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Resource Conservation and Recovery Act Facility Investigation/Remedial Investigation Report with Baseline Risk Assessment and Corrective Measures Study/Feasibility Study for the Early Construction and Operational Disposal Site L-3 (East of L Area) (NBN), L-Area Rubble Pit (131-1L), and L-Area Rubble Pit (131-4L) Operable Unit (U)

SEMS Number: 91

SRNS-RP-2023-01365

Revision 1

January 2025

SAVANNAH RIVER SITE • AIKEN, SOUTH CAROLINA

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Prepared for
U.S. Department of Energy
and
Savannah River Nuclear Solutions, LLC
Aiken, South Carolina

SRNS-RP-2023-01365

CERTIFICATION

Resource Conservation and Recovery Act Facility Investigation/Remedial Investigation Report with Baseline Risk Assessment and Corrective Measures Study/Feasibility Study for the Early Construction and Operational Disposal Site L-3 (East of L Area) (NBN), L-Area Rubble Pit (131-1L) and L-Area Rubble Pit (131-4L) Operable Unit (U)

SRNS-RP-2023-01365, Revision 1, January 2025

[REF: 40CFR270.11 (d)(1)]

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08/20/2025

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Savannah River Operations Office

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Owner and Co-Operator

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EXECUTIVE SUMMARY

This Resource Conservation and Recovery Act Facility Investigation / Remedial Investigation Report with Baseline Risk Assessment and Corrective Measures Study / Feasibility Study has been prepared for the Early Construction and Operational Disposal Site L-3 (East of L Area) (no building number), L-Area Rubble Pit (131-1L) and L-Area Rubble Pit (131-4L) Operable Unit located at Savannah River Site in Aiken, South Carolina (Figure ES-1). This combined document incorporates elements of two typically stand-alone documents – the Resource Conservation and Recovery Act Facility Investigation / Remedial Investigation Report with Baseline Risk Assessment and the Corrective Measures Study / Feasibility Study. A Core Team of representatives from the United States Department of Energy, the U.S. Environmental Protection Agency, and the South Carolina Department Environmental Services[1] agreed to this combined and accelerated strategy for the Early Construction and Operational Disposal Site L-3 (East of L Area) (no building number), L-Area Rubble Pit (131-1L) and L-Area Rubble Pit (131-4L) Operable Unit.

This document presents a summary of the data collected, describes the nature and extent of contamination, provides an assessment of the potential risk to human health and ecological receptors, identifies remedial action objectives, and evaluates potential remedial alternatives for the Early Construction and Operational Disposal Site L-3 (East of L Area) (no building number), L-Area Rubble Pit (131-1L) and L-Area Rubble Pit (131-4L) Operable Unit.

The Operable Unit is comprised of three subunits: the Early Construction and Operational Disposal Site L-3 (East of L Area) (no building number), the L-Area Rubble Pit (131-1L), and the L-Area Rubble Pit (131-4L). The Early Construction and Operational Disposal Site L-3 subunit is one of twenty-five similar sites at Savannah River Site, which were identified during a review of early 1950s aerial photographs. These sites were used during the construction and early operation of Savannah River Site for disposal of construction debris and other non-radioactive waste materials such as rubble and concrete. The subunit is estimated to have been in use from November 1953 to June 1954, and there are no records of hazardous or radioactive waste disposal at the subunit. The

[1] South Carolina Department of Environmental Services (SCDES) was known as South Carolina Department of Health and Environmental Control prior to July 1, 2024.

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subunit contains trenches with sections that may have been used as a burn pit for disposal of combustible waste. Waste was encountered as part of the 2002 Site Evaluation assessment.

A site evaluation of the subunit was conducted in 2002 and results were reported in the *Site Evaluation Report for the Early Construction and Operational Disposal Site (ECODS) L-3 (NBN) (U)* (WSRC 2003). Based on the site evaluation report, in accordance with 300.420(b)(1)(I) of the National Oil and Hazardous Substances Pollution Contingency Plan, the Early Construction and Operational Disposal Site L-3 subunit was removed from the Federal Facility Agreement Appendix G.1, *Areas to Be Investigated*, and placed in Appendix C, *RCRA/CERCLA Units*, for further action (FFA 1993). The characterization data for the subunit meets the Savannah River Site requirements for definitive level data that is of sufficient quality and quantity to conduct a baseline risk assessment to support remedial decision making.

The L-Area Rubble Pit 131-1L subunit is a former waste disposal area reportedly used for various construction debris and operated from 1973 to 1982 (DuPont 1983a). Plant records indicate that metal, lumber, poles, concrete, brick, tile, asphalt, tires, rubber, scrap metal, fence posts, hard plastics, wallboard, asbestos, glass, batteries paint cans, drums and transite were disposed of in the subunit. There are no records of hazardous or radioactive material disposed of at the pit. No waste was encountered during the Resource Conservation and Recovery Act Facility Investigation / Remedial Investigation assessment conducted in 2022. This was further supported by recent documentation that showed waste was placed on-unit and not within a pit. The waste was later removed from the surface of the subunit. The L-Area Rubble Pit 131-1L subunit is in Appendix C of the Federal Facility Agreement, *RCRA/CERCLA Units*, for further assessment (FFA 1993). In 2022, the L-Area Rubble Pit 131-1L subunit was investigated in accordance with the approved Resource Conservation and Recovery Act Facility Investigation/Remedial Investigation Work Plan (SRNS 2022). The characterization consisted of soil sampling and analysis that reported definitive level data that is of sufficient quality and quantity to conduct a baseline risk assessment to support remedial decision making.

The L-Area Rubble Pit 131-4L subunit is an unlined pit, reported to have operated from 1973 to 1983, before it was filled and seeded in 1983. The subunit received inert rubble from the L-Area Powerhouse Stack and Silo demolition (DuPont 1983a and DuPont 1983b). The rubble consisted

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primarily of concrete and asphalt material with some metal. Operating procedures indicate it was to receive inert, non-hazardous materials, and there are no records indicating any disposal of hazardous or radioactive materials. Waste was encountered during the Resource Conservation and Recovery Act Facility Investigation / Remedial Investigation assessment conducted in 2022.

A site evaluation of the subunit was conducted from 1992 to 1994 and results were reported in the *Site Evaluation Report for the L-Area Rubble Pit (131-4L) (U)* (WSRC 1994). Based on the site evaluation report, in accordance with 300.420(b)(1)(I) of the National Oil and Hazardous Substances Pollution Contingency Plan, the L-Area Rubble Pit (131-4L) subunit was removed from Federal Facility Agreement Appendix G.1, *Areas to Be Investigated*, and placed in Appendix C, *RCRA/CERCLA Units*, for further assessment (FFA 1993). In 2022, the L-Area Rubble Pit 131-4L subunit was investigated in accordance with the approved Resource Conservation and Recovery Act Facility Investigation/Remedial Investigation Work Plan (SRNS 2022). The characterization consisted of soil sampling and analysis that reported definitive level data that is of sufficient quality and quantity to conduct a baseline risk assessment to support remedial decision making.

The Remedial Investigation is based on soil collected from the three subunits. Groundwater is not part of the Operable Unit and is addressed as part of the L-Area Southern Groundwater Operable Unit.

The following summarizes the risk at these three subunits as determined by the Remedial Investigation:

- At the Early Construction and Operational Disposal Site L-3 (no building number) subunit, asbestos containing material is presumed to be present in unit soil based on remedial investigations at other Early Construction and Operational Disposal Sites at Savannah River Site where asbestos was found to be present. The presence of this material poses a risk to human health if the material becomes exposed. Polychlorinated biphenyls, Aroclor 1254 and Aroclor 1260, present a risk unacceptable to human health in surface soils.
- At the L-Area Rubble Pit 131-1L subunit, no risk to human health or environment was determined.

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- At the L-Area Rubble Pit 131-4L subunit, asbestos containing material was found to be present in unit soils. The presence of this material poses a risk to human health if the material becomes exposed. Benzo(a)pyrene presents a risk unacceptable to human health in surface soils.

Additionally, at all three subunits, no ecological risk or principal threat source material was determined as well as no impact to groundwater through the contaminant migration assessment.

The Corrective Measures Study/Feasibility Study portion of this document identifies remedial technologies, provides a screening of potential remedial alternatives, and provides a detailed analysis of the remedial alternatives retained following the screening process. These remedial alternatives were evaluated relative to each other based on the Comprehensive Environmental Response, Compensation, and Liability Act nine criteria established by the United States Environmental Protection Agency (Tables ES-1). The remedial alternatives are unit-specific actions that achieve the Remedial Action Objectives and satisfy the requirements of the National Contingency Plan. The remedial alternatives evaluated for the Early Construction and Operational Disposal Site L-3 (no building number), L-Area Rubble Pit 131-1L, and L-Area Rubble Pit 131-4L Operable Unit include No Action, Land Use Controls, Soil Cover with Land Use Controls, and Excavation and Disposal response actions. These response actions may be implemented singly or in combination.

The preferred remedial alternative(s) will be presented in the Statement of Basis/Proposed Plan based on information contained in this report and comments received from the United States Environmental Protection Agency, South Carolina Department of Environmental Services, and the public, prior to selecting the final remedial alternative(s) in the Record of Decision.

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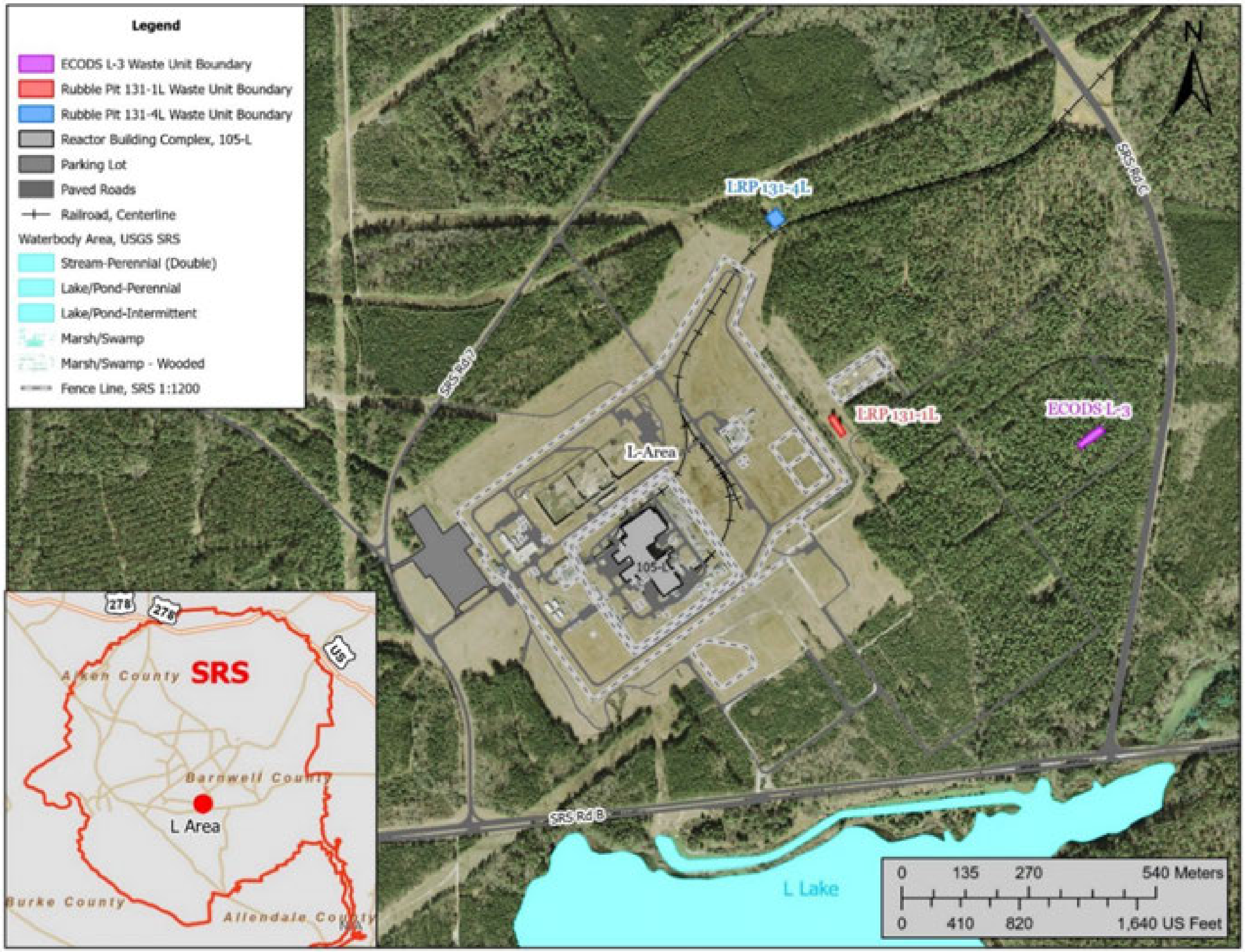

Figure ES-1. Location of Early Construction and Operational Disposal Site L-3 (no building number), L-Area Rubble Pit (131-1L), and L-Area Rubble Pit (131-4L) Operable Unit

Table ES-1. Comparative Alternative Analysis for Early Construction and Operational Disposal Site L-3 (no building number), L-Area Rubble Pit (131-1L), and L-Area Rubble Pit (131-4L) Operable Unit

Alternatives	Overall Protection of Human Health	Compliance with RAOs	Compliance with ARARs	Long-Term Effectiveness and Performance	Reduction of Toxicity, Mobility, or Volume Through Treatment	Short-Term Effectiveness	Implementability	Cost	Overall Ranking (1-20)
Early Construction and Operational Disposal Site L-3 (no building number) Subunit									
A-1) No Action	No	No	No	1	1	1	5	$0	8
A-2) Land Use Controls	Yes	Yes	Yes	4	1	5	5	$382,557	15
A-3) Soil Cover with Land Use Controls	Yes	Yes	Yes	4	1	4	3	$1,228,712	12
A-4) Excavation and Disposal	Yes	Yes	Yes	5	1	4	3	$1,654,216	13
L-Area Rubble Pit (131-4L) Subunit									
B-1) No Action	No	No	N/A	1	1	1	5	$0	8
B-2) Land Use Controls	Yes	Yes	N/A	4	1	5	5	$560,619	15
B-3) Soil Cover with Land Use Controls	Yes	Yes	Yes	4	1	4	3	$1,543,338	12
B-4) Excavation and Disposal	Yes	Yes	Yes	5	1	4	3	$7,671,286	13

Note: No impact to the environment was determined at the L-Area Rubble Pit (131-1L) subunit
Numeric Range 1 through 5, where 1 = worse and 5 = best
RAO: remedial action objective
ARAR: applicable or relevant and appropriate requirement

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LIST OF ABBREVIATIONS AND ACRONYMS

~	approximate, approximately
<	less than
ac	acres
ACM	asbestos containing material
amsl	above mean sea level
ARAR	applicable or relevant and appropriate requirement
ARF	Administrative Record File
bgs	below ground surface
BMP	Best Management Practice
BRA	Baseline Risk Assessment
°C	degrees Celsius
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CM	contaminant migration
cm	centimeter
CMS	Corrective Measures Study
COC	constituent of concern
COPC	constituent of potential concern
COPEC	constituent of potential ecological concern
CSM	conceptual site model
DDE	dichlorodiphenyldichloroethylene
DDT	dichlorodiphenyltrichloroethane
DEHP	bis(2-ethylhexyl)phthalate
EC&ACP	Environmental Compliance and Area Completion Projects
ECO	ecological
ECODS	Early Construction and Operational Disposal Site
EPC	exposure point concentration
ERA	Ecological Risk Assessment
ESV	ecological screening value
°F	degrees Fahrenheit
FD	field duplicate
FFA	Federal Facility Agreement
FS	Feasibility Study
ft	feet
GPR	ground-penetrating radar
ha	hectare
HH	human health
HHRA	Human Health Risk Assessment
HI	hazard index
HQ	hazard quotient

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LIST OF ABBREVIATIONS AND ACRONYMS *(CONTINUED)*

in.	inch
km	kilometer
LANL	Los Alamos National Laboratory
LASG	L-Area Southern Groundwater
LRP 131-1L	L-Area Rubble Pit 131-1L
LRP 131-4L	L-Area Rubble Pit 131-4L
LUC	land use control
LUCIP	Land Use Control Implementation Plan
m	meter
m^2	square meters
m^3	cubic meters
mg/kg	milligrams per kilogram
mi	mile
NBN	no building number
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NOAA	National Oceanic and Atmospheric Administration
NORM	naturally occurring radioactive material
NPDES	National Pollutant Discharge Elimination System
NRIE	Natural Resource Injury Evaluation
OU	Operable Unit
O&M	operation and maintenance
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyl
pCi/g	picocuries per gram
PFAS	per- and polyfluoroalkyl substances
PP	Proposed Plan
ppm	parts per million
PRG	preliminary remediation goal
PTSM	Principal Threat Source Material
QC	quality control
RAO	remedial action objective
RCOC	refined constituent of concern
RCRA	Resource Conservation and Recovery Act
REG	regular sample
RB	rinsate blank
RFI	RCRA Facility Investigation
RI	Remedial Investigation
ROD	Record of Decision
RSL	Regional Screening Level

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LIST OF ABBREVIATIONS AND ACRONYMS *(CONTINUED/END)*

SB	Statement of Basis
SCDES[2]	South Carolina Department of Environmental Services
SE	site evaluation
SER	site evaluation report
SPL	split
SRNL	Savannah River National Laboratory
SRNS	Savannah River Nuclear Solutions, LLC
SRS	Savannah River Site
SVOC	semi-volatile organic compound
TAL	Target Analyte List
TBC	to-be-considered
TCL	Target Compound List
TCR	total cumulative risk
TES	threatened, endangered, and sensitive (species)
TL	threshold level
TSCA	Toxic Substances Control Act
UCL	upper confidence limit
USC	unit-specific constituent
USDA	United States Department of Agriculture
USDOE	United States Department of Energy
USEPA	United States Environmental Protection Agency
USFS-SR	United States Forestry Service-Savannah River
USFWS	United States Fish and Wildlife Service
VOC	volatile organic compound
WSRC	Washington Savannah River Company
WSRC	Westinghouse Savannah River Company (before October 2005)
yd^2	square yards
yd^3	cubic yards

[2] South Carolina Department of Environmental Services (SCDES) was known as South Carolina Department of Health and Environmental Control prior to July 1, 2024.

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1.0 INTRODUCTION

This Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI)/Remedial Investigation Report (RI) with Baseline Risk Assessment (BRA) and Corrective Measures Study (CMS)/Feasibility Study (FS) (RFI/RI/BRA/CMS/FS) has been prepared for the Early Construction and Operational Disposal Site (no building number [NBN]) (ECODS) L-3, L-Area Rubble Pit (131-1L) (LRP 131-1L), and L-Area Rubble Pit (131-4L) (LRP 131-4L) Operable Unit (OU), located in L Area at the Savannah River Site (SRS) (Figure 1-1).

The primary goal of the ECODS L-3, LRP 131-1L, and LRP 131-4L OU RFI/RI/BRA/CMS/FS (herein referred to as the Combined Document) is to provide sufficient information to support a Statement of Basis (SB)/ Proposed Plan (PP) and a Record of Decision (ROD) for remedy selection at the ECODS L-3, LRP 131-1L, and LRP 131-4L OU. The requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) constitute the applicable regulatory framework for this document. The format and content of this document have been developed to accommodate decisions made by Core Team representatives from the United States Environmental Protection Agency (USEPA), South Carolina Department of Environmental Services (SCDES), and the United States Department of Energy (USDOE) – Savannah River.

The ECODS L-3, LRP 131-1L and LRP 131-4L OU Combined Document describes the evaluations and decisions made during the scoping process, summarizes the characterization activities, discusses the results of the contaminant migration (CM) and risk evaluations, identifies the specific problems warranting action, and proposes remedial alternatives for the ECODS L-3, LRP 131-1L, and LRP 131-4L OU subunits requiring cleanup. For evaluation purposes, the ECODS L-3, LRP 131-1L, and LRP 131-4L OU was segregated into the following three subunits: ECODS L-3, LRP 131-1L, and LRP 131-4L. Groundwater is not a subunit of the OU and is being addressed as part of the L-Area Southern Groundwater (LASG) OU.

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1.1 Purpose and Organization of Report

The contents of this document generally follow the guidelines established in the Environmental Compliance and Area Completion Projects (EC&ACP) Regulatory Document Handbook (Savannah River Nuclear Solutions, LLC [SRNS] 2023).

Chapter 1, Introduction, broadly discusses the purpose and organization of the report, regulatory background, OU history, land use, and natural resource trustees. Chapter 2, Operable Unit Description, provides a review of the physical setting, geology and hydrogeology, and conceptual site model (CSM) descriptions. Chapter 3, Remedial Investigation, provides information on the characterization efforts, nature and extent of contamination, and results of the risk assessments and Principal Threat Source Material (PTSM) evaluations for each of the individual subunits. Chapter 4, Remedial Action Objectives and Preliminary Remediation Goals, discusses the remedial action objectives (RAOs), preliminary remediation goals (PRGs) (i.e., cleanup levels), and applicable or relevant and appropriate requirements (ARARs). Chapter 5 is the Corrective Measures Study and Feasibility Study, which provides the identification, screening, and detailed analysis of remedial alternatives. Chapter 6, Summary/Conclusions, provides a summary of the complete report. Chapter 7, Implementation Schedule, provides a list of key deliverables and submittal dates. The list of document references is provided in Chapter 8.

Supporting information includes:

- Investigation Data/Data Summary Tables (Appendix A)
- Contaminant Fate and Transport Analysis (Appendix B)
- Human Health Risk Assessment (Appendix C)
- Ecological Risk Assessment (Appendix D)
- Principal Threat Source Material Evaluation (Appendix E)
- Risk-Based Cleanup Level Calculations (Preliminary Remediation Goals) (Appendix F)
- Natural Resource Injury Evaluation (NRIE) Checklist (Appendix G)
- Detailed Cost Estimates (Appendix H)

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- Data Usability Report (Appendix I)
- RFI/RI Characterization Boring Logs (Appendix J)
- RFI/RI Characterization Data (LRP 131-1L and LRP 131-4L subunits) (Appendix K)

Appendices A through J are pertinent to supporting the conclusions presented in the Combined Document. An electronic copy of Appendix K is provided on the data disk for reference.

1.2 Regulatory Background

On December 21, 1989, SRS was included on the National Priorities List. This inclusion created a need to integrate the established RCRA program with the CERCLA requirements to provide for a focused environmental program. In accordance with Section 120 of CERCLA (42 United States Code Section 9620), the USDOE negotiated a Federal Facility Agreement (FFA) with the USEPA and SCDES to coordinate cleanup activities at SRS as one comprehensive effort, which fulfills the dual regulatory requirements (FFA 1993). The FFA is a legally binding agreement between the Core Team members that establishes the responsibilities and schedule for the comprehensive remediation of SRS. The ECODS L-3, LRP 131-1L, and LRP 131-4L OU is listed as a RCRA/CERCLA OU in Appendix C of the FFA (FFA 1993).

The Core Team agreed in the December 13, 2021, RFI/RI Work Plan scoping meeting that existing data for the ECODS L-3 subunit was sufficient for performing the BRA, and the proposed sampling strategy for the LRP 131-1L and LRP 131-4L subunits was sufficient to meet the data needs for the LRP 131-1L and LRP 131-4L subunits (SRNS 2021a). RFI/RI Work Plan characterization activities for soil were conducted at the LRP 131-1L and LRP 131-4L subunits in 2022 and 2023, per the approved RFI/RI Work Plan (SRNS 2022). A scoping meeting was held on November 9, 2023, with the Core Team to review the results of the RFI/RI Work Plan investigation at the subunits. In the scoping meeting held on November 9, 2023, the Core Team agreed that there were no additional data needs for the ECODS L-3, LRP 131-1L, and LRP 131-4L OU (SRNS 2021b). On March 19, 2024, a scoping meeting was held to review the results of the Human Health Risk Assessment (HHRA), Ecological Risk Assessment (ERA), PTSM

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evaluation, and CM evaluation, and to reach agreement on the problems warranting action and remedial alternatives for the ECODS L-3, LRP 131-1L, and LRP 131-4L OU (SRNS 2021c).

The *Savannah River Site Federal Facility Agreement Community Involvement Plan* (Westinghouse Savannah River Company [WSRC] 1996) facilitates public participation in the decision-making processes. Public participation requirements (Sections 113 and 117 of CERCLA) include the establishment of an Administrative Record File (ARF) that documents the selection of cleanup alternatives and provides for review and comment by the public on those alternatives. This Combined Document is part of the ARF and will be available to the public at USDOE's Public Reading Rooms at the University of South Carolina-Aiken, in Aiken, South Carolina, and the Thomas Cooper Library in Columbia, South Carolina. A notice will be published in local newspapers when information is being compiled regarding the investigation and cleanup of the ECODS L-3, LRP 131-1L, and LRP 131-4L OU. Additional repositories may be added and/or locations changed to better meet the needs of the public.

1.3 Operable Unit History

L Area is located in the southern portion of the SRS (Figure 1-1). Prior to construction of L Area, the land was used as farmland. The ECODS L-3, LRP 131-1L, and LRP 131-4L OU is located in L Area within the Steel Creek Watershed. L Area is an industrialized area of SRS, consisting primarily of a nuclear reactor and support facilities that operated from August 1954 to 1968 and 1984 to 1988. Between 1968 and 1984, the reactor facility was in warm standby (Washington Savannah River Company, LLC [WSRC] 2005). Facilities in L Area are still active, with the primary mission of receiving, stabilizing, and dispositioning spent nuclear fuel.

1.3.1 ECODS L-3 Subunit

The ECODS L-3 subunit is one of twenty-five ECODS at SRS which were identified during a review of early 1950s aerial photographs. These sites were used during the construction and early operation of SRS for disposal of construction debris and other non-radioactive waste materials, such as rubble and concrete.

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The ECODS L-3 subunit is located in the southern portion of the SRS, east of L Area (Figure 1-1). The subunit is approximately (~) 9.7 kilometers (km) (6.0 miles [mi]) north of the nearest SRS boundary and is within the Steel Creek Watershed. The ECODS L-3 subunit is located ~518 meters (m) (1,700 feet [ft]) east of the eastern corner of the L Area perimeter fence.

