12-7	mg/kg	1/ 6	1.7E-01	7.3E-02	7.3E-02	2.1E-01	7.3E-02			2.4E+04	No
Benz(*a*)anthracene	56-55-3	mg/kg	3/ 6	1.8E-01	6.1E-02	4.1E-01	5.1E-01	4.1E-01			2.1E+00	No
Benzo(*a*)pyrene	50-32-8	mg/kg	3/ 6	1.8E-01	8.1E-02	3.7E-01	3.9E-01	3.7E-01			2.1E-01	Yes
Benzo(*b*)fluoranthene	205-99-2	mg/kg	3/ 6	2.1E-01	1.1E-01	4.7E-01	4.1E-01	4.1E-01	2.2E+03		2.1E+00	No
Benzo(*g,h,i*)perylene	191-24-2	mg/kg	3/ 6	1.6E-01	5.7E-02	2.4E-01	2.1E-01	2.1E-01	6.2E-01			Yes
Benzo(*k*)fluoranthene	207-08-9	mg/kg	1/ 6	1.9E-01	2.1E-01	2.1E-01	2.0E-01	2.0E-01	6.2E-02		2.1E+01	No
Carbazole	86-74-8	mg/kg	1/ 6	1.7E-01	7.2E-02	7.2E-02	2.1E-01	7.2E-02	6.2E-01		8.6E+01	No
Chrysene	218-01-9	mg/kg	3/ 6	2.0E-01	6.9E-02	4.8E-01	5.2E-01	4.8E-01			2.1E+02	No
Di-n-butyl phthalate	84-74-2	mg/kg	1/ 6	2.4E-01	4.7E-01	4.7E-01	3.3E-01	3.3E-01	6.2E+00	6.1E+02	6.2E+03	No
Fluoranthene	206-44-0	mg/kg	3/ 6	3.0E-01	1.2E-01	1.0E+00	5.8E-01	5.8E-01	2.4E+01		2.2E+03	No
Fluorene	86-73-7	mg/kg	1/ 6	1.6E-01	4.1E-02	4.1E-02	2.1E-01	4.1E-02	6.2E+01		2.6E+03	No
Indeno(1,2,3-*cd*)pyrene	193-39-5	mg/kg	3/ 6	1.6E-01	5.6E-02	2.6E-01	2.2E-01	2.2E-01			2.1E+00	No
Naphthalene	91-20-3	mg/kg	1/ 6	1.8E-01	1.0E-01	1.0E-01	2.1E-01	1.0E-01	2.3E+02		1.9E+01	No
Phenanthrene	85-01-8	mg/kg	2/ 6	2.2E-01	1.1E-01	4.5E-01	3.2E-01	3.2E-01	2.7E+02			Yes
Pyrene	129-00-0	mg/kg	3/ 6	2.6E-01	9.4E-02	7.9E-01	8.1E-01	7.9E-01	6.2E-01		2.9E+03	No
Organics-Volatile									5.6E+00			
1,2-Dichloroethene	549-59-0	mg/kg	5/ 6	3.8E-03	1.8E-03	7.2E-03	6.7E-03	6.7E-03		4.3E+00	1.5E+01	No
Acetone	67-64-1	mg/kg	1/ 6	5.7E-03	5.0E-03	5.0E-03	6.0E-03	5.0E-03	2.3E+02		6.0E+02	No
Methylene Chloride	75-09-2	mg/kg	1/ 6	2.8E-03	2.2E-03	2.2E-03	3.1E-03	2.2E-03		9.1E+00	2.1E+01	No
Toluene	108-88-3	mg/kg	2/ 6	3.1E-03	3.1E-03	4.4E-03	3.7E-03	3.7E-03			2.2E+02	No
Trichloroethene	79-01-6	mg/kg	3/ 6	2.8E-03	1.8E-03	3.3E-03	3.2E-03	3.2E-03	1.6E+02	5.3E-02	1.1E-01	No
CB-14, CB-17, and CA-15												
Explosives									6.6E+01			
2,4,6-Trinitrotoluene	118-96-7	mg/kg	2/ 4	1.3E+00	3.7E-01	4.5E+00	1.2E+05	4.5E+00		3.1E+00	3.1E+01	Yes
2,4-Dinitrotoluene	121-14-2	mg/kg	2/ 4	2.9E-01	3.8E-01	5.3E-01	5.3E-01	5.3E-01		7.2E-01	2.5E+00	No
4-Amino-2,6-dinitrotoluene	19406-51-0	mg/kg	2/ 4	2.5E-01	1.4E-01	6.2E-01	5.4E-01	5.4E-01				Yes
HMX	2691-41-0	mg/kg	2/ 4	8.8E-01	3.2E-01	2.7E+00	2.3E+00	2.3E+00		3.1E+02	3.1E+03	No

Table A-4. Summary of COPC Screening for Load Line 1 Shallow Surface Soil (continued)

Analyte	Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria	Region 9 Residential PRG	Region 9 Industrial PRG	COPC?
Nitrocellulose	9004-70-0	mg/kg	2/ 4	3.5E+01	5.0E+01	9.0E+01	8.6E+01	8.6E+01				Yes
RDX	121-82-4	mg/kg	1/ 4	8.7E+00	3.4E+01	3.4E+01	2.9E+01	2.9E+01		4.4E+00	1.6E+01	Yes
Metals												
Aluminum	7429-90-5	mg/kg	26/ 26	1.4E+04	6.1E+03	9.7E+04	2.0E+04	2.0E+04	1.8E+04	7.6E+03	9.2E+04	Yes
Antimony	7440-36-0	mg/kg	2/ 26	7.3E-01	5.5E-01	6.4E-01	9.9E-01	6.4E-01	9.6E-01	3.1E+00	4.1E+01	No
Arsenic	7440-38-2	mg/kg	26/ 26	1.5E+01	4.5E+00	1.1E+02	2.1E+01	2.1E+01	1.5E+01	3.9E-01	1.6E+00	Yes
Barium	7440-39-3	mg/kg	26/ 26	9.9E+01	3.1E+01	5.7E+02	1.4E+02	1.4E+02	8.8E+01	5.4E+02	6.7E+03	Yes
Beryllium	7440-41-7	mg/kg	25/ 26	6.7E-01	2.4E-01	3.3E+00	9.4E-01	9.4E-01	8.8E-01	1.5E+01	1.9E+02	No
Cadmium	7440-43-9	mg/kg	11/ 26	1.2E+00	5.0E-02	1.2E+01	2.1E+00	2.1E+00			4.5E+01	Yes
Calcium	7440-70-2	mg/kg	26/ 26	1.4E+04	4.1E+02	1.3E+05	3.4E+04	3.4E+04	1.6E+04			No
Chromium	7440-47-3	mg/kg	26/ 26	2.0E+01	8.4E+00	1.3E+02	2.8E+01	2.8E+01	1.7E+01	2.1E+02	4.5E+02	No
Cobalt	7440-48-4	mg/kg	26/ 26	1.0E+01	2.6E+00	7.2E+01	1.5E+01	1.5E+01	1.0E+01	1.4E+02	1.3E+03	No
Copper	7440-50-8	mg/kg	26/ 26	3.4E+01	8.0E+00	2.0E+02	4.9E+01	4.9E+01	1.8E+01	3.1E+02	4.1E+03	No
Cyanide	57-12-5	mg/kg	1/ 11	6.6E-01	2.4E+00	2.4E+00	1.1E+00	1.1E+00		1.2E+02	1.2E+03	No
Iron	7439-89-6	mg/kg	26/ 26	2.8E+04	9.8E+03	2.0E+05	4.0E+04	4.0E+04	2.3E+04	2.3E+03	3.1E+04	No
Lead	7439-92-1	mg/kg	26/ 26	7.0E+01	1.3E+01	6.0E+02	1.1E+02	1.1E+02	2.6E+01	4.0E+02	7.5E+02	Yes
Magnesium	7439-95-4	mg/kg	26/ 26	4.1E+03	1.4E+03	2.3E+04	6.0E+03	6.0E+03	3.0E+03			No
Manganese	7439-96-5	mg/kg	26/ 26	8.6E+02	2.2E+02	4.7E+03	1.2E+03	1.2E+03	1.5E+03	1.8E+02	1.9E+03	Yes
Mercury	7487-94-6	mg/kg	26/ 26	5.7E-02	1.8E-02	3.7E-01	8.1E-02	8.1E-02	3.6E-02	2.3E+00	3.1E+01	No
Nickel	7440-02-0	mg/kg	26/ 26	2.2E+01	7.3E+00	1.6E+02	3.2E+01	3.2E+01	2.1E+01	1.6E+02	2.0E+03	Yes
Potassium	7440-09-7	mg/kg	26/ 26	1.5E+03	5.9E+02	1.2E+04	2.2E+03	2.2E+03	9.3E+02			No
Selenium	7782-49-2	mg/kg	6/ 26	5.4E-01	5.5E-01	1.1E+00	6.7E-01	6.7E-01	1.4E+00	3.9E+01	5.1E+02	No
Silver	7440-22-4	mg/kg	3/ 26	6.8E-01	2.0E-01	2.1E-01	9.5E-01	2.1E-01		3.9E+01	5.1E+02	No
Sodium	7440-23-5	mg/kg	9/ 26	2.5E+02	6.3E+01	1.6E+03	3.6E+02	3.6E+02	1.2E+02			No
Thallium	6533-73-9	mg/kg	26/ 26	6.4E-01	3.4E-01	4.6E+00	9.1E-01	9.1E-01			6.7E+00	Yes
Vanadium	7440-62-2	mg/kg	26/ 26	2.4E+01	8.6E+00	1.8E+02	3.5E+01	3.5E+01	3.1E+01	5.5E+01	7.2E+02	Yes
Zinc	7440-66-6	mg/kg	26/ 26	1.5E+02	3.9E+01	8.8E+02	2.2E+02	2.2E+02	6.2E+01	2.3E+03	3.1E+04	No
Organics-Pesticide/PCB										5.2E-01		
4,4'-DDE	72-55-9	mg/kg	3/ 3	7.4E-02	1.0E-02	2.0E-01	5.3E+10	2.0E-01			7.0E+00	No
Endrin Aldehyde	7421-93-4	mg/kg	3/ 3	1.1E-01	8.3E-03	3.0E-01	3.9E-01	3.0E-01		1.8E+00	1.8E+01	No
Endrin Ketone	53494-70-5	mg/kg	1/ 3	8.2E-03	4.1E-03	4.1E-03	2.5E-02	4.1E-03		1.8E+00	1.8E+01	No
Methoxychlor	72-43-5	mg/kg	1/ 3	1.5E-02	3.7E-03	3.7E-03	4.8E-02	3.7E-03	1.7E+00		3.1E+02	No
PCB-1254	11097-69-1	mg/kg	3/ 3	2.0E+00	6.0E-01	4.7E+00	1.2E+06	4.7E+00		1.1E-01	7.4E-01	Yes
alpha-Chlordane	5103-71-9	mg/kg	1/ 3	8.5E-03	4.9E-03	4.9E-03	2.5E-02	4.9E-03		1.6E+00	6.5E+00	No
beta-BHC	319-85-7	mg/kg	1/ 3	8.0E-03	2.8E-03	2.8E-03	2.5E-02	2.8E-03	3.1E+01		1.3E+00	No
gamma-Chlordane	5103-74-2	mg/kg	3/ 3	4.6E-02	4.4E-03	1.3E-01	1.7E-01	1.3E-01		1.6E+00	6.5E+00	No

3.7E+00

3.2E-01

Table A-4. Summary of COPC Screening for Load Line 1 Shallow Surface Soil (continued)

Analyte	Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria	Region 9 Residential PRG	Region 9 Industrial PRG	COPC?
Organics-Semivolatile												
2-Methylnaphthalene	91-57-6	mg/kg	2/ 4	1.4E-01	3.8E-02	1.7E-01	2.3E-01	1.7E-01				Yes
Acenaphthene	83-32-9	mg/kg	1/ 4	1.6E-01	6.9E-02	6.9E-02	2.3E-01	6.9E-02			2.9E+03	No
Anthracene	120-12-7	mg/kg	2/ 4	1.6E-01	1.1E-01	1.6E-01	2.0E-01	1.6E-01			2.4E+04	No
Benz(*a*)anthracene	56-55-3	mg/kg	2/ 4	3.5E-01	4.0E-01	6.4E-01	2.0E+00	6.4E-01			2.1E+00	Yes
Benzo(*a*)pyrene	50-32-8	mg/kg	3/ 4	4.0E-01	3.7E-02	8.4E-01	8.2E-01	8.2E-01	3.7E+02		2.1E-01	Yes
Benzo(*b*)fluoranthene	205-99-2	mg/kg	3/ 4	5.3E-01	7.3E-02	1.1E+00	9.0E+02	1.1E+00	2.2E+03		2.1E+00	Yes
Benzo(*g,h,i*)perylene	191-24-2	mg/kg	2/ 4	3.2E-01	3.0E-01	6.1E-01	1.3E+00	6.1E-01	6.2E-01			Yes
Benzo(*k*)fluoranthene	207-08-9	mg/kg	2/ 4	2.3E-01	2.6E-01	3.0E-01	3.0E-01	3.0E-01	6.2E-02		2.1E+01	No
Bis(2-ethylhexyl)phthalate	117-81-7	mg/kg	1/ 4	1.7E-01	1.4E-01	1.4E-01	2.0E-01	1.4E-01	6.2E-01	3.5E+01	1.2E+02	No
Carbazole	86-74-8	mg/kg	2/ 4	1.4E-01	9.5E-02	1.1E-01	2.8E-01	1.1E-01			8.6E+01	No
Chrysene	218-01-9	mg/kg	2/ 4	3.9E-01	5.6E-01	6.4E-01	6.8E-01	6.4E-01	6.2E+00		2.1E+02	No
Di-n-butyl phthalate	84-74-2	mg/kg	3/ 4	2.8E-01	9.3E-02	7.2E-01	1.0E+01	7.2E-01		6.1E+02	6.2E+03	No
Dibenz(*a,h*)anthracene	53-70-3	mg/kg	2/ 4	1.6E-01	8.6E-02	1.8E-01	2.2E-01	1.8E-01	2.4E+01		2.1E-01	Yes
Dibenzofuran	132-64-9	mg/kg	1/ 4	1.5E-01	4.5E-02	4.5E-02	2.3E-01	4.5E-02	6.2E+01		3.1E+02	No
Fluoranthene	206-44-0	mg/kg	3/ 4	6.5E-01	8.9E-02	1.4E+00	1.4E+03	1.4E+00			2.2E+03	No
Fluorene	86-73-7	mg/kg	1/ 4	1.5E-01	5.7E-02	5.7E-02	2.3E-01	5.7E-02	6.2E-02		2.6E+03	No
Indeno(1,2,3-*cd*)pyrene	193-39-5	mg/kg	2/ 4	3.3E-01	2.9E-01	6.4E-01	1.4E+00	6.4E-01	2.9E+01		2.1E+00	Yes
Naphthalene	91-20-3	mg/kg	2/ 4	1.3E-01	4.5E-02	1.1E-01	2.1E-01	1.1E-01	2.3E+02		1.9E+01	No
Phenanthrene	85-01-8	mg/kg	2/ 4	3.7E-01	4.5E-01	6.7E-01	6.5E-01	6.5E-01	2.7E+02			Yes
Pyrene	129-00-0	mg/kg	3/ 4	5.6E-01	6.3E-02	1.0E+00	1.8E+03	1.0E+00	6.2E-01		2.9E+03	No
Organics-Volatile									5.6E+00			
1,2-Dichloroethene	549-59-0	mg/kg	4/ 4	2.4E-03	1.6E-03	3.1E-03	4.5E-03	3.1E-03		4.3E+00	1.5E+01	No
Methylene Chloride	75-09-2	mg/kg	2/ 4	2.4E-03	1.9E-03	2.1E-03	3.5E-03	2.1E-03	2.3E+02	9.1E+00	2.1E+01	No
Toluene	108-88-3	mg/kg	1/ 4	2.5E-03	1.7E-03	1.7E-03	3.1E-03	1.7E-03			2.2E+02	No
CB-3 and -801												
Explosives												
1,3,5-Trinitrobenzene	99-35-4	mg/kg	3/ 13	1.2E-01	9.8E-02	1.2E-01	1.3E-01	1.2E-01	6.6E+01	1.8E+02	1.8E+03	No
2,4,6-Trinitrotoluene	118-96-7	mg/kg	6/ 13	2.2E-01	8.0E-02	1.2E+00	3.7E-01	3.7E-01		3.1E+00	3.1E+01	No
2,4-Dinitrotoluene	121-14-2	mg/kg	1/ 13	1.3E-01	1.5E-01	1.5E-01	1.3E-01	1.3E-01		7.2E-01	2.5E+00	No
2-Amino-4,6-dinitrotoluene	35572-78-2	mg/kg	1/ 13	1.2E-01	9.7E-02	9.7E-02	1.3E-01	9.7E-02				Yes
2-Nitrotoluene	88-72-2	mg/kg	1/ 13	1.5E-01	2.2E-01	2.2E-01	1.8E-01	1.8E-01			1.8E+02	No
4-Amino-2,6-dinitrotoluene	19406-51-0	mg/kg	5/ 13	1.3E-01	9.1E-02	2.3E-01	1.5E-01	1.5E-01				Yes
Nitrobenzene	98-95-3	mg/kg	3/ 13	1.3E-01	9.5E-02	2.3E-01	1.5E-01	1.5E-01			1.0E+01	No
Nitrocellulose	9004-70-0	mg/kg	5/ 13	2.6E+00	5.2E-01	1.5E+01	4.5E+00	4.5E+00	3.7E+01			Yes
RDX	121-82-4	mg/kg	1/ 13	2.5E-01	2.9E-01	2.9E-01	2.6E-01	2.6E-01		4.4E+00	1.6E+01	No
									2.0E+00			

Table A-4. Summary of COPC Screening for Load Line 1 Shallow Surface Soil (continued)

Analyte	Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria	Region 9 Residential PRG	Region 9 Industrial PRG	COPC?
Metals												
Aluminum	7429-90-5	mg/kg	22/ 22	9.8E+03	4.1E+03	2.3E+04	1.2E+04	1.2E+04	1.8E+04	7.6E+03	9.2E+04	Yes
Antimony	7440-36-0	mg/kg	10/ 22	5.0E+01	7.1E-01	6.5E+02	1.1E+02	1.1E+02	9.6E-01	3.1E+00	4.1E+01	Yes
Arsenic	7440-38-2	mg/kg	22/ 22	1.2E+01	5.3E+00	1.9E+01	1.3E+01	1.3E+01	1.5E+01	3.9E-01	1.6E+00	Yes
Barium	7440-39-3	mg/kg	22/ 22	1.1E+02	2.1E+01	3.5E+02	1.5E+02	1.5E+02	8.8E+01	5.4E+02	6.7E+03	No
Beryllium	7440-41-7	mg/kg	11/ 22	5.6E-01	3.3E-01	2.5E+00	9.5E-01	9.5E-01	8.8E-01	1.5E+01	1.9E+02	No
Cadmium	7440-43-9	mg/kg	20/ 22	2.6E+00	7.4E-02	2.7E+01	6.3E+00	6.3E+00			4.5E+01	Yes
Calcium	7440-70-2	mg/kg	22/ 22	3.1E+04	3.0E+02	2.2E+05	2.0E+05	2.0E+05	1.6E+04			No
Chromium	7440-47-3	mg/kg	22/ 22	3.0E+01	6.8E+00	1.7E+02	4.4E+01	4.4E+01	1.7E+01	2.1E+02	4.5E+02	No
Chromium, hexavalent	18540-29-9	mg/kg	1/ 2	1.0E+00	1.4E+00	1.4E+00	3.5E+00	1.4E+00	3.7E+00	2.2E+01	6.4E+01	No
Cobalt	7440-48-4	mg/kg	22/ 22	7.5E+00	3.4E+00	1.1E+01	8.2E+00	8.2E+00	1.0E+01	1.4E+02	1.3E+03	No
Copper	7440-50-8	mg/kg	22/ 22	3.8E+01	5.9E+00	1.9E+02	5.6E+01	5.6E+01	1.8E+01	3.1E+02	4.1E+03	No
Cyanide	57-12-5	mg/kg	2/ 9	4.0E-01	5.8E-01	1.0E+00	5.5E-01	5.5E-01			1.2E+03	No
Iron	7439-89-6	mg/kg	22/ 22	2.4E+04	8.8E+03	9.0E+04	3.0E+04	3.0E+04	2.3E+04	2.3E+03	3.1E+04	No
Lead	7439-92-1	mg/kg	22/ 22	2.4E+02	1.6E+01	1.6E+03	6.1E+02	6.1E+02	2.6E+01	4.0E+02	7.5E+02	Yes
Magnesium	7439-95-4	mg/kg	22/ 22	4.1E+03	1.3E+03	1.7E+04	5.5E+03	5.5E+03	3.0E+03	1.2E+02		No
Manganese	7439-96-5	mg/kg	22/ 22	9.2E+02	3.2E+02	4.1E+03	1.3E+03	1.3E+03	1.5E+03	1.8E+02	1.9E+03	Yes
Mercury	7487-94-6	mg/kg	20/ 22	8.5E-02	1.6E-02	4.2E-01	1.4E-01	1.4E-01	3.6E-02	2.3E+00	3.1E+01	No
Nickel	7440-02-0	mg/kg	22/ 22	1.9E+01	7.8E+00	6.1E+01	2.3E+01	2.3E+01	2.1E+01	1.6E+02	2.0E+03	No
Potassium	7440-09-7	mg/kg	22/ 22	1.1E+03	5.7E+02	1.8E+03	1.2E+03	1.2E+03	9.3E+02			No
Selenium	7782-49-2	mg/kg	10/ 22	5.5E-01	3.9E-01	1.8E+00	6.9E-01	6.9E-01	1.4E+00	3.9E+01	5.1E+02	No
Silver	7440-22-4	mg/kg	3/ 22	5.7E-01	2.1E-01	4.6E-01	6.2E-01	4.6E-01		3.9E+01	5.1E+02	No
Sodium	7440-23-5	mg/kg	7/ 22	2.3E+02	7.0E+01	9.3E+02	3.0E+02	3.0E+02	1.2E+02			No
Thallium	6533-73-9	mg/kg	22/ 22	5.6E-01	4.3E-01	8.0E-01	6.0E-01	6.0E-01			6.7E+00	Yes
Vanadium	7440-62-2	mg/kg	22/ 22	1.5E+01	7.8E+00	2.7E+01	1.8E+01	1.8E+01	3.1E+01	5.5E+01	7.2E+02	No
Zinc	7440-66-6	mg/kg	22/ 22	1.9E+02	7.2E+01	6.7E+02	2.6E+02	2.6E+02	6.2E+01	2.3E+03	3.1E+04	No
Organics-Pesticide/PCB									5.2E-01			
4,4'-DDE	72-55-9	mg/kg	2/ 4	5.2E-02	4.8E-02	1.2E-01	1.1E+00	1.2E-01			7.0E+00	No
4,4'-DDT	50-29-3	mg/kg	1/ 4	2.5E-02	4.1E-02	4.1E-02	3.8E-02	3.8E-02			7.0E+00	No
Dieldrin	60-57-1	mg/kg	1/ 4	2.4E-02	3.6E-02	3.6E-02	3.3E-02	3.3E-02			1.1E-01	Yes
Endrin Aldehyde	7421-93-4	mg/kg	2/ 4	8.1E-02	7.3E-02	2.1E-01	2.2E+01	2.1E-01	1.7E+00	1.8E+00	1.8E+01	No
Endrin Ketone	53494-70-5	mg/kg	1/ 4	3.1E-02	8.1E-02	8.1E-02	7.1E-02	7.1E-02	1.7E+00	1.8E+00	1.8E+01	No
Methoxychlor	72-43-5	mg/kg	1/ 4	3.6E-02	2.6E-02	2.6E-02	4.3E-02	2.6E-02	3.0E-02		3.1E+02	No
PCB-1254	11097-69-1	mg/kg	4/ 4	1.8E+00	3.3E-01	4.3E+00	4.3E+02	4.3E+00		1.1E-01	7.4E-01	Yes
beta-BHC	319-85-7	mg/kg	2/ 4	6.9E-02	1.8E-02	2.2E-01	1.9E-01	1.9E-01			1.3E+00	No
gamma-Chlordane	5103-74-2	mg/kg	2/ 4	3.3E-02	4.0E-02	5.2E-02	5.2E-02	5.2E-02	3.1E+01	1.6E+00	6.5E+00	No

CAS

3.2E-01

Table A-4. Summary of COPC Screening for Load Line 1 Shallow Surface Soil (continued)

Analyte	Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria	Region 9 Residential PRG	Region 9 Industrial PRG	COPC?
Organics-Semivolatile												
2-Methylnaphthalene	91-57-6	mg/kg	2/ 5	6.0E-01	5.0E-02	1.2E-01	1.6E+00	1.2E-01				Yes
Acenaphthene	83-32-9	mg/kg	1/ 5	6.9E-01	2.4E+00	2.4E+00	1.6E+00	1.6E+00			2.9E+03	No
Anthracene	120-12-7	mg/kg	2/ 5	1.3E+00	2.1E-01	5.8E+00	3.7E+00	3.7E+00			2.4E+04	No
Benz(*a*)anthracene	56-55-3	mg/kg	5/ 5	3.1E+00	7.1E-02	1.4E+01	1.5E+06	1.4E+01			2.1E+00	Yes
Benzo(*a*)pyrene	50-32-8	mg/kg	5/ 5	2.9E+00	7.3E-02	1.3E+01	1.5E+06	1.3E+01	3.7E+02		2.1E-01	Yes
Benzo(*b*)fluoranthene	205-99-2	mg/kg	5/ 5	3.6E+00	1.0E-01	1.5E+01	1.6E+06	1.5E+01	2.2E+03		2.1E+00	Yes
Benzo(*g,h,i*)perylene	191-24-2	mg/kg	5/ 5	2.0E+00	5.4E-02	8.2E+00	1.2E+06	8.2E+00	6.2E-01			Yes
Benzo(*k*)fluoranthene	207-08-9	mg/kg	3/ 5	1.4E+00	1.3E-01	5.7E+00	9.0E+02	5.7E+00	6.2E-02		2.1E+01	No
Bis(2-ethylhexyl)phthalate	117-81-7	mg/kg	2/ 5	6.5E-01	9.5E-02	3.4E-01	1.6E+00	3.4E-01	6.2E-01	3.5E+01	1.2E+02	No
Carbazole	86-74-8	mg/kg	2/ 5	9.7E-01	1.6E-01	4.1E+00	2.6E+00	2.6E+00			8.6E+01	No
Chrysene	218-01-9	mg/kg	5/ 5	3.5E+00	8.9E-02	1.5E+01	1.4E+06	1.5E+01	6.2E+00		2.1E+02	No
Di-n-butyl phthalate	84-74-2	mg/kg	1/ 5	7.1E-01	5.0E-01	5.0E-01	1.6E+00	5.0E-01		6.1E+02	6.2E+03	No
Dibenz(*a,h*)anthracene	53-70-3	mg/kg	2/ 5	5.2E-01	3.2E-01	1.7E+00	1.2E+00	1.2E+00	2.4E+01		2.1E-01	Yes
Dibenzofuran	132-64-9	mg/kg	1/ 5	4.7E-01	1.3E+00	1.3E+00	9.3E-01	9.3E-01	6.2E+01		3.1E+02	No
Fluoranthene	206-44-0	mg/kg	5/ 5	8.4E+00	1.4E-01	3.9E+01	7.0E+06	3.9E+01			2.2E+03	No
Fluorene	86-73-7	mg/kg	1/ 5	6.7E-01	2.3E+00	2.3E+00	1.5E+00	1.5E+00	6.2E-02		2.6E+03	No
Indeno(1,2,3-*cd*)pyrene	193-39-5	mg/kg	5/ 5	2.0E+00	5.3E-02	8.7E+00	9.4E+05	8.7E+00	2.9E+01		2.1E+00	Yes
Naphthalene	91-20-3	mg/kg	1/ 5	6.7E-01	4.6E-02	4.6E-02	1.6E+00	4.6E-02	2.3E+02		1.9E+01	No
Pentachlorophenol	87-86-5	mg/kg	1/ 5	1.6E+00	8.3E-02	8.3E-02	4.0E+00	8.3E-02	2.7E+02	3.0E+00	9.0E+00	No
Phenanthrene	85-01-8	mg/kg	5/ 5	6.3E+00	7.2E-02	3.0E+01	8.0E+06	3.0E+01	6.2E-01			Yes
Phenol	108-95-2	mg/kg	1/ 5	6.7E-01	4.5E-02	4.5E-02	1.6E+00	4.5E-02	5.6E+00		3.7E+04	No
Pyrene	129-00-0	mg/kg	5/ 5	8.7E+00	1.4E-01	4.1E+01	8.8E+06	4.1E+01			2.9E+03	No
Organics-Volatile												
1,2-Dichloroethene	549-59-0	mg/kg	5/ 5	4.7E-03	7.2E-04	7.9E-03	7.1E-03	7.1E-03	3.7E+03	4.3E+00	1.5E+01	No
Methylene Chloride	75-09-2	mg/kg	1/ 5	2.9E-03	3.0E-03	3.0E-03	3.0E-03	3.0E-03	2.3E+02	9.1E+00	2.1E+01	No
Trichloroethene	79-01-6	mg/kg	1/ 5	3.2E-03	4.4E-03	4.4E-03	3.9E-03	3.9E-03		5.3E-02	1.1E-01	No
CB-4/4A and CA-6/6A												
Explosives												
1,3,5-Trinitrobenzene	99-35-4	mg/kg	5/ 82	3.2E+00	1.2E-01	1.1E+02	5.9E+00	5.9E+00		1.8E+02	1.8E+03	No
1,3-Dinitrobenzene	99-65-0	mg/kg	4/ 82	3.2E+00	3.4E-02	1.1E+02	5.9E+00	5.9E+00		6.1E-01	6.2E+00	Yes
2,4,6-Trinitrotoluene	118-96-7	mg/kg	60/ 82	1.6E+02	5.2E-02	4.8E+03	3.0E+02	3.0E+02		3.1E+00	3.1E+01	Yes
2,4-Dinitrotoluene	121-14-2	mg/kg	9/ 82	3.4E+00	4.6E-02	2.3E-01	6.3E+00	2.3E-01		7.2E-01	2.5E+00	No
2,6-Dinitrotoluene	606-20-2	mg/kg	7/ 82	3.4E+00	9.3E-02	8.6E-01	6.4E+00	8.6E-01		7.2E-01	2.5E+00	Yes
2-Amino-4,6-dinitrotoluene	35572-78-2	mg/kg	43/ 82	4.0E+00	1.0E-01	1.1E+01	6.9E+00	6.9E+00				Yes
2-Nitrotoluene	88-72-2	mg/kg	2/ 82	3.4E+00	1.8E-01	6.9E-01	6.3E+00	6.9E-01			1.8E+02	No
3-Nitrotoluene	99-08-1	mg/kg	5/ 82	3.4E+00	1.4E-01	1.8E-01	6.3E+00	1.8E-01			1.8E+02	No

3.7E+01
3.7E+01

Table A-4. Summary of COPC Screening for Load Line 1 Shallow Surface Soil (continued)

Analyte	Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria	Region 9 Residential PRG	Region 9 Industrial PRG	COPC?
4-Amino-2,6-dinitrotoluene	19406-51-0	mg/kg	20/ 82	9.3E+00	1.3E-01	5.9E+00	1.9E+01	5.9E+00				Yes
4-Nitrotoluene	99-99-0	mg/kg	5/ 82	3.4E+00	1.1E-01	2.0E-01	6.3E+00	2.0E-01			1.8E+02	No
HMX	2691-41-0	mg/kg	13/ 82	8.4E+00	2.5E-01	2.6E+02	1.6E+01	1.6E+01		3.1E+02	3.1E+03	No
Nitrobenzene	98-95-3	mg/kg	8/ 82	3.4E+00	4.8E-02	5.9E-01	6.3E+00	5.9E-01			1.0E+01	No
Nitrocellulose	9004-70-0	mg/kg	50/ 82	1.1E+01	3.0E-01	3.9E+02	2.0E+01	2.0E+01				Yes
Nitroglycerin	55-63-0	mg/kg	1/ 82	3.4E+01	7.4E+00	7.4E+00	6.3E+01	7.4E+00			1.2E+02	No
Nitroguanidine	556-88-7	mg/kg	1/ 82	2.5E-01	3.5E-02	3.5E-02	3.8E-01	3.5E-02			6.2E+03	No
RDX	121-82-4	mg/kg	17/ 82	4.8E+01	2.2E-01	2.3E+03	1.0E+02	1.0E+02		4.4E+00	1.6E+01	Yes
Metals												
Aluminum	7429-90-5	mg/kg	160/ 160	9.4E+03	7.6E+02	4.6E+04	1.0E+04	1.0E+04		7.6E+03	9.2E+04	Yes
Antimony	7440-36-0	mg/kg	21/ 160	7.0E-01	5.9E-01	3.0E+00	7.5E-01	7.5E-01		3.1E+00	4.1E+01	No
Arsenic	7440-38-2	mg/kg	160/ 160	1.0E+01	1.8E+00	5.6E+01	1.1E+01	1.1E+01		3.9E-01	1.6E+00	Yes
Barium	7440-39-3	mg/kg	160/ 160	1.1E+02	1.3E+01	2.0E+03	1.4E+02	1.4E+02		5.4E+02	6.7E+03	Yes
Beryllium	7440-41-7	mg/kg	96/ 160	4.0E-01	2.2E-01	2.6E+00	4.6E-01	4.6E-01		1.5E+01	1.9E+02	No
Cadmium	7440-43-9	mg/kg	128/ 160	1.4E+00	5.3E-02	2.7E+01	1.8E+00	1.8E+00		3.7E+00	4.5E+01	Yes
Calcium	7440-70-2	mg/kg	159/ 160	7.4E+03	1.2E+02	1.2E+05	9.7E+03	9.7E+03				No
Chromium	7440-47-3	mg/kg	160/ 160	2.0E+01	2.1E+00	4.0E+02	2.5E+01	2.5E+01		2.1E+02	4.5E+02	Yes
Cobalt	7440-48-4	mg/kg	159/ 160	8.2E+00	8.8E-01	4.9E+01	8.9E+00	8.9E+00		1.4E+02	1.3E+03	No
Copper	7440-50-8	mg/kg	160/ 160	6.2E+01	2.4E+00	3.7E+03	1.1E+02	1.1E+02		3.1E+02	4.1E+03	Yes
Cyanide	57-12-5	mg/kg	10/ 75	4.6E-01	5.7E-01	3.8E+00	5.5E-01	5.5E-01			1.2E+03	No
Iron	7439-89-6	mg/kg	160/ 160	2.1E+04	2.5E+03	1.1E+05	2.3E+04	2.3E+04		2.3E+03	3.1E+04	No
Lead	7439-92-1	mg/kg	160/ 160	2.0E+02	1.0E+01	7.1E+03	2.8E+02	2.8E+02		4.0E+02	7.5E+02	Yes
Magnesium	7439-95-4	mg/kg	160/ 160	2.4E+03	1.1E+02	1.5E+04	2.7E+03	2.7E+03				No
Manganese	7439-96-5	mg/kg	160/ 160	6.4E+02	8.0E+01	3.5E+03	7.0E+02	7.0E+02		1.8E+02	1.9E+03	Yes
Mercury	7487-94-6	mg/kg	146/ 160	2.2E-01	1.0E-02	9.7E+00	3.4E-01	3.4E-01		2.3E+00	3.1E+01	Yes
Nickel	7440-02-0	mg/kg	159/ 160	1.6E+01	3.5E+00	1.0E+02	1.8E+01	1.8E+01		1.6E+02	2.0E+03	No
Potassium	7440-09-7	mg/kg	159/ 160	9.3E+02	2.0E+02	5.7E+03	1.0E+03	1.0E+03				No
Selenium	7782-49-2	mg/kg	102/ 160	7.1E-01	3.4E-01	5.3E+00	7.9E-01	7.9E-01		3.9E+01	5.1E+02	No
Silver	7440-22-4	mg/kg	5/ 160	5.9E-01	1.7E-01	8.8E-01	6.2E-01	6.2E-01		3.9E+01	5.1E+02	No
Sodium	7440-23-5	mg/kg	25/ 160	2.5E+02	6.0E+01	8.9E+02	2.8E+02	2.8E+02				No
Thallium	6533-73-9	mg/kg	152/ 160	5.0E-01	1.7E-01	2.5E+00	5.4E-01	5.4E-01			6.7E+00	Yes
Vanadium	7440-62-2	mg/kg	160/ 160	1.8E+01	1.8E+00	7.8E+01	1.9E+01	1.9E+01		5.5E+01	7.2E+02	Yes
Zinc	7440-66-6	mg/kg	160/ 160	1.6E+02	1.5E+01	1.7E+03	1.9E+02	1.9E+02		2.3E+03	3.1E+04	No
Organics-Pesticide/PCB												
4,4'-DDE	72-55-9	mg/kg	12/ 17	5.1E-01	3.0E-03	6.7E+00	1.2E+00	1.2E+00			7.0E+00	Yes
4,4'-DDT	50-29-3	mg/kg	2/ 17	2.1E-02	5.3E-03	4.1E-02	4.1E-02	4.1E-02			7.0E+00	No
Dieldrin	60-57-1	mg/kg	3/ 17	4.3E-02	1.4E-02	5.5E-01	9.8E-02	9.8E-02			1.1E-01	Yes

Table A-4. Summary of COPC Screening for Load Line 1 Shallow Surface Soil (continued)

Analyte	Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria	Region 9 Residential PRG	Region 9 Industrial PRG	COPC?
Endrin Aldehyde	7421-93-4	mg/kg	10/ 17	3.1E-01	3.8E-03	4.4E+00	5.6E+00	4.4E+00		1.8E+00	1.8E+01	Yes
Endrin Ketone	53494-70-5	mg/kg	1/ 17	1.9E-02	1.4E-02	1.4E-02	3.9E-02	1.4E-02			1.8E+01	No
Heptachlor	76-44-8	mg/kg	2/ 17	3.5E-02	7.2E-03	3.2E-01	7.2E-02	7.2E-02			3.8E-01	Yes
Heptachlor Epoxide	1024-57-3	mg/kg	1/ 17	2.0E-02	3.1E-02	3.1E-02	4.0E-02	3.1E-02		5.3E-02	1.9E-01	No
Methoxychlor**CAS**	72-43-5	mg/kg	1/ 17	3.8E-02	1.4E-02	1.4E-02	7.6E-02	1.4E-02	1.8E+00		3.1E+02	No
PCB-1016	12674-11-2	mg/kg	1/ 17	2.4E+00	1.4E-01	1.4E-01	6.3E+00	1.4E-01	1.1E-01	3.9E-01	3.7E+00	No
PCB-1254	11097-69-1	mg/kg	15/ 17	7.0E+01	5.3E-02	1.1E+03	3.3E+03	1.1E+03		1.1E-01	7.4E-01	Yes
alpha-Chlordane	5103-71-9	mg/kg	1/ 17	3.3E-02	4.4E-01	4.4E-01	7.8E-02	7.8E-02	3.1E+01		6.5E+00	No
beta-BHC	319-85-7	mg/kg	1/ 17	1.9E-02	9.7E-03	9.7E-03	3.9E-02	9.7E-03			1.3E+00	No
gamma-Chlordane	5103-74-2	mg/kg	5/ 17	3.5E-01	6.0E-03	5.3E+00	8.9E-01	8.9E-01			6.5E+00	Yes
Organics-Semivolatile									1.6E+00			
2-Methylnaphthalene	91-57-6	mg/kg	2/ 18	3.6E-01	4.1E-02	7.7E-02	5.4E-01	7.7E-02	3.2E-01			Yes
Acenaphthene	83-32-9	mg/kg	1/ 18	3.8E-01	2.3E-01	2.3E-01	5.6E-01	2.3E-01	1.6E+00		2.9E+03	No
Anthracene	120-12-7	mg/kg	2/ 18	3.6E-01	2.1E-01	5.5E-01	5.4E-01	5.4E-01			2.4E+04	No
Benz(*a*)anthracene	56-55-3	mg/kg	4/ 18	4.3E-01	6.1E-02	1.2E+00	6.4E-01	6.4E-01			2.1E+00	Yes
Benzo(*a*)pyrene	50-32-8	mg/kg	4/ 18	4.1E-01	6.0E-02	1.0E+00	6.1E-01	6.1E-01	3.7E+02	6.2E-02	2.1E-01	Yes
Benzo(*b*)fluoranthene	205-99-2	mg/kg	6/ 18	4.4E-01	4.2E-02	1.4E+00	6.6E-01	6.6E-01	2.2E+03		2.1E+00	Yes
Benzo(*g,h,i*)perylene	191-24-2	mg/kg	3/ 18	3.7E-01	7.4E-02	5.5E-01	5.4E-01	5.4E-01	6.2E-01			Yes
Benzo(*k*)fluoranthene	207-08-9	mg/kg	3/ 18	3.7E-01	5.3E-02	5.8E-01	5.5E-01	5.5E-01			2.1E+01	No
Bis(2-ethylhexyl)phthalate	117-81-7	mg/kg	4/ 18	3.5E-01	7.9E-02	1.1E-01	5.4E-01	1.1E-01	6.2E-01	3.5E+01	1.2E+02	No
Butyl benzyl phthalate	85-68-7	mg/kg	1/ 18	3.7E-01	5.0E-02	5.0E-02	5.5E-01	5.0E-02		1.2E+03	1.2E+04	No
Carbazole	86-74-8	mg/kg	1/ 18	3.8E-01	3.8E-01	3.8E-01	5.6E-01	3.8E-01	6.2E+00		8.6E+01	No
Chrysene	218-01-9	mg/kg	4/ 18	4.3E-01	9.5E-02	1.1E+00	6.3E-01	6.3E-01			2.1E+02	No
Dibenz(*a,h*)anthracene	53-70-3	mg/kg	1/ 18	3.7E-01	9.6E-02	9.6E-02	5.5E-01	9.6E-02			2.1E-01	Yes
Dibenzofuran	132-64-9	mg/kg	1/ 18	3.7E-01	1.9E-01	1.9E-01	5.5E-01	1.9E-01	2.4E+01		3.1E+02	No
Fluoranthene	206-44-0	mg/kg	8/ 18	5.5E-01	5.6E-02	2.9E+00	9.1E-01	9.1E-01	6.2E+01		2.2E+03	No
Fluorene	86-73-7	mg/kg	1/ 18	3.8E-01	3.1E-01	3.1E-01	5.6E-01	3.1E-01	6.2E-02	2.7E+02	2.6E+03	No
Indeno(1,2,3-*cd*)pyrene	193-39-5	mg/kg	3/ 18	3.7E-01	7.6E-02	6.2E-01	5.5E-01	5.5E-01	2.9E+01	6.2E-01	2.1E+00	No
Naphthalene	91-20-3	mg/kg	1/ 18	3.7E-01	2.2E-01	2.2E-01	5.6E-01	2.2E-01	2.3E+02		1.9E+01	No
Phenanthrene	85-01-8	mg/kg	5/ 18	4.9E-01	4.6E-02	2.5E+00	7.7E-01	7.7E-01				Yes
Phenol	108-95-2	mg/kg	1/ 18	3.7E-01	5.0E-02	5.0E-02	5.5E-01	5.0E-02		3.7E+03	3.7E+04	No
Pyrene	129-00-0	mg/kg	5/ 18	5.4E-01	7.0E-02	2.3E+00	8.3E-01	8.3E-01	5.6E+00	2.3E+02	2.9E+03	No
Organics-Volatile												
1,2-Dichloroethene	549-59-0	mg/kg	17/ 18	6.3E-03	7.0E-04	1.8E-02	1.2E-02	1.2E-02		4.3E+00	1.5E+01	No
Acetone	67-64-1	mg/kg	2/ 18	7.0E-03	8.6E-03	1.1E-02	8.1E-03	8.1E-03		1.6E+02	6.0E+02	No
Methylene Chloride	75-09-2	mg/kg	2/ 18	3.0E-03	1.7E-03	3.3E-03	3.4E-03	3.3E-03		9.1E+00	2.1E+01	No
Trichloroethene	79-01-6	mg/kg	2/ 18	3.3E-03	2.6E-03	6.7E-03	3.8E-03	3.8E-03			1.1E-01	No

5.3E-02

Table A-4. Summary of COPC Screening for Load Line 1 Shallow Surface Soil (continued)

Analyte	Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria	Region 9 Residential PRG	Region 9 Industrial PRG	COPC?
Change Houses (CB-12, -23, -8, and -22)												
Metals												
Aluminum	7429-90-5	mg/kg	21/ 21	6.9E+03	3.7E+03	1.7E+04	8.4E+03	8.4E+03	1.8E+04	7.6E+03	9.2E+04	No
Antimony	7440-36-0	mg/kg	3/ 21	1.3E+00	9.0E-01	1.3E+01	2.3E+00	2.3E+00	9.6E-01	3.1E+00	4.1E+01	Yes
Arsenic **CAS**	7440-38-2	mg/kg	21/ 21	1.0E+01	2.5E+00	2.8E+01	1.2E+01	1.2E+01	1.5E+01	3.9E-01	1.6E+00	Yes
Barium	7440-39-3	mg/kg	21/ 21	5.7E+01	1.8E+01	1.8E+02	7.1E+01	7.1E+01	8.8E+01	5.4E+02	6.7E+03	No
Beryllium	7440-41-7	mg/kg	3/ 21	2.5E-01	4.5E-01	1.2E+00	3.5E-01	3.5E-01	8.8E-01	1.5E+01	1.9E+02	No
Cadmium	7440-43-9	mg/kg	15/ 21	1.6E+00	1.4E-01	1.1E+01	3.3E+00	3.3E+00			4.5E+01	Yes
Calcium	7440-70-2	mg/kg	21/ 21	1.1E+04	3.6E+02	1.8E+05	2.5E+04	2.5E+04	1.6E+04			No
Chromium	7440-47-3	mg/kg	21/ 21	1.3E+01	6.4E+00	2.7E+01	1.5E+01	1.5E+01	1.7E+01	2.1E+02	4.5E+02	No
Cobalt	7440-48-4	mg/kg	21/ 21	6.2E+00	1.9E+00	1.5E+01	7.2E+00	7.2E+00	1.0E+01	3.7E+00 1.4E+02	1.3E+03	No
Copper	7440-50-8	mg/kg	21/ 21	2.0E+01	5.7E+00	5.1E+01	2.5E+01	2.5E+01	1.8E+01	3.1E+02	4.1E+03	No
Cyanide	57-12-5	mg/kg	1/ 21	4.5E-01	3.0E+00	3.0E+00	6.7E-01	6.7E-01		1.2E+02	1.2E+03	No
Iron	7439-89-6	mg/kg	21/ 21	1.6E+04	3.2E+03	2.9E+04	1.8E+04	1.8E+04	2.3E+04	2.3E+03	3.1E+04	No
Lead	7439-92-1	mg/kg	21/ 21	1.1E+02	1.7E+01	5.3E+02	1.9E+02	1.9E+02	2.6E+01	4.0E+02	7.5E+02	Yes
Magnesium	7439-95-4	mg/kg	21/ 21	1.9E+03	7.7E+02	1.2E+04	2.8E+03	2.8E+03	3.0E+03			No
Manganese	7439-96-5	mg/kg	21/ 21	6.7E+02	6.8E+01	2.0E+03	8.3E+02	8.3E+02	1.5E+03	1.8E+02	1.9E+03	Yes
Mercury	7487-94-6	mg/kg	8/ 15	8.4E-02	2.8E-02	2.9E-01	1.2E-01	1.2E-01	3.6E-02	2.3E+00	3.1E+01	No
Nickel	7440-02-0	mg/kg	21/ 21	1.4E+01	3.5E+00	2.3E+01	1.6E+01	1.6E+01	2.1E+01	1.6E+02	2.0E+03	No
Potassium	7440-09-7	mg/kg	21/ 21	8.5E+02	5.1E+02	1.5E+03	9.7E+02	9.7E+02	9.3E+02			No
Selenium	7782-49-2	mg/kg	7/ 21	4.8E-01	5.3E-01	1.3E+00	5.8E-01	5.8E-01	1.4E+00	3.9E+01	5.1E+02	No
Silver	7440-22-4	mg/kg	1/ 21	6.3E-01	3.5E-01	3.5E-01	6.6E-01	3.5E-01		3.9E+01	5.1E+02	No
Sodium	7440-23-5	mg/kg	1/ 21	3.0E+02	4.3E+02	4.3E+02	3.4E+02	3.4E+02	1.2E+02			No
Thallium	6533-73-9	mg/kg	5/ 21	3.1E-01	2.9E-01	7.3E-01	4.3E-01	4.3E-01			6.7E+00	Yes
Vanadium	7440-62-2	mg/kg	21/ 21	1.3E+01	5.1E+00	3.9E+01	1.6E+01	1.6E+01	3.1E+01	5.5E+01	7.2E+02	No
Zinc	7440-66-6	mg/kg	21/ 21	2.7E+02	3.4E+01	1.6E+03	4.3E+02	4.3E+02	6.2E+01	2.3E+03	3.1E+04	No
Organics-Pesticide/PCB									5.2E-01			
4,4'-DDE	72-55-9	mg/kg	1/ 2	1.3E-03	1.6E-03	1.6E-03	3.1E-03	1.6E-03			7.0E+00	No
Endrin Aldehyde	7421-93-4	mg/kg	1/ 1	1.4E-03	1.4E-03	1.4E-03		1.4E-03			1.8E+01	No
PCB-1254	11097-69-1	mg/kg	2/ 2	7.7E-02	4.3E-02	1.1E-01	2.9E-01	1.1E-01		1.1E-01	7.4E-01	No
Organics-Semivolatile									1.7E+00			
Benz(*a*)anthracene	56-55-3	mg/kg	2/ 2	6.1E-02	5.0E-02	7.2E-02	1.3E-01	7.2E-02	1.8E+00		2.1E+00	No
Benzo(*a*)pyrene	50-32-8	mg/kg	2/ 2	7.6E-02	6.0E-02	9.2E-02	1.8E-01	9.2E-02			2.1E-01	Yes
Benzo(*b*)fluoranthene	205-99-2	mg/kg	2/ 2	1.2E-01	8.4E-02	1.5E-01	3.3E-01	1.5E-01			2.1E+00	No
Benzo(*g,h,i*)perylene	191-24-2	mg/kg	1/ 2	1.5E-01	7.4E-02	7.4E-02	6.4E-01	7.4E-02	6.2E-01			Yes
Benzo(*k*)fluoranthene	207-08-9	mg/kg	1/ 2	1.5E-01	6.5E-02	6.5E-02	6.7E-01	6.5E-02	6.2E-02		2.1E+01	No
Bis(2-ethylhexyl)phthalate	117-81-7	mg/kg	1/ 2	1.4E-01	5.7E-02	5.7E-02	6.9E-01	5.7E-02	6.2E-01	3.5E+01	1.2E+02	No
									6.2E+00			

Table A-4. Summary of COPC Screening for Load Line 1 Shallow Surface Soil (continued)

Analyte	Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria	Region 9 Residential PRG	Region 9 Industrial PRG	COPC?
Chrysene	218-01-9	mg/kg	2/ 2	8.6E-02	6.2E-02	1.1E-01	2.4E-01	1.1E-01			2.1E+02	No
Fluoranthene	206-44-0	mg/kg	2/ 2	1.3E-01	9.3E-02	1.7E-01	3.7E-01	1.7E-01			2.2E+03	No
Indeno(1,2,3-*cd*)pyrene	193-39-5	mg/kg	1/ 2	1.5E-01	7.5E-02	7.5E-02	6.4E-01	7.5E-02			2.1E+00	No
Phenanthrene	85-01-8	mg/kg	2/ 2	7.8E-02	4.6E-02	1.1E-01	2.8E-01	1.1E-01	6.2E+01			Yes
Pyrene **CAS**	129-00-0	mg/kg	2/ 2	9.5E-02	7.0E-02	1.2E-01	2.5E-01	1.2E-01	2.3E+02		2.9E+03	No
Organics-Volatile										6.2E-01		
Methylene Chloride	75-09-2	mg/kg	2/ 2	1.5E-03	1.0E-03	1.9E-03	4.3E-03	1.9E-03		9.1E+00	2.1E+01	No
Toluene	108-88-3	mg/kg	2/ 2	2.3E-03	1.5E-03	3.1E-03	7.4E-03	3.1E-03	2.3E+02		2.2E+02	No
Perimeter Area												
Metals												
Aluminum	7429-90-5	mg/kg	26/ 26	1.3E+04	8.8E+03	2.1E+04	1.4E+04	1.4E+04	1.8E+04	7.6E+03	9.2E+04	Yes
Antimony	7440-36-0	mg/kg	2/ 26	6.3E-01	7.4E-01	8.1E-01	6.5E-01	6.5E-01	9.6E-01	3.1E+00	4.1E+01	No
Arsenic	7440-38-2	mg/kg	26/ 26	1.1E+01	7.5E+00	2.5E+01	1.3E+01	1.3E+01	1.5E+01	3.9E-01	1.6E+00	Yes
Barium	7440-39-3	mg/kg	26/ 26	8.3E+01	5.2E+01	1.4E+02	9.2E+01	9.2E+01	8.8E+01	5.4E+02	6.7E+03	No
Beryllium	7440-41-7	mg/kg	20/ 26	4.3E-01	2.7E-01	8.2E-01	5.0E-01	5.0E-01	8.8E-01	1.5E+01	1.9E+02	No
Cadmium	7440-43-9	mg/kg	10/ 26	2.4E-01	5.2E-02	3.2E-01	2.7E-01	2.7E-01			4.5E+01	No
Calcium	7440-70-2	mg/kg	22/ 26	2.0E+03	1.2E+02	3.4E+04	4.2E+03	4.2E+03	1.6E+04			No
Chromium	7440-47-3	mg/kg	26/ 26	1.6E+01	1.1E+01	2.5E+01	1.7E+01	1.7E+01	1.7E+01	2.1E+02	4.5E+02	No
Chromium, hexavalent	18540-29-9	mg/kg	1/ 5	8.1E-01	1.5E+00	1.5E+00	1.2E+00	1.2E+00	3.7E+00	2.2E+01	6.4E+01	No
Cobalt	7440-48-4	mg/kg	26/ 26	9.8E+00	4.9E+00	2.1E+01	1.1E+01	1.1E+01	1.0E+01	1.4E+02	1.3E+03	No
Copper	7440-50-8	mg/kg	26/ 26	1.1E+01	5.1E+00	2.0E+01	1.2E+01	1.2E+01	1.8E+01	3.1E+02	4.1E+03	No
Cyanide	57-12-5	mg/kg	3/ 24	4.3E-01	7.5E-01	1.7E+00	5.6E-01	5.6E-01		1.2E+02	1.2E+03	No
Iron	7439-89-6	mg/kg	26/ 26	2.2E+04	1.5E+04	3.3E+04	2.4E+04	2.4E+04	2.3E+04	2.3E+03	3.1E+04	No
Lead	7439-92-1	mg/kg	26/ 26	1.9E+01	1.3E+01	3.5E+01	2.1E+01	2.1E+01	2.6E+01	4.0E+02	7.5E+02	No
Magnesium	7439-95-4	mg/kg	26/ 26	1.8E+03	9.2E+02	3.2E+03	1.9E+03	1.9E+03	3.0E+03			No
Manganese	7439-96-5	mg/kg	26/ 26	9.2E+02	9.9E+01	2.3E+03	1.4E+03	1.4E+03	1.5E+03	1.8E+02	1.9E+03	Yes
Mercury	7487-94-6	mg/kg	26/ 26	5.4E-02	1.9E-02	9.3E-02	6.1E-02	6.1E-02	3.6E-02	2.3E+00	3.1E+01	No
Nickel	7440-02-0	mg/kg	26/ 26	1.5E+01	8.9E+00	2.3E+01	1.6E+01	1.6E+01	2.1E+01	1.6E+02	2.0E+03	No
Potassium	7440-09-7	mg/kg	26/ 26	8.9E+02	3.7E+02	1.5E+03	1.0E+03	1.0E+03	9.3E+02			No
Selenium	7782-49-2	mg/kg	13/ 26	6.4E-01	4.6E-01	1.7E+00	7.9E-01	7.9E-01	1.4E+00	3.9E+01	5.1E+02	No
Thallium	6533-73-9	mg/kg	26/ 26	6.0E-01	4.0E-01	8.6E-01	6.4E-01	6.4E-01			6.7E+00	Yes
Vanadium	7440-62-2	mg/kg	26/ 26	2.7E+01	2.0E+01	4.6E+01	2.9E+01	2.9E+01	3.1E+01	5.5E+01	7.2E+02	No
Zinc	7440-66-6	mg/kg	26/ 26	5.8E+01	3.7E+01	7.8E+01	6.2E+01	6.2E+01	6.2E+01	2.3E+03	3.1E+04	No
Organics-Semivolatile										5.2E-01		
Benzo(*b*)fluoranthene	205-99-2	mg/kg	1/ 2	1.2E-01	4.2E-02	4.2E-02	6.4E-01	4.2E-02			2.1E+00	No
Fluoranthene	206-44-0	mg/kg	1/ 2	1.3E-01	5.7E-02	5.7E-02	6.0E-01	5.7E-02			2.2E+03	No

6.2E-01
2.3E+02

Table A-4. Summary of COPC Screening for Load Line 1 Shallow Surface Soil (continued)

Analyte	Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria	Region 9 Residential PRG	Region 9 Industrial PRG	COPC?
Organics-Volatile												
1,2-Dichloroethene	549-59-0	mg/kg	2/ 2	3.5E-03	2.9E-03	4.1E-03	7.3E-03	4.1E-03		4.3E+00	1.5E+01	No
Trichloroethene	79-01-6	mg/kg	2/ 2	4.5E-03	2.4E-03	6.6E-03	1.8E-02	6.6E-03		5.3E-02	1.1E-01	No
Water Tower												
CAS				***Metals***								
Aluminum	7429-90-5	mg/kg	5/ 5	1.1E+04	7.2E+03	1.3E+04	1.4E+04	1.3E+04	1.8E+04	7.6E+03	9.2E+04	No
Antimony	7440-36-0	mg/kg	1/ 5	8.4E-01	1.9E+00	1.9E+00	1.4E+00	1.4E+00	9.6E-01	3.1E+00	4.1E+01	No
Arsenic	7440-38-2	mg/kg	5/ 5	1.3E+01	1.2E+01	1.4E+01	1.4E+01	1.4E+01	1.5E+01	3.9E-01	1.6E+00	No
Barium	7440-39-3	mg/kg	5/ 5	7.0E+01	6.5E+01	7.7E+01	7.6E+01	7.6E+01	8.8E+01	5.4E+02	6.7E+03	No
Beryllium	7440-41-7	mg/kg	5/ 5	6.4E-01	4.2E-01	9.2E-01	9.9E-01	9.2E-01	8.8E-01	1.5E+01	1.9E+02	No
Cadmium	7440-43-9	mg/kg	4/ 5	2.3E-01	1.1E-01	2.9E-01	3.1E-01	2.9E-01			4.5E+01	No
Calcium	7440-70-2	mg/kg	5/ 5	2.5E+03	1.4E+03	3.3E+03	3.2E+03	3.2E+03	1.6E+04			No
Chromium	7440-47-3	mg/kg	5/ 5	9.7E+01	1.8E+01	3.9E+02	2.5E+02	2.5E+02	1.7E+01	2.1E+02	4.5E+02	Yes
Cobalt	7440-48-4	mg/kg	5/ 5	1.2E+01	8.7E+00	1.8E+01	1.7E+01	1.7E+01	1.0E+01	1.4E+02	1.3E+03	No
Copper	7440-50-8	mg/kg	5/ 5	2.7E+01	1.2E+01	5.1E+01	6.4E+01	5.1E+01	1.8E+01	3.1E+02	4.1E+03	No
Iron	7439-89-6	mg/kg	5/ 5	3.0E+04	2.2E+04	4.9E+04	4.6E+04	4.6E+04	2.3E+04	2.3E+03	3.1E+04	No
Lead	7439-92-1	mg/kg	5/ 5	6.1E+02	1.8E+01	2.5E+03	6.8E+06	2.5E+03	2.6E+01	4.0E+02	7.5E+02	Yes
Magnesium	7439-95-4	mg/kg	5/ 5	2.3E+03	1.8E+03	2.9E+03	2.8E+03	2.8E+03	3.0E+03			No
Manganese	7439-96-5	mg/kg	5/ 5	5.0E+02	4.1E+02	6.9E+02	6.3E+02	6.3E+02	1.5E+03	1.8E+02	1.9E+03	No
Mercury	7487-94-6	mg/kg	3/ 5	3.9E-02	3.7E-02	5.7E-02	6.2E-02	5.7E-02	3.6E-02	2.3E+00	3.1E+01	No
Nickel	7440-02-0	mg/kg	5/ 5	2.7E+01	1.7E+01	3.2E+01	3.3E+01	3.2E+01	2.1E+01	1.6E+02	2.0E+03	No
Potassium	7440-09-7	mg/kg	5/ 5	1.6E+03	1.3E+03	2.3E+03	2.1E+03	2.1E+03	9.3E+02			No
Sodium	7440-23-5	mg/kg	1/ 5	1.1E+02	1.1E+02	1.1E+02	2.1E+02	1.1E+02	1.2E+02			No
Thallium	6533-73-9	mg/kg	5/ 5	5.8E-01	4.9E-01	6.7E-01	6.4E-01	6.4E-01			6.7E+00	Yes
Vanadium	7440-62-2	mg/kg	5/ 5	2.0E+01	1.4E+01	2.4E+01	2.4E+01	2.4E+01	3.1E+01	5.5E+01	7.2E+02	No
Zinc	7440-66-6	mg/kg	5/ 5	2.4E+02	5.4E+01	9.3E+02	6.1E+02	6.1E+02	6.2E+01	2.3E+03	3.1E+04	No

3.7E+00

5.2E-01

[a] Value is Region 9 PRG for a cancer risk level of 1E-06 or a non-cancer hazard quotient of 0.1, whichever is lower.
BHC = Benzene hexachloride.
CAS = Chemical Abstracts Service.
COPC = Contaminant of potential concern.
DDE = Dichlorodiphenyldichloroethylene.
DDT = Dichlorodiphenyltrichloroethane.
HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.
PCB = Polychlorinated biphenyl.
PRG = Preliminary remediation goal.
RDX = = Hexahydro-1,3,5-trinitro-1,3,5-triazine.
UCL = Upper confidence level.