Based on historical photographs and a ground-penetrating radar (GPR) survey completed in 2002 during a site evaluation (SE) of the subunit, it was estimated that waste disposed of in the ECODS L-3 subunit was buried in two trenches located end-to-end (Figure 1-2). The original trenches were estimated to be 18 m (60 ft) wide by 30 m (100 ft) long. The 2002 SE effort determined the trench dimensions were actually ~15 m (50 ft) wide by 27 m (90 ft) long and 4.6 m (15 ft) wide by 27 m (90 ft) long (WSRC 2003).

The ECODS L-3 subunit was used to dispose of trash and construction debris, such as rubble and concrete, and is estimated to have been in use from November 1953 to June 1954. Prior to use as a disposal site, the area was used as farmland. Sections of the trenches may have been used as a burn pit for disposal of combustible waste.

Soil samples were collected and analyzed during the 2002 SE of the ECODS L-3 subunit and results were reported in the *Site Evaluation Report for the Early Construction and Operational Disposal Site (ECODS) L-3 (NBN) (U)* (WSRC 2003). Based on the site evaluation report (SER) and in accordance with Section 300.420(b)(1)(I) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), the ECODS L-3 subunit was removed from FFA Appendix G.1, Areas to Be Investigated, and placed in Appendix C, RCRA/CERCLA Units, for further assessment (FFA 1993).

1.3.2 LRP 131-1L Subunit

The LRP 131-1L subunit is a former waste disposal area reportedly used for various construction debris and operated from 1973 to 1982 (DuPont 1983a). The LRP 131-1L subunit is located to the east of L Area, ~46 m (150 ft) outside of the facility perimeter fence (Figure 1-1). The subunit is a rectangular area ~12 m (40 ft) by 46 m (150 ft) with the four corners marked by orange ball markers (Figure 1-3). Plant records indicate that metal, lumber, poles, concrete, brick, tile, asphalt, tires, rubber, scrap metal, fence posts, hard plastics, wallboard, asbestos, glass, batteries, paint

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cans, drums and transite were disposed of at the LRP 131-1L subunit (DuPont 1983a and DuPont 1983b). However, the term “pit” may be a misnomer as the 2022 characterization activities did not indicate that a pit was constructed or that waste was placed below ground surface (bgs). Recently discovered photographs of the subunit show land disposal of material on the surface of the subunit during operation between 1973 and 1982 (Figures 1-4 and 1-5). There is no record of hazardous or radioactive material disposed of at the subunit.

A preliminary screening was performed at the LRP 131-1L subunit in 1991, which included a soil-gas survey to determine if hazardous waste may be present in the subsurface soils and to identify potential areas of contamination within the subunit. A total of ten soil-gas samples were collected along the centerline of the subunit. Samples were analyzed for volatile organic compounds (VOCs) and chlorinated VOCs. The survey results determined that VOCs from methane through hexane are likely to be present in the subunit soils. These compounds are expected in relation to breakdown of typical disposal debris in SRS disposal sites, however contamination within the subunit could not be ruled out and further investigation was warranted. No other characterization was performed at the LRP 131-1L subunit prior to the RFI/RI characterization in 2022 (SRNS 2022). The LRP 131-1L subunit is in Appendix C of the FFA, *RCRA/CERCLA Units*, for further assessment (FFA 1993).

1.3.3 LRP 131-4L Subunit

The LRP 131-4L subunit is located north of the L-Area fence and east of Road 7 (Figure 1-1). Orange ball markers are present to designate the subunit boundaries, an area ~30.5 m by 30.5 m (100 ft by 100 ft) (Figure 1-6). However, during site walkdowns to support a 1994 SE effort, the subunit size was questioned due to land disturbance on the northwestern side of the subunit, outside of the orange ball markers. Additionally, during site walkdowns in 2021, in preparation of the RFI/RI Work Plan for the LRP 131-4L subunit, surface disturbance and debris (e.g., rebar, concrete, asphalt) were observed on the northeastern side of subunit outside of the orange ball markers. Therefore, the LRP 131-4L subunit area to be investigated was expanded to ~36.6 m by 36.6 m (120 ft by 120 ft) to include the disturbed land and observed debris (Figure 1-6).

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Records indicate the LRP 131-4L subunit received inert rubble from the L-Area Powerhouse Stack and Silo demolition (Dupont 1983a and DuPont 1983b). The rubble consisted primarily of concrete and asphalt material with some metal. The unlined pit was reported to have operated from 1973 to 1983 before it was filled and seeded in 1983. Operating procedures indicate it was to receive inert, non-hazardous materials, and there are no records indicating any disposal of hazardous or radioactive materials.

A SE of the LRP 131-4L subunit was conducted from 1992 to 1994, and results were reported in the *Site Evaluation Report for the L-Area Rubble Pit (131-4L) (U)* (WSRC 1994). Based on the SER, in accordance with 300.420(b)(1)(I) of the NCP, the LRP 131-4L subunit was removed from FFA Appendix G.1, *Areas to Be Investigated*, and placed in Appendix C, *RCRA/CERCLA Units*, for further assessment (FFA 1993).

1.4 Land Use

The ECODS L-3, LRP 131-1L, and LRP 131-4L OU is located in an area designated for industrial use as defined by the *Land Use Control Assurance Plan for the Savannah River Site* (WSRC 1999). No current or future development of the OU is planned. Land use controls will be part of any remedial action that leaves contamination in place above levels that allow for unrestricted use (e.g., residential). Groundwater is not part of the OU and is addressed in the LASG OU monitored natural attenuation final remedy. There is no current or projected future use of the groundwater as a drinking water source.

1.5 Natural Resource Trustees Injury Evaluation

The potential for natural resource injuries is documented by completing the NRIE Checklist (Appendix G). The purpose of the NRIE Checklist is to identify potential natural resource injuries associated with CERCLA remedial activities. If potential injuries are identified, consideration is given as to whether trustee involvement is needed. The checklist is a starting point in potential injury identification and is not intended to be all-inclusive. The checklist has been designed as a series of questions to help identify the potential for natural resource injuries and what resources may be affected. It is based on the pre-assessment screen in 43 Code of Federal Regulations (CFR) 11.13.

The USDOE, as a trustee of its land, is responsible for identifying resources of concern. SRS integrates components of the Natural Resource Damage Assessment and RI/FS processes to assess potential threats to natural resources during the remedial process. The intent is to prevent potential injuries to natural resources that can occur as the result of remediation activities and to mitigate, to the extent practical, any injuries that have already occurred. The list of trustees for the SRS is included in Table 1-1.

Based on the NRIE Checklist (Appendix G), natural resources have been adversely affected by hazardous substances from the ECODS L-3 subunit (i.e., asbestos containing materials [ACM] and polychlorinated biphenyls [PCBs] in soils) and the LRP 131-4L subunit (i.e., ACM and benzo[a]pyrene in soils). Natural resources were not adversely affected by hazardous substances from LRP 131-1L subunit. Remedial alternatives may or may not address injuries to the natural resources and could cause additional injury based on the scope of the remedial action. No irreversible or irretrievable resource losses are known to exist. The impact to natural resources will be considered during the remedial alternative evaluation for the ECODS L-3, LRP 131-1L, and LRP 131-4L OU.

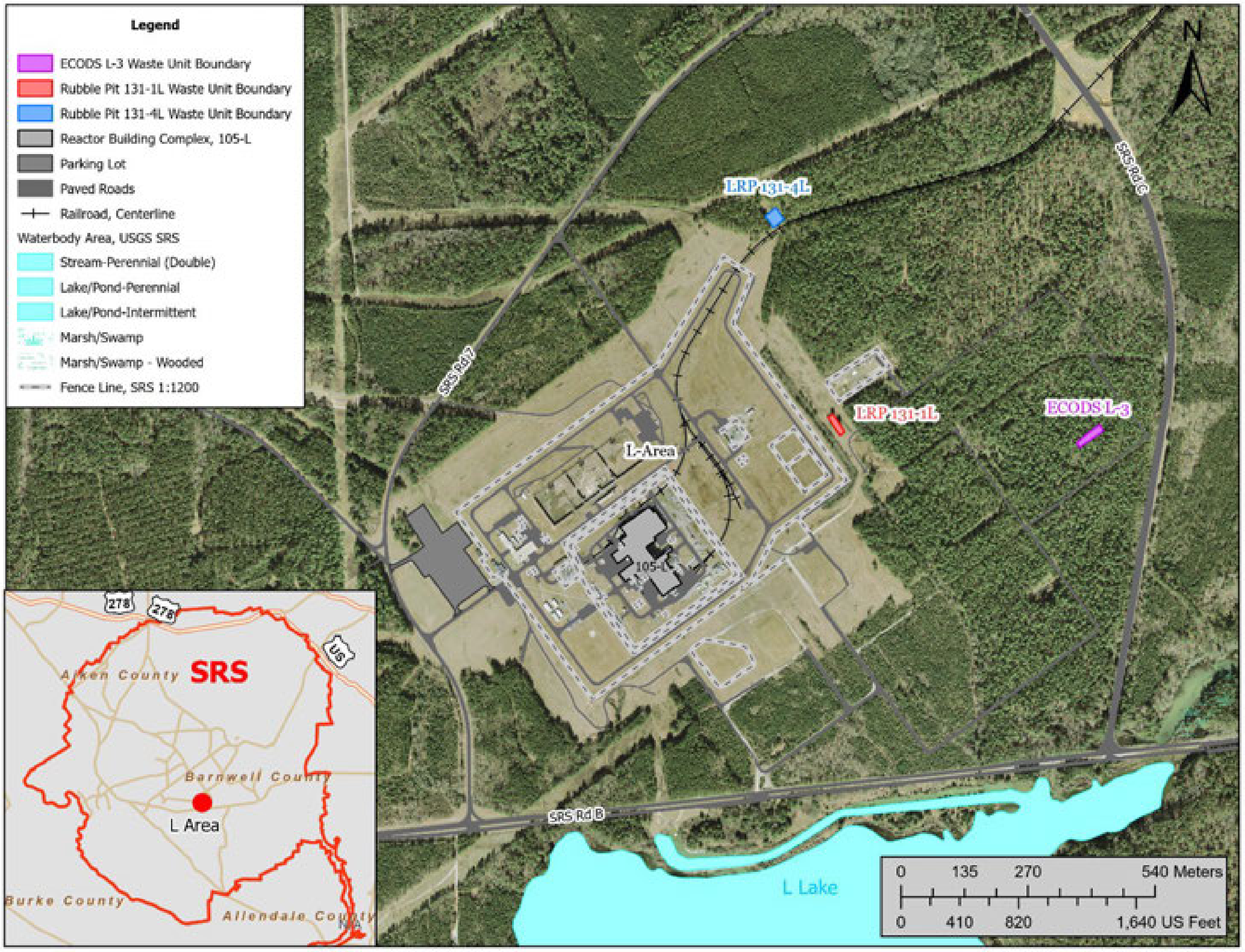

Figure 1-1. Location of the ECODS L-3, LRP 131-1L, and LRP 131-4L Operable Unit

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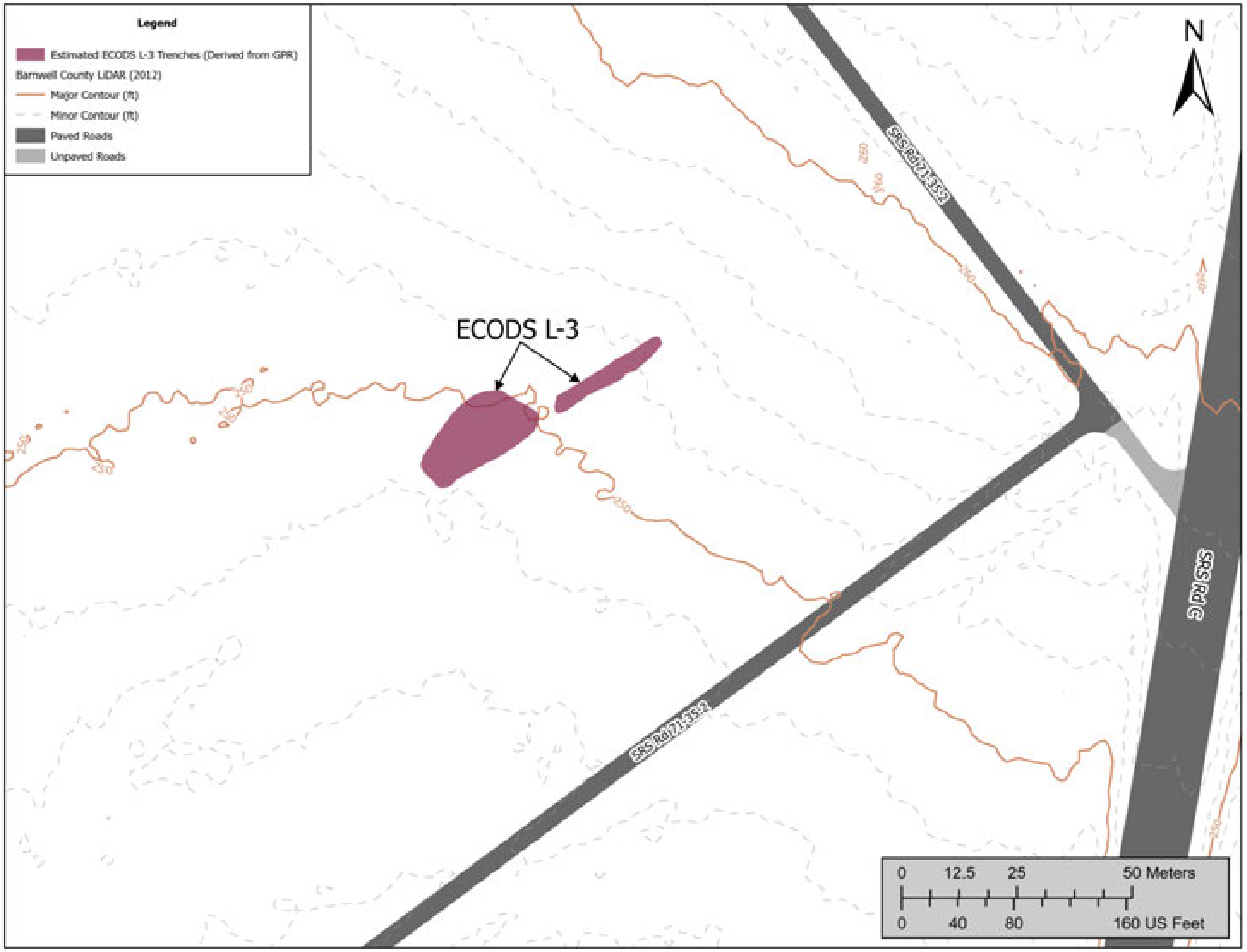

Figure 1-2. ECODS L-3 Subunit Boundaries

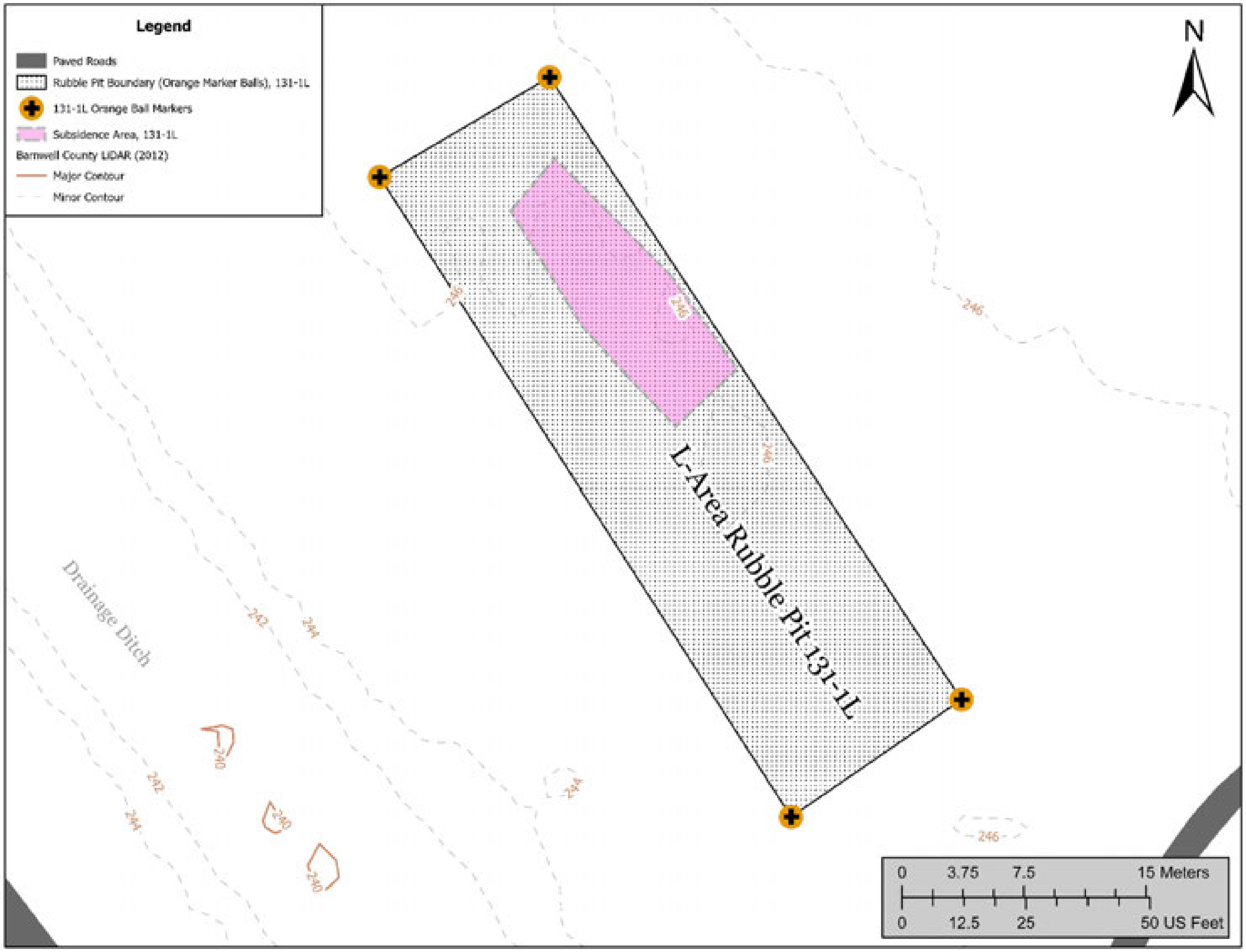

Figure 1-3. L-Area Rubble Pit 131-1L Subunit Boundary

Figure 1-4. Photo of Rubble on Surface of LRP 131-1L Subunit (Photo 17471-28)

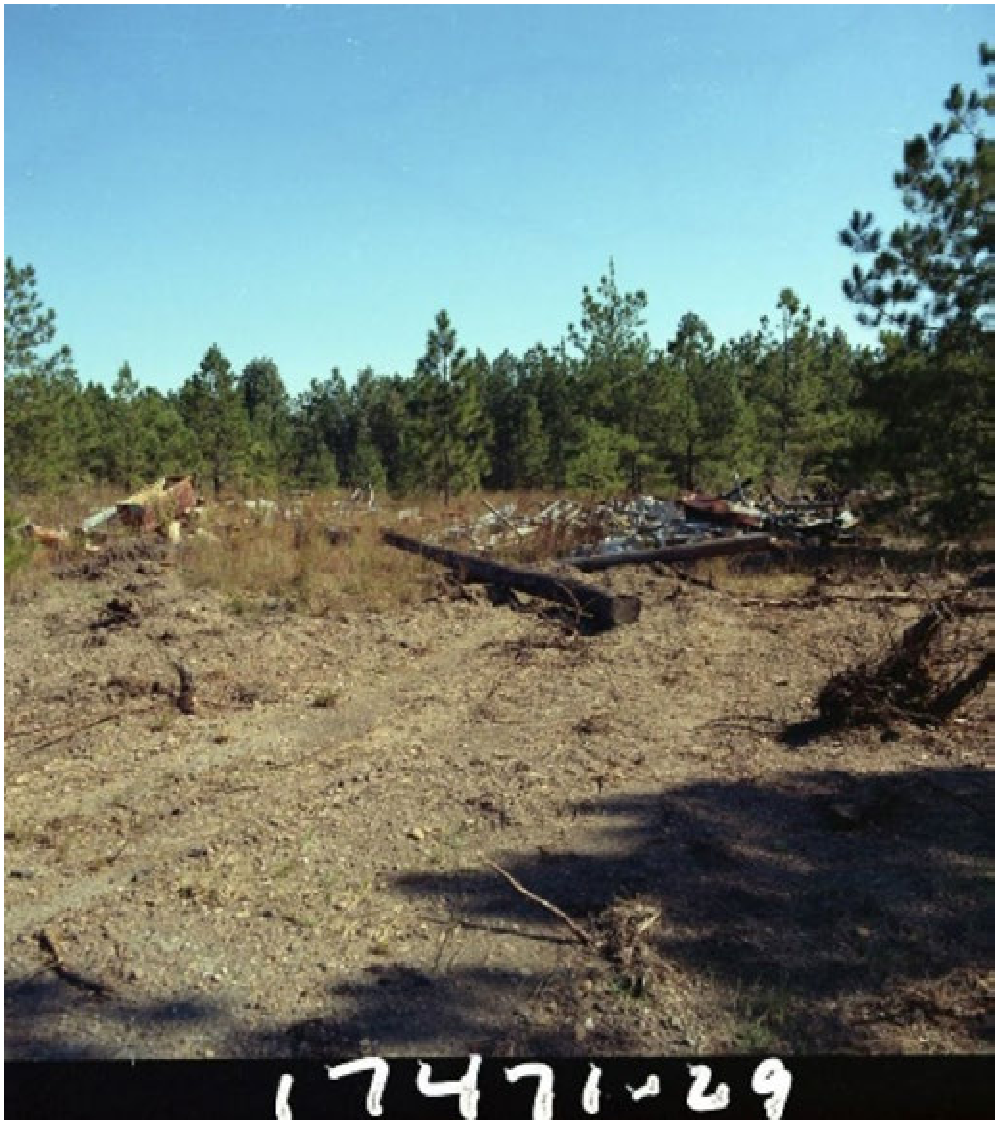

Figure 1-5. Photo of Rubble on Surface of LRP 131-1L Subunit (Photo 17471-29)

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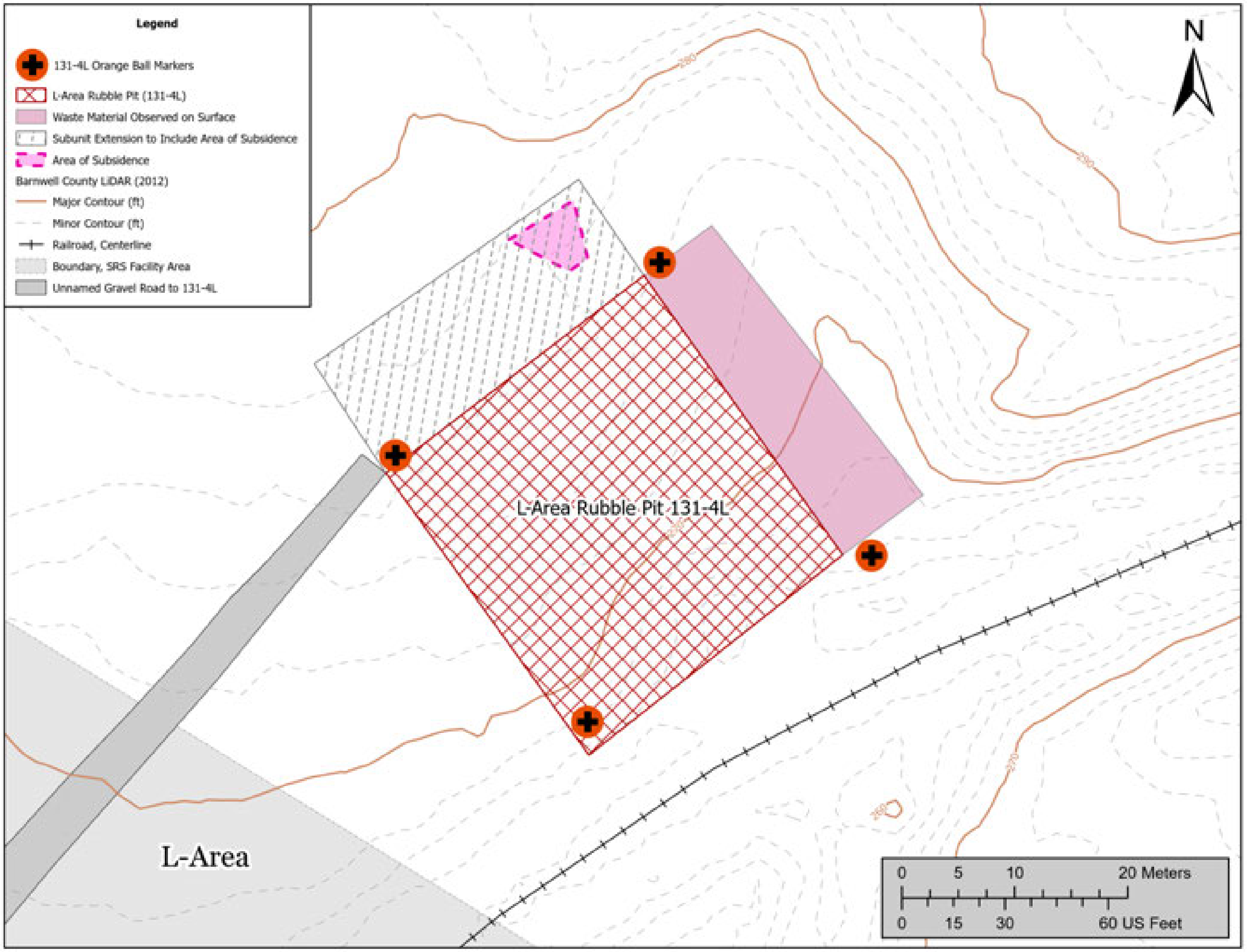

Figure 1-6. L-Area Rubble Pit 131-4L Subunit Boundary

Table 1-1. Savannah River Site Natural Resource Trustees and Their Responsibilities

Governing Power	Responsibilities
USDOE, Savannah River Operations Office	All-natural resources located on, over, or under land administered by USDOE
South Carolina Office of the Governor	All-natural resources of the State of South Carolina
SCDES, Bureau of Land and Waste Management	Geologic resources including soil, groundwater resources (including drinking water sources), air resources, and surface water resources
U.S. Department of the Interior	Threatened and endangered species (includes Red-Cockaded Woodpecker, Bald Eagle, Wood Stork, Shortnose Sturgeon, and Smooth Coneflower), migratory birds, anadromous species, National Park Service land (Fort Pulaski National Monument), Fish and Wildlife Service land (Savannah River National Wildlife Refuge), Tybee Island National Wildlife Refuge, and Orangeburg National Fish Hatchery
South Carolina Department of Natural Resources	Commercial species, game and non-game species, and state sensitive species
Georgia Department of Natural Resources	Savannah River resources, groundwater resources, air resources, and surface water resources
U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA)	Living and non-living natural resources in coastal and marine areas including the following: • All life stages, wherever they occur, of fishery resources on the Exclusive Economic Zone and continental shelf • Anadromous and catadromous species throughout their ranges, rivers, and tributaries to rivers, which historically or presently support the above species • Federally endangered and threatened species, including designated critical habitat and marine mammals for which NOAA has assigned responsibility • Tidal wetlands, salt marshes, estuaries, and all other habitats supporting all fishery and marine resources listed above • Living and non-living resources of National Marine Sanctuaries and National Estuarine Reserves
United States Army Corps of Engineers, Charleston, South Carolina District, Savannah, Georgia District	Savannah River resources, navigable waters resources, and waters of the United States resources

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2.0 OPERABLE UNIT DESCRIPTION

A discussion of the physical attributes of the ECODS L-3, LRP 131-1L, and LRP 131-4L OU including physical habitats, ecological setting, surface features, meteorology, unit-specific geology and hydrogeology, surface water hydrology, and sediments/ soils are described and depicted in the following sections.

2.1 Physical Setting

The ECODS L-3, LRP 131-1L, and LRP 131-4L OU is located in the southern portion of the SRS near L Area and within the Steel Creek Watershed (Figure 2-1). Prior to construction of L Area, the land was used as farmland. L Area is an industrialized area of SRS, consisting primarily of a nuclear reactor and support facilities that operated from August 1954 to 1968 and 1984 to 1988. Between 1968 and 1984, the reactor facility was in warm standby (WSRC 2005). Facilities in L Area are still active, with the primary mission of receiving, stabilizing, and dispositioning spent nuclear fuel. Beyond the L-Area facility boundary, the terrain is relatively flat and wooded, primarily mature pine forest (Pinus spp). Figure 2-1 depicts the major surface features of L Area and surrounding areas.

2.1.1 Habitats and Ecological Setting

The diverse habitats of SRS support a wide range of aquatic, semi-aquatic, and terrestrial biota. As an Environmental Research Park, the SRS has a wealth of site-specific information on a variety of species including threatened, endangered, and sensitive (TES) species. The information includes locational data from geographic information system coverages for plant and select faunal species that is further supported by ground surveys for TES species and other various organisms to support various research and monitoring efforts including long-term monitoring conducted by the Savannah River Ecology Laboratory. The SRS Natural Resources Management Plan developed by the United States Forestry Service-Savannah River (USFS-SR) prioritizes protection of TES species. The USFS-SR manages the USDOE’s SRS wildlife, plants, and renewable timber resources so that ecological systems are sustained and protected (USFS 2019). They also develop habitat management plans through consultation with the United States Fish and Wildlife Service

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(USFWS) for endangered species management and conduct ground surveys of TES species. TES species known to be present at SRS are provided in Table 2-1 and Table 2-2. Table 2-3 lists TES animal species known to occur on SRS (USFWS 2021). Along with the extensive ecological data available for SRS, there is area-specific information for L Area, including the ECODS L-3, LRP 131-1L, and LRP 131-4L OU.

The ECODS L-3 subunit is located in a wooded area consisting of mainly open-canopy mature pine (Pinus spp) (Figure 2-2). No TES species are known to exist within 0.8 km (0.5 mi) of the subunit. There are no wetland or surface water features on or near the subunit. The nearest wetland to the ECODS L-3 subunit are the extensive aquatic/wetland areas associated with L Lake, ~0.6 km (0.4 mi) to the south. There is no evidence of stained soil or stressed vegetation within the ECODS L-3 subunit. The depth to groundwater at the ECODS L-3 subunit is ~7.62 m (25 ft) bgs.

The LRP 131-1L subunit area was covered in herbaceous and scrub habitat with scattered, open-canopy mature pine trees prior to RFI/RI characterization in 2022 (Figure 2-3). There was no evidence of stained soil or stressed vegetation within the subunit. To support the RFI/RI characterization, the subunit was cleared of all vegetation (Figure 2-4). The subunit is currently recovering and is covered in native grasses/sedges and an assortment of young woody plants. No TES species are known to exist within 0.8 km (0.5 mi) of the subunit. There are no wetland areas near the subunit except for wetland areas associated with L Lake ~1.0 km (0.6 mi) to the southeast. There also is a man-made ditch with a depth of ~3.0 m (10 ft) and width ranging from 15 to 21 m (50 to 70 ft) that receives rainfall runoff and runs to the south, following the L Area facility fence line. The depth to groundwater at the subunit is ~4.6 m (15 ft) bgs.

The LRP 131-4L subunit area was covered in dense vegetation of shrubs, grasses, and forbs, and was surrounded by an open canopy of mature pine trees prior to RFI/RI characterization in 2022 (Figure 2-5). There was no evidence of stressed vegetation or stained soil at the subunit. To support the RFI/RI characterization, the subunit was cleared of all vegetation (Figure 2-6). The subunit is currently recovering and is covered in native grass and an assortment of young woody plants. No TES species are known to exist within 0.8 km (0.5 mi) of the subunit. There are no wetland areas near the subunit except for wetland areas associated with L Lake, 1.5 km (0.9 mi) to the southeast. The depth to groundwater at the subunits is ~7.6 m (25 ft) bgs.

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2.1.2 Surface Features

The ECODS L-3 subunit is in a relatively flat area that slopes gradually to the southwest with surface elevation ranging from 75 to 77 m (248 to 254 ft) above mean sea level (amsl) (Figure 1-2). The subunit is covered in mature pine trees with a moderately dense understory (Figure 2-2). The subunit is marked by established signage.

The LRP 131-1L subunit is a relatively flat area that slopes gently to the southwest towards an open drainage ditch with surface elevation ranging from 74 to 75 m (244 to 246 ft) amsl (Figure 1-3). The drainage system discharges to L Lake, ~830 m (2,700 ft) away. A depression, ~1 m (3 ft) in depth and 92 square meters (m^2) (110 square yards [yd^2]) in areal extent, was observed within the northern end of the subunit (Figure 2-7). The depression receives rainwater runoff, however the soil drains well and does not regularly hold water. The subunit is marked by four orange balls marking the corners of the subunit and established signage (Figure 2-3).

The LRP 131-4L subunit surface elevation ranges from ~81 to 84 m (265 to 275 ft) amsl (Figure 1-6). Surface runoff flows across the subunit to the southeast and collects at the culvert, which then travels under the nearby railroad tracks. This culvert and drainage system discharges to L Lake, ~1,300 m (4,300 ft) away. From this point, L Lake flows southwest and south for 5.6 km (3.5 mi) before discharging into Steel Creek. Steel Creek flows south and west for an additional 12 km (7.5 mi) before discharging into the Savannah River. Drainage from the LRP 131-4L subunit does not discharge to a National Pollutant Discharge Elimination System (NPDES) permitted storm water outfall, as it is in an area not served by storm sewers. The original subunit boundary is delineated by the orange ball markers. The subunit is not marked by established signage.

2.1.3 Meteorology

The climate of the central Savannah River area is humid and subtropical. It is characterized by hot summers and mild winters. Outbreaks of severe thunderstorms occur more frequently during the spring; rainfall is evenly distributed throughout the year (Savannah River National Laboratory [SRNL] 2024). Except for the Savannah River valley, there are no topographic features that would significantly influence the general climate.

Meteorological monitoring has been conducted at the SRS since the 1950s. Monthly averages of temperature and precipitation based on a 30-year historical record of observations are presented in Table 2-4 and Table 2-5, respectively. During the summer months, temperatures at SRS typically average between 27 and 28 degrees Celsius (°C) (80- and 82-degrees Fahrenheit [°F]). On average, fall and spring temperatures range between 14 and 23 °C (57 and 74 °F). Winter temperatures average between 8.9 and 11 °C (48 and 52 °F). The 30-year average rainfall is 124 centimeters (cm) (49.0 inches [in.]), with record low annual rainfall of 81.5 cm (32.1 in.) in 2011, and a record high annual rainfall of 171 cm (67.2 in.) in 2023. Average precipitation is relatively consistent throughout the year, with slightly higher rainfall occurring during the summer months when the humidity levels are higher.

2.2 Geology and Hydrogeology

This section describes the geology, hydrogeology, surface water hydrology, and soil types for the ECODS L-3, LRP 131-1L, and LRP 131-4L OU.

2.2.1 Operable Unit-Specific Geology

SRS is situated on the Atlantic Coastal Plain, a wedge of unconsolidated and semi-consolidated sediments that thickens toward the southeast. Investigations into regional and SRS geology are summarized in the Hydrogeologic Framework of West-Central South Carolina and other reports (Aadland et al. 1995; Fallaw and Price 1995; Stieve and Stephenson 1995).

As shown on Figure 2-8, the shallow geologic units associated with the ECODS L-3, LRP 131-1L, and LRP 131-4L OU include the middle to late Tertiary Age Tobacco Road Formation and "Upland Unit" (correlative to the Altamaha Formation). Figure 2-9 depicts surface exposure of the geologic units at each of the three subunits. As shown on Figure 2-9, the primary exposed geologic unit found mostly at L Area and the ECODS L-3 and LRP 131-1L subunits is the Tobacco Road Formation. The Tobacco Road Formation is ~21.3 m (70 ft) thick and consists of moderately- to poorly-sorted, red, brown, tan, purple, and orange, fine to coarse, clayey quartz sand. Pebble layers are common, as are clay laminae and beds. Trace fossils, possibly Ophiomorpha burrows, are abundant in parts of the formation. Sediments have the characteristics of a shallow marine deposit.

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The informally named "Upland Unit" consists of poorly-sorted, silty, clayey sand, pebbly sand, and conglomerate. This unit caps hills in higher elevations over much of SRS and in an area to the northeast of L Area starting at the LRP 131-4L subunit (Figure 2-9). The average thickness is 12.2 m (40 ft). The color is variable, and facies changes are abrupt; weathered feldspar is abundant in places. Due to the highly eroded and channelized nature of the underlying Tobacco Road Formation, the thickness of the "Upland Unit" changes abruptly. The "Upland Unit" appears to have been deposited in a fluvial environment.

2.2.2 Operable Unit-Specific Hydrogeology

The unconsolidated marine and fluvial sediments of the Atlantic coastal plain underlying the ECODS L-3, LRP 131-1L, and LRP 131-4L OU and all of SRS are a variably stratified, heterogeneous sequence of sand, clay, limestone, and gravel layers. In terms of hydrostratigraphy, the uppermost sediments make up the Floridan Aquifer System. In the ECODS L-3, LRP 131-1L, and LRP 131-4L OU, the Floridan Aquifer System consists of, in ascending order, the Gordon Aquifer, the Gordon Confining Unit, and the Upper Three Runs Aquifer (Figure 2-8). The Floridan Aquifer System is separated from lower aquifer units by the Crouch Branch Confining Unit, which is a competent aquitard.

2.2.3 Operable Unit Surface Water Hydrology

The five major streams that drain from the SRS to the Savannah River are the Upper Three Runs, Fourmile Branch, Pen Branch, Steel Creek, and Lower Three Runs. The ECODS L-3, LRP 131-1L, and LRP 131-4L OU is in an area of relatively flat topographic relief gently sloping to the southeast toward the Steel Creek Watershed (Figure 2-10). The regional area does contain various poorly drained surface depressions such as Carolina bays.

A drainage system consists of a drainage ditch that collects runoff from the LRP 131-4L subunit and runs toward nearby railroad tracks. Just before the railroad tracks on the southeastern end of the subunit, there is a depression and a drainpipe which collects runoff and carries it through a culvert under the railroad tracks and then continues toward L Area. The drainage ditch continues around the L Area facility perimeter fence and runs adjacent to the LRP 131-1L subunit, with a depth of ~3.0 m (10 ft) and a width ranging from 15 to 21 m (50 to 70 ft). Runoff from the LRP

131-1L subunit also is collected in this drainage ditch. The drainage system continues until discharging to L Lake, ~830 m (2,700 ft) away. Runoff from the ECODS L-3 subunit follows the gentle sloping topography to the southwest, eventually collecting in the same drainage system that collects runoff from the other two subunits.

2.2.4 Operable Unit Soils

According to the United States Soil Conservation Service Soil Survey, soils at the ECODS L-3, LRP 131-1L, and LRP 131-4L OU consist of Udorthents (friable substratum) and Wagram Sand (United States Department of Agriculture [USDA] 1990) (Figure 2-11). Udorthents (friable substratum) soil series are associated with the LRP 131-1L and LRP 131-4L subunits. This soil type consists of mostly well drained soils that formed in heterogenous material, which are the spoil or refuse from excavations and major construction operations. The soil series cannot be identified due to use of heavy equipment extensively moving the soil material. Udorthents have a very low organic content and are strongly acid throughout. Udorthents range from sandy to clayey and are most commonly associated with well drained upland soils. This soil type typically is low in nutrients and not suitable for crops.

Wagram Sand is found at the ECODS L-3 subunit and consists of well-drained, moderately permeable soils that is found on broad ridgetops at higher elevations of the Coastal Plain. The soils of the Wagram Sand are classified as loamy and siliceous with low organic content. This soil type is suitable for crops and timber production.

2.3 Conceptual Site Model

The CSM is an objective framework for assessing data pertinent to the investigation. The preliminary CSMs for the ECODS L-3, LRP 131-1L, and LRP 131-4L OU (Figures 2-12 through 2-14) identify and evaluate suspected sources of contamination, contaminant release mechanisms, potentially affected media (secondary sources of contamination), potential exposure pathways, and potential human and ecological receptors that are evaluated in the risk assessment.

Exposure pathways describe the course a chemical or physical agent takes from the source to the exposed receptor. The following seven components constitute an exposure pathway:

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1. *Primary Sources of Contamination* – the waste(s) initially disposed of or released within the subunit.
2. *Primary Sources Environmental Release Mechanisms* – how contaminants from the primary source enter the environment or impact secondary sources.
3. *Secondary Sources* – the environmental media contaminated by release of the primary source.
4. *Secondary Sources Environmental Release Mechanisms* – processes that currently, or may in the future, release contaminants for exposure to potential receptors.
5. *Exposure media* -identifies all media (soil, sediment, surface water, etc.) that could potentially be contaminated.
6. *Exposure routes* – method of entry into the receptor (e.g., external radiation, ingestion, dermal contact, inhalation, etc.)
7. *Receptors (Human and Ecological)* – potential future human receptors (e.g., hypothetical resident, industrial worker) as well as generic descriptions of potential ecological receptors (e.g., terrestrial, aquatic/semi-aquatic, etc.)

If any of these elements are missing, the pathway is incomplete and is not considered further in the quantitative risk assessment. A pathway is complete when all five components are present to permit potential exposure of a receptor to a source of contamination. Exposure analysis is important in terms of identifying all potentially complete exposure routes, understanding the nature and extent (as well as fate and transport) of contamination, and developing preliminary remedial alternatives. In a complete pathway, exposure occurs at exposure points that may represent only a small portion of the entire exposure route. If there is no exposure point, then there is no exposure, and the pathway is considered incomplete.

2.3.1 Primary Sources of Contamination

The ECODS L-3 subunit is one of twenty-five ECODS at SRS which were identified during a review of early 1950s aerial photographs. These sites were used during the construction and early operation of SRS for disposal of construction debris and other non-radioactive waste materials, such as rubble and concrete. The ECODS L-3 subunit is estimated to have been used from November 1953 to June 1954, and there are no records of hazardous or radioactive waste disposal at the subunit. Prior to use as a disposal site, the area was used as farmland. Sections of the disposal trenches may have been used as a burn pit for disposal of combustible waste. Based on historical records and the known uses of the ECODS L-3 subunit, per- and polyfluoroalkyl substances (PFAS) are not expected to be present.

The LRP 131-1L subunit is a former waste disposal area reportedly used for various construction debris and operated from 1973 to 1982 (DuPont 1983a). Plant records indicate that metal, lumber, poles, concrete, brick, tile, asphalt, tires, rubber, scrap metal, fence posts, hard plastics, wallboard, asbestos, glass, batteries paint cans, drums, and transite were disposed of at the LRP 131-1L subunit (DuPont 1983a and DuPont 1983b). Based on available records and the results of the RFI/RI characterization, there was no pit constructed at the LRP 131-1L subunit, and waste was placed on the subunit surface between 1973 and 1982. Recently discovered photos of the subunit show land disposal of material on the surface of the subunit (Figure 1-4 and Figure 1-5). It is unknown when the waste was removed. There is no record of hazardous or radioactive material disposed of at the subunit. Based on historical records and the known uses of the LRP 131-1L subunit, PFAS are not expected to be present.

The LRP 131-4L subunit is an unlined pit, reported to have operated from 1973 to 1983, before it was filled and seeded in 1983. The LRP 131-4L subunit received inert rubble from the L-Area Powerhouse Stack and Silo demolition. The rubble consisted primarily of concrete and asphalt material with some metal. Operating procedures indicate it was to receive inert, non-hazardous materials, and there are no records indicating any disposal of hazardous or radioactive materials. Based on historical records and the known uses of the LRP 131-4L subunit, PFAS are not expected to be present.

2.3.2 Primary Sources Environmental Release Mechanisms

Environmental release mechanisms evaluated as primary sources of contamination to the ECODS L-3 subunit were solid construction wastes disposed of in the ECODS L-3 subunit during

L-Reactor (105-L) Complex construction activities in the 1950s. All environmental release mechanisms for primary sources of contamination have been inactive since 1954.

Environmental release mechanisms evaluated as primary sources of contamination to the LRP 131-1L subunit were various solid construction wastes. Based on available records and the results of the RFI/RI characterization, there was no pit constructed at the LRP 131-1L subunit, and waste was placed on the subunit surface between 1973 and 1982. It is unknown when the waste was removed. SRS records indicate that metal, lumber, poles, and concrete were disposed of at the LRP 131-1L subunit. There are no records of hazardous or radioactive material disposed of at the subunit. All environmental release mechanisms for primary sources of contamination have been inactive since 1982.

Environmental release mechanisms evaluated as primary sources of contamination to the LRP 131-4L subunit were solid demolition wastes disposed of in the LRP 131-4L subunit between 1973 and 1983. The rubble consisted primarily of concrete and asphalt material with some metal. Environmental release mechanisms for primary sources of contamination have been inactive since 1983.

2.3.3 Secondary Sources of Contamination

As primary source contacts other media, secondary sources of contamination can potentially be created. During construction of the L Area facilities and L-Area Powerhouse Stack and Silo demolition, disposal of debris at the ECODS L-3, LRP 131-1L, and LRP 131-4L OU had the potential to create secondary sources including surface, subsurface, and deep soil.

2.3.4 Secondary Sources Environmental Release Mechanisms

At the ECODS L-3, LRP 131-1L, and LRP 131-4L OU, potential secondary release mechanisms included volatilization, fugitive dust by wind, biotic uptake, deep soil excavation, and leaching to groundwater.

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2.3.5 Exposure Media

ECODS L-3, LRP 131-1L, and LRP 131-4L OU exposure media include air vapor/particulate, biota, surface soil, subsurface soil, deep soil to a depth of 5.3 m (18 ft) bgs, and groundwater (i.e., CM analysis).

2.3.6 Exposure Routes

ECODS L-3, LRP 131-1L, and LRP 131-4L OU exposure routes include inhalation, ingestion, dermal contact, and external radiation.

2.3.7 Receptors (Human and Ecological)

The industrial worker is the most appropriate receptor scenario for assessing potential risks associated with the soil of the ECODS L-3, LRP 131-1L, and LRP 131-4L OU. The hypothetical resident scenario is protective of the industrial worker since the resident is a more conservative scenario to assess potential risk to human receptors. A comparison of exposure assumptions to potential human exposure scenarios at SRS is provided below:

Potential Receptor	Years	Days/Year	Hours/Day	Exposure Hours
Hypothetical Resident	26	350	24	218,400
Industrial Worker	25	250	8	50,000

Source: SRNS 2023

Potential ecological receptors for ECODS L-3, LRP 131-1L, and LRP 131-4L OU include terrestrial wildlife.

Complete exposure pathways to potential human receptors and ecological receptors for evaluation in this document are included in the preliminary CSMs (Figures 2-12 through 2-14). The refined CSMs, which include the refined constituents of concern (RCOCs), are included in Chapter 3.

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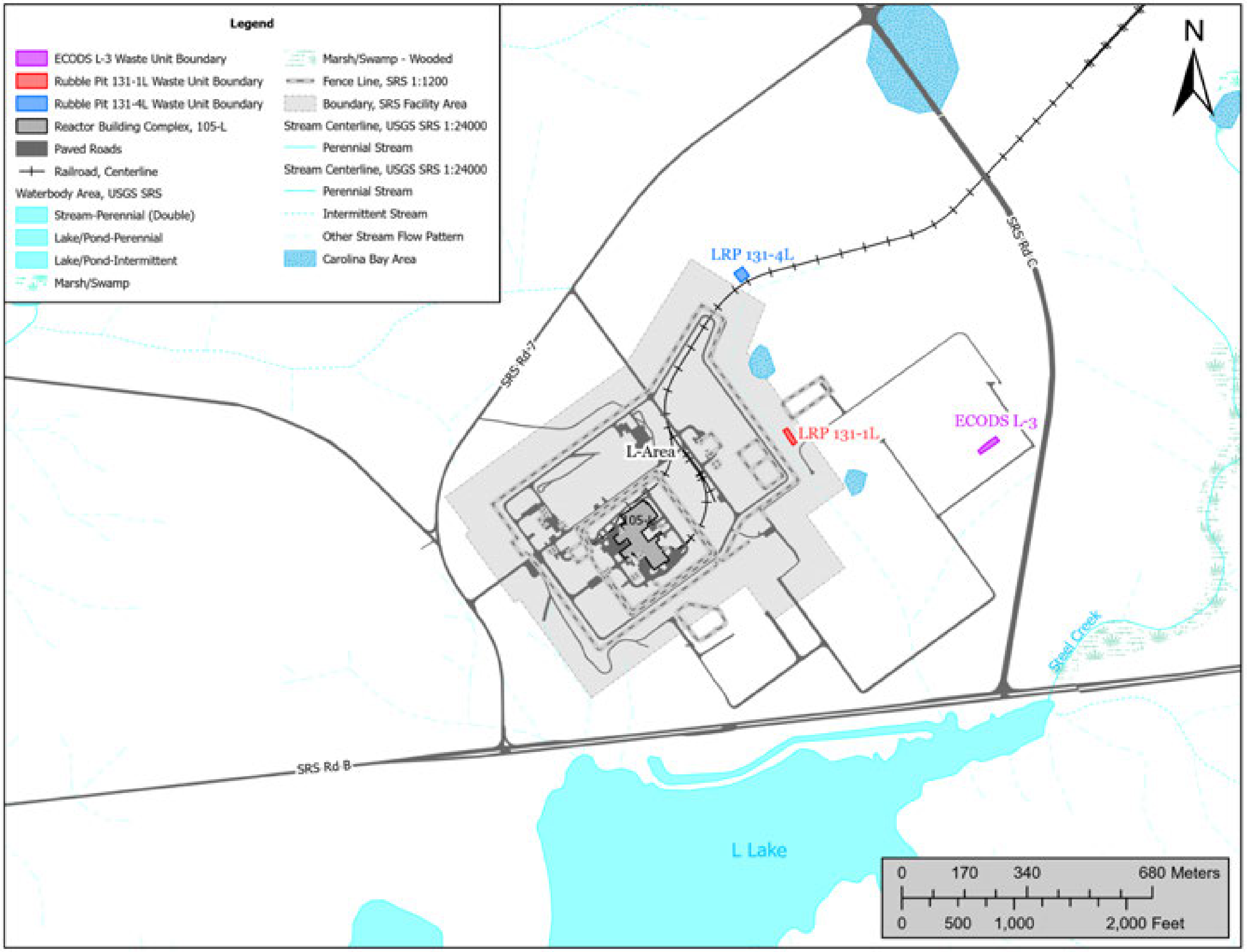

Figure 2-1. L-Area Surface Features and Surrounding Area

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Figure 2-2. Photo of the ECODS L-3 Subunit (2021)

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Figure 2-3. Photo of the LRP 131-1L Subunit Before Clearing to Support RFI/RI Characterization Sampling (2021)

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Figure 2-4. Photo of the LRP 131-1L Subunit Following Clearing to Support the RFI/RI Characterization Sampling (2022)

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Figure 2-5. Photo of the LRP 131-4L Subunit Prior to Clearing Activities to Support the RFI/RI Characterization Sampling (2021)

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Figure 2-6. Photo of the LRP 131-4L Subunit Following Clearing Activities to Support the RFI/RI Characterization (2022)

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Figure 2-7. Depressed Area within LRP 131-1L Subunit