Table A-5. Summary of COPC Screening for Load Line 1 Deep Surface Soil

Analyte	CAS Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria[a]	Region 9 Residential PRG[b]	Region 9 Industrial PRG[b]	COPC?
CB-13 and -10												
Explosives												
2,4,6-Trinitrotoluene	118-96-7	mg/kg	17/ 28	9.4E+00	5.5E-02	2.3E+02	2.3E+01	2.3E+01		3.1E+00	3.1E+01	Yes
2,4-Dinitrotoluene	121-14-2	mg/kg	6/ 28	7.4E-01	8.6E-02	9.3E+00	1.4E+00	1.4E+00		7.2E-01	2.5E+00	Yes
2,6-Dinitrotoluene	606-20-2	mg/kg	5/ 28	3.8E-01	1.1E-01	6.0E-01	7.3E-01	6.0E-01		7.2E-01	2.5E+00	No
2-Amino-4,6-dinitrotoluene	35572-78-2	mg/kg	9/ 28	6.3E-01	9.1E-02	8.7E+00	1.2E+00	1.2E+00				Yes
4-Amino-2,6-dinitrotoluene	19406-51-0	mg/kg	5/ 28	5.6E-01	2.0E-01	1.9E+00	9.4E-01	9.4E-01				Yes
4-Nitrotoluene	99-99-0	mg/kg	1/ 28	3.7E-01	2.0E-01	2.0E-01	7.3E-01	2.0E-01			1.8E+02	No
HMX	2691-41-0	mg/kg	2/ 28	8.0E-01	7.8E-01	2.2E+00	1.6E+00	1.6E+00		3.1E+02	3.1E+03	No
Nitrocellulose	9004-70-0	mg/kg	9/ 28	1.1E+01	6.5E+00	1.0E+02	1.8E+01	1.8E+01				Yes
RDX	121-82-4	mg/kg	1/ 28	1.7E+00	2.7E+01	2.7E+01	3.4E+00	3.4E+00	3.7E+01	4.4E+00	1.6E+01	Yes
Metals												
Aluminum	7429-90-5	mg/kg	55/ 55	1.1E+04	3.4E+03	2.6E+04	1.3E+04	1.3E+04	1.8E+04	7.6E+03	9.2E+04	Yes
Antimony	7440-36-0	mg/kg	17/ 55	2.7E+00	5.5E-01	9.8E+01	5.7E+00	5.7E+00	9.6E-01	3.1E+00	4.1E+01	Yes
Arsenic	7440-38-2	mg/kg	55/ 55	1.0E+01	3.1E+00	1.8E+01	1.1E+01	1.1E+01	1.5E+01	3.9E-01	1.6E+00	Yes
Barium	7440-39-3	mg/kg	55/ 55	1.1E+02	2.4E+01	4.1E+02	1.3E+02	1.3E+02	8.8E+01	5.4E+02	6.7E+03	No
Beryllium	7440-41-7	mg/kg	29/ 55	7.0E-01	2.7E-01	3.4E+00	9.2E-01	9.2E-01	8.8E-01	1.5E+01	1.9E+02	No
Cadmium	7440-43-9	mg/kg	44/ 55	3.4E+00	6.2E-02	4.8E+01	5.2E+00	5.2E+00			4.5E+01	Yes
Calcium	7440-70-2	mg/kg	55/ 55	2.6E+04	2.2E+02	1.6E+05	3.7E+04	3.7E+04	1.6E+04			No
Chromium	7440-47-3	mg/kg	55/ 55	2.5E+01	5.2E+00	3.1E+02	3.5E+01	3.5E+01	1.7E+01	2.1E+02	4.5E+02	Yes
Cobalt	7440-48-4	mg/kg	55/ 55	8.6E+00	2.2E+00	3.2E+01	9.7E+00	9.7E+00	1.0E+01	1.4E+02	1.3E+03	No
Copper	7440-50-8	mg/kg	55/ 55	1.0E+02	5.3E+00	2.4E+03	1.8E+02	1.8E+02	1.8E+01	3.1E+02	4.1E+03	Yes
Cyanide	57-12-5	mg/kg	4/ 25	3.8E-01	6.7E-01	1.0E+00	4.5E-01	4.5E-01		1.2E+02	1.2E+03	No
Iron	7439-89-6	mg/kg	55/ 55	2.0E+04	5.2E+03	5.8E+04	2.2E+04	2.2E+04	2.3E+04	2.3E+03	3.1E+04	No
Lead	7439-92-1	mg/kg	55/ 55	1.7E+02	9.4E+00	1.8E+03	2.5E+02	2.5E+02	1.9E+01	4.0E+02	7.5E+02	Yes
Magnesium	7439-95-4	mg/kg	55/ 55	5.0E+03	8.0E+02	2.0E+04	6.2E+03	6.2E+03	3.0E+03			No
Manganese	7439-96-5	mg/kg	55/ 55	9.9E+02	2.3E+02	3.7E+03	1.2E+03	1.2E+03	1.5E+03	1.8E+02	1.9E+03	Yes
Mercury	7487-94-6	mg/kg	50/ 55	6.8E-02	9.3E-03	4.1E-01	8.7E-02	8.7E-02	3.6E-02	2.3E+00	3.1E+01	No
Nickel	7440-02-0	mg/kg	55/ 55	1.8E+01	3.3E+00	6.2E+01	2.1E+01	2.1E+01	2.1E+01	1.6E+02	2.0E+03	No
Potassium	7440-09-7	mg/kg	55/ 55	1.2E+03	4.0E+02	3.6E+03	1.3E+03	1.3E+03	9.3E+02			No
Selenium	7782-49-2	mg/kg	21/ 55	6.6E-01	3.9E-01	3.6E+00	8.1E-01	8.1E-01	1.4E+00	3.9E+01	5.1E+02	No
Silver	7440-22-4	mg/kg	3/ 55	5.9E-01	2.1E-01	5.2E-01	6.2E-01	5.2E-01		3.9E+01	5.1E+02	No
Sodium	7440-23-5	mg/kg	27/ 55	3.0E+02	6.3E+01	1.4E+03	3.6E+02	3.6E+02	1.2E+02			No
Thallium	6533-73-9	mg/kg	52/ 55	4.6E-01	1.9E-01	7.8E-01	4.9E-01	4.9E-01			6.7E+00	Yes
Vanadium	7440-62-2	mg/kg	55/ 55	1.5E+01	5.8E+00	3.8E+01	1.7E+01	1.7E+01	3.1E+01	5.5E+01	7.2E+02	No
Zinc	7440-66-6	mg/kg	55/ 55	3.9E+02	2.0E+01	4.2E+03	5.5E+02	5.5E+02	6.2E+01	2.3E+03	3.1E+04	Yes

3.7E+00

5.2E-01

Table A-5. Summary of COPC Screening for Load Line 1 Deep Surface Soil (continued)

Analyte	Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria[a]	Region 9 Residential PRG[b]	Region 9 Industrial [b]	COPC?
Organics-Pesticide/PCB												
4,4'-DDE	72-55-9	mg/kg	3/ 6	2.9E-02	2.2E-02	8.2E-02	3.8E+02	8.2E-02			7.0E+00	No
4,4'-DDT	50-29-3	mg/kg	1/ 6	6.3E-03	1.5E-02	1.5E-02	1.1E-02	1.1E-02			7.0E+00	No
Endrin Aldehyde	7421-93-4	mg/kg	3/ 6	2.1E-02	1.5E-02	5.3E-02	2.3E+01	5.3E-02		1.8E+00	1.8E+01	No
Heptachlor	76-44-8	mg/kg	1/ 6	8.5E-03	2.8E-02	2.8E-02	1.7E-02	1.7E-02			3.8E-01	No
PCB-1254	11097-69-1	mg/kg	3/ 6	8.6E-01	1.0E+00	2.4E+00	1.7E+00	1.7E+00			7.4E-01	Yes
gamma-Chlordane	5103-74-2	mg/kg	2/ 6	1.0E-02	1.4E-02	3.5E-02	2.1E-02	2.1E-02		1.6E+00	6.5E+00	No
Organics-Semivolatile												
2-Methylnaphthalene	91-57-6	mg/kg	1/ 6	1.8E-01	1.4E-01	1.4E-01	2.0E-01	1.4E-01				Yes
Anthracene	120-12-7	mg/kg	1/ 6	1.7E-01	7.3E-02	7.3E-02	2.1E-01	7.3E-02			2.4E+04	No
Benz(*a*)anthracene	56-55-3	mg/kg	3/ 6	1.8E-01	6.1E-02	4.1E-01	5.1E-01	4.1E-01			2.1E+00	No
Benzo(*a*)pyrene	50-32-8	mg/kg	3/ 6	1.8E-01	8.1E-02	3.7E-01	3.9E-01	3.7E-01			2.1E-01	Yes
Benzo(*b*)fluoranthene	205-99-2	mg/kg	3/ 6	2.1E-01	1.1E-01	4.7E-01	4.1E-01	4.1E-01			2.1E+00	No
Benzo(*g,h,i*)perylene	191-24-2	mg/kg	3/ 6	1.6E-01	5.7E-02	2.4E-01	2.1E-01	2.1E-01				Yes
Benzo(*k*)fluoranthene	207-08-9	mg/kg	1/ 6	1.9E-01	2.1E-01	2.1E-01	2.0E-01	2.0E-01			2.1E+01	No
Carbazole	86-74-8	mg/kg	1/ 6	1.7E-01	7.2E-02	7.2E-02	2.1E-01	7.2E-02			8.6E+01	No
Chrysene	218-01-9	mg/kg	3/ 6	2.0E-01	6.9E-02	4.8E-01	5.2E-01	4.8E-01			2.1E+02	No
Di-n-butyl phthalate	84-74-2	mg/kg	1/ 6	2.4E-01	4.7E-01	4.7E-01	3.3E-01	3.3E-01		6.1E+02	6.2E+03	No
Fluoranthene	206-44-0	mg/kg	3/ 6	3.0E-01	1.2E-01	1.0E+00	5.8E-01	5.8E-01			2.2E+03	No
Fluorene	86-73-7	mg/kg	1/ 6	1.6E-01	4.1E-02	4.1E-02	2.1E-01	4.1E-02			2.6E+03	No
Indeno(1,2,3-*cd*)pyrene	193-39-5	mg/kg	3/ 6	1.6E-01	5.6E-02	2.6E-01	2.2E-01	2.2E-01			2.1E+00	No
Naphthalene	91-20-3	mg/kg	1/ 6	1.8E-01	1.0E-01	1.0E-01	2.1E-01	1.0E-01			1.9E+01	No
Phenanthrene	85-01-8	mg/kg	2/ 6	2.2E-01	1.1E-01	4.5E-01	3.2E-01	3.2E-01				Yes
Pyrene	129-00-0	mg/kg	3/ 6	2.6E-01	9.4E-02	7.9E-01	8.1E-01	7.9E-01			2.9E+03	No
Organics-Volatile												
1,2-Dichloroethene	549-59-0	mg/kg	5/ 6	3.8E-03	1.8E-03	7.2E-03	6.7E-03	6.7E-03		4.3E+00	1.5E+01	No
Acetone	67-64-1	mg/kg	1/ 6	5.7E-03	5.0E-03	5.0E-03	6.0E-03	5.0E-03			6.0E+02	No
Methylene Chloride	75-09-2	mg/kg	1/ 6	2.8E-03	2.2E-03	2.2E-03	3.1E-03	2.2E-03		9.1E+00	2.1E+01	No
Toluene	108-88-3	mg/kg	2/ 6	3.1E-03	3.1E-03	4.4E-03	3.7E-03	3.7E-03			2.2E+02	No
Trichloroethene	79-01-6	mg/kg	3/ 6	2.8E-03	1.8E-03	3.3E-03	3.2E-03	3.2E-03		5.3E-02	1.1E-01	No
CB-14, CB-17, and CA-15												
Explosives												
2,4,6-Trinitrotoluene	118-96-7	mg/kg	3/ 5	1.0E+00	8.8E-02	4.5E+00	8.5E+02	4.5E+00		3.1E+00	3.1E+01	Yes
2,4-Dinitrotoluene	121-14-2	mg/kg	3/ 5	2.6E-01	1.3E-01	5.3E-01	4.4E-01	4.4E-01		7.2E-01	2.5E+00	No
4-Amino-2,6-dinitrotoluene	19406-51-0	mg/kg	2/ 5	2.3E-01	1.4E-01	6.2E-01	4.4E-01	4.4E-01				Yes
HMX	2691-41-0	mg/kg	2/ 5	7.5E-01	3.2E-01	2.7E+00	1.8E+00	1.8E+00		3.1E+02	3.1E+03	No

Table A-5. Summary of COPC Screening for Load Line 1 Deep Surface Soil (continued)

Analyte	Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria[a]	Region 9 Residential PRG[b]	Region 9 Industrial [b]	COPC?
Nitrocellulose	9004-70-0	mg/kg	3/ 5	3.0E+01	8.8E+00	9.0E+01	1.7E+07	9.0E+01				Yes
RDX	121-82-4	mg/kg	1/ 5	7.0E+00	3.4E+01	3.4E+01	2.1E+01	2.1E+01		4.4E+00	PRG 1.6E+01	Yes
Metals												
Aluminum	7429-90-5	mg/kg	28/ 28	1.4E+04	1.6E+03	9.7E+04	1.9E+04	1.9E+04	1.8E+04	7.6E+03	9.2E+04	Yes
Antimony CAS	7440-36-0	mg/kg	2/ 28	7.2E-01	5.5E-01	6.4E-01	9.6E-01	6.4E-01	9.6E-01	3.1E+00	4.1E+01	No
Arsenic	7440-38-2	mg/kg	28/ 28	1.4E+01	4.5E+00	1.1E+02	2.1E+01	2.1E+01	1.5E+01	3.9E-01	1.6E+00	Yes
Barium	7440-39-3	mg/kg	28/ 28	9.6E+01	3.1E+01	5.7E+02	1.3E+02	1.3E+02	8.8E+01	5.4E+02	6.7E+03	Yes
Beryllium	7440-41-7	mg/kg	26/ 28	6.4E-01	2.4E-01	3.3E+00	8.9E-01	8.9E-01	8.8E-01	1.5E+01	1.9E+02	No
Cadmium	7440-43-9	mg/kg	12/ 28	1.2E+00	5.0E-02	1.2E+01	2.0E+00	2.0E+00			4.5E+01	Yes
Calcium	7440-70-2	mg/kg	28/ 28	1.3E+04	4.1E+02	1.3E+05	3.3E+04	3.3E+04	1.6E+04			No
Chromium	7440-47-3	mg/kg	28/ 28	1.9E+01	8.3E+00	1.3E+02	2.7E+01	2.7E+01	1.7E+01	2.1E+02	4.5E+02	No
Cobalt	7440-48-4	mg/kg	28/ 28	1.0E+01	2.6E+00	7.2E+01	1.4E+01	1.4E+01	1.0E+01	3.7E+00 1.4E+02	1.3E+03	No
Copper	7440-50-8	mg/kg	28/ 28	3.3E+01	8.0E+00	2.0E+02	4.7E+01	4.7E+01	1.8E+01	3.1E+02	4.1E+03	No
Cyanide	57-12-5	mg/kg	1/ 13	6.0E-01	2.4E+00	2.4E+00	9.8E-01	9.8E-01		1.2E+02	1.2E+03	No
Iron	7439-89-6	mg/kg	28/ 28	2.8E+04	9.8E+03	2.0E+05	3.9E+04	3.9E+04	2.3E+04	2.3E+03	3.1E+04	No
Lead	7439-92-1	mg/kg	28/ 28	8.6E+01	1.3E+01	6.0E+02	1.3E+02	1.3E+02	1.9E+01	4.0E+02	7.5E+02	Yes
Magnesium	7439-95-4	mg/kg	28/ 28	4.0E+03	4.2E+02	2.3E+04	5.7E+03	5.7E+03	3.0E+03			No
Manganese	7439-96-5	mg/kg	28/ 28	8.3E+02	2.2E+02	4.7E+03	1.1E+03	1.1E+03	1.5E+03	1.8E+02	1.9E+03	Yes
Mercury	7487-94-6	mg/kg	27/ 28	5.4E-02	1.8E-02	3.7E-01	7.7E-02	7.7E-02	3.6E-02	2.3E+00	3.1E+01	No
Nickel	7440-02-0	mg/kg	28/ 28	2.2E+01	7.3E+00	1.6E+02	3.1E+01	3.1E+01	2.1E+01	1.6E+02	2.0E+03	Yes
Potassium	7440-09-7	mg/kg	28/ 28	1.4E+03	2.9E+02	1.2E+04	2.1E+03	2.1E+03	9.3E+02			No
Selenium	7782-49-2	mg/kg	7/ 28	5.3E-01	4.4E-01	1.1E+00	6.5E-01	6.5E-01	1.4E+00	3.9E+01	5.1E+02	No
Silver	7440-22-4	mg/kg	3/ 28	6.8E-01	2.0E-01	2.1E-01	9.2E-01	2.1E-01		3.9E+01	5.1E+02	No
Sodium	7440-23-5	mg/kg	9/ 28	2.4E+02	6.3E+01	1.6E+03	3.4E+02	3.4E+02	1.2E+02			No
Thallium	6533-73-9	mg/kg	28/ 28	6.3E-01	3.4E-01	4.6E+00	8.8E-01	8.8E-01			6.7E+00	Yes
Vanadium	7440-62-2	mg/kg	28/ 28	2.4E+01	5.6E+00	1.8E+02	3.4E+01	3.4E+01	3.1E+01	5.5E+01	7.2E+02	Yes
Zinc	7440-66-6	mg/kg	28/ 28	1.5E+02	3.9E+01	8.8E+02	2.1E+02	2.1E+02	6.2E+01	2.3E+03	3.1E+04	No
Organics-Pesticide/PCB										5.2E-01		
4,4'-DDE	72-55-9	mg/kg	3/ 3	7.4E-02	1.0E-02	2.0E-01	5.3E+10	2.0E-01			7.0E+00	No
Endrin Aldehyde	7421-93-4	mg/kg	3/ 3	1.1E-01	8.3E-03	3.0E-01	3.9E-01	3.0E-01		1.8E+00	1.8E+01	No
Endrin Ketone	53494-70-5	mg/kg	1/ 3	8.2E-03	4.1E-03	4.1E-03	2.5E-02	4.1E-03		1.8E+00	1.8E+01	No
Methoxychlor	72-43-5	mg/kg	1/ 3	1.5E-02	3.7E-03	3.7E-03	4.8E-02	3.7E-03	1.7E+00		3.1E+02	No
PCB-1254	11097-69-1	mg/kg	3/ 3	2.0E+00	6.0E-01	4.7E+00	1.2E+06	4.7E+00		1.1E-01	7.4E-01	Yes
alpha-Chlordane	5103-71-9	mg/kg	1/ 3	8.5E-03	4.9E-03	4.9E-03	2.5E-02	4.9E-03		1.6E+00	6.5E+00	No
beta-BHC	319-85-7	mg/kg	1/ 3	8.0E-03	2.8E-03	2.8E-03	2.5E-02	2.8E-03	3.1E+01		1.3E+00	No
gamma-Chlordane	5103-74-2	mg/kg	3/ 3	4.6E-02	4.4E-03	1.3E-01	1.7E-01	1.3E-01		1.6E+00	6.5E+00	No

3.2E-01

Table A-5. Summary of COPC Screening for Load Line 1 Deep Surface Soil (continued)

Analyte	Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria[a]	Region 9 Residential PRG[b]	Region 9 Industrial [b]	COPC?
Organics-Semivolatile												
2-Methylnaphthalene	91-57-6	mg/kg	2/ 4	1.4E-01	3.8E-02	1.7E-01	2.3E-01	1.7E-01		PRG		Yes
Acenaphthene	83-32-9	mg/kg	1/ 4	1.6E-01	6.9E-02	6.9E-02	2.3E-01	6.9E-02			2.9E+03	No
Anthracene	120-12-7	mg/kg	2/ 4	1.6E-01	1.1E-01	1.6E-01	2.0E-01	1.6E-01			2.4E+04	No
Benz(*a*)anthracene	56-55-3	mg/kg	2/ 4	3.5E-01	4.0E-01	6.4E-01	2.0E+00	6.4E-01			2.1E+00	Yes
Benzo(*a*)pyrene	50-32-8	mg/kg	3/ 4	4.0E-01	3.7E-02	8.4E-01	8.2E-01	8.2E-01	3.7E+02		2.1E-01	Yes
Benzo(*b*)fluoranthene	205-99-2	mg/kg	3/ 4	5.3E-01	7.3E-02	1.1E+00	9.0E+02	1.1E+00	2.2E+03		2.1E+00	Yes
Benzo(*g,h,i*)perylene	191-24-2	mg/kg	2/ 4	3.2E-01	3.0E-01	6.1E-01	1.3E+00	6.1E-01	6.2E-01			Yes
Benzo(*k*)fluoranthene	207-08-9	mg/kg	2/ 4	2.3E-01	2.6E-01	3.0E-01	3.0E-01	3.0E-01	6.2E-02		2.1E+01	No
Bis(2-ethylhexyl)phthalate	117-81-7	mg/kg	1/ 4	1.7E-01	1.4E-01	1.4E-01	2.0E-01	1.4E-01	6.2E-01	3.5E+01	1.2E+02	No
Carbazole	86-74-8	mg/kg	2/ 4	1.4E-01	9.5E-02	1.1E-01	2.8E-01	1.1E-01			8.6E+01	No
Chrysene	218-01-9	mg/kg	2/ 4	3.9E-01	5.6E-01	6.4E-01	6.8E-01	6.4E-01	6.2E+00		2.1E+02	No
Di-n-butyl phthalate	84-74-2	mg/kg	3/ 4	2.8E-01	9.3E-02	7.2E-01	1.0E+01	7.2E-01		6.1E+02	6.2E+03	No
Dibenz(*a,h*)anthracene	53-70-3	mg/kg	2/ 4	1.6E-01	8.6E-02	1.8E-01	2.2E-01	1.8E-01	2.4E+01		2.1E-01	Yes
Dibenzofuran	132-64-9	mg/kg	1/ 4	1.5E-01	4.5E-02	4.5E-02	2.3E-01	4.5E-02	6.2E+01		3.1E+02	No
Fluoranthene	206-44-0	mg/kg	3/ 4	6.5E-01	8.9E-02	1.4E+00	1.4E+03	1.4E+00			2.2E+03	No
Fluorene	86-73-7	mg/kg	1/ 4	1.5E-01	5.7E-02	5.7E-02	2.3E-01	5.7E-02	6.2E-02		2.6E+03	No
Indeno(1,2,3-*cd*)pyrene	193-39-5	mg/kg	2/ 4	3.3E-01	2.9E-01	6.4E-01	1.4E+00	6.4E-01	2.9E+01		2.1E+00	Yes
Naphthalene	91-20-3	mg/kg	2/ 4	1.3E-01	4.5E-02	1.1E-01	2.1E-01	1.1E-01	2.3E+02		1.9E+01	No
Phenanthrene	85-01-8	mg/kg	2/ 4	3.7E-01	4.5E-01	6.7E-01	6.5E-01	6.5E-01	2.7E+02			Yes
Pyrene	129-00-0	mg/kg	3/ 4	5.6E-01	6.3E-02	1.0E+00	1.8E+03	1.0E+00	6.2E-01		2.9E+03	No
Organics-Volatile									5.6E+00			
1,2-Dichloroethene	549-59-0	mg/kg	4/ 4	2.4E-03	1.6E-03	3.1E-03	4.5E-03	3.1E-03		4.3E+00	1.5E+01	No
Methylene Chloride	75-09-2	mg/kg	2/ 4	2.4E-03	1.9E-03	2.1E-03	3.5E-03	2.1E-03	2.3E+02	9.1E+00	2.1E+01	No
Toluene	108-88-3	mg/kg	1/ 4	2.5E-03	1.7E-03	1.7E-03	3.1E-03	1.7E-03			2.2E+02	No
CB-3 and -801												
Explosives												
1,3,5-Trinitrobenzene	99-35-4	mg/kg	3/ 13	1.2E-01	9.8E-02	1.2E-01	1.3E-01	1.2E-01	6.6E+01	1.8E+02	1.8E+03	No
2,4,6-Trinitrotoluene	118-96-7	mg/kg	6/ 13	2.2E-01	8.0E-02	1.2E+00	3.7E-01	3.7E-01		3.1E+00	3.1E+01	No
2,4-Dinitrotoluene	121-14-2	mg/kg	1/ 13	1.3E-01	1.5E-01	1.5E-01	1.3E-01	1.3E-01		7.2E-01	2.5E+00	No
2-Amino-4,6-dinitrotoluene	35572-78-2	mg/kg	1/ 13	1.2E-01	9.7E-02	9.7E-02	1.3E-01	9.7E-02				Yes
2-Nitrotoluene	88-72-2	mg/kg	1/ 13	1.5E-01	2.2E-01	2.2E-01	1.8E-01	1.8E-01			1.8E+02	No
4-Amino-2,6-dinitrotoluene	19406-51-0	mg/kg	5/ 13	1.3E-01	9.1E-02	2.3E-01	1.5E-01	1.5E-01				Yes
Nitrobenzene	98-95-3	mg/kg	3/ 13	1.3E-01	9.5E-02	2.3E-01	1.5E-01	1.5E-01			1.0E+01	No
Nitrocellulose	9004-70-0	mg/kg	5/ 13	2.6E+00	5.2E-01	1.5E+01	4.5E+00	4.5E+00	3.7E+01			Yes
RDX	121-82-4	mg/kg	1/ 13	2.5E-01	2.9E-01	2.9E-01	2.6E-01	2.6E-01		4.4E+00	1.6E+01	No

[a] 2.0E+00

Table A-5. Summary of COPC Screening for Load Line 1 Deep Surface Soil (continued)

Analyte	Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria[a]	Region 9 Residential PRG[b]	Region 9 Industrial [b]	COPC?
Metals												
Aluminum	7429-90-5	mg/kg	22/ 22	9.8E+03	4.1E+03	2.3E+04	1.2E+04	1.2E+04	1.8E+04	7.6E+03	9.2E+04	Yes
Antimony	7440-36-0	mg/kg	10/ 22	5.0E+01	7.1E-01	6.5E+02	1.1E+02	1.1E+02	9.6E-01	3.1E+00	4.1E+01	Yes
Arsenic	7440-38-2	mg/kg	22/ 22	1.2E+01	5.3E+00	1.9E+01	1.3E+01	1.3E+01	1.5E+01	3.9E-01	1.6E+00	Yes
Barium	7440-39-3	mg/kg	22/ 22	1.1E+02	2.1E+01	3.5E+02	1.5E+02	1.5E+02	8.8E+01	5.4E+02	6.7E+03	No
Beryllium	7440-41-7	mg/kg	11/ 22	5.6E-01	3.3E-01	2.5E+00	9.5E-01	9.5E-01	8.8E-01	1.5E+01	1.9E+02	No
Cadmium	7440-43-9	mg/kg	20/ 22	2.6E+00	7.4E-02	2.7E+01	6.3E+00	6.3E+00			4.5E+01	Yes
Calcium	7440-70-2	mg/kg	22/ 22	3.1E+04	3.0E+02	2.2E+05	2.0E+05	2.0E+05	1.6E+04			No
Chromium	7440-47-3	mg/kg	22/ 22	3.0E+01	6.8E+00	1.7E+02	4.4E+01	4.4E+01	1.7E+01	2.1E+02	4.5E+02	No
Chromium, hexavalent	18540-29-9	mg/kg	1/ 2	1.0E+00	1.4E+00	1.4E+00	3.5E+00	1.4E+00		2.2E+01	6.4E+01	No
Cobalt	7440-48-4	mg/kg	22/ 22	7.5E+00	3.4E+00	1.1E+01	8.2E+00	8.2E+00	1.0E+01	1.4E+02	1.3E+03	No
Copper	7440-50-8	mg/kg	22/ 22	3.8E+01	5.9E+00	1.9E+02	5.6E+01	5.6E+01	1.8E+01	3.1E+02	4.1E+03	No
Cyanide	57-12-5	mg/kg	2/ 9	4.0E-01	5.8E-01	1.0E+00	5.5E-01	5.5E-01			1.2E+03	No
Iron	7439-89-6	mg/kg	22/ 22	2.4E+04	8.8E+03	9.0E+04	3.0E+04	3.0E+04	2.3E+04	2.3E+03	3.1E+04	No
Lead	7439-92-1	mg/kg	22/ 22	2.4E+02	1.6E+01	1.6E+03	6.1E+02	6.1E+02	1.9E+01	4.0E+02	7.5E+02	Yes
Magnesium	7439-95-4	mg/kg	22/ 22	4.1E+03	1.3E+03	1.7E+04	5.5E+03	5.5E+03				No
Manganese	7439-96-5	mg/kg	22/ 22	9.2E+02	3.2E+02	4.1E+03	1.3E+03	1.3E+03	1.5E+03	1.8E+02	1.9E+03	Yes
Mercury	7487-94-6	mg/kg	20/ 22	8.5E-02	1.6E-02	4.2E-01	1.4E-01	1.4E-01	3.6E-02	2.3E+00	3.1E+01	No
Nickel	7440-02-0	mg/kg	22/ 22	1.9E+01	7.8E+00	6.1E+01	2.3E+01	2.3E+01	2.1E+01	1.6E+02	2.0E+03	No
Potassium	7440-09-7	mg/kg	22/ 22	1.1E+03	5.7E+02	1.8E+03	1.2E+03	1.2E+03	9.3E+02			No
Selenium	7782-49-2	mg/kg	10/ 22	5.5E-01	3.9E-01	1.8E+00	6.9E-01	6.9E-01	1.4E+00	3.9E+01	5.1E+02	No
Silver	7440-22-4	mg/kg	3/ 22	5.7E-01	2.1E-01	4.6E-01	6.2E-01	4.6E-01		3.9E+01	5.1E+02	No
Sodium	7440-23-5	mg/kg	7/ 22	2.3E+02	7.0E+01	9.3E+02	3.0E+02	3.0E+02	1.2E+02			No
Thallium	6533-73-9	mg/kg	22/ 22	5.6E-01	4.3E-01	8.0E-01	6.0E-01	6.0E-01			6.7E+00	Yes
Vanadium	7440-62-2	mg/kg	22/ 22	1.5E+01	7.8E+00	2.7E+01	1.8E+01	1.8E+01	3.1E+01	5.5E+01	7.2E+02	No
Zinc	7440-66-6	mg/kg	22/ 22	1.9E+02	7.2E+01	6.7E+02	2.6E+02	2.6E+02	6.2E+01	2.3E+03	3.1E+04	No
Organics-Pesticide/PCB												
4,4'-DDE	72-55-9	mg/kg	2/ 4	5.2E-02	4.8E-02	1.2E-01	1.1E+00	1.2E-01			7.0E+00	No
4,4'-DDT	50-29-3	mg/kg	1/ 4	2.5E-02	4.1E-02	4.1E-02	3.8E-02	3.8E-02			7.0E+00	No
Dieldrin	60-57-1	mg/kg	1/ 4	2.4E-02	3.6E-02	3.6E-02	3.3E-02	3.3E-02			1.1E-01	Yes
Endrin Aldehyde	7421-93-4	mg/kg	2/ 4	8.1E-02	7.3E-02	2.1E-01	2.2E+01	2.1E-01		1.8E+00	1.8E+01	No
Endrin Ketone	53494-70-5	mg/kg	1/ 4	3.1E-02	8.1E-02	8.1E-02	7.1E-02	7.1E-02		1.8E+00	1.8E+01	No
Methoxychlor	72-43-5	mg/kg	1/ 4	3.6E-02	2.6E-02	2.6E-02	4.3E-02	2.6E-02			3.1E+02	No
PCB-1254	11097-69-1	mg/kg	4/ 4	1.8E+00	3.3E-01	4.3E+00	4.3E+02	4.3E+00		1.1E-01	7.4E-01	Yes
beta-BHC	319-85-7	mg/kg	2/ 4	6.9E-02	1.8E-02	2.2E-01	1.9E-01	1.9E-01			1.3E+00	No
gamma-Chlordane	5103-74-2	mg/kg	2/ 4	3.3E-02	4.0E-02	5.2E-02	5.2E-02	5.2E-02		1.6E+00	6.5E+00	No

Table A-5. Summary of COPC Screening for Load Line 1 Deep Surface Soil (continued)

Analyte	Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria[a]	Region 9 Residential PRG[b]	Region 9 Industrial [b]	COPC?
Organics-Semivolatile												
2-Methylnaphthalene	91-57-6	mg/kg	2/ 5	6.0E-01	5.0E-02	1.2E-01	1.6E+00	1.2E-01		PRG		Yes
Acenaphthene	83-32-9	mg/kg	1/ 5	6.9E-01	2.4E+00	2.4E+00	1.6E+00	1.6E+00			2.9E+03	No
Anthracene	120-12-7	mg/kg	2/ 5	1.3E+00	2.1E-01	5.8E+00	3.7E+00	3.7E+00			2.4E+04	No
Benz(*a*)anthracene	56-55-3	mg/kg	5/ 5	3.1E+00	7.1E-02	1.4E+01	1.5E+06	1.4E+01			2.1E+00	Yes
Benzo(*a*)pyrene	50-32-8	mg/kg	5/ 5	2.9E+00	7.3E-02	1.3E+01	1.5E+06	1.3E+01	3.7E+02		2.1E-01	Yes
Benzo(*b*)fluoranthene	205-99-2	mg/kg	5/ 5	3.6E+00	1.0E-01	1.5E+01	1.6E+06	1.5E+01	2.2E+03		2.1E+00	Yes
Benzo(*g,h,i*)perylene	191-24-2	mg/kg	5/ 5	2.0E+00	5.4E-02	8.2E+00	1.2E+06	8.2E+00	6.2E-01			Yes
Benzo(*k*)fluoranthene	207-08-9	mg/kg	3/ 5	1.4E+00	1.3E-01	5.7E+00	9.0E+02	5.7E+00	6.2E-02		2.1E+01	No
Bis(2-ethylhexyl)phthalate	117-81-7	mg/kg	2/ 5	6.5E-01	9.5E-02	3.4E-01	1.6E+00	3.4E-01	6.2E-01	3.5E+01	1.2E+02	No
Carbazole	86-74-8	mg/kg	2/ 5	9.7E-01	1.6E-01	4.1E+00	2.6E+00	2.6E+00			8.6E+01	No
Chrysene	218-01-9	mg/kg	5/ 5	3.5E+00	8.9E-02	1.5E+01	1.4E+06	1.5E+01	6.2E+00		2.1E+02	No
Di-n-butyl phthalate	84-74-2	mg/kg	1/ 5	7.1E-01	5.0E-01	5.0E-01	1.6E+00	5.0E-01		6.1E+02	6.2E+03	No
Dibenz(*a,h*)anthracene	53-70-3	mg/kg	2/ 5	5.2E-01	3.2E-01	1.7E+00	1.2E+00	1.2E+00	2.4E+01		2.1E-01	Yes
Dibenzofuran	132-64-9	mg/kg	1/ 5	4.7E-01	1.3E+00	1.3E+00	9.3E-01	9.3E-01	6.2E+01		3.1E+02	No
Fluoranthene	206-44-0	mg/kg	5/ 5	8.4E+00	1.4E-01	3.9E+01	7.0E+06	3.9E+01			2.2E+03	No
Fluorene	86-73-7	mg/kg	1/ 5	6.7E-01	2.3E+00	2.3E+00	1.5E+00	1.5E+00	6.2E-02		2.6E+03	No
Indeno(1,2,3-*cd*)pyrene	193-39-5	mg/kg	5/ 5	2.0E+00	5.3E-02	8.7E+00	9.4E+05	8.7E+00	2.9E+01		2.1E+00	Yes
Naphthalene	91-20-3	mg/kg	1/ 5	6.7E-01	4.6E-02	4.6E-02	1.6E+00	4.6E-02	2.3E+02		1.9E+01	No
Pentachlorophenol	87-86-5	mg/kg	1/ 5	1.6E+00	8.3E-02	8.3E-02	4.0E+00	8.3E-02	2.7E+02	3.0E+00	9.0E+00	No
Phenanthrene	85-01-8	mg/kg	5/ 5	6.3E+00	7.2E-02	3.0E+01	8.0E+06	3.0E+01	6.2E-01			Yes
Phenol	108-95-2	mg/kg	1/ 5	6.7E-01	4.5E-02	4.5E-02	1.6E+00	4.5E-02	5.6E+00		3.7E+04	No
Pyrene	129-00-0	mg/kg	5/ 5	8.7E+00	1.4E-01	4.1E+01	8.8E+06	4.1E+01			2.9E+03	No
Organics-Volatile												
1,2-Dichloroethene	549-59-0	mg/kg	5/ 5	4.7E-03	7.2E-04	7.9E-03	7.1E-03	7.1E-03	3.7E+03	4.3E+00	1.5E+01	No
Methylene Chloride	75-09-2	mg/kg	1/ 5	2.9E-03	3.0E-03	3.0E-03	3.0E-03	3.0E-03	2.3E+02	9.1E+00	2.1E+01	No
Trichloroethene	79-01-6	mg/kg	1/ 5	3.2E-03	4.4E-03	4.4E-03	3.9E-03	3.9E-03		5.3E-02	1.1E-01	No
CB-4/4A and CA-6/6A												
Explosives												
1,3,5-Trinitrobenzene	99-35-4	mg/kg	6/ 95	3.7E+00	1.2E-01	1.1E+02	6.4E+00	6.4E+00		1.8E+02	1.8E+03	No
1,3-Dinitrobenzene	99-65-0	mg/kg	4/ 95	3.7E+00	3.4E-02	1.1E+02	6.4E+00	6.4E+00		6.1E-01	6.2E+00	Yes
2,4,6-Trinitrotoluene	118-96-7	mg/kg	72/ 95	1.9E+02	5.2E-02	4.8E+03	3.3E+02	3.3E+02		3.1E+00	3.1E+01	Yes
2,4-Dinitrotoluene	121-14-2	mg/kg	9/ 95	3.9E+00	4.6E-02	2.3E-01	6.7E+00	2.3E-01		7.2E-01	2.5E+00	No
2,6-Dinitrotoluene	606-20-2	mg/kg	8/ 95	3.9E+00	9.3E-02	8.6E-01	6.7E+00	8.6E-01		7.2E-01	2.5E+00	Yes
2-Amino-4,6-dinitrotoluene	35572-78-2	mg/kg	51/ 95	4.4E+00	1.0E-01	1.1E+01	7.2E+00	7.2E+00				Yes
2-Nitrotoluene	88-72-2	mg/kg	2/ 95	3.9E+00	1.8E-01	6.9E-01	6.7E+00	6.9E-01			1.8E+02	No
3-Nitrotoluene	99-08-1	mg/kg	5/ 95	3.9E+00	1.4E-01	1.8E-01	6.7E+00	1.8E-01			1.8E+02	No

CAS

3.7E+01
3.7E+01

Table A-5. Summary of COPC Screening for Load Line 1 Deep Surface Soil (continued)

Analyte	Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria[a]	Region 9 Residential PRG[b]	Region 9 Industrial [b]	COPC?
4-Amino-2,6-dinitrotoluene	19406-51-0	mg/kg	26/ 95	9.1E+00	1.3E-01	5.9E+00	1.7E+01	5.9E+00				Yes
4-Nitrotoluene	99-99-0	mg/kg	5/ 95	3.9E+00	1.1E-01	2.0E-01	6.7E+00	2.0E-01			1.8E+02	No
HMX	2691-41-0	mg/kg	15/ 95	9.2E+00	2.5E-01	2.6E+02	1.6E+01	1.6E+01		3.1E+02	3.1E+03	No
Nitrobenzene	98-95-3	mg/kg	8/ 95	3.9E+00	4.8E-02	5.9E-01	6.7E+00	5.9E-01			1.0E+01	No
Nitrocellulose	9004-70-0	mg/kg	57/ 94	1.0E+01	3.0E-01	3.9E+02	1.8E+01	1.8E+01				Yes
Nitroglycerin	55-63-0	mg/kg	1/ 95	3.9E+01	7.4E+00	7.4E+00	6.7E+01	7.4E+00			1.2E+02	No
Nitroguanidine	556-88-7	mg/kg	1/ 95	2.3E-01	3.5E-02	3.5E-02	3.4E-01	3.5E-02			6.2E+03	No
RDX	121-82-4	mg/kg	21/ 95	4.4E+01	2.2E-01	2.3E+03	8.9E+01	8.9E+01		4.4E+00	1.6E+01	Yes
Metals												
Aluminum	7429-90-5	mg/kg	181/ 181	9.4E+03	4.9E+02	4.6E+04	1.0E+04	1.0E+04		7.6E+03	9.2E+04	Yes
Antimony	7440-36-0	mg/kg	22/ 181	6.8E-01	5.9E-01	3.0E+00	7.3E-01	7.3E-01	9.6E-01	3.1E+00	4.1E+01	No
Arsenic	7440-38-2	mg/kg	181/ 181	1.0E+01	1.8E+00	5.6E+01	1.1E+01	1.1E+01	1.5E+01	3.9E-01	1.6E+00	Yes
Barium	7440-39-3	mg/kg	181/ 181	1.1E+02	7.1E+00	2.0E+03	1.3E+02	1.3E+02	8.8E+01	5.4E+02	6.7E+03	Yes
Beryllium	7440-41-7	mg/kg	109/ 181	4.1E-01	2.2E-01	2.6E+00	4.6E-01	4.6E-01	8.8E-01	1.5E+01	1.9E+02	No
Cadmium	7440-43-9	mg/kg	136/ 181	1.4E+00	5.3E-02	2.7E+01	1.8E+00	1.8E+00		3.7E+00	4.5E+01	Yes
Calcium	7440-70-2	mg/kg	180/ 181	7.4E+03	1.2E+02	1.2E+05	9.6E+03	9.6E+03	1.6E+04			No
Chromium	7440-47-3	mg/kg	181/ 181	2.0E+01	1.5E+00	4.0E+02	2.4E+01	2.4E+01	1.7E+01	2.1E+02	4.5E+02	Yes
Chromium, hexavalent	18540-29-9	mg/kg	1/ 38	1.1E+00	1.4E+01	1.4E+01	1.7E+00	1.7E+00		2.2E+01	6.4E+01	No
Cobalt	7440-48-4	mg/kg	180/ 181	8.0E+00	5.5E-01	4.9E+01	8.6E+00	8.6E+00	1.0E+01	1.4E+02	1.3E+03	No
Copper	7440-50-8	mg/kg	181/ 181	6.0E+01	2.4E+00	3.7E+03	9.9E+01	9.9E+01	1.8E+01	3.1E+02	4.1E+03	Yes
Cyanide	57-12-5	mg/kg	12/ 89	4.5E-01	5.7E-01	3.8E+00	5.3E-01	5.3E-01			1.2E+03	No
Iron	7439-89-6	mg/kg	181/ 181	2.1E+04	2.5E+03	1.1E+05	2.2E+04	2.2E+04	2.3E+04	2.3E+03	3.1E+04	No
Lead	7439-92-1	mg/kg	181/ 181	1.8E+02	8.4E+00	7.1E+03	2.6E+02	2.6E+02	1.9E+01	4.0E+02	7.5E+02	Yes
Magnesium	7439-95-4	mg/kg	181/ 181	2.4E+03	1.1E+02	1.5E+04	2.7E+03	2.7E+03	3.0E+03			No
Manganese	7439-96-5	mg/kg	181/ 181	6.2E+02	5.1E+01	3.5E+03	6.8E+02	6.8E+02	1.5E+03	1.8E+02	1.9E+03	Yes
Mercury	7487-94-6	mg/kg	163/ 181	2.0E-01	1.0E-02	9.7E+00	3.1E-01	3.1E-01	3.6E-02	2.3E+00	3.1E+01	Yes
Nickel	7440-02-0	mg/kg	180/ 181	1.6E+01	1.4E+00	1.0E+02	1.7E+01	1.7E+01	2.1E+01	1.6E+02	2.0E+03	No
Potassium	7440-09-7	mg/kg	179/ 181	9.2E+02	2.0E+02	5.7E+03	9.8E+02	9.8E+02	9.3E+02			No
Selenium	7782-49-2	mg/kg	109/ 181	7.0E-01	3.4E-01	5.3E+00	7.7E-01	7.7E-01	1.4E+00	3.9E+01	5.1E+02	No
Silver	7440-22-4	mg/kg	5/ 181	5.9E-01	1.7E-01	8.8E-01	6.2E-01	6.2E-01		3.9E+01	5.1E+02	No
Sodium	7440-23-5	mg/kg	28/ 181	2.5E+02	6.0E+01	8.9E+02	2.7E+02	2.7E+02	1.2E+02			No
Thallium	6533-73-9	mg/kg	172/ 181	5.0E-01	1.7E-01	2.5E+00	5.3E-01	5.3E-01			6.7E+00	Yes
Vanadium	7440-62-2	mg/kg	181/ 181	1.8E+01	1.2E+00	7.8E+01	1.9E+01	1.9E+01	3.1E+01	5.5E+01	7.2E+02	Yes
Zinc	7440-66-6	mg/kg	180/ 180	1.6E+02	1.5E+01	1.7E+03	1.8E+02	1.8E+02	6.2E+01	2.3E+03	3.1E+04	No
Organics-Pesticide/PCB												
4,4'-DDE	72-55-9	mg/kg	12/ 17	5.1E-01	3.0E-03	6.7E+00	1.2E+00	1.2E+00			7.0E+00	Yes
4,4'-DDT	50-29-3	mg/kg	2/ 17	2.1E-02	5.3E-03	4.1E-02	4.1E-02	4.1E-02			7.0E+00	No

Table A-5. Summary of COPC Screening for Load Line 1 Deep Surface Soil (continued)

Analyte	Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria[a]	Region 9 Residential PRG[b]	Region 9 Industrial [b]	COPC?
Dieldrin	60-57-1	mg/kg	3/ 17	4.3E-02	1.4E-02	5.5E-01	9.8E-02	9.8E-02			1.1E-01	Yes
Endrin Aldehyde	7421-93-4	mg/kg	10/ 17	3.1E-01	3.8E-03	4.4E+00	5.6E+00	4.4E+00		1.8E+00	1.8E+01	Yes
Endrin Ketone	53494-70-5	mg/kg	1/ 17	1.9E-02	1.4E-02	1.4E-02	3.9E-02	1.4E-02			1.8E+01	No
Heptachlor	76-44-8	mg/kg	2/ 17	3.5E-02	7.2E-03	3.2E-01	7.2E-02	7.2E-02	3.0E-02		3.8E-01	Yes
Heptachlor Epoxide	1024-57-3	mg/kg	1/ 17	2.0E-02	3.1E-02	3.1E-02	4.0E-02	3.1E-02		5.3E-02	1.9E-01	No
Methoxychlor	72-43-5	mg/kg	1/ 17	3.8E-02	1.4E-02	1.4E-02	7.6E-02	1.4E-02	1.8E+00		3.1E+02	No
PCB-1016	12674-11-2	mg/kg	1/ 17	2.4E+00	1.4E-01	1.4E-01	6.3E+00	1.4E-01	1.1E-01	3.9E-01	3.7E+00	No
PCB-1254	11097-69-1	mg/kg	15/ 17	7.0E+01	5.3E-02	1.1E+03	3.3E+03	1.1E+03		1.1E-01	7.4E-01	Yes
alpha-Chlordane	5103-71-9	mg/kg	1/ 17	3.3E-02	4.4E-01	4.4E-01	7.8E-02	7.8E-02	3.1E+01		6.5E+00	No
beta-BHC	319-85-7	mg/kg	1/ 17	1.9E-02	9.7E-03	9.7E-03	3.9E-02	9.7E-03			1.3E+00	No
gamma-Chlordane	5103-74-2	mg/kg	5/ 17	3.5E-01	6.0E-03	5.3E+00	8.9E-01	8.9E-01			6.5E+00	Yes
Organics-Semivolatile									1.6E+00			
2-Methylnaphthalene	91-57-6	mg/kg	2/ 18	3.6E-01	4.1E-02	7.7E-02	5.4E-01	7.7E-02	3.2E-01			Yes
Acenaphthene	83-32-9	mg/kg	1/ 18	3.8E-01	2.3E-01	2.3E-01	5.6E-01	2.3E-01	1.6E+00		2.9E+03	No
Anthracene	120-12-7	mg/kg	2/ 18	3.6E-01	2.1E-01	5.5E-01	5.4E-01	5.4E-01			2.4E+04	No
Benz(*a*)anthracene	56-55-3	mg/kg	4/ 18	4.3E-01	6.1E-02	1.2E+00	6.4E-01	6.4E-01			2.1E+00	Yes
Benzo(*a*)pyrene	50-32-8	mg/kg	4/ 18	4.1E-01	6.0E-02	1.0E+00	6.1E-01	6.1E-01	3.7E+02	6.2E-02	2.1E-01	Yes
Benzo(*b*)fluoranthene	205-99-2	mg/kg	6/ 18	4.4E-01	4.2E-02	1.4E+00	6.6E-01	6.6E-01	2.2E+03		2.1E+00	Yes
Benzo(*g,h,i*)perylene	191-24-2	mg/kg	3/ 18	3.7E-01	7.4E-02	5.5E-01	5.4E-01	5.4E-01	6.2E-01			Yes
Benzo(*k*)fluoranthene	207-08-9	mg/kg	3/ 18	3.7E-01	5.3E-02	5.8E-01	5.5E-01	5.5E-01			2.1E+01	No
Bis(2-ethylhexyl)phthalate	117-81-7	mg/kg	4/ 18	3.5E-01	7.9E-02	1.1E-01	5.4E-01	1.1E-01	6.2E-01	3.5E+01	1.2E+02	No
Butyl benzyl phthalate	85-68-7	mg/kg	1/ 18	3.7E-01	5.0E-02	5.0E-02	5.5E-01	5.0E-02		1.2E+03	1.2E+04	No
Carbazole	86-74-8	mg/kg	1/ 18	3.8E-01	3.8E-01	3.8E-01	5.6E-01	3.8E-01	6.2E+00		8.6E+01	No
Chrysene	218-01-9	mg/kg	4/ 18	4.3E-01	9.5E-02	1.1E+00	6.3E-01	6.3E-01			2.1E+02	No
Dibenz(*a,h*)anthracene	53-70-3	mg/kg	1/ 18	3.7E-01	9.6E-02	9.6E-02	5.5E-01	9.6E-02			2.1E-01	Yes
Dibenzofuran	132-64-9	mg/kg	1/ 18	3.7E-01	1.9E-01	1.9E-01	5.5E-01	1.9E-01	2.4E+01		3.1E+02	No
Fluoranthene	206-44-0	mg/kg	8/ 18	5.5E-01	5.6E-02	2.9E+00	9.1E-01	9.1E-01	6.2E+01		2.2E+03	No
Fluorene	86-73-7	mg/kg	1/ 18	3.8E-01	3.1E-01	3.1E-01	5.6E-01	3.1E-01	6.2E-02	2.7E+02	2.6E+03	No
Indeno(1,2,3-*cd*)pyrene	193-39-5	mg/kg	3/ 18	3.7E-01	7.6E-02	6.2E-01	5.5E-01	5.5E-01	2.9E+01	6.2E-01	2.1E+00	No
Naphthalene	91-20-3	mg/kg	1/ 18	3.7E-01	2.2E-01	2.2E-01	5.6E-01	2.2E-01	2.3E+02		1.9E+01	No
Phenanthrene	85-01-8	mg/kg	5/ 18	4.9E-01	4.6E-02	2.5E+00	7.7E-01	7.7E-01				Yes
Phenol	108-95-2	mg/kg	1/ 18	3.7E-01	5.0E-02	5.0E-02	5.5E-01	5.0E-02		3.7E+03	3.7E+04	No
Pyrene	129-00-0	mg/kg	5/ 18	5.4E-01	7.0E-02	2.3E+00	8.3E-01	8.3E-01	5.6E+00	2.3E+02	2.9E+03	No
Organics-Volatile												
1,2-Dichloroethene	549-59-0	mg/kg	17/ 18	6.3E-03	7.0E-04	1.8E-02	1.2E-02	1.2E-02		4.3E+00	1.5E+01	No
Acetone	67-64-1	mg/kg	2/ 18	7.0E-03	8.6E-03	1.1E-02	8.1E-03	8.1E-03		1.6E+02	6.0E+02	No
Methylene Chloride	75-09-2	mg/kg	2/ 18	3.0E-03	1.7E-03	3.3E-03	3.4E-03	3.3E-03		9.1E+00	2.1E+01	No

Table A-5. Summary of COPC Screening for Load Line 1 Deep Surface Soil (continued)

Analyte	Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria[a]	Region 9 Residential PRG[b]	Region 9 Industrial [b]	COPC?
Trichloroethene	79-01-6	mg/kg	2/ 18	3.3E-03	2.6E-03	6.7E-03	3.8E-03	3.8E-03			1.1E-01	No
Change Houses (CB-12, -23, -8, and -22)											**PRG**	
Metals												
Aluminum	7429-90-5	mg/kg	21/ 21	6.9E+03	3.7E+03	1.7E+04	8.4E+03	8.4E+03	1.8E+04	7.6E+03	9.2E+04	No
Antimony **CAS**	7440-36-0	mg/kg	3/ 21	1.3E+00	9.0E-01	1.3E+01	2.3E+00	2.3E+00	9.6E-01	3.1E+00	4.1E+01	Yes
Arsenic	7440-38-2	mg/kg	21/ 21	1.0E+01	2.5E+00	2.8E+01	1.2E+01	1.2E+01	1.5E+01	3.9E-01	1.6E+00	Yes
Barium	7440-39-3	mg/kg	21/ 21	5.7E+01	1.8E+01	1.8E+02	7.1E+01	7.1E+01	8.8E+01	5.4E+02	6.7E+03	No
Beryllium	7440-41-7	mg/kg	3/ 21	2.5E-01	4.5E-01	1.2E+00	3.5E-01	3.5E-01	8.8E-01	1.5E+01	1.9E+02	No
Cadmium	7440-43-9	mg/kg	15/ 21	1.6E+00	1.4E-01	1.1E+01	3.3E+00	3.3E+00			4.5E+01	Yes
Calcium	7440-70-2	mg/kg	21/ 21	1.1E+04	3.6E+02	1.8E+05	2.5E+04	2.5E+04	1.6E+04			No
Chromium	7440-47-3	mg/kg	21/ 21	1.3E+01	6.4E+00	2.7E+01	1.5E+01	1.5E+01	1.7E+01	2.1E+02	4.5E+02	No
Cobalt	7440-48-4	mg/kg	21/ 21	6.2E+00	1.9E+00	1.5E+01	7.2E+00	7.2E+00	1.0E+01	1.4E+02	1.3E+03	No
Copper	7440-50-8	mg/kg	21/ 21	2.0E+01	5.7E+00	5.1E+01	2.5E+01	2.5E+01	1.8E+01	3.1E+02	4.1E+03	No
Cyanide	57-12-5	mg/kg	1/ 21	4.5E-01	3.0E+00	3.0E+00	6.7E-01	6.7E-01		1.2E+02	1.2E+03	No
Iron	7439-89-6	mg/kg	21/ 21	1.6E+04	3.2E+03	2.9E+04	1.8E+04	1.8E+04	2.3E+04	2.3E+03	3.1E+04	No
Lead	7439-92-1	mg/kg	21/ 21	1.1E+02	1.7E+01	5.3E+02	1.9E+02	1.9E+02	1.9E+01	4.0E+02	7.5E+02	Yes
Magnesium	7439-95-4	mg/kg	21/ 21	1.9E+03	7.7E+02	1.2E+04	2.8E+03	2.8E+03	3.0E+03			No
Manganese	7439-96-5	mg/kg	21/ 21	6.7E+02	6.8E+01	2.0E+03	8.3E+02	8.3E+02	1.5E+03	1.8E+02	1.9E+03	Yes
Mercury	7487-94-6	mg/kg	8/ 15	8.4E-02	2.8E-02	2.9E-01	1.2E-01	1.2E-01	3.6E-02	2.3E+00	3.1E+01	No
Nickel	7440-02-0	mg/kg	21/ 21	1.4E+01	3.5E+00	2.3E+01	1.6E+01	1.6E+01	2.1E+01	1.6E+02	2.0E+03	No
Potassium	7440-09-7	mg/kg	21/ 21	8.5E+02	5.1E+02	1.5E+03	9.7E+02	9.7E+02	9.3E+02			No
Selenium	7782-49-2	mg/kg	7/ 21	4.8E-01	5.3E-01	1.3E+00	5.8E-01	5.8E-01	1.4E+00	3.9E+01	5.1E+02	No
Silver	7440-22-4	mg/kg	1/ 21	6.3E-01	3.5E-01	3.5E-01	6.6E-01	3.5E-01		3.9E+01	5.1E+02	No
Sodium	7440-23-5	mg/kg	1/ 21	3.0E+02	4.3E+02	4.3E+02	3.4E+02	3.4E+02	1.2E+02			No
Thallium	6533-73-9	mg/kg	5/ 21	3.1E-01	2.9E-01	7.3E-01	4.3E-01	4.3E-01			6.7E+00	Yes
Vanadium	7440-62-2	mg/kg	21/ 21	1.3E+01	5.1E+00	3.9E+01	1.6E+01	1.6E+01	3.1E+01	5.5E+01	7.2E+02	No
Zinc	7440-66-6	mg/kg	21/ 21	2.7E+02	3.4E+01	1.6E+03	4.3E+02	4.3E+02	6.2E+01	2.3E+03	3.1E+04	No
Organics-Pesticide/PCB												
4,4'-DDE	72-55-9	mg/kg	1/ 2	1.3E-03	1.6E-03	1.6E-03	3.1E-03	1.6E-03			7.0E+00	No
Endrin Aldehyde	7421-93-4	mg/kg	1/ 1	1.4E-03	1.4E-03	1.4E-03		1.4E-03			1.8E+01	No
PCB-1254	11097-69-1	mg/kg	2/ 2	7.7E-02	4.3E-02	1.1E-01	2.9E-01	1.1E-01		1.1E-01	7.4E-01	No
Organics-Semivolatile												
Benz(*a*)anthracene	56-55-3	mg/kg	2/ 2	6.1E-02	5.0E-02	7.2E-02	1.3E-01	7.2E-02			2.1E+00	No
Benzo(*a*)pyrene	50-32-8	mg/kg	2/ 2	7.6E-02	6.0E-02	9.2E-02	1.8E-01	9.2E-02			2.1E-01	Yes
Benzo(*b*)fluoranthene	205-99-2	mg/kg	2/ 2	1.2E-01	8.4E-02	1.5E-01	3.3E-01	1.5E-01			2.1E+00	No
Benzo(*g,h,i*)perylene	191-24-2	mg/kg	1/ 2	1.5E-01	7.4E-02	7.4E-02	6.4E-01	7.4E-02				Yes
Benzo(*k*)fluoranthene	207-08-9	mg/kg	1/ 2	1.5E-01	6.5E-02	6.5E-02	6.7E-01	6.5E-02			2.1E+01	No

5.3E-02
3.7E+00
5.2E-01
1.7E+00
1.8E+00
6.2E-01
6.2E-02
6.2E-01
6.2E+00

Table A-5. Summary of COPC Screening for Load Line 1 Deep Surface Soil (continued)

Analyte	Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria[a]	Region 9 Residential PRG[b]	Region 9 Industrial [b]	COPC?
Bis(2-ethylhexyl)phthalate	117-81-7	mg/kg	1/ 2	1.4E-01	5.7E-02	5.7E-02	6.9E-01	5.7E-02		3.5E+01	1.2E+02	No
Chrysene	218-01-9	mg/kg	2/ 2	8.6E-02	6.2E-02	1.1E-01	2.4E-01	1.1E-01		PRG	2.1E+02	No
Fluoranthene	206-44-0	mg/kg	2/ 2	1.3E-01	9.3E-02	1.7E-01	3.7E-01	1.7E-01			2.2E+03	No
Indeno(1,2,3-*cd*)pyrene	193-39-5	mg/kg	1/ 2	1.5E-01	7.5E-02	7.5E-02	6.4E-01	7.5E-02			2.1E+00	No
Phenanthrene CAS	85-01-8	mg/kg	2/ 2	7.8E-02	4.6E-02	1.1E-01	2.8E-01	1.1E-01	6.2E+01			Yes
Pyrene	129-00-0	mg/kg	2/ 2	9.5E-02	7.0E-02	1.2E-01	2.5E-01	1.2E-01	2.3E+02		2.9E+03	No
Organics-Volatile									6.2E-01			
Methylene Chloride	75-09-2	mg/kg	2/ 2	1.5E-03	1.0E-03	1.9E-03	4.3E-03	1.9E-03		9.1E+00	2.1E+01	No
Toluene	108-88-3	mg/kg	2/ 2	2.3E-03	1.5E-03	3.1E-03	7.4E-03	3.1E-03	2.3E+02		2.2E+02	No
Perimeter Area												
Metals												
Aluminum	7429-90-5	mg/kg	27/ 27	1.3E+04	8.8E+03	2.1E+04	1.4E+04	1.4E+04	1.8E+04	7.6E+03	9.2E+04	Yes
Antimony	7440-36-0	mg/kg	2/ 27	6.3E-01	7.4E-01	8.1E-01	6.5E-01	6.5E-01	9.6E-01	3.1E+00	4.1E+01	No
Arsenic	7440-38-2	mg/kg	27/ 27	1.1E+01	7.5E+00	2.5E+01	1.3E+01	1.3E+01	1.5E+01	3.9E-01	1.6E+00	Yes
Barium	7440-39-3	mg/kg	27/ 27	8.3E+01	5.2E+01	1.4E+02	9.1E+01	9.1E+01	8.8E+01	5.4E+02	6.7E+03	No
Beryllium	7440-41-7	mg/kg	21/ 27	4.4E-01	2.7E-01	8.2E-01	5.0E-01	5.0E-01	8.8E-01	1.5E+01	1.9E+02	No
Cadmium	7440-43-9	mg/kg	10/ 27	2.4E-01	5.2E-02	3.2E-01	2.7E-01	2.7E-01			4.5E+01	No
Calcium	7440-70-2	mg/kg	23/ 27	2.0E+03	1.2E+02	3.4E+04	4.1E+03	4.1E+03	1.6E+04			No
Chromium	7440-47-3	mg/kg	27/ 27	1.6E+01	1.1E+01	2.5E+01	1.7E+01	1.7E+01	1.7E+01	2.1E+02	4.5E+02	No
Chromium, hexavalent	18540-29-9	mg/kg	1/ 5	8.1E-01	1.5E+00	1.5E+00	1.2E+00	1.2E+00	3.7E+00	2.2E+01	6.4E+01	No
Cobalt	7440-48-4	mg/kg	27/ 27	9.7E+00	4.9E+00	2.1E+01	1.1E+01	1.1E+01	1.0E+01	1.4E+02	1.3E+03	No
Copper	7440-50-8	mg/kg	27/ 27	1.1E+01	5.1E+00	2.0E+01	1.3E+01	1.3E+01	1.8E+01	3.1E+02	4.1E+03	No
Cyanide	57-12-5	mg/kg	3/ 25	4.2E-01	7.5E-01	1.7E+00	5.5E-01	5.5E-01		1.2E+02	1.2E+03	No
Iron	7439-89-6	mg/kg	27/ 27	2.2E+04	1.5E+04	3.3E+04	2.4E+04	2.4E+04	2.3E+04	2.3E+03	3.1E+04	No
Lead	7439-92-1	mg/kg	27/ 27	1.9E+01	1.3E+01	3.5E+01	2.1E+01	2.1E+01	1.9E+01	4.0E+02	7.5E+02	No
Magnesium	7439-95-4	mg/kg	27/ 27	1.8E+03	9.2E+02	3.2E+03	2.0E+03	2.0E+03	3.0E+03			No
Manganese	7439-96-5	mg/kg	27/ 27	8.9E+02	9.9E+01	2.3E+03	1.4E+03	1.4E+03	1.5E+03	1.8E+02	1.9E+03	Yes
Mercury	7487-94-6	mg/kg	26/ 27	5.3E-02	1.9E-02	9.3E-02	6.4E-02	6.4E-02	3.6E-02	2.3E+00	3.1E+01	No
Nickel	7440-02-0	mg/kg	27/ 27	1.5E+01	8.9E+00	2.3E+01	1.6E+01	1.6E+01	2.1E+01	1.6E+02	2.0E+03	No
Potassium	7440-09-7	mg/kg	27/ 27	9.4E+02	3.7E+02	2.3E+03	1.1E+03	1.1E+03	9.3E+02			No
Selenium	7782-49-2	mg/kg	13/ 27	6.3E-01	4.6E-01	1.7E+00	7.7E-01	7.7E-01	1.4E+00	3.9E+01	5.1E+02	No
Thallium	6533-73-9	mg/kg	27/ 27	6.0E-01	4.0E-01	8.6E-01	6.4E-01	6.4E-01			6.7E+00	Yes
Vanadium	7440-62-2	mg/kg	27/ 27	2.7E+01	2.0E+01	4.6E+01	2.9E+01	2.9E+01	3.1E+01	5.5E+01	7.2E+02	No
Zinc	7440-66-6	mg/kg	27/ 27	5.8E+01	3.7E+01	7.8E+01	6.1E+01	6.1E+01	6.2E+01	2.3E+03	3.1E+04	No
Organics-Semivolatile									5.2E-01			
Benzo(*b*)fluoranthene	205-99-2	mg/kg	1/ 2	1.2E-01	4.2E-02	4.2E-02	6.4E-01	4.2E-02			2.1E+00	No
Fluoranthene	206-44-0	mg/kg	1/ 2	1.3E-01	5.7E-02	5.7E-02	6.0E-01	5.7E-02			2.2E+03	No

6.2E-01
2.3E+02

Table A-5. Summary of COPC Screening for Load Line 1 Deep Surface Soil (continued)

Analyte	Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria[a]	Region 9 Residential PRG[b]	Region 9 Industrial [b]	COPC?
Organics-Volatile												
1,2-Dichloroethene	549-59-0	mg/kg	2/ 2	3.5E-03	2.9E-03	4.1E-03	7.3E-03	4.1E-03		4.3E+00	1.5E+01	No
Trichloroethene	79-01-6	mg/kg	2/ 2	4.5E-03	2.4E-03	6.6E-03	1.8E-02	6.6E-03		5.3E-02	1.1E-01	No
Water Tower												
CAS				***Metals***								
Aluminum	7429-90-5	mg/kg	5/ 5	1.1E+04	7.2E+03	1.3E+04	1.4E+04	1.3E+04	1.8E+04	7.6E+03	9.2E+04	No
Antimony	7440-36-0	mg/kg	1/ 5	8.4E-01	1.9E+00	1.9E+00	1.4E+00	1.4E+00	9.6E-01	3.1E+00	4.1E+01	No
Arsenic	7440-38-2	mg/kg	5/ 5	1.3E+01	1.2E+01	1.4E+01	1.4E+01	1.4E+01	1.5E+01	3.9E-01	1.6E+00	No
Barium	7440-39-3	mg/kg	5/ 5	7.0E+01	6.5E+01	7.7E+01	7.6E+01	7.6E+01	8.8E+01	5.4E+02	6.7E+03	No
Beryllium	7440-41-7	mg/kg	5/ 5	6.4E-01	4.2E-01	9.2E-01	9.9E-01	9.2E-01	8.8E-01	1.5E+01	1.9E+02	No
Cadmium	7440-43-9	mg/kg	4/ 5	2.3E-01	1.1E-01	2.9E-01	3.1E-01	2.9E-01			4.5E+01	No
Calcium	7440-70-2	mg/kg	5/ 5	2.5E+03	1.4E+03	3.3E+03	3.2E+03	3.2E+03	1.6E+04			No
Chromium	7440-47-3	mg/kg	5/ 5	9.7E+01	1.8E+01	3.9E+02	2.5E+02	2.5E+02	1.7E+01	2.1E+02	4.5E+02	Yes
Cobalt	7440-48-4	mg/kg	5/ 5	1.2E+01	8.7E+00	1.8E+01	1.7E+01	1.7E+01	1.0E+01	1.4E+02	1.3E+03	No
Copper	7440-50-8	mg/kg	5/ 5	2.7E+01	1.2E+01	5.1E+01	6.4E+01	5.1E+01	1.8E+01	3.1E+02	4.1E+03	No
Iron	7439-89-6	mg/kg	5/ 5	3.0E+04	2.2E+04	4.9E+04	4.6E+04	4.6E+04	2.3E+04	2.3E+03	3.1E+04	No
Lead	7439-92-1	mg/kg	5/ 5	6.1E+02	1.8E+01	2.5E+03	6.8E+06	2.5E+03	1.9E+01	4.0E+02	7.5E+02	Yes
Magnesium	7439-95-4	mg/kg	5/ 5	2.3E+03	1.8E+03	2.9E+03	2.8E+03	2.8E+03	3.0E+03			No
Manganese	7439-96-5	mg/kg	5/ 5	5.0E+02	4.1E+02	6.9E+02	6.3E+02	6.3E+02	1.5E+03	1.8E+02	1.9E+03	No
Mercury	7487-94-6	mg/kg	3/ 5	3.9E-02	3.7E-02	5.7E-02	6.2E-02	5.7E-02	3.6E-02	2.3E+00	3.1E+01	No
Nickel	7440-02-0	mg/kg	5/ 5	2.7E+01	1.7E+01	3.2E+01	3.3E+01	3.2E+01	2.1E+01	1.6E+02	2.0E+03	No
Potassium	7440-09-7	mg/kg	5/ 5	1.6E+03	1.3E+03	2.3E+03	2.1E+03	2.1E+03	9.3E+02			No
Sodium	7440-23-5	mg/kg	1/ 5	1.1E+02	1.1E+02	1.1E+02	2.1E+02	1.1E+02	1.2E+02			No
Thallium	6533-73-9	mg/kg	5/ 5	5.8E-01	4.9E-01	6.7E-01	6.4E-01	6.4E-01			6.7E+00	Yes
Vanadium	7440-62-2	mg/kg	5/ 5	2.0E+01	1.4E+01	2.4E+01	2.4E+01	2.4E+01	3.1E+01	5.5E+01	7.2E+02	No
Zinc	7440-66-6	mg/kg	5/ 5	2.4E+02	5.4E+01	9.3E+02	6.1E+02	6.1E+02	6.2E+01	2.3E+03	3.1E+04	No

[a] Background value for 0 to 1-ft background soil data or 1- to 13-ft background soil data, whichever is lower.
[b] Value is Region 9 PRG for a cancer risk level of 1E-06 or a non-cancer hazard quotient of 0.1, whichever is lower.
BHC = Benzene hexachloride.
CAS = Chemical Abstracts Service.
COPC = Contaminant of potential concern.
DDE = Dichlorodiphenyldichloroethylene.
DDT = Dichlorodiphenyltrichloroethane.
HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.
PCB = Polychlorinated biphenyl.
PRG = Preliminary remediation goal.
RDX = = Hexahydro-1,3,5-trinitro-1,3,5-triazine.
UCL = Upper confidence level.

Table A-6. Summary of COPC Screening for Load Line 1 Subsurface Soil

Analyte	Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria	Region 9 Residential PRG[a]	Region 9 Industrial [a]	COPC?
CB-13 and -10												
Explosives												
2,4-Dinitrotoluene	121-14-2	mg/kg	1/ 2	1.1E-01	8.6E-02	8.6E-02	2.3E-01	8.6E-02		7.2E-01	2.5E+00	No
Nitrocellulose	9004-70-0	mg/kg	1/ 2	1.5E+01	2.9E+01	2.9E+01	1.0E+02	2.9E+01				Yes
CAS						***Metals***				**PRG**		
Aluminum	7429-90-5	mg/kg	5/ 5	9.3E+03	5.8E+03	1.6E+04	1.4E+04	1.4E+04	2.0E+04	7.6E+03	9.2E+04	No
Antimony	7440-36-0	mg/kg	1/ 5	2.0E+01	9.8E+01	9.8E+01	6.2E+01	6.2E+01	9.6E-01	3.1E+00	4.1E+01	Yes
Arsenic	7440-38-2	mg/kg	5/ 5	1.1E+01	9.1E+00	1.4E+01	1.3E+01	1.3E+01	2.0E+01	3.9E-01	1.6E+00	No
Barium	7440-39-3	mg/kg	5/ 5	7.8E+01	3.3E+01	1.5E+02	2.1E+02	1.5E+02	1.2E+02	5.4E+02	6.7E+03	No
Beryllium	7440-41-7	mg/kg	4/ 5	4.0E-01	2.7E-01	6.3E-01	5.8E-01	5.8E-01	8.8E-01	1.5E+01	1.9E+02	No
Cadmium	7440-43-9	mg/kg	5/ 5	5.4E+00	7.8E-02	2.6E+01	1.6E+01	1.6E+01			4.5E+01	Yes
Calcium	7440-70-2	mg/kg	5/ 5	1.1E+04	6.1E+03	1.5E+04	1.4E+04	1.4E+04	3.6E+04			No
Chromium	7440-47-3	mg/kg	5/ 5	2.9E+01	7.6E+00	8.6E+01	3.5E+02	8.6E+01	2.7E+01	2.1E+02	4.5E+02	No
Cobalt	7440-48-4	mg/kg	5/ 5	7.1E+00	5.0E+00	9.9E+00	9.1E+00	9.1E+00	2.3E+01	1.4E+02	1.3E+03	No
Copper	7440-50-8	mg/kg	5/ 5	4.8E+01	1.4E+01	1.8E+02	1.2E+02	1.2E+02	3.2E+01	3.1E+02	4.1E+03	No
Iron	7439-89-6	mg/kg	5/ 5	2.1E+04	1.5E+04	2.5E+04	2.5E+04	2.5E+04	3.5E+04	2.3E+03	3.1E+04	No
Lead	7439-92-1	mg/kg	5/ 5	1.5E+02	1.1E+01	6.8E+02	4.3E+02	4.3E+02	1.9E+01	4.0E+02	7.5E+02	Yes
Magnesium	7439-95-4	mg/kg	5/ 5	3.4E+03	2.8E+03	3.9E+03	3.7E+03	3.7E+03	8.8E+03			No
Manganese	7439-96-5	mg/kg	5/ 5	5.8E+02	3.1E+02	8.8E+02	7.8E+02	7.8E+02	3.0E+03	1.8E+02	1.9E+03	No
Mercury	7487-94-6	mg/kg	4/ 5	4.3E-02	9.3E-03	1.4E-01	1.0E+00	1.4E-01	4.4E-02	2.3E+00	3.1E+01	No
Nickel	7440-02-0	mg/kg	5/ 5	1.8E+01	1.1E+01	2.6E+01	2.4E+01	2.4E+01	6.1E+01	1.6E+02	2.0E+03	No
Potassium	7440-09-7	mg/kg	5/ 5	1.4E+03	7.6E+02	2.8E+03	3.4E+03	2.8E+03	3.4E+03			No
Selenium	7782-49-2	mg/kg	2/ 5	6.1E-01	4.2E-01	1.8E+00	1.2E+00	1.2E+00	1.5E+00	3.9E+01	5.1E+02	No
Silver	7440-22-4	mg/kg	1/ 5	5.6E-01	5.2E-01	5.2E-01	6.0E-01	5.2E-01			5.1E+02	No
Sodium	7440-23-5	mg/kg	2/ 5	9.9E+01	7.2E+01	8.1E+01	1.7E+02	8.1E+01	1.5E+02			No
Thallium	6533-73-9	mg/kg	5/ 5	4.9E-01	1.9E-01	7.3E-01	6.9E-01	6.9E-01	9.1E-01	5.2E-01	6.7E+00	No
Vanadium	7440-62-2	mg/kg	5/ 5	1.6E+01	8.2E+00	3.2E+01	4.1E+01	3.2E+01	3.8E+01	5.5E+01	7.2E+02	No
Zinc	7440-66-6	mg/kg	5/ 5	8.8E+02	5.5E+01	4.2E+03	2.6E+03	2.6E+03	9.3E+01	2.3E+03	3.1E+04	Yes
CB-14, CB-17, and CA-15												
Explosives												
2,4,6-Trinitrotoluene	118-96-7	mg/kg	1/ 1	8.8E-02	8.8E-02	8.8E-02		8.8E-02		3.1E+00	3.1E+01	No
2,4-Dinitrotoluene	121-14-2	mg/kg	1/ 1	1.3E-01	1.3E-01	1.3E-01		1.3E-01			2.5E+00	No
Nitrocellulose	9004-70-0	mg/kg	1/ 1	8.8E+00	8.8E+00	8.8E+00		8.8E+00				Yes
Metals												
Aluminum	7429-90-5	mg/kg	2/ 2	8.4E+03	1.6E+03	1.5E+04	5.1E+04	1.5E+04	2.0E+04	7.6E+03	9.2E+04	No
Arsenic	7440-38-2	mg/kg	2/ 2	1.0E+01	5.9E+00	1.5E+01	3.9E+01	1.5E+01	2.0E+01	3.9E-01	1.6E+00	No

Table A-6. Summary of COPC Screening for Load Line 1 Subsurface Soil (continued)

Analyte	Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria	Region 9 Residential PRG[a]	Region 9 Industrial [a]	COPC?
Barium	7440-39-3	mg/kg	2/ 2	5.6E+01	3.6E+01	7.7E+01	1.8E+02	7.7E+01	1.2E+02	5.4E+02	6.7E+03	No
Beryllium	7440-41-7	mg/kg	1/ 2	2.7E-01	4.8E-01	4.8E-01	1.6E+00	4.8E-01	8.8E-01	1.5E+01	1.9E+02	No
Cadmium	7440-43-9	mg/kg	1/ 2	1.5E+00	2.8E+00	2.8E+00	9.5E+00	2.8E+00			4.5E+01	No
Calcium	7440-70-2	mg/kg	2/ 2	8.3E+02	5.4E+02	1.1E+03	2.7E+03	1.1E+03	3.6E+04			No
Chromium	7440-47-3	mg/kg	2/ 2	1.4E+01	8.3E+00	1.9E+01	4.7E+01	1.9E+01	2.7E+01	2.1E+02	4.5E+02	No
Cobalt	7440-48-4	mg/kg	2/ 2	6.7E+00	3.2E+00	1.0E+01	2.8E+01	1.0E+01	2.3E+01	1.4E+02	1.3E+03	No
Copper	7440-50-8	mg/kg	2/ 2	1.7E+01	1.7E+01	1.8E+01	2.0E+01	1.8E+01	3.2E+01	3.1E+02	4.1E+03	No
Iron	7439-89-6	mg/kg	2/ 2	2.0E+04	1.1E+04	2.8E+04	7.4E+04	2.8E+04	3.5E+04	2.3E+03	3.1E+04	No
Lead	7439-92-1	mg/kg	2/ 2	2.9E+02	1.5E+01	5.6E+02	2.0E+03	5.6E+02	1.9E+01	4.0E+02	7.5E+02	Yes
Magnesium	7439-95-4	mg/kg	2/ 2	1.6E+03	4.2E+02	2.7E+03	8.8E+03	2.7E+03	8.8E+03			No
Manganese	7439-96-5	mg/kg	2/ 2	4.7E+02	4.6E+02	4.7E+02	4.9E+02	4.7E+02	3.0E+03	1.8E+02	1.9E+03	No
Mercury	7487-94-6	mg/kg	1/ 2	2.6E-02	3.0E-02	3.0E-02	5.3E-02	3.0E-02	4.4E-02	2.3E+00	3.1E+01	No
Nickel	7440-02-0	mg/kg	2/ 2	1.4E+01	8.2E+00	2.0E+01	5.0E+01	2.0E+01	6.1E+01	1.6E+02	2.0E+03	No
Potassium	7440-09-7	mg/kg	2/ 2	8.3E+02	2.9E+02	1.4E+03	4.2E+03	1.4E+03	3.4E+03			No
Selenium	7782-49-2	mg/kg	1/ 2	3.7E-01	4.4E-01	4.4E-01	8.3E-01	4.4E-01	1.5E+00	3.9E+01	5.1E+02	No
Thallium	6533-73-9	mg/kg	2/ 2	5.3E-01	3.8E-01	6.8E-01	1.5E+00	6.8E-01	9.1E-01	5.2E-01	6.7E+00	No
Vanadium	7440-62-2	mg/kg	2/ 2	1.7E+01	5.6E+00	2.8E+01	8.8E+01	2.8E+01	3.8E+01	5.5E+01	7.2E+02	No
Zinc	7440-66-6	mg/kg	2/ 2	1.1E+02	5.8E+01	1.6E+02	4.1E+02	1.6E+02	9.3E+01	2.3E+03	3.1E+04	No
CB-4/4A and CA-6/6A												
Explosives												
1,3,5-Trinitrobenzene	99-35-4	mg/kg	1/ 13	6.9E+00	1.1E+01	1.1E+01	1.7E+01	1.1E+01		1.8E+02	1.8E+03	No
2,4,6-Trinitrotoluene	118-96-7	mg/kg	12/ 13	3.9E+02	7.1E-02	4.5E+03	1.0E+03	1.0E+03		3.1E+00	3.1E+01	Yes
2,6-Dinitrotoluene	606-20-2	mg/kg	1/ 13	7.0E+00	1.4E-01	1.4E-01	1.7E+01	1.4E-01		7.2E-01	2.5E+00	No
2-Amino-4,6-dinitrotoluene	35572-78-2	mg/kg	8/ 13	7.1E+00	1.0E-01	2.0E+00	1.7E+01	2.0E+00				Yes
4-Amino-2,6-dinitrotoluene	19406-51-0	mg/kg	6/ 13	7.9E+00	1.5E-01	8.4E-01	1.8E+01	8.4E-01				Yes
HMX	2691-41-0	mg/kg	2/ 13	1.4E+01	6.2E-01	8.1E+00	3.5E+01	8.1E+00		3.1E+02	3.1E+03	No
Nitrocellulose	9004-70-0	mg/kg	7/ 12	4.5E+00	7.0E-01	2.9E+01	8.7E+00	8.7E+00				Yes
RDX	121-82-4	mg/kg	4/ 13	1.9E+01	2.7E-01	5.8E+01	4.0E+01	4.0E+01		4.4E+00	1.6E+01	Yes
Metals												
Aluminum	7429-90-5	mg/kg	21/ 21	9.4E+03	4.9E+02	1.7E+04	1.1E+04	1.1E+04	2.0E+04	7.6E+03	9.2E+04	No
Antimony	7440-36-0	mg/kg	1/ 21	6.0E-01	6.6E-01	6.6E-01	6.1E-01	6.1E-01	9.6E-01	3.1E+00	4.1E+01	No
Arsenic	7440-38-2	mg/kg	21/ 21	1.0E+01	2.4E+00	1.7E+01	1.2E+01	1.2E+01	2.0E+01	3.9E-01	1.6E+00	No
Barium	7440-39-3	mg/kg	21/ 21	7.2E+01	7.1E+00	2.5E+02	1.1E+02	1.1E+02	1.2E+02	5.4E+02	6.7E+03	No
Beryllium	7440-41-7	mg/kg	13/ 21	4.2E-01	3.0E-01	1.5E+00	1.1E+00	1.1E+00	8.8E-01	1.5E+01	1.9E+02	No

Table A-6. Summary of COPC Screening for Load Line 1 Subsurface Soil (continued)

Analyte	Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria	Region 9 Residential PRG[a]	Region 9 Industrial [a]	COPC?
Cadmium	7440-43-9	mg/kg	8/ 21	1.3E+00	1.5E-01	9.9E+00	2.4E+00	2.4E+00		3.7E+00	4.5E+01	Yes
Calcium	7440-70-2	mg/kg	21/ 21	7.8E+03	2.8E+02	5.4E+04	2.9E+04	2.9E+04	3.6E+04	PRG		No
Chromium	7440-47-3	mg/kg	21/ 21	1.5E+01	1.5E+00	6.7E+01	2.0E+01	2.0E+01	2.7E+01	2.1E+02	4.5E+02	No
Chromium, hexavalent	18540-29-9	mg/kg	1/ 15	1.5E+00	1.4E+01	1.4E+01	3.0E+00	3.0E+00		2.2E+01	6.4E+01	No
Cobalt **CAS**	7440-48-4	mg/kg	21/ 21	6.5E+00	5.5E-01	1.9E+01	8.0E+00	8.0E+00	2.3E+01	1.4E+02	1.3E+03	No
Copper	7440-50-8	mg/kg	21/ 21	4.3E+01	2.5E+00	4.2E+02	7.9E+01	7.9E+01	3.2E+01	3.1E+02	4.1E+03	Yes
Cyanide	57-12-5	mg/kg	2/ 14	3.8E-01	6.3E-01	1.2E+00	5.0E-01	5.0E-01		1.2E+02	1.2E+03	No
Iron	7439-89-6	mg/kg	21/ 21	1.9E+04	2.5E+03	4.2E+04	2.3E+04	2.3E+04	3.5E+04	2.3E+03	3.1E+04	No
Lead	7439-92-1	mg/kg	21/ 21	6.0E+01	8.4E+00	2.5E+02	1.2E+02	1.2E+02	1.9E+01	4.0E+02	7.5E+02	No
Magnesium	7439-95-4	mg/kg	21/ 21	2.4E+03	1.1E+02	8.8E+03	5.2E+03	5.2E+03	8.8E+03			No
Manganese	7439-96-5	mg/kg	21/ 21	4.8E+02	5.1E+01	1.3E+03	8.2E+02	8.2E+02	3.0E+03	1.8E+02	1.9E+03	No
Mercury	7487-94-6	mg/kg	17/ 21	8.9E-02	1.5E-02	7.8E-01	1.5E-01	1.5E-01	4.4E-02	2.3E+00	3.1E+01	No
Nickel	7440-02-0	mg/kg	21/ 21	1.5E+01	1.4E+00	5.0E+01	1.9E+01	1.9E+01	6.1E+01	1.6E+02	2.0E+03	No
Potassium	7440-09-7	mg/kg	20/ 21	8.7E+02	2.0E+02	1.7E+03	1.0E+03	1.0E+03	3.4E+03			No
Selenium	7782-49-2	mg/kg	7/ 21	6.0E-01	5.3E-01	1.7E+00	8.0E-01	8.0E-01	1.5E+00	3.9E+01	5.1E+02	No
Sodium	7440-23-5	mg/kg	3/ 21	1.9E+02	7.9E+01	3.7E+02	2.4E+02	2.4E+02	1.5E+02			No
Thallium	6533-73-9	mg/kg	20/ 21	4.8E-01	2.5E-01	7.7E-01	5.7E-01	5.7E-01	9.1E-01	5.2E-01	6.7E+00	No
Vanadium	7440-62-2	mg/kg	21/ 21	1.6E+01	1.2E+00	3.4E+01	2.0E+01	2.0E+01	3.8E+01	5.5E+01	7.2E+02	No
Zinc	7440-66-6	mg/kg	20/ 20	1.2E+02	1.9E+01	4.0E+02	2.0E+02	2.0E+02	9.3E+01	2.3E+03	3.1E+04	No
Perimeter Area												
Metals												
Aluminum	7429-90-5	mg/kg	1/ 1	1.8E+04	1.8E+04	1.8E+04		1.8E+04	2.0E+04	7.6E+03	9.2E+04	No
Arsenic	7440-38-2	mg/kg	1/ 1	1.3E+01	1.3E+01	1.3E+01		1.3E+01	2.0E+01	3.9E-01	1.6E+00	No
Barium	7440-39-3	mg/kg	1/ 1	7.4E+01	7.4E+01	7.4E+01		7.4E+01	1.2E+02	5.4E+02	6.7E+03	No
Beryllium	7440-41-7	mg/kg	1/ 1	5.5E-01	5.5E-01	5.5E-01		5.5E-01	8.8E-01	1.5E+01	1.9E+02	No
Calcium	7440-70-2	mg/kg	1/ 1	5.0E+02	5.0E+02	5.0E+02		5.0E+02	3.6E+04			No
Chromium	7440-47-3	mg/kg	1/ 1	2.3E+01	2.3E+01	2.3E+01		2.3E+01	2.7E+01	2.1E+02	4.5E+02	No
Cobalt	7440-48-4	mg/kg	1/ 1	7.2E+00	7.2E+00	7.2E+00		7.2E+00	2.3E+01	1.4E+02	1.3E+03	No
Copper	7440-50-8	mg/kg	1/ 1	1.9E+01	1.9E+01	1.9E+01		1.9E+01	3.2E+01	3.1E+02	4.1E+03	No
Iron	7439-89-6	mg/kg	1/ 1	2.9E+04	2.9E+04	2.9E+04		2.9E+04	3.5E+04	2.3E+03	3.1E+04	No
Lead	7439-92-1	mg/kg	1/ 1	1.3E+01	1.3E+01	1.3E+01		1.3E+01	1.9E+01	4.0E+02	7.5E+02	No
Magnesium	7439-95-4	mg/kg	1/ 1	3.1E+03	3.1E+03	3.1E+03		3.1E+03	8.8E+03			No
Manganese	7439-96-5	mg/kg	1/ 1	1.7E+02	1.7E+02	1.7E+02		1.7E+02	3.0E+03	1.8E+02	1.9E+03	No
Nickel	7440-02-0	mg/kg	1/ 1	2.1E+01	2.1E+01	2.1E+01		2.1E+01	6.1E+01	1.6E+02	2.0E+03	No

Table A-6. Summary of COPC Screening for Load Line 1 Subsurface Soil (continued)

Analyte	Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	Site Backgd. Criteria	Region 9 Residential PRG[a]	Region 9 Industrial [a]	COPC?
Potassium	7440-09-7	mg/kg	1/ 1	2.3E+03	2.3E+03	2.3E+03		2.3E+03	3.4E+03			No
Thallium	6533-73-9	mg/kg	1/ 1	6.4E-01	6.4E-01	6.4E-01		6.4E-01	9.1E-01	5.2E-01	6.7E+00	No
Vanadium	7440-62-2	mg/kg	1/ 1	3.1E+01	3.1E+01	3.1E+01		3.1E+01	3.8E+01	5.5E+01	7.2E+02	No
Zinc	7440-66-6	mg/kg	1/ 1	5.5E+01	5.5E+01	5.5E+01		5.5E+01	9.3E+01	2.3E+03	3.1E+04	No

PRG

CAS

[a] Value is Region 9 PRG for a cancer risk level of 1E-06 or a non-cancer hazard quotient of 0.1, whichever is lower.
CAS = Chemical Abstracts Service.
COPC = Contaminant of potential concern.
HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.
PRG = Preliminary remediation goal.
RDX = = Hexahydro-1,3,5-trinitro-1,3,5-triazine.
UCL = Upper confidence level.

Table A-7. Chemical-specific Exposure Parameters

Analyte	Dermal Absorption Factor[a] (unitless)	Permeability Constant[b] (cm/h)	Volatilization Factor[c] (m^3/kg)	Fish Biotransfer Factor[b] (L/kg)
Aluminum	0.001	2.14E-03		3.2
Antimony	0.001	1.09E-03		3.2
Arsenic	0.03	1.93E-03		3.2
Barium	0.001	4.03E-04		3.2
Cadmium	0.001	3.50E-04		3.2
Chromium (as Chromium III)	0.001	1.00E-03		200
Copper	0.001	3.07E-04		3.2
Manganese	0.001	1.28E-03		3.2
Mercury	0.001	2.94E-05		100
Nickel	0.001	3.29E-04		3.2
Thallium (as Thallium carbomate)	0.001	1.57E-04		3.2
Vanadium	0.001	1.35E-03		3.2
Zinc	0.001	3.42E-04		3.2
1,3-Dinitrobenzene	0.1	2.05E-03		2.8
2,4,6-Trinitrotoluene	0.1	1.07E-03		3.4
2,4-Dinitrotoluene	0.1	3.76E-03		6.7
2,6-Dinitrotoluene	0.1	4.57E-03		8.3
4,4'-DDE	0.1	9.16E-01		21,000
Benz(*a*)anthracene	0.13	9.48E-01		5,400
Benzo(*a*)pyrene	0.13	1.24E+00		11,000
Benzo(*b*)fluoranthene	0.13	6.99E-01		5,600
Dibenz(*a*,*h*)anthracene	0.13	1.68E+00		22,000
Dieldrin	0.1	4.45E-02		2,000
Endrin Aldehyde (as Endrin)	0.1	4.45E-02		2,000
Heptachlor	0.1	2.16E-01		9,900
Indeno(1,2,3-*cd*)pyrene	0.13	2.23E+00		29,000
PCB-1254	0.14	1.29E+00		140,000
RDX	0.1	3.49E-04		3.2
gamma-Chlordane (as Chlordane)	0.04	1.57E-01		12,000

[a]Chemical-specific absorption factor values are from U.S. Environmental Protection Agency (EPA) Region V (EPA 2000). When chemical-specific values are not available, the following default values are used: semivolatile organic compounds = 0.1, volatile organic compounds (VOCs) = 0.01, and inorganics = 0.001 per EPA Region 4 Supplemental Guidance to RAGS.
[b]From Risk Assessment Information System (RAIS) http://risk.lsd.ornl.gov/tox/tox_values.shtml.
[c]Volatilization factors (VFs) are calculated using the 1996 EPA Soil Screening Guidance Methodology, using site-specific parameter values for Cleveland, OH, and they are only used for VOCs. However, there are no VOCs that are chemicals of potential concern; therefore, no VF values are shown.
DDE = Dichlorodiphenyldichloroethylene.
PCB = Polychlorinated biphenyl.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.

Table A-8. Non-carcinogenic Reference Doses for Load Line 1 Risk Characterization

Analyte	Oral Chronic RfD (mg/(kg-d)	Confidence Level	% GI Absorption[a]	Dermal Chronic RfD (mg/(kg-d)	Inhalation Chronic RfD (mg/(kg-d)	RfD Basis (vehicle)	Critical Effect	Uncertainty/ Modifying Factor
Aluminum	1.0E+00	NA	1	1.0E+00	1.4E-03	NA		
Antimony	4.0E-04	Low	0.15	6.0E-05		Oral, oral-water	Gastrointestinal, liver, cardiovascular, and developmental toxicity	(O) UF = 1,000
Arsenic	3.0E-04	Medium (O)	0.95	3.0E-04		Oral, oral-water	Hyperpigmentation and keritosis and possible vascular complication	(O) UF = 3
Barium	7.0E-02	Medium (O)	0.07	4.9E-03	1.4E-04	Oral, oral-water, inhalation	(O) increased blood pressure (human)	(O) UF = 3
							(I) baritosis (human)	(1) UF = 1,000
Cadmium (food)	1.0E-03	High	0.025	2.5E-05		Oral, oral-water	Renal toxicity, osteomalacia, osteoporosis, and significant proteinuria	(O) UF = 1,000
Cadmium (soil)	1.0E-03	High	0.025	2.5E-05		Oral, oral-water	Renal toxicity, osteomalacia, osteoporosis, and significant proteinuria	(O) UF = 1,000
Cadmium (water)	5.0E-04	High	0.05	2.5E-05		Oral, oral-water	Renal toxicity, osteomalacia, osteoporosis, and significant proteinuria	(O) UF = 1,000
Chromium (as CrIII)	1.5E+00	Low (O)	0.013	2.0E-02		Oral (rat)	Reduced liver/spleen weight	(O) UF = 100
Copper	4.0E-02	NA	1	4.0E-02		NA		
Manganese (food)	1.4E-01	NA	0.04	5.6E-03	1.4E-05	Oral: water, inhalation	(O) lethargy, tremors, mental disturbance, muscle tonus, and central nervous system effects	(O) UF = 1 (O) MF = 3 (I) UF = 1,000
Manganese (soil and water)	4.6E-02	NA	0.04	1.8E-03	1.4E-05	Oral: water, inhalation	(O) lethargy, tremors, mental disturbance, muscle tonus, and central nervous system effects	(O) UF = 1 (O) MF = 3 (I) UF = 1,000
Mercury	3.0E-04	Low (O)	0.07	2.1E-05		Oral: diet (mouse)	(O) None	(O) UF = 300
		Medium (I)				Inhalation: (human)	(I) Neurotoxicity (human)	(I) UF = 30
Nickel	2.0E-02	Medium	0.04	8.0E-04		Oral: diet (rat)	Decreased body and major organ weights (rat)	UF = 100
Thallium (as Thallium carbomate)	8.0E-05	Low	1	8.0E-05		Oral (rat)	Increased levels of SGOT and LDH	UF = 3,000
Vanadium	7.0E-03	Low	0.026	1.8E-04		Oral (rat)	Decreased hair cystine	UF = 100
Zinc	3.0E-01	Medium	0.3	9.0E-02		Oral	(O) copper deficiency and hypochromic microcytic anemia (human)	UF = 100
							(I) pulmonary and gastrointestinal effects (human)	

Table A-8. Noncarcinogenic Reference Doses for Load Line 1 Risk Characterization (continued)

Analyte	Oral Chronic RfD (mg/(kg-d)	Confidence Level	% GI Absorption[a]	Dermal Chronic RfD (mg/(kg-d)	Inhalation Chronic RfD (mg/(kg-d)	RfD Basis (vehicle)	Critical Effect	Uncertainty/ Modifying Factor
1,3-Dinitrobenzene	1.0E-04	Low	1	1.0E-04		Oral (rat)	Increased spleen weight	UF = 3,000
2,4,6-Trinitrotoluene	5.0E-04	Medium	1	5.0E-04		Oral (dog)	Liver effects	UF = 1,000
2,4-Dinitrotoluene	2.0E-03	High	1	2.0E-03		Oral (dog)	Neurotoxicity, biliary tract hyperplasia	UF = 100
2,6-Dinitrotoluene	1.0E-03	High	1	1.0E-03		Oral (dog)	Neurotoxicity, biliary tract hyperplasia	UF = 100
Dieldrin	5.0E-05	Medium	1	5.0E-05		Oral: diet (rat)	Liver lesions (rat)	UF = 100
Endrin Aldehyde (as Endrin)	3.0E-04	Medium	1	3.0E-04		Oral (dog)	Histological liver lesions	UF = 100
Heptachlor	5.0E-04	Low	1	5.0E-04		Oral (rat)	Liver weight increase	UF = 300
PCB-1254	2.0E-05	NA	0.8	2.0E-05		Oral: capsule (monkey)	Immune system toxicity (monkey)	UF = 300
RDX	3.0E-03	High (O)	1	3.0E-03		Oral (rat)	Inflamed prostate	UF = 100
gamma-Chlordane (as Chlordane)	5.0E-04	Medium (O)	0.8	5.0E-04	2.0E-04	Oral (mouse)	Liver hypertrophy	(O) UF = 300

[a]% GI (gastrointestinal) absorption values from EPA 2000.
(I) indicates inhalation.
MF = Modifying factor (the default modifying factor is 1).
NA = Not available.
(O) indicates oral.
PCB = Polychlorinated biphenyl.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.
RfD = Reference dose.
UF = Uncertainty factor.

Table A-9. Cancer Slope Factors for Load Line 1 Risk Characterization

Analyte	Oral Slope Factor (mg/kg-d)[a]	% GI Absorption[a]	Dermal Slope Factor (mg/kg-d)[a]	Inhalation Slope Factor (mg/kg-d)[a]	EPA Class	TEF	Type of Cancer
Arsenic	1.5E+00	0.95	1.5E+00	1.5E+01	A		Respiratory system tumors
Cadmium (soil)		0.025		6.3E+00	B1		Respiratory tract and lung tumors
Cadmium (water)		0.05		6.3E+00	B1		Respiratory tract and lung tumors
2,4,6-Trinitrotoluene	3.0E-02	1	3.0E-02		C		Bladder transitional cell papilloma
2,4-Dinitrotoluene	6.8E-01	1	6.8E-01		B2		Liver carcinoma, mammary adenomas, fibromas (mouse)
2,6-Dinitrotoluene	6.8E-01	1	6.8E-01		B2		Liver carcinoma, mammary adenomas, fibromas (mouse)
4,4'-DDE	3.4E-01	1	3.4E-01		B2		Hepatocellular carcinoma (mouse)
Benz(*a*)anthracene	7.3E-01	0.58	7.3E-01	3.1E-01	B2	0.1	Stomach tunors (mouse)
Benzo(*a*)pyrene	7.3E+00	0.58	7.3E+00	3.1E+00	B2		Stomach, nasal cavity, larynx, tracheak, and pharynx
Benzo(*b*)fluoranthene	7.3E-01	0.58	7.3E-01	3.1E-01	B2	0.1	Tumors
Dibenz(*a,h*)anthracene	7.3E+00	0.58	7.3E+00	3.1E+00	B2	1.0	Immunodepressive effects (mouse)
Dieldrin	1.6E+01	1	1.6E+01	1.6E+01	B2		Liver carcinoma (mouse)
Heptachlor	4.5E+00	1	4.5E+00	4.6E+00	B2		Hepatocellular carcinoma (mouse)
Indeno(1,2,3-*cd*)pyrene	7.3E-01	0.58	7.3E-01	3.1E-01	B2	0.1	Tumors
PCB-1254	2.0E+00	0.8	2.0E+00	2.0E+00	B2		Liver hepatocellular adenomas, carcinomas, cholangiomas, or cholangiocarcinomas (rat)
RDX	1.1E-01	1	1.1E-01		C		Liver hepatocellular carcinomas/adenomas (mouse)
gamma-Chlordane (as Chlordane)	3.5E-01	0.8	3.5E-01	3.5E-01	B2		Hepatocellular carcinoma (mouse)

[a]% GI (gastrointestinal) absorption values from EPA 2000.
DDE = Dichlorodiphenyldichloroethylene.
EPA = U.S. Environmental Protection Agency.
PCB = Polychlorinated biphenyl.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.
TEF = Toxicity equivalence factor; based on the relative potency of each carcinogenic polycyclic aromatic hydrocarbon (PAH) relative to that of benzo(*a*)pyrene.

Table A-10. Load Line 1 Groundwater Hazards – Direct Contact

COPC	EPC (mg/L)	Daily Intake (mg/kg-d)			Hazard Quotient			Total HI Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
National Guard Trainee									
Arsenic	7.8E-03	2.4E-05	1.1E-07		8.0E-02	3.7E-04		8.0E-02	
Manganese	2.9E+00	9.0E-03	2.8E-05		1.9E-01	1.5E-02		2.1E-01	
Inorganics Pathway Total					2.7E-01	1.5E-02		2.9E-01	
2,4,6-Trinitrotoluene	5.4E-03	1.6E-05	4.3E-08		3.3E-02	8.5E-05		3.3E-02	
2,4-Dinitrotoluene	2.4E-03	7.2E-06	6.6E-08		3.6E-03	3.3E-05		3.6E-03	
2,6-Dinitrotoluene	1.5E-03	4.6E-06	5.1E-08		4.6E-03	5.1E-05		4.7E-03	
4,4'-DDE	3.4E-03	1.0E-05	2.3E-05						
RDX	1.4E-02	4.3E-05	3.6E-08		1.4E-02	1.2E-05		1.4E-02	
Organics Pathway Total					5.5E-02	1.8E-04		5.5E-02	
Pathway Total – Chemicals					3.3E-01	1.6E-02		3.5E-01	
Resident Farmer Adult									
Arsenic	7.8E-03	2.1E-04	1.0E-06		7.2E-01	3.4E-03		7.2E-01	
Manganese	2.9E+00	8.0E-02	2.5E-04		1.7E+00	1.4E-01		1.9E+00	H
Inorganics Pathway Total					2.5E+00	1.4E-01		2.6E+00	
2,4,6-Trinitrotoluene	5.4E-03	1.5E-04	3.8E-07		2.9E-01	7.6E-04		3.0E-01	
2,4-Dinitrotoluene	2.4E-03	6.5E-05	5.9E-07		3.2E-02	2.9E-04		3.3E-02	
2,6-Dinitrotoluene	1.5E-03	4.2E-05	4.6E-07		4.2E-02	4.6E-04		4.2E-02	
4,4'-DDE	3.4E-03	9.2E-05	2.1E-04						
RDX	1.4E-02	3.8E-04	3.2E-07		1.3E-01	1.1E-04		1.3E-01	
Organics Pathway Total					5.0E-01	1.6E-03		5.0E-01	
Pathway Total – Chemicals					3.0E+00	1.4E-01		3.1E+00	
Resident Farmer Child									
Arsenic	7.8E-03	7.5E-04	2.1E-06		2.5E+00	7.0E-03		2.5E+00	H
Manganese	2.9E+00	2.8E-01	5.2E-04		6.1E+00	2.8E-01		6.4E+00	H
Inorganics Pathway Total					8.6E+00	2.9E-01		8.9E+00	
2,4,6-Trinitrotoluene	5.4E-03	5.2E-04	8.0E-07		1.0E+00	1.6E-03		1.0E+00	H
2,4-Dinitrotoluene	2.4E-03	2.3E-04	1.2E-06		1.1E-01	6.1E-04		1.1E-01	
2,6-Dinitrotoluene	1.5E-03	1.5E-04	9.6E-07		1.5E-01	9.6E-04		1.5E-01	
4,4'-DDE	3.4E-03	3.2E-04	4.3E-04						
RDX	1.4E-02	1.3E-03	6.7E-07		4.5E-01	2.2E-04		4.5E-01	
Organics Pathway Total					1.7E+00	3.4E-03		1.7E+00	
Pathway Total – Chemicals					1.0E+01	2.9E-01		1.1E+01	

[a] Chemicals of potential concern (COPCs) are identified as chemicals of concern (COCs) if the total hazard index (HI) across all pathways is > 1 (H).
DDE = Dichlorodiphenyldichloroethylene.
EPC = Exposure point concentration.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.