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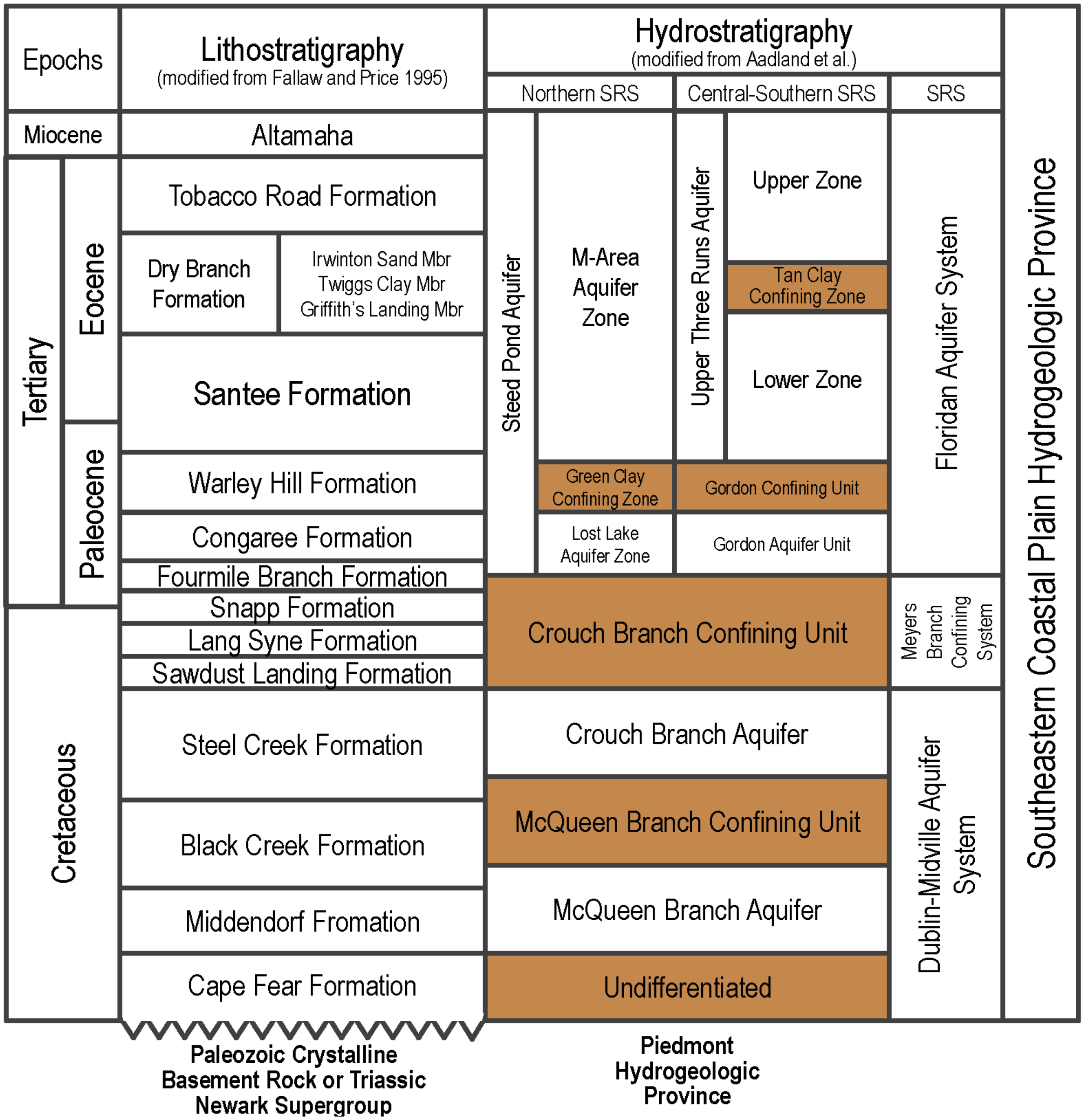

Figure 2-8. Lithostratigraphic and Hydrostratigraphic Unit Comparisons

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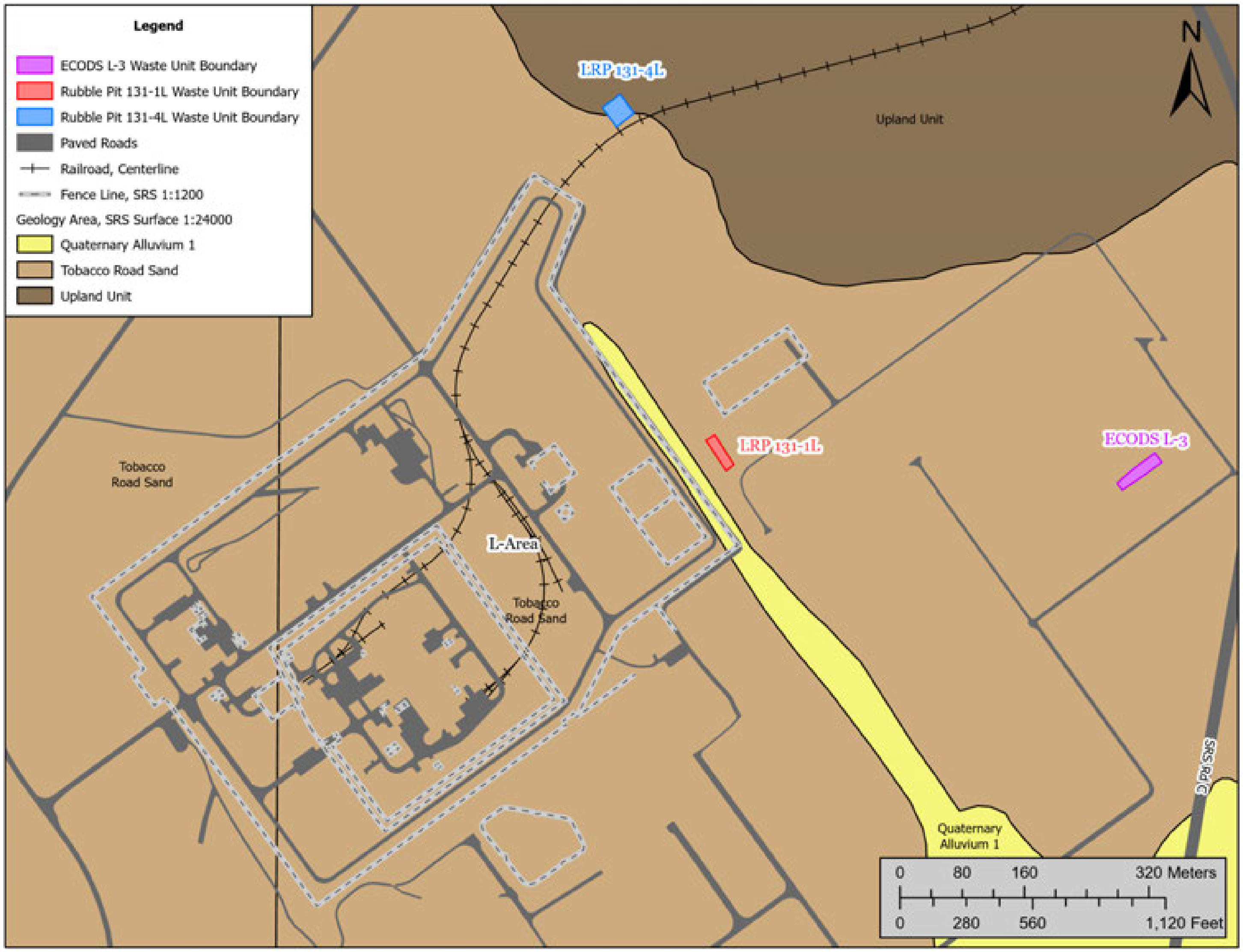

Figure 2-9. Geologic Units Exposed at Surface, L Area

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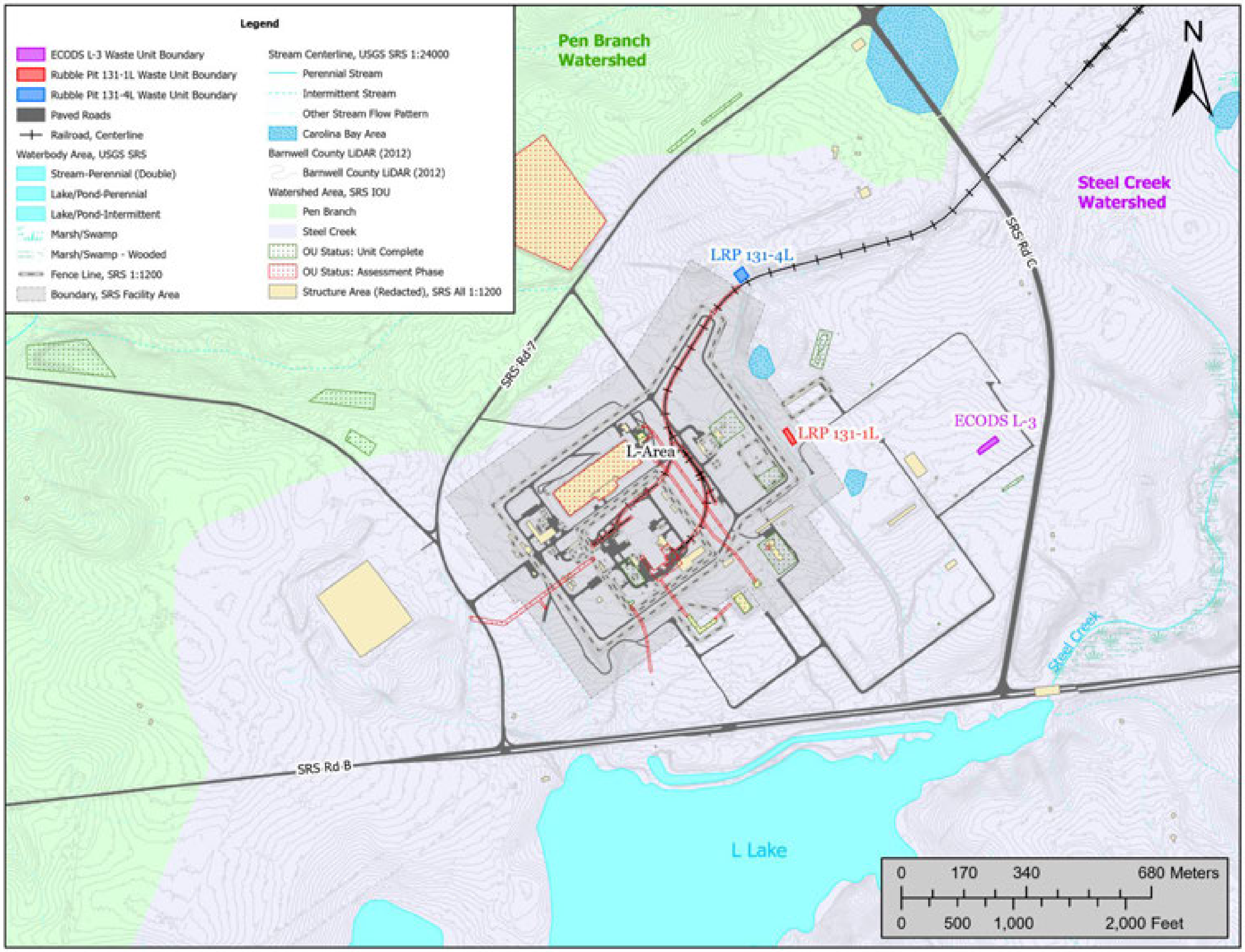

Figure 2-10. L-Area Surface Water Run-Off

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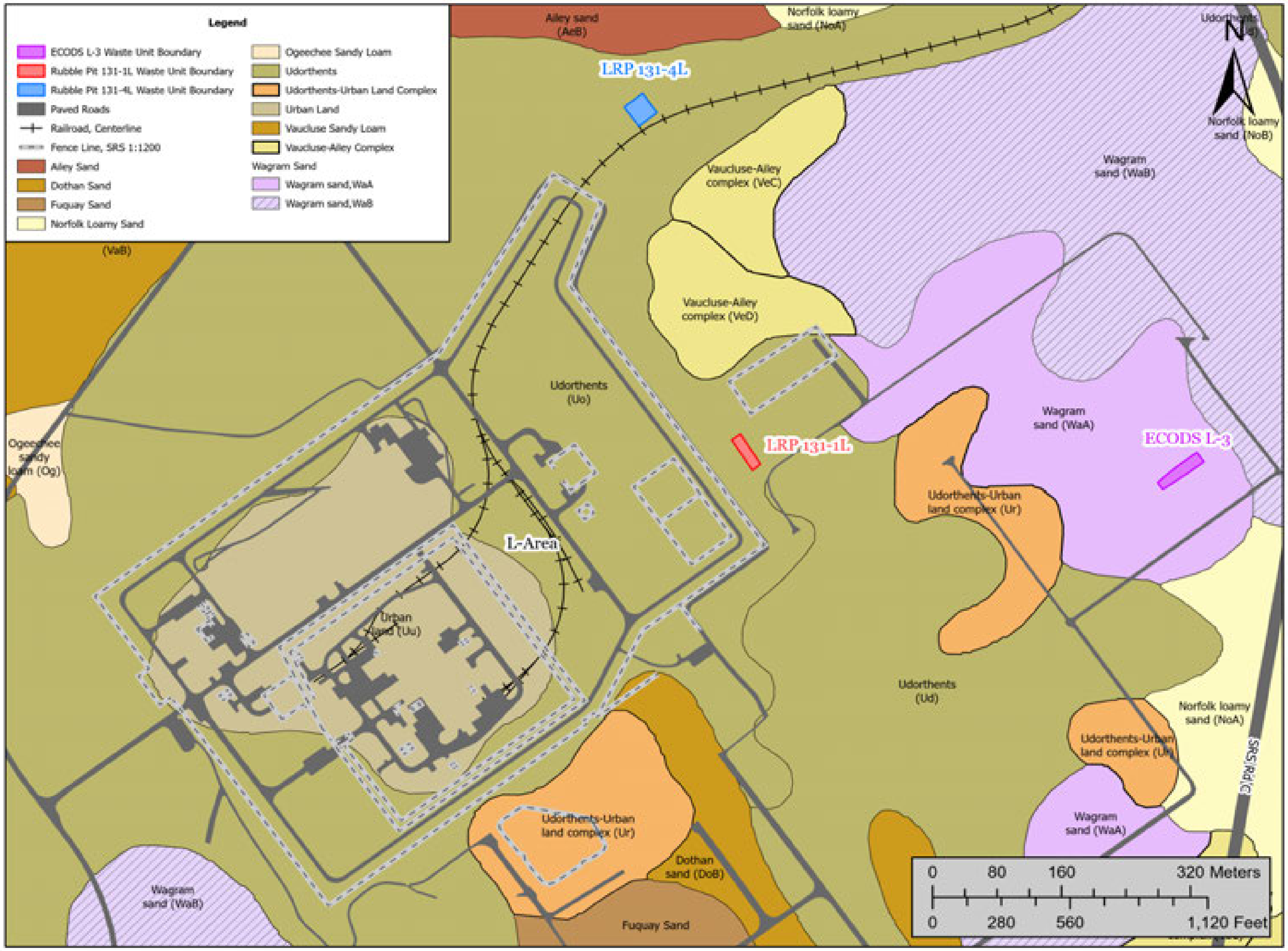

Figure 2-11. Soil Series in the L Area

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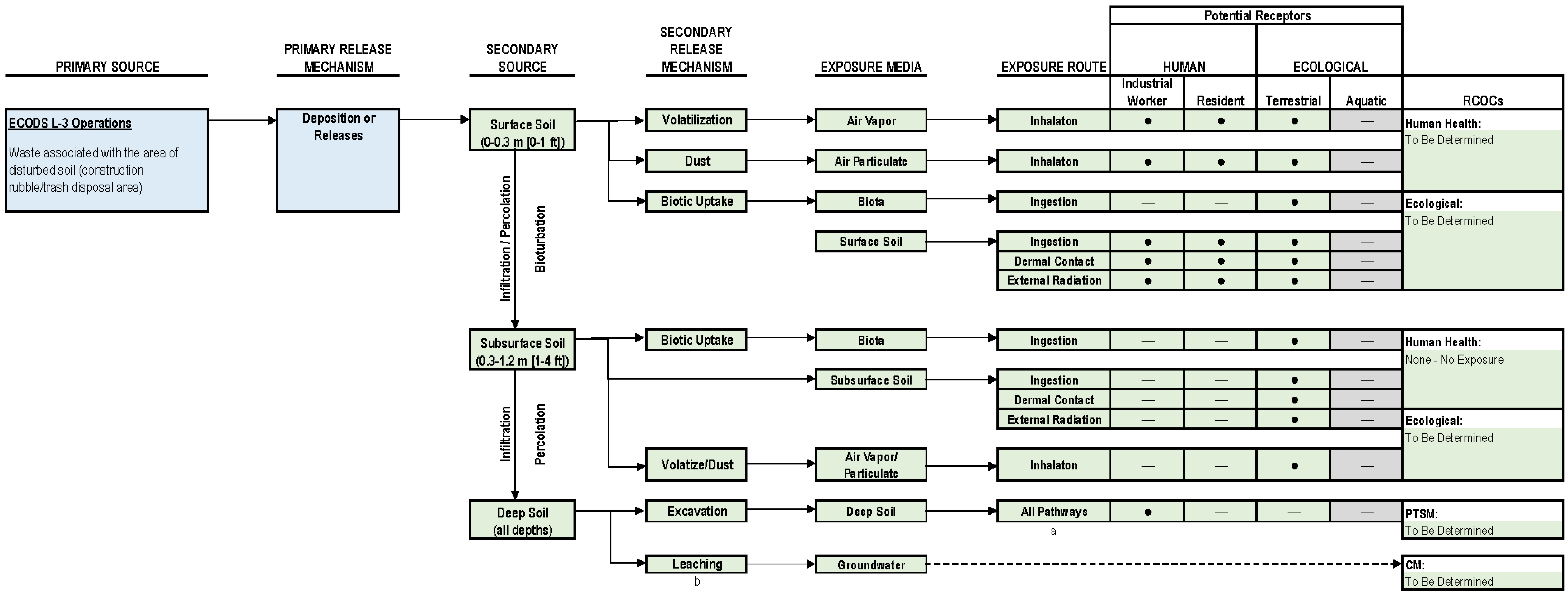
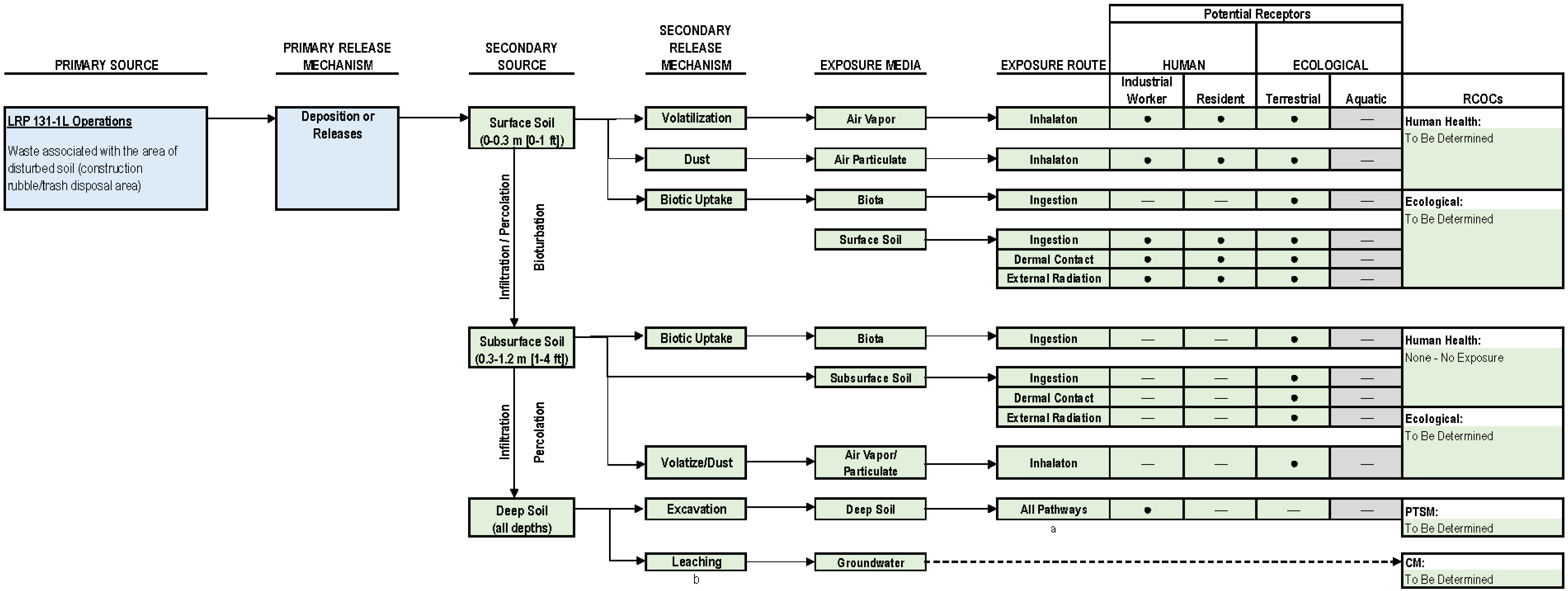


a - "All Pathways" represents ingestion, inhalation, dermal contact, and external radiation exposure for the principal threat source material (PTSM) evaluation for toxicity.
b - Leaching represents the potential of a contaminant in soil or sediment to migrate to groundwater above MCLs per the contaminant migration (CM) analysis and does not represent a human health or ecological exposure route.
- Receptors shaded gray were considered, but were determined not to be applicable to the subunit.

→ - Pathways: current, historic, and future
● - Complete exposure pathway for quantitative evaluation
O - Complete exposure pathway for qualitative evaluation
— - Incomplete exposure pathway
⇢ Contaminant migration analysis

Figure 2-12. Preliminary Conceptual Site Model for the ECODS L-3 Subunit



a - "All Pathways" represents ingestion, inhalation, dermal contact, and external radiation exposure for the principal threat source material (PTSM) evaluation for toxicity.

b - Leaching represents the potential of a contaminant in soil or sediment to migrate to groundwater above MCLs per the contaminant migration (CM) analysis and does not represent a human health or ecological exposure route.

- Receptors shaded gray were considered, but were determined not to be applicable to the subunit.

→ - Pathways: current, historic, and future
● - Complete exposure pathway for quantitative evaluation
O - Complete exposure pathway for qualitative evaluation
— - Incomplete exposure pathway
⇢ - Contaminant migration analysis

Figure 2-13. Preliminary Conceptual Site Model for the L-Area Rubble Pit 131-1L Subunit

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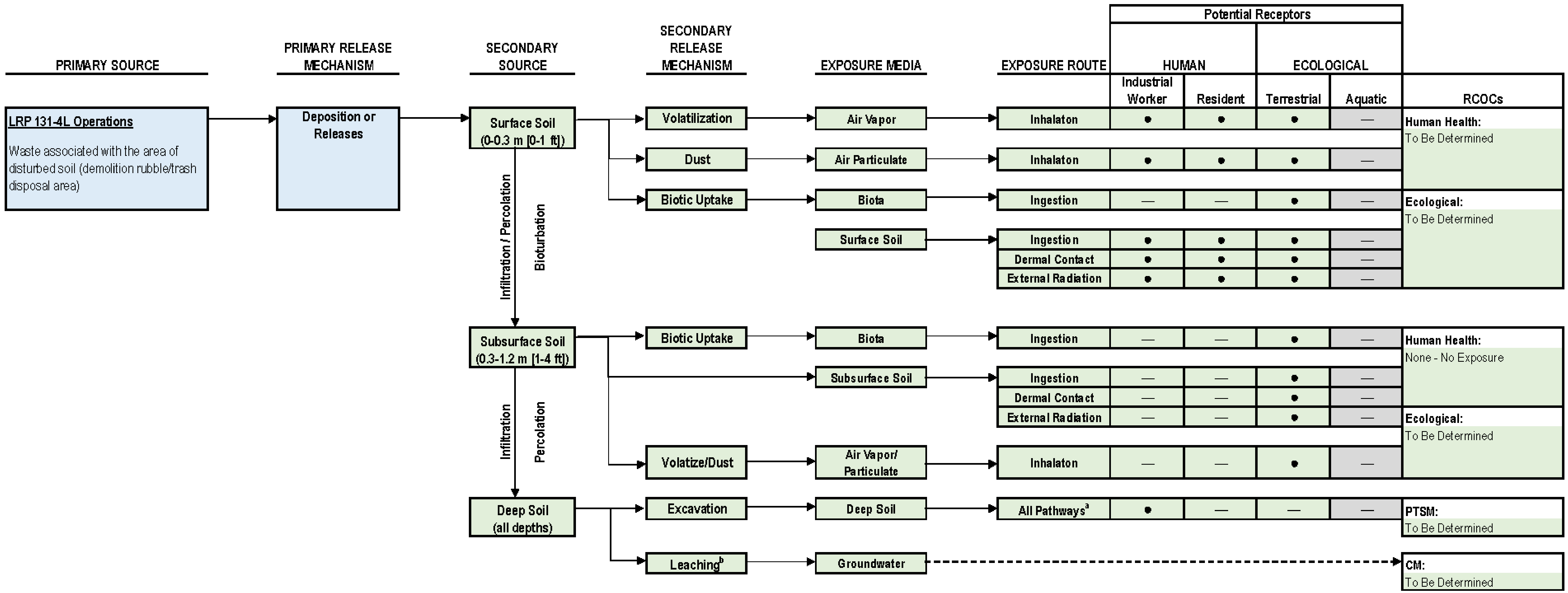

a - "All Pathways" represents ingestion, inhalation, dermal contact, and external radiation exposure for the principal threat source material (PTSM) evaluation for toxicity.
b - Leaching represents the potential of a contaminant in soil or sediment to migrate to groundwater above MCLs per the contaminant migration (CM) analysis and does not represent a human health or ecological exposure route.
- Receptors shaded gray were considered, but were determined not to be applicable to the subunit.

→ - Pathways: current, historic, and future
● - Complete exposure pathway for quantitative evaluation
O - Complete exposure pathway for qualitative evaluation
— - Incomplete exposure pathway
⇢ Contaminant migration analysis

Figure 2-14. Preliminary Conceptual Site Model for the L-Area Rubble Pit 131-4L Subunit

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Table 2-1. Threatened and Endangered Species Plants Known to Occur on SRS

Common Name	Scientific Name
Incised agrimony	*Agrimonia incisa*
Striped garlic	*Allium cuthbertii*
Muhlenberg maidencane	*Amphicarpum muehlenbergianum*
Wiregrass	*Aristida beyrichiana*
Sandhills milkvetch	*Astragalus michauxii*
Bearded milkvetch	*Astragalus villosus*
Gopherweed	*Baptisia lanceolata*
Chapman's sedge	*Carex chapmanii*
Collin's sedge	*Carex collinsii*
Cypressknee sedge	*Carex decomposita*
Nutmeg hickory	*Carya myristiciformis*
Sand heath	*Ceratiola ericoides*
Blue Ridge horsebalm	*Collinsonia punctata*
Pink tickseed	*Coreopsis rosea*
Elliott's croton	*Croton elliottii*
Carolina larkspur	*Delphinium carolinianum*
Smooth purple coneflower	*Echinacea laevigata*
Eastern swamp privet	*Forestiera acuminata*
Dwarf witchalder	*Fothergilla parvifolia*
Carolina silverbell	*Halesia carolina*
Mudbabies	*Helanthium tenellum*
Largeroot morning-glory	*Ipomoea macrorhiza*
Tall blazing star	*Liatris aspera*
Pondberry	*Lindera melissifolia*
Bog spicebush	*Lindera subcoriacea*
Boykin's lobelia	*Lobelia boykinii*
Spoon primrose-willow	*Ludwigia spathulata*
Carolina birds-in-a-nest	*Macbridea caroliniana*
Common moonseed	*Menispermum canadense*
Leechbrush	*Nestronia umbellula*
Georgia beargrass/sandhills lilly	*Nolina georgiana*
American nailwort	*Paronychia americana*
Thicket bean	*Phaseolus polystachios var. sinuatus*
Sword groundcherry	*Physalis lanceolata*
Green fringed orchid	*Platanthera lacera*
Bastard white oak/bluff oak	*Quercus austrina*

Table 2-1. Threatened and Endangered Species Plants Known to Occur on SRS *(continued/end)*

Common Name	Scientific Name
Bastard oak	*Quercus durandii*
Awnpetal meadowbeauty	*Rhexia aristosa*
Piedmont azalea	*Rhododendron flammeum*
Narrowfruit horned beaksedge	*Rhynchospora inundata*
Tracy's beaksedge	*Rhynchospora tracyi*
Hartweg's locust	*Robinia hartwegii*
Quillwort arrowhead	*Sagittaria isoetiformis*
Hooded pitcherplant	*Sarracenia minor*
Sweet pitcherplant	*Sarracenia rubra*
Georgia calamint	*Satureja georgiana*
Baldwin's nutrush	*Scleria baldwinii*
Leavenworth's goldenrod	*Solidago leavenworthii*
Whitenymph	*Trepocarpus aethusae*
Carolina fluffgrass	*Tridens carolinianus*
Dwarf wakerobin	*Trillium pusillum*
Florida yellow bladderwort	*Utricularia floridana*
Piedmont bladderwort	*Utricularia olivacea*
Carolina pinelandcress	*Warea cuneifolia*
Sarvis holly	*Ilex amelanchier*

* This list is based on the USFS Region 8 sensitive species list incorporating considerations to include periodic updates in the Federal register, status updates at the state level produced by the South Carolina Department of Natural Resources, and the Southeastern Plants Regional Species of Greatest Conservation Need (RSGCN) list produced by South Eastern Plant Conservation Alliance, Atlanta Botanical Garden, Natureserve, Terwilliger Consulting Inc., and Southeastern Association of Fish and Wildlife agencies with funding from the USFWS . Additionally, local experts (Savannah River Ecology Lab, Southern Research Station, and others) and their publications help determine the status of plant species on SRS.

Table 2-2. Threatened and Endangered Species Plants with Potential to Occur on SRS (not confirmed to occur)

Common Name	Scientific Name
Tenlobe false foxglove	*Agalinis decemloba*
Richwoods sedge	*Carex oligocarpa*
Canby's bulrush	*Scirpus etuberculatus*
Kral's goldenrod	*Solidago kralii*
Treat indian plantain	*Arnoglossum reniforme*
Atlantic white cedar	*Chamaecyparis thyoides*
Swamp justiceweed	*Eupatorium paludicola*
Dwarf witchalder	*Fothergilla gardenii*
Two-wing silverbell	*Halesia diptera*
Woolly dutchman's pipe	*Isotrema tomentosa*
Canby's cowbane	*Oxypolis canbyi*
Piedmont mock bishopweed	*Ptilimnium nodosum*
Chaffseed	*Schwalbea americana*
Ocmulgee skullcap	*Scutellaria ocmulgee*
Confederate wakerobin	*Trillium reliquum*
Tall ironweed	*Vernonia angustifolia ssp. scaberrima*

* This list is based on the USFS Region 8 sensitive species list incorporating considerations to include periodic updates in the Federal register, status updates at the state level produced by the South Carolina Department of Natural Resources, and the Southeastern Plants RSGCN list produced by South Eastern Plant Conservation Alliance, Atlanta Botanical Garden, Natureserve, Terwilliger Consulting Inc., and Southeastern Association of Fish and Wildlife agencies with funding from the USFWS. Additionally, local experts (Savannah River Ecology Lab, Southern Research Station, and others) and their publications help determine the status of plant species on SRS.

Table 2-3. Threatened and Endangered Species Fauna Known to Occur on SRS

Group	Common Name	Scientific Name	Conservation Status
Amphibians	Chamberlain's dwarf salamander	*Eurycea chamberlaini*	At-risk
Amphibians	Gopher frog	*Lithobates capito (also called Rana capito)*	At-risk, SE, Sensitive
Birds	American wood stork	*Mycteria americana*	FT
Birds	Bachman's sparrow	*Peucaea aestivalis*	Sensitive
Birds	Bald eagle	*Haliaeetus leucocephalus*	BGEPA, ST
Birds	Henslow's sparrow	*Centronyx henslowii (formerly Ammodramus henslowii)*	Sensitive
Birds	Red-cockaded woodpecker	*Picoides borealis*	FE, SE
Insects	American bumble bee	*Bombus pensylvanicus*	At-risk, Sensitive
Insects	Frosted elfin	*Callophrys irus*	At-risk, Sensitive
Insects	Monarch butterfly	*Danaus plexippus*	C, Sensitive
Mammals	Rafinesque's big-eared bat	*Corynorhinus rafinesquii*	SE, Sensitive
Mammals	Southeastern myotis	*Myotis austroriparius*	Sensitive
Mammals	Tri-colored bat	*Perimyotis subflavus*	PE, Sensitive
Reptiles	Florida pine snake	*Pituophis melanoleucus mugitus*	At-risk, Sensitive
Reptiles	Northern pinesnake	*Pituophis melanoleucus melanoleucus*	Sensitive
Reptiles	Southern hognose snake	*Heterodon simus*	ST, Sensitive

Notes: FE = federally endangered; FT = federally threatened; PE = proposed federally endangered; C = candidate for federal listing; SE = state endangered; ST = state threatened; BGEPA = Bald and Golden Eagle Protection Act; At-risk = petitioned for federal listing and positive 90-day finding that listing may be warranted; Sensitive = Forest Service Region 8 Regional Forester’s Sensitive Species.

From H. Davis, USFS-SR (personal communication May 2024)

Table 2-4. Average Temperature (ºF) for SRS (L Area)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1994	41.5	50.1	60.2	68.0	71.2	82.3	81.8	81.1	77.4	67.2	62.3	53.3	66.4
1995	49.9	50.9	62.5	69.6	76.7	75.3	81.7	79.3	72.6	67.0	51.4	46.0	65.2
1996	46.0	49.3	48.8	62.9	74.5	78.5	80.9	76.9	73.9	62.5	51.8	50.9	63.1
1997	50.3	54.6	64.5	62.7	69.6	75.3	82.2	80.5	76.6	63.0	51.1	46.4	64.7
1998	48.2	50.0	53.0	61.8	76.8	84.0	84.6	81.7	78.6	70.3	61.7	55.8	67.2
1999	53.4	53.0	53.5	67.0	70.2	76.4	81.0	82.8	73.1	64.0	57.7	48.5	65.0
2000	45.9	53.5	61.2	62.7	77.7	81.6	83.0	80.9	74.2	66.6	55.2	40.1	65.2
2001	46.8	54.8	55.2	66.6	74.0	78.3	79.8	81.2	73.4	65.0	63.4	54.7	66.1
2002	51.3	51.2	60.5	70.9	71.3	78.9	82.8	80.3	77.3	67.5	53.2	45.6	65.9
2003	43.5	49.3	59.7	65.6	73.5	79.6	80.7	81.5	74.9	66.2	60.5	46.0	65.1
2004	46.7	46.9	60.4	66.0	77.9	81.7	83.7	79.6	75.1	68.1	58.6	49.0	66.1
2005	49.2	50.4	53.5	60.5	70.9	77.3	79.6	78.5	77.4	64.5	56.2	44.6	63.5
2006	50.8	47.3	57.2	68.8	72.1	79.0	83.2	83.7	75.3	64.8	57.0	53.4	66.0
2007	50.2	48.7	61.2	63.9	71.8	79.4	80.0	85.8	77.9	71.1	56.7	54.6	66.8
2008	46.2	52.8	57.6	64.2	72.8	83.3	81.9	81.3	76.5	63.9	52.9	53.9	65.6
2009	46.8	50.0	57.4	64.2	73.4	82.5	81.7	81.4	76.6	64.8	57.3	46.1	65.2
2010	43.2	43.3	54.4	67.6	76.2	83.5	84.9	83.4	79.6	67.6	57.4	41.5	65.2
2011	43.3	53.4	58.3	69.0	74.3	83.8	85.4	84.8	76.9	63.4	57.6	53.3	67.0
2012	51.5	54.0	66.1	67.5	75.3	77.0	84.4	79.6	75.8	66.9	54.2	53.3	67.1
2013	54.3	48.5	51.4	64.7	70.5	78.9	79.7	78.8	75.7	66.6	53.2	51.4	64.5
2014	40.2	49.2	52.0	65.1	73.2	79.6	80.2	79.5	75.4	65.8	51.2	51.6	63.6
2015	45.2	43.8	57.8	67.5	74.0	82.2	84.6	81.7	76.6	65.8	60.7	61.2	66.8
2016	45.3	51.6	63.8	66.4	72.5	81.7	85.7	83.7	78.7	69.0	58.9	51.1	67.4
2017	54.7	58.3	58.6	69.4	73.5	78.9	82.4	80.7	76.2	68.2	57.1	49.6	67.3
2018	43.5	60.1	54.4	61.3	75.1	80.9	81.6	81.2	80.7	68.6	53.3	50.5	65.9
2019	48.3	55.6	57.3	65.9	78.2	78.6	83.2	82.2	81.0	70.8	52.8	51.9	67.1
2020	52.0	51.9	63.2	64.4	70.7	78.2	83.5	81.7	74.9	70.1	61.5	47.2	66.6
2021	48.4	49.9	59.8	66.0	72.7	79.8	82.4	83.1	76.6	70.0	55.4	58.9	66.9
2022	47.3	55.9	62.0	64.5	75.1	81.3	82.7	80.4	75.3	64.0	59.2	48.6	66.4
2023	51.9	58.2	59.1	64.5	68.4	75.1	81.4	81.1	73.5	64.5	54.7	50.4	65.2
30-yr Average	47.9	51.5	58.2	65.6	73.5	79.8	82.4	81.3	76.3	66.6	56.5	50.3	65.8
Record Monthly Low	40.2	43.3	48.8	60.5	68.4	75.1	79.6	76.9	72.6	62.5	51.1	40.1	63.1
Year of Monthly Low	2014	2010	1996	2005	2023	2023	2005	1996	1995	1996	1997	2000	1996
Record Monthly High	54.7	60.1	66.1	70.9	78.2	84.0	85.7	85.8	81.0	71.1	63.4	61.2	67.4
Year of Monthly High	2017	2018	2012	2002	2019	1998	2016	2007	2019	2007	2001	2015	2016
Record Daily High	82	85	90	96	100	108	103	107	99	99	86	82	
Year of Daily High	2002	2022	2016	2021	2019	2012	2012	2007	2019	2019	2013	1998	
Record Daily Low	10	12	16	30	42.5	54	58	56	46	31	21	12	
Year of Daily Low	1994	1996	1996	2007	2023	1996	2008	2004	1999	2001	2014	2022	

Table 2-5. Average Precipitation for SRS (L Area) past 30 yrs (inches)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1994	5.0	3.6	6.7	0.9	1.2	4.9	6.2	4.9	4.0	9.2	2.4	5.5	54.4
1995	5.0	5.3	1.3	0.6	2.0	6.8	5.6	7.4	3.1	2.8	2.8	4.7	47.4
1996	3.1	3.2	6.7	2.3	2.6	3.4	6.3	10.7	6.2	2.6	2.2	2.7	52.0
1997	5.5	5.1	2.4	4.0	2.1	5.6	8.0	2.8	5.0	4.1	5.1	9.9	59.6
1998	7.3	7.2	7.0	7.5	4.9	2.7	5.6	3.6	5.4	1.2	0.9	1.8	55.1
1999	5.3	2.2	2.2	1.1	3.0	8.4	6.9	3.9	3.9	2.5	1.5	1.1	41.9
2000	5.7	0.6	5.1	1.5	0.6	4.8	6.2	6.7	8.2	0.0	3.9	2.0	45.4
2001	2.9	2.8	7.4	1.2	4.2	7.5	3.1	2.0	2.8	0.5	0.9	0.4	35.8
2002	2.1	2.3	4.1	2.3	1.8	2.6	4.0	3.6	4.2	2.7	3.5	3.4	36.4
2003	1.9	4.9	7.9	6.3	5.3	10.3	10.8	8.6	1.9	2.8	1.0	1.6	63.1
2004	2.3	6.8	0.6	1.6	3.2	4.6	3.2	3.6	9.9	1.2	3.1	1.7	41.7
2005	2.3	4.4	6.3	1.3	4.2	9.4	6.9	4.7	0.3	2.8	2.3	5.2	49.9
2006	3.4	2.9	1.3	2.4	2.3	7.3	6.0	1.7	3.2	3.1	3.3	4.7	41.4
2007	5.5	3.1	1.7	2.5	0.9	5.7	5.8	2.8	1.1	1.5	0.6	8.6	39.7
2008	3.7	5.8	3.4	2.4	2.0	0.8	7.2	6.3	1.4	3.8	3.0	4.6	44.3
2009	1.7	0.7	3.9	5.3	6.6	2.5	5.3	3.5	3.9	2.5	4.6	8.8	49.3
2010	4.8	2.3	2.9	1.6	2.0	11.8	2.1	4.4	3.1	0.7	1.0	1.3	38.0
2011	1.9	3.9	5.6	2.5	1.4	2.2	3.3	2.3	4.0	2.1	1.3	1.6	32.1
2012	2.7	1.7	4.1	1.4	8.8	3.2	7.7	7.6	2.5	0.2	1.0	4.6	45.6
2013	0.8	9.6	3.0	4.5	2.6	10.8	11.0	6.0	1.3	2.3	1.7	5.1	58.6
2014	3.2	5.4	4.0	4.2	2.7	11.4	6.2	3.7	4.0	1.8	4.7	4.9	56.1
2015	3.7	5.1	4.3	5.5	0.6	4.1	3.4	5.3	5.5	5.2	7.1	4.3	54.0
2016	2.8	5.5	3.5	4.0	4.7	5.6	4.5	5.4	8.0	5.0	0.3	6.1	55.3
2017	8.1	1.6	1.5	6.6	3.8	3.5	5.1	4.1	5.5	1.2	1.1	4.9	46.8
2018	1.9	2.3	3.6	4.5	7.5	6.1	7.7	6.8	2.9	3.8	7.1	7.4	61.5
2019	4.4	1.1	2.3	4.2	2.2	8.6	1.1	3.7	1.1	4.6	3.1	8.0	44.3
2020	7.1	10.7	5.1	5.3	4.8	5.6	3.3	5.4	4.6	0.5	1.8	2.6	56.8
2021	4.8	7.3	2.9	1.6	2.2	5.0	5.6	5.2	4.1	1.8	0.4	4.3	45.0
2022	4.3	1.9	2.8	5.4	3.3	6.7	6.1	10.3	3.4	2.0	1.6	3.8	51.6
2023	7.0	5.6	3.6	3.5	4.6	9.3	9.5	11.3	5.1	2.5	1.7	3.6	67.2
30-yr Average	4.0	4.2	3.9	3.3	3.3	6.0	5.8	5.3	4.0	2.6	2.5	4.3	49.0
Record Lowest	0.8	0.6	0.6	0.6	0.6	0.8	1.1	1.7	0.3	0.0	0.3	0.4	32.1
Year of Record Low	2013	2000	2004	1995	2000	2008	2019	2006	2005	2000	2016	2001	2011
Record Highest	8.1	10.7	7.9	7.5	8.8	11.8	11.0	11.3	9.9	9.2	7.1	9.9	67.2
Year of Record High	2017	2020	2003	1998	2012	2010	2013	2023	2004	1994	2018	1997	2023

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3.0 REMEDIAL INVESTIGATION

This chapter describes the data collected and evaluated at the subunits that have been investigated for the ECODS L-3, LRP 131-1L, and LRP 131-4L OU.

3.1 ECODS L-3, LRP 131-1L, and LRP 131-4L Operable Unit Investigation Overview

A comprehensive approach was implemented to address potential impact to the human health and the environment at the ECODS L-3, LRP 131-1L, and LRP 131-4L OU. Soil samples were collected and analyzed in support of a 2002 SE characterization for the ECODS L-3 subunit. Soil samples were collected and analyzed for the LRP 131-1L and LRP 131-4L subunits in 2022 and 2023 during the RFI/RI characterization. Sample locations are presented in Figure 3-1, Figure 3-2, and Figure 3-3 for the three subunits of the ECODS L-3, LRP 131-1L, and LRP 131-4L OU.

3.2 Site Characterization and Data Usability

Characterization activities for soil media were conducted in 2002 at the ECODS L-3 subunit and in 2022-2023 for the LRP 131-1L and LRP 131-4L subunits. No groundwater or surface water samples were collected.

SRS data usability procedures incorporate the criteria found in the USEPA National Functional Guidelines to verify, validate, and qualify analytical data to assess its usability for risk and remedial management decisions. Adherence to this complex list of procedures and guidelines establishes: (a) if data meets the specific technical and quality control (QC) criteria established by the data quality objectives and laboratory quality assurance project plans, and (b) the usability of any data not meeting the specific technical and QC criteria. All data is qualified for usability using USEPA Functional Guidelines. Adherence to the guideline requirements and the USDOE Audit Program for analytical laboratories allows the data to be qualified based upon a set of nationally established functional guideline qualifiers for uniformity.

The Data Usability Reports for the RFI/RI characterization samples are presented in Appendix I. The reports concluded that data quality objectives were met, and that the data is considered useable for the purposes of remedial decision-making in the RFI/RI/BRA. In addition, Appendix G of the *Site Evaluation Report for Early Construction and Operational Disposal Site (ECODS) L-3 (NBN)*

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(U) presents a Laboratory Quality Discussion in Section IV and a *Site Evaluation Validation Report* in Section V for the samples that were collected in 2002 (WSRC 2003).

3.2.1 ECODS L-3 Subunit

A SE characterization effort at the ECODS L-3 subunit was conducted in 2002. The SE characterization efforts in 2002 included a radiological control survey, a GPR survey, and soil sampling. The radiological control survey designated the area as a "Clean Area." Two confirmation soil samples were collected from location EL3-09 and EL3-10 (Figure 3-1) and were sent for laboratory analyses of gross alpha and nonvolatile beta. Sample results confirmed both samples were below the screening level of 20 picocuries per gram (pCi/g) for gross alpha and 50 pCi/g for nonvolatile beta.

Based on historical photographs, it is estimated that waste disposed of in the ECODS L-3 subunit was buried in two trenches located end-to-end and each ~18 m (60 ft) wide by 30 m (100 ft) long. The boundaries of the trenches were estimated by the 2002 GPR survey which determined the size of each trench determined to be ~15 m (50 ft) wide by 27 m (90 ft) long and 4.6 m (15 ft) wide by 27 m (90 ft) long (Figure 3-1). The GPR survey estimated the depth as ~7.3 m (24 ft) bgs. However, during soil sampling, the bottom of the two trenches within the subunit were confirmed at depths of 3.4 m (11 ft) bgs or less.

In support of the 2002 SE, composite soil sampling was performed at 23 locations, including five background locations, using direct push technology. Eighteen of the locations were distributed systematically throughout the area using a grid pattern. Sixteen of sampling locations (EL3-01 to EL3-16) were within the trenches; one location (EL3-17) was adjacent to the east end of the eastern trench; and one sample location (EL3-18) was between the two trenches. The five background sampling locations (EL3-19 to EL3-23) were selected based on the groundwater flow path with one side-gradient location, one down-gradient location, and three up-gradient of the subunit.

Sampling was completed at all 23 locations with a total of 90 samples collected (81 regular [REG] samples, 9 field duplicate [FD]) (Figure 3-1). Thirteen sampling locations (EL3-03 to EL3-05, EL3-07 to EL3-09, EL3-11 to EL3-15, and EL3-17 to EL3-18) collected samples from three sample intervals: 0.0 to 0.3 m, 0.3 to 1.2 m, and 1.2 to 2.4 m (0 to 1 ft, 1 to 4 ft, and 4 to 8 ft) bgs.

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Three sampling locations (EL3-06, EL3-10, and EL3-16) collected samples from four sample intervals: 0.0 to 0.3 m, 0.3 to 1.2 m, 1.2 to 2.4 m, and 2.4 to 3.7 m (0 to 1 ft, 1 to 4 ft, 4 to 8 ft, and 8 to 12 ft) bgs. Seven sampling locations (EL3-01 to EL3-02 and EL3-19 to EL3-23) collected samples from five intervals: 0.0 to 0.3 m, 0.3 to 1.2 m, 1.2 to 2.4 m, 2.4 to 3.7 m, and 3.7 to 4.9 m (0 to 1 ft, 1 to 4 ft, 4 to 8 ft, 8 to 12 ft, and 12 to 16 ft) bgs. During sampling activities, the presence of waste was noted to include glass, metal, and rubber.

All samples were analyzed for the Target Analyte List (TAL) of inorganic constituents and the Target Compound List (TCL) of organic compounds, pesticides, herbicides, and PCBs. As documented in the *Site Evaluation Report for Early Construction and Operational Disposal Site (ECODS) L-3 (NBN) (U)* (WSRC 2003), seven polycyclic aromatic hydrocarbons (PAHs) (benzo(a)anthracene; benzo(a)pyrene benzo(b)fluoranthene; benzo(k)fluoranthene; bis(2-ethylhexyl)phthalate; dibenz(a,h)anthracene; and indeno(1,2,3-cd)pyrene), two PCBs (Aroclor 1254 and Aroclor 1260), and five metals (antimony; copper; lead; arsenic; and iron) were present in concentrations that exceeded residential and/or industrial PRGs.

The Core Team agreed at the December 2021 scoping meeting that the definitive level data from the SER was considered usable for the purposes of performing a BRA for the ECODS L-3 subunit to support remedial decision making; therefore, no data gaps were identified for the ECODS L-3 subunit, and sampling at the subunit was not included in the RFI/RI Work Plan (SRNS 2022).

3.2.2 LRP 131-1L Subunit

The 2022 RFI/RI characterization started with an effort to delineate the lateral and vertical extent of the subunit with a GPR survey. The GPR survey at the LRP 131-1L subunit was not able to confirm land disturbance below surface within the subunit boundary. Visual description of the core collected from all sampling locations were described (Appendix J). Subsurface soil appeared to be native and undisturbed throughout, therefore it was determined that a “pit” was not constructed at this subunit. This was further confirmed through historical photos which demonstrated that waste was placed on surface at the subunit, and no pit was constructed.

Soil sampling of the LRP 131-1L subunit was completed in accordance with the RFI/RI Work Plan (SRNS 2022). Twenty-one sampling locations and a total of 131 samples (113 REG, 7 FD, 7 splits

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[SPL], and 4 rinsate blanks [RB]) were collected to determine nature and extent of contamination. Eight pit boundary locations (LAP-1L-001 to LAP-1L-008) were chosen to aid in extent determination and 13 locations (LAP-1L-009 to LAP-1L-021) were placed within the subunit boundary in a random, unbiased sampling pattern (Figure 3-2). Five soil boring intervals were sampled at all locations, including surface soil (0.0 to 0.3 m [0 to 1 ft] bgs), subsurface soil (0.3 to 1.2 m [1 to 4 ft] bgs), and deep soil (1.2 to 2.4 m, 2.4 to 3.7 m, 3.7 to 4.9 m [4 to 8 ft, 8 to 12 ft, 12 to 16 ft] bgs). At the eight boundary locations, an additional subsurface soil interval was sampled 4.9 to 6.1 m (16 to 20 ft) bgs in order to confirm the extent of the subunit was delineated. All samples were successfully collected without any deviations.

For the LRP 131-1L subunit, the seven SPL samples were collected at locations LAP-1L-003 (0.0-0.3 m [0-1 ft]), LAP-1L-006 (0.3-1.2 m [1-4 ft]), LAP-1L-009 (1.2-2.4 m [4-8 ft]), LAP-1L-012 (2.4-3.6 m [8-12 ft]), LAP-1L-015 (3.6-4.9 m [12-16 ft]), LAP-1L-018 (0.0-0.3 m [0-1 ft]), and LAP-1L-021 (0.3-1.2 m [1-4 ft]) (Figure 3-2). SPL samples were collected and prepared using the same methods as REG samples and were sent to separate laboratories from the REG samples for analyses using the same analytical methods to ensure direct comparison.

Waste was encountered at one location (LAP-1L-015) in the bottom of the 0.3 to 1.2 m (1 to 4 ft) interval (Figure 3-4). The observed waste appeared to be a railroad tie, or other creosote wooden material. No potential ACM was observed in any soil borings for the LRP 131-1L subunit.

All samples were analyzed for all constituents on the TAL and TCL, and all requested analyses were completed without deviation. In addition to TAL and TCL constituents, gross alpha and nonvolatile beta screening was performed on all samples. Exceedances of trigger levels for gross alpha (20 pCi/g) and nonvolatile beta (50 pCi/g) prompted analyses of a contingent set of additional radiological analyses. No samples exceeded the nonvolatile beta trigger level. However, 59 of 65 samples (91%) collected from soil boring locations within the subunit exceeded the alpha trigger, with a median result of 27.2 pCi/g and maximum of 46.1 pCi/g. Similarly, 42 of 48 samples (88%) collected from boundary soil boring locations exceeded the gross alpha trigger, with a median result of 28.6 pCi/g and maximum of 46.3 pCi/g. In comparison, seven SPL samples were collected and analyzed by a separate laboratory using the same collection, preparation, and analytical methods with no trigger level exceedances. The maximum gross alpha result for the SPL

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samples was 16.9 pCi/g. The SPL samples were analyzed by alpha spectroscopy for a full alpha speciation and results show the contributing alpha emitting radionuclides were naturally occurring radioactive material (NORM) species and were within site background levels (Table 3-1).