Table A-11. Load Line 1 Groundwater Risks – Direct Contact

COPC	EPC (mg/L)	Daily Intake (mg/kg-d)			Risk			Total Risk Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
National Guard Trainee									
Arsenic	7.8E-03	8.5E-06	4.0E-08		1.3E-05	6.0E-08		1.3E-05	R
Manganese	2.9E+00	3.2E-03	9.9E-06						
Inorganics Pathway Total					1.3E-05	6.0E-08		1.3E-05	
2,4,6-Trinitrotoluene	5.4E-03	5.9E-06	1.5E-08		1.8E-07	4.6E-10		1.8E-07	
2,4-Dinitrotoluene	2.4E-03	2.6E-06	2.3E-08		1.8E-06	1.6E-08		1.8E-06	R
2,6-Dinitrotoluene	1.5E-03	1.7E-06	1.8E-08		1.1E-06	1.2E-08		1.1E-06	R
4,4'-DDE	3.4E-03	3.7E-06	8.2E-06		1.3E-06	2.8E-06		4.0E-06	R
RDX	1.4E-02	1.5E-05	1.3E-08		1.7E-06	1.4E-09		1.7E-06	R
Organics Pathway Total					6.0E-06	2.8E-06		8.8E-06	
Pathway Total – Chemicals					1.9E-05	2.9E-06		2.2E-05	
Resident Farmer Adult									
Arsenic	7.8E-03	9.2E-05	4.3E-07		1.4E-04	6.5E-07		1.4E-04	R
Manganese	2.9E+00	3.4E-02	1.1E-04						
Inorganics Pathway Total					1.4E-04	6.5E-07		1.4E-04	
2,4,6-Trinitrotoluene	5.4E-03	6.3E-05	1.6E-07		1.9E-06	4.9E-09		1.9E-06	R
2,4-Dinitrotoluene	2.4E-03	2.8E-05	2.5E-07		1.9E-05	1.7E-07		1.9E-05	R
2,6-Dinitrotoluene	1.5E-03	1.8E-05	2.0E-07		1.2E-05	1.3E-07		1.2E-05	R
4,4'-DDE	3.4E-03	4.0E-05	8.8E-05		1.3E-05	3.0E-05		4.3E-05	R
RDX	1.4E-02	1.6E-04	1.4E-07		1.8E-05	1.5E-08		1.8E-05	R
Organics Pathway Total					6.4E-05	3.0E-05		9.5E-05	
Pathway Total – Chemicals					2.0E-04	3.1E-05		2.3E-04	
Resident Farmer Child									
Arsenic	7.8E-03	6.4E-05	1.8E-07		9.7E-05	2.7E-07		9.7E-05	R
Manganese	2.9E+00	2.4E-02	4.5E-05						
Inorganics Pathway Total					9.7E-05	2.7E-07		9.7E-05	
2,4,6-Trinitrotoluene	5.4E-03	4.4E-05	6.8E-08		1.3E-06	2.0E-09		1.3E-06	R
2,4-Dinitrotoluene	2.4E-03	1.9E-05	1.1E-07		1.3E-05	7.2E-08		1.3E-05	R
2,6-Dinitrotoluene	1.5E-03	1.2E-05	8.2E-08		8.5E-06	5.6E-08		8.6E-06	R
4,4'-DDE	3.4E-03	2.8E-05	3.7E-05		9.4E-06	1.2E-05		2.2E-05	R
RDX	1.4E-02	1.1E-04	5.8E-08		1.3E-05	6.3E-09		1.3E-05	R
Organics Pathway Total					4.5E-05	1.3E-05		5.8E-05	
Pathway Total – Chemicals					1.4E-04	1.3E-05		1.5E-04	

[a] Chemicals of potential concern (COPCs) are identified as chemicals of concern (COCs) if the total incremental lifetime cancer risk across all pathways is > 1E-06 (R).
DDE = Dichlorodiphenyldichloroethylene.
EPC = Exposure point concentration.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.

Table A-12. Load Line 1 Surface Water Hazards – Direct Contact

COPC	EPC (mg/L)	Daily Intake (mg/kg-d)		Hazard Quotient		Total HI Across all Pathways	COC[a]
		Ingestion	Dermal	Ingestion	Dermal		
Hunter/Trapper/Fisher							
Outlet C and Charlie's Pond							
Arsenic	3.1E-02	4.2E-07	3.9E-07	1.4E-03	1.3E-03	2.7E-03	
Chromium	2.4E-03	3.3E-08	1.6E-08	2.2E-08	8.0E-07	8.2E-07	
Inorganics Pathway Total				1.4E-03	1.3E-03	2.7E-03	
Pathway Total – Chemicals				1.4E-03	1.3E-03	2.7E-03	
Outlets D, E, and F and Criggy's Pond							
Arsenic	5.1E-03	7.0E-08	6.4E-08	2.3E-04	2.1E-04	4.5E-04	
Inorganics Pathway Total				2.3E-04	2.1E-04	4.5E-04	
Pathway Total – Chemicals				2.3E-04	2.1E-04	4.5E-04	
Dust/Fire Suppression							
Outlet C and Charlie's Pond							
Arsenic	3.1E-02	1.8E-06	4.6E-07	6.1E-03	1.5E-03	7.6E-03	
Chromium	2.4E-03	1.4E-07	1.9E-08	9.4E-08	9.5E-07	1.0E-06	
Inorganics Pathway Total				6.1E-03	1.5E-03	7.6E-03	
Pathway Total – Chemicals				6.1E-03	1.5E-03	7.6E-03	
Outlets D, E, and F and Criggy's Pond							
Arsenic	5.1E-03	3.0E-07	7.6E-08	1.0E-03	2.5E-04	1.3E-03	
Inorganics Pathway Total				1.0E-03	2.5E-04	1.3E-03	
Pathway Total – Chemicals				1.0E-03	2.5E-04	1.3E-03	
National Guard Trainee							
Outlet C and Charlie's Pond							
Arsenic	3.1E-02	4.7E-06	7.2E-06	1.6E-02	2.4E-02	4.0E-02	
Chromium	2.4E-03	3.7E-07	2.9E-07	2.4E-07	1.5E-05	1.5E-05	
Inorganics Pathway Total				1.6E-02	2.4E-02	4.0E-02	
Pathway Total – Chemicals				1.6E-02	2.4E-02	4.0E-02	
Outlets D,E,F and Criggy's Pond							
Arsenic	5.1E-03	7.8E-07	1.2E-06	2.6E-03	4.0E-03	6.6E-03	
Inorganics Pathway Total				2.6E-03	4.0E-03	6.6E-03	
Pathway Total – Chemicals				2.6E-03	4.0E-03	6.6E-03	
Resident Farmer Adult							
Outlet C and Charlie's Pond							
Arsenic	3.1E-02	4.2E-05	1.2E-05	1.4E-01	3.9E-02	1.8E-01	
Chromium	2.4E-03	3.3E-06	4.7E-07	2.2E-06	2.4E-05	2.6E-05	
Inorganics Pathway Total				1.4E-01	3.9E-02	1.8E-01	
Pathway Total – Chemicals				1.4E-01	3.9E-02	1.8E-01	
Outlets D, E, and F and Criggy's Pond							
Arsenic	5.1E-03	7.0E-06	1.9E-06	2.3E-02	6.4E-03	3.0E-02	
Inorganics Pathway Total				2.3E-02	6.4E-03	3.0E-02	
Pathway Total – Chemicals				2.3E-02	6.4E-03	3.0E-02	
Resident Farmer Child							
Outlet C and Charlie's Pond							
Arsenic	3.1E-02	2.0E-04	2.1E-05	6.6E-01	7.0E-02	7.3E-01	
Chromium	2.4E-03	1.5E-05	8.4E-07	1.0E-05	4.3E-05	5.4E-05	
Inorganics Pathway Total				6.6E-01	7.0E-02	7.3E-01	
Pathway Total – Chemicals				6.6E-01	7.0E-02	7.3E-01	

Table A-12. Load Line 1 Surface Water Hazards – Direct Contact (continued)

COPC	EPC (mg/L)	Daily Intake (mg/kg-d)		Hazard Quotient		Total HI Across all Pathways	COC[a]
		Ingestion	Dermal	Ingestion	Dermal		
Outlets D, E, and F and Criggy's Pond							
Arsenic	5.1E-03	3.3E-05	3.5E-06	1.1E-01	1.2E-02	1.2E-01	
Inorganics Pathway Total				1.1E-01	1.2E-02	1.2E-01	
Pathway Total – Chemicals				1.1E-01	1.2E-02	1.2E-01	

[a] Chemicals of potential concern (COPCs) are identified as chemicals of concern (COCs) if the total hazard index (HI) across all pathways is > 1 (H).
EPC = Exposure point concentration.

Table A-13. Load Line 1 Surface Water Risks – Direct Contact

COPC	EPC (mg/L)	Daily Intake (mg/kg-d)		Risk		Total Risk Across all Pathways	COC[a]
		Ingestion	Dermal	Ingestion	Dermal		
Hunter/Trapper/Fisher							
Outlet C and Charlie's Pond							
Arsenic	3.1E-02	1.8E-07	1.7E-07	2.7E-07	2.5E-07	5.2E-07	
Chromium	2.4E-03	1.4E-08	6.7E-09				
Inorganics Pathway Total				2.7E-07	2.5E-07	5.2E-07	
Pathway Total – Chemicals				2.7E-07	2.5E-07	5.2E-07	
Outlets D, E, and F and Criggy's Pond							
Arsenic	5.1E-03	3.0E-08	2.7E-08	4.5E-08	4.1E-08	8.6E-08	
Inorganics Pathway Total				4.5E-08	4.1E-08	8.6E-08	
Pathway Total – Chemicals				4.5E-08	4.1E-08	8.6E-08	
Dust/Fire Suppression							
Outlet C and Charlie's Pond							
Arsenic	3.1E-02	6.5E-07	1.7E-07	9.7E-07	2.5E-07	1.2E-06	R
Chromium	2.4E-03	5.0E-08	6.6E-09				
Inorganics Pathway Total				9.7E-07	2.5E-07	1.2E-06	
Pathway Total – Chemicals				9.7E-07	2.5E-07	1.2E-06	
Outlets D, E, and F and Criggy's Pond							
Arsenic	5.1E-03	1.1E-07	2.7E-08	1.6E-07	4.1E-08	2.0E-07	
Inorganics Pathway Total				1.6E-07	4.1E-08	2.0E-07	
Pathway Total – Chemicals				1.6E-07	4.1E-08	2.0E-07	
National Guard Trainee							
Outlet C and Charlie's Pond							
Arsenic	3.1E-02	1.7E-06	2.6E-06	2.5E-06	3.9E-06	6.4E-06	R
Chromium	2.4E-03	1.3E-07	1.0E-07				
Inorganics Pathway Total				2.5E-06	3.9E-06	6.4E-06	
Pathway Total – Chemicals				2.5E-06	3.9E-06	6.4E-06	
Outlets D, E, and F and Criggy's Pond							
Arsenic	5.1E-03	2.8E-07	4.2E-07	4.2E-07	6.4E-07	1.1E-06	R
Inorganics Pathway Total				4.2E-07	6.4E-07	1.1E-06	
Pathway Total – Chemicals				4.2E-07	6.4E-07	1.1E-06	
Resident Farmer Adult							
Outlet C and Charlie's Pond							
Arsenic	3.1E-02	1.8E-05	5.0E-06	2.7E-05	7.5E-06	3.5E-05	R
Chromium	2.4E-03	1.4E-06	2.0E-07				
Inorganics Pathway Total				2.7E-05	7.5E-06	3.5E-05	
Pathway Total – Chemicals				2.7E-05	7.5E-06	3.5E-05	
Outlets D, E, and F and Criggy's Pond							
Arsenic	5.1E-03	3.0E-06	8.2E-07	4.5E-06	1.2E-06	5.7E-06	R
Inorganics Pathway Total				4.5E-06	1.2E-06	5.7E-06	
Pathway Total – Chemicals				4.5E-06	1.2E-06	5.7E-06	
Resident Farmer Child							
Outlet C and Charlie's Pond							
Arsenic	3.1E-02	1.7E-05	1.8E-06	2.5E-05	2.7E-06	2.8E-05	R
Chromium	2.4E-03	1.3E-06	7.2E-08				
Inorganics Pathway Total				2.5E-05	2.7E-06	2.8E-05	
Pathway Total – Chemicals				2.5E-05	2.7E-06	2.8E-05	

Table A-13. Load Line 1 Surface Water Risks – Direct Contact (continued)

COPC	EPC (mg/L)	Daily Intake (mg/kg-d)		Risk		Total Risk Across all Pathways	COC[a]
		Ingestion	Dermal	Ingestion	Dermal		
Outlets D, E , and F and Criggy's Pond							
Arsenic	5.1E-03	2.8E-06	3.0E-07	4.2E-06	4.4E-07	4.6E-06	R
Inorganics Pathway Total				4.2E-06	4.4E-07	4.6E-06	
Pathway Total – Chemicals				4.2E-06	4.4E-07	4.6E-06	

[a] Chemical of potential concern (COPCs) are identified as chemicals of concern (COCs) if the total incremental lifetime cancer risk across all pathways is > 1E-06 (R).
EPC = Exposure point concentration.

Table A-14. Load Line 1 Sediment Hazards – Direct Contact

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Hazard Quotient			Total HI Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
Hunter/Trapper/Fisher									
Outlet C and Charlie's Pond									
Arsenic	2.5E+01	1.3E-07	3.2E-07	2.8E-11	4.3E-04	1.1E-03		1.5E-03	
Manganese	2.4E+03	1.2E-05	1.0E-06	2.7E-09	2.7E-04	5.5E-04	1.9E-04	1.0E-03	
Inorganics Pathway Total					7.0E-04	1.6E-03	1.9E-04	2.5E-03	
Benzo(*a*)pyrene	8.4E-02	4.4E-10	4.7E-09	9.5E-14					
PCB-1254	8.7E-01	4.5E-09	5.2E-08	9.8E-13	2.3E-04	2.6E-03		2.8E-03	
Organics Pathway Total					2.3E-04	2.6E-03		2.8E-03	
Pathway Total – Chemicals					9.3E-04	4.2E-03	1.9E-04	5.3E-03	
Outlets A and B									
Aluminum	1.3E+04	6.9E-05	5.6E-06	1.5E-08	6.9E-05	5.6E-06	1.0E-05	8.5E-05	
Antimony	4.6E+00	2.4E-08	2.0E-09	5.2E-12	6.0E-05	3.3E-05		9.3E-05	
Arsenic	1.8E+01	9.1E-08	2.2E-07	2.0E-11	3.0E-04	7.5E-04		1.1E-03	
Cadmium	1.5E+01	7.8E-08	6.4E-09	1.7E-11	7.8E-05	2.6E-04		3.3E-04	
Copper	1.6E+02	8.2E-07	6.7E-08	1.8E-10	2.0E-05	1.7E-06		2.2E-05	
Thallium	8.9E-01	4.6E-09	3.8E-10	1.0E-12	5.8E-05	4.7E-06		6.3E-05	
Zinc	1.0E+03	5.2E-06	4.3E-07	1.1E-09	1.7E-05	4.8E-06		2.2E-05	
Inorganics Pathway Total					6.1E-04	1.1E-03	1.0E-05	1.7E-03	
2,4-Dinitrotoluene	2.0E+00	1.0E-08	8.5E-08	2.3E-12	5.2E-06	4.3E-05		4.8E-05	
Benz(*a*)anthracene	9.2E+00	4.8E-08	5.1E-07	1.0E-11					
Benzo(*a*)pyrene	9.5E+00	5.0E-08	5.3E-07	1.1E-11					
Benzo(*b*)fluoranthene	1.2E+01	6.3E-08	6.7E-07	1.4E-11					
Dibenz(*a*,*h*)anthracene	1.7E+00	8.9E-09	9.4E-08	1.9E-12					
Indeno(1,2,3-*cd*)pyrene	6.7E+00	3.5E-08	3.7E-07	7.6E-12					
PCB-1254	6.1E-01	3.2E-09	3.6E-08	6.9E-13	1.6E-04	1.8E-03		2.0E-03	
Organics Pathway Total					1.6E-04	1.9E-03		2.0E-03	
Pathway Total – Chemicals					7.7E-04	2.9E-03	1.0E-05	3.7E-03	
Outlets D, E, and F and Criggy's Pond									
Antimony	5.9E+02	3.1E-06	2.5E-07	6.7E-10	7.8E-03	4.2E-03		1.2E-02	
Arsenic	2.1E+01	1.1E-07	2.7E-07	2.3E-11	3.6E-04	8.9E-04		1.2E-03	
Copper	1.0E+03	5.3E-06	4.4E-07	1.2E-09	1.3E-04	1.1E-05		1.4E-04	
Manganese	3.4E+03	1.8E-05	1.4E-06	3.8E-09	3.8E-04	7.9E-04	2.7E-04	1.4E-03	
Inorganics Pathway Total					8.6E-03	5.9E-03	2.7E-04	1.5E-02	
Pathway Total – Chemicals					8.6E-03	5.9E-03	2.7E-04	1.5E-02	
Dust/Fire Suppression									
Outlet C and Charlie's Pond									
Arsenic	2.5E+01	2.4E-07	4.4E-07	1.2E-10	8.1E-04	1.5E-03		2.3E-03	
Manganese	2.4E+03	2.3E-05	1.4E-06	1.1E-08	5.0E-04	7.4E-04	7.7E-04	2.0E-03	
Inorganics Pathway Total					1.3E-03	2.2E-03	7.7E-04	4.3E-03	
Benzo(*a*)pyrene	8.4E-02	8.2E-10	6.3E-09	4.0E-13					
PCB-1254	8.7E-01	8.5E-09	7.1E-08	4.1E-12	4.3E-04	3.5E-03		4.0E-03	
Organics Pathway Total					4.3E-04	3.5E-03		4.0E-03	
Pathway Total – Chemicals					1.7E-03	5.7E-03	7.7E-04	8.2E-03	
Outlets A and B									
Aluminum	1.3E+04	1.3E-04	7.6E-06	6.2E-08	1.3E-04	7.6E-06	4.3E-05	1.8E-04	
Antimony	4.6E+00	4.5E-08	2.7E-09	2.2E-11	1.1E-04	4.5E-05		1.6E-04	
Arsenic	1.8E+01	1.7E-07	3.1E-07	8.2E-11	5.7E-04	1.0E-03		1.6E-03	
Cadmium	1.5E+01	1.5E-07	8.7E-09	7.1E-11	1.5E-04	3.5E-04		5.0E-04	
Copper	1.6E+02	1.5E-06	9.1E-08	7.3E-10	3.8E-05	2.3E-06		4.0E-05	
Thallium	8.9E-01	8.7E-09	5.2E-10	4.2E-12	1.1E-04	6.5E-06		1.2E-04	
Zinc	1.0E+03	9.8E-06	5.8E-07	4.7E-09	3.3E-05	6.5E-06		3.9E-05	

Table A-14. Load Line 1 Sediment Hazards – Direct Contact (continued)

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Hazard Quotient			Total HI Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
Inorganics Pathway Total					1.1E-03	1.4E-03	4.3E-05	2.6E-03	
2,4-Dinitrotoluene	2.0E+00	2.0E-08	1.2E-07	9.4E-12	9.8E-06	5.8E-05		6.8E-05	
Benz(*a*)anthracene	9.2E+00	9.0E-08	7.0E-07	4.3E-11					
Benzo(*a*)pyrene	9.5E+00	9.3E-08	7.2E-07	4.5E-11					
Benzo(*b*)fluoranthene	1.2E+01	1.2E-07	9.1E-07	5.6E-11					
Dibenz(*a*,*h*)anthracene	1.7E+00	1.7E-08	1.3E-07	8.0E-12					
Indeno(1,2,3-*cd*)pyrene	6.7E+00	6.6E-08	5.1E-07	3.2E-11					
PCB-1254	6.1E-01	6.0E-09	5.0E-08	2.9E-12	3.0E-04	2.5E-03		2.8E-03	
Organics Pathway Total					3.1E-04	2.5E-03		2.8E-03	
Pathway Total – Chemicals					1.4E-03	4.0E-03	4.3E-05	5.5E-03	
Outlets D, E, and F and Criggy's Pond									
Antimony	5.9E+02	5.8E-06	3.5E-07	2.8E-09	1.5E-02	5.8E-03		2.0E-02	
Arsenic	2.1E+01	2.0E-07	3.6E-07	9.8E-11	6.8E-04	1.2E-03		1.9E-03	
Copper	1.0E+03	1.0E-05	5.9E-07	4.8E-09	2.5E-04	1.5E-05		2.6E-04	
Manganese	3.4E+03	3.3E-05	2.0E-06	1.6E-08	7.2E-04	1.1E-03	1.1E-03	2.9E-03	
Inorganics Pathway Total					1.6E-02	8.0E-03	1.1E-03	2.5E-02	
Pathway Total – Chemicals					1.6E-02	8.0E-03	1.1E-03	2.5E-02	
National Guard Trainee									
Outlet C and Charlie's Pond									
Arsenic	2.5E+01	3.8E-06	1.1E-06	1.0E-06	1.3E-02	3.8E-03		1.6E-02	
Manganese	2.4E+03	3.6E-04	3.6E-06	9.6E-05	7.8E-03	1.9E-03	6.7E+00	6.7E+00	H
Inorganics Pathway Total					2.0E-02	5.7E-03	6.7E+00	6.7E+00	
Benzo(*a*)pyrene	8.4E-02	1.3E-08	1.7E-08	3.4E-09					
PCB-1254	8.7E-01	1.3E-07	1.8E-07	3.5E-08	6.6E-03	9.2E-03		1.6E-02	
Organics Pathway Total					6.6E-03	9.2E-03		1.6E-02	
Pathway Total – Chemicals					2.7E-02	1.5E-02	6.7E+00	6.7E+00	
Outlets A and B									
Aluminum	1.3E+04	2.0E-03	2.0E-05	5.3E-04	2.0E-03	2.0E-05	3.7E-01	3.8E-01	
Antimony	4.6E+00	7.1E-07	7.0E-09	1.9E-07	1.8E-03	1.2E-04		1.9E-03	
Arsenic	1.8E+01	2.7E-06	7.9E-07	7.1E-07	8.9E-03	2.6E-03		1.2E-02	
Cadmium	1.5E+01	2.3E-06	2.3E-08	6.1E-07	2.3E-03	9.1E-04		3.2E-03	
Copper	1.6E+02	2.4E-05	2.4E-07	6.4E-06	6.0E-04	5.9E-06		6.0E-04	
Thallium	8.9E-01	1.4E-07	1.3E-09	3.6E-08	1.7E-03	1.7E-05		1.7E-03	
Zinc	1.0E+03	1.5E-04	1.5E-06	4.1E-05	5.1E-04	1.7E-05		5.3E-04	
Inorganics Pathway Total					1.8E-02	3.7E-03	3.7E-01	4.0E-01	
2,4-Dinitrotoluene	2.0E+00	3.1E-07	3.0E-07	8.1E-08	1.5E-04	1.5E-04		3.0E-04	
Benz(*a*)anthracene	9.2E+00	1.4E-06	1.8E-06	3.7E-07					
Benzo(*a*)pyrene	9.5E+00	1.5E-06	1.9E-06	3.9E-07					
Benzo(*b*)fluoranthene	1.2E+01	1.8E-06	2.4E-06	4.9E-07					
Dibenz(*a*,*h*)anthracene	1.7E+00	2.6E-07	3.3E-07	6.9E-08					
Indeno(1,2,3-*cd*)pyrene	6.7E+00	1.0E-06	1.3E-06	2.7E-07					
PCB-1254	6.1E-01	9.3E-08	1.3E-07	2.5E-08	4.7E-03	6.5E-03		1.1E-02	
Organics Pathway Total					4.8E-03	6.6E-03		1.1E-02	
Pathway Total – Chemicals					2.3E-02	1.0E-02	3.7E-01	4.1E-01	
Outlets D, E, and F and Criggy's Pond									
Antimony	5.9E+02	9.1E-05	9.0E-07	2.4E-05	2.3E-01	1.5E-02		2.4E-01	
Arsenic	2.1E+01	3.2E-06	9.4E-07	8.4E-07	1.1E-02	3.1E-03		1.4E-02	
Copper	1.0E+03	1.6E-04	1.5E-06	4.1E-05	3.9E-03	3.9E-05		3.9E-03	
Manganese	3.4E+03	5.2E-04	5.1E-06	1.4E-04	1.1E-02	2.8E-03	9.6E+00	9.6E+00	H
Inorganics Pathway Total					2.5E-01	2.1E-02	9.6E+00	9.9E+00	
Pathway Total – Chemicals					2.5E-01	2.1E-02	9.6E+00	9.9E+00	

Table A-14. Load Line 1 Sediment Hazards – Direct Contact (continued)

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Hazard Quotient			Total HI Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
Resident Farmer Adult									
Outlet C and Charlie's Pond									
Arsenic	2.5E+01	3.4E-05	2.3E-05	7.4E-09	1.1E-01	7.8E-02		1.9E-01	
Manganese	2.4E+03	3.2E-03	7.3E-05	7.0E-07	7.0E-02	4.0E-02	4.9E-02	1.6E-01	
Inorganics Pathway Total					1.8E-01	1.2E-01	4.9E-02	3.5E-01	
Benzo(*a*)pyrene	8.4E-02	1.2E-07	3.4E-07	2.5E-11					
PCB-1254	8.7E-01	1.2E-06	3.8E-06	2.6E-10	6.0E-02	1.9E-01		2.5E-01	
Organics Pathway Total					6.0E-02	1.9E-01		2.5E-01	
Pathway Total – Chemicals					2.4E-01	3.1E-01	4.9E-02	6.0E-01	
Outlets A and B									
Aluminum	1.3E+04	1.8E-02	4.1E-04	3.9E-06	1.8E-02	4.1E-04	2.7E-03	2.1E-02	
Antimony	4.6E+00	6.3E-06	1.4E-07	1.4E-09	1.6E-02	2.4E-03		1.8E-02	
Arsenic	1.8E+01	2.4E-05	1.6E-05	5.2E-09	8.0E-02	5.5E-02		1.3E-01	
Cadmium	1.5E+01	2.1E-05	4.7E-07	4.4E-09	2.1E-02	1.9E-02		3.9E-02	
Copper	1.6E+02	2.1E-04	4.9E-06	4.6E-08	5.3E-03	1.2E-04		5.5E-03	
Thallium	8.9E-01	1.2E-06	2.8E-08	2.6E-10	1.5E-02	3.5E-04		1.6E-02	
Zinc	1.0E+03	1.4E-03	3.1E-05	3.0E-07	4.6E-03	3.5E-04		4.9E-03	
Inorganics Pathway Total					1.6E-01	7.7E-02	2.7E-03	2.4E-01	
2,4-Dinitrotoluene	2.0E+00	2.7E-06	6.2E-06	5.9E-10	1.4E-03	3.1E-03		4.5E-03	
Benz(*a*)anthracene	9.2E+00	1.3E-05	3.7E-05	2.7E-09					
Benzo(*a*)pyrene	9.5E+00	1.3E-05	3.9E-05	2.8E-09					
Benzo(*b*)fluoranthene	1.2E+01	1.6E-05	4.9E-05	3.6E-09					
Dibenz(*a*,*h*)anthracene	1.7E+00	2.3E-06	6.9E-06	5.0E-10					
Indeno(1,2,3-*cd*)pyrene	6.7E+00	9.2E-06	2.7E-05	2.0E-09					
PCB-1254	6.1E-01	8.4E-07	2.7E-06	1.8E-10	4.2E-02	1.3E-01		1.8E-01	
Organics Pathway Total					4.3E-02	1.4E-01		1.8E-01	
Pathway Total – Chemicals					2.0E-01	2.1E-01	2.7E-03	4.2E-01	
Outlets D, E, and F and Criggy's Pond									
Antimony	5.9E+02	8.1E-04	1.9E-05	1.8E-07	2.0E+00	3.1E-01		2.3E+00	H
Arsenic	2.1E+01	2.8E-05	1.9E-05	6.2E-09	9.5E-02	6.5E-02		1.6E-01	
Copper	1.0E+03	1.4E-03	3.2E-05	3.0E-07	3.5E-02	8.0E-04		3.6E-02	
Manganese	3.4E+03	4.6E-03	1.1E-04	1.0E-06	1.0E-01	5.7E-02	7.0E-02	2.3E-01	
Inorganics Pathway Total					2.3E+00	4.3E-01	7.0E-02	2.8E+00	
Pathway Total – Chemicals					2.3E+00	4.3E-01	7.0E-02	2.8E+00	
Resident Farmer Child									
Outlet C and Charlie's Pond									
Arsenic	2.5E+01	3.2E-04	2.1E-05	1.7E-08	1.1E+00	7.0E-02		1.1E+00	H
Manganese	2.4E+03	3.0E-02	6.6E-05	1.6E-06	6.5E-01	3.6E-02	1.1E-01	8.0E-01	
Inorganics Pathway Total					1.7E+00	1.1E-01	1.1E-01	1.9E+00	
Benzo(*a*)pyrene	8.4E-02	1.1E-06	3.1E-07	5.8E-11					
PCB-1254	8.7E-01	1.1E-05	3.4E-06	6.0E-10	5.6E-01	1.7E-01		7.3E-01	
Organics Pathway Total					5.6E-01	1.7E-01		7.3E-01	
Pathway Total – Chemicals					2.3E+00	2.8E-01	1.1E-01	2.7E+00	
Outlets A and B									
Aluminum	1.3E+04	1.7E-01	3.7E-04	9.1E-06	1.7E-01	3.7E-04	6.4E-03	1.7E-01	
Antimony	4.6E+00	5.9E-05	1.3E-07	3.2E-09	1.5E-01	2.2E-03		1.5E-01	
Arsenic	1.8E+01	2.2E-04	1.5E-05	1.2E-08	7.5E-01	4.9E-02		8.0E-01	
Cadmium	1.5E+01	1.9E-04	4.2E-07	1.0E-08	1.9E-01	1.7E-02		2.1E-01	
Copper	1.6E+02	2.0E-03	4.4E-06	1.1E-07	5.0E-02	1.1E-04		5.0E-02	
Thallium	8.9E-01	1.1E-05	2.5E-08	6.1E-10	1.4E-01	3.1E-04		1.4E-01	
Zinc	1.0E+03	1.3E-02	2.8E-05	6.9E-07	4.3E-02	3.1E-04		4.3E-02	
Inorganics Pathway Total					1.5E+00	6.9E-02	6.4E-03	1.6E+00	
2,4-Dinitrotoluene	2.0E+00	2.6E-05	5.6E-06	1.4E-09	1.3E-02	2.8E-03		1.6E-02	
Benz(*a*)anthracene	9.2E+00	1.2E-04	3.4E-05	6.4E-09					

Table A-14. Load Line 1 Sediment Hazards – Direct Contact (continued)

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Hazard Quotient			Total HI Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
Benzo(*a*)pyrene	9.5E+00	1.2E-04	3.5E-05	6.6E-09					
Benzo(*b*)fluoranthene	1.2E+01	1.5E-04	4.4E-05	8.3E-09					
Dibenz(*a*,*h*)anthracene	1.7E+00	2.2E-05	6.2E-06	1.2E-09					
Indeno(1,2,3-*cd*)pyrene	6.7E+00	8.6E-05	2.4E-05	4.6E-09					
PCB-1254	6.1E-01	7.8E-06	2.4E-06	4.2E-10	3.9E-01	1.2E-01		5.1E-01	
Organics Pathway Total					4.0E-01	1.2E-01		5.3E-01	
Pathway Total – Chemicals					1.9E+00	1.9E-01	6.4E-03	2.1E+00	
Outlets D, E, and F and Criggy's Pond									
Antimony	5.9E+02	7.6E-03	1.7E-05	4.1E-07	1.9E+01	2.8E-01		1.9E+01	H
Arsenic	2.1E+01	2.7E-04	1.8E-05	1.4E-08	8.8E-01	5.8E-02		9.4E-01	
Copper	1.0E+03	1.3E-02	2.9E-05	7.1E-07	3.3E-01	7.2E-04		3.3E-01	
Manganese	3.4E+03	4.3E-02	9.5E-05	2.3E-06	9.4E-01	5.2E-02	1.6E-01	1.2E+00	H
Inorganics Pathway Total					2.1E+01	3.9E-01	1.6E-01	2.2E+01	
Pathway Total – Chemicals					2.1E+01	3.9E-01	1.6E-01	2.2E+01	

[a] Chemicals of potential concern (COPCs) are identified as chemicals of concern (COCs) if the total hazard index (HI) across all pathways is > 1 (H).
EPC = Exposure point concentration.
PCB = Polychlorinated biphenyl.

Table A-15. Load Line 1 Sediment Risks – Direct Contact

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Risk			Total Risk Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
Hunter/Trapper/Fisher									
Outlet C and Charlie's Pond									
Arsenic	2.5E+01	5.6E-08	1.4E-07	1.2E-11	8.4E-08	2.1E-07	1.8E-10	2.9E-07	
Manganese	2.4E+03	5.3E-06	4.3E-07	1.1E-09					
Inorganics Pathway Total					8.4E-08	2.1E-07	1.8E-10	2.9E-07	
Benzo(*a*)pyrene	8.4E-02	1.9E-10	2.0E-09	4.1E-14	1.4E-09	1.5E-08	1.3E-13	1.6E-08	
PCB-1254	8.7E-01	1.9E-09	2.2E-08	4.2E-13	3.9E-09	4.5E-08	8.4E-13	4.9E-08	
Organics Pathway Total					5.3E-09	5.9E-08	9.7E-13	6.4E-08	
Pathway Total – Chemicals					8.9E-08	2.6E-07	1.8E-10	3.5E-07	
Outlets A and B									
Aluminum	1.3E+04	2.9E-05	2.4E-06	6.4E-09					
Antimony	4.6E+00	1.0E-08	8.5E-10	2.2E-12					
Arsenic	1.8E+01	3.9E-08	9.6E-08	8.5E-12	5.9E-08	1.4E-07	1.3E-10	2.0E-07	
Cadmium	1.5E+01	3.4E-08	2.7E-09	7.3E-12			4.6E-11	4.6E-11	
Copper	1.6E+02	3.5E-07	2.9E-08	7.6E-11					
Thallium	8.9E-01	2.0E-09	1.6E-10	4.3E-13					
Zinc	1.0E+03	2.2E-06	1.8E-07	4.8E-10					
Inorganics Pathway Total					5.9E-08	1.4E-07	1.7E-10	2.0E-07	
2,4-Dinitrotoluene	2.0E+00	4.5E-09	3.7E-08	9.7E-13	3.0E-09	2.5E-08		2.8E-08	
Benz(*a*)anthracene	9.2E+00	2.1E-08	2.2E-07	4.5E-12	1.5E-08	1.6E-07	1.4E-12	1.7E-07	
Benzo(*a*)pyrene	9.5E+00	2.1E-08	2.3E-07	4.6E-12	1.6E-07	1.7E-06	1.4E-11	1.8E-06	R
Benzo(*b*)fluoranthene	1.2E+01	2.7E-08	2.9E-07	5.8E-12	2.0E-08	2.1E-07	1.8E-12	2.3E-07	
Dibenz(*a*,*h*)anthracene	1.7E+00	3.8E-09	4.0E-08	8.2E-13	2.8E-08	3.0E-07	2.6E-12	3.2E-07	
Indeno(1,2,3-*cd*)pyrene	6.7E+00	1.5E-08	1.6E-07	3.2E-12	1.1E-08	1.2E-07	1.0E-12	1.3E-07	
PCB-1254	6.1E-01	1.4E-09	1.6E-08	3.0E-13	2.7E-09	3.1E-08	5.9E-13	3.4E-08	
Organics Pathway Total					2.3E-07	2.5E-06	2.2E-11	2.7E-06	
Pathway Total – Chemicals					2.9E-07	2.6E-06	2.0E-10	2.9E-06	
Outlets D, E, and F and Criggy's Pond									
Antimony	5.9E+02	1.3E-06	1.1E-07	2.9E-10					
Arsenic	2.1E+01	4.6E-08	1.1E-07	1.0E-11	7.0E-08	1.7E-07	1.5E-10	2.4E-07	
Copper	1.0E+03	2.3E-06	1.9E-07	4.9E-10					
Manganese	3.4E+03	7.6E-06	6.2E-07	1.6E-09					
Inorganics Pathway Total					7.0E-08	1.7E-07	1.5E-10	2.4E-07	
Pathway Total – Chemicals					7.0E-08	1.7E-07	1.5E-10	2.4E-07	
Dust/Fire Suppression									
Outlet C and Charlie's Pond									
Arsenic	2.5E+01	8.7E-08	1.6E-07	4.2E-11	1.3E-07	2.3E-07	6.3E-10	3.6E-07	
Manganese	2.4E+03	8.2E-06	4.9E-07	3.9E-09					
Inorganics Pathway Total					1.3E-07	2.3E-07	6.3E-10	3.6E-07	
Benzo(*a*)pyrene	8.4E-02	2.9E-10	2.3E-09	1.4E-13	2.1E-09	1.7E-08	4.4E-13	1.9E-08	
PCB-1254	8.7E-01	3.0E-09	2.5E-08	1.5E-12	6.1E-09	5.1E-08	2.9E-12	5.7E-08	
Organics Pathway Total					8.2E-09	6.7E-08	3.4E-12	7.5E-08	
Pathway Total – Chemicals					1.4E-07	3.0E-07	6.3E-10	4.4E-07	
Outlets A and B									
Aluminum	1.3E+04	4.6E-05	2.7E-06	2.2E-08					
Antimony	4.6E+00	1.6E-08	9.6E-10	7.8E-12					
Arsenic	1.8E+01	6.1E-08	1.1E-07	2.9E-11	9.2E-08	1.6E-07	4.4E-10	2.6E-07	
Cadmium	1.5E+01	5.2E-08	3.1E-09	2.5E-11			1.6E-10	1.6E-10	
Copper	1.6E+02	5.5E-07	3.2E-08	2.6E-10					
Thallium	8.9E-01	3.1E-09	1.8E-10	1.5E-12					
Zinc	1.0E+03	3.5E-06	2.1E-07	1.7E-09					

Table A-15. Load Line 1 Sediment Risks – Direct Contact (continued)

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Risk			Total Risk Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
Inorganics Pathway Total					9.2E-08	1.6E-07	6.0E-10	2.6E-07	
2,4-Dinitrotoluene	2.0E+00	7.0E-09	4.2E-08	3.4E-12	4.8E-09	2.8E-08		3.3E-08	
Benz(*a*)anthracene	9.2E+00	3.2E-08	2.5E-07	1.5E-11	2.3E-08	1.8E-07	4.8E-12	2.0E-07	
Benzo(*a*)pyrene	9.5E+00	3.3E-08	2.6E-07	1.6E-11	2.4E-07	1.9E-06	4.9E-11	2.1E-06	R
Benzo(*b*)fluoranthene	1.2E+01	4.2E-08	3.2E-07	2.0E-11	3.1E-08	2.4E-07	6.2E-12	2.7E-07	
Dibenz(*a*,*h*)anthracene	1.7E+00	5.9E-09	4.6E-08	2.9E-12	4.3E-08	3.3E-07	8.9E-12	3.8E-07	
Indeno(1,2,3-*cd*)pyrene	6.7E+00	2.3E-08	1.8E-07	1.1E-11	1.7E-08	1.3E-07	3.5E-12	1.5E-07	
PCB-1254	6.1E-01	2.1E-09	1.8E-08	1.0E-12	4.3E-09	3.5E-08	2.0E-12	4.0E-08	
Organics Pathway Total					3.7E-07	2.8E-06	7.5E-11	3.2E-06	
Pathway Total – Chemicals					4.6E-07	3.0E-06	6.8E-10	3.4E-06	
Outlets D, E, and F and Criggy's Pond									
Antimony	5.9E+02	2.1E-06	1.2E-07	1.0E-09					
Arsenic	2.1E+01	7.2E-08	1.3E-07	3.5E-11	1.1E-07	1.9E-07	5.2E-10	3.0E-07	
Copper	1.0E+03	3.6E-06	2.1E-07	1.7E-09					
Manganese	3.4E+03	1.2E-05	7.0E-07	5.7E-09					
Inorganics Pathway Total					1.1E-07	1.9E-07	5.2E-10	3.0E-07	
Pathway Total – Chemicals					1.1E-07	1.9E-07	5.2E-10	3.0E-07	
National Guard Trainee									
Outlet C and Charlie's Pond									
Arsenic	2.5E+01	1.4E-06	4.0E-07	3.6E-07	2.0E-06	6.1E-07	5.5E-06	8.1E-06	R
Manganese	2.4E+03	1.3E-04	1.3E-06	3.4E-05					
Inorganics Pathway Total					2.0E-06	6.1E-07	5.5E-06	8.1E-06	R
Benzo(*a*)pyrene	8.4E-02	4.6E-09	5.9E-09	1.2E-09	3.3E-08	4.3E-08	3.8E-09	8.0E-08	
PCB-1254	8.7E-01	4.7E-08	6.6E-08	1.3E-08	9.5E-08	1.3E-07	2.5E-08	2.5E-07	
Organics Pathway Total					1.3E-07	1.7E-07	2.9E-08	3.3E-07	
Pathway Total – Chemicals					2.2E-06	7.8E-07	5.5E-06	8.4E-06	
Outlets A and B									
Aluminum	1.3E+04	7.2E-04	7.1E-06	1.9E-04					
Antimony	4.6E+00	2.5E-07	2.5E-09	6.7E-08					
Arsenic	1.8E+01	9.6E-07	2.8E-07	2.5E-07	1.4E-06	4.3E-07	3.8E-06	5.7E-06	R
Cadmium	1.5E+01	8.2E-07	8.1E-09	2.2E-07			1.4E-06	1.4E-06	R
Copper	1.6E+02	8.5E-06	8.4E-08	2.3E-06					
Thallium	8.9E-01	4.8E-08	4.8E-10	1.3E-08					
Zinc	1.0E+03	5.5E-05	5.4E-07	1.5E-05					
Inorganics Pathway Total					1.4E-06	4.3E-07	5.2E-06	7.1E-06	
2,4-Dinitrotoluene	2.0E+00	1.1E-07	1.1E-07	2.9E-08	7.4E-08	7.3E-08		1.5E-07	
Benz(*a*)anthracene	9.2E+00	5.0E-07	6.5E-07	1.3E-07	3.7E-07	4.7E-07	4.1E-08	8.8E-07	
Benzo(*a*)pyrene	9.5E+00	5.2E-07	6.7E-07	1.4E-07	3.8E-06	4.9E-06	4.3E-07	9.1E-06	R
Benzo(*b*)fluoranthene	1.2E+01	6.5E-07	8.4E-07	1.7E-07	4.8E-07	6.1E-07	5.4E-08	1.1E-06	R
Dibenz(*a*,*h*)anthracene	1.7E+00	9.3E-08	1.2E-07	2.5E-08	6.8E-07	8.7E-07	7.7E-08	1.6E-06	R
Indeno(1,2,3-*cd*)pyrene	6.7E+00	3.7E-07	4.7E-07	9.7E-08	2.7E-07	3.4E-07	3.0E-08	6.4E-07	
PCB-1254	6.1E-01	3.3E-08	4.6E-08	8.9E-09	6.7E-08	9.2E-08	1.8E-08	1.8E-07	
Organics Pathway Total					5.7E-06	7.3E-06	6.5E-07	1.4E-05	
Pathway Total – Chemicals					7.1E-06	7.8E-06	5.8E-06	2.1E-05	
Outlets D, E, and F and Criggy's Pond									
Antimony	5.9E+02	3.2E-05	3.2E-07	8.6E-06					
Arsenic	2.1E+01	1.1E-06	3.4E-07	3.0E-07	1.7E-06	5.0E-07	4.5E-06	6.7E-06	R
Copper	1.0E+03	5.6E-05	5.5E-07	1.5E-05					
Manganese	3.4E+03	1.8E-04	1.8E-06	4.9E-05					
Inorganics Pathway Total					1.7E-06	5.0E-07	4.5E-06	6.7E-06	
Pathway Total – Chemicals					1.7E-06	5.0E-07	4.5E-06	6.7E-06	

Table A-15. Load Line 1 Sediment Risks – Direct Contact (continued)

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Risk			Total Risk Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
Resident Farmer Adult									
Outlet C and Charlie's Pond									
Arsenic	2.5E+01	1.5E-05	1.0E-05	3.2E-09	2.2E-05	1.5E-05	4.8E-08	3.7E-05	R
Manganese	2.4E+03	1.4E-03	3.1E-05	3.0E-07					
Inorganics Pathway Total					2.2E-05	1.5E-05	4.8E-08	3.7E-05	
Benzo(*a*)pyrene	8.4E-02	4.9E-08	1.5E-07	1.1E-11	3.6E-07	1.1E-06	3.3E-11	1.4E-06	R
PCB-1254	8.7E-01	5.1E-07	1.6E-06	1.1E-10	1.0E-06	3.3E-06	2.2E-10	4.3E-06	R
Organics Pathway Total					1.4E-06	4.3E-06	2.5E-10	5.7E-06	
Pathway Total – Chemicals					2.3E-05	1.9E-05	4.8E-08	4.3E-05	
Outlets A and B									
Aluminum	1.3E+04	7.7E-03	1.8E-04	1.7E-06					
Antimony	4.6E+00	2.7E-06	6.2E-08	5.9E-10					
Arsenic	1.8E+01	1.0E-05	7.0E-06	2.2E-09	1.5E-05	1.1E-05	3.4E-08	2.6E-05	R
Cadmium	1.5E+01	8.8E-06	2.0E-07	1.9E-09			1.2E-08	1.2E-08	
Copper	1.6E+02	9.2E-05	2.1E-06	2.0E-08					
Thallium	8.9E-01	5.2E-07	1.2E-08	1.1E-10					
Zinc	1.0E+03	5.9E-04	1.3E-05	1.3E-07					
Inorganics Pathway Total					1.5E-05	1.1E-05	4.6E-08	2.6E-05	
2,4-Dinitrotoluene	2.0E+00	1.2E-06	2.7E-06	2.5E-10	8.0E-07	1.8E-06		2.6E-06	R
Benz(*a*)anthracene	9.2E+00	5.4E-06	1.6E-05	1.2E-09	3.9E-06	1.2E-05	3.6E-10	1.6E-05	R
Benzo(*a*)pyrene	9.5E+00	5.6E-06	1.7E-05	1.2E-09	4.1E-05	1.2E-04	3.7E-09	1.6E-04	R
Benzo(*b*)fluoranthene	1.2E+01	7.0E-06	2.1E-05	1.5E-09	5.1E-06	1.5E-05	4.7E-10	2.0E-05	R
Dibenz(*a*,*h*)anthracene	1.7E+00	1.0E-06	3.0E-06	2.2E-10	7.3E-06	2.2E-05	6.7E-10	2.9E-05	R
Indeno(1,2,3-*cd*)pyrene	6.7E+00	3.9E-06	1.2E-05	8.5E-10	2.9E-06	8.5E-06	2.6E-10	1.1E-05	R
PCB-1254	6.1E-01	3.6E-07	1.1E-06	7.8E-11	7.2E-07	2.3E-06	1.6E-10	3.0E-06	R
Organics Pathway Total					6.1E-05	1.8E-04	5.7E-09	2.4E-04	
Pathway Total – Chemicals					7.7E-05	1.9E-04	5.1E-08	2.7E-04	
Outlets D, E, and F and Criggy's Pond									
Antimony	5.9E+02	3.5E-04	8.0E-06	7.6E-08					
Arsenic	2.1E+01	1.2E-05	8.3E-06	2.6E-09	1.8E-05	1.2E-05	4.0E-08	3.1E-05	R
Copper	1.0E+03	6.0E-04	1.4E-05	1.3E-07					
Manganese	3.4E+03	2.0E-03	4.5E-05	4.3E-07					
Inorganics Pathway Total					1.8E-05	1.2E-05	4.0E-08	3.1E-05	
Pathway Total – Chemicals					1.8E-05	1.2E-05	4.0E-08	3.1E-05	
Resident Farmer Child									
Outlet C and Charlie's Pond									
Arsenic	2.5E+01	2.7E-05	1.8E-06	1.5E-09	4.1E-05	2.7E-06	2.2E-08	4.4E-05	R
Manganese	2.4E+03	2.6E-03	5.7E-06	1.4E-07					
Inorganics Pathway Total					4.1E-05	2.7E-06	2.2E-08	4.4E-05	
Benzo(*a*)pyrene	8.4E-02	9.2E-08	2.6E-08	5.0E-12	6.7E-07	1.9E-07	1.5E-11	8.6E-07	
PCB-1254	8.7E-01	9.5E-07	2.9E-07	5.2E-11	1.9E-06	5.9E-07	1.0E-10	2.5E-06	R
Organics Pathway Total					2.6E-06	7.8E-07	1.2E-10	3.4E-06	
Pathway Total – Chemicals					4.4E-05	3.5E-06	2.2E-08	4.7E-05	
Outlets A and B									
Aluminum	1.3E+04	1.4E-02	3.2E-05	7.8E-07					
Antimony	4.6E+00	5.1E-06	1.1E-08	2.7E-10					
Arsenic	1.8E+01	1.9E-05	1.3E-06	1.0E-09	2.9E-05	1.9E-06	1.6E-08	3.1E-05	R
Cadmium	1.5E+01	1.6E-05	3.6E-08	8.9E-10			5.6E-09	5.6E-09	
Copper	1.6E+02	1.7E-04	3.8E-07	9.3E-09					
Thallium	8.9E-01	9.7E-07	2.1E-09	5.3E-11					
Zinc	1.0E+03	1.1E-03	2.4E-06	5.9E-08					
Inorganics Pathway Total					2.9E-05	1.9E-06	2.1E-08	3.1E-05	
2,4-Dinitrotoluene	2.0E+00	2.2E-06	4.8E-07	1.2E-10	1.5E-06	3.3E-07		1.8E-06	R
Benz(*a*)anthracene	9.2E+00	1.0E-05	2.9E-06	5.5E-10	7.4E-06	2.1E-06	1.7E-10	9.5E-06	R

Table A-15. Load Line 1 Sediment Risks – Direct Contact (continued)

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Risk			Total Risk Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
Benzo(*a*)pyrene	9.5E+00	1.0E-05	3.0E-06	5.6E-10	7.6E-05	2.2E-05	1.7E-09	9.8E-05	R
Benzo(*b*)fluoranthene	1.2E+01	1.3E-05	3.8E-06	7.1E-10	9.6E-06	2.7E-06	2.2E-10	1.2E-05	R
Dibenz(*a*,*h*)anthracene	1.7E+00	1.9E-06	5.3E-07	1.0E-10	1.4E-05	3.9E-06	3.1E-10	1.7E-05	R
Indeno(1,2,3-*cd*)pyrene	6.7E+00	7.3E-06	2.1E-06	4.0E-10	5.4E-06	1.5E-06	1.2E-10	6.9E-06	R
PCB-1254	6.1E-01	6.7E-07	2.1E-07	3.6E-11	1.3E-06	4.1E-07	7.2E-11	1.7E-06	R
Organics Pathway Total					1.1E-04	3.3E-05	2.6E-09	1.5E-04	
Pathway Total – Chemicals					1.4E-04	3.5E-05	2.4E-08	1.8E-04	
Outlets D, E, and F and Criggy's Pond									
Antimony	5.9E+02	6.5E-04	1.4E-06	3.5E-08					
Arsenic	2.1E+01	2.3E-05	1.5E-06	1.2E-09	3.4E-05	2.3E-06	1.9E-08	3.6E-05	R
Copper	1.0E+03	1.1E-03	2.5E-06	6.1E-08					
Manganese	3.4E+03	3.7E-03	8.1E-06	2.0E-07					
Inorganics Pathway Total					3.4E-05	2.3E-06	1.9E-08	3.6E-05	
Pathway Total – Chemicals					3.4E-05	2.3E-06	1.9E-08	3.6E-05	

[a] Chemicals of potential concern (COPCs) are identified as chemicals of concern (COCs) if the total incremental lifetime cancer risk across all pathways is > 1E-06 (R).
EPC = Exposure Point Concentration.
PCB = Polychlorinated biphenyl.

Table A-16. Load Line 1 Surface Water Hazards and Risks – Fish Ingestion

COPC	Water EPC (mg/L)	Fish Ingestion Non-carcinogen Daily Intake (mg/kg-d)	Fish Ingestion HQ	Fish Ingestion Carcinogen Daily Intake (mg/kg-d)	Fish Ingestion Risk	COC[a]
Hunter/Trapper/Fisher						
Outlet C and Charlie's Pond						
Arsenic	3.1E-02	7.7E-05	2.6E-01	3.3E-05	4.9E-05	R
Chromium	2.4E-03	3.7E-04	2.5E-04	1.6E-04		
Inorganics Pathway Total			2.6E-01		4.9E-05	
Pathway Total			2.6E-01		4.9E-05	
Outlets D, E, and F and Criggy's Pond						
Arsenic	5.1E-03	1.3E-05	4.2E-02	5.4E-06	8.1E-06	R
Inorganics Pathway Total			4.2E-02		8.1E-06	
Pathway Total			4.2E-02		8.1E-06	
Resident Farmer Adult						
Outlet C and Charlie's Pond						
Arsenic	3.1E-02	7.7E-05	2.6E-01	3.3E-05	4.9E-05	R
Chromium	2.4E-03	3.7E-04	2.5E-04	1.6E-04		
Inorganics Pathway Total			2.6E-01		4.9E-05	
Pathway Total			2.6E-01		4.9E-05	
Outlets D, E, and F and Criggy's Pond						
Arsenic	5.1E-03	1.3E-05	4.2E-02	5.4E-06	8.1E-06	R
Inorganics Pathway Total			4.2E-02		8.1E-06	
Pathway Total			4.2E-02		8.1E-06	
Resident Farmer Child						
Outlet C and Charlie's Pond						
Arsenic	3.1E-02	3.6E-04	1.2E+00	3.1E-05	4.6E-05	R,H
Chromium	2.4E-03	1.7E-03	1.2E-03	1.5E-04		
Inorganics Pathway Total			1.2E+00		4.6E-05	
Pathway Total			1.2E+00		4.6E-05	
Outlets D ,E, and F and Criggy's Pond						
Arsenic	5.1E-03	5.9E-05	2.0E-01	5.0E-06	7.6E-06	R
Inorganics Pathway Total			2.0E-01		7.6E-06	
Pathway Total			2.0E-01		7.6E-06	

[a] Chemicals of potential concern (COPCs) are identified as chemicals of concern (COCs) if the total hazard index across all pathways is > 1 (H) or if the total incremental lifetime cancer risk is > 1E-06 (R).
EPC = Exposure point concentration.
HQ = Hazard quotient.