There is no history or any indication that radioactive material was ever sent to the LRP 131-1L subunit. Additionally, no waste debris was encountered during drilling activities, with the exception of ~0.3 m (1 ft) of creosote wood in one soil boring location (LAP-1L-015) (Figure 3-4). To verify the origin of the elevated gross alpha results, 10% of the total samples that exceeded the gross alpha trigger were selected for full alpha spectroscopy, using the rationale in Table 3-2, before moving forward with a decision on the remaining samples. Alpha spectroscopy results from the subset of samples support that the gross alpha exceedances were from NORM contributions only (Table 3-3). Therefore, the remaining 90% of samples with gross alpha results exceeding the alpha trigger level of 20 pCi/g were not analyzed for alpha speciation.

3.2.3 LRP 131-4L Subunit

The 2022 RFI/RI characterization started with an effort to delineate the lateral and vertical extent of the subunit with a GPR survey. GPR was performed prior to commencement of soil sampling activities to ascertain if pit size and depth could be determined. However, due to interferences with shallow deposition of material and makeup, as well as shallow roots from the dense underbrush, the findings were inconclusive.

Soil sampling of the LRP 131-4L subunit consisted of 41 total sample locations for a total of 220 samples (192 REG, 11 FD, 11 SPL, and 6 RB) collected (Figure 3-3). Fifteen samples were unable to be collected due to waste material within the sampling depth (LAP-4L-014 [1.2-2.4 m, 2.4-3.6 m {4-8 ft, 8-12 ft}], LAP-4L-015 [1.2-2.4 m, 2.4-3.6 m {4-8 ft, 8-12 ft}], LAP-4L-018 [2.4-3.6 m {8-12 ft}], LAP-4L-021 [1.2 2.4 m {4-8 ft}], LAP-4L-032 [1.2-2.4 m, 2.4-3.6 m {4-8 ft, 8-12 ft}], LAP-4L-035 [2.4 3.6 m {8-12 ft}], LAP-4L-040 [2.4-3.6 m {8-12 ft}], and LAP-4L-041 [1.2-2.4 m, 2.4 3.6 m, 3.6-4.9 m {4 8 ft, 8-12 ft, 12-16 ft}]) or no deep soil recovered in sample barrel (LAP-4L-30 [2.4-3.6 m, 3.6-4.9 m {8-12 ft, 12-16 ft}]). There were fourteen interior sample locations (LAP-4L-013 to LAP-4L-016, LAP-4L-018, LAP-4L-020 to LAP-4L-022, LAP-4L-024 to LAP-4L-026, and LAP-4L-028 to LAP-4L-030), completed in a random, unbiased sampling

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pattern spaced 6.1 m (20 ft) apart within the subunit. Along the original subunit boundary, delineated by the orange ball markers, eleven peripheral sample locations were identified (LAP-4L-006 to LAP-4L-011, LAP-4L-017, LAP-4L-023, and LAP-4L-031 to LAP-4L-033). Eight sample locations (LAP-4L-001 to LAP-4L-005, LAP-4L-012, LAP-4L-019, and LAP-4L-027) were included to investigate the area northeast of the subunit, where debris was observed on surface. Four sample locations (LAP-4L-034 to LAP-4L-037) were included to bound an area of subsidence that was identified on the northern side of the subunit during site walkdowns. Four step-out sample locations (LAP-4L-038 to LAP-4L-041) were identified northwest of the subunit as contingent locations based on field observations.

For the LRP 131-4L subunit, the eleven SPL samples were collected at locations LAP-4L-002 (0.0 0.3 m [0-1 ft]), LAP-4L-004 (0.3-1.2 m [1-4 ft]), LAP-4L-006 (1.2-2.4 m [4-8 ft]), LAP 4L 008 (2.4-3.6 m [8-12 ft]), LAP-4L-010 (0.0-0.3 m [0-1 ft]), LAP-4L-012 (0.0-0.3 m [0 1 ft]), LAP-4L-014 (0.3-1.2 m [1-4 ft]), LAP-4L-016 (1.2-2.4 m [4-8 ft]), LAP-4L-020 (1.2-2.4 m [4-8 ft]), LAP-4L-022 (0.0-0.3 m [0-1 ft]), and LAP-4L-025 (3.6-4.9 m [12-16]) (Figure 3-3). SPL samples were collected and prepared using the same methods as REG samples, and were sent to separate laboratories from the REG samples for analyses using the same analytical methods to ensure direct comparison.

All of the 41 locations were sampled with soil sampling depth intervals that included surface soil (0.0 to 0.3 m [0 to 1 ft] bgs), subsurface soil (0.3 to 1.2 m [1 to 4 ft] bgs), and deep soil (1.2 to 2.4 m and 2.4 to 3.6 m [4 to 8 ft and 8 to 12 ft] bgs), unless samples were unable to be collected due to waste in the sample core or no recovery of deep soil in the sample barrel. At three locations of the LRP 131-4L subunit (LAP-4L-016, LAP-4L-020, and LAP-4L-026), the bottom of the pit was confirmed in previous intervals and the tentative interval from 3.6 to 4.9 m (12 to 16 ft) bgs was not sampled. At 33 locations (LAP-4L-001 to LAP-4L-015, LAP-4L-017 to LAP-4L-019, LAP-4L-021 to LAP-4L-025, LAP-4L-027 to LAP-4L-029, LAP-4L-031, LAP-4L-033 to LAP-4L-034, and LAP-4L-036 to LAP-4L-039), sampling was completed at 3.6 to 4.9 m (12 to 16 ft) bgs because the bottom of the pit was not confirmed, or waste was determined in the previous sampling depth. At four locations (LAP-4L-032, LAP-4L-035, LAP-4L-040, and LAP-4L-041), sampling was completed to a depth of 4.9 to 7.3 m (16 to 20 ft) bgs because waste was confirmed in the 3.6 to 4.9 m (12 to 16 ft) bgs interval. Additionally, at one location (LAP-4L-030), sampling was completed to a depth of 6.1 to 7.3 m (20 to 24 ft) bgs due to no soil recovery in the shallower depths. At sample location LAP-4L-007 (Figure 3-3), a soil core was collected to a depth of 15 m (50 ft) bgs, and lithologic descriptions recorded. The deeper samples were collected to provide necessary information at depth to support the CM analysis and better define nature and extent below the unit. Soil cores were recorded in the field for lithologic descriptions at all sample locations (Appendix J). Most of the soil described contained significant amount of clay matrix, except within the waste, and the pit was underlain by a dense clay unit.

All samples were analyzed for all constituents on the TAL and TCL, and all requested analyses were completed without deviation. In addition to TAL and TCL constituents, gross alpha and nonvolatile beta screening was performed on all samples. Estimation of the pit boundary and depth was determined through sampling activities. Through soil sampling activities, waste was identified within the orange balls marking the pit boundary. Waste was also observed in peripheral locations to the northwest (Figure 3-5), therefore the four step-out locations were drilled and sampled. In this area, waste was observed at step-out location LAP-4L-040 from 0.91 to 4.6 m (3.0 to 15 ft) bgs. Based on observation of waste material at LAP-4L-040, the RFI/RI characterization of the subunit did not define the extent of the buried waste to the northwest, which was beyond the original defined subunit boundary. Material encountered at LAP-4L-040 and other step-out locations was consistent with material encountered at other sampling locations at the LRP 131-4L subunit; therefore, the Core Team agreed in the November 2023 scoping meeting that the nature of the contamination was defined by the RFI/RI characterization.

Description of waste encountered throughout the subunit consisted of brick, concrete, metal, rebar, wire, charred debris, black clinker/ash, and asphalt. Thickness of waste at the unit varied in depth from 0.2 to 3.9 m (0.5 to 12.8 ft) with an approximate volume of 10,900 m^3 (386,000 ft^3) (Figure 3-5). Figure 3-6 depicts a cross section that is northwest to southeast through the unit while Figure 3-7 depicts a cross section southwest to northeast across the unit. Potential ACM was identified at one location (LAP-4L-018) at a depth of 0.6 to 1.7 m (2 to 5.5 ft) (Figure 3-8). In accordance with the RFI/RI Work Plan, an SRS asbestos inspector confirmed the material was presumed ACM and

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is consistent with expected building materials and the time period that the LRP 131-4L subunit was in operation.

Exceedances of trigger levels for gross alpha (20 pCi/g) and nonvolatile beta (50 pCi/g) prompted analyses of a contingent set of additional radiological analyses. No samples exceeded the nonvolatile beta trigger level. However, at the LRP 131-4L subunit, 44 of 60 samples (73%) collected from soil boring locations within the subunit interior exceeded the alpha trigger, with a median result of 23.3 pCi/g and maximum of 44.8 pCi/g. From all LRP 131-4L subunit samples, 109 of 192 samples (57%) exceeded the gross alpha trigger, with a median result of 21.7 pCi/g and maximum of 44.8 pCi/g. Eleven SPL samples were collected from the LRP 131-4L subunit and analyzed by a separate laboratory using the same collection, preparation, and analytical methods with no trigger level exceedances, with a maximum of 12.7 pCi/g. The SPL samples were analyzed by alpha spectroscopy for a full alpha speciation, and results show the contributing alpha emitting radionuclides were NORM species and were within site background levels (Table 3-4).

There is no history or any indication that radioactive material was ever sent to the LRP 131-4L subunit. To verify the origin of the elevated gross alpha results, a subset of the total samples that exceeded the gross alpha trigger were selected for full alpha spectroscopy using the rationale in Table 3-2 before moving forward with a decision on the remaining samples. Alpha spectroscopy results from the subset of samples support that the gross alpha exceedances are from NORM contributions only (Table 3-5). Therefore, the remaining samples with gross alpha results exceeding the 20 pCi/g threshold were not analyzed for alpha speciation.

3.3 Unit-Specific Constituent Screening

A data evaluation to determine the nature and extent of contamination at the ECODS L-3, LRP 131-1L, and LRP 131-4L OU was conducted by comparing soil data for all depth intervals to SRS background data represented in *Appendix B-2 Upland Soils (All Depth Intervals)* of the approved *Background Soils Statistical Summary Report for the Savannah River Site* (WSRC 2006). A constituent for which the maximum concentration is greater than two-times (2X) the SRS background mean concentration is more likely to be present from unit-related activities and is identified as a unit-specific constituent (USC). Constituents for which no background

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concentrations are available are also identified as USCs if detected at one of more location and depth interval. Constituents identified as USCs are evaluated in the contaminant fate and transport analysis (Appendix B).

The USCs identified for the ECODS L-3, LRP 131-1L, and LRP 131-4L OU are provided in Appendix A. The nature and extent of USCs is discussed in more detail in Section 3.8.1.3, 3.8.2.3, and 3.8.3.3.

3.4 Contaminant Fate and Transport Analysis

Simulations of contaminant transport through the vadose zone were completed for each ECODS L-3, LRP 131-1L, and LRP 131-4L OU subunit using VZCOMML© (V.4.0), a multi-layer vadose zone CM modeling program developed by SRS. VZCOMML© is intended to provide a conservative initial screening. Constituents retained throughout VZCOMML© simulations and after discussions of uncertainty were considered CM RCOCs. The detailed CM analysis and results for each subunit are presented in Appendix B.

For the VZCOMML© Tier 1 screening, each subunit was modeled under the most conservative assumptions including maximum constituent concentrations at the maximum sample depth (i.e., shortest travel time distance in the vadose zone to water table). Constituents predicted by the model to have the potential to impact groundwater at concentrations exceeding action levels were retained as Tier I CM constituents of potential concern (COPCs). The Tier II Simulation 1 uses the same conservative assumptions (maximum constituent concentrations and deepest source zone) to predict constituents that will impact groundwater at concentrations exceeding action levels within the evaluation time of 1,000 years. Constituents predicted to exceed action levels in the Tier II Simulation 1 were retained as Tier II CM COPCs. Where justified, conservatism in the model was removed for Tier II CM COPCs in a Tier II Simulation 2. Constituents retained following Tier II simulations were retained as CM constituents of concern (COCs).

CM COCs were then evaluated further based on site-specific data and professional judgement to further refine the list of COCs in an uncertainty evaluation (i.e., weight-of-evidence discussion) (Appendix B). Any constituents that were not dismissed in the uncertainty evaluation would be

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retained as CM RCOCs and considered problems warranting action for the ECODS L-3, LRP 131-1L, and LRP 131-4L OU subunits.

3.5 Human Health Risk Assessment Methodology

The purpose of the HHRA is to assess the potential for adverse effects to various human receptors associated with exposure to contaminants present at the ECODS L-3, LRP 131-1L, and LRP 131-4L OU (Appendix C). The evaluation for each subunit estimates the risk potential in the absence of remedial actions and provides a basis for determining whether remedial action is necessary to protect human health (HH). The process follows the latest available USEPA guidance (USEPA 2018b) and approved HHRA protocols in the EC&ACP Regulatory Document Handbook (SRNS 2023). Statistical data summaries for each media of concern, by subunit, are used in the process (Appendix A). The HHRA includes the following steps:

- Identification of potential human receptors
- Identification of COPCs
- Identification of COCs
- Identification of RCOCs

Risk-based threshold levels (TLs) used in this assessment are obtained from the USEPA Regional Screening Levels (RSLs) website (USEPA 2023a) for chemicals and from USEPA PRGs website (USEPA 2023b) for radiological constituents.

For surface soil COPC screening, maximum detected concentrations from the 0 to 0.3 m (0 to 1 ft) sampling interval are compared to residential risk-based TLs, as well as two-times (2X) the average background concentrations for each constituent. Those constituents that exceed both the TLs for surface soil and the background values are identified as COPCs and are carried forward into risk or hazard calculations for resident and industrial worker receptors, consistent with the subunit specific CSMs presented in Chapter 2. As discussed in Chapter 2, the most likely human receptor for risks associated with the ECODS L-3, LRP 131-1L, and LRP 131-4L OU subunits is the industrial worker. For risk management purposes, a risk evaluation was also conducted for a hypothetical future resident.

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Note that for the background comparisons involving a particular decay chain, activities of the parent and its daughter products are considered. For example, the thorium series (thorium-232) evaluation includes not only the measured concentration of thorium-232, specifically, but also includes any analytical results from its daughter products (e.g., radium-228, actinium-228, thorium-228, radium-224, lead-212, bismuth-212, and thallium-208) since these isotopes are assumed to be in secular equilibrium. This same approach was applied for the uranium-238 decay series, including its daughter products (e.g., uranium-234, thorium-230, radium-226, lead-214, and bismuth-214). Therefore, background comparisons for the thorium-232 decay series and the uranium-238 decay series includes consideration of the range of concentrations for the entire decay chain (i.e., includes daughter products).

Exposure point concentrations (EPCs), which are concentrations in an exposure medium to which a receptor may be exposed, consist of the lower of either the 95% upper confidence limit (UCL) on the mean concentrations for constituents or the maximum detected concentration used in the formal risk/hazard calculations. Results of the risk and hazard calculations identify HH COCs for either soil or sediment where both the hazard index (HI) and individual constituent hazard quotients (HQs) exceed 1 for noncarcinogens and constituent-specific risk exceeds 1E-06 for carcinogens. Constituents identified as COCs are carried forward for further evaluation.

For risk calculations involving a particular decay chain, activities of the parent and its daughter products are considered since these isotopes are assumed to be in secular equilibrium. The risk calculations were performed using the highest EPC for the entire series.

Individual constituents that are identified as a COC are further evaluated in a refinement step. The refinement step is an uncertainty evaluation that includes an interpretive discussion of the applicable uncertainty factors (line of evidence) and a recommendation whether the constituent should or should not be identified as a RCOC and carried forward for further remedial evaluation. The major categories of uncertainty used in the evaluation include the following:

- Unit-related uncertainty related to the nature and extent of contamination, consistency with history of use, and presence in background.

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- Data quality and risk assessment uncertainties related to data quality and physical characteristics.
- Risk assessment uncertainty related toxicity data and changes in constituent concentrations, or lack thereof, due to natural decay or transformation.

The results of this process determine which remedial actions need to be evaluated to protect HH receptors. RAOs for protection of HH are developed for constituents identified as RCOCs and are discussed in more detail in Chapter 4.

3.6 Ecological Risk Assessment Methodology

The purpose of the ERA is to assess the potential for adverse effects to terrestrial receptors (wildlife) associated with potential exposure to contaminants present at the ECODS L-3, LRP 131-1L, and LRP 131-4L OU (Appendix D). The evaluation for each subunit estimates the risk potential to ecological receptors in absence of remedial actions and provides a basis for determining whether remedial action is necessary to protect the health of ecological receptors. The process follows the latest available USEPA guidance (USEPA 2018a) and approved ecological risk assessment protocols in the EC&ACP Regulatory Document Handbook (SRNS 2023). Statistical data summaries for each media of concern by subunit are used in the process (Appendix A). The ERA includes the following:

- Identification of risk assessment exposure groups and exposure pathways,
- Identification of potential ecological (wildlife) receptors and assessment endpoints, including terrestrial and aquatic
- Identification of constituents of potential ecological concern (COPECs)
- Identification of COPCs
- Identification of RCOCs

Risk-based TLs used in the ERA are no observed adverse effects level and lowest observed adverse effects level values obtained from the USEPA Region 4 ERA Supplemental Guidance March 2018

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Update (USEPA 2018a) and the Los Alamos National Laboratory (LANL) *EcoRisk Database* (LANL 2022).

The ERA is conducted by comparing constituent concentrations in environmental media within each subunit with regulatory or technically defensible screening values called ecological screening values (ESVs), as well as two-times (2X) the mean background concentration in SRS soil (WSRC 2006). Constituents that are less than an ESV are eliminated from further consideration in the ERA, while those that both exceed an ESV, and background are identified as COPECs and are retained for further examination by calculating refinement-level hazard (ecological HQs) using refinement screening values. Constituents with an ecological HQ greater than 1 are identified as COPCs and brought forward in an uncertainty evaluation.

A recommendation of whether a constituent is identified as a RCOC is made following a refinement step. This step considers the following lines of evidence (same as HHRA):

- Unit-related uncertainty related to the nature and extent of contamination, consistency with history of use, and presence in background.
- Data quality and risk assessment uncertainties related to data quality and physical characteristics.
- Risk assessment uncertainty related to toxicity data and changes in constituent concentrations, or lack thereof, due to natural decay or transformation.

The results of this process identify if a remedial action will need to be evaluated to protect ecological receptors. RAOs for protection of ecological receptors are developed for constituents identified as RCOCs as discussed in more detail in Chapter 4.

3.7 Principal Threat Source Material Methodology

The PTSM evaluation for the ECODS L-3, LRP 131-1L, and LRP 131-4L OU is presented in Appendix E. The concept of principal threat waste and low-level threat waste, as developed by the USEPA in the NCP (40 CFR 300.430[a][1][iii]), is to be applied on a site-specific basis when characterizing source material. Source materials include or contain hazardous substances, pollutants, or contaminants that act as a reservoir for migration to surface water, or air, or the act as a source for direct exposure. The determination of whether the source materials present at a waste unit would be classified as PTSM is based principally on the USEPA guidance (USEPA 1991).

In determining whether the source should be preliminarily considered PTSM, the evaluation considers the cumulative effects of both the potential risk from carcinogenic constituents and the adverse health effects from noncarcinogens to human receptors. The toxicity assessment of the source material is based on the potential exposure of an industrial worker, which is the most appropriate receptor scenario at the ECODS L-3, LRP 131-1L, and LRP 131-4L OU.

The source material (i.e., in soil) from all depth intervals is preliminarily considered to be PTSM if the cumulative risk exceeds one of the following toxicity threshold criteria:

- Carcinogens: greater than 1E-03 industrial worker risk
- Noncarcinogens: industrial worker HI greater than 10

If the threshold criteria for PTSM is not exceeded based on a maximum concentration, then PTSM is not present, and it is not necessary to carry the assessment into an uncertainty evaluation. An uncertainty evaluation is performed on potential PTSM constituents using similar criteria as that used for the identification of HH RCOCs. This evaluation includes, but is not limited to, assessing the potential for natural degradation, or lack thereof, that would reduce concentrations over time, as applicable.

3.8 Operable Unit Summary

3.8.1 ECODS L-3 Subunit

3.8.1.1 ECODS L-3 Subunit Description

The ECODS L-3 subunit is one of twenty-five ECODS at SRS which were used during the construction and early operation of SRS for disposal of construction debris and other non-radioactive waste materials, such as rubble and concrete. The ECODS L-3 subunit was estimated to have been active from November 1953 to June 1954. The ECODS L-3 subunit is within the Steel Creek Watershed. The area was used as farmland prior to construction of the SRS. Based on historical photographs and a GPR survey completed in 2002 during a SE of the subunit, it was

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estimated that waste disposed of in the ECODS L-3 subunit was buried in two trenches located end-to-end (Figure 3-1). The 2002 SE effort determined the two trench dimensions were ~15 m (50 ft) wide by 27 m (90 ft) long and 4.6 m (15 ft) wide by 27 m (90 ft) long.

3.8.1.2 ECODS L-3 Subunit Characterization and Data Summary

A SE characterization effort in 2002 performed a radiological control survey, a GPR survey, and soil sampling (WSRC 2003). The SE soil sampling effort collected 81 REG samples from 5 depth intervals at 23 locations (Figure 3-1) and were analyzed for the complete list of TAL constituents (inorganics) and the TCL of organic compounds, pesticides, and PCBs. The Core Team agreed at the December 2021 scoping meeting that the definitive level data from the SER was considered usable for the purposes of performing a BRA to support remedial decision making; therefore, the ECODS L-3 subunit was not included in the RFI/RI Work Plan (SRNS 2022). Depth to groundwater at the subunit is 7.6 m (25 ft) bgs.

The locations sampled for the ECODS L-3 subunit include 18 locations within the subunit boundary and five locations designated as background locations. Sampling was completed at all 23 locations with a total of 90 samples (81 REG, 9 FD) collected (Figure 3-1). Sampling intervals were dependent on the depth that waste was observed in sample core. Of the 18 locations within the subunit boundary, thirteen sampling locations collected samples from three sample intervals: 0.0 to 0.3 m, 0.3 to 1.2 m, and 1.2 to 2.4 m (0 to 1 ft, 1 to 4 ft, and 4 to 8 ft) bgs. Three sampling locations collected samples from four sample intervals: 0.0 to 0.3 m, 0.3 to 1.2 m, 1.2 to 2.4 m, and 2.4 to 3.7 m (0 to 1 ft, 1 to 4 ft, 4 to 8 ft, and 8 to 12 ft) bgs. Two sampling locations collected samples from five intervals: 0.0 to 0.3 m, 0.3 to 1.2 m, 1.2 to 2.4 m, 2.4 to 3.7 m, and 3.7 to 4.9 m (0 to 1 ft, 1 to 4 ft, 4 to 8 ft, 8 to 12 ft, and 12 to 16 ft) bgs. The five background sampling locations collected samples from four sample intervals: 0.0 to 0.3 m, 0.3 to 1.2 m, 2.4 to 3.7 m, and 3.7 to 4.9 m (0 to 1 ft, 1 to 4 ft, 8 to 12 ft, and 12 to 16 ft) bgs. During sampling activities, the presence of waste was noted to include glass, metal, and rubber.

3.8.1.3 ECODS L-3 Subunit Nature and Extent of Contamination

The radiological control survey designated the ECODS L-3 subunit area as a “Clean Area.” The GPR survey estimated the ECODS L-3 subunit boundary and estimated the depth as ~7.3 m (24

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ft). However, during soil sampling, the bottom of the two trenches within the subunit was confirmed at depths of 3.4 m (11 ft) bgs or less.

Constituents identified as USCs for the ECODS L-3 subunit are shown in Appendix A. Maximum soil concentrations above detection were compared against two-times (2X) the SRS mean background concentrations (WSRC 2006), if applicable, to determine if the constituent was a USC. Constituents above detection limits and constituents without an SRS mean background were considered USCs. The primary contaminants at the ECODS L-3 subunit are inorganics (metals) and semi-volatile organic compounds (SVOCs). An asbestos survey has not been completed at the subunit; however, due to the dates of operation and based on similar waste units at SRS, ACM is assumed to be present at the ECODS L-3 subunit.

For all soil depths at the ECODS L-3 subunit, the following constituents were identified as USCs in one (1) or more sample(s): 1,1'-biphenyl; 1,1-dichloroethylene; 2-methylnaphthalene; acenaphthene; acetone; aluminum; anthracene; antimony; Aroclor 1254; Aroclor 1260; arsenic; barium; benzaldehyde; benzene; benzo(g,h,i)perylene; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; benzo(k)fluoranthene; bis(2-ethylhexyl)phthalate (DEHP); cadmium; calcium; carbazole; carbon disulfide; chromium; chrysene; cobalt; copper; cyanide; dichlorodiphenyldichloroethylene (DDE); dichlorodiphenyltrichloroethane (DDT); dibenz(ah)anthracene; dibenzofuran; dichloromethane (methylene chloride); di-n-butyl phthalate; fluoranthene; fluorene; indeno(1,2,3-cd)pyrene; iron; lead; magnesium; manganese; methyl ethyl ketone; methyl tertiary butyl ether; mercury; naphthalene; nickel; phenanthrene; potassium; pyrene; sodium; styrene; toluene; vanadium; xylenes; and zinc. Soil sampling at the ECODS L-3 subunit is sufficient enough to determine the nature and extent of contamination and the presence or absence of problems warranting response action. The highest concentrations are relatively immobile. A CM analysis has been performed as described in Section 3.8.1.4.

3.8.1.4 ECODS L-3 Subunit Contaminant Fate and Transport Evaluation Results

The following is a summary of the results from the ECODS L-3 subunit CM analysis using VZCOMML® (Appendix B):

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- Tier I CM COPCs: 1,1'-biphenyl; 2-methylnaphthalene; antimony; arsenic; barium; benzaldehyde; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; cadmium; cobalt; copper; DEHP; dibenz(a,h)anthracene; dibenzofuran; fluorene; indeno(1,2,3-c,d)pyrene; iron; lead; manganese; mercury; naphthalene; nickel; Aroclor 1254; Aroclor 1260; pyrene; and zinc.
- Tier II CM COCs: None.
- Tier II CM RCOCs: None.

Results of the CM analysis indicates that the contaminants at the ECODS L-3 subunit are not a potential source for groundwater contamination.

3.8.1.5 ECODS L-3 Subunit Human Health Risk Assessment Results

The HHRA includes risk calculations for the resident and industrial worker scenarios for the ECODS L-3 subunit soil media (Appendix C).

Results of each step of the HHRA for soil media for ECODS L-3 subunit are summarized below.

- HH COPCs: aluminum, antimony, Aroclor 1254, Aroclor 1260, benzo(a)pyrene, cadmium, chromium, iron, and lead. These constituents had maximum detected concentrations that exceeded HH (residential) risk-based screening levels and exceeded two-times (2X) SRS mean background concentrations (WSRC 2006).
- HH COCs include the following:
  - Resident scenario: Aroclor 1254, Aroclor 1260, and chromium.
  - Industrial worker scenario: Aroclor 1254 and chromium.
- HH RCOCs include the following:
  - Resident scenario: Aroclor 1254 and Aroclor 1260.
  - Industrial worker scenario: none.

3.8.1.6 ECODS L-3 Subunit Ecological Risk Assessment Results

- The ERA includes risk calculations for the ecological receptors for the ECODS L-3 subunit soil media (Appendix D).

- Results of each step of the ERA for the soil media are summarized below.
- Ecological (ECO) COPECs:
  - Surface soil (0 to 0.3 m [0 to 1 ft]): aluminum, antimony, Aroclor 1254, Aroclor 1260, cadmium, chromium, copper, cyanide, DEHP, iron, lead, mercury, nickel, and zinc.
  - Subsurface soil (0.3 to 1.2 m [1 to 4 ft]): 1,1-biphenyl; aluminum; antimony; Aroclor 1254; Aroclor 1260; arsenic; benzo(g,h,i)perylene; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; benzo(k)fluoranthene; cadmium; carbazole; chromium; chrysene; copper; DEHP; dibenz(a,h)anthracene; dibenzofuran; fluoranthene; fluorene; indeno(1,2,3-cd)pyrene; iron; lead; manganese; mercury; naphthalene; nickel; phenanthrene; pyrene; vanadium; and zinc.
- ECO COPCs:
  - Surface soil (0 to 0.3 m [0 to 1 ft]): aluminum, Aroclor 1254, cadmium, cyanide, DEHP, iron, lead, and zinc.
  - Subsurface soil (0.3 to 1.2 m [1 to 4 ft]): 1,1-biphenyl; aluminum; Aroclor 1254; cadmium; copper; DEHP; iron; lead; vanadium; and zinc.
- ECO RCOCs:
  - Surface soil: none
  - Subsurface soil: none.

3.8.1.7 <u>ECODS L-3 Subunit Principal Threat Source Material</u>

The PTSM evaluation is presented in Appendix E. The following is a summary of the problems warranting action per the PTSM evaluation for the ECODS L-3 subunit.

- Soil media (all depths): No PTSM RCOCs.

3.8.1.8 <u>ECODS L-3 Subunit Summary of Problems Warranting Action</u>

There were no CM, ECO, or PTSM RCOCs identified for the ECODS L-3 subunit. There were no industrial worker scenario HH RCOCs identified for the ECODS L-3 subunit. Resident scenario

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HH RCOCs identified for the ECODS L-3 subunit include: Aroclor 1254 and Aroclor 1260. ACM material is assumed to be present in subunit soils. The following problems warranting action exist for the ECODS L-3 subunit:

- ACM is likely present in unit soils that may pose a risk to human receptors if exposed.
- PCBs are present in the surface soil (0 to 0.3 m [0 to 1 ft]) that pose a risk greater than 1.0E-06 and a HQ greater than 1 to the hypothetical resident receptor scenario. More specifically, Aroclor 1254 (EPC = 1.28 milligram per kilogram [mg/kg]) has a residential risk = 5.4E-06 and Aroclor 1260 (EPC = 0.356 mg/kg) has a residential risk of 1.5E-06. PCB total cumulative risk (TCR) = 6.9E-06. Aroclor 1254 also has a HQ = 1.1 for a residential scenario.
- PCBs are present in surface soil (0 to 0.3 m [0 to 1 ft]) that exceed the Toxic Substances Control Act (TSCA) ARAR threshold of 1 mg/kg for high occupancy (i.e., unrestricted land use). Aroclor 1254 maximum detected concentration = 5.63 mg/kg and Aroclor 1260 maximum detected concentration = 2.17 mg/kg.

3.8.2 LRP 131-1L Subunit

3.8.2.1 <u>LRP 131-1L Subunit Description</u>

The LRP 131-1L subunit is a former waste disposal area reportedly used for various construction debris and operated from 1973 to 1982 (DuPont 1983a). The LRP 131-1L subunit is located to the east of L Area, ~46 m (150 ft) outside of the facility boundary fence. Plant records indicate that metal, lumber, poles, concrete, brick, tile, asphalt, tires, rubber, scrap metal, fence posts, hard plastics, wallboard, asbestos, glass, batteries, paint cans, drums and transite were disposed of at the LRP 131-1L subunit (DuPont 1983a and DuPont 1983b). The term “pit” is a misnomer, as the 2022 RFI/RI characterization determined that a pit was not constructed and that waste was not placed below ground surface. Historical photos of the subunit support this, showing land disposal of material on the surface of the subunit. There is no record of hazardous or radioactive material disposed of at the subunit.

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3.8.2.2 LRP 131-1L Subunit Characterization and Data Summary

The LRP 131-1L subunit was included in the 2022 RFI/RI characterization. The RFI/RI characterization effort started with a GPR survey to delineate the lateral and vertical extent of the subunit. Soil sampling of the LRP 131-1L subunit was completed in accordance with the RFI/RI Work Plan (SRNS 2022). Twenty-one sampling locations and a total of 131 samples (113 REG, 7 FD, 7 SPL, and 4 RB) were collected to determine nature and extent of contamination. Eight pit boundary locations were chosen to aid in extent determination and 13 locations were placed within the subunit boundary in a random, unbiased sampling pattern (Figure 3-2). Five soil boring intervals were sampled at all locations, including surface soil (0.0 to 0.3 m [0 to 1 ft] bgs), subsurface soil (0.3 to 1.2 m [1 to 4 ft] bgs), and deep soil (1.2 to 2.4 m, 2.4 to 3.7 m, 3.7 to 4.9 m [4 to 8 ft, 8 to 12 ft, 12 to 16 ft] bgs). At the eight boundary locations, an additional subsurface soil interval was sampled 4.9 to 6.1 m (16 to 20 ft) bgs in order to confirm the extent of the subunit was delineated. All samples were analyzed for constituents on the TAL and TCL lists, and all requested analyses were completed without deviation. In addition to TAL and TCL analyses, gross alpha and nonvolatile beta screening was performed on all samples. In the December 2023 scoping meeting, the Core Team agreed that the radiological screening did not indicate any subunit related radiological material was present and all detections were from NORM only.

3.8.2.3 LRP 131-1L Subunit Nature and Extent of Contamination

The 2022 RFI/RI characterization of the LRP 131-1L subunit consisted of a GPR survey and soil sampling. The GPR survey was not able to confirm land disturbance below ground surface within the subunit boundary. Visual description of the core collected from all sampling locations were described and used to determine the extent of contamination (Appendix J). Subsurface soil appeared to be native and undisturbed throughout, therefore it was determined that a "pit" was not constructed at this subunit. This was further confirmed through historical photos which demonstrated that waste was placed on surface at the subunit, and no pit was constructed.

Constituents identified as USCs for the LRP 131-1L subunit are shown in Appendix A. Maximum soil concentrations above detection were compared against two-times (2X) the SRS mean background concentrations (WSRC 2006), if applicable, to determine if the constituent was a USC. Constituents above detection limits and without an SRS mean background, were considered USCs.

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The primary contaminants at the LRP 131-1L subunit are inorganics (metals) and SVOCs. An asbestos survey has not been completed at the subunit, however, there was no potential ACM identified during sampling activities and there was no disturbance below ground surface identified. Therefore, ACM is not considered a problem warranting response action at the LRP 131-1L subunit.

For all soil depths at the LRP 131-1L subunit, the following constituents were identified as USCs in one (1) or more sample(s): 2-hexanone; 4-nitrophenol; acenaphthene; acetone; aluminum; americium-243; arsenic; barium; benzo(g,h,i)perylene; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; benzo(k)fluoranthene; beryllium; DEHP; butyl benzyl phthalate; calcium; carbazole; cesium-137; chromium; chrysene; cobalt; copper; cumene (isopropylbenzene); curium-245/246; cyanide; DDE; dibenz(a,h)anthracene; dibenzofuran; di-n-butyl phthalate; fluoranthene; fluorene; gross alpha; hexachlorobutadiene; indeno(1,2,3-cd)pyrene; iron; lead; lead-214; magnesium; manganese; mercury; methyl acetate; methyl ethyl ketone; n-dioctyl phthalate; n-nitrosodiphenylamine; nickel; nonvolatile beta; phenanthrene; plutonium-242; potassium; promethium-147; pyrene; radium-228; styrene; toluene; vanadium; and zinc. Soil sampling at the LRP 131-1L subunit is sufficient enough to determine the nature and extent of contamination, and the presence or absence of problems warranting response action. The highest concentrations are relatively immobile. A CM analysis has been performed as described in Section 3.8.2.4.

3.8.2.4 LRP 131-1L Subunit Contaminant Fate and Transport Evaluation Results

The following is a summary of the results from the LRP 131-1L subunit CM analysis using VZCOMML® (Appendix B):

- Tier I CM COPCs: aluminum; arsenic; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; cobalt; dibenz(a,h)anthracene; dibenzofuran; hexachlorobutadiene; iron; and manganese.
- Tier II CM COCs: None.
- Tier II CM RCOCs: None.

Results of the CM analysis indicates that the contaminants at the LRP 131-1L subunits are not a potential source for groundwater contamination.

3.8.2.5 LRP 131-1L Subunit Human Health Risk Assessment Results

The HHRA includes risk calculations for the resident and industrial worker scenarios for the LRP 131-1L subunit soil media (Appendix C).

Results of each step of the HHRA for soil media for the LRP 131-1L subunit are summarized below.

- HH COPCs: aluminum, arsenic, cesium-137, chromium, iron, manganese, vanadium, uranium-235 and uranium-238 (thorium-230). These constituents had maximum detected concentrations that exceeded HH (residential) risk-based screening levels and exceeded two-times (2X) SRS mean background concentrations (WSRC 2006).
- HH COCs include the following:
  - Resident scenario: arsenic, cesium-137, chromium, uranium-235, and uranium-238.
  - Industrial worker scenario: arsenic, cesium-137, chromium, uranium-235, and uranium-238.
- HH RCOCs include the following:
  - Resident scenario: none.
  - Industrial worker scenario: none.

3.8.2.6 LRP 131-1L Subunit Ecological Risk Assessment Results

The ERA includes risk calculations for the ecological receptors for the LRP 131-1L subunit soil media (Appendix D).

Results of each step of the ERA for the soil media are summarized below.

- ECO COPECs:
  - Surface soil (0 to 0.3 m [0 to 1 ft]): aluminum, americium-243, chromium, copper, curium-245/246, cyanide, iron, lead, lead-214, and vanadium.

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- Subsurface soil (0.3 to 1.2 m [1 to 4 ft]): aluminum; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; benzo(k)fluoranthene; carbazole; chromium; chrysene; copper; dibenz(a,h)anthracene; dibenzofuran; fluoranthene; hexachlorobutadiene; indeno[1,2,3-cd]pyrene; iron; lead-214; phenanthrene; plutonium-242; promethium-147; pyrene; radium-228; and vanadium.

- ECO COPCs:
  - Surface soil (0 to 0.3 m [0 to 1 ft]): aluminum, americium-243, curium-245/246, iron, lead-214, and vanadium.
  - Subsurface soil (0.3 to 1.2 m [1 to 4 ft]): aluminum, fluoranthene, hexachlorobutadiene, iron, lead-214, phenanthrene, and vanadium.
- ECO RCOCs:
  - Surface soil: none
  - Subsurface soil: none.

3.8.2.7 LRP 131-1L Subunit Principal Threat Source Material

The PTSM evaluation is presented in Appendix E. The following is a summary of the problems warranting action per the PTSM evaluation for the LRP 131-1L subunit.

- Soil media (all depths): No PTSM RCOCs.

3.8.2.8 LRP 131-1L Subunit Summary of Problems Warranting Action

There were no CM, HH, ECO, or PTSM RCOCs identified for the LRP 131-1L subunit. There are no existing problems warranting action for the LRP 131-1L subunit.

3.8.3 LRP 131-4L Subunit

3.8.3.1 LRP 131-4L Subunit Description

The LRP 131-4L subunit is located north of the L-Area fence and east of Road 7. The LRP 131-4L subunit area investigated in the RFI/RI characterization was ~36.6 m by 36.6 m (120 ft by 120 ft) to include expanded areas to the northwest and northeast. Records indicate the LRP 131-4L subunit

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received inert rubble from the L-Area Powerhouse Stack and Silo demolition (Dupont 1983a and DuPont 1983b). The rubble consisted primarily of concrete and asphalt material with some metal. The unlined pit was reported to have operated from 1973 to 1983 before it was filled and seeded in 1983. Operating procedures indicate it was to receive inert, non-hazardous materials and there are no records indicating any disposal of hazardous or radioactive materials. The subunit is located within the Steel Creek Watershed.

3.8.3.2 LRP 131-4L Subunit Characterization and Data Summary

The LRP 131-4L subunit was included in the 2022 RFI/RI characterization. The RFI/RI characterization effort started with a GPR survey to delineate the lateral and vertical extent of the subunit. Soil sampling of the LRP 131-4L subunit was completed in accordance with the RFI/RI Work Plan (SRNS 2022). Sampling consisted of 41 total sample locations for a total of 220 samples (192 REG, 11 FD, 11 SPL, and 6 RB) collected (Figure 3-3). Fifteen samples were unable to be collected due to waste material within the sampling depth or no deep soil recovered in sample barrel. There were fourteen interior sample locations within the original boundary of the subunit, completed in a random, unbiased sampling pattern spaced 6.1 m (20 ft) apart within the subunit. Along the original subunit boundary, delineated by the orange ball markers, eleven peripheral sample locations were identified. Eight sample locations were included to investigate the area northeast of the subunit, where debris was observed on surface. Four sample locations were included to bound an area of subsidence that was identified on the northern side of the subunit during site walkdowns. Four step-out sample locations were identified northwest of the subunit as contingent locations based on field observations.

All of the 41 locations were sampled with soil sampling depth intervals that included surface soil (0.0 to 0.3 m [0 to 1 ft] bgs), subsurface soil (0.3 to 1.2 m [1 to 4 ft] bgs), and deep soil (1.2 to 2.4 m and 2.4 to 3.6 m [4 to 8 ft and 8 to 12 ft] bgs), unless samples were unable to be collected due to waste in the sample core or no recovery of deep soil in the sample barrel. At three locations of the LRP 131-4L subunit, the bottom of the pit was confirmed in previous intervals and the tentative interval from 3.6 to 4.9 m (12 to 16 ft) bgs was not sampled. At 33 locations, sampling was completed at 3.6 to 4.9 m (12 to 16 ft) bgs because the bottom of the pit was not confirmed, or waste was determined in the previous sampling depth. At four locations, sampling was completed

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to a depth of 4.9 to 7.3 m (16 to 20 ft) bgs because waste was confirmed in the 3.6 to 4.9 m (12 to 16 ft) bgs interval. Additionally, at one location, sampling was completed to a depth of 6.1 to 7.3 m (20 to 24 ft) bgs due to no soil recovery in the shallower depths. At sample location LAP-4L-007 (Figure 3-3), a soil core was collected to a depth of 15 m (50 ft) bgs for lithologic descriptions. The deeper samples were collected to provide necessary information at depth to be used as part of the CM analysis and better define nature and extent below the subunit. Soil cores were recorded in the field for lithologic descriptions at all sample locations (Appendix J). Most of the soil described contained a significant amount of clay matrix except within the waste, and the pit was underlain by a dense clay unit. All samples were analyzed for constituents on the TAL and TCL lists, and all requested analyses were completed without deviation. In addition to TAL and TCL analyses, gross alpha and nonvolatile beta screening was performed on all samples. In the December 2023 scoping meeting, the Core Team agreed that the radiological screening did not indicate any subunit related radiological material was present and all detections were from NORM only.

3.8.3.3 LRP 131-4L Subunit Nature and Extent of Contamination

Due to interferences with shallow deposition of material, subsurface makeup, as well as shallow roots from the dense underbrush, the findings of the GPR survey were inconclusive. Visual description of the core collected from all sampling locations were described and used to determine the extent of contamination (Appendix J). The extent of contamination to the northwest of the subunit was not defined by the RFI/RI characterization (Figure 3-5). Observed material in collected cores were consistent throughout the LRP 131-4L subunit, therefore, the Core Team agreed in the December 2023 scoping meeting that the RFI/RI characterization data was sufficient to define the nature of contamination at the LRP 131-4L subunit.

Constituents identified as USCs for the LRP 131-4L subunit are shown in Appendix A. Maximum soil concentrations above detection were compared against two-times (2X) the SRS mean background concentrations (WSRC 2006), if applicable, to determine if the constituent was a USC. Constituents above detection limits and without an SRS mean background were considered USCs. The primary contaminants at the LRP 131-4L subunit are inorganics (metals) and SVOCs. An asbestos survey has not been completed at the subunit, however, presumed ACM was identified

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by an SRS asbestos inspector. Therefore, ACM is considered a problem warranting response action at the LRP 131-4L subunit and will be addressed by the selected remedy.

For all soil depths at the LRP 131-4L subunit, the following constituents were identified as USCs in one (1) or more sample(s): 2,4,6-trichlorophenol; 2-methylnaphthalene; 2-nitrophenol; acenaphthene; acenaphthylene; acetone; actinium-228; aluminum; americium-243; anthracene; Aroclor 1254; arsenic; barium; benzaldehyde; benzene; benzo(g,h,i)perylene; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; benzo(k)fluoranthene; beryllium; DEHP; cadmium; calcium; carbazole; chromium; chrysene; cobalt; copper; cumene (isopropylbenzene); cyanide; cyclohexane; DDE; DDT; dibenz(a,h)anthracene; dibenzofuran; dichloromethane (methylene chloride); diethyl phthalate; di-n-butyl phthalate; endosulfan II; fluoranthene; fluorene; gamma-chlordane; gross alpha; indeno(1,2,3-cd)pyrene; iron; lead; lead-212; lead-214; magnesium; manganese; mercury; methoxychlor; methyl acetate; methyl ethyl ketone; methylcyclohexane; m,p-xylene; naphthalene; n-dioctyl phthalate; nickel; n-nitrosodipropylamine; nonvolatile beta; o-xylene; phenanthrene; plutonium-238; potassium; potassium-40; pyrene; radium-226; sodium; styrene; tetrachloroethylene; thorium-228; thorium-230; thorium-232; toluene; uranium-233/234; uranium-235; uranium-238; vanadium; and zinc. Soil sampling at the LRP 131-4L subunit is sufficient enough to determine the nature of contamination, and the presence or absence of problems warranting response action. The extent of contamination was not bounded on the northwestern side of the subunit. The final remedy design will address the extent of contamination at the LRP 131-4L subunit. The highest concentrations of contaminants in the RFI/RI characterization data are relatively immobile. A CM analysis has been performed as described in Section 3.8.3.4.

3.8.3.4 LRP 131-4L Subunit Contaminant Fate and Transport Evaluation Results

The following is a summary of the results from the LRP 131-4L subunit CM analysis using VZCOMML® (Appendix B):

- Tier I CM COPCs: 2,4,6-trichlorophenol; aluminum; Aroclor 1254; arsenic; barium; benzaldehyde; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; cadmium; cobalt;

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copper; cyanide; dibenz(a,h)anthracene; iron; lead; manganese; naphthalene; n-nitrosodipropylamine; thallium; and vanadium.

- Tier II CM COCs: cadmium and n-nitrosodipropylamine.
- Tier II CM RCOCs: None.

Results of the CM analysis indicates that the contaminants at the LRP 131-4L subunit are not a potential source for groundwater contamination.

3.8.3.5 LRP 131-4L Subunit Human Health Risk Assessment Results

The HHRA includes risk calculations for the resident and industrial worker scenarios for the LRP 131-4L subunit soil media (Appendix C).

Results of each step of the HHRA for soil media for the LRP 131-4L subunit are summarized below.

- HH COPCs: aluminum; arsenic; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; chromium; copper; cyanide; dibenz(a,h)anthracene; iron; manganese; n-nitrosodipropylamine; potassium-40; thorium-232 (actinium-228 and lead-212); uranium-238 (lead-214); and vanadium. These constituents had maximum detected concentrations that exceeded HH (residential) risk-based screening levels and exceeded two-times (2X) SRS mean background concentrations (WSRC 2006).
- HH COCs include the following:
  - Resident scenario: arsenic, chromium, benzo(a)pyrene, n-nitrosodipropylamine, potassium-40, thorium-232, and uranium-238.
  - Industrial worker scenario: chromium, n-nitrosodipropylamine, potassium-40, thorium-232, and uranium-238.
- HH RCOCs include the following:
  - Resident scenario: benzo(a)pyrene.
  - Industrial worker scenario: none.

3.8.3.6 LRP 131-4L Subunit Ecological Risk Assessment Results

The ERA includes risk calculations for the ecological receptors for the LRP 131-4L subunit soil media (Appendix D).

Results of each step of the ERA for the soil media are summarized below.

- ECO COPECs:
  - Surface soil (0 to 0.3 m [0 to 1 ft]): 2-nitrophenol, actinium-228, aluminum, Aroclor 1254, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, carbazole, chromium, chrysene, copper, cyanide, diethyl phthalate, di-n-butyl phthalate, fluoranthene, iron, lead, lead-212, lead-214, mercury, methoxychlor, methyl acetate, n-nitrosodipropylamine, potassium-40, pyrene, and vanadium.
  - Subsurface soil (0.3 to 1.2 m [1 to 4 ft]): actinium-228, aluminum, americium-243, Aroclor 1254, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chromium, copper, cyanide, cyclohexane, DEHP, diethyl phthalate, di-n-butyl phthalate, fluoranthene, iron, lead, lead-212, lead-214, mercury, methoxychlor, methyl acetate, methylcyclohexane, pyrene, and vanadium.
- ECO COPCs:
  - Surface soil (0 to 0.3 m [0 to 1 ft]): 2-nitrophenol, actinium-228, aluminum, cyanide, iron, lead-212, lead-214, methyl acetate, n-nitrosodipropylamine, potassium-40, and vanadium.
  - Subsurface soil (0.3 to 1.2 m [1 to 4 ft]): actinium-228, aluminum, americium-243, cyanide, cyclohexane, iron, lead-212, lead-214, methyl acetate, methylcyclohexane, and vanadium.
- ECO RCOCs:
  - Surface soil: none
  - Subsurface soil: none.

3.8.3.7 LRP 131-4L Subunit Principal Threat Source Material

The PTSM evaluation is presented in Appendix E. The following is a summary of the problems warranting action per the PTSM evaluation for the LRP 131-4L subunit.

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- Soil media (all depths): No PTSM RCOCs.

3.8.3.8 LRP 131-4L Subunit Summary of Problems Warranting Action

There were no CM, ECO, or PTSM RCOCs identified for the LRP 131-4L subunit. There were no industrial worker scenario HH RCOCs identified for the LRP 131-4L subunit. Resident scenario HH RCOCs identified for the LRP 131-4L subunit include: benzo(a)pyrene. ACM material is assumed to be present in subunit soils. The following problems warranting action exist for the LRP 131-4L subunit:

- ACM is likely present in unit soils that may pose a risk to human receptors if exposed.
- Benzo(a)pyrene (EPC = 0.164 mg/kg) is present in the surface soil (0-0.3 m [0-1 ft]) that poses a risk greater than 1.0E-06 for the hypothetical resident receptor scenario (risk = 1.4E-06).

3.9 Summary of Refined Constituents of Concern and Refined Conceptual Site Models

The ECODS L-3, LRP 131-1L, and LRP 131-4L OU was investigated to determine the nature and extent of contamination; the risk to the resident, industrial worker, and the environment; the presence of PTSM; and if there are constituents that are a CM concern. Soil samples were collected, evaluated, and screened against the appropriate regulatory thresholds and protocols to identify RCOCs that warrant further consideration for remedial action. Results of the evaluations indicate that there are no RCOCs for the LRP 131-1L subunit. RCOCs were identified at the ECODS L-3 subunit and the LRP 131-4L subunit in soil and include the following:

ECODS L-3 Subunit

- HH resident scenario: Aroclor 1254 and Aroclor 1260.
- HH industrial worker scenario, CM, ECO, PTSM: none.

LRP 131-4L Subunit

- HH resident scenario: benzo(a)pyrene.
- HH industrial worker scenario, CM, ECO, PTSM: none.

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With the results of the HHRA, ERA, PTSM, and CM evaluations, the preliminary CSMs (Figure 2-12 through 2-14) were revised to refined CSMs (Figures 3-9 through 3-11) to provide a visual summary of potential risks/hazards for each receptor by exposure route. Filled circles within boxes beneath applicable receptors indicate a potential unacceptable exposure as a result of a quantitative evaluation. Below is a summary of the elements of the refined CSMs by exposure medial in which potential impacts are noted.

3.9.1 ECODS L-3 Subunit

Figure 3-9 presents the refined CSM for the ECODS L-3 subunit. Soil media and its potential for migration to groundwater were evaluated. ACM is presumed to be present in unit soils, based on the waste history at other ECODS, that may pose a risk to human receptors if exposed and will require further evaluation in the CMS/FS.

3.9.2 LRP 131-1L Subunit

Figure 3-10 presents the refined CSM for the LRP 131-1L subunit. Soil media and its potential for migration to groundwater were evaluated. The CSM presents that no further evaluation of surface, subsurface, or deep soils within the subunit is required in the CMS/FS based on results of the HHRA, ERA, CM, and PTSM evaluations.

3.9.3 LRP 131-4L Subunit

Figure 3-11 presents the refined CSM for the LRP 131-4L subunit. Soil media and its potential for migration to groundwater were evaluated. An asbestos survey has not been completed at the subunit; however, presumed ACM was identified by an SRS asbestos inspector. Therefore, ACM is considered a problem warranting response action and will be addressed by the selected remedy.

3.10 Applicable or Relevant and Appropriate Requirements Evaluation

Analytical data are compared to the chemical-specific ARARs. Chemical-specific ARARs or to-be-considered (TBC) requirements exist under federal and state regulations for lead and PCBs.