Table A-17. Load Line 1 Surface Water and Sediment Hazards and Risks – Waterfowl Ingestion

COPC	Water EPC (mg/kg)	Waterfowl Ingestion Non-carcinogen Daily Intake (mg/kg-d)	Waterfowl Ingestion HQ	Waterfowl Ingestion Carcinogen Daily Intake (mg/kg-d)	Waterfowl Ingestion Risk	COC[a]
Hunter/Trapper/Fisher						
Outlet C and Charlie's Pond						
Arsenic	2.2E+00	4.2E-04	1.4E+00	1.8E-04	2.7E-04	R,H
Chromium	2.0E+00	3.8E-04	2.5E-04	1.6E-04		
Manganese	4.0E+01	7.6E-03	5.5E-02	3.3E-03		
Inorganics Pathway Total			1.5E+00		2.7E-04	
Benzo(*a*)pyrene	1.9E-01	3.6E-05		1.5E-05	1.1E-04	R
PCB-1254	2.0E+01	3.7E-03	1.9E+02	1.6E-03	3.2E-03	R,H
Organics Pathway Total			1.9E+02		3.3E-03	
Pathway Total			1.9E+02		3.6E-03	
Outlets D, E, and F and Criggy's Pond						
Antimony	2.6E+01	4.9E-03	1.2E+01	2.1E-03		H
Arsenic	1.9E+00	3.6E-04	1.2E+00	1.5E-04	2.3E-04	R,H
Copper	1.7E+02	3.1E-02	7.8E-01	1.3E-02		
Manganese	5.8E+01	1.1E-02	7.8E-02	4.7E-03		
Inorganics Pathway Total			1.4E+01		2.3E-04	
Pathway Total			1.4E+01		2.3E-04	

[a] Chemicals of potential concern (COPCs) are identified as chemicals of concern (COCs) if the total hazard index (HIa0 across all pathways is > 1 (H) or if the total incremental lifetime cancer risk is > 1E-06 (R).
EPC = Exposure point concentration.
HQ = Hazard quotient.
PCB = Polychlorinated biphenyl.

Table A-18. Load Line 1 Shallow Surface Soil Hazards

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Hazard Quotient			Total HI Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
Hunter/Trapper/Fisher									
CB-13 and -10									
Aluminum	1.3E+04	6.8E-05	6.1E-06	1.5E-08	6.8E-05	6.1E-06	1.0E-05	8.4E-05	
Antimony	1.3E+00	6.6E-09	5.9E-10	1.4E-12	1.6E-05	9.9E-06		2.6E-05	
Arsenic	1.1E+01	5.8E-08	1.6E-07	1.3E-11	1.9E-04	5.2E-04		7.1E-04	
Cadmium	6.2E+00	3.2E-08	2.9E-09	7.0E-12	3.2E-05	1.2E-04		1.5E-04	
Chromium	3.5E+01	1.8E-07	1.6E-08	4.0E-11	1.2E-07	8.5E-07		9.7E-07	
Copper	1.9E+02	1.0E-06	9.0E-08	2.2E-10	2.5E-05	2.2E-06		2.7E-05	
Manganese	1.3E+03	6.8E-06	6.1E-07	1.5E-09	1.5E-04	3.3E-04	1.0E-04	5.8E-04	
Thallium	4.9E-01	2.5E-09	2.3E-10	5.5E-13	3.2E-05	2.9E-06		3.5E-05	
Inorganics Pathway Total					5.1E-04	9.9E-04	1.1E-04	1.6E-03	
2,4,6-Trinitrotoluene	2.5E+01	1.3E-07	1.2E-06	2.9E-11	2.6E-04	2.4E-03		2.6E-03	
2,4-Dinitrotoluene	1.5E+00	7.8E-09	7.0E-08	1.7E-12	3.9E-06	3.5E-05		3.9E-05	
Benzo(*a*)pyrene	3.7E-01	1.9E-09	2.3E-08	4.2E-13					
PCB-1254	1.7E+00	8.9E-09	1.1E-07	1.9E-12	4.4E-04	5.6E-03		6.0E-03	
RDX	3.7E+00	1.9E-08	1.7E-07	4.2E-12	6.4E-06	5.8E-05		6.4E-05	
Organics Pathway Total					7.2E-04	8.0E-03		8.7E-03	
Pathway Total – Chemicals					1.2E-03	9.0E-03	1.1E-04	1.0E-02	
CB-14, CB-17, and CA-15									
Aluminum	2.0E+04	1.0E-04	9.3E-06	2.2E-08	1.0E-04	9.3E-06	1.6E-05	1.3E-04	
Arsenic	2.1E+01	1.1E-07	3.0E-07	2.4E-11	3.7E-04	1.0E-03		1.4E-03	
Barium	1.4E+02	7.1E-07	6.3E-08	1.5E-10	1.0E-05	1.3E-05	1.1E-06	2.4E-05	
Cadmium	2.1E+00	1.1E-08	9.7E-10	2.3E-12	1.1E-05	3.9E-05		5.0E-05	
Manganese	1.2E+03	6.2E-06	5.5E-07	1.3E-09	1.3E-04	3.0E-04	9.3E-05	5.3E-04	
Nickel	3.2E+01	1.7E-07	1.5E-08	3.6E-11	8.3E-06	1.9E-05		2.7E-05	
Thallium	9.1E-01	4.8E-09	4.3E-10	1.0E-12	5.9E-05	5.3E-06		6.5E-05	
Vanadium	3.5E+01	1.8E-07	1.6E-08	4.0E-11	2.6E-05	9.0E-05		1.2E-04	
Inorganics Pathway Total					7.2E-04	1.5E-03	1.1E-04	2.3E-03	
2,4,6-Trinitrotoluene	4.5E+00	2.3E-08	2.1E-07	5.1E-12	4.7E-05	4.2E-04		4.7E-04	
Benz(*a*)anthracene	6.4E-01	3.3E-09	3.9E-08	7.2E-13					
Benzo(*a*)pyrene	8.2E-01	4.3E-09	5.0E-08	9.3E-13					
Benzo(*b*)fluoranthene	1.1E+00	5.7E-09	6.7E-08	1.2E-12					
Dibenz(*a*,*h*)anthracene	1.8E-01	9.4E-10	1.1E-08	2.0E-13					
Indeno(1,2,3-*cd*)pyrene	6.4E-01	3.3E-09	3.9E-08	7.2E-13					
PCB-1254	4.7E+00	2.5E-08	3.1E-07	5.3E-12	1.2E-03	1.5E-02		1.7E-02	
RDX	2.9E+01	1.5E-07	1.3E-06	3.2E-11	5.0E-05	4.5E-04		5.0E-04	
Organics Pathway Total					1.3E-03	1.6E-02		1.8E-02	
Pathway Total – Chemicals					2.0E-03	1.8E-02	1.1E-04	2.0E-02	
CB-3 and -801									
Aluminum	1.2E+04	6.3E-05	5.6E-06	1.4E-08	6.3E-05	5.6E-06	9.5E-06	7.8E-05	
Antimony	1.1E+02	5.7E-07	5.1E-08	1.2E-10	1.4E-03	8.6E-04		2.3E-03	
Arsenic	1.3E+01	6.7E-08	1.8E-07	1.5E-11	2.2E-04	6.0E-04		8.3E-04	
Cadmium	6.3E+00	3.3E-08	2.9E-09	7.1E-12	3.3E-05	1.2E-04		1.5E-04	
Manganese	1.3E+03	6.6E-06	5.9E-07	1.4E-09	1.4E-04	3.2E-04	1.0E-04	5.6E-04	
Thallium	6.0E-01	3.1E-09	2.8E-10	6.8E-13	3.9E-05	3.5E-06		4.3E-05	
Inorganics Pathway Total					1.9E-03	1.9E-03	1.1E-04	4.0E-03	
Benz(*a*)anthracene	1.4E+01	7.3E-08	8.5E-07	1.6E-11					
Benzo(*a*)pyrene	1.3E+01	6.8E-08	7.9E-07	1.5E-11					
Benzo(*b*)fluoranthene	1.5E+01	7.8E-08	9.1E-07	1.7E-11					
Dibenz(*a*,*h*)anthracene	1.2E+00	6.0E-09	7.0E-08	1.3E-12					
Dieldrin	3.3E-02	1.7E-10	1.6E-09	3.8E-14	3.5E-06	3.1E-05		3.5E-05	
Indeno(1,2,3-*cd*)pyrene	8.7E+00	4.5E-08	5.3E-07	9.8E-12					
PCB-1254	4.3E+00	2.2E-08	2.8E-07	4.9E-12	1.1E-03	1.4E-02		1.5E-02	

Table A-18. Load Line 1 Shallow Surface Soil Hazards (continued)

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Hazard Quotient			Total HI Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
Organics Pathway Total					1.1E-03	1.4E-02		1.5E-02	
Pathway Total – Chemicals					3.1E-03	1.6E-02	1.1E-04	1.9E-02	
CB-4/4A and CA-6/6A									
Aluminum	1.0E+04	5.3E-05	4.7E-06	1.1E-08	5.3E-05	4.7E-06	8.0E-06	6.6E-05	
Arsenic	1.1E+01	5.7E-08	1.5E-07	1.2E-11	1.9E-04	5.1E-04		7.0E-04	
Barium	1.4E+02	7.2E-07	6.5E-08	1.6E-10	1.0E-05	1.3E-05	1.1E-06	2.5E-05	
Cadmium	1.8E+00	9.4E-09	8.5E-10	2.0E-12	9.4E-06	3.4E-05		4.3E-05	
Chromium	2.5E+01	1.3E-07	1.2E-08	2.8E-11	8.7E-08	6.0E-07		6.8E-07	
Copper	1.1E+02	5.5E-07	5.0E-08	1.2E-10	1.4E-05	1.2E-06		1.5E-05	
Manganese	7.0E+02	3.7E-06	3.3E-07	7.9E-10	7.9E-05	1.8E-04	5.5E-05	3.1E-04	
Mercury	3.4E-01	1.8E-09	1.6E-10	3.9E-13	5.9E-06	7.6E-06		1.4E-05	
Thallium	5.4E-01	2.8E-09	2.5E-10	6.1E-13	3.5E-05	3.1E-06		3.8E-05	
Vanadium	1.9E+01	9.9E-08	8.9E-09	2.2E-11	1.4E-05	4.9E-05		6.3E-05	
Inorganics Pathway Total					4.1E-04	8.0E-04	6.5E-05	1.3E-03	
1,3-Dinitrobenzene	5.9E+00	3.1E-08	2.8E-07	6.7E-12	3.1E-04	2.8E-03		3.1E-03	
2,4,6-Trinitrotoluene	3.0E+02	1.6E-06	1.4E-05	3.4E-10	3.1E-03	2.8E-02		3.1E-02	
2,6-Dinitrotoluene	8.6E-01	4.5E-09	4.0E-08	9.7E-13	4.5E-06	4.0E-05		4.5E-05	
4,4'-DDE	1.2E+00	6.2E-09	5.6E-08	1.3E-12					
Benz(*a*)anthracene	6.4E-01	3.3E-09	3.9E-08	7.2E-13					
Benzo(*a*)pyrene	6.1E-01	3.2E-09	3.7E-08	6.9E-13					
Benzo(*b*)fluoranthene	6.6E-01	3.5E-09	4.0E-08	7.5E-13					
Dibenz(*a*,*h*)anthracene	9.6E-02	5.0E-10	5.8E-09	1.1E-13					
Dieldrin	9.8E-02	5.1E-10	4.6E-09	1.1E-13	1.0E-05	9.2E-05		1.0E-04	
Endrin Aldehyde	4.4E+00	2.3E-08	2.1E-07	5.0E-12	7.7E-05	6.9E-04		7.6E-04	
Heptachlor	7.2E-02	3.8E-10	3.4E-09	8.1E-14	7.5E-07	6.7E-06		7.5E-06	
PCB-1254	1.1E+03	5.7E-06	7.2E-05	1.2E-09	2.9E-01	3.6E+00		3.9E+00	H
RDX	1.0E+02	5.2E-07	4.7E-06	1.1E-10	1.7E-04	1.6E-03		1.7E-03	
gamma-Chlordane	8.9E-01	4.6E-09	1.7E-08	1.0E-12	9.3E-06	3.3E-05	5.0E-09	4.3E-05	
Organics Pathway Total					2.9E-01	3.6E+00	5.0E-09	3.9E+00	
Pathway Total – Chemicals					2.9E-01	3.6E+00	6.5E-05	3.9E+00	
Change Houses (CB-12, -23, -8, and -22)									
Antimony	2.3E+00	1.2E-08	1.1E-09	2.6E-12	2.9E-05	1.8E-05		4.7E-05	
Arsenic	1.2E+01	6.3E-08	1.7E-07	1.4E-11	2.1E-04	5.7E-04		7.8E-04	
Cadmium	3.3E+00	1.7E-08	1.5E-09	3.7E-12	1.7E-05	6.2E-05		7.9E-05	
Manganese	8.3E+02	4.3E-06	3.9E-07	9.4E-10	9.4E-05	2.1E-04	6.6E-05	3.7E-04	
Thallium	4.3E-01	2.3E-09	2.0E-10	4.9E-13	2.8E-05	2.5E-06		3.1E-05	
Inorganics Pathway Total					3.8E-04	8.6E-04	6.6E-05	1.3E-03	
Benzo(*a*)pyrene	9.2E-02	4.8E-10	5.6E-09	1.0E-13					
Organics Pathway Total									
Pathway Total – Chemicals					3.8E-04	8.6E-04	6.6E-05	1.3E-03	
Perimeter Area									
Aluminum	1.4E+04	7.3E-05	6.6E-06	1.6E-08	7.3E-05	6.6E-06	1.1E-05	9.1E-05	
Arsenic	1.3E+01	6.5E-08	1.8E-07	1.4E-11	2.2E-04	5.9E-04		8.0E-04	
Manganese	1.4E+03	7.3E-06	6.5E-07	1.6E-09	1.6E-04	3.6E-04	1.1E-04	6.2E-04	
Thallium	6.4E-01	3.4E-09	3.0E-10	7.3E-13	4.2E-05	3.8E-06		4.6E-05	
Inorganics Pathway Total					4.9E-04	9.5E-04	1.2E-04	1.6E-03	
Pathway Total – Chemicals					4.9E-04	9.5E-04	1.2E-04	1.6E-03	
Water Tower									
Chromium	2.5E+02	1.3E-06	1.2E-07	2.8E-10	8.7E-07	6.0E-06		6.9E-06	
Thallium	6.4E-01	3.4E-09	3.0E-10	7.3E-13	4.2E-05	3.8E-06		4.6E-05	

Table A-18. Load Line 1 Shallow Surface Soil Hazards (continued)

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Hazard Quotient			Total HI Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
Inorganics Pathway Total					4.3E-05	9.8E-06		5.3E-05	
Pathway Total – Chemicals					4.3E-05	9.8E-06		5.3E-05	
Security Guard/Maintenance Worker									
CB-13 and -10									
Aluminum	1.3E+04	5.3E-04	2.9E-04	1.1E-07	5.3E-04	2.9E-04	8.0E-05	9.0E-04	
Antimony	1.3E+00	5.1E-08	2.9E-08	1.1E-11	1.3E-04	4.8E-04		6.0E-04	
Arsenic	1.1E+01	4.5E-07	7.5E-06	9.8E-11	1.5E-03	2.5E-02		2.7E-02	
Cadmium	6.2E+00	2.5E-07	1.4E-07	5.5E-11	2.5E-04	5.6E-03		5.8E-03	
Chromium	3.5E+01	1.4E-06	8.0E-07	3.1E-10	9.6E-07	4.1E-05		4.2E-05	
Copper	1.9E+02	7.8E-06	4.3E-06	1.7E-09	2.0E-04	1.1E-04		3.0E-04	
Manganese	1.3E+03	5.3E-05	2.9E-05	1.1E-08	1.2E-03	1.6E-02	8.0E-04	1.8E-02	
Thallium	4.9E-01	2.0E-08	1.1E-08	4.3E-12	2.5E-04	1.4E-04		3.9E-04	
Inorganics Pathway Total					4.0E-03	4.8E-02	8.8E-04	5.3E-02	
2,4,6-Trinitrotoluene	2.5E+01	1.0E-06	5.7E-05	2.2E-10	2.1E-03	1.1E-01		1.2E-01	
2,4-Dinitrotoluene	1.5E+00	6.1E-08	3.4E-06	1.3E-11	3.0E-05	1.7E-03		1.7E-03	
Benzo(*a*)pyrene	3.7E-01	1.5E-08	1.1E-06	3.3E-12					
PCB-1254	1.7E+00	6.9E-08	5.4E-06	1.5E-11	3.5E-03	2.7E-01		2.7E-01	
RDX	3.7E+00	1.5E-07	8.3E-06	3.3E-11	5.0E-05	2.8E-03		2.8E-03	
Organics Pathway Total					5.6E-03	3.9E-01		3.9E-01	
Pathway Total – Chemicals					9.6E-03	4.4E-01	8.8E-04	4.5E-01	
CB-14, CB-17, and CA-15									
Aluminum	2.0E+04	8.1E-04	4.5E-04	1.8E-07	8.1E-04	4.5E-04	1.2E-04	1.4E-03	
Arsenic	2.1E+01	8.7E-07	1.5E-05	1.9E-10	2.9E-03	4.8E-02		5.1E-02	
Barium	1.4E+02	5.5E-06	3.1E-06	1.2E-09	7.9E-05	6.2E-04	8.3E-06	7.1E-04	
Cadmium	2.1E+00	8.5E-08	4.7E-08	1.8E-11	8.5E-05	1.9E-03		2.0E-03	
Manganese	1.2E+03	4.8E-05	2.7E-05	1.0E-08	1.0E-03	1.4E-02	7.3E-04	1.6E-02	
Nickel	3.2E+01	1.3E-06	7.2E-07	2.8E-10	6.5E-05	9.0E-04		9.6E-04	
Thallium	9.1E-01	3.7E-08	2.1E-08	8.0E-12	4.6E-04	2.6E-04		7.2E-04	
Vanadium	3.5E+01	1.4E-06	7.9E-07	3.1E-10	2.0E-04	4.3E-03		4.5E-03	
Inorganics Pathway Total					5.7E-03	7.1E-02	8.6E-04	7.8E-02	
2,4,6-Trinitrotoluene	4.5E+00	1.8E-07	1.0E-05	4.0E-11	3.7E-04	2.0E-02		2.1E-02	
Benz(*a*)anthracene	6.4E-01	2.6E-08	1.9E-06	5.7E-12					
Benzo(*a*)pyrene	8.2E-01	3.3E-08	2.4E-06	7.3E-12					
Benzo(*b*)fluoranthene	1.1E+00	4.5E-08	3.2E-06	9.7E-12					
Dibenz(*a,h*)anthracene	1.8E-01	7.3E-09	5.3E-07	1.6E-12					
Indeno(1,2,3-*cd*)pyrene	6.4E-01	2.6E-08	1.9E-06	5.7E-12					
PCB-1254	4.7E+00	1.9E-07	1.5E-05	4.1E-11	9.6E-03	7.4E-01		7.5E-01	
RDX	2.9E+01	1.2E-06	6.5E-05	2.5E-10	3.9E-04	2.2E-02		2.2E-02	
Organics Pathway Total					1.0E-02	7.9E-01		8.0E-01	
Pathway Total – Chemicals					1.6E-02	8.6E-01	8.6E-04	8.7E-01	
CB-3/CB-801									
Aluminum	1.2E+04	4.9E-04	2.7E-04	1.1E-07	4.9E-04	2.7E-04	7.4E-05	8.4E-04	
Antimony	1.1E+02	4.5E-06	2.5E-06	9.7E-10	1.1E-02	4.1E-02		5.3E-02	
Arsenic	1.3E+01	5.3E-07	8.7E-06	1.1E-10	1.8E-03	2.9E-02		3.1E-02	
Cadmium	6.3E+00	2.6E-07	1.4E-07	5.5E-11	2.6E-04	5.7E-03		5.9E-03	
Manganese	1.3E+03	5.1E-05	2.9E-05	1.1E-08	1.1E-03	1.5E-02	7.8E-04	1.7E-02	
Thallium	6.0E-01	2.4E-08	1.4E-08	5.3E-12	3.1E-04	1.7E-04		4.8E-04	
Inorganics Pathway Total					1.5E-02	9.2E-02	8.5E-04	1.1E-01	
Benz(*a*)anthracene	1.4E+01	5.7E-07	4.1E-05	1.2E-10					
Benzo(*a*)pyrene	1.3E+01	5.3E-07	3.8E-05	1.1E-10					
Benzo(*b*)fluoranthene	1.5E+01	6.1E-07	4.4E-05	1.3E-10					
Dibenz(*a,h*)anthracene	1.2E+00	4.7E-08	3.4E-06	1.0E-11					
Dieldrin	3.3E-02	1.4E-09	7.5E-08	2.9E-13	2.7E-05	1.5E-03		1.5E-03	

Table A-18. Load Line 1 Shallow Surface Soil Hazards (continued)

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Hazard Quotient			Total HI Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
Indeno(1,2,3-*cd*)pyrene	8.7E+00	3.5E-07	2.6E-05	7.7E-11					
PCB-1254	4.3E+00	1.8E-07	1.4E-05	3.8E-11	8.8E-03	6.8E-01		6.9E-01	
Organics Pathway Total					8.8E-03	6.8E-01		6.9E-01	
Pathway Total – Chemicals					2.4E-02	7.7E-01	8.5E-04	8.0E-01	
CB-4/4A and CA-6/6A									
Aluminum	1.0E+04	4.1E-04	2.3E-04	8.9E-08	4.1E-04	2.3E-04	6.3E-05	7.0E-04	
Arsenic	1.1E+01	4.4E-07	7.4E-06	9.6E-11	1.5E-03	2.5E-02		2.6E-02	
Barium	1.4E+02	5.7E-06	3.1E-06	1.2E-09	8.1E-05	6.4E-04	8.6E-06	7.3E-04	
Cadmium	1.8E+00	7.4E-08	4.1E-08	1.6E-11	7.4E-05	1.6E-03		1.7E-03	
Chromium	2.5E+01	1.0E-06	5.6E-07	2.2E-10	6.8E-07	2.9E-05		3.0E-05	
Copper	1.1E+02	4.3E-06	2.4E-06	9.4E-10	1.1E-04	6.0E-05		1.7E-04	
Manganese	7.0E+02	2.9E-05	1.6E-05	6.2E-09	6.2E-04	8.6E-03	4.3E-04	9.7E-03	
Mercury	3.4E-01	1.4E-08	7.7E-09	3.0E-12	4.6E-05	3.7E-04		4.1E-04	
Thallium	5.4E-01	2.2E-08	1.2E-08	4.7E-12	2.7E-04	1.5E-04		4.2E-04	
Vanadium	1.9E+01	7.8E-07	4.3E-07	1.7E-10	1.1E-04	2.4E-03		2.5E-03	
Inorganics Pathway Total					3.2E-03	3.9E-02	5.0E-04	4.2E-02	
1,3-Dinitrobenzene	5.9E+00	2.4E-07	1.3E-05	5.2E-11	2.4E-03	1.3E-01		1.4E-01	
2,4,6-Trinitrotoluene	3.0E+02	1.2E-05	6.7E-04	2.6E-09	2.4E-02	1.3E+00		1.4E+00	H
2,6-Dinitrotoluene	8.6E-01	3.5E-08	1.9E-06	7.6E-12	3.5E-05	1.9E-03		2.0E-03	
4,4'-DDE	1.2E+00	4.9E-08	2.7E-06	1.1E-11					
Benz(*a*)anthracene	6.4E-01	2.6E-08	1.9E-06	5.7E-12					
Benzo(*a*)pyrene	6.1E-01	2.5E-08	1.8E-06	5.4E-12					
Benzo(*b*)fluoranthene	6.6E-01	2.7E-08	1.9E-06	5.8E-12					
Dibenz(*a*,*h*)anthracene	9.6E-02	3.9E-09	2.8E-07	8.5E-13					
Dieldrin	9.8E-02	4.0E-09	2.2E-07	8.7E-13	8.0E-05	4.5E-03		4.5E-03	
Endrin Aldehyde	4.4E+00	1.8E-07	9.9E-06	3.9E-11	6.0E-04	3.3E-02		3.4E-02	
Heptachlor	7.2E-02	2.9E-09	1.6E-07	6.3E-13	5.9E-06	3.2E-04		3.3E-04	
PCB-1254	1.1E+03	4.5E-05	3.5E-03	9.7E-09	2.2E+00	1.7E+02		1.8E+02	H
RDX	1.0E+02	4.1E-06	2.3E-04	8.8E-10	1.4E-03	7.5E-02		7.7E-02	
gamma-Chlordane	8.9E-01	3.6E-08	8.0E-07	7.8E-12	7.2E-05	1.6E-03	3.9E-08	1.7E-03	
Organics Pathway Total					2.3E+00	1.8E+02	3.9E-08	1.8E+02	
Pathway Total – Chemicals					2.3E+00	1.8E+02	5.0E-04	1.8E+02	
Change Houses (CB-12, -23, -8, and -22)									
Antimony	2.3E+00	9.2E-08	5.1E-08	2.0E-11	2.3E-04	8.5E-04		1.1E-03	
Arsenic	1.2E+01	5.0E-07	8.2E-06	1.1E-10	1.7E-03	2.7E-02		2.9E-02	
Cadmium	3.3E+00	1.3E-07	7.4E-08	2.9E-11	1.3E-04	3.0E-03		3.1E-03	
Manganese	8.3E+02	3.4E-05	1.9E-05	7.3E-09	7.4E-04	1.0E-02	5.1E-04	1.1E-02	
Thallium	4.3E-01	1.8E-08	9.8E-09	3.8E-12	2.2E-04	1.2E-04		3.4E-04	
Inorganics Pathway Total					3.0E-03	4.2E-02	5.1E-04	4.5E-02	
Benzo(*a*)pyrene	9.2E-02	3.8E-09	2.7E-07	8.1E-13					
Organics Pathway Total									
Pathway Total – Chemicals					3.0E-03	4.2E-02	5.1E-04	4.5E-02	
Perimeter Area									
Aluminum	1.4E+04	5.7E-04	3.2E-04	1.2E-07	5.7E-04	3.2E-04	8.7E-05	9.8E-04	
Arsenic	1.3E+01	5.1E-07	8.5E-06	1.1E-10	1.7E-03	2.8E-02		3.0E-02	
Manganese	1.4E+03	5.7E-05	3.2E-05	1.2E-08	1.2E-03	1.7E-02	8.6E-04	1.9E-02	
Thallium	6.4E-01	2.6E-08	1.5E-08	5.7E-12	3.3E-04	1.8E-04		5.1E-04	
Inorganics Pathway Total					3.8E-03	4.6E-02	9.5E-04	5.1E-02	
Pathway Total – Chemicals					3.8E-03	4.6E-02	9.5E-04	5.1E-02	
Water Tower									
Chromium	2.5E+02	1.0E-05	5.7E-06	2.2E-09	6.8E-06	2.9E-04		3.0E-04	
Thallium	6.4E-01	2.6E-08	1.5E-08	5.7E-12	3.3E-04	1.8E-04		5.1E-04	

Table A-18. Load Line 1 Shallow Surface Soil Hazards (continued)

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Hazard Quotient			Total HI Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
Inorganics Pathway Total					3.4E-04	4.7E-04		8.1E-04	
Pathway Total – Chemicals					3.4E-04	4.7E-04		8.1E-04	
Dust/Fire Suppression									
CB-13 and -10									
Aluminum	1.3E+04	1.3E-04	7.5E-06	6.1E-08	1.3E-04	7.5E-06	4.3E-05	1.8E-04	
Antimony	1.3E+00	1.2E-08	7.3E-10	5.9E-12	3.1E-05	1.2E-05		4.3E-05	
Arsenic	1.1E+01	1.1E-07	1.9E-07	5.2E-11	3.6E-04	6.5E-04		1.0E-03	
Cadmium	6.2E+00	6.1E-08	3.6E-09	2.9E-11	6.1E-05	1.4E-04		2.0E-04	
Chromium	3.5E+01	3.4E-07	2.0E-08	1.7E-10	2.3E-07	1.0E-06		1.3E-06	
Copper	1.9E+02	1.9E-06	1.1E-07	9.0E-10	4.7E-05	2.8E-06		5.0E-05	
Manganese	1.3E+03	1.3E-05	7.5E-07	6.1E-09	2.8E-04	4.1E-04	4.3E-04	1.1E-03	
Thallium	4.9E-01	4.8E-09	2.8E-10	2.3E-12	6.0E-05	3.5E-06		6.3E-05	
Inorganics Pathway Total					9.6E-04	1.2E-03	4.7E-04	2.7E-03	
2,4,6-Trinitrotoluene	2.5E+01	2.5E-07	1.5E-06	1.2E-10	4.9E-04	2.9E-03		3.4E-03	
2,4-Dinitrotoluene	1.5E+00	1.5E-08	8.6E-08	7.0E-12	7.3E-06	4.3E-05		5.0E-05	
Benzo(*a*)pyrene	3.7E-01	3.6E-09	2.8E-08	1.7E-12					
PCB-1254	1.7E+00	1.7E-08	1.4E-07	8.0E-12	8.3E-04	6.9E-03		7.7E-03	
RDX	3.7E+00	3.6E-08	2.1E-07	1.7E-11	1.2E-05	7.1E-05		8.4E-05	
Organics Pathway Total					1.3E-03	1.0E-02		1.1E-02	
Pathway Total – Chemicals					2.3E-03	1.1E-02	4.7E-04	1.4E-02	
CB-14, CB-17, and CA-15									
Aluminum	2.0E+04	1.9E-04	1.2E-05	9.4E-08	1.9E-04	1.2E-05	6.6E-05	2.7E-04	
Arsenic	2.1E+01	2.1E-07	3.7E-07	1.0E-10	7.0E-04	1.2E-03		1.9E-03	
Barium	1.4E+02	1.3E-06	7.9E-08	6.4E-10	1.9E-05	1.6E-05	4.4E-06	3.9E-05	
Cadmium	2.1E+00	2.0E-08	1.2E-09	9.8E-12	2.0E-05	4.8E-05		6.8E-05	
Manganese	1.2E+03	1.2E-05	6.9E-07	5.5E-09	2.5E-04	3.7E-04	3.9E-04	1.0E-03	
Nickel	3.2E+01	3.1E-07	1.8E-08	1.5E-10	1.6E-05	2.3E-05		3.9E-05	
Thallium	9.1E-01	8.9E-09	5.3E-10	4.3E-12	1.1E-04	6.6E-06		1.2E-04	
Vanadium	3.5E+01	3.4E-07	2.0E-08	1.6E-10	4.9E-05	1.1E-04		1.6E-04	
Inorganics Pathway Total					1.4E-03	1.8E-03	4.6E-04	3.7E-03	
2,4,6-Trinitrotoluene	4.5E+00	4.4E-08	2.6E-07	2.1E-11	8.8E-05	5.2E-04		6.1E-04	
Benz(*a*)anthracene	6.4E-01	6.3E-09	4.8E-08	3.0E-12					
Benzo(*a*)pyrene	8.2E-01	8.0E-09	6.2E-08	3.9E-12					
Benzo(*b*)fluoranthene	1.1E+00	1.1E-08	8.3E-08	5.2E-12					
Dibenz(*a,h*)anthracene	1.8E-01	1.8E-09	1.4E-08	8.5E-13					
Indeno(1,2,3-*cd*)pyrene	6.4E-01	6.3E-09	4.8E-08	3.0E-12					
PCB-1254	4.7E+00	4.6E-08	3.8E-07	2.2E-11	2.3E-03	1.9E-02		2.1E-02	
RDX	2.9E+01	2.8E-07	1.7E-06	1.3E-10	9.3E-05	5.5E-04		6.5E-04	
Organics Pathway Total					2.5E-03	2.0E-02		2.3E-02	
Pathway Total – Chemicals					3.8E-03	2.2E-02	4.6E-04	2.6E-02	
CB-3 and -801									
Aluminum	1.2E+04	1.2E-04	7.0E-06	5.7E-08	1.2E-04	7.0E-06	4.0E-05	1.6E-04	
Antimony	1.1E+02	1.1E-06	6.4E-08	5.2E-10	2.7E-03	1.1E-03		3.7E-03	
Arsenic	1.3E+01	1.3E-07	2.2E-07	6.1E-11	4.2E-04	7.5E-04		1.2E-03	
Cadmium	6.3E+00	6.1E-08	3.6E-09	3.0E-11	6.1E-05	1.5E-04		2.1E-04	
Manganese	1.3E+03	1.2E-05	7.3E-07	5.9E-09	2.7E-04	4.0E-04	4.2E-04	1.1E-03	
Thallium	6.0E-01	5.9E-09	3.5E-10	2.8E-12	7.3E-05	4.4E-06		7.8E-05	
Inorganics Pathway Total					3.6E-03	2.4E-03	4.5E-04	6.4E-03	
Benz(*a*)anthracene	1.4E+01	1.4E-07	1.1E-06	6.6E-11					
Benzo(*a*)pyrene	1.3E+01	1.3E-07	9.8E-07	6.1E-11					
Benzo(*b*)fluoranthene	1.5E+01	1.5E-07	1.1E-06	7.1E-11					
Dibenz(*a,h*)anthracene	1.2E+00	1.1E-08	8.7E-08	5.4E-12					

Table A-18. Load Line 1 Shallow Surface Soil Hazards (continued)

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Hazard Quotient			Total HI Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
Dieldrin	3.3E-02	3.3E-10	1.9E-09	1.6E-13	6.5E-06	3.9E-05		4.5E-05	
Indeno(1,2,3-*cd*)pyrene	8.7E+00	8.5E-08	6.6E-07	4.1E-11					
PCB-1254	4.3E+00	4.2E-08	3.5E-07	2.0E-11	2.1E-03	1.7E-02		2.0E-02	
Organics Pathway Total					2.1E-03	1.8E-02		2.0E-02	
Pathway Total – Chemicals					5.7E-03	2.0E-02	4.5E-04	2.6E-02	
CB-4/4A and CA-6/6A									
Aluminum	1.0E+04	9.9E-05	5.9E-06	4.8E-08	9.9E-05	5.9E-06	3.3E-05	1.4E-04	
Arsenic	1.1E+01	1.1E-07	1.9E-07	5.1E-11	3.6E-04	6.3E-04		9.9E-04	
Barium	1.4E+02	1.4E-06	8.1E-08	6.5E-10	1.9E-05	1.6E-05	4.6E-06	4.0E-05	
Cadmium	1.8E+00	1.8E-08	1.1E-09	8.5E-12	1.8E-05	4.2E-05		6.0E-05	
Chromium	2.5E+01	2.4E-07	1.4E-08	1.2E-10	1.6E-07	7.4E-07		9.0E-07	
Copper	1.1E+02	1.0E-06	6.2E-08	5.0E-10	2.6E-05	1.5E-06		2.7E-05	
Manganese	7.0E+02	6.9E-06	4.1E-07	3.3E-09	1.5E-04	2.2E-04	2.3E-04	6.0E-04	
Mercury	3.4E-01	3.3E-09	2.0E-10	1.6E-12	1.1E-05	9.5E-06		2.1E-05	
Thallium	5.4E-01	5.2E-09	3.1E-10	2.5E-12	6.5E-05	3.9E-06		6.9E-05	
Vanadium	1.9E+01	1.9E-07	1.1E-08	9.0E-11	2.7E-05	6.1E-05		8.7E-05	
Inorganics Pathway Total					7.7E-04	1.0E-03	2.7E-04	2.0E-03	
1,3-Dinitrobenzene	5.9E+00	5.8E-08	3.4E-07	2.8E-11	5.8E-04	3.4E-03		4.0E-03	
2,4,6-Trinitrotoluene	3.0E+02	2.9E-06	1.7E-05	1.4E-09	5.8E-03	3.5E-02		4.0E-02	
2,6-Dinitrotoluene	8.6E-01	8.4E-09	5.0E-08	4.0E-12	8.4E-06	5.0E-05		5.8E-05	
4,4'-DDE	1.2E+00	1.2E-08	6.9E-08	5.6E-12					
Benz(*a*)anthracene	6.4E-01	6.3E-09	4.8E-08	3.0E-12					
Benzo(*a*)pyrene	6.1E-01	6.0E-09	4.6E-08	2.9E-12					
Benzo(*b*)fluoranthene	6.6E-01	6.5E-09	5.0E-08	3.1E-12					
Dibenz(*a*,*h*)anthracene	9.6E-02	9.4E-10	7.3E-09	4.5E-13					
Dieldrin	9.8E-02	9.6E-10	5.7E-09	4.6E-13	1.9E-05	1.1E-04		1.3E-04	
Endrin Aldehyde	4.4E+00	4.3E-08	2.6E-07	2.1E-11	1.4E-04	8.5E-04		1.0E-03	
Heptachlor	7.2E-02	7.0E-10	4.2E-09	3.4E-13	1.4E-06	8.4E-06		9.8E-06	
PCB-1254	1.1E+03	1.1E-05	9.0E-05	5.2E-09	5.4E-01	4.5E+00		5.0E+00	H
RDX	1.0E+02	9.8E-07	5.8E-06	4.7E-10	3.3E-04	1.9E-03		2.3E-03	
gamma-Chlordane	8.9E-01	8.7E-09	2.1E-08	4.2E-12	1.7E-05	4.1E-05	2.1E-08	5.9E-05	
Organics Pathway Total					5.5E-01	4.5E+00	2.1E-08	5.1E+00	
Pathway Total – Chemicals					5.5E-01	4.5E+00	2.7E-04	5.1E+00	
Change Houses (CB-12, -23, -8, and -22)									
Antimony	2.3E+00	2.2E-08	1.3E-09	1.1E-11	5.5E-05	2.2E-05		7.7E-05	
Arsenic	1.2E+01	1.2E-07	2.1E-07	5.7E-11	4.0E-04	7.1E-04		1.1E-03	
Cadmium	3.3E+00	3.2E-08	1.9E-09	1.5E-11	3.2E-05	7.6E-05		1.1E-04	
Manganese	8.3E+02	8.1E-06	4.8E-07	3.9E-09	1.8E-04	2.6E-04	2.7E-04	7.1E-04	
Thallium	4.3E-01	4.2E-09	2.5E-10	2.0E-12	5.3E-05	3.1E-06		5.6E-05	
Inorganics Pathway Total					7.1E-04	1.1E-03	2.7E-04	2.1E-03	
Benzo(*a*)pyrene	9.2E-02	9.0E-10	7.0E-09	4.3E-13					
Organics Pathway Total									
Pathway Total – Chemicals					7.1E-04	1.1E-03	2.7E-04	2.1E-03	
Perimeter Area									
Aluminum	1.4E+04	1.4E-04	8.2E-06	6.6E-08	1.4E-04	8.2E-06	4.6E-05	1.9E-04	
Arsenic	1.3E+01	1.2E-07	2.2E-07	5.9E-11	4.1E-04	7.3E-04		1.1E-03	
Manganese	1.4E+03	1.4E-05	8.1E-07	6.6E-09	3.0E-04	4.4E-04	4.6E-04	1.2E-03	
Thallium	6.4E-01	6.3E-09	3.7E-10	3.0E-12	7.9E-05	4.7E-06		8.3E-05	
Inorganics Pathway Total					9.2E-04	1.2E-03	5.1E-04	2.6E-03	
Pathway Total – Chemicals					9.2E-04	1.2E-03	5.1E-04	2.6E-03	
Water Tower									
Chromium	2.5E+02	2.5E-06	1.5E-07	1.2E-09	1.6E-06	7.5E-06		9.1E-06	
Thallium	6.4E-01	6.3E-09	3.7E-10	3.0E-12	7.9E-05	4.7E-06		8.4E-05	

Table A-18. Load Line 1 Shallow Surface Soil Hazards (continued)

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Hazard Quotient			Total HI Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
Inorganics Pathway Total					8.1E-05	1.2E-05		9.3E-05	
Pathway Total – Chemicals					8.1E-05	1.2E-05		9.3E-05	
Resident Farmer Adult									
CB-13 and -10									
Aluminum	1.3E+04	1.8E-02	4.0E-04	3.8E-06	1.8E-02	4.0E-04	2.7E-03	2.1E-02	
Antimony	1.3E+00	1.7E-06	3.9E-08	3.7E-10	4.3E-03	6.6E-04		5.0E-03	
Arsenic	1.1E+01	1.5E-05	1.0E-05	3.3E-09	5.1E-02	3.5E-02		8.5E-02	
Cadmium	6.2E+00	8.5E-06	1.9E-07	1.8E-09	8.5E-03	7.7E-03		1.6E-02	
Chromium	3.5E+01	4.8E-05	1.1E-06	1.0E-08	3.2E-05	5.6E-05		8.9E-05	
Copper	1.9E+02	2.6E-04	6.0E-06	5.7E-08	6.6E-03	1.5E-04		6.7E-03	
Manganese	1.3E+03	1.8E-03	4.1E-05	3.9E-07	3.9E-02	2.2E-02	2.7E-02	8.8E-02	
Thallium	4.9E-01	6.7E-07	1.5E-08	1.4E-10	8.3E-03	1.9E-04		8.5E-03	
Inorganics Pathway Total					1.3E-01	6.6E-02	3.0E-02	2.3E-01	
2,4,6-Trinitrotoluene	2.5E+01	3.5E-05	7.9E-05	7.5E-09	6.9E-02	1.6E-01		2.3E-01	
2,4-Dinitrotoluene	1.5E+00	2.0E-06	4.6E-06	4.4E-10	1.0E-03	2.3E-03		3.3E-03	
Benzo(*a*)pyrene	3.7E-01	5.1E-07	1.5E-06	1.1E-10					
PCB-1254	1.7E+00	2.3E-06	7.4E-06	5.0E-10	1.2E-01	3.7E-01		4.9E-01	
RDX	3.7E+00	5.1E-06	1.2E-05	1.1E-09	1.7E-03	3.8E-03		5.5E-03	
Organics Pathway Total					1.9E-01	5.4E-01		7.2E-01	
Pathway Total – Chemicals					3.2E-01	6.0E-01	3.0E-02	9.5E-01	
CB-14, CB-17, and CA-15									
Aluminum	2.0E+04	2.7E-02	6.2E-04	5.9E-06	2.7E-02	6.2E-04	4.1E-03	3.2E-02	
Arsenic	2.1E+01	2.9E-05	2.0E-05	6.4E-09	9.8E-02	6.7E-02		1.6E-01	
Barium	1.4E+02	1.9E-04	4.2E-06	4.0E-08	2.6E-03	8.6E-04	2.8E-04	3.8E-03	
Cadmium	2.1E+00	2.8E-06	6.5E-08	6.1E-10	2.8E-03	2.6E-03		5.4E-03	
Manganese	1.2E+03	1.6E-03	3.7E-05	3.5E-07	3.5E-02	2.0E-02	2.4E-02	8.0E-02	
Nickel	3.2E+01	4.4E-05	9.9E-07	9.4E-09	2.2E-03	1.2E-03		3.4E-03	
Thallium	9.1E-01	1.2E-06	2.8E-08	2.7E-10	1.6E-02	3.6E-04		1.6E-02	
Vanadium	3.5E+01	4.8E-05	1.1E-06	1.0E-08	6.8E-03	6.0E-03		1.3E-02	
Inorganics Pathway Total					1.9E-01	9.9E-02	2.9E-02	3.2E-01	
2,4,6-Trinitrotoluene	4.5E+00	6.2E-06	1.4E-05	1.3E-09	1.2E-02	2.8E-02		4.0E-02	
Benz(*a*)anthracene	6.4E-01	8.8E-07	2.6E-06	1.9E-10					
Benzo(*a*)pyrene	8.2E-01	1.1E-06	3.3E-06	2.4E-10					
Benzo(*b*)fluoranthene	1.1E+00	1.5E-06	4.5E-06	3.3E-10					
Dibenz(*a,h*)anthracene	1.8E-01	2.5E-07	7.3E-07	5.3E-11					
Indeno(1,2,3-*cd*)pyrene	6.4E-01	8.8E-07	2.6E-06	1.9E-10					
PCB-1254	4.7E+00	6.4E-06	2.1E-05	1.4E-09	3.2E-01	1.0E+00		1.3E+00	H
RDX	2.9E+01	3.9E-05	8.9E-05	8.5E-09	1.3E-02	3.0E-02		4.3E-02	
Organics Pathway Total					3.5E-01	1.1E+00		1.4E+00	
Pathway Total – Chemicals					5.4E-01	1.2E+00	2.9E-02	1.8E+00	
CB-3 and -801									
Aluminum	1.2E+04	1.6E-02	3.8E-04	3.6E-06	1.6E-02	3.8E-04	2.5E-03	1.9E-02	
Antimony	1.1E+02	1.5E-04	3.4E-06	3.3E-08	3.8E-01	5.7E-02		4.3E-01	
Arsenic	1.3E+01	1.8E-05	1.2E-05	3.8E-09	5.9E-02	4.0E-02		9.9E-02	
Cadmium	6.3E+00	8.6E-06	2.0E-07	1.9E-09	8.6E-03	7.8E-03		1.6E-02	
Manganese	1.3E+03	1.7E-03	3.9E-05	3.7E-07	3.8E-02	2.1E-02	2.6E-02	8.5E-02	
Thallium	6.0E-01	8.2E-07	1.9E-08	1.8E-10	1.0E-02	2.3E-04		1.1E-02	
Inorganics Pathway Total					5.1E-01	1.3E-01	2.9E-02	6.6E-01	
Benz(*a*)anthracene	1.4E+01	1.9E-05	5.7E-05	4.2E-09					
Benzo(*a*)pyrene	1.3E+01	1.8E-05	5.3E-05	3.9E-09					
Benzo(*b*)fluoranthene	1.5E+01	2.1E-05	6.1E-05	4.4E-09					
Dibenz(*a,h*)anthracene	1.2E+00	1.6E-06	4.7E-06	3.4E-10					

Table A-18. Load Line 1 Shallow Surface Soil Hazards (continued)

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Hazard Quotient			Total HI Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
Dieldrin	3.3E-02	4.6E-08	1.0E-07	9.9E-12	9.1E-04	2.1E-03		3.0E-03	
Indeno(1,2,3-*cd*)pyrene	8.7E+00	1.2E-05	3.5E-05	2.6E-09					
PCB-1254	4.3E+00	5.9E-06	1.9E-05	1.3E-09	2.9E-01	9.4E-01		1.2E+00	H
Organics Pathway Total					3.0E-01	9.4E-01		1.2E+00	
Pathway Total – Chemicals					8.0E-01	1.1E+00	2.9E-02	1.9E+00	
CB-4/4A and CA-6/6A									
Aluminum	1.0E+04	1.4E-02	3.2E-04	3.0E-06	1.4E-02	3.2E-04	2.1E-03	1.6E-02	
Arsenic	1.1E+01	1.5E-05	1.0E-05	3.2E-09	5.0E-02	3.4E-02		8.4E-02	
Barium	1.4E+02	1.9E-04	4.3E-06	4.1E-08	2.7E-03	8.9E-04	2.9E-04	3.9E-03	
Cadmium	1.8E+00	2.5E-06	5.7E-08	5.4E-10	2.5E-03	2.3E-03		4.7E-03	
Chromium	2.5E+01	3.4E-05	7.8E-07	7.4E-09	2.3E-05	4.0E-05		6.3E-05	
Copper	1.1E+02	1.5E-04	3.3E-06	3.1E-08	3.6E-03	8.3E-05		3.7E-03	
Manganese	7.0E+02	9.6E-04	2.2E-05	2.1E-07	2.1E-02	1.2E-02	1.5E-02	4.7E-02	
Mercury	3.4E-01	4.7E-07	1.1E-08	1.0E-10	1.6E-03	5.1E-04		2.1E-03	
Thallium	5.4E-01	7.3E-07	1.7E-08	1.6E-10	9.2E-03	2.1E-04		9.4E-03	
Vanadium	1.9E+01	2.6E-05	5.9E-07	5.7E-09	3.7E-03	3.3E-03		7.0E-03	
Inorganics Pathway Total					1.1E-01	5.3E-02	1.7E-02	1.8E-01	
1,3-Dinitrobenzene	5.9E+00	8.1E-06	1.8E-05	1.7E-09	8.1E-02	1.8E-01		2.6E-01	
2,4,6-Trinitrotoluene	3.0E+02	4.1E-04	9.3E-04	8.8E-08	8.1E-01	1.9E+00		2.7E+00	H
2,6-Dinitrotoluene	8.6E-01	1.2E-06	2.7E-06	2.6E-10	1.2E-03	2.7E-03		3.9E-03	
4,4'-DDE	1.2E+00	1.6E-06	3.7E-06	3.5E-10					
Benz(*a*)anthracene	6.4E-01	8.8E-07	2.6E-06	1.9E-10					
Benzo(*a*)pyrene	6.1E-01	8.3E-07	2.5E-06	1.8E-10					
Benzo(*b*)fluoranthene	6.6E-01	9.1E-07	2.7E-06	2.0E-10					
Dibenz(*a*,*h*)anthracene	9.6E-02	1.3E-07	3.9E-07	2.8E-11					
Dieldrin	9.8E-02	1.3E-07	3.1E-07	2.9E-11	2.7E-03	6.2E-03		8.8E-03	
Endrin Aldehyde	4.4E+00	6.0E-06	1.4E-05	1.3E-09	2.0E-02	4.6E-02		6.6E-02	
Heptachlor	7.2E-02	9.8E-08	2.2E-07	2.1E-11	2.0E-04	4.5E-04		6.5E-04	
PCB-1254	1.1E+03	1.5E-03	4.8E-03	3.3E-07	7.5E+01	2.4E+02		3.2E+02	H
RDX	1.0E+02	1.4E-04	3.1E-04	3.0E-08	4.6E-02	1.0E-01		1.5E-01	
gamma-Chlordane	8.9E-01	1.2E-06	1.1E-06	2.6E-10	2.4E-03	2.2E-03	1.3E-06	4.7E-03	
Organics Pathway Total					7.6E+01	2.4E+02	1.3E-06	3.2E+02	
Pathway Total – Chemicals					7.6E+01	2.4E+02	1.7E-02	3.2E+02	
Change Houses (CB-12, -23, -8, and -22)									
Antimony	2.3E+00	3.1E-06	7.0E-08	6.7E-10	7.7E-03	1.2E-03		8.9E-03	
Arsenic	1.2E+01	1.7E-05	1.1E-05	3.6E-09	5.6E-02	3.8E-02		9.4E-02	
Cadmium	3.3E+00	4.5E-06	1.0E-07	9.7E-10	4.5E-03	4.1E-03		8.6E-03	
Manganese	8.3E+02	1.1E-03	2.6E-05	2.5E-07	2.5E-02	1.4E-02	1.7E-02	5.6E-02	
Thallium	4.3E-01	5.9E-07	1.4E-08	1.3E-10	7.4E-03	1.7E-04		7.6E-03	
Inorganics Pathway Total					1.0E-01	5.8E-02	1.7E-02	1.7E-01	
Benzo(*a*)pyrene	9.2E-02	1.3E-07	3.7E-07	2.7E-11					
Organics Pathway Total									
Pathway Total – Chemicals					1.0E-01	5.8E-02	1.7E-02	1.7E-01	
Perimeter Area									
Aluminum	1.4E+04	1.9E-02	4.4E-04	4.2E-06	1.9E-02	4.4E-04	2.9E-03	2.3E-02	
Arsenic	1.3E+01	1.7E-05	1.2E-05	3.7E-09	5.7E-02	3.9E-02		9.6E-02	
Manganese	1.4E+03	1.9E-03	4.4E-05	4.1E-07	4.2E-02	2.4E-02	2.9E-02	9.4E-02	
Thallium	6.4E-01	8.8E-07	2.0E-08	1.9E-10	1.1E-02	2.5E-04		1.1E-02	
Inorganics Pathway Total					1.3E-01	6.4E-02	3.2E-02	2.2E-01	
Pathway Total – Chemicals					1.3E-01	6.4E-02	3.2E-02	2.2E-01	
Water Tower									
Chromium	2.5E+02	3.4E-04	7.8E-06	7.4E-08	2.3E-04	4.0E-04		6.3E-04	
Thallium	6.4E-01	8.8E-07	2.0E-08	1.9E-10	1.1E-02	2.5E-04		1.1E-02	

Table A-18. Load Line 1 Shallow Surface Soil Hazards (continued)

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Hazard Quotient			Total HI Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
Inorganics Pathway Total					1.1E-02	6.5E-04		1.2E-02	
Pathway Total – Chemicals					1.1E-02	6.5E-04		1.2E-02	
Resident Farmer Child									
CB-13 and -10									
Aluminum	1.3E+04	1.7E-01	3.6E-04	9.0E-06	1.7E-01	3.6E-04	6.3E-03	1.7E-01	
Antimony	1.3E+00	1.6E-05	3.5E-08	8.7E-10	4.0E-02	5.9E-04		4.1E-02	
Arsenic	1.1E+01	1.4E-04	9.4E-06	7.7E-09	4.7E-01	3.1E-02		5.0E-01	
Cadmium	6.2E+00	7.9E-05	1.7E-07	4.3E-09	7.9E-02	7.0E-03		8.6E-02	
Chromium	3.5E+01	4.5E-04	9.9E-07	2.4E-08	3.0E-04	5.1E-05		3.5E-04	
Copper	1.9E+02	2.5E-03	5.4E-06	1.3E-07	6.1E-02	1.4E-04		6.2E-02	
Manganese	1.3E+03	1.7E-02	3.7E-05	9.0E-07	3.6E-01	2.0E-02	6.3E-02	4.4E-01	
Thallium	4.9E-01	6.2E-06	1.4E-08	3.4E-10	7.8E-02	1.7E-04		7.8E-02	
Inorganics Pathway Total					1.3E+00	5.9E-02	6.9E-02	1.4E+00	
2,4,6-Trinitrotoluene	2.5E+01	3.2E-04	7.1E-05	1.7E-08	6.5E-01	1.4E-01		7.9E-01	
2,4-Dinitrotoluene	1.5E+00	1.9E-05	4.2E-06	1.0E-09	9.5E-03	2.1E-03		1.2E-02	
Benzo(*a*)pyrene	3.7E-01	4.7E-06	1.4E-06	2.6E-10					
PCB-1254	1.7E+00	2.2E-05	6.7E-06	1.2E-09	1.1E+00	3.3E-01		1.4E+00	H
RDX	3.7E+00	4.7E-05	1.0E-05	2.6E-09	1.6E-02	3.5E-03		1.9E-02	
Organics Pathway Total					1.8E+00	4.8E-01		2.2E+00	
Pathway Total – Chemicals					3.0E+00	5.4E-01	6.9E-02	3.6E+00	
CB-14, CB-17, and CA-15									
Aluminum	2.0E+04	2.5E-01	5.6E-04	1.4E-05	2.5E-01	5.6E-04	9.6E-03	2.6E-01	
Arsenic	2.1E+01	2.7E-04	1.8E-05	1.5E-08	9.1E-01	6.0E-02		9.7E-01	
Barium	1.4E+02	1.7E-03	3.8E-06	9.4E-08	2.5E-02	7.8E-04	6.5E-04	2.6E-02	
Cadmium	2.1E+00	2.7E-05	5.8E-08	1.4E-09	2.7E-02	2.3E-03		2.9E-02	
Manganese	1.2E+03	1.5E-02	3.3E-05	8.2E-07	3.3E-01	1.8E-02	5.7E-02	4.0E-01	
Nickel	3.2E+01	4.1E-04	8.9E-07	2.2E-08	2.0E-02	1.1E-03		2.1E-02	
Thallium	9.1E-01	1.2E-05	2.6E-08	6.3E-10	1.5E-01	3.2E-04		1.5E-01	
Vanadium	3.5E+01	4.5E-04	9.8E-07	2.4E-08	6.4E-02	5.4E-03		6.9E-02	
Inorganics Pathway Total					1.8E+00	8.9E-02	6.7E-02	1.9E+00	
2,4,6-Trinitrotoluene	4.5E+00	5.8E-05	1.3E-05	3.1E-09	1.2E-01	2.5E-02		1.4E-01	
Benz(*a*)anthracene	6.4E-01	8.2E-06	2.3E-06	4.4E-10					
Benzo(*a*)pyrene	8.2E-01	1.1E-05	3.0E-06	5.7E-10					
Benzo(*b*)fluoranthene	1.1E+00	1.4E-05	4.0E-06	7.6E-10					
Dibenz(*a,h*)anthracene	1.8E-01	2.3E-06	6.6E-07	1.2E-10					
Indeno(1,2,3-*cd*)pyrene	6.4E-01	8.2E-06	2.3E-06	4.4E-10					
PCB-1254	4.7E+00	6.0E-05	1.9E-05	3.3E-09	3.0E+00	9.3E-01		3.9E+00	H
RDX	2.9E+01	3.6E-04	8.0E-05	2.0E-08	1.2E-01	2.7E-02		1.5E-01	
Organics Pathway Total					3.2E+00	9.8E-01		4.2E+00	
Pathway Total – Chemicals					5.0E+00	1.1E+00	6.7E-02	6.2E+00	
CB-3 and -801									
Aluminum	1.2E+04	1.5E-01	3.4E-04	8.3E-06	1.5E-01	3.4E-04	5.8E-03	1.6E-01	
Antimony	1.1E+02	1.4E-03	3.1E-06	7.6E-08	3.5E+00	5.1E-02		3.6E+00	H
Arsenic	1.3E+01	1.6E-04	1.1E-05	8.9E-09	5.5E-01	3.6E-02		5.9E-01	
Cadmium	6.3E+00	8.0E-05	1.8E-07	4.3E-09	8.0E-02	7.1E-03		8.7E-02	
Manganese	1.3E+03	1.6E-02	3.5E-05	8.7E-07	3.5E-01	1.9E-02	6.1E-02	4.3E-01	
Thallium	6.0E-01	7.7E-06	1.7E-08	4.2E-10	9.6E-02	2.1E-04		9.6E-02	
Inorganics Pathway Total					4.7E+00	1.1E-01	6.7E-02	4.9E+00	
Benz(*a*)anthracene	1.4E+01	1.8E-04	5.1E-05	9.7E-09					
Benzo(*a*)pyrene	1.3E+01	1.7E-04	4.8E-05	9.0E-09					
Benzo(*b*)fluoranthene	1.5E+01	1.9E-04	5.5E-05	1.0E-08					
Dibenz(*a,h*)anthracene	1.2E+00	1.5E-05	4.2E-06	8.0E-10					

Table A-18. Load Line 1 Shallow Surface Soil Hazards (continued)

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Hazard Quotient			Total HI Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
Dieldrin	3.3E-02	4.3E-07	9.4E-08	2.3E-11	8.5E-03	1.9E-03		1.0E-02	
Indeno(1,2,3-*cd*)pyrene	8.7E+00	1.1E-04	3.2E-05	6.0E-09					
PCB-1254	4.3E+00	5.5E-05	1.7E-05	3.0E-09	2.7E+00	8.5E-01		3.6E+00	H
Organics Pathway Total					2.8E+00	8.5E-01		3.6E+00	
Pathway Total – Chemicals					7.5E+00	9.6E-01	6.7E-02	8.5E+00	
CB-4/4A and CA-6/6A									
Aluminum	1.0E+04	1.3E-01	2.8E-04	7.0E-06	1.3E-01	2.8E-04	4.9E-03	1.3E-01	
Arsenic	1.1E+01	1.4E-04	9.2E-06	7.5E-09	4.6E-01	3.1E-02		4.9E-01	
Barium	1.4E+02	1.8E-03	3.9E-06	9.6E-08	2.5E-02	8.0E-04	6.7E-04	2.7E-02	
Cadmium	1.8E+00	2.3E-05	5.1E-08	1.3E-09	2.3E-02	2.0E-03		2.5E-02	
Chromium	2.5E+01	3.2E-04	7.0E-07	1.7E-08	2.1E-04	3.6E-05		2.5E-04	
Copper	1.1E+02	1.4E-03	3.0E-06	7.3E-08	3.4E-02	7.5E-05		3.4E-02	
Manganese	7.0E+02	9.0E-03	2.0E-05	4.8E-07	1.9E-01	1.1E-02	3.4E-02	2.4E-01	
Mercury	3.4E-01	4.4E-06	9.6E-09	2.4E-10	1.5E-02	4.6E-04		1.5E-02	
Thallium	5.4E-01	6.8E-06	1.5E-08	3.7E-10	8.6E-02	1.9E-04		8.6E-02	
Vanadium	1.9E+01	2.4E-04	5.4E-07	1.3E-08	3.5E-02	2.9E-03		3.8E-02	
Inorganics Pathway Total					1.0E+00	4.8E-02	4.0E-02	1.1E+00	
1,3-Dinitrobenzene	5.9E+00	7.5E-05	1.7E-05	4.1E-09	7.5E-01	1.7E-01		9.2E-01	
2,4,6-Trinitrotoluene	3.0E+02	3.8E-03	8.4E-04	2.1E-07	7.6E+00	1.7E+00		9.3E+00	H
2,6-Dinitrotoluene	8.6E-01	1.1E-05	2.4E-06	6.0E-10	1.1E-02	2.4E-03		1.3E-02	
4,4'-DDE	1.2E+00	1.5E-05	3.4E-06	8.3E-10					
Benz(*a*)anthracene	6.4E-01	8.2E-06	2.3E-06	4.4E-10					
Benzo(*a*)pyrene	6.1E-01	7.8E-06	2.2E-06	4.2E-10					
Benzo(*b*)fluoranthene	6.6E-01	8.5E-06	2.4E-06	4.6E-10					
Dibenz(*a*,*h*)anthracene	9.6E-02	1.2E-06	3.5E-07	6.6E-11					
Dieldrin	9.8E-02	1.3E-06	2.8E-07	6.8E-11	2.5E-02	5.5E-03		3.1E-02	
Endrin Aldehyde	4.4E+00	5.6E-05	1.2E-05	3.0E-09	1.9E-01	4.1E-02		2.3E-01	
Heptachlor	7.2E-02	9.2E-07	2.0E-07	5.0E-11	1.8E-03	4.0E-04		2.2E-03	
PCB-1254	1.1E+03	1.4E-02	4.3E-03	7.6E-07	7.0E+02	2.2E+02		9.2E+02	H
RDX	1.0E+02	1.3E-03	2.8E-04	6.9E-08	4.3E-01	9.4E-02		5.2E-01	
gamma-Chlordane	8.9E-01	1.1E-05	1.0E-06	6.1E-10	2.3E-02	2.0E-03	3.1E-06	2.5E-02	
Organics Pathway Total					7.1E+02	2.2E+02	3.1E-06	9.3E+02	
Pathway Total – Chemicals					7.1E+02	2.2E+02	4.0E-02	9.3E+02	
Change Houses (CB-12, -23, -8, and -22)									
Antimony	2.3E+00	2.9E-05	6.3E-08	1.6E-09	7.2E-02	1.1E-03		7.3E-02	
Arsenic	1.2E+01	1.6E-04	1.0E-05	8.4E-09	5.2E-01	3.4E-02		5.5E-01	
Cadmium	3.3E+00	4.2E-05	9.2E-08	2.3E-09	4.2E-02	3.7E-03		4.6E-02	
Manganese	8.3E+02	1.1E-02	2.3E-05	5.7E-07	2.3E-01	1.3E-02	4.0E-02	2.8E-01	
Thallium	4.3E-01	5.5E-06	1.2E-08	3.0E-10	6.9E-02	1.5E-04		6.9E-02	
Inorganics Pathway Total					9.3E-01	5.2E-02	4.0E-02	1.0E+00	
Benzo(*a*)pyrene	9.2E-02	1.2E-06	3.4E-07	6.4E-11					
Organics Pathway Total									
Pathway Total – Chemicals					9.3E-01	5.2E-02	4.0E-02	1.0E+00	
Perimeter Area									
Aluminum	1.4E+04	1.8E-01	4.0E-04	9.7E-06	1.8E-01	4.0E-04	6.8E-03	1.9E-01	
Arsenic	1.3E+01	1.6E-04	1.1E-05	8.7E-09	5.3E-01	3.5E-02		5.7E-01	
Manganese	1.4E+03	1.8E-02	3.9E-05	9.7E-07	3.9E-01	2.1E-02	6.8E-02	4.8E-01	
Thallium	6.4E-01	8.2E-06	1.8E-08	4.4E-10	1.0E-01	2.3E-04		1.0E-01	
Inorganics Pathway Total					1.2E+00	5.7E-02	7.4E-02	1.3E+00	
Pathway Total – Chemicals					1.2E+00	5.7E-02	7.4E-02	1.3E+00	
Water Tower									
Chromium	2.5E+02	3.2E-03	7.0E-06	1.7E-07	2.1E-03	3.6E-04		2.5E-03	
Thallium	6.4E-01	8.2E-06	1.8E-08	4.5E-10	1.0E-01	2.3E-04		1.0E-01	

Table A-18. Load Line 1 Shallow Surface Soil Hazards (continued)

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Hazard Quotient			Total HI Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
Inorganics Pathway Total					1.1E-01	5.9E-04		1.1E-01	
Pathway Total – Chemicals					1.1E-01	5.9E-04		1.1E-01	

[a] Chemicals of potential concern (COPCs) are identified as chemicals of concern (COCs) if the total hazard index (HI) across all pathways is > 1 (H).
DDE = Dichlorodiphenyldichloroethylene.
EPC = Exposure point concentration.
PCB = Polychlorinated biphenyl.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.

Table A-19. Load Line 1 Shallow Surface Soil Risks

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Risk			Total Risk Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
Hunter/Trapper/Fisher									
CB-13 and -10									
Aluminum	1.3E+04	2.9E-05	2.6E-06	6.3E-09					
Antimony	1.3E+00	2.8E-09	2.5E-10	6.1E-13					
Arsenic	1.1E+01	2.5E-08	6.7E-08	5.4E-12	3.7E-08	1.0E-07	8.1E-11	1.4E-07	
Cadmium	6.2E+00	1.4E-08	1.2E-09	3.0E-12			1.9E-11	1.9E-11	
Chromium	3.5E+01	7.9E-08	7.1E-09	1.7E-11					
Copper	1.9E+02	4.3E-07	3.9E-08	9.3E-11					
Manganese	1.3E+03	2.9E-06	2.6E-07	6.3E-10					
Thallium	4.9E-01	1.1E-09	9.8E-11	2.4E-13					
Inorganics Pathway Total					3.7E-08	1.0E-07	1.0E-10	1.4E-07	
2,4,6-Trinitrotoluene	2.5E+01	5.6E-08	5.1E-07	1.2E-11	1.7E-09	1.5E-08		1.7E-08	
2,4-Dinitrotoluene	1.5E+00	3.3E-09	3.0E-08	7.2E-13	2.3E-09	2.0E-08		2.3E-08	
Benzo(*a*)pyrene	3.7E-01	8.3E-10	9.7E-09	1.8E-13	6.0E-09	7.1E-08	5.6E-13	7.7E-08	
PCB-1254	1.7E+00	3.8E-09	4.8E-08	8.2E-13	7.6E-09	9.6E-08	1.6E-12	1.0E-07	
RDX	3.7E+00	8.3E-09	7.4E-08	1.8E-12	9.1E-10	8.1E-09		9.1E-09	
Organics Pathway Total					1.9E-08	2.1E-07	2.2E-12	2.3E-07	
Pathway Total – Chemicals					5.6E-08	3.1E-07	1.0E-10	3.7E-07	
CB-14, CB-17, and CA-15									
Aluminum	2.0E+04	4.5E-05	4.0E-06	9.6E-09					
Arsenic	2.1E+01	4.8E-08	1.3E-07	1.0E-11	7.2E-08	1.9E-07	1.6E-10	2.7E-07	
Barium	1.4E+02	3.0E-07	2.7E-08	6.5E-11					
Cadmium	2.1E+00	4.6E-09	4.2E-10	1.0E-12			6.3E-12	6.3E-12	
Manganese	1.2E+03	2.6E-06	2.4E-07	5.7E-10					
Nickel	3.2E+01	7.1E-08	6.4E-09	1.5E-11					
Thallium	9.1E-01	2.0E-09	1.8E-10	4.4E-13					
Vanadium	3.5E+01	7.8E-08	7.0E-09	1.7E-11					
Inorganics Pathway Total					7.2E-08	1.9E-07	1.6E-10	2.7E-07	
2,4,6-Trinitrotoluene	4.5E+00	1.0E-08	9.0E-08	2.2E-12	3.0E-10	2.7E-09		3.0E-09	
Benz(*a*)anthracene	6.4E-01	1.4E-09	1.7E-08	3.1E-13	1.0E-09	1.2E-08	9.6E-14	1.3E-08	
Benzo(*a*)pyrene	8.2E-01	1.8E-09	2.1E-08	4.0E-13	1.3E-08	1.6E-07	1.2E-12	1.7E-07	
Benzo(*b*)fluoranthene	1.1E+00	2.5E-09	2.9E-08	5.3E-13	1.8E-09	2.1E-08	1.7E-13	2.3E-08	
Dibenz(*a*,*h*)anthracene	1.8E-01	4.0E-10	4.7E-09	8.7E-14	2.9E-09	3.4E-08	2.7E-13	3.7E-08	
Indeno(1,2,3-*cd*)pyrene	6.4E-01	1.4E-09	1.7E-08	3.1E-13	1.0E-09	1.2E-08	9.6E-14	1.3E-08	
PCB-1254	4.7E+00	1.1E-08	1.3E-07	2.3E-12	2.1E-08	2.6E-07	4.6E-12	2.9E-07	
RDX	2.9E+01	6.4E-08	5.7E-07	1.4E-11	7.0E-09	6.3E-08		7.0E-08	
Organics Pathway Total					4.9E-08	5.7E-07	6.4E-12	6.1E-07	
Pathway Total – Chemicals					1.2E-07	7.6E-07	1.7E-10	8.8E-07	
CB-3 and -801									
Aluminum	1.2E+04	2.7E-05	2.4E-06	5.8E-09					
Antimony	1.1E+02	2.5E-07	2.2E-08	5.3E-11					
Arsenic	1.3E+01	2.9E-08	7.8E-08	6.2E-12	4.3E-08	1.2E-07	9.4E-11	1.6E-07	
Cadmium	6.3E+00	1.4E-08	1.3E-09	3.0E-12			1.9E-11	1.9E-11	
Manganese	1.3E+03	2.8E-06	2.5E-07	6.1E-10					
Thallium	6.0E-01	1.3E-09	1.2E-10	2.9E-13					
Inorganics Pathway Total					4.3E-08	1.2E-07	1.1E-10	1.6E-07	
Benz(*a*)anthracene	1.4E+01	3.1E-08	3.7E-07	6.8E-12	2.3E-08	2.7E-07	2.1E-12	2.9E-07	
Benzo(*a*)pyrene	1.3E+01	2.9E-08	3.4E-07	6.3E-12	2.1E-07	2.5E-06	2.0E-11	2.7E-06	R
Benzo(*b*)fluoranthene	1.5E+01	3.4E-08	3.9E-07	7.3E-12	2.4E-08	2.9E-07	2.3E-12	3.1E-07	
Dibenz(*a*,*h*)anthracene	1.2E+00	2.6E-09	3.0E-08	5.6E-13	1.9E-08	2.2E-07	1.7E-12	2.4E-07	
Dieldrin	3.3E-02	7.5E-11	6.7E-10	1.6E-14	1.2E-09	1.1E-08	2.6E-13	1.2E-08	
Indeno(1,2,3-*cd*)pyrene	8.7E+00	1.9E-08	2.3E-07	4.2E-12	1.4E-08	1.7E-07	1.3E-12	1.8E-07	

Table A-19. Load Line 1 Shallow Surface Soil Risks (continued)

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Risk			Total Risk Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
PCB-1254	4.3E+00	9.6E-09	1.2E-07	2.1E-12	1.9E-08	2.4E-07	4.2E-12	2.6E-07	
Organics Pathway Total					3.1E-07	3.7E-06	3.1E-11	4.0E-06	
Pathway Total – Chemicals					3.6E-07	3.8E-06	1.4E-10	4.1E-06	
CB-4/4A and CA-6/6A									
Aluminum	1.0E+04	2.3E-05	2.0E-06	4.9E-09					
Arsenic	1.1E+01	2.4E-08	6.6E-08	5.3E-12	3.7E-08	9.8E-08	7.9E-11	1.4E-07	
Barium	1.4E+02	3.1E-07	2.8E-08	6.7E-11					
Cadmium	1.8E+00	4.0E-09	3.6E-10	8.8E-13			5.5E-12	5.5E-12	
Chromium	2.5E+01	5.6E-08	5.0E-09	1.2E-11					
Copper	1.1E+02	2.4E-07	2.1E-08	5.1E-11					
Manganese	7.0E+02	1.6E-06	1.4E-07	3.4E-10					
Mercury	3.4E-01	7.6E-10	6.9E-11	1.7E-13					
Thallium	5.4E-01	1.2E-09	1.1E-10	2.6E-13					
Vanadium	1.9E+01	4.3E-08	3.8E-09	9.2E-12					
Inorganics Pathway Total					3.7E-08	9.8E-08	8.5E-11	1.4E-07	
1,3-Dinitrobenzene	5.9E+00	1.3E-08	1.2E-07	2.9E-12					
2,4,6-Trinitrotoluene	3.0E+02	6.7E-07	6.0E-06	1.4E-10	2.0E-08	1.8E-07		2.0E-07	
2,6-Dinitrotoluene	8.6E-01	1.9E-09	1.7E-08	4.2E-13	1.3E-09	1.2E-08		1.3E-08	
4,4'-DDE	1.2E+00	2.7E-09	2.4E-08	5.8E-13	9.1E-10	8.1E-09		9.1E-09	
Benz(*a*)anthracene	6.4E-01	1.4E-09	1.7E-08	3.1E-13	1.0E-09	1.2E-08	9.6E-14	1.3E-08	
Benzo(*a*)pyrene	6.1E-01	1.4E-09	1.6E-08	3.0E-13	9.9E-09	1.2E-07	9.1E-13	1.3E-07	
Benzo(*b*)fluoranthene	6.6E-01	1.5E-09	1.7E-08	3.2E-13	1.1E-09	1.3E-08	9.9E-14	1.4E-08	
Dibenz(*a*,*h*)anthracene	9.6E-02	2.1E-10	2.5E-09	4.6E-14	1.6E-09	1.8E-08	1.4E-13	2.0E-08	
Dieldrin	9.8E-02	2.2E-10	2.0E-09	4.8E-14	3.5E-09	3.2E-08	7.7E-13	3.5E-08	
Endrin Aldehyde	4.4E+00	9.8E-09	8.8E-08	2.1E-12					
Heptachlor	7.2E-02	1.6E-10	1.4E-09	3.5E-14	7.2E-10	6.5E-09	1.6E-13	7.2E-09	
PCB-1254	1.1E+03	2.5E-06	3.1E-05	5.3E-10	4.9E-06	6.2E-05	1.1E-09	6.7E-05	R
RDX	1.0E+02	2.2E-07	2.0E-06	4.9E-11	2.5E-08	2.2E-07		2.5E-07	
gamma-Chlordane	8.9E-01	2.0E-09	7.1E-09	4.3E-13	7.0E-10	2.5E-09	1.5E-13	3.2E-09	
Organics Pathway Total					5.0E-06	6.2E-05	1.1E-09	6.7E-05	
Pathway Total – Chemicals					5.0E-06	6.3E-05	1.2E-09	6.8E-05	
Change Houses (CB-12, -23, -8, and -22)									
Antimony	2.3E+00	5.0E-09	4.5E-10	1.1E-12					
Arsenic	1.2E+01	2.7E-08	7.3E-08	5.9E-12	4.1E-08	1.1E-07	8.9E-11	1.5E-07	
Cadmium	3.3E+00	7.3E-09	6.6E-10	1.6E-12			1.0E-11	1.0E-11	
Manganese	8.3E+02	1.9E-06	1.7E-07	4.0E-10					
Thallium	4.3E-01	9.7E-10	8.7E-11	2.1E-13					
Inorganics Pathway Total					4.1E-08	1.1E-07	9.9E-11	1.5E-07	
Benzo(*a*)pyrene	9.2E-02	2.1E-10	2.4E-09	4.5E-14	1.5E-09	1.8E-08	1.4E-13	1.9E-08	
Organics Pathway Total					1.5E-09	1.8E-08	1.4E-13	1.9E-08	
Pathway Total – Chemicals					4.2E-08	1.3E-07	9.9E-11	1.7E-07	
Perimeter Area									
Aluminum	1.4E+04	3.1E-05	2.8E-06	6.8E-09					
Arsenic	1.3E+01	2.8E-08	7.5E-08	6.1E-12	4.2E-08	1.1E-07	9.1E-11	1.6E-07	
Manganese	1.4E+03	3.1E-06	2.8E-07	6.8E-10					
Thallium	6.4E-01	1.4E-09	1.3E-10	3.1E-13					
Inorganics Pathway Total					4.2E-08	1.1E-07	9.1E-11	1.6E-07	
Pathway Total – Chemicals					4.2E-08	1.1E-07	9.1E-11	1.6E-07	
Water Tower									
Chromium	2.5E+02	5.6E-07	5.0E-08	1.2E-10					
Thallium	6.4E-01	1.4E-09	1.3E-10	3.1E-13					
Inorganics Pathway Total									
Pathway Total – Chemicals									

Table A-19. Load Line 1 Shallow Surface Soil Risks (continued)

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Risk			Total Risk Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
Security Guard/Maintenance Worker									
CB-13 and -10									
Aluminum	1.3E+04	1.9E-04	1.0E-04	4.1E-08					
Antimony	1.3E+00	1.8E-08	1.0E-08	4.0E-12					
Arsenic	1.1E+01	1.6E-07	2.7E-06	3.5E-11	2.4E-07	4.0E-06	5.3E-10	4.3E-06	R
Cadmium	6.2E+00	9.0E-08	5.0E-08	2.0E-11			1.2E-10	1.2E-10	
Chromium	3.5E+01	5.1E-07	2.8E-07	1.1E-10					
Copper	1.9E+02	2.8E-06	1.5E-06	6.1E-10					
Manganese	1.3E+03	1.9E-05	1.0E-05	4.1E-09					
Thallium	4.9E-01	7.1E-09	3.9E-09	1.5E-12					
Inorganics Pathway Total					2.4E-07	4.0E-06	6.5E-10	4.3E-06	
2,4,6-Trinitrotoluene	2.5E+01	3.7E-07	2.0E-05	8.0E-11	1.1E-08	6.1E-07		6.2E-07	
2,4-Dinitrotoluene	1.5E+00	2.2E-08	1.2E-06	4.7E-12	1.5E-08	8.2E-07		8.3E-07	
Benzo(*a*)pyrene	3.7E-01	5.4E-09	3.9E-07	1.2E-12	3.9E-08	2.8E-06	3.6E-12	2.9E-06	R
PCB-1254	1.7E+00	2.5E-08	1.9E-06	5.4E-12	5.0E-08	3.8E-06	1.1E-11	3.9E-06	R
RDX	3.7E+00	5.4E-08	3.0E-06	1.2E-11	5.9E-09	3.3E-07		3.3E-07	
Organics Pathway Total					1.2E-07	8.4E-06	1.4E-11	8.6E-06	
Pathway Total – Chemicals					3.6E-07	1.2E-05	6.6E-10	1.3E-05	
CB-14, CB-17, and CA-15									
Aluminum	2.0E+04	2.9E-04	1.6E-04	6.3E-08					
Arsenic	2.1E+01	3.1E-07	5.2E-06	6.8E-11	4.7E-07	7.8E-06	1.0E-09	8.2E-06	R
Barium	1.4E+02	2.0E-06	1.1E-06	4.3E-10					
Cadmium	2.1E+00	3.0E-08	1.7E-08	6.5E-12			4.1E-11	4.1E-11	
Manganese	1.2E+03	1.7E-05	9.5E-06	3.7E-09					
Nickel	3.2E+01	4.6E-07	2.6E-07	1.0E-10					
Thallium	9.1E-01	1.3E-08	7.4E-09	2.9E-12					
Vanadium	3.5E+01	5.1E-07	2.8E-07	1.1E-10					
Inorganics Pathway Total					4.7E-07	7.8E-06	1.1E-09	8.2E-06	
2,4,6-Trinitrotoluene	4.5E+00	6.6E-08	3.6E-06	1.4E-11	2.0E-09	1.1E-07		1.1E-07	
Benz(*a*)anthracene	6.4E-01	9.3E-09	6.7E-07	2.0E-12	6.8E-09	4.9E-07	6.3E-13	5.0E-07	
Benzo(*a*)pyrene	8.2E-01	1.2E-08	8.6E-07	2.6E-12	8.7E-08	6.3E-06	8.0E-12	6.4E-06	R
Benzo(*b*)fluoranthene	1.1E+00	1.6E-08	1.2E-06	3.5E-12	1.2E-08	8.4E-07	1.1E-12	8.5E-07	
Dibenz(*a*,*h*)anthracene	1.8E-01	2.6E-09	1.9E-07	5.7E-13	1.9E-08	1.4E-06	1.8E-12	1.4E-06	R
Indeno(1,2,3-*cd*)pyrene	6.4E-01	9.3E-09	6.7E-07	2.0E-12	6.8E-09	4.9E-07	6.3E-13	5.0E-07	
PCB-1254	4.7E+00	6.8E-08	5.3E-06	1.5E-11	1.4E-07	1.1E-05	3.0E-11	1.1E-05	R
RDX	2.9E+01	4.2E-07	2.3E-05	9.0E-11	4.6E-08	2.5E-06		2.6E-06	R
Organics Pathway Total					3.2E-07	2.3E-05	4.2E-11	2.3E-05	
Pathway Total – Chemicals					7.8E-07	3.1E-05	1.1E-09	3.1E-05	
CB-3 and -801									
Aluminum	1.2E+04	1.8E-04	9.7E-05	3.8E-08					
Antimony	1.1E+02	1.6E-06	8.9E-07	3.5E-10					
Arsenic	1.3E+01	1.9E-07	3.1E-06	4.1E-11	2.8E-07	4.7E-06	6.1E-10	5.0E-06	R
Cadmium	6.3E+00	9.1E-08	5.1E-08	2.0E-11			1.2E-10	1.2E-10	
Manganese	1.3E+03	1.8E-05	1.0E-05	4.0E-09					
Thallium	6.0E-01	8.7E-09	4.9E-09	1.9E-12					
Inorganics Pathway Total					2.8E-07	4.7E-06	7.4E-10	5.0E-06	
Benz(*a*)anthracene	1.4E+01	2.0E-07	1.5E-05	4.4E-11	1.5E-07	1.1E-05	1.4E-11	1.1E-05	R
Benzo(*a*)pyrene	1.3E+01	1.9E-07	1.4E-05	4.1E-11	1.4E-06	1.0E-04	1.3E-10	1.0E-04	R
Benzo(*b*)fluoranthene	1.5E+01	2.2E-07	1.6E-05	4.7E-11	1.6E-07	1.1E-05	1.5E-11	1.2E-05	R
Dibenz(*a*,*h*)anthracene	1.2E+00	1.7E-08	1.2E-06	3.6E-12	1.2E-07	8.8E-06	1.1E-11	8.9E-06	R
Dieldrin	3.3E-02	4.9E-10	2.7E-08	1.1E-13	7.8E-09	4.3E-07	1.7E-12	4.4E-07	
Indeno(1,2,3-*cd*)pyrene	8.7E+00	1.3E-07	9.1E-06	2.7E-11	9.2E-08	6.7E-06	8.5E-12	6.8E-06	R
PCB-1254	4.3E+00	6.3E-08	4.9E-06	1.4E-11	1.3E-07	9.7E-06	2.7E-11	9.8E-06	R
Organics Pathway Total					2.0E-06	1.5E-04	2.0E-10	1.5E-04	

Table A-19. Load Line 1 Shallow Surface Soil Risks (continued)

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Risk			Total Risk Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
Pathway Total – Chemicals					2.3E-06	1.5E-04	9.4E-10	1.5E-04	
CB-4/4A and CA-6/6A									
Aluminum	1.0E+04	1.5E-04	8.2E-05	3.2E-08					
Arsenic	1.1E+01	1.6E-07	2.6E-06	3.4E-11	2.4E-07	4.0E-06	5.2E-10	4.2E-06	R
Barium	1.4E+02	2.0E-06	1.1E-06	4.4E-10					
Cadmium	1.8E+00	2.6E-08	1.5E-08	5.7E-12			3.6E-11	3.6E-11	
Chromium	2.5E+01	3.6E-07	2.0E-07	7.8E-11					
Copper	1.1E+02	1.5E-06	8.6E-07	3.3E-10					
Manganese	7.0E+02	1.0E-05	5.7E-06	2.2E-09					
Mercury	3.4E-01	5.0E-09	2.8E-09	1.1E-12					
Thallium	5.4E-01	7.8E-09	4.3E-09	1.7E-12					
Vanadium	1.9E+01	2.8E-07	1.5E-07	6.0E-11					
Inorganics Pathway Total					2.4E-07	4.0E-06	5.5E-10	4.2E-06	
1,3-Dinitrobenzene	5.9E+00	8.6E-08	4.8E-06	1.9E-11					
2,4,6-Trinitrotoluene	3.0E+02	4.3E-06	2.4E-04	9.4E-10	1.3E-07	7.2E-06		7.3E-06	R
2,6-Dinitrotoluene	8.6E-01	1.3E-08	6.9E-07	2.7E-12	8.5E-09	4.7E-07		4.8E-07	
4,4'-DDE	1.2E+00	1.7E-08	9.6E-07	3.8E-12	5.9E-09	3.3E-07		3.3E-07	
Benz(*a*)anthracene	6.4E-01	9.3E-09	6.7E-07	2.0E-12	6.8E-09	4.9E-07	6.3E-13	5.0E-07	
Benzo(*a*)pyrene	6.1E-01	8.9E-09	6.4E-07	1.9E-12	6.5E-08	4.7E-06	6.0E-12	4.7E-06	R
Benzo(*b*)fluoranthene	6.6E-01	9.6E-09	6.9E-07	2.1E-12	7.0E-09	5.1E-07	6.5E-13	5.1E-07	
Dibenz(*a*,*h*)anthracene	9.6E-02	1.4E-09	1.0E-07	3.0E-13	1.0E-08	7.4E-07	9.4E-13	7.5E-07	
Dieldrin	9.8E-02	1.4E-09	7.9E-08	3.1E-13	2.3E-08	1.3E-06	5.0E-12	1.3E-06	R
Endrin Aldehyde	4.4E+00	6.4E-08	3.6E-06	1.4E-11					
Heptachlor	7.2E-02	1.0E-09	5.8E-08	2.3E-13	4.7E-09	2.6E-07	1.0E-12	2.7E-07	
PCB-1254	1.1E+03	1.6E-05	1.2E-03	3.5E-09	3.2E-05	2.5E-03	6.9E-09	2.5E-03	R
RDX	1.0E+02	1.5E-06	8.1E-05	3.2E-10	1.6E-07	8.9E-06		9.1E-06	R
gamma-Chlordane	8.9E-01	1.3E-08	2.9E-07	2.8E-12	4.5E-09	1.0E-07	9.8E-13	1.0E-07	
Organics Pathway Total					3.2E-05	2.5E-03	7.0E-09	2.5E-03	
Pathway Total – Chemicals					3.3E-05	2.5E-03	7.5E-09	2.5E-03	
Change Houses (CB-12, -23, -8, and -22)									
Antimony	2.3E+00	3.3E-08	1.8E-08	7.1E-12					
Arsenic	1.2E+01	1.8E-07	2.9E-06	3.8E-11	2.7E-07	4.4E-06	5.8E-10	4.7E-06	R
Cadmium	3.3E+00	4.8E-08	2.7E-08	1.0E-11			6.5E-11	6.5E-11	
Manganese	8.3E+02	1.2E-05	6.7E-06	2.6E-09					
Thallium	4.3E-01	6.3E-09	3.5E-09	1.4E-12					
Inorganics Pathway Total					2.7E-07	4.4E-06	6.4E-10	4.7E-06	
Benzo(*a*)pyrene	9.2E-02	1.3E-09	9.7E-08	2.9E-13	9.8E-09	7.0E-07	9.0E-13	7.1E-07	
Organics Pathway Total					9.8E-09	7.0E-07	9.0E-13	7.1E-07	
Pathway Total – Chemicals					2.8E-07	5.1E-06	6.4E-10	5.4E-06	
Perimeter Area									
Aluminum	1.4E+04	2.0E-04	1.1E-04	4.4E-08					
Arsenic	1.3E+01	1.8E-07	3.0E-06	4.0E-11	2.7E-07	4.6E-06	5.9E-10	4.8E-06	R
Manganese	1.4E+03	2.0E-05	1.1E-05	4.4E-09					
Thallium	6.4E-01	9.3E-09	5.2E-09	2.0E-12					
Inorganics Pathway Total					2.7E-07	4.6E-06	5.9E-10	4.8E-06	
Pathway Total – Chemicals					2.7E-07	4.6E-06	5.9E-10	4.8E-06	
Water Tower									
Chromium	2.5E+02	3.6E-06	2.0E-06	7.9E-10					
Thallium	6.4E-01	9.4E-09	5.2E-09	2.0E-12					
Inorganics Pathway Total									
Pathway Total – Chemicals									

Table A-19. Load Line 1 Shallow Surface Soil Risks (continued)

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Risk			Total Risk Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
Dust/Fire Suppression									
CB-13 and -10									
Aluminum	1.3E+04	4.5E-05	2.7E-06	2.2E-08					
Antimony	1.3E+00	4.4E-09	2.6E-10	2.1E-12					
Arsenic	1.1E+01	3.9E-08	6.9E-08	1.9E-11	5.8E-08	1.0E-07	2.8E-10	1.6E-07	
Cadmium	6.2E+00	2.2E-08	1.3E-09	1.0E-11			6.6E-11	6.6E-11	
Chromium	3.5E+01	1.2E-07	7.3E-09	5.9E-11					
Copper	1.9E+02	6.7E-07	4.0E-08	3.2E-10					
Manganese	1.3E+03	4.5E-06	2.7E-07	2.2E-09					
Thallium	4.9E-01	1.7E-09	1.0E-10	8.2E-13					
Inorganics Pathway Total					5.8E-08	1.0E-07	3.5E-10	1.6E-07	
2,4,6-Trinitrotoluene	2.5E+01	8.8E-08	5.2E-07	4.2E-11	2.6E-09	1.6E-08		1.8E-08	
2,4-Dinitrotoluene	1.5E+00	5.2E-09	3.1E-08	2.5E-12	3.5E-09	2.1E-08		2.5E-08	
Benzo(*a*)pyrene	3.7E-01	1.3E-09	1.0E-08	6.2E-13	9.4E-09	7.3E-08	1.9E-12	8.2E-08	
PCB-1254	1.7E+00	5.9E-09	4.9E-08	2.9E-12	1.2E-08	9.9E-08	5.7E-12	1.1E-07	
RDX	3.7E+00	1.3E-08	7.7E-08	6.2E-12	1.4E-09	8.4E-09		9.8E-09	
Organics Pathway Total					2.9E-08	2.2E-07	7.6E-12	2.5E-07	
Pathway Total – Chemicals					8.7E-08	3.2E-07	3.5E-10	4.1E-07	
CB-14, CB-17, and CA-15									
Aluminum	2.0E+04	7.0E-05	4.1E-06	3.3E-08					
Arsenic	2.1E+01	7.5E-08	1.3E-07	3.6E-11	1.1E-07	2.0E-07	5.4E-10	3.1E-07	
Barium	1.4E+02	4.7E-07	2.8E-08	2.3E-10					
Cadmium	2.1E+00	7.2E-09	4.3E-10	3.5E-12			2.2E-11	2.2E-11	
Manganese	1.2E+03	4.1E-06	2.4E-07	2.0E-09					
Nickel	3.2E+01	1.1E-07	6.6E-09	5.3E-11					
Thallium	9.1E-01	3.2E-09	1.9E-10	1.5E-12					
Vanadium	3.5E+01	1.2E-07	7.3E-09	5.9E-11					
Inorganics Pathway Total					1.1E-07	2.0E-07	5.6E-10	3.1E-07	
2,4,6-Trinitrotoluene	4.5E+00	1.6E-08	9.3E-08	7.6E-12	4.7E-10	2.8E-09		3.3E-09	
Benz(*a*)anthracene	6.4E-01	2.2E-09	1.7E-08	1.1E-12	1.6E-09	1.3E-08	3.3E-13	1.4E-08	
Benzo(*a*)pyrene	8.2E-01	2.9E-09	2.2E-08	1.4E-12	2.1E-08	1.6E-07	4.3E-12	1.8E-07	
Benzo(*b*)fluoranthene	1.1E+00	3.8E-09	3.0E-08	1.8E-12	2.8E-09	2.2E-08	5.7E-13	2.4E-08	
Dibenz(*a*,*h*)anthracene	1.8E-01	6.3E-10	4.9E-09	3.0E-13	4.6E-09	3.5E-08	9.4E-13	4.0E-08	
Indeno(1,2,3-*cd*)pyrene	6.4E-01	2.2E-09	1.7E-08	1.1E-12	1.6E-09	1.3E-08	3.3E-13	1.4E-08	
PCB-1254	4.7E+00	1.6E-08	1.4E-07	7.9E-12	3.3E-08	2.7E-07	1.6E-11	3.1E-07	
RDX	2.9E+01	1.0E-07	5.9E-07	4.8E-11	1.1E-08	6.5E-08		7.6E-08	
Organics Pathway Total					7.6E-08	5.9E-07	2.2E-11	6.6E-07	
Pathway Total – Chemicals					1.9E-07	7.9E-07	5.9E-10	9.7E-07	
CB-3 and -801									
Aluminum	1.2E+04	4.2E-05	2.5E-06	2.0E-08					
Antimony	1.1E+02	3.8E-07	2.3E-08	1.8E-10					
Arsenic	1.3E+01	4.5E-08	8.0E-08	2.2E-11	6.8E-08	1.2E-07	3.3E-10	1.9E-07	
Cadmium	6.3E+00	2.2E-08	1.3E-09	1.1E-11			6.6E-11	6.6E-11	
Manganese	1.3E+03	4.4E-06	2.6E-07	2.1E-09					
Thallium	6.0E-01	2.1E-09	1.2E-10	1.0E-12					
Inorganics Pathway Total					6.8E-08	1.2E-07	3.9E-10	1.9E-07	
Benz(*a*)anthracene	1.4E+01	4.9E-08	3.8E-07	2.4E-11	3.6E-08	2.8E-07	7.3E-12	3.1E-07	
Benzo(*a*)pyrene	1.3E+01	4.5E-08	3.5E-07	2.2E-11	3.3E-07	2.6E-06	6.8E-11	2.9E-06	R
Benzo(*b*)fluoranthene	1.5E+01	5.2E-08	4.0E-07	2.5E-11	3.8E-08	3.0E-07	7.8E-12	3.3E-07	
Dibenz(*a*,*h*)anthracene	1.2E+00	4.0E-09	3.1E-08	1.9E-12	2.9E-08	2.3E-07	6.0E-12	2.6E-07	
Dieldrin	3.3E-02	1.2E-10	6.9E-10	5.6E-14	1.9E-09	1.1E-08	9.0E-13	1.3E-08	
Indeno(1,2,3-*cd*)pyrene	8.7E+00	3.0E-08	2.3E-07	1.5E-11	2.2E-08	1.7E-07	4.5E-12	1.9E-07	
PCB-1254	4.3E+00	1.5E-08	1.2E-07	7.2E-12	3.0E-08	2.5E-07	1.4E-11	2.8E-07	
Organics Pathway Total					4.9E-07	3.8E-06	1.1E-10	4.3E-06	

Table A-19. Load Line 1 Shallow Surface Soil Risks (continued)

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Risk			Total Risk Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
Pathway Total – Chemicals					5.6E-07	3.9E-06	5.0E-10	4.5E-06	
CB-4/4A and CA-6/6A									
Aluminum	1.0E+04	3.5E-05	2.1E-06	1.7E-08					
Arsenic	1.1E+01	3.8E-08	6.8E-08	1.8E-11	5.7E-08	1.0E-07	2.8E-10	1.6E-07	
Barium	1.4E+02	4.9E-07	2.9E-08	2.3E-10					
Cadmium	1.8E+00	6.3E-09	3.8E-10	3.0E-12			1.9E-11	1.9E-11	
Chromium	2.5E+01	8.7E-08	5.2E-09	4.2E-11					
Copper	1.1E+02	3.7E-07	2.2E-08	1.8E-10					
Manganese	7.0E+02	2.4E-06	1.5E-07	1.2E-09					
Mercury	3.4E-01	1.2E-09	7.1E-11	5.7E-13					
Thallium	5.4E-01	1.9E-09	1.1E-10	9.0E-13					
Vanadium	1.9E+01	6.7E-08	4.0E-09	3.2E-11					
Inorganics Pathway Total					5.7E-08	1.0E-07	2.9E-10	1.6E-07	
1,3-Dinitrobenzene	5.9E+00	2.1E-08	1.2E-07	9.9E-12					
2,4,6-Trinitrotoluene	3.0E+02	1.0E-06	6.2E-06	5.0E-10	3.1E-08	1.9E-07		2.2E-07	
2,6-Dinitrotoluene	8.6E-01	3.0E-09	1.8E-08	1.4E-12	2.0E-09	1.2E-08		1.4E-08	
4,4'-DDE	1.2E+00	4.2E-09	2.5E-08	2.0E-12	1.4E-09	8.4E-09		9.8E-09	
Benz(*a*)anthracene	6.4E-01	2.2E-09	1.7E-08	1.1E-12	1.6E-09	1.3E-08	3.3E-13	1.4E-08	
Benzo(*a*)pyrene	6.1E-01	2.1E-09	1.6E-08	1.0E-12	1.6E-08	1.2E-07	3.2E-12	1.4E-07	
Benzo(*b*)fluoranthene	6.6E-01	2.3E-09	1.8E-08	1.1E-12	1.7E-09	1.3E-08	3.4E-13	1.5E-08	
Dibenz(*a*,*h*)anthracene	9.6E-02	3.4E-10	2.6E-09	1.6E-13	2.4E-09	1.9E-08	5.0E-13	2.1E-08	
Dieldrin	9.8E-02	3.4E-10	2.0E-09	1.7E-13	5.5E-09	3.3E-08	2.7E-12	3.8E-08	
Endrin Aldehyde	4.4E+00	1.5E-08	9.1E-08	7.4E-12					
Heptachlor	7.2E-02	2.5E-10	1.5E-09	1.2E-13	1.1E-09	6.7E-09	5.5E-13	7.8E-09	
PCB-1254	1.1E+03	3.8E-06	3.2E-05	1.8E-09	7.7E-06	6.4E-05	3.7E-09	7.2E-05	R
RDX	1.0E+02	3.5E-07	2.1E-06	1.7E-10	3.9E-08	2.3E-07		2.7E-07	
gamma-Chlordane	8.9E-01	3.1E-09	7.4E-09	1.5E-12	1.1E-09	2.6E-09	5.2E-13	3.7E-09	
Organics Pathway Total					7.8E-06	6.5E-05	3.7E-09	7.2E-05	
Pathway Total – Chemicals					7.8E-06	6.5E-05	4.0E-09	7.3E-05	
Change Houses (CB-12, -23, -8, and -22)									
Antimony	2.3E+00	7.9E-09	4.7E-10	3.8E-12					
Arsenic	1.2E+01	4.2E-08	7.6E-08	2.0E-11	6.4E-08	1.1E-07	3.1E-10	1.8E-07	
Cadmium	3.3E+00	1.1E-08	6.8E-10	5.5E-12			3.5E-11	3.5E-11	
Manganese	8.3E+02	2.9E-06	1.7E-07	1.4E-09					
Thallium	4.3E-01	1.5E-09	9.0E-11	7.3E-13					
Inorganics Pathway Total					6.4E-08	1.1E-07	3.4E-10	1.8E-07	
Benzo(*a*)pyrene	9.2E-02	3.2E-10	2.5E-09	1.5E-13	2.3E-09	1.8E-08	4.8E-13	2.0E-08	
Organics Pathway Total					2.3E-09	1.8E-08	4.8E-13	2.0E-08	
Pathway Total – Chemicals					6.6E-08	1.3E-07	3.4E-10	2.0E-07	
Perimeter Area									
Aluminum	1.4E+04	4.9E-05	2.9E-06	2.4E-08					
Arsenic	1.3E+01	4.4E-08	7.8E-08	2.1E-11	6.6E-08	1.2E-07	3.2E-10	1.8E-07	
Manganese	1.4E+03	4.9E-06	2.9E-07	2.3E-09					
Thallium	6.4E-01	2.2E-09	1.3E-10	1.1E-12					
Inorganics Pathway Total					6.6E-08	1.2E-07	3.2E-10	1.8E-07	
Pathway Total – Chemicals					6.6E-08	1.2E-07	3.2E-10	1.8E-07	
Water Tower									
Chromium	2.5E+02	8.8E-07	5.2E-08	4.2E-10					
Thallium	6.4E-01	2.3E-09	1.3E-10	1.1E-12					
Inorganics Pathway Total									
Pathway Total – Chemicals									
Resident Farmer Adult									
CB-13 and -10									
Aluminum	1.3E+04	7.6E-03	1.7E-04	1.6E-06					

Table A-19. Load Line 1 Shallow Surface Soil Risks (continued)

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Risk			Total Risk Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
Antimony	1.3E+00	7.4E-07	1.7E-08	1.6E-10					
Arsenic	1.1E+01	6.5E-06	4.5E-06	1.4E-09	9.8E-06	6.7E-06	2.1E-08	1.6E-05	R
Cadmium	6.2E+00	3.6E-06	8.3E-08	7.9E-10			5.0E-09	5.0E-09	
Chromium	3.5E+01	2.1E-05	4.7E-07	4.5E-09					
Copper	1.9E+02	1.1E-04	2.6E-06	2.4E-08					
Manganese	1.3E+03	7.6E-04	1.7E-05	1.7E-07					
Thallium	4.9E-01	2.9E-07	6.5E-09	6.2E-11					
Inorganics Pathway Total					9.8E-06	6.7E-06	2.6E-08	1.7E-05	
2,4,6-Trinitrotoluene	2.5E+01	1.5E-05	3.4E-05	3.2E-09	4.4E-07	1.0E-06		1.5E-06	R
2,4-Dinitrotoluene	1.5E+00	8.7E-07	2.0E-06	1.9E-10	5.9E-07	1.4E-06		1.9E-06	R
Benzo(*a*)pyrene	3.7E-01	2.2E-07	6.4E-07	4.7E-11	1.6E-06	4.7E-06	1.5E-10	6.3E-06	R
PCB-1254	1.7E+00	1.0E-06	3.2E-06	2.2E-10	2.0E-06	6.4E-06	4.3E-10	8.4E-06	R
RDX	3.7E+00	2.2E-06	4.9E-06	4.7E-10	2.4E-07	5.4E-07		7.8E-07	
Organics Pathway Total					4.9E-06	1.4E-05	5.8E-10	1.9E-05	
Pathway Total – Chemicals					1.5E-05	2.1E-05	2.7E-08	3.5E-05	
CB-14, CB-17, and CA-15									
Aluminum	2.0E+04	1.2E-02	2.7E-04	2.5E-06					
Arsenic	2.1E+01	1.3E-05	8.6E-06	2.7E-09	1.9E-05	1.3E-05	4.1E-08	3.2E-05	R
Barium	1.4E+02	7.9E-05	1.8E-06	1.7E-08					
Cadmium	2.1E+00	1.2E-06	2.8E-08	2.6E-10			1.7E-09	1.7E-09	
Manganese	1.2E+03	6.9E-04	1.6E-05	1.5E-07					
Nickel	3.2E+01	1.9E-05	4.3E-07	4.0E-09					
Thallium	9.1E-01	5.4E-07	1.2E-08	1.2E-10					
Vanadium	3.5E+01	2.1E-05	4.7E-07	4.4E-09					
Inorganics Pathway Total					1.9E-05	1.3E-05	4.3E-08	3.2E-05	
2,4,6-Trinitrotoluene	4.5E+00	2.6E-06	6.0E-06	5.7E-10	7.9E-08	1.8E-07		2.6E-07	
Benz(*a*)anthracene	6.4E-01	3.8E-07	1.1E-06	8.1E-11	2.7E-07	8.1E-07	2.5E-11	1.1E-06	R
Benzo(*a*)pyrene	8.2E-01	4.8E-07	1.4E-06	1.0E-10	3.5E-06	1.0E-05	3.2E-10	1.4E-05	R
Benzo(*b*)fluoranthene	1.1E+00	6.5E-07	1.9E-06	1.4E-10	4.7E-07	1.4E-06	4.3E-11	1.9E-06	R
Dibenz(*a*,*h*)anthracene	1.8E-01	1.1E-07	3.1E-07	2.3E-11	7.7E-07	2.3E-06	7.1E-11	3.1E-06	R
Indeno(1,2,3-*cd*)pyrene	6.4E-01	3.8E-07	1.1E-06	8.1E-11	2.7E-07	8.1E-07	2.5E-11	1.1E-06	R
PCB-1254	4.7E+00	2.8E-06	8.8E-06	6.0E-10	5.5E-06	1.8E-05	1.2E-09	2.3E-05	R
RDX	2.9E+01	1.7E-05	3.8E-05	3.6E-09	1.8E-06	4.2E-06		6.0E-06	R
Organics Pathway Total					1.3E-05	3.8E-05	1.7E-09	5.0E-05	
Pathway Total – Chemicals					3.2E-05	5.1E-05	4.4E-08	8.2E-05	
CB-3 and -801									
Aluminum	1.2E+04	7.1E-03	1.6E-04	1.5E-06					
Antimony	1.1E+02	6.4E-05	1.5E-06	1.4E-08					
Arsenic	1.3E+01	7.6E-06	5.2E-06	1.6E-09	1.1E-05	7.8E-06	2.5E-08	1.9E-05	R
Cadmium	6.3E+00	3.7E-06	8.4E-08	8.0E-10			5.0E-09	5.0E-09	
Manganese	1.3E+03	7.4E-04	1.7E-05	1.6E-07					
Thallium	6.0E-01	3.5E-07	8.0E-09	7.6E-11					
Inorganics Pathway Total					1.1E-05	7.8E-06	3.0E-08	1.9E-05	
Benz(*a*)anthracene	1.4E+01	8.2E-06	2.4E-05	1.8E-09	6.0E-06	1.8E-05	5.5E-10	2.4E-05	R
Benzo(*a*)pyrene	1.3E+01	7.6E-06	2.3E-05	1.7E-09	5.6E-05	1.7E-04	5.1E-09	2.2E-04	R
Benzo(*b*)fluoranthene	1.5E+01	8.8E-06	2.6E-05	1.9E-09	6.4E-06	1.9E-05	5.9E-10	2.5E-05	R
Dibenz(*a*,*h*)anthracene	1.2E+00	6.8E-07	2.0E-06	1.5E-10	4.9E-06	1.5E-05	4.5E-10	2.0E-05	R
Dieldrin	3.3E-02	2.0E-08	4.5E-08	4.2E-12	3.1E-07	7.2E-07	6.8E-11	1.0E-06	R
Indeno(1,2,3-*cd*)pyrene	8.7E+00	5.1E-06	1.5E-05	1.1E-09	3.7E-06	1.1E-05	3.4E-10	1.5E-05	R
PCB-1254	4.3E+00	2.5E-06	8.1E-06	5.5E-10	5.0E-06	1.6E-05	1.1E-09	2.1E-05	R
Organics Pathway Total					8.2E-05	2.4E-04	8.2E-09	3.3E-04	
Pathway Total – Chemicals					9.4E-05	2.5E-04	3.8E-08	3.5E-04	
CB-4/4A and CA-6/6A									
Aluminum	1.0E+04	5.9E-03	1.4E-04	1.3E-06					

Table A-19. Load Line 1 Shallow Surface Soil Risks (continued)

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Risk			Total Risk Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
Arsenic	1.1E+01	6.4E-06	4.4E-06	1.4E-09	9.6E-06	6.6E-06	2.1E-08	1.6E-05	R
Barium	1.4E+02	8.2E-05	1.9E-06	1.8E-08					
Cadmium	1.8E+00	1.1E-06	2.4E-08	2.3E-10			1.4E-09	1.4E-09	
Chromium	2.5E+01	1.5E-05	3.3E-07	3.2E-09					
Copper	1.1E+02	6.2E-05	1.4E-06	1.3E-08					
Manganese	7.0E+02	4.1E-04	9.4E-06	8.9E-08					
Mercury	3.4E-01	2.0E-07	4.6E-09	4.3E-11					
Thallium	5.4E-01	3.1E-07	7.2E-09	6.8E-11					
Vanadium	1.9E+01	1.1E-05	2.5E-07	2.4E-09					
Inorganics Pathway Total					9.6E-06	6.6E-06	2.2E-08	1.6E-05	
1,3-Dinitrobenzene	5.9E+00	3.5E-06	7.9E-06	7.5E-10					
2,4,6-Trinitrotoluene	3.0E+02	1.7E-04	4.0E-04	3.8E-08	5.2E-06	1.2E-05		1.7E-05	R
2,6-Dinitrotoluene	8.6E-01	5.0E-07	1.2E-06	1.1E-10	3.4E-07	7.8E-07		1.1E-06	R
4,4'-DDE	1.2E+00	7.0E-07	1.6E-06	1.5E-10	2.4E-07	5.4E-07		7.8E-07	
Benz(*a*)anthracene	6.4E-01	3.8E-07	1.1E-06	8.1E-11	2.7E-07	8.1E-07	2.5E-11	1.1E-06	R
Benzo(*a*)pyrene	6.1E-01	3.6E-07	1.1E-06	7.7E-11	2.6E-06	7.7E-06	2.4E-10	1.0E-05	R
Benzo(*b*)fluoranthene	6.6E-01	3.9E-07	1.2E-06	8.4E-11	2.8E-07	8.4E-07	2.6E-11	1.1E-06	R
Dibenz(*a*,*h*)anthracene	9.6E-02	5.6E-08	1.7E-07	1.2E-11	4.1E-07	1.2E-06	3.8E-11	1.6E-06	R
Dieldrin	9.8E-02	5.8E-08	1.3E-07	1.3E-11	9.2E-07	2.1E-06	2.0E-10	3.0E-06	R
Endrin Aldehyde	4.4E+00	2.6E-06	5.9E-06	5.6E-10					
Heptachlor	7.2E-02	4.2E-08	9.6E-08	9.1E-12	1.9E-07	4.3E-07	4.2E-11	6.2E-07	
PCB-1254	1.1E+03	6.5E-04	2.1E-03	1.4E-07	1.3E-03	4.1E-03	2.8E-07	5.4E-03	R
RDX	1.0E+02	5.9E-05	1.3E-04	1.3E-08	6.5E-06	1.5E-05		2.1E-05	R
gamma-Chlordane	8.9E-01	5.2E-07	4.8E-07	1.1E-10	1.8E-07	1.7E-07	4.0E-11	3.5E-07	
Organics Pathway Total					1.3E-03	4.2E-03	2.8E-07	5.5E-03	
Pathway Total – Chemicals					1.3E-03	4.2E-03	3.0E-07	5.5E-03	
Change Houses (CB-12, -23, -8, and -22)									
Antimony	2.3E+00	1.3E-06	3.0E-08	2.9E-10					
Arsenic	1.2E+01	7.1E-06	4.9E-06	1.5E-09	1.1E-05	7.3E-06	2.3E-08	1.8E-05	R
Cadmium	3.3E+00	1.9E-06	4.4E-08	4.2E-10			2.6E-09	2.6E-09	
Manganese	8.3E+02	4.9E-04	1.1E-05	1.1E-07					
Thallium	4.3E-01	2.5E-07	5.8E-09	5.5E-11					
Inorganics Pathway Total					1.1E-05	7.3E-06	2.6E-08	1.8E-05	
Benzo(*a*)pyrene	9.2E-02	5.4E-08	1.6E-07	1.2E-11	3.9E-07	1.2E-06	3.6E-11	1.6E-06	R
Organics Pathway Total					3.9E-07	1.2E-06	3.6E-11	1.6E-06	
Pathway Total – Chemicals					1.1E-05	8.5E-06	2.6E-08	2.0E-05	
Perimeter Area									
Aluminum	1.4E+04	8.2E-03	1.9E-04	1.8E-06					
Arsenic	1.3E+01	7.4E-06	5.0E-06	1.6E-09	1.1E-05	7.5E-06	2.4E-08	1.9E-05	R
Manganese	1.4E+03	8.2E-04	1.9E-05	1.8E-07					
Thallium	6.4E-01	3.8E-07	8.6E-09	8.2E-11					
Inorganics Pathway Total					1.1E-05	7.5E-06	2.4E-08	1.9E-05	
Pathway Total – Chemicals					1.1E-05	7.5E-06	2.4E-08	1.9E-05	
Water Tower									
Chromium	2.5E+02	1.5E-04	3.4E-06	3.2E-08					
Thallium	6.4E-01	3.8E-07	8.6E-09	8.2E-11					
Inorganics Pathway Total									
Pathway Total – Chemicals									
Resident Farmer Child									
CB-13 and -10									
Aluminum	1.3E+04	1.4E-02	3.1E-05	7.7E-07					
Antimony	1.3E+00	1.4E-06	3.0E-09	7.5E-11					
Arsenic	1.1E+01	1.2E-05	8.0E-07	6.6E-10	1.8E-05	1.2E-06	9.9E-09	1.9E-05	R
Cadmium	6.2E+00	6.8E-06	1.5E-08	3.7E-10			2.3E-09	2.3E-09	

Table A-19. Load Line 1 Shallow Surface Soil Risks (continued)

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Risk			Total Risk Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
Chromium	3.5E+01	3.9E-05	8.5E-08	2.1E-09					
Copper	1.9E+02	2.1E-04	4.6E-07	1.1E-08					
Manganese	1.3E+03	1.4E-03	3.1E-06	7.7E-08					
Thallium	4.9E-01	5.3E-07	1.2E-09	2.9E-11					
Inorganics Pathway Total					1.8E-05	1.2E-06	1.2E-08	1.9E-05	
2,4,6-Trinitrotoluene	2.5E+01	2.8E-05	6.1E-06	1.5E-09	8.3E-07	1.8E-07		1.0E-06	R
2,4-Dinitrotoluene	1.5E+00	1.6E-06	3.6E-07	8.8E-11	1.1E-06	2.4E-07		1.4E-06	R
Benzo(*a*)pyrene	3.7E-01	4.1E-07	1.2E-07	2.2E-11	3.0E-06	8.5E-07	6.8E-11	3.8E-06	R
PCB-1254	1.7E+00	1.9E-06	5.7E-07	1.0E-10	3.7E-06	1.1E-06	2.0E-10	4.9E-06	R
RDX	3.7E+00	4.0E-06	8.9E-07	2.2E-10	4.4E-07	9.8E-08		5.4E-07	
Organics Pathway Total					9.1E-06	2.5E-06	2.7E-10	1.2E-05	
Pathway Total – Chemicals					2.7E-05	3.7E-06	1.3E-08	3.1E-05	
CB-14, CB-17, and CA-15									
Aluminum	2.0E+04	2.2E-02	4.8E-05	1.2E-06					
Arsenic	2.1E+01	2.3E-05	1.5E-06	1.3E-09	3.5E-05	2.3E-06	1.9E-08	3.8E-05	R
Barium	1.4E+02	1.5E-04	3.3E-07	8.0E-09					
Cadmium	2.1E+00	2.3E-06	5.0E-09	1.2E-10			7.7E-10	7.7E-10	
Manganese	1.2E+03	1.3E-03	2.8E-06	7.0E-08					
Nickel	3.2E+01	3.5E-05	7.7E-08	1.9E-09					
Thallium	9.1E-01	1.0E-06	2.2E-09	5.4E-11					
Vanadium	3.5E+01	3.8E-05	8.4E-08	2.1E-09					
Inorganics Pathway Total					3.5E-05	2.3E-06	2.0E-08	3.8E-05	
2,4,6-Trinitrotoluene	4.5E+00	4.9E-06	1.1E-06	2.7E-10	1.5E-07	3.3E-08		1.8E-07	
Benz(*a*)anthracene	6.4E-01	7.0E-07	2.0E-07	3.8E-11	5.1E-07	1.5E-07	1.2E-11	6.6E-07	
Benzo(*a*)pyrene	8.2E-01	9.0E-07	2.6E-07	4.9E-11	6.6E-06	1.9E-06	1.5E-10	8.5E-06	R
Benzo(*b*)fluoranthene	1.1E+00	1.2E-06	3.4E-07	6.5E-11	8.8E-07	2.5E-07	2.0E-11	1.1E-06	R
Dibenz(*a*,*h*)anthracene	1.8E-01	2.0E-07	5.6E-08	1.1E-11	1.4E-06	4.1E-07	3.3E-11	1.9E-06	R
Indeno(1,2,3-*cd*)pyrene	6.4E-01	7.0E-07	2.0E-07	3.8E-11	5.1E-07	1.5E-07	1.2E-11	6.6E-07	
PCB-1254	4.7E+00	5.2E-06	1.6E-06	2.8E-10	1.0E-05	3.2E-06	5.6E-10	1.3E-05	R
RDX	2.9E+01	3.1E-05	6.9E-06	1.7E-09	3.4E-06	7.6E-07		4.2E-06	R
Organics Pathway Total					2.4E-05	6.8E-06	7.9E-10	3.1E-05	
Pathway Total – Chemicals					5.9E-05	9.1E-06	2.1E-08	6.8E-05	
CB-3 and -801									
Aluminum	1.2E+04	1.3E-02	2.9E-05	7.1E-07					
Antimony	1.1E+02	1.2E-04	2.6E-07	6.5E-09					
Arsenic	1.3E+01	1.4E-05	9.3E-07	7.6E-10	2.1E-05	1.4E-06	1.2E-08	2.3E-05	R
Cadmium	6.3E+00	6.9E-06	1.5E-08	3.7E-10			2.3E-09	2.3E-09	
Manganese	1.3E+03	1.4E-03	3.0E-06	7.5E-08					
Thallium	6.0E-01	6.6E-07	1.4E-09	3.6E-11					
Inorganics Pathway Total					2.1E-05	1.4E-06	1.4E-08	2.3E-05	
Benz(*a*)anthracene	1.4E+01	1.5E-05	4.4E-06	8.3E-10	1.1E-05	3.2E-06	2.6E-10	1.4E-05	R
Benzo(*a*)pyrene	1.3E+01	1.4E-05	4.1E-06	7.7E-10	1.0E-04	3.0E-05	2.4E-09	1.3E-04	R
Benzo(*b*)fluoranthene	1.5E+01	1.6E-05	4.7E-06	8.9E-10	1.2E-05	3.4E-06	2.8E-10	1.5E-05	R
Dibenz(*a*,*h*)anthracene	1.2E+00	1.3E-06	3.6E-07	6.8E-11	9.2E-06	2.6E-06	2.1E-10	1.2E-05	R
Dieldrin	3.3E-02	3.7E-08	8.1E-09	2.0E-12	5.9E-07	1.3E-07	3.2E-11	7.1E-07	
Indeno(1,2,3-*cd*)pyrene	8.7E+00	9.5E-06	2.7E-06	5.2E-10	7.0E-06	2.0E-06	1.6E-10	9.0E-06	R
PCB-1254	4.3E+00	4.7E-06	1.5E-06	2.6E-10	9.4E-06	2.9E-06	5.1E-10	1.2E-05	R
Organics Pathway Total					1.5E-04	4.4E-05	3.8E-09	2.0E-04	
Pathway Total – Chemicals					1.7E-04	4.5E-05	1.8E-08	2.2E-04	
CB-4/4A and CA-6/6A									
Aluminum	1.0E+04	1.1E-02	2.4E-05	6.0E-07					
Arsenic	1.1E+01	1.2E-05	7.9E-07	6.5E-10	1.8E-05	1.2E-06	9.7E-09	1.9E-05	R
Barium	1.4E+02	1.5E-04	3.3E-07	8.2E-09					
Cadmium	1.8E+00	2.0E-06	4.4E-09	1.1E-10			6.8E-10	6.8E-10	

Table A-19. Load Line 1 Shallow Surface Soil Risks (continued)

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Risk			Total Risk Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
Chromium	2.5E+01	2.7E-05	6.0E-08	1.5E-09					
Copper	1.1E+02	1.2E-04	2.6E-07	6.3E-09					
Manganese	7.0E+02	7.7E-04	1.7E-06	4.2E-08					
Mercury	3.4E-01	3.7E-07	8.2E-10	2.0E-11					
Thallium	5.4E-01	5.9E-07	1.3E-09	3.2E-11					
Vanadium	1.9E+01	2.1E-05	4.6E-08	1.1E-09					
Inorganics Pathway Total					1.8E-05	1.2E-06	1.0E-08	1.9E-05	
1,3-Dinitrobenzene	5.9E+00	6.5E-06	1.4E-06	3.5E-10					
2,4,6-Trinitrotoluene	3.0E+02	3.3E-04	7.2E-05	1.8E-08	9.8E-06	2.2E-06		1.2E-05	R
2,6-Dinitrotoluene	8.6E-01	9.4E-07	2.1E-07	5.1E-11	6.4E-07	1.4E-07		7.8E-07	
4,4'-DDE	1.2E+00	1.3E-06	2.9E-07	7.1E-11	4.4E-07	9.8E-08		5.4E-07	
Benz(*a*)anthracene	6.4E-01	7.0E-07	2.0E-07	3.8E-11	5.1E-07	1.5E-07	1.2E-11	6.6E-07	
Benzo(*a*)pyrene	6.1E-01	6.7E-07	1.9E-07	3.6E-11	4.9E-06	1.4E-06	1.1E-10	6.3E-06	R
Benzo(*b*)fluoranthene	6.6E-01	7.3E-07	2.1E-07	3.9E-11	5.3E-07	1.5E-07	1.2E-11	6.8E-07	
Dibenz(*a*,*h*)anthracene	9.6E-02	1.1E-07	3.0E-08	5.7E-12	7.7E-07	2.2E-07	1.8E-11	9.9E-07	
Dieldrin	9.8E-02	1.1E-07	2.4E-08	5.8E-12	1.7E-06	3.8E-07	9.4E-11	2.1E-06	R
Endrin Aldehyde	4.4E+00	4.8E-06	1.1E-06	2.6E-10					
Heptachlor	7.2E-02	7.9E-08	1.7E-08	4.3E-12	3.5E-07	7.8E-08	1.9E-11	4.3E-07	
PCB-1254	1.1E+03	1.2E-03	3.7E-04	6.5E-08	2.4E-03	7.4E-04	1.3E-07	3.2E-03	R
RDX	1.0E+02	1.1E-04	2.4E-05	5.9E-09	1.2E-05	2.7E-06		1.5E-05	R
gamma-Chlordane	8.9E-01	9.7E-07	8.6E-08	5.3E-11	3.4E-07	3.0E-08	1.8E-11	3.7E-07	
Organics Pathway Total					2.4E-03	7.5E-04	1.3E-07	3.2E-03	
Pathway Total – Chemicals					2.5E-03	7.5E-04	1.4E-07	3.2E-03	
Change Houses (CB-12, -23, -8, and -22)									
Antimony	2.3E+00	2.5E-06	5.4E-09	1.3E-10					
Arsenic	1.2E+01	1.3E-05	8.8E-07	7.2E-10	2.0E-05	1.3E-06	1.1E-08	2.1E-05	R
Cadmium	3.3E+00	3.6E-06	7.9E-09	1.9E-10			1.2E-09	1.2E-09	
Manganese	8.3E+02	9.1E-04	2.0E-06	4.9E-08					
Thallium	4.3E-01	4.7E-07	1.0E-09	2.6E-11					
Inorganics Pathway Total					2.0E-05	1.3E-06	1.2E-08	2.1E-05	
Benzo(*a*)pyrene	9.2E-02	1.0E-07	2.9E-08	5.5E-12	7.4E-07	2.1E-07	1.7E-11	9.5E-07	
Organics Pathway Total					7.4E-07	2.1E-07	1.7E-11	9.5E-07	
Pathway Total – Chemicals					2.1E-05	1.5E-06	1.2E-08	2.2E-05	
Perimeter Area									
Aluminum	1.4E+04	1.5E-02	3.4E-05	8.3E-07					
Arsenic	1.3E+01	1.4E-05	9.1E-07	7.4E-10	2.1E-05	1.4E-06	1.1E-08	2.2E-05	R
Manganese	1.4E+03	1.5E-03	3.4E-06	8.3E-08					
Thallium	6.4E-01	7.0E-07	1.5E-09	3.8E-11					
Inorganics Pathway Total					2.1E-05	1.4E-06	1.1E-08	2.2E-05	
Pathway Total – Chemicals					2.1E-05	1.4E-06	1.1E-08	2.2E-05	
Water Tower									
Chromium	2.5E+02	2.7E-04	6.0E-07	1.5E-08					
Thallium	6.4E-01	7.1E-07	1.6E-09	3.8E-11					
Inorganics Pathway Total									
Pathway Total – Chemicals									

[a] Chemicals of potential concern (COPCs) are identified as chemicals of concern (COCs) if the total incremental lifetime cancer risk across all pathways is > 1E-06 (R).
DDE = Dichlorodiphenyldichloroethylene.
EPC = Exposure point concentration.
PCB = Polychlorinated biphenyl.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.

Table A-20. Load Line 1 Deep Surface Soil Hazards

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Hazard Quotient			Total HI Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
National Guard Trainee									
CB-13 and -10									
Aluminum	1.3E+04	1.9E-03	1.9E-05	5.1E-04	1.9E-03	1.9E-05	3.6E-01	3.6E-01	
Antimony	5.7E+00	8.6E-07	8.5E-09	2.3E-07	2.2E-03	1.4E-04		2.3E-03	
Arsenic	1.1E+01	1.7E-06	5.0E-07	4.5E-07	5.7E-03	1.7E-03		7.3E-03	
Cadmium	5.2E+00	7.9E-07	7.9E-09	2.1E-07	7.9E-04	3.1E-04		1.1E-03	
Chromium	3.5E+01	5.3E-06	5.3E-08	1.4E-06	3.5E-06	2.7E-06		6.2E-06	
Copper	1.8E+02	2.7E-05	2.7E-07	7.3E-06	6.8E-04	6.8E-06		6.9E-04	
Manganese	1.2E+03	1.9E-04	1.8E-06	4.9E-05	4.0E-03	1.0E-03	3.5E+00	3.5E+00	H
Thallium	4.9E-01	7.5E-08	7.4E-10	2.0E-08	9.4E-04	9.3E-06		9.5E-04	
Zinc	5.5E+02	8.3E-05	8.3E-07	2.2E-05	2.8E-04	9.2E-06		2.9E-04	
Inorganics Pathway Total					1.6E-02	3.2E-03	3.8E+00	3.8E+00	
2,4,6-Trinitrotoluene	2.3E+01	3.6E-06	3.5E-06	9.5E-07	7.1E-03	7.1E-03		1.4E-02	
2,4-Dinitrotoluene	1.4E+00	2.1E-07	2.1E-07	5.6E-08	1.1E-04	1.0E-04		2.1E-04	
Benzo(*a*)pyrene	3.7E-01	5.6E-08	7.3E-08	1.5E-08					
PCB-1254	1.7E+00	2.6E-07	3.6E-07	6.9E-08	1.3E-02	1.8E-02		3.1E-02	
RDX	3.4E+00	5.3E-07	5.2E-07	1.4E-07	1.8E-04	1.7E-04		3.5E-04	
Organics Pathway Total					2.0E-02	2.5E-02		4.6E-02	
Pathway Total – Chemicals					3.7E-02	2.9E-02	3.8E+00	3.9E+00	
CB-14, CB-17, and CA-15									
Aluminum	1.9E+04	2.9E-03	2.9E-05	7.8E-04	2.9E-03	2.9E-05	5.4E-01	5.5E-01	
Arsenic	2.1E+01	3.1E-06	9.3E-07	8.4E-07	1.0E-02	3.1E-03		1.4E-02	
Barium	1.3E+02	2.0E-05	2.0E-07	5.3E-06	2.8E-04	4.0E-05	3.7E-02	3.7E-02	
Cadmium	2.0E+00	3.1E-07	3.1E-09	8.3E-08	3.1E-04	1.2E-04		4.3E-04	
Manganese	1.1E+03	1.7E-04	1.7E-06	4.6E-05	3.7E-03	9.3E-04	3.2E+00	3.2E+00	H
Nickel	3.1E+01	4.7E-06	4.6E-08	1.2E-06	2.3E-04	5.8E-05		2.9E-04	
Thallium	8.8E-01	1.3E-07	1.3E-09	3.6E-08	1.7E-03	1.7E-05		1.7E-03	
Vanadium	3.4E+01	5.1E-06	5.1E-08	1.4E-06	7.4E-04	2.8E-04		1.0E-03	
Inorganics Pathway Total					2.0E-02	4.6E-03	3.8E+00	3.8E+00	
2,4,6-Trinitrotoluene	4.5E+00	6.9E-07	6.8E-07	1.8E-07	1.4E-03	1.4E-03		2.7E-03	
Benz(*a*)anthracene	6.4E-01	9.8E-08	1.3E-07	2.6E-08					
Benzo(*a*)pyrene	8.2E-01	1.3E-07	1.6E-07	3.3E-08					
Benzo(*b*)fluoranthene	1.1E+00	1.7E-07	2.2E-07	4.5E-08					
Dibenz(*a,h*)anthracene	1.8E-01	2.7E-08	3.5E-08	7.3E-09					
Indeno(1,2,3-*cd*)pyrene	6.4E-01	9.8E-08	1.3E-07	2.6E-08					
PCB-1254	4.7E+00	7.2E-07	9.9E-07	1.9E-07	3.6E-02	5.0E-02		8.6E-02	
RDX	2.1E+01	3.3E-06	3.2E-06	8.7E-07	1.1E-03	1.1E-03		2.2E-03	
Organics Pathway Total					3.8E-02	5.2E-02		9.0E-02	
Pathway Total – Chemicals					5.9E-02	5.7E-02	3.8E+00	3.9E+00	
CB-3 and -801									
Aluminum	1.2E+04	1.8E-03	1.8E-05	4.9E-04	1.8E-03	1.8E-05	3.4E-01	3.4E-01	
Antimony	1.1E+02	1.7E-05	1.7E-07	4.5E-06	4.2E-02	2.8E-03		4.5E-02	
Arsenic	1.3E+01	2.0E-06	5.8E-07	5.2E-07	6.6E-03	1.9E-03		8.5E-03	
Cadmium	6.3E+00	9.6E-07	9.5E-09	2.6E-07	9.6E-04	3.8E-04		1.3E-03	
Manganese	1.3E+03	1.9E-04	1.9E-06	5.1E-05	4.2E-03	1.0E-03	3.6E+00	3.6E+00	H
Thallium	6.0E-01	9.2E-08	9.1E-10	2.4E-08	1.1E-03	1.1E-05		1.2E-03	
Inorganics Pathway Total					5.7E-02	6.2E-03	3.9E+00	4.0E+00	
Benz(*a*)anthracene	1.4E+01	2.1E-06	2.8E-06	5.7E-07					
Benzo(*a*)pyrene	1.3E+01	2.0E-06	2.6E-06	5.3E-07					
Benzo(*b*)fluoranthene	1.5E+01	2.3E-06	2.9E-06	6.1E-07					
Dibenz(*a,h*)anthracene	1.2E+00	1.8E-07	2.3E-07	4.7E-08					
Dieldrin	3.3E-02	5.1E-09	5.0E-09	1.4E-09	1.0E-04	1.0E-04		2.0E-04	

Table A-20. Load Line 1 Deep Surface Soil Hazards (continued)

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Hazard Quotient (HQ)			Total HI Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
Indeno(1,2,3-*cd*)pyrene	8.7E+00	1.3E-06	1.7E-06	3.5E-07					
PCB-1254	4.3E+00	6.6E-07	9.1E-07	1.7E-07	3.3E-02	4.5E-02		7.8E-02	
Organics Pathway Total					3.3E-02	4.6E-02		7.9E-02	
Pathway Total – Chemicals					8.9E-02	5.2E-02	3.9E+00	4.1E+00	
CB-4/4A and CA-6/6A									
Aluminum	1.0E+04	1.5E-03	1.5E-05	4.1E-04	1.5E-03	1.5E-05	2.9E-01	2.9E-01	
Arsenic	1.1E+01	1.7E-06	4.9E-07	4.4E-07	5.5E-03	1.6E-03		7.1E-03	
Barium	1.3E+02	2.0E-05	2.0E-07	5.3E-06	2.9E-04	4.0E-05	3.7E-02	3.8E-02	
Cadmium	1.8E+00	2.7E-07	2.7E-09	7.2E-08	2.7E-04	1.1E-04		3.8E-04	
Chromium	2.4E+01	3.6E-06	3.6E-08	9.7E-07	2.4E-06	1.8E-06		4.3E-06	
Copper	9.9E+01	1.5E-05	1.5E-07	4.0E-06	3.8E-04	3.7E-06		3.8E-04	
Manganese	6.8E+02	1.0E-04	1.0E-06	2.8E-05	2.2E-03	5.6E-04	1.9E+00	1.9E+00	H
Mercury	3.1E-01	4.8E-08	4.7E-10	1.3E-08	1.6E-04	2.3E-05		1.8E-04	
Thallium	5.3E-01	8.1E-08	8.0E-10	2.2E-08	1.0E-03	1.0E-05		1.0E-03	
Vanadium	1.9E+01	2.9E-06	2.8E-08	7.6E-07	4.1E-04	1.6E-04		5.7E-04	
Inorganics Pathway Total					1.2E-02	2.6E-03	2.3E+00	2.3E+00	
1,3-Dinitrobenzene	6.4E+00	9.7E-07	9.6E-07	2.6E-07	9.7E-03	9.6E-03		1.9E-02	
2,4,6-Trinitrotoluene	3.3E+02	5.1E-05	5.0E-05	1.4E-05	1.0E-01	1.0E-01		2.0E-01	
2,6-Dinitrotoluene	8.6E-01	1.3E-07	1.3E-07	3.5E-08	1.3E-04	1.3E-04		2.6E-04	
4,4'-DDE	1.2E+00	1.8E-07	1.8E-07	4.9E-08					
Benz(*a*)anthracene	6.4E-01	9.8E-08	1.3E-07	2.6E-08					
Benzo(*a*)pyrene	6.1E-01	9.3E-08	1.2E-07	2.5E-08					
Benzo(*b*)fluoranthene	6.6E-01	1.0E-07	1.3E-07	2.7E-08					
Dibenz(*a*,*h*)anthracene	9.6E-02	1.5E-08	1.9E-08	3.9E-09					
Dieldrin	9.8E-02	1.5E-08	1.5E-08	4.0E-09	3.0E-04	3.0E-04		6.0E-04	
Endrin Aldehyde	4.4E+00	6.7E-07	6.6E-07	1.8E-07	2.2E-03	2.2E-03		4.5E-03	
Heptachlor	7.2E-02	1.1E-08	1.1E-08	2.9E-09	2.2E-05	2.2E-05		4.4E-05	
PCB-1254	1.1E+03	1.7E-04	2.3E-04	4.5E-05	8.4E+00	1.2E+01		2.0E+01	H
RDX	8.9E+01	1.4E-05	1.3E-05	3.6E-06	4.5E-03	4.5E-03		9.0E-03	
gamma-Chlordane	8.9E-01	1.4E-07	5.4E-08	3.6E-08	2.7E-04	1.1E-04	1.8E-04	5.6E-04	
Organics Pathway Total					8.5E+00	1.2E+01	1.8E-04	2.0E+01	
Pathway Total – Chemicals					8.5E+00	1.2E+01	2.3E+00	2.3E+01	
Change Houses (CB-12, -23, -8, and -22)									
Antimony	2.3E+00	3.4E-07	3.4E-09	9.2E-08	8.6E-04	5.7E-05		9.2E-04	
Arsenic	1.2E+01	1.9E-06	5.5E-07	4.9E-07	6.2E-03	1.8E-03		8.0E-03	
Cadmium	3.3E+00	5.0E-07	5.0E-09	1.3E-07	5.0E-04	2.0E-04		7.0E-04	
Manganese	8.3E+02	1.3E-04	1.3E-06	3.4E-05	2.8E-03	6.8E-04	2.4E+00	2.4E+00	H
Thallium	4.3E-01	6.6E-08	6.5E-10	1.8E-08	8.2E-04	8.2E-06		8.3E-04	
Inorganics Pathway Total					1.1E-02	2.8E-03	2.4E+00	2.4E+00	
Benzo(*a*)pyrene	9.2E-02	1.4E-08	1.8E-08	3.7E-09					
Organics Pathway Total									
Pathway Total – Chemicals					1.1E-02	2.8E-03	2.4E+00	2.4E+00	
Perimeter Area									
Aluminum	1.4E+04	2.2E-03	2.2E-05	5.8E-04	2.2E-03	2.2E-05	4.1E-01	4.1E-01	
Arsenic	1.3E+01	1.9E-06	5.7E-07	5.1E-07	6.4E-03	1.9E-03		8.3E-03	
Manganese	1.4E+03	2.1E-04	2.1E-06	5.7E-05	4.6E-03	1.1E-03	4.0E+00	4.0E+00	H
Thallium	6.4E-01	9.8E-08	9.7E-10	2.6E-08	1.2E-03	1.2E-05		1.2E-03	
Inorganics Pathway Total					1.4E-02	3.1E-03	4.4E+00	4.4E+00	
Pathway Total – Chemicals					1.4E-02	3.1E-03	4.4E+00	4.4E+00	

Table A-20. Load Line 1 Deep Surface Soil Hazards (continued)

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Hazard Quotient (HQ)			Total HI Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
Water Tower									
Chromium	2.5E+02	3.8E-05	3.8E-07	1.0E-05	2.5E-05	1.9E-05		4.5E-05	
Thallium	6.4E-01	9.8E-08	9.7E-10	2.6E-08	1.2E-03	1.2E-05		1.2E-03	
Inorganics Pathway Total					1.3E-03	3.2E-05		1.3E-03	
Pathway Total – Chemicals					1.3E-03	3.2E-05		1.3E-03	

[a] Chemicals of potential concern (OPCs) are identified as chemicals of concern (COCs) if the total hazard index (HI) across all pathways is > 1 (H).
DDE = Dichlorodiphenyldichloroethylene.
EPC = Exposure Point Concentration.
PCB = Polychlorinated biphenyl.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.

Table A-21. Load Line 1 Deep Surface Soil Risks

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Risk			Total Risk Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
National Guard Trainee									
CB-13 and -10									
Aluminum	1.3E+04	6.9E-04	6.8E-06	1.8E-04					
Antimony	5.7E+00	3.1E-07	3.1E-09	8.2E-08					
Arsenic	1.1E+01	6.1E-07	1.8E-07	1.6E-07	9.1E-07	2.7E-07	2.4E-06	3.6E-06	R
Cadmium	5.2E+00	2.8E-07	2.8E-09	7.6E-08			4.8E-07	4.8E-07	
Chromium	3.5E+01	1.9E-06	1.9E-08	5.1E-07					
Copper	1.8E+02	9.8E-06	9.7E-08	2.6E-06					
Manganese	1.2E+03	6.6E-05	6.6E-07	1.8E-05					
Thallium	4.9E-01	2.7E-08	2.7E-10	7.2E-09					
Zinc	5.5E+02	3.0E-05	3.0E-07	7.9E-06					
Inorganics Pathway Total					9.1E-07	2.7E-07	2.9E-06	4.1E-06	
2,4,6-Trinitrotoluene	2.3E+01	1.3E-06	1.3E-06	3.4E-07	3.8E-08	3.8E-08		7.6E-08	
2,4-Dinitrotoluene	1.4E+00	7.6E-08	7.5E-08	2.0E-08	5.1E-08	5.1E-08		1.0E-07	
Benzo(*a*)pyrene	3.7E-01	2.0E-08	2.6E-08	5.4E-09	1.5E-07	1.9E-07	1.7E-08	3.5E-07	
PCB-1254	1.7E+00	9.3E-08	1.3E-07	2.5E-08	1.9E-07	2.6E-07	4.9E-08	4.9E-07	
RDX	3.4E+00	1.9E-07	1.9E-07	5.0E-08	2.1E-08	2.0E-08		4.1E-08	
Organics Pathway Total					4.4E-07	5.6E-07	6.6E-08	1.1E-06	
Pathway Total – Chemicals					1.4E-06	8.3E-07	3.0E-06	5.1E-06	
CB-14, CB-17, and CA-15									
Aluminum	1.9E+04	1.0E-03	1.0E-05	2.8E-04					
Arsenic	2.1E+01	1.1E-06	3.3E-07	3.0E-07	1.7E-06	5.0E-07	4.5E-06	6.7E-06	R
Barium	1.3E+02	7.1E-06	7.0E-08	1.9E-06					
Cadmium	2.0E+00	1.1E-07	1.1E-09	3.0E-08			1.9E-07	1.9E-07	
Manganese	1.1E+03	6.1E-05	6.1E-07	1.6E-05					
Nickel	3.1E+01	1.7E-06	1.6E-08	4.4E-07					
Thallium	8.8E-01	4.8E-08	4.8E-10	1.3E-08					
Vanadium	3.4E+01	1.8E-06	1.8E-08	4.9E-07					
Inorganics Pathway Total					1.7E-06	5.0E-07	4.7E-06	6.9E-06	
2,4,6-Trinitrotoluene	4.5E+00	2.5E-07	2.4E-07	6.5E-08	7.4E-09	7.3E-09		1.5E-08	
Benz(*a*)anthracene	6.4E-01	3.5E-08	4.5E-08	9.3E-09	2.5E-08	3.3E-08	2.9E-09	6.1E-08	
Benzo(*a*)pyrene	8.2E-01	4.5E-08	5.8E-08	1.2E-08	3.3E-07	4.2E-07	3.7E-08	7.8E-07	
Benzo(*b*)fluoranthene	1.1E+00	6.0E-08	7.7E-08	1.6E-08	4.4E-08	5.6E-08	5.0E-09	1.1E-07	
Dibenz(*a,h*)anthracene	1.8E-01	9.8E-09	1.3E-08	2.6E-09	7.2E-08	9.2E-08	8.1E-09	1.7E-07	
Indeno(1,2,3-*cd*)pyrene	6.4E-01	3.5E-08	4.5E-08	9.3E-09	2.5E-08	3.3E-08	2.9E-09	6.1E-08	
PCB-1254	4.7E+00	2.6E-07	3.6E-07	6.8E-08	5.1E-07	7.1E-07	1.4E-07	1.4E-06	R
RDX	2.1E+01	1.2E-06	1.2E-06	3.1E-07	1.3E-07	1.3E-07		2.6E-07	
Organics Pathway Total					1.1E-06	1.5E-06	1.9E-07	2.8E-06	
Pathway Total – Chemicals					2.8E-06	2.0E-06	4.9E-06	9.7E-06	
CB-3 and -801									
Aluminum	1.2E+04	6.6E-04	6.5E-06	1.7E-04					
Antimony	1.1E+02	6.0E-06	5.9E-08	1.6E-06					
Arsenic	1.3E+01	7.0E-07	2.1E-07	1.9E-07	1.1E-06	3.1E-07	2.8E-06	4.2E-06	R
Cadmium	6.3E+00	3.4E-07	3.4E-09	9.1E-08			5.7E-07	5.7E-07	
Manganese	1.3E+03	6.9E-05	6.8E-07	1.8E-05					
Thallium	6.0E-01	3.3E-08	3.2E-10	8.7E-09					
Inorganics Pathway Total					1.1E-06	3.1E-07	3.4E-06	4.8E-06	
Benz(*a*)anthracene	1.4E+01	7.6E-07	9.8E-07	2.0E-07	5.6E-07	7.2E-07	6.3E-08	1.3E-06	R
Benzo(*a*)pyrene	1.3E+01	7.1E-07	9.1E-07	1.9E-07	5.2E-06	6.7E-06	5.9E-07	1.2E-05	R
Benzo(*b*)fluoranthene	1.5E+01	8.2E-07	1.1E-06	2.2E-07	6.0E-07	7.7E-07	6.8E-08	1.4E-06	R
Dibenz(*a,h*)anthracene	1.2E+00	6.3E-08	8.1E-08	1.7E-08	4.6E-07	5.9E-07	5.2E-08	1.1E-06	R
Dieldrin	3.3E-02	1.8E-09	1.8E-09	4.8E-10	2.9E-08	2.9E-08	7.8E-09	6.6E-08	

Table A-21. Load Line 1 Deep Surface Soil Risks (continued)

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Risk			Total Risk Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
Indeno(1,2,3-*cd*)pyrene	8.7E+00	4.7E-07	6.1E-07	1.3E-07	3.5E-07	4.5E-07	3.9E-08	8.3E-07	
PCB-1254	4.3E+00	2.3E-07	3.2E-07	6.2E-08	4.7E-07	6.5E-07	1.2E-07	1.2E-06	R
Organics Pathway Total					7.6E-06	9.9E-06	9.4E-07	1.8E-05	
Pathway Total – Chemicals					8.7E-06	1.0E-05	4.3E-06	2.3E-05	
CB-4/4A and CA-6/6A									
Aluminum	1.0E+04	5.5E-04	5.4E-06	1.5E-04					
Arsenic	1.1E+01	5.9E-07	1.8E-07	1.6E-07	8.9E-07	2.6E-07	2.4E-06	3.5E-06	R
Barium	1.3E+02	7.2E-06	7.1E-08	1.9E-06					
Cadmium	1.8E+00	9.7E-08	9.6E-10	2.6E-08			1.6E-07	1.6E-07	
Chromium	2.4E+01	1.3E-06	1.3E-08	3.5E-07					
Copper	9.9E+01	5.4E-06	5.3E-08	1.4E-06					
Manganese	6.8E+02	3.7E-05	3.7E-07	9.8E-06					
Mercury	3.1E-01	1.7E-08	1.7E-10	4.5E-09					
Thallium	5.3E-01	2.9E-08	2.9E-10	7.7E-09					
Vanadium	1.9E+01	1.0E-06	1.0E-08	2.7E-07					
Inorganics Pathway Total					8.9E-07	2.6E-07	2.5E-06	3.7E-06	
1,3-Dinitrobenzene	6.4E+00	3.5E-07	3.4E-07	9.2E-08					
2,4,6-Trinitrotoluene	3.3E+02	1.8E-05	1.8E-05	4.8E-06	5.4E-07	5.4E-07		1.1E-06	R
2,6-Dinitrotoluene	8.6E-01	4.7E-08	4.6E-08	1.2E-08	3.2E-08	3.2E-08		6.3E-08	
4,4'-DDE	1.2E+00	6.5E-08	6.4E-08	1.7E-08	2.2E-08	2.2E-08		4.4E-08	
Benz(*a*)anthracene	6.4E-01	3.5E-08	4.5E-08	9.3E-09	2.6E-08	3.3E-08	2.9E-09	6.1E-08	
Benzo(*a*)pyrene	6.1E-01	3.3E-08	4.3E-08	8.8E-09	2.4E-07	3.1E-07	2.7E-08	5.8E-07	
Benzo(*b*)fluoranthene	6.6E-01	3.6E-08	4.6E-08	9.6E-09	2.6E-08	3.4E-08	3.0E-09	6.3E-08	
Dibenz(*a*,*h*)anthracene	9.6E-02	5.2E-09	6.7E-09	1.4E-09	3.8E-08	4.9E-08	4.3E-09	9.2E-08	
Dieldrin	9.8E-02	5.4E-09	5.3E-09	1.4E-09	8.6E-08	8.5E-08	2.3E-08	1.9E-07	
Endrin Aldehyde	4.4E+00	2.4E-07	2.4E-07	6.4E-08					
Heptachlor	7.2E-02	3.9E-09	3.9E-09	1.0E-09	1.8E-08	1.7E-08	4.7E-09	4.0E-08	
PCB-1254	1.1E+03	6.0E-05	8.3E-05	1.6E-05	1.2E-04	1.7E-04	3.2E-05	3.2E-04	R
RDX	8.9E+01	4.9E-06	4.8E-06	1.3E-06	5.3E-07	5.3E-07		1.1E-06	R
gamma-Chlordane	8.9E-01	4.8E-08	1.9E-08	1.3E-08	1.7E-08	6.7E-09	4.5E-09	2.8E-08	
Organics Pathway Total					1.2E-04	1.7E-04	3.2E-05	3.2E-04	
Pathway Total – Chemicals					1.2E-04	1.7E-04	3.5E-05	3.3E-04	
Change Houses (CB-12, -23, -8, and -22)									
Antimony	2.3E+00	1.2E-07	1.2E-09	3.3E-08					
Arsenic	1.2E+01	6.6E-07	2.0E-07	1.8E-07	9.9E-07	3.0E-07	2.7E-06	3.9E-06	R
Cadmium	3.3E+00	1.8E-07	1.8E-09	4.8E-08			3.0E-07	3.0E-07	
Manganese	8.3E+02	4.5E-05	4.5E-07	1.2E-05					
Thallium	4.3E-01	2.4E-08	2.3E-10	6.3E-09					
Inorganics Pathway Total					9.9E-07	3.0E-07	3.0E-06	4.2E-06	
Benzo(*a*)pyrene	9.2E-02	5.0E-09	6.5E-09	1.3E-09	3.7E-08	4.7E-08	4.1E-09	8.8E-08	
Organics Pathway Total					3.7E-08	4.7E-08	4.1E-09	8.8E-08	
Pathway Total – Chemicals					1.0E-06	3.4E-07	3.0E-06	4.3E-06	
Perimeter Area									
Aluminum	1.4E+04	7.8E-04	7.7E-06	2.1E-04					
Arsenic	1.3E+01	6.9E-07	2.0E-07	1.8E-07	1.0E-06	3.1E-07	2.7E-06	4.1E-06	R
Manganese	1.4E+03	7.6E-05	7.5E-07	2.0E-05					
Thallium	6.4E-01	3.5E-08	3.5E-10	9.3E-09					
Inorganics Pathway Total					1.0E-06	3.1E-07	2.7E-06	4.1E-06	
Pathway Total – Chemicals					1.0E-06	3.1E-07	2.7E-06	4.1E-06	

Table A-21. Load Line 1 Deep Surface Soil Risks (continued)

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Risk			Total Risk Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
Water Tower									
Chromium	2.5E+02	1.4E-05	1.4E-07	3.6E-06					
Thallium	6.4E-01	3.5E-08	3.5E-10	9.4E-09					
Inorganics Pathway Total									
Pathway Total – Chemicals									

[a] Chemicals of potential concern (COPCs) are identified as chemicals of concern (COCs) if the total incremental lifetime cancer risk across all pathways is > 1E-06 (R).
DDE = Dichlorodiphenyldichloroethylene.
EPC = Exposure point concentration.
PCB = Polychlorinated biphenyl.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.

Table A-22. Load Line 1 Subsurface Soil Hazards

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Hazard Quotient			Total HI Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
Resident Farmer Adult									
CB-13 and -10									
Antimony	6.2E+01	8.4E-05	1.9E-06	1.8E-08	2.1E-01	3.2E-02		2.4E-01	
Cadmium	1.6E+01	2.3E-05	5.1E-07	4.9E-09	2.3E-02	2.1E-02		4.3E-02	
Zinc	2.6E+03	3.6E-03	8.2E-05	7.8E-07	1.2E-02	9.1E-04		1.3E-02	
Inorganics Pathway Total					2.5E-01	5.4E-02		3.0E-01	
Pathway Total – Chemicals					2.5E-01	5.4E-02		3.0E-01	
CB-4/4A and CA-6/6A									
Cadmium	2.4E+00	3.3E-06	7.5E-08	7.1E-10	3.3E-03	3.0E-03		6.3E-03	
Copper	7.9E+01	1.1E-04	2.5E-06	2.3E-08	2.7E-03	6.2E-05		2.8E-03	
Inorganics Pathway Total					6.0E-03	3.1E-03		9.1E-03	
2,4,6-Trinitrotoluene	1.0E+03	1.4E-03	3.1E-03	3.0E-07	2.8E+00	6.3E+00		9.0E+00	H
RDX	4.0E+01	5.5E-05	1.2E-04	1.2E-08	1.8E-02	4.2E-02		6.0E-02	
Organics Pathway Total					2.8E+00	6.3E+00		9.1E+00	
Pathway Total – Chemicals					2.8E+00	6.3E+00		9.1E+00	
Resident Farmer Child									
CB-13 and -10									
Antimony	6.2E+01	7.9E-04	1.7E-06	4.3E-08	2.0E+00	2.9E-02		2.0E+00	H
Cadmium	1.6E+01	2.1E-04	4.6E-07	1.1E-08	2.1E-01	1.9E-02		2.3E-01	
Zinc	2.6E+03	3.4E-02	7.4E-05	1.8E-06	1.1E-01	8.2E-04		1.1E-01	
Inorganics Pathway Total					2.3E+00	4.8E-02		2.3E+00	
Pathway Total – Chemicals					2.3E+00	4.8E-02		2.3E+00	
CB-4/4A and CA-6/6A									
Cadmium	2.4E+00	3.1E-05	6.8E-08	1.7E-09	3.1E-02	2.7E-03		3.3E-02	
Copper	7.9E+01	1.0E-03	2.2E-06	5.5E-08	2.5E-02	5.5E-05		2.5E-02	
Inorganics Pathway Total					5.6E-02	2.8E-03		5.9E-02	
2,4,6-Trinitrotoluene	1.0E+03	1.3E-02	2.8E-03	7.0E-07	2.6E+01	5.7E+00		3.1E+01	H
RDX	4.0E+01	5.1E-04	1.1E-04	2.8E-08	1.7E-01	3.7E-02		2.1E-01	
Organics Pathway Total					2.6E+01	5.7E+00		3.2E+01	
Pathway Total – Chemicals					2.6E+01	5.7E+00		3.2E+01	

[a] Chemicals of potential concern (COPCs) are identified as chemicals of concern (COCs) if the total hazard index (HI) across all pathways is > 1 (H).
EPC = Exposure point concentration.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.

Table A-23. Load Line 1 Subsurface Soil Risks

COPC	EPC (mg/kg)	Daily Intake (mg/kg-d)			Risk			Total Risk Across all Pathways	COC[a]
		Ingestion	Dermal	Inhalation	Ingestion	Dermal	Inhalation		
Resident Farmer Adult									
CB-13 and -10									
Antimony	6.2E+01	3.6E-05	8.3E-07	7.8E-09					
Cadmium	1.6E+01	9.7E-06	2.2E-07	2.1E-09			1.3E-08	1.3E-08	
Zinc	2.6E+03	1.5E-03	3.5E-05	3.3E-07					
Inorganics Pathway Total							1.3E-08	1.3E-08	
Pathway Total – Chemicals							1.3E-08	1.3E-08	
CB-4/4A and CA-6/6A									
Cadmium	2.4E+00	1.4E-06	3.2E-08	3.1E-10			1.9E-09	1.9E-09	
Copper	7.9E+01	4.6E-05	1.1E-06	1.0E-08					
Inorganics Pathway Total							1.9E-09	1.9E-09	
2,4,6-Trinitrotoluene	1.0E+03	5.9E-04	1.3E-03	1.3E-07	1.8E-05	4.0E-05		5.8E-05	R
RDX	4.0E+01	2.3E-05	5.3E-05	5.1E-09	2.6E-06	5.9E-06		8.5E-06	R
Organics Pathway Total					2.0E-05	4.6E-05		6.7E-05	
Pathway Total – Chemicals					2.0E-05	4.6E-05	1.9E-09	6.7E-05	
Resident Farmer Child									
CB-13 and -10									
Antimony	6.2E+01	6.8E-05	1.5E-07	3.7E-09					
Cadmium	1.6E+01	1.8E-05	4.0E-08	9.8E-10			6.2E-09	6.2E-09	
Zinc	2.6E+03	2.9E-03	6.3E-06	1.6E-07					
Inorganics Pathway Total							6.2E-09	6.2E-09	
Pathway Total – Chemicals							6.2E-09	6.2E-09	
CB-4/4A and CA-6/6A									
Cadmium	2.4E+00	2.6E-06	5.8E-09	1.4E-10			9.0E-10	9.0E-10	
Copper	7.9E+01	8.6E-05	1.9E-07	4.7E-09					
Inorganics Pathway Total							9.0E-10	9.0E-10	
2,4,6-Trinitrotoluene	1.0E+03	1.1E-03	2.4E-04	6.0E-08	3.3E-05	7.3E-06		4.0E-05	R
RDX	4.0E+01	4.4E-05	9.6E-06	2.4E-09	4.8E-06	1.1E-06		5.9E-06	R
Organics Pathway Total					3.8E-05	8.3E-06		4.6E-05	
Pathway Total – Chemicals					3.8E-05	8.3E-06	9.0E-10	4.6E-05	

[a] Chemicals of potential concern (COPCs) are identified as chemicals of concern (COCs) if the total incremental lifetime cancer risk across all pathways is > 1E-06 (R)
EPC = Exposure point concentration.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.

APPENDIX B
MODELING FOR LOAD LINE 1: WATERFOWL CONCENTRATIONS FROM SEDIMENT AND SURFACE WATER AND FISH CONCENTRATIONS FROM SURFACE WATER

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APPENDIX B

MODELING FOR LOAD LINE 1: WATERFOWL CONCENTRATIONS FROM SEDIMENT AND SURFACE WATER AND FISH CONCENTRATIONS FROM SURFACE WATER

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CONTENTS

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TABLES

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ACRONYMS

BCF_{inv}	water-to-tissue bioconcentration factor
BHHRA	baseline human health risk assessment
BSAF	sediment-to-tissue bioaccumulation factor
BTF	biotransfer factor
COPC	chemical of potential concern
EC	exposure concentration
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
EU	exposure unit
foc	fraction organic carbon
HAZWRAP	Hazardous Waste Remedial Actions Program
K_{ow}	octanol-water partitioning coefficient
RTLS	Ravenna Training and Logistics Site
RVAAP	Ravenna Army Ammunition Plant

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B1.0 INTRODUCTION

This appendix documents the process for determining exposure point concentrations (EPCs) that are used in the baseline human health risk assessment (BHHRA) for waterfowl and fish. Section B2 discusses the process for waterfowl and Section B3 discussed the process for fish; references are provided in Section B4.

B2.0 DETERMINING WATERFOWL CONCENTRATIONS

Numerous waterfowl are harvested and eaten by humans in northeast Ohio, where the Ravenna Army Ammunition Plant (RVAAP) is located. Ohio is in the Mississippi Flyway, and many species of waterfowl migrate through the RVAAP area in the spring and fall (ODNR 2003). Other species breed in the area and are summer residents. A 1993 census of waterfowl at Ravenna found bufflehead, Canada goose, wood duck, hooded merganser, mallard, blue-winged teal, ring-necked duck, American coot, red-breasted merganser, greater scaup, red-headed duck, common goldeneye, Northern shoveler, and American widgeon (ODNR 1993).

The mallard will be used as a representative species of dabbling-type ducks for the development of EPCs for the Hunter/Trapper scenario. According to Tim Morgan, Office of Species Conservation forester, the most likely species hunted at the Ravenna Training and Logistics Site (RTLS) are mallards, wood ducks, and Canada Geese (Morgan 2003). The goose is primarily herbivorous, while the mallard and wood duck are omnivorous and dabble for seeds, rootlets, tubers of aquatic plants, and aquatic insects, such as snails, small clams, insects, worms, and crustaceans (Ducks Unlimited 2003; EPA 1993a).

To calculate the concentrations of chemicals of potential concern (COPCs) in duck whole body tissue, biouptake and concentration factors are required for each transfer represented in the exposure model for the duck. The duck is exposed directly and indirectly via the food web to the measured concentrations of COPCs in sediment (Table B-1) and surface water (Table B-2) at the RVAAP Load Line 1. For calculating whole body concentrations, ducks are assumed to be exposed by the following routes:

- ingestion of aquatic plants that are exposed to surface water, sediment, and sediment porewater;
- ingestion of sediment invertebrates that are exposed to surface water, sediment, and sediment porewater;
- ingestion of surface water; and
- incidental ingestion of sediment.

The values and sources of all biouptake and concentration factors used in the calculation of duck tissue concentrations are given in Table B-3.

B2.1 ESTIMATING AQUATIC PLANT TISSUE CONCENTRATIONS

The exposure concentrations (ECs) of inorganic COPCs (metals) in aquatic plant tissues eaten by dabbling ducks are assumed to result primarily from uptake from sediment by rooted aquatic plants. The

resulting concentrations are estimated using soil-to-plant uptake factors (soil-to-plant Bv) reported by Hazardous Waste Remedial Actions Program (HAZWRAP) (1994), because it is assumed that the root uptake into plants of inorganics in sediment and soil is similar. That is, for inorganic COPCs in sediment,

$$\text{Aquatic Plant EC} = \text{soil-to-plant Bv} \times \text{Sediment EC}.$$

For organic COPCs, plant tissue concentrations are estimated from water-to-algae uptake factors (water-to-algae Bv) recommended in U.S. Environmental Protection Agency (EPA) guidance for screening-level risk assessments at hazardous waste combustion facilities (EPA 1999). For organic COPCs, the Bv is multiplied by the larger of the measured surface water EC and estimated sediment porewater ECs, representing floating plants and rooted plants, respectively. That is, for organic COPCs,

$$\text{Aquatic Plant EC} = \text{water-to-algae Bv} \times \text{Surface Water EC}$$

or

$$\text{Aquatic Plant EC} = \text{water-to-algae Bv} \times \text{Sediment Porewater EC}.$$

The method of estimating sediment porewater ECs is described below, following the method for estimating sediment invertebrate tissue ECs.

B2.2 ESTIMATING SEDIMENT INVERTEBRATE TISSUE CONCENTRATIONS

Water-to-tissue bioconcentration factors (BCF_{inv}) and sediment-to-tissue bioaccumulation factors (BSAFs) are required to predict the tissue concentration in sediment invertebrates exposed to COPCs in sediment. The values used are those recommended in EPA (1999). For organic COPCs with log octanol-water partitioning coefficient (K_{ow}) ≤ 5, the sediment porewater EC and BCF_{inv} are used to estimate the tissue concentration in sediment invertebrates. For inorganic COPCs and organic COPCs with log $K_{ow} > 5$, the sediment EC and BSAF are used. That is, for inorganic COPCs and organic COPCs with log $K_{ow} > 5$,

$$\text{Sediment Invertebrate EC} = \text{BSAF} \times \text{Sediment EC},$$

and for organic COPCs with log $K_{ow} \leq 5$,

$$\text{Sediment Invertebrate EC} = BCF_{inv} \times \text{Sediment Porewater EC}.$$

This approach, modeled after the method of calculating fish tissue concentrations for human health risk assessment (EPA 1998), assumes that sediment invertebrates primarily take up COPCs either from bulk sediment or sediment porewater as a function of the COPCs' different affinities for sediment. Inorganic COPCs (metals) and organic COPCs with log $K_{ow} > 5$ (polychlorinated biphenyls, most semivolatile organic compounds) are assumed to be strongly associated with sediment. The BSAF is assumed to capture the relationship between sediment invertebrate tissue concentration and bulk sediment concentration of these COPCs resulting primarily from ingestion of sediment. The organic COPCs with log $K_{ow} \leq 5$ (i.e., explosives; phenanthrene; and 1,2-dichloroethene) are assumed to be less strongly associated with sediment and, thus, reach an equilibrium with sediment porewater. The BCF_{inv} for these COPCs is assumed to capture the relationship between the concentration in sediment porewater and sediment invertebrate tissue concentration resulting from direct contact and ingestion of sediment porewater.

B2.3 ESTIMATING SEDIMENT POREWATER CONCENTRATIONS

Sediment porewater concentrations for organic COPCs are estimated from sediment concentrations using the product of the K_{ow} and fraction organic carbon (foc) assuming equilibrium partitioning (EPA 1993b), that is,

$$\text{Sediment Porewater EC} = \text{Sediment EC}/(K_{ow} \times \text{foc}).$$

The foc is equal to the total organic carbon concentration measured in Criggy's Pond sediment (Table B-1), reported as 56,700 mg/kg (5.7%, foc = 0.057). The K_{ow} values for organic COPCs are calculated from the log K_{ow} values reported in HAZWRAP (1994).

B2.4 ESTIMATING DUCK WHOLE-BODY TISSUE CONCENTRATIONS

Bioaccumulation in the duck from the plant and animal food, water, and sediment it ingests is estimated using the bioaccumulation factors (BAF_vs) for small birds reported in HAZWRAP (1994).

A diet of 50% plant matter and 50% animal matter is used in the calculation of dabbling ducks' (as represented by the mallard) whole-body tissue concentrations. According to EPA (1993a), female mallards, during the breeding season, consume large amounts of animals dwelling in or on the sediment of lakes and streams, while the information for males in Louisiana coastal marsh-prairie indicates they are primarily herbivorous during the winter. Thus, the ratio of animal-to-plant food differs by sex and by time of year. The 1:1 ratio is assumed to be representative of the diet of harvested ducks. Mallards and other dabbling ducks drink water and are likely to ingest small amounts of sediment incidentally while feeding; the calculations use a conservative value of 2% of food eaten daily for the amount of sediment ingested (EPA 1993a). The food ingestion rate and water ingestion rates for the mallard are given in Table B-4.

For the purposes of estimating duck tissue concentrations for human health COPCs, it is assumed that ducks spend enough time at the RVAAP Load Line 1 exposure units (EUs) prior to harvesting to achieve the predicted tissue concentration of COPCs via the different pathways.

The calculation of duck tissue concentrations for human health COPCs at the two RVAAP Load Line 1 EUs are shown in Tables B-5 and B-6.

B2.5 UNCERTAINTIES IN ESTIMATING WATERFOWL CONCENTRATIONS

The use of published bioaccumulation and uptake factors, especially the large water-to-tissue bioconcentration factors for sediment invertebrates (BCF_{inv}), introduces uncertainty to the predicted duck tissue concentrations. The bioaccumulation factors for the duck (BAFv) are the values for cattle, and they have not been adjusted for differences in fat content, exposure duration, and amount of COPC ingested per unit tissue. Other sources of uncertainty include the actual average diet of the ducks harvested and consumed by hunters at RVAAP and the amount of food obtained from the RVAAP Loan Line 1 EUs by harvested ducks. Another uncertainty involves the amount of floating plants (e.g., duckweed) eaten by dabbling ducks at RVAAP. When these plants are exposed to inorganic COPCs in surface water rather than in sediment, estimated duck tissue concentrations may be underestimated for some inorganics.

B2.6 WATERFOWL SUMMARY

The estimated concentrations in ducks of human health COPCs in sediment and surface water at RVAAP Load Line 1 EUs are summarized in Table B-7. Note that duck tissue concentrations in Outlet C and Charlie's' Pond are lower than at Outlets D, E, and F, and Criggy's Pond for comparable COPCs (e.g., arsenic, lead, and manganese).

B3.0 DETERMINING FISH CONCENTRATIONS

As discussed in Section 3.2.2 of the Supplemental BHHRA, catch and release fishing is allowed for personnel permanently assigned to the RTLS and their guests (OHARNG 2001). When the installation restoration program is done, the goal is to have unrestricted fishing and taking of fish from all ponds. Therefore, this BHHRA evaluates a receptor that is assumed to ingest fish caught on-site.

EPCs in fish are estimated from the concentrations found in surface water. Human health COPCs for surface water are available for two EUs: (1) Outlet C and Charlie's Pond and (2) Outlets D, E, and F, and Criggy's Pond. Arsenic, chromium, and lead are COPCs for Outlet C and Charlie's Pond, while arsenic is the only COPC for Outlets D, E, and F, and Criggy's Pond (see Table B-2).

The process for determining fish concentrations from surface water concentrations is a relatively simple modeling process, which involves the use of a water-to-fish biotransfer factor (BTF). The equation for determining the fish concentration is

$$C_{fish} = C_{sw} \times BTF,$$

where

C_{fish} = concentration in fish for COPC (mg/kg),
C_{sw} = EC in surface water for COPC (mg/L),
BTF = water-to-fish BTF for COPC (L/kg).

Table B-8 displays the surface water ECs (also shown on Table B-2), the water-to-fish BTFs, and the resulting fish concentrations for all surface water COPCs. The BTF values used in this BHHRA are taken from a database supplied by the Oak Ridge National Laboratory (2004). The resulting fish concentrations are used in the BHHRA to quantify carcinogenic risks and non-carcinogenic hazards for the ingestion of fish pathway. Note that because lead does not have EPA-approved oral toxicity values, risks and hazards cannot be quantified for this surface water COPC (see Chapter 4.0 of the Supplemental BHHRA for a discussion of toxicity values used).

B4.0 REFERENCES

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TABLES

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Table B-1. Summary Concentration Data for Human Health COPCs in Sediment at Load Line 1

Analyte	CAS Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration
Outlet C and Charlie's Pond								
Explosives								
2-Amino-4,6-Dinitrotoluene	35572-78-2	mg/kg	2/ 5	2.01E-01	1.90E-01	4.40E-01	3.31E-01	3.31E-01
4-Amino-2,6-Dinitrotoluene	19406-51-0	mg/kg	2/ 5	2.39E-01	3.70E-01	4.50E-01	3.90E-01	3.90E-01
Metals								
Arsenic	7440-38-2	mg/kg	8/ 8	1.54E+01	7.60E+00	5.05E+01	2.50E+01	2.50E+01
Manganese	7439-96-5	mg/kg	7/ 7	9.31E+02	2.37E+02	2.35E+03	3.06E+03	2.35E+03
Organics-Pesticides/PCBs								
PCB-1254	11097-69-1	mg/kg	1/ 2	4.47E-01	8.70E-01	8.70E-01	3.12E+00	8.70E-01
Organics-Semivolatile								
Benzo(*a*)pyrene	50-32-8	mg/kg	2/ 2	7.00E-02	5.60E-02	8.40E-02	1.58E-01	8.40E-02
Benzo(*g,h,i*)perylene	191-24-2	mg/kg	1/ 2	1.47E-01	5.80E-02	5.80E-02	7.05E-01	5.80E-02
Phenanthrene	85-01-8	mg/kg	1/ 2	1.47E-01	5.90E-02	5.90E-02	7.03E-01	5.90E-02
Outlets D, E, and F, and Criggy's Pond								
Metals								
Antimony	7440-36-0	mg/kg	4/ 6	1.99E+02	2.00E+00	1.18E+03	5.94E+02	5.94E+02
Arsenic	7440-38-2	mg/kg	6/ 6	1.46E+01	9.50E+00	2.10E+01	2.15E+01	2.10E+01
Copper	7440-50-8	mg/kg	6/ 6	3.09E+02	9.50E+00	1.02E+03	3.24E+05	1.02E+03
Lead	7439-92-1	mg/kg	6/ 6	2.45E+02	2.15E+01	1.21E+03	2.64E+04	1.21E+03
Manganese	7439-96-5	mg/kg	6/ 6	1.74E+03	4.96E+02	3.38E+03	7.30E+03	3.38E+03

CAS = Chemical Abstracts Service.
COPC = Chemical of potential concern.
PCB = Polychlorinated biphenyl.
UCL = Upper confidence limit.

Table B-2. Summary Concentration Data for Human Health COPCs in Surface Water at Load Line 1

Analyte	CAS Number	Units	Results > Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration
Outlet C and Charlie's Pond								
Metals								
Arsenic	7440-38-2	µg/L	1/ 1	3.10E+01	3.10E+01	3.10E+01	--	3.10E+01
Chromium	7440-47-3	µg/L	1/ 1	2.40E+00	2.40E+00	2.40E+00	--	2.40E+00
Lead	7439-92-1	µg/L	1/ 1	3.10E+00	3.10E+00	3.10E+00	--	3.10E+00
Outlets D, E, and F, and Criggy's Pond								
Metals								
Arsenic	7440-38-2	µg/L	1/ 1	5.10E+00	5.10E+00	5.10E+00	--	5.10E+00

CAS = Chemical Abstracts Service.
COPC = Chemical of potential concern.
UCL = Upper confidence limit.
-- = Not applicable.

Table B-3. Bioaccumulation Factors for Estimating Duck Tissue Concentrations for Human Health COPCs in Sediment and Surface Water in Outlet C and Charlie's Pond and Outlets D, E, and F, and Criggy's Pond

COPC	$_d$ or K_{ow}		log K_{ow}		BCF_{inv}		Bv		BSAF		BAFv	
	Value	Source	Value	Source	Value	Source	Value	Source	Value	Source	Value	Source
Inorganics												
Antimony	NA		NA		7	EPA (1999)[a]	0.04	Baes et al. (1984)[b]	0.9	EPA (1999)[c]	0.05	Baes et al. (1984)[d]
Arsenic	NA		NA		73	EPA (1999)[a]	0.008	Baes et al. (1984)[b]	0.9	EPA (1999)[c]	0.1	Baes et al. (1984)[d]
Chromium (all forms)	NA		NA		3,000	EPA (1999)[a]	0.0015	Baes et al. (1984)[b]	0.39	EPA (1999)[a]	0.28	Baes et al. (1984)[d]
Copper	NA		NA		3,718	EPA (1999)[a]	0.08	Baes et al. (1984)[b]	0.3	EPA (1999)[a]	0.5	Baes et al. (1984)[d]
Lead	NA		NA		5,059	EPA (1999)[a]	0.009	Baes et al. (1984)[b]	0.63	EPA (1999)[a]	0.015	Baes et al. (1984)[d]
Manganese	NA		NA		4,066	EPA (1999)[a]	0.05	Baes et al. (1984)[b]	0.9	EPA (1999)[c]	0.02	Baes et al. (1984)[d]
PCBs												
PCB-1254	1,000,000	EPA (1990)[e]	6	EPA (1990)[e]	NA		476,829	EPA (1999)[a]	0.53	EPA (1999)[a]	2.90	EPA (1985)[f]
Explosives												
2-Amino-4,6-dinitrotoluene	126	SCDM (1993)[g]	2.1	SCDM (1993)[g]	13	EPA (1999)[g]	2,507	EPA (1999)[g]	NA		0.00019	Travis and Arms (1988)[h]
4-Amino-2,6-dinitrotoluene	126	SCDM (1993)[g]	2.1	SCDM (1993)[g]	13	EPA (1999)[g]	2,507	EPA (1999)[g]	NA		0.00019	Travis and Arms (1988)[h]
SVOCs												
Benzo(*a*)pyrene	1,000,000	SCDM (1993)[i]	6	SCDM (1993)[i]	NA		5,258	EPA (1999)[a]	1.59	EPA (1999)[a]	1.5	Travis and Arms (1988)[h]
Benzo(*g,h,i*)perylene	3,981,071.71	SCDM (1993)[i]	6.6	SCDM (1993)[i]	NA		5,258	EPA (1999)[a]	1.59	EPA (1999)[a]	6	Travis and Arms (1988)[h]
Phenanthrene	31,623	SCDM (1993)[i]	4.5	SCDM (1993)[i]	4,697	EPA (1999)[a]	5,258	EPA (1999)[a]	NA		0.05	Travis and Arms (1988)[h]

[a] Recommended value in EPA (1999).
[b] SPv (plant uptake) value from Baes et al. (1984) multiplied by 0.2 to adjust from dry weight to 80% moisture wet weight.
[c] Arithmetic mean of EPA (1999) recommended values for six inorganics: Cd, Cr, Cu, Pb, Hg, and Zn.
[d] Ff (ingestion-to-beef transfer) value form Baes et al. (1984) multiplied by cattle ingestion rate of 50 kg/d.
[e] EPA (1990) value reported in HAZWRAP (1994).
[f] Whole-body BAF for DDT update by pheasants (EPA 1985), used as surrogate for all pesticides.
[g] Value for 2,6-Dinitrotoluene used as surrogate by Science Applications International Corporation.
[h] Biotransfer factor (BTF) calculated from octanol-water partitioning coefficient (K_{ow}): log (BTF) = log(K_{ow}) – 7.6 (Travis and Arms 1988). BTF multiplied by ingestion rate of 12 kg dry wt/d and divided by 0.2 to adjust from weight to 80% moisture wet weight.
[i] SCDM (1993) value reported in HAZWRAP (1994).
BAFv = Ingested material-to-bird bioconcentration factor (kg-ingest/kg-tissue).
BCF_{inv} = Water-to-invertebrate bioconcentration factor (L/kg) from EPA (1999).
BSAF = Sediment-to-invertebrate bioconcentration factor (kg-sediment/kg-tissue).
Bv = Aquatic plant uptake factor (kg-sediment/kg-tissue).
COPC = Chemical of potential concern (for human health).
Kd = Correlation coefficient.
K_{ow} = Octanol-water partitioning coefficient.
NA = Not applicable.
PCB = Polychlorinated biphenyl.
SCDM = Superfund Chemical Data Matrix.
SVOC = Semivolatile organic compound.

Table B-4. Receptor Parameters for Mallard Ducks (*Anas platyrhynchos*)

Parameter	Definition	Value	Reference/Notes
BW	Body weight (kg)	1.134	Arithmetic mean adult males and females, throughout North America (EPA 1993a)
HR	Home range (ha)	111	Adult females, spring, laying, North Dakota prairie potholes (EPA 1993a)
TUF	Temporal use factor	1	Will be 1 unless a specific value exists for a receptor
IR_F	Food ingestion rate (g/g-d = kg/kgBW/d)[a]	0.09	Estimated by dividing free-living metabolic rate (203 kcal/kgBW/d) by the product of the energy composition of seeds (4.26 kcal/g wet wt.) and leaves/stems 0.64 kcal/g wet wt) times their assimilation efficiencies (0.59 and 0.23, respectively) per Table 4 in EPA 1993a
PF	Plant fraction	0.5	Assumed by SAIC to be average for harvested ducks based on interpretation of diets for males and females at different seasons
AF	Animal fraction	0.5	Assumed by SAIC to be average for harvested ducks based on interpretation of diets for males and females at different seasons
SF	Soil fraction	0.02	Less than 2% (EPA 1993a), assume 2%
IR_w	Water ingestion rate (g/g-d = L/kgBW/d)	0.057	Adult, arithmetic mean, both sexes (EPA 1993a)

[a]Food ingestion rate (g/g-d) re-expressed as kg/kgBW/d is assumed not to include ingested soil; therefore, PF + AF = 1.0.
EPA = U.S. Environmental Protection Agency.
SAIC = Science Applications International Corporation.

Table B-5. Calculation of Dabbling Duck Tissue Concentrations for Human Health COPCs in Sediment and Surface Water in Outlet C and Charlie's Pond, Load Line 1

	Parameters						Measurements		Model Calculations							
			Aquatic Plant	Sediment Invertebrate		Bird	Sediment	Surface Water	Sediment Pore Water	Aquatic Plant	Sediment Invertebrate	Sediment	Water	Aquatic Plant	Sediment Invertebrate	Duck Tissue
COPC	K_{ow} (L/kg)	$\log K_{ow}$	Bv (kg/kg)	BCF_{inv} (L/kg)	BSAF (kg/kg)	BAFv (kg/kg)	EC (mg/kg)	EC (µg/L)	EC µg/L)	EC (mg/kg)	EC (mg/kg)	Intake (mg/kg/d)	Intake (mg/kg/d)	Intake (mg/kg/d)	Intake (mg/kg/d)	Concentration (mg/kg)
Outlet C and Charlie's Pond																
Inorganics																
Arsenic	NA	NA	8.0E-03	7.3E+01	9.0E-01	1.0E-01	2.5E+01	3.1E+01	NA	2.0E-01	2.2E+01	4.5E-02	1.8E-03	9.0E-03	1.0E+00	2.2E+00
Chromium	NA	NA	1.5E-03	3.0E+03	3.9E-01	2.8E-01	1.6E+01	NA	NA	2.4E-02	6.3E+00	2.9E-02	0.0E+00	1.1E-03	2.8E-01	2.0E+00
Lead	NA	NA	9.0E-03	5.1E+03	6.3E-01	1.5E-02	4.0E+01	3.1E+00	NA	3.6E-01	2.5E+01	7.1E-02	1.8E-04	1.6E-02	1.1E+00	3.8E-01
Manganese	NA	NA	5.0E-02	4.1E+03	9.0E-01	2.0E-02	2.4E+03	5.1E+02	NA	1.2E+02	2.1E+03	4.2E+00	2.9E-02	5.3E+00	9.5E+01	4.0E+01
PCBs																
PCB-1254	1.0E+06	6.0E+00	4.8E+05	5.5E+03	5.3E-01	2.9E+00	8.7E-01	NA	1.5E-02	7.3E+00	4.6E-01	1.6E-03	0.0E+00	3.3E-01	2.1E-02	2.0E+01
Explosives																
2-Amino-4,6-dinitrotoluene	1.3E+02	2.1E+00	2.5E+03	1.3E+01	3.8E+00	1.9E-04	3.3E-01	NA	4.6E+01	1.2E+02	6.0E-01	6.0E-04	0.0E+00	5.2E+00	2.7E-02	2.2E-02
4-Amino-2,6-dinitrotoluene	1.3E+02	2.1E+00	2.5E+03	1.3E+01	3.8E+00	1.9E-04	3.9E-01	NA	5.4E+01	1.4E+02	7.1E-01	7.0E-04	0.0E+00	6.1E+00	3.2E-02	2.6E-02
SVOCs																
Benzo(*a*)pyrene	1.0E+06	6.0E+00	5.3E+03	4.7E+03	1.6E+00	1.5E+00	8.4E-02	NA	1.5E-03	7.7E-03	1.3E-01	1.5E-04	0.0E+00	3.5E-04	6.0E-03	1.9E-01
Benzo(*g,h,i*)perylene	4.0E+06	6.6E+00	5.3E+03	4.7E+03	1.6E+00	6.0E+00	5.8E-02	NA	2.6E-04	1.3E-03	9.2E-02	1.0E-04	0.0E+00	6.0E-05	4.1E-03	5.4E-01
Phenanthrene	3.2E+04	4.5E+00	5.3E+03	4.7E+03	1.6E+00	4.8E-02	5.9E-02	NA	3.3E-02	1.7E-01	1.5E-01	1.1E-04	0.0E+00	7.7E-03	6.9E-03	7.8E-03

BAFv = Ingested material-to-bird bioconcentration factor (kg-ingest/kg-tissue) from HAZWRAP (1994).
BCF_{inv} = Water-to-invertebrate bioconcentration factor (L/kg) from EPA (1999).
BSAF = Sediment-to-invertebrate bioconcentration factor (kg-sediment/kg-tissue) from EPA (1999).
Bv = Aquatic plant uptake factor; soil-to-plant uptake factor (kg-sediment/kg-tissue) from HAZWRAP (1994) for metals; water-to-algae uptake factor (L/kg) from EPA (1999) for organic COPCs.
COPC = Chemical of potential concern (for human health).
EC = Exposure concentration. Sediment EC and Surface Water EC measured values; Sediment Pore Water EC = Sediment EC/(K_{ow} × foc).
foc = Measured fraction organic carbon in Criggy's Pond sediment = 0.057.
Kow = Octanol-water partitioning coefficient (for organic compounds) (HAZWRAP 1994).
NA = Not applicable.
PCB = Polychlorinated biphenyl.
Aquatic Plant EC = Larger of Surface Water EC × Bv and Sediment Pore Water EC x Bv for organic COPCs; = Sediment EC × Bv for metals.
Sediment Invertebrate EC = Sediment EC x BSAF for metals and organic COPCs with log K_{ow} > 5; = Sediment Pore Water EC × BCF_{inv} for organic COPCs with log $K_{ow} \leq 5$.

Sediment Intake (mg/kg/d) = Sediment EC × IR_S. IR_S = Sediment ingestion rate (kg/kg/d) = IR_F × SF = 0.0018. SF = Incidental ingested sediment as fraction of food diet = 0.02 (EPA 1993a).
Water Intake (mg/kg/d) = Surface Water EC × IR_W. IR_W = Water ingestion rate (L/kg/d) = 0.057.
Aquatic Plant Intake (mg/kg/d) = Aquatic Plant EC × IR_P. IR_P = Plant food ingestion rate (kg/kg/d) = IR_F × PF = 0.045. IR_F = Food ingestion rate (kg/kg/d) = 0.09. PF = Plant fraction of diet = 0.5.
Sediment Invertebrate Intake (mg/kg/d) = Sediment Invertebrate EC x IR_A. IR_A = Animal food ingestion rate (kg/kg/d) = IR_F × AF = 0.045. AF = Animal fraction of diet = 0.5.

Duck Tissue Concentration (mg/kg) = BAFv × (Sediment EC × FS + Surface Water EC × FW + Aquatic Plant EC × FP + Sediment Invertebrate EC × FA).
FS = Sediment EC x IR_S/(Sediment EC × IR_S + Surface Water EC × IR_W + Aquatic Plant EC × IR_P + Sediment Invertebrate EC × IR_A).
FW = Surface Water EC × IR_W/(Sediment EC × IR_S + Surface Water EC × IR_W + Aquatic Plant EC × IR_P + Sediment Invertebrate EC × IR_A).
FP = Aquatic Plant EC ×IR_P/(Sediment EC x IR_S + Surface Water EC × IR_W + Aquatic Plant EC × IR_P + Sediment Invertebrate EC × IR_A).
FA = Sediment Invertebrate EC × IRA/(Sediment EC × IRS + Surface Water EC × IRW + Aquatic Plant EC x IRP + Sediment Invertebrate EC × IRA).

Table B-6. Calculation of Dabbling Duck Tissue Concentrations for Human Health COPCs in Sediment and Surface Water in Outlets D, E, and F and Criggy's Pond, Load Line 1

	Parameters						Measurements		Model Calculations							
				Sediment Invertebrate												
COPC	K_{ow} (L/kg)	$\log K_{ow}$	Aquatic Plant Bv (kg/kg)	BCF_{inv} (L/kg)	BSAF (kg/kg)	Duck BAFv (kg/kg)	Sediment EPC (mg/kg)	Surface Water EPC (µg/L)	Sediment Pore Water EPC µg/L)	Aquatic Plant EPC (mg/kg)	Sediment Invertebrate EPC (mg/kg)	Sediment Intake (mg/kg/d)	Water Intake (mg/kg/d)	Aquatic Plant Intake (mg/kg/d)	Sediment Invertebrate Intake (mg/kg/d)	Duck Tissue Concentration (mg/kg)
Outlets D, E, and F, and Criggy's Pond																
K (*Inorganics*																
Antimony	NA	NA	4.0E-02	7.0E+00	9.0E-01	5.0E-02	5.9E+02	NA	NA	2.4E+01	5.3E+02	1.1E+00	0.0E+00	1.1E+00	2.4E+01	2.6E+01
Arsenic	NA	NA	8.0E-03	7.3E+01	9.0E-01	1.0E-01	2.1E+01	5.1E+00	NA	1.7E-01	1.9E+01	3.8E-02	2.9E-04	7.6E-03	8.5E-01	1.9E+00
Copper	NA	NA	8.0E-02	3.7E+03	3.0E-01	5.0E-01	1.0E+03	NA	NA	8.2E+01	3.1E+02	1.8E+00	0.0E+00	3.7E+00	1.4E+01	1.7E+02
Lead	NA	NA	9.0E-03	5.1E+03	6.3E-01	1.5E-02	1.2E+03	NA	NA	1.1E+01	7.6E+02	2.2E+00	0.0E+00	4.9E-01	3.4E+01	1.2E+01
Manganese	NA	NA	5.0E-02	4.1E+03	9.0E-01	2.0E-02	3.4E+03	NA	NA	1.7E+02	3.0E+03	6.1E+00	0.0E+00	7.6E+00	1.4E+02	5.8E+01

BAFv = Ingested material-to-bird bioconcentration factor (kg-ingest/kg-tissue) from HAZWRAP (1994).
BCF_{inv} = Water-to-invertebrate bioconcentration factor (L/kg) from EPA (1999).
BSAF = Sediment-to-invertebrate bioconcentration factor (kg-sediment/kg-tissue) from EPA (1999).
Bv = Aquatic plant uptake factor; soil-to-plant uptake factor (kg-sediment/kg-tissue) from HAZWRAP (1994) for metals; water-to-algae uptake factor (L/kg) from EPA (1999) for organic COPCs.
COPC = Chemical of potential concern (for human health).
EC = Exposure concentration. Sediment EC and Surface Water EC measured values; Sediment Pore Water EC = Sediment EC/(K_{ow} × foc).
foc = Measured fraction organic carbon in Criggy's Pond sediment = 0.057.
Kow = Octanol-water partitioning coefficient (for organic compounds) (HAZWRAP 1994).
NA = Not applicable.
Aquatic Plant EC = Larger of Surface Water EC x Bv and Sediment Pore Water EC × Bv for organic COPCs; = Sediment EC × Bv for metals.
Sediment Invertebrate EC = Sediment EC × BSAF for metals and organic COPCs with log K_{ow} > 5; = Sediment Pore Water EC × BCF_{inv} for organic COPCs with log $K_{ow} \leq 5$.

Sediment Intake (mg/kg/d) = Sediment EC × IR_S.
Water Intake (mg/kg/d) = Surface Water EC × IR_W.
Aquatic Plant Intake (mg/kg/d) = Aquatic Plant EC × IR_P.
Sediment Invertebrate Intake (mg/kg/d) = Sediment Invertebrate EC × IR_A.

IR_S = Sediment ingestion rate (kg/kg/d) = IR_F × SF = 0.0018.
IR_W = Water ingestion rate (L/kg/d) = 0.057.
IR_P = Plant food ingestion rate (kg/kg/d) = IR_F × PF = 0.045.
IR_A = Animal food ingestion rate (kg/kg/d) = IR_F × AF = 0.045.

SF = Incidental ingested sediment as fraction of food diet = 0.02 (EPA 1993a).
IR_F = Food ingestion rate (kg/kg/d) = 0.09. PF = Plant fraction of diet = 0.5.
AF = Animal fraction of diet = 0.5.

Duck Tissue Concentration (mg/kg) = BAFv × (Sediment EC × FS + Surface Water EC × FW + Aquatic Plant EC × FP + Sediment Invertebrate EC × FA).
FS = Sediment EC x IR_S/(Sediment EC × IR_S + Surface Water EC × IR_W + Aquatic Plant EC × IR_P + Sediment Invertebrate EC × IR_A).
FW = Surface Water EC × IR_W/(Sediment EC × IR_S + Surface Water EC × IR_W + Aquatic Plant EC × IR_P + Sediment Invertebrate EC × IR_A).
FP = Aquatic Plant EC × IR_P/(Sediment EC × IR_S + Surface Water EC × IR_W + Aquatic Plant EC × IR_P + Sediment Invertebrate EC × IR_A).
FA = Sediment Invertebrate EC × IR_A/(Sediment EC × IR_S + Surface Water EC × IR_W + Aquatic Plant EC × IR_P + Sediment Invertebrate EC × IR_A).

Table B-7. Dabbling Duck Tissue Concentrations for Human Health COPCs in Sediment and Surface Water at Load Line 1

COPC	Duck Tissue Concentration (mg/kg)
Outlet C and Charlie's Pond	
Metals	
Arsenic	2.2E+00
Chromium	2.0E+00
Lead	3.8E-01
Manganese	4.0E+01
PCBs	
PCB-1254	2.0E+01
Explosives	
2-Amino-4,6-dinitrotoluene	2.2E-02
4-Amino-2,6-dinitrotoluene	2.6E-02
SVOCs	
Benzo(*a*)pyrene	1.9E-01
Benzo(*g,h,i*)perylene	5.4E-01
Phenanthrene	7.8E-03
Outlets D, E, and F, and Criggy's Pond	
Metals	
Antimony	2.6E+01
Arsenic	1.9E+00
Copper	1.7E+02
Lead	1.2E+01
Manganese	5.8E+01

COPC = Chemical of potential concern (for human health).
PCB = Polychlorinated biphenyl.
SVOC = Semivolatile organic compound.

Table B-8. Determination of Fish Concentrations for Surface Water COPCs at Load Line 1

COPC	CAS Number	Exposure Concentration (mg/L)	Water-to-Fish Biotransfer Factor[a] (L/kg)	Fish Concentration[b] (mg/kg)
Outlet C and Charlie's Pond				
Arsenic	7440-38-2	31	3.2[c]	99.2
Chromium	7440-47-3	2.4	200[d]	480
Lead	7439-92-1	3.1	3.2[c]	9.92
Outlets D, E, and F, and Criggy's Pond				
Arsenic	7440-38-2	5.1	3.2[c]	16.32

[a]Water-to-fish biotransfer factors (BTFs) as shown in the Risk Assessment Information System database, maintained by the University of Tennessee for the Oak Ridge National Laboratory (ORNL 2004). Actual references for specific values are shown in footnotes c and d.
[b]Fish concentration (C_{fish}) calculated as follows: C_{fish} = (EPC)(BTF).
[c]Value is from http://www.epa.gov/oppt/exposure/docs/episuitedl.htm. The BCFWIN software estimates a log Kow by using the estimation engine from Syracuse Research Corporation's LOGKOW (KOWWIN for Windows) program. BCFWIN also automatically retrieves experimental log Kow values from a database containing more than 11,500 organic compounds with reliably measured values. When a structure matches a database structure (via an exact atom-to-atom connection match), the experimental log Kow value is retrieved and used to predict the biotransfer factor rather than the estimated value.
[d]Value is from International Atomic Energy Agency 1994. *Handbook of parameter values for the prediction of radionuclide transfer in temperate environment*, Technical Report Serial No. 364, Vienna, Austria.
CAS = Chemical Abstracts Service.
COPC = Chemical of potential concern (for human health).

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APPENDIX C
RESULTS OF LEAD MODELING

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Table C-1. Ravenna\Load Line 1 Surface Water – Outlet C and Charlie's Pond Adult Receptors
Calculations of Blood Lead Concentrations (PbBs)
EPA Technical Review Workgroup for Lead, Adult Lead Committee

Exposure Variable	PbB Equation[a]		Description of Exposure Variable	Units	Resident Farmer Adult	
	1*	2**			GSDi = 1.8	GSDi = 2.1
PbW	X	X	Water lead concentration	µg/L	3.1	3.1
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	X	X	Biokinetic slope factor	µg/dL per µg/d	0.4	0.4
GSD_i	X	X	Geometric standard deviation PbB	--	1.8	2.1
PbB_0	X	X	Baseline PbB	µg/dL	2.2	1.7
IR_W	X		Water ingestion rate	L/d	0.1	0.1
AF_W	X	X	Absorption fraction	--	0.12	0.12
EF_W	X	X	Exposure frequency	d/year	350	350
AT_W	X	X	Averaging time	d/year	365	365
						1.7
						5.2
						10.0
						0.6%

[a]Equation 1 based on Equations 1 and 2 in EPA (1996).
PbB_{adult} = $(PbW*BKSF*IR_W*AF_W*EF_W/AT_W) + PbB_0$.
$PbB_{fetal,\ 0.95}$ = $PbB_{adult} * (GSD_i^{1.645} * R)$.

Table C-2. Ravenna\Load Line 1 Surface Water
Calculations of Blood Lead Concentrations (PbBs)

Exposure Variable	Description of Exposure Variable	Units	Resident Farmer Child
			Outlet C and Charlie's Pond
PbS	Water lead concentration	µg/L	3.1
GSD_i	Geometric standard deviation PbB	--	1.6
			18.1
			10.0
			89.6

Child receptor uses the IEUBK win 32 Lead Model, Version 1.0 (Build 252), to calculate the PbB concentration and the probability that PbB > PbBt assuming a soil/dust ingestion weighting factor of 100%.

Table C-3. Ravenna\Load Line 1 Sediment – Outlets A and B Adult Receptors
Calculations of Blood Lead Concentrations (PbBs)
EPA Technical Review Workgroup for Lead, Adult Lead Committee

Exposure Variable	PbB Equation[a] 1*	PbB Equation[a] 2**	Description of Exposure Variable	Units	Resident Farmer Adult GSDi = 1.8	Resident Farmer Adult GSDi = 2.1
PbS	X	X	Soil lead concentration	µg/g or ppm	508	508
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	X	X	Biokinetic slope factor	µg/dL per µg/d	0.4	0.4
GSD_i	X	X	Geometric standard deviation PbB	--	1.8	2.1
PbB_0	X	X	Baseline PbB	µg/dL	2.2	1.7
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/d	0.1	0.1
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/d	0.1	0.1
W_S		X	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--
K_{SD}		X	Mass fraction of soil in dust	--	--	--
$AF_{S, D}$	X	X	Absorption fraction (same for soil and dust)	--	0.12	0.12
$EF_{S, D}$	X	X	Exposure frequency (same for soil and dust)	d/year	350	350
$AT_{S, D}$	X	X	Averaging time (same for soil and dust)	d/year	365	365
						4.0
						12.3
						10.0
						8.6%

[a] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}). When IRS = IR_{S+D} and WS = 1.0, the equations yield the same $PbB_{fetal,0.95}$.

*Equation 1 based on Equations 1 and 2 in EPA (1996).

PbB_{adult} = $(PbS*BKSF*IR_{S+D}*AF_{S,D}*EF_{S,D}/AT_{S,D}) + PbB_0$.

$PbB_{fetal, 0.95}$ = $PbB_{adult} * (GSD_i^{1.645} * R)$.

Table C-4. Ravenna\Load Line 1 Sediment – Outlets D, E, and F and Criggy's Pond
Calculations of Blood Lead Concentrations (PbBs)
EPA Technical Review Workgroup for Lead, Adult Lead Committee

Exposure Variable	PbB Equation[a] 1*	PbB Equation[a] 2**	Description of Exposure Variable	Units	Resident Farmer Adult GSDi = 1.8	Resident Farmer Adult GSDi = 2.1
PbS	X	X	Soil lead concentration	µg/g or ppm	1210	1210
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	X	X	Biokinetic slope factor	µg/dL per µg/d	0.4	0.4
GSD_i	X	X	Geometric standard deviation PbB	--	1.8	2.1
PbB_0	X	X	Baseline PbB	µg/dL	2.2	1.7
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/d	0.1	0.1
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/d	0.1	0.1
W_S		X	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--
K_{SD}		X	Mass fraction of soil in dust	--	--	--
$AF_{S, D}$	X	X	Absorption fraction (same for soil and dust)	--	0.12	0.12
$EF_{S, D}$	X	X	Exposure frequency (same for soil and dust)	d/year	350	350
$AT_{S, D}$	X	X	Averaging time (same for soil and dust)	d/year	365	365
						7.3
						22.2
						10.0
						28.4%

[a] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}). When IRS = IR_{S+D} and WS = 1.0, the equations yield the same $PbB_{fetal,0.95}$.

*Equation 1 based on Equations 1 and 2 in EPA (1996).

PbB_{adult} = $(PbS*BKSF*IR_{S+D}*AF_{S,D}*EF_{S,D}/AT_{S,D}) + PbB_0$.

$PbB_{fetal, 0.95}$ = $PbB_{adult} * (GSD_i^{1.645} * R)$.

Table C-5. Ravenna\Load Line 1 Sediment
Calculations of Blood Lead Concentrations (PbBs)

Exposure Variable	Description of Exposure Variable	Units	Resident Farmer Child	
			Outlets A and B	Outlets D, E, and F and Criggy's Pond
PbS	Sediment lead concentration	mg/kg	508	1210
GSD_i	Geometric standard deviation PbB	--	1.6	1.6
				18.2
				10.0
				89.8

Child receptor uses the IEUBK win 32 Lead Model, Version 1.0 (Build 252), to calculate the PbB concentration and the probability that PbB > PbBt assuming a soil/dust ingestion weighting factor of 100%.

Table C-6. Ravenna\Load Line 1 Shallow Surface Soil – CB-3 and -801
Calculations of Blood Lead Concentrations (PbBs)
EPA Technical Review Workgroup for Lead, Adult Lead Committee

Exposure Variable	PbB Equation[a]		Description of Exposure Variable	Units	Resident Farmer Adult		Security Guard/ Maintenance Worker	
	1*	2**			GSDi = 1.8	GSDi = 2.1	GSDi = 1.8	GSDi = 2.1
PbS	X	X	Soil lead concentration	µg/g or ppm	605.5	605.5	605.5	605.5
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9
BKSF	X	X	Biokinetic slope factor	µg/dL per µg/d	0.4	0.4	0.4	0.4
GSD_i	X	X	Geometric standard deviation PbB	--	1.8	2.1	1.8	2.1
PbB_0	X	X	Baseline PbB	µg/dL	2.2	1.7	2.2	1.7
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/d	0.1	0.1	0.1	0.1
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/d	0.1	0.1	0.1	0.1
W_S		X	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	--	--
K_{SD}		X	Mass fraction of soil in dust	--	--	--	--	--
$AF_{S, D}$	X	X	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12
$EF_{S, D}$	X	X	Exposure frequency (same for soil and dust)	d/year	350	350	250	250
$AT_{S, D}$	X	X	Averaging time (same for soil and dust)	d/year	365	365	365	365
								3.7
								11.3
								10.0
								6.9%

[a] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}). When IRS = IR_{S+D} and WS = 1.0, the equations yield the same $PbB_{fetal,0.95}$.
*****Equation 1 based on Equations 1 and 2 in EPA (1996).
PbB_{adult} = $(PbS*BKSF*IR_{S+D}*AF_{S,D}*EF_{S,D}/AT_{S,D}) + PbB_0$.
$PbB_{fetal, 0.95}$ = $PbB_{adult} * (GSD_i^{1.645} * R)$.

Table C-7. Ravenna\Load Line 1 Shallow Surface Soil – CB-4/4A and CA-6/6A
Calculations of Blood Lead Concentrations (PbBs)
EPA Technical Review Workgroup for Lead, Adult Lead Committee

Exposure Variable	PbB Equation[a] 1*	PbB Equation[a] 2**	Description of Exposure Variable	Units	Resident Farmer Adult GSDi = 1.8	Resident Farmer Adult GSDi = 2.1	Security Guard/ Maintenance Worker GSDi = 1.8	Security Guard/ Maintenance Worker GSDi = 2.1
PbS	X	X	Soil lead concentration	µg/g or ppm	283.5	283.5	283.5	283.5
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9
BKSF	X	X	Biokinetic slope factor	µg/dL per µg/d	0.4	0.4	0.4	0.4
GSD_i	X	X	Geometric standard deviation PbB	--	1.8	2.1	1.8	2.1
PbB_0	X	X	Baseline PbB	µg/dL	2.2	1.7	2.2	1.7
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/d	0.1	0.1	0.1	0.1
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/d	0.1	0.1	0.1	0.1
W_S		X	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	--	--
K_{SD}		X	Mass fraction of soil in dust	--	--	--	--	--
$AF_{S, D}$	X	X	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12
$EF_{S, D}$	X	X	Exposure frequency (same for soil and dust)	d/year	350	350	250	250
$AT_{S, D}$	X	X	Averaging time (same for soil and dust)	d/year	365	365	365	365
								2.6
								8.0
								10.0
								2.6%

[a] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}). When IRS = IR_{S+D} and WS = 1.0, the equations yield the same $PbB_{fetal,0.95}$.
*Equation 1 based on Equations 1 and 2 in EPA (1996).
PbB_{adult} = $(PbS*BKSF*IR_{S+D}*AF_{S,D}*EF_{S,D}/AT_{S,D}) + PbB_0$.
$PbB_{fetal, 0.95}$ = $PbB_{adult} * (GSD_i^{1.645} * R)$.

Table C-8. Ravenna\Load Line 1 Shallow Surface Soil – CB-13 and -10
Calculations of Blood Lead Concentrations (PbBs)
EPA Technical Review Workgroup for Lead, Adult Lead Committee

Exposure Variable	PbB Equation[a] 1*	PbB Equation[a] 2**	Description of Exposure Variable	Units	Resident Farmer Adult GSDi = 1.8	Resident Farmer Adult GSDi = 2.1	Security Guard/ Maintenance Worker GSDi = 1.8	Security Guard/ Maintenance Worker GSDi = 2.1
PbS	X	X	Soil lead concentration	µg/g or ppm	253.3	253.3	253.3	253.3
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9
BKSF	X	X	Biokinetic slope factor	µg/dL per µg/d	0.4	0.4	0.4	0.4
GSD_i	X	X	Geometric standard deviation PbB	--	1.8	2.1	1.8	2.1
PbB_0	X	X	Baseline PbB	µg/dL	2.2	1.7	2.2	1.7
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/d	0.1	0.1	0.1	0.1
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/d	0.1	0.1	0.1	0.1
W_S		X	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	--	--
K_{SD}		X	Mass fraction of soil in dust	--	--	--	--	--
$AF_{S, D}$	X	X	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12
$EF_{S, D}$	X	X	Exposure frequency (same for soil and dust)	d/year	350	350	250	250
$AT_{S, D}$	X	X	Averaging time (same for soil and dust)	d/year	365	365	365	365
								2.5
								7.7
								10.0
								2.3%

[a] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}). When IRS = IR_{S+D} and WS = 1.0, the equations yield the same $PbB_{fetal,0.95}$.
*Equation 1 based on Equations 1 and 2 in EPA (1996).
PbB_{adult} = $(PbS*BKSF*IR_{S+D}*AF_{S,D}*EF_{S,D}/AT_{S,D}) + PbB_0$.
$PbB_{fetal, 0.95}$ = $PbB_{adult} * (GSD_i^{1.645} * R)$.

Table C-9. Ravenna\Load Line 1 Shallow Surface Soil – CB-14, CB-17, and CA-15
Calculations of Blood Lead Concentrations (PbBs)
EPA Technical Review Workgroup for Lead, Adult Lead Committee

Exposure Variable	PbB Equation[a]		Description of Exposure Variable	Units	Resident Farmer Adult		Security Guard/ Maintenance Worker	
	1*	2**			GSDi = 1.8	GSDi = 2.1	GSDi = 1.8	GSDi = 2.1
PbS	X	X	Soil lead concentration	µg/g or ppm	110.8	110.8	110.8	110.8
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9
BKSF	X	X	Biokinetic slope factor	µg/dL per µg/d	0.4	0.4	0.4	0.4
GSD_i	X	X	Geometric standard deviation PbB	--	1.8	2.1	1.8	2.1
PbB_0	X	X	Baseline PbB	µg/dL	2.2	1.7	2.2	1.7
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/d	0.1	0.1	0.1	0.1
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/d	0.1	0.1	0.1	0.1
W_S		X	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	--	--
K_{SD}		X	Mass fraction of soil in dust	--	--	--	--	--
$AF_{S, D}$	X	X	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12
$EF_{S, D}$	X	X	Exposure frequency (same for soil and dust)	d/year	350	350	250	250
$AT_{S, D}$	X	X	Averaging time (same for soil and dust)	d/year	365	365	365	365
								2.1
								6.3
								10.0
								1.2%

[a] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}). When IRS = IR_{S+D} and WS = 1.0, the equations yield the same $PbB_{fetal,0.95}$.
*Equation 1 based on Equations 1 and 2 in EPA (1996).
PbB_{adult} = $(PbS*BKSF*IR_{S+D}*AF_{S,D}*EF_{S,D}/AT_{S,D}) + PbB_0$.
$PbB_{fetal, 0.95}$ = $PbB_{adult} * (GSD_i^{1.645} * R)$.

Table C-10. Ravenna\Load Line 1 Shallow Surface Soil – Change Houses (CB-12, -23, -8, -22)
Calculations of Blood Lead Concentrations (PbBs)
EPA Technical Review Workgroup for Lead, Adult Lead Committee

Exposure Variable	PbB Equation[a]		Description of Exposure Variable	Units	Resident Farmer Adult		Security Guard/ Maintenance Worker	
	1*	2**			GSDi = 1.8	GSDi = 2.1	GSDi = 1.8	GSDi = 2.1
PbS	X	X	Soil lead concentration	µg/g or ppm	189.6	189.6	189.6	189.6
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9
BKSF	X	X	Biokinetic slope factor	µg/dL per µg/d	0.4	0.4	0.4	0.4
GSD_i	X	X	Geometric standard deviation PbB	--	1.8	2.1	1.8	2.1
PbB_0	X	X	Baseline PbB	µg/dL	2.2	1.7	2.2	1.7
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/d	0.1	0.1	0.1	0.1
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/d	0.1	0.1	0.1	0.1
W_S		X	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	--	--
K_{SD}		X	Mass fraction of soil in dust	--	--	--	--	--
$AF_{S, D}$	X	X	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12
$EF_{S, D}$	X	X	Exposure frequency (same for soil and dust)	d/year	350	350	250	250
$AT_{S, D}$	X	X	Averaging time (same for soil and dust)	d/year	365	365	365	365
								2.3
								7.1
								10.0
								1.7%

[a] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}). When IRS = IR_{S+D} and WS = 1.0, the equations yield the same $PbB_{fetal,0.95}$.
*Equation 1 based on Equations 1 and 2 in EPA (1996).
PbB_{adult} = $(PbS*BKSF*IR_{S+D}*AF_{S,D}*EF_{S,D}/AT_{S,D}) + PbB_0$.
$PbB_{fetal, 0.95}$ = $PbB_{adult} * (GSD_i^{1.645} * R)$.

Table C-11. Ravenna\Load Line 1 Shallow Surface Soil – Water Tower
Calculations of Blood Lead Concentrations (PbBs)
EPA Technical Review Workgroup for Lead, Adult Lead Committee

Exposure Variable	PbB Equation[a]		Description of Exposure Variable	Units	Resident Farmer Adult		Security Guard/ Maintenance Worker	
	1*	2**			GSDi = 1.8	GSDi = 2.1	GSDi = 1.8	GSDi = 2.1
PbS	X	X	Soil lead concentration	µg/g or ppm	2510	2510	2510	2510
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9
BKSF	X	X	Biokinetic slope factor	µg/dL per µg/d	0.4	0.4	0.4	0.4
GSD_i	X	X	Geometric standard deviation PbB	--	1.8	2.1	1.8	2.1
PbB_0	X	X	Baseline PbB	µg/dL	2.2	1.7	2.2	1.7
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/d	0.1	0.1	0.1	0.1
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/d	0.1	0.1	0.1	0.1
W_S		X	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	--	--
K_{SD}		X	Mass fraction of soil in dust	--	--	--	--	--
$AF_{S, D}$	X	X	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12
$EF_{S, D}$	X	X	Exposure frequency (same for soil and dust)	d/year	350	350	250	250
$AT_{S, D}$	X	X	Averaging time (same for soil and dust)	d/year	365	365	365	365
								10.0
								30.4
								10.0
								44.1%

[a] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}). When IRS = IR_{S+D} and WS = 1.0, the equations yield the same $PbB_{fetal,0.95}$.
*Equation 1 based on Equations 1 and 2 in EPA (1996).
PbB_{adult} = $(PbS*BKSF*IR_{S+D}*AF_{S,D}*EF_{S,D}/AT_{S,D}) + PbB_0$.
$PbB_{fetal, 0.95}$ = $PbB_{adult} * (GSD_i^{1.645} * R)$.

Table C-12. Ravenna\Load Line 1 Shallow Surface Soil
Calculations of Blood Lead Concentrations (PbBs)

Exposure Variable	Description of Exposure Variable	Units	Resident Farmer Child					
			CB-13 and -10	CB-14, CB-17, and CA-15	CB-3 and -801	CB-4/4A and CA-6/6A	Change Houses (CB-12, -23, -8, -22)	Water Tower
PbS	Soil lead concentration	mg/kg	253.3	110.8	605.5	283.5	189.6	2510
GSD_i	Geometric standard deviation PbB	--	1.6	1.6	1.6	1.6	1.6	1.6
								28.5
								10.0
								98.7

Child receptor uses the IEUBK win 32 Lead Model, Version 1.0 (Build 252), to calculate the PbB concentration and the probability that PbB > PbBt assuming a soil/dust ingestion weighting factor of 100%.

Table C-13. Ravenna\Load Line 1 Subsurface Soil – CB-13 and -10
Calculations of Blood Lead Concentrations (PbBs)
EPA Technical Review Workgroup for Lead, Adult Lead Committee

Exposure Variable	PbB Equation[a] 1*	PbB Equation[a] 2**	Description of Exposure Variable	Units	Resident Farmer Adult GSDi = 1.8	Resident Farmer Adult GSDi = 2.1
PbS	X	X	Soil lead concentration	µg/g or ppm	430.9	430.9
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	X	X	Biokinetic slope factor	µg/dL per µg/d	0.4	0.4
GSD_i	X	X	Geometric standard deviation PbB	--	1.8	2.1
PbB_0	X	X	Baseline PbB	µg/dL	2.2	1.7
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/d	0.1	0.1
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/d	0.1	0.1
W_S		X	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--
K_{SD}		X	Mass fraction of soil in dust	--	--	--
$AF_{S, D}$	X	X	Absorption fraction (same for soil and dust)	--	0.12	0.12
$EF_{S, D}$	X	X	Exposure frequency (same for soil and dust)	d/year	350	350
$AT_{S, D}$	X	X	Averaging time (same for soil and dust)	d/year	365	365
						3.7
						11.2
						10.0
						6.8%

[a] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}). When IRS = IR_{S+D} and WS = 1.0, the equations yield the same $PbB_{fetal,0.95}$.

*Equation 1 based on Equations 1 and 2 in EPA (1996).

PbB_{adult} = $(PbS*BKSF*IR_{S+D}*AF_{S,D}*EF_{S,D}/AT_{S,D}) + PbB_0$.

$PbB_{fetal, 0.95}$ = $PbB_{adult} * (GSD_i^{1.645} * R)$.

Table C-14. Ravenna\Load Line 1 Subsurface Soil – CB-14, CB-17, and CA-15
Calculations of Blood Lead Concentrations (PbBs)
EPA Technical Review Workgroup for Lead, Adult Lead Committee

Exposure Variable	PbB Equation[a] 1*	PbB Equation[a] 2**	Description of Exposure Variable	Units	Resident Farmer Adult GSDi = 1.8	Resident Farmer Adult GSDi = 2.1
PbS	X	X	Soil lead concentration	µg/g or ppm	558	558
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	X	X	Biokinetic slope factor	µg/dL per µg/d	0.4	0.4
GSD_i	X	X	Geometric standard deviation PbB	--	1.8	2.1
PbB_0	X	X	Baseline PbB	µg/dL	2.2	1.7
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/d	0.1	0.1
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/d	0.1	0.1
W_S		X	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--
K_{SD}		X	Mass fraction of soil in dust	--	--	--
$AF_{S, D}$	X	X	Absorption fraction (same for soil and dust)	--	0.12	0.12
$EF_{S, D}$	X	X	Exposure frequency (same for soil and dust)	d/year	350	350
$AT_{S, D}$	X	X	Averaging time (same for soil and dust)	d/year	365	365
						4.3
						13.0
						10.0
						9.9%

[a] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}). When IRS = IR_{S+D} and WS = 1.0, the equations yield the same $PbB_{fetal,0.95}$.

*Equation 1 based on Equations 1 and 2 in EPA (1996).

PbB_{adult} = $(PbS*BKSF*IR_{S+D}*AF_{S,D}*EF_{S,D}/AT_{S,D}) + PbB_0$.

$PbB_{fetal, 0.95}$ = $PbB_{adult} * (GSD_i^{1.645} * R)$.

Table C-15. Ravenna\Load Line 1 Subsurface Soil
Calculations of Blood Lead Concentrations (PbBs)

Exposure Variable	Description of Exposure Variable	Units	Resident Farmer Child	
			CB-13 and -10	CB-14, CB-17, and CA-15
PbS	Soil lead concentration	mg/kg	430.9	558
GSD_i	Geometric standard deviation PbB	--	1.6	1.6
				10.8
				10.0
				56.3

Child receptor uses the IEUBK win 32 Lead Model, Version 1.0 (Build 252), to calculate the PbB concentration and the probability that PbB > PbBt assuming a soil/dust ingestion weighting factor of 100%.

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Comment Response Table
Draft Supplemental Baseline Human Health Risk Assessment for
Load Line 1 Alternative Receptors at RVAAP, April 2004
Rev. June 21 2004

No.	Page No. Line No.	Comment	Recommendation	Response
		Ohio EPA DERR NEDO and OFFO – Laurie Moore 06/2/04		
1	General	The methods used in the document closely followed the Facility -wide Human Health Risk Assessors Manual (USACE 2004) and therefore, minimal comments are needed for this report. The report is well written and clear. Below are a few specific comments that should be addressed in the Final baseline risk assessment report.		Comment noted. Thank you.
2	Table ES-1	Table ES-1 should be revised to bold locations that exceed an excess lifetime cancer risk level of 1E-5. The table presently identifies areas that exceed a 1E-6 and 1E-4 (in bold) risk level. In fact, it would be helpful to only identify areas and compounds that exceed a 1E-5 risk and hazard quotient or hazard index of 1.		Clarification. Chemicals of concern (COCs) are identified as anything with a risk > 10^{-6} or HQ > 1. Therefore, the table of COCs has been revised to remove the bolding that indicates risks >10^{-4} or HQ > 1.
3	Load Line 1 Soil Aggregates, Figure 2-2	Figure 2-2 identifies the aggregates used in the baseline risk assessment of LL1. Ohio EPA agrees with the use and locations of the aggregates. It should be pointed out in the report that the field-screening results were used in the determination of the boundaries of the aggregates. Section 2.1 identifies that field screening information was not included in the quantitative risk evaluation process. However, it may be helpful to note that the field-screening information was used to help delineate the extent of contamination.		Clarification. Field screening results were not used in determining aggregate boundaries. Aggregates were based on process knowledge and historical usage. Depth intervals were based on receptors (e.g., 0 to 1 ft for resident and 0 to 3 ft for National Guard trainee). The depths sampled at each sampling location were determined by field sampling (i.e., if field sampling showed explosives in a sample, the next deeper interval was sampled, if possible). Some locations were randomly sampled below 1 ft and some locations could not be sampled below 1 or 3 ft due to shallow bedrock. The application of field screening results is discussed in Chapter 3.0 of the remedial investigation report.

4	Section 2.0, Data Evaluation	Lines 1 through 6 of page 2-3 identify that samples taken from the railroad beds were not included in the risk assessment. Additional information should be given regarding these data. Line 2 states that the samples are more representative of slag rather than soil. Is this based on physical properties or chemical characteristics? In addition, the sampling results should be presented in the document. Regardless of remedial/management issues surrounding slag, the soil or area around the railroad beds or under the slag should be characterized and evaluated analytically to determine if contamination is present from a past spill, etc. This should be evaluated in the risk assessment to provide information to risk managers for decision making. The railroad beds may make up a significant area and may be considered as their own exposure unit as needed. Figure 2-2 identifies the railroad tracks as its own area of 2.2 acres and no information is presented on the aggregate in table ES-1 or other areas of the report. Risk estimations of the soils beneath the slag or the slag its self would be useful for future decision making for LL1. In addition, if the slag is acting as a source of contamination (*e.g.*, potential source of metals) then this information is needed. Please revise the document to include an evaluation of the railroad beds.		Comment rescinded by Ohio EPA on June 14, 2004. However, as requested in the notification by Ohio EPA rescinding Comment 4, data related to the collection of samples from the railroad bed has been included in the report for informational purposes. Additional text has also been added to say that, "Further evaluation of the railroad beds is not required because the slag material is (1) highly weathered, (2) applied as a building material or in a similar manner (not disposal), (3) will likely remain intact at the load line (after removal of the slabs), and (4) no exposure pathway to the troops should occur."
5	Table 3-2, Parameters Used to Quantify Exposures for Each Medium and Receptor at Load Line 1	Several values are given in bold in the resident subsistence farmer child column. These appear to be inadvertently placed in the table. Please remove the bold or clarify the reason for highlighting these values.		Agree. Bolding has been removed.

6	Section 5.2.1, Groundwater Results	Section 5.2.1, page 5-4 discusses potential risks associated with background concentrations of arsenic in ground water. Please note that the footnote of the table on page 5-4 is incorrect. The background values for groundwater were calculated using a 95% UTL, not UCL as given in the text. In addition, please provide a reference to the source for background information/data on groundwater. Please tell the reader where to find the details on how background in groundwater was established at Ravenna - this could be done by including another footnote under the table on page 5-4.		Agree. Footnote 'a' has been corrected to note the background criteria are UTLs. A new footnote 'b' "Background values are reported in USACE (U.S. Army Corps of Engineers) 2001. *Phase II Remedial Investigation Report for the Winklepeck Burning Grounds at the Ravenna Army Ammunition Plant, Ravenna, Ohio*, DACA62-94-D-0029, D.O. 0060, Final, April" has been added.
7	Section 5.2.4, Summary of Chemicals of Concern for all Media and Receptors	Section 5.2.4 discusses risk management concepts related to acceptable risks and hazards. Section 5.2.4 uses the 1E-4 risk level to define COCs with large risks. Generally, the risk assessment report does not interject risk management concepts into the presentation of the risk assessment results. In addition, and given that the risk goal has been identified as a cumulative 1E-5, it would be better to identify compounds with an excess lifetime cancer that exceeds 1E-5 as being of concern rather than those reaching a 1E-4 risk level. Please revise the table 5-8 and any others that use the 1E-4 excess lifetime cancer risk level and revise accordingly.		Clarification. COCs are identified as anything with a risk > 10^{-6} or HQ > 1. Therefore, the table of COCs has been revised to remove the bolding that indicates risks >10^{-4} or HQ > 1. Table 5-9 has been removed and text has been changed to remove the discussion of risks > 10^{-4}.

8	Section 6.0, Remedial Goal Options, page 6-2	The end of this section should discuss how to account for multiple chemical exposures (for example, in cases where there are more than 10 COC=s for a specific receptor) in order to ensure that the 1E-5 risk goal is applied cumulatively.		Agree. The following text has been added, "Exposure to multiple COCs may require downward adjustment of the TR and target hazard used to calculate final remedial levels. The TR and THI are dependent on several factors, including the number of carcinogenic and non-carcinogenic COCs and the target organs and toxic endpoints of these COCs. For example, if numerous (i.e., more than 10) non-carcinogenic COCs with similar toxic endpoints are present, it may be appropriate to use chemical-specific RGOs with a THI of 0.1 to account for exposure to multiple contaminants."