For lead in soil, the CERCLA value of 400 mg/kg was set by the USEPA Office of Solid Waste Emergency Response and adopted as a TBC for the screening process. At the ECODS L-3 subunit,

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one (1) of the 61 REG soil samples from all soil depth intervals within the subunit boundary was above this concentration. The maximum detected concentration of lead is 1,300 mg/kg from location EL3-06 (0 to 0.3 m [0 to 1 ft] interval. The ARAR TBC screening threshold corresponds to the residential RSL of 400 mg/kg. The 95% UCL in surface soil is 214 mg/kg and the residential HQ is 0.54 (RSL 400 mg/kg). The all-depths soils mean concentration is 49.5 mg/kg. The isolated lead hotspot is not deemed significant enough to warrant a remedial response, and lead is not identified as an ARAR RCOC.

PCBs are governed by the TSCA (40 CFR Part 761). The final rule for PCB disposal was established on August 20, 1998 (as amended); it addresses residual levels of PCB remediation waste that can be left in place. Action levels are based on site-specific conditions.

The regulatory criteria for PCB remediation waste, as defined by 40 CFR 761.50(b)(3), requires action under TSCA for as-found concentrations ≥50 parts per million (ppm) that was either placed in a land disposal facility, spilled, or otherwise released into the environment prior to April 18, 1978. Disposal at the ECODS L-3 subunit took place from November 1953 to June 1954, and the soil concentrations are ≤50 ppm; therefore, no cleanup is required under TSCA and the TSCA ARAR is not applicable.

PCB remediation waste is regulated by the requirements of 40 CFR 761.61. The self-implementing cleanup option under 40 CFR 761.61(a) establishes cleanup levels of 1 mg/kg and 25 mg/kg for high and low occupancy sites, respectively.

At the ECODS L-3 subunit, PCBs are present in surface soil at concentrations above the high occupancy, free-release threshold of 1.0 mg/kg. The maximum Aroclor 1254 result was 5.63 mg/kg and the maximum Aroclor 1260 result was 2.17 mg/kg. Therefore, Aroclor 1254 and Aroclor 1260 were retained as ARAR RCOCs and identified as problems warranting action for the ECODS L-3 subunit.

Per the self-implementing cleanup option outlined in 40 CFR 761.61(a), the PCB contamination at the ECODS L-3 subunit is above the high occupancy cleanup level of 1 mg/kg but below the low occupancy cleanup level of 25 mg/kg. Under TSCA, the ECODS L-3 subunit is considered

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low occupancy. Therefore, under the low occupancy self-implementing clean up level, no further action is required under TSCA.

40 CFR 761.61(c) allows for a risk-based approval for consideration of alternative cleanup levels. This CERCLA Combined Document meets the substantive requirements of the risk-based approval request, and no additional TSCA documentation will be required.

The residential RSL that is used to evaluate risk to the hypothetical resident (0.24 mg/kg) is more restrictive than the high occupancy cleanup levels (1 mg/kg), therefore, PCBs are retained as an RCOC.

3.11 Natural Resource Injury Evaluation

The NRIE Checklist and supporting descriptions are provided in Appendix G. The purpose of the NRIE Checklist is to identify potential natural resource injuries associated with CERCLA remedial activities. Based on the NRIE Checklist, natural resources in the locale have been impacted by hazardous substances from the unit. Remedial alternatives under consideration may or may not address injuries to the natural resources. Remedial alternatives considered may cause additional injury based on the scope of the action (e.g., excavation). No irreversible resource losses are known to exist.

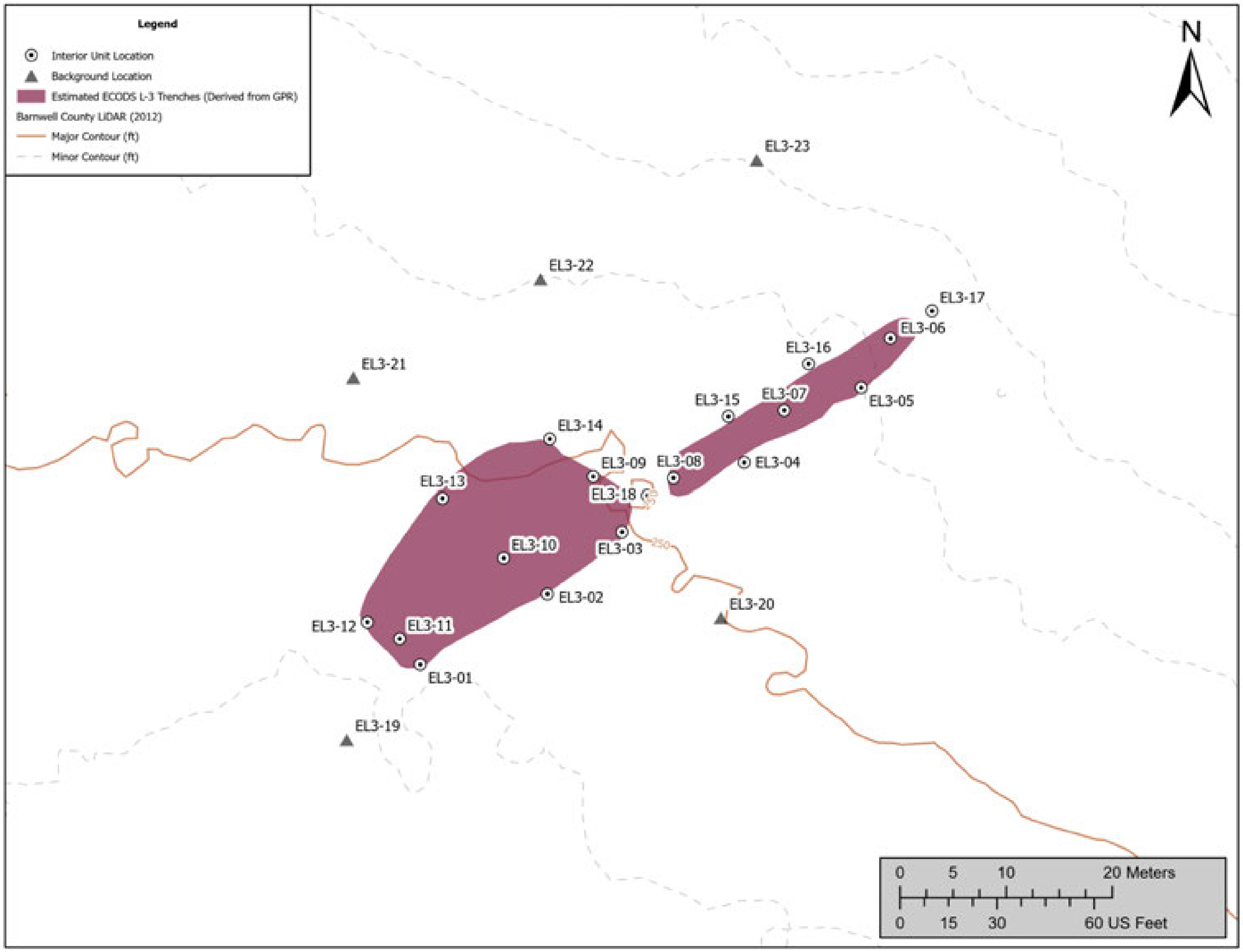

Figure 3-1. Sampling Locations at ECODS L-3 Subunit

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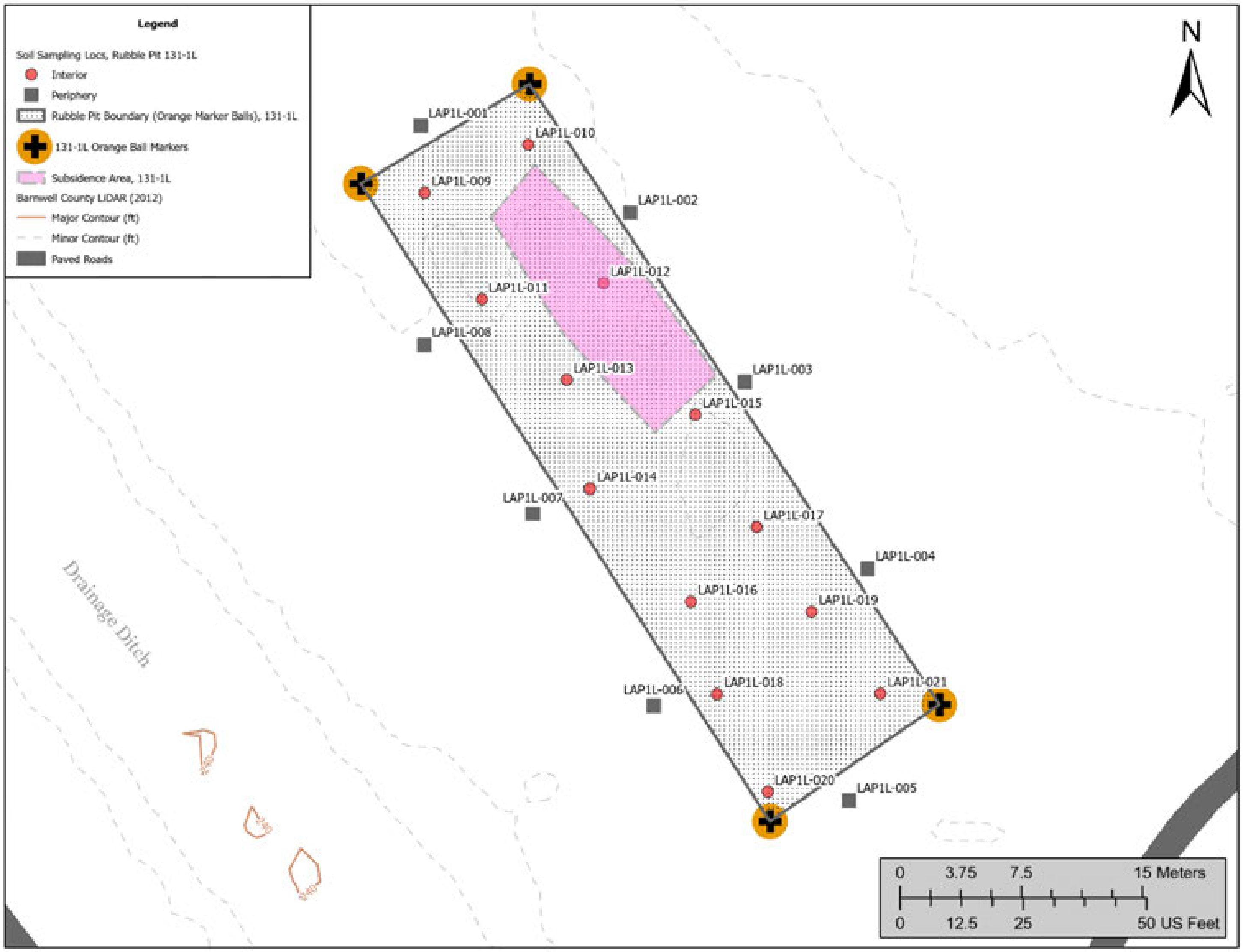

Figure 3-2. Sampling Locations at L-Area Rubble Pit 131-1L Subunit

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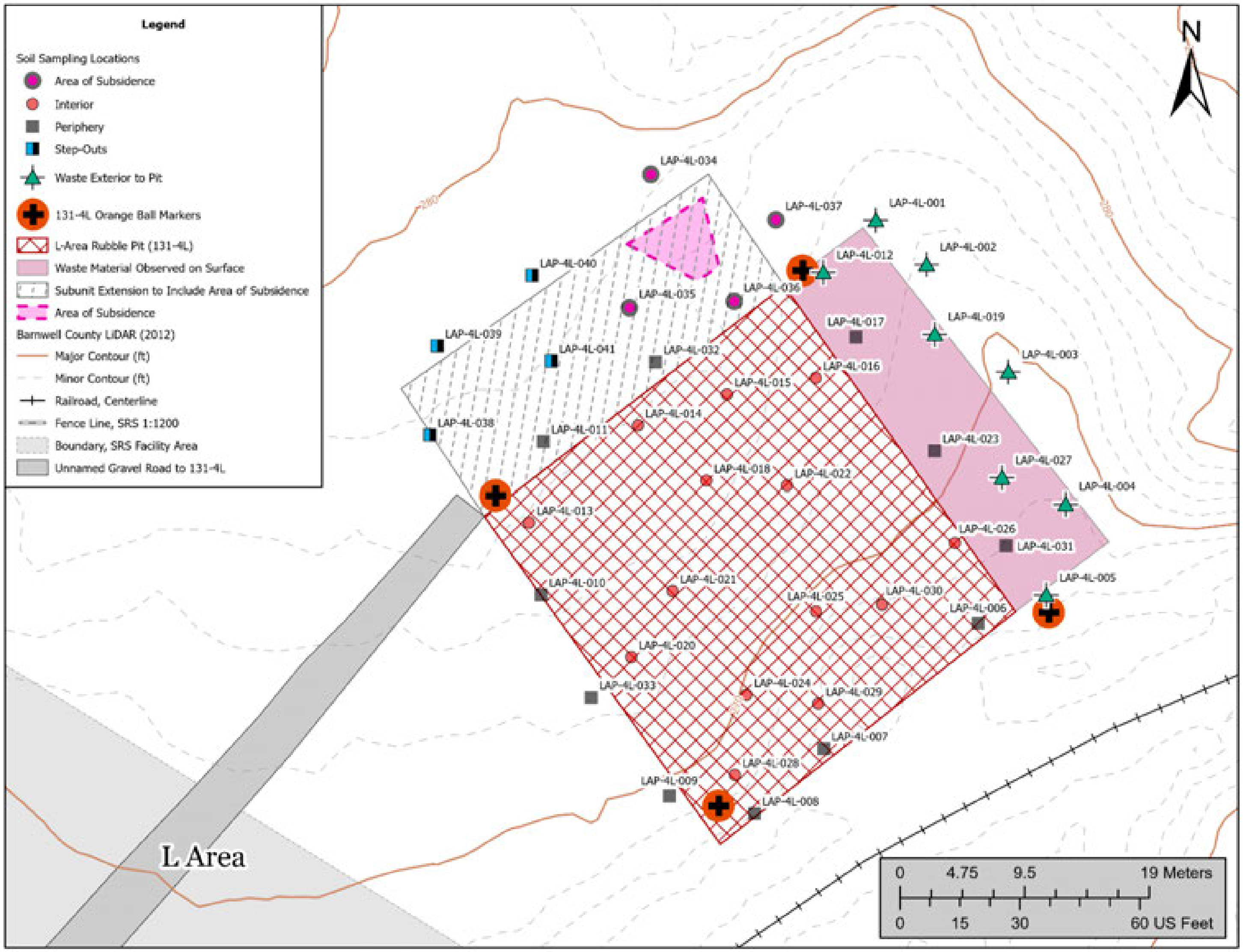

Figure 3-3. Sampling Locations at L-Area Rubble Pit 131-4L Subunit

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Figure 3-4. Creosote Wooden Material Encountered at Sampling Location LAP-1L-015 (0.3-1.2 m [1-4 ft])

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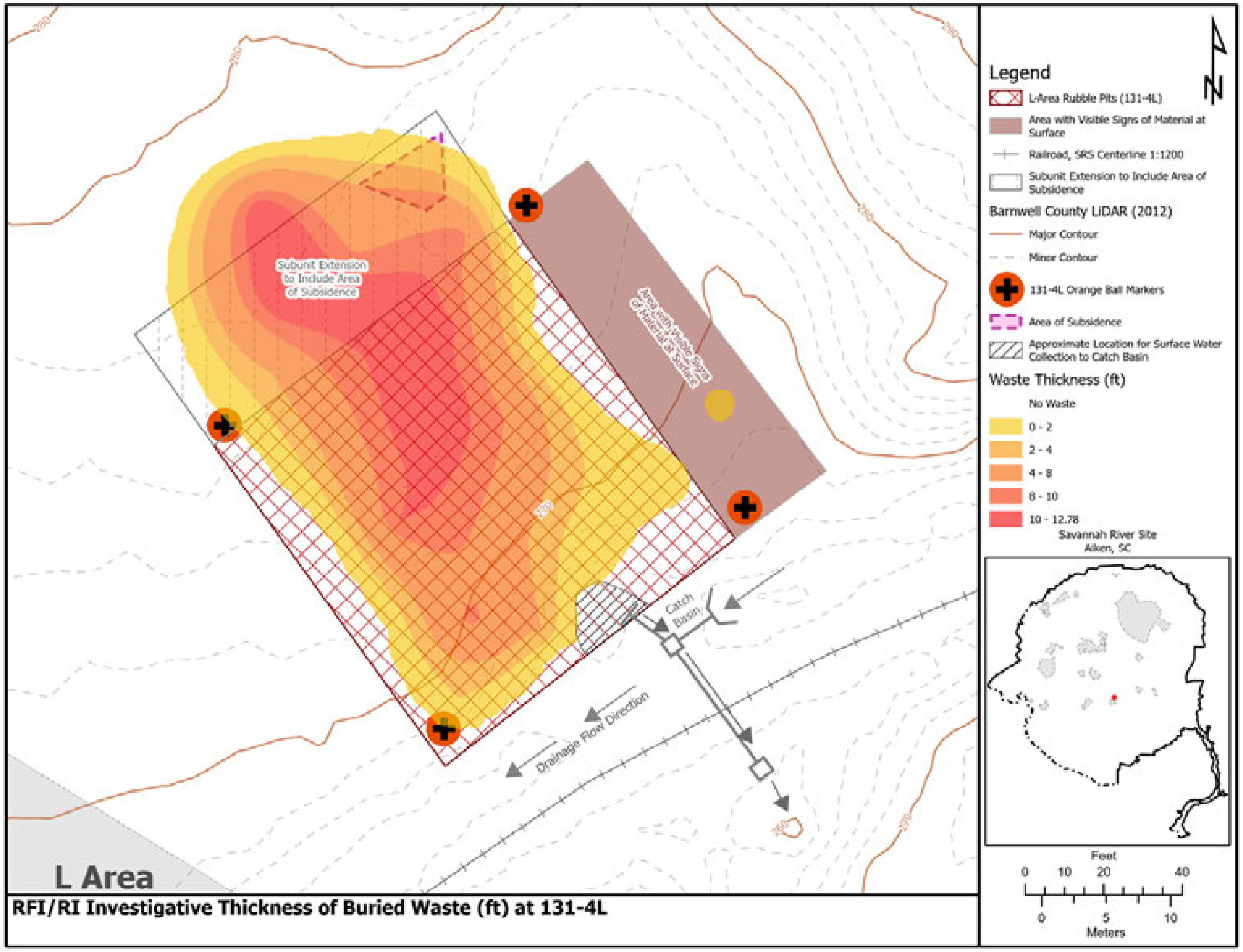

Figure 3-5. Waste Thickness Observed at LRP 131-4L Subunit as Outcome of RFI/RI Characterization

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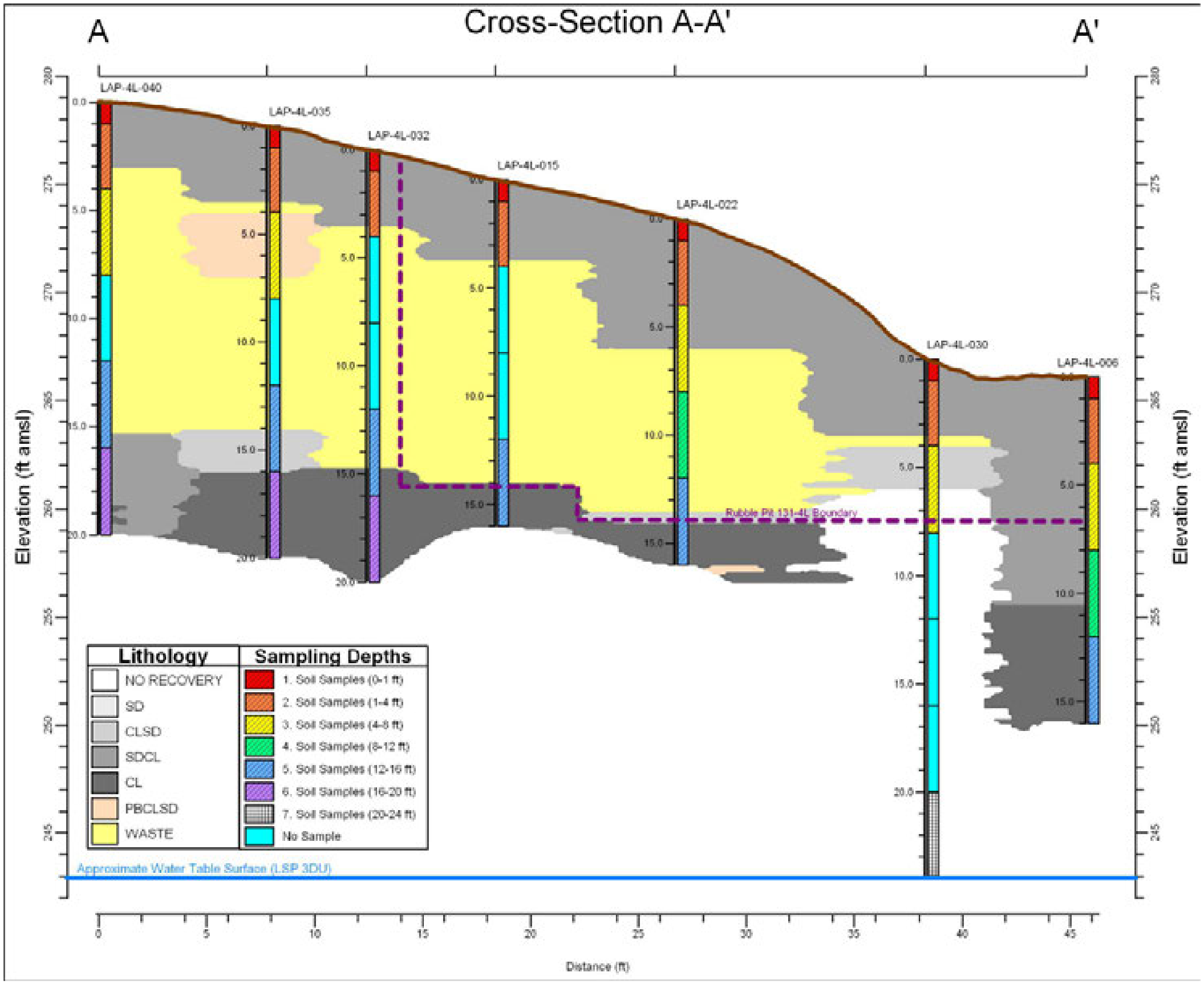

Figure 3-6. Cross-Section A-A' Through the LRP 131-4L Subunit

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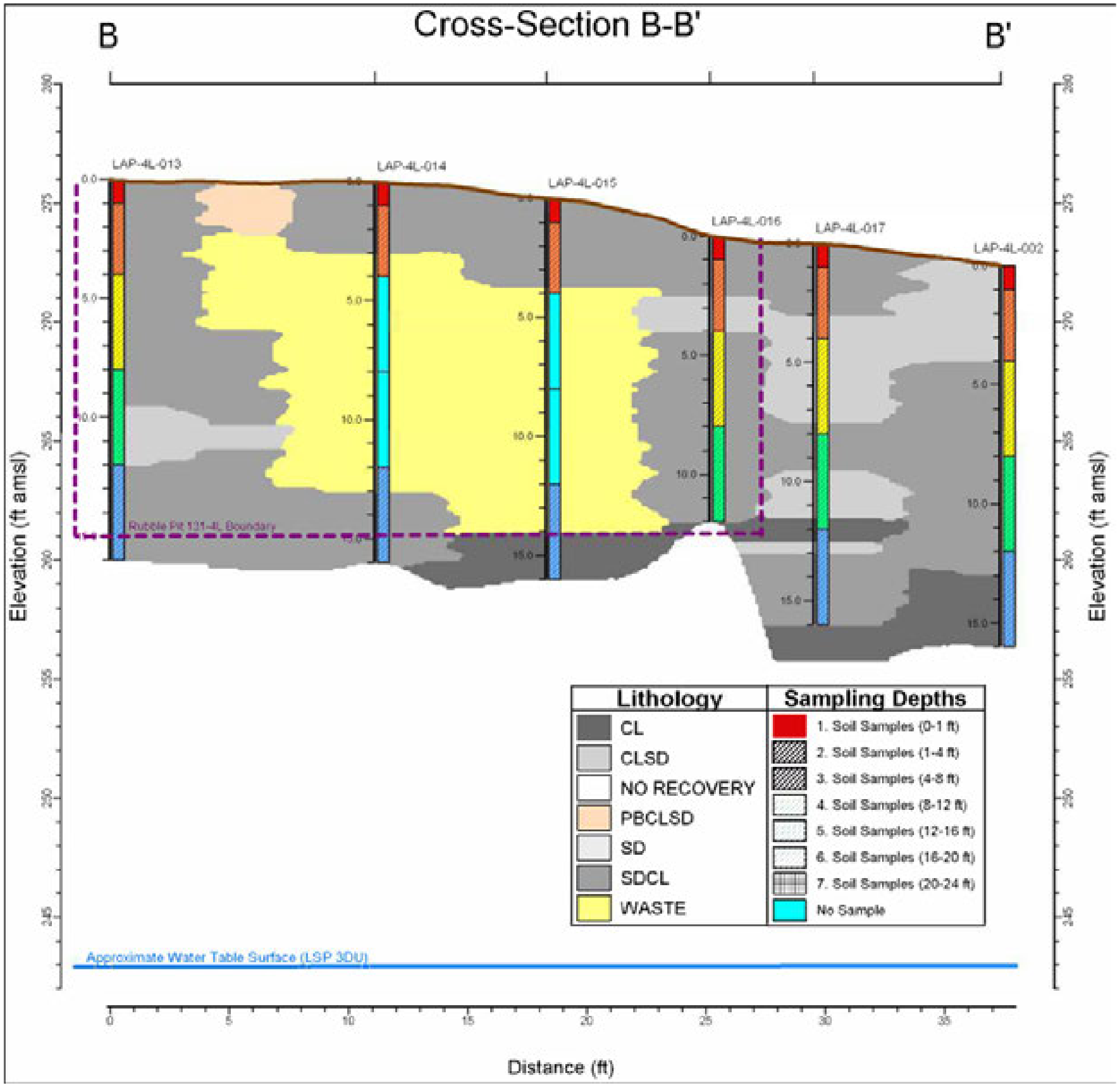

Figure 3-7. Cross-Section B-B' Through the LRP 131-4L Subunit

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Figure 3-8. Photo of Asbestos-Containing Material Determined in Sampling Location LAP-4L-018

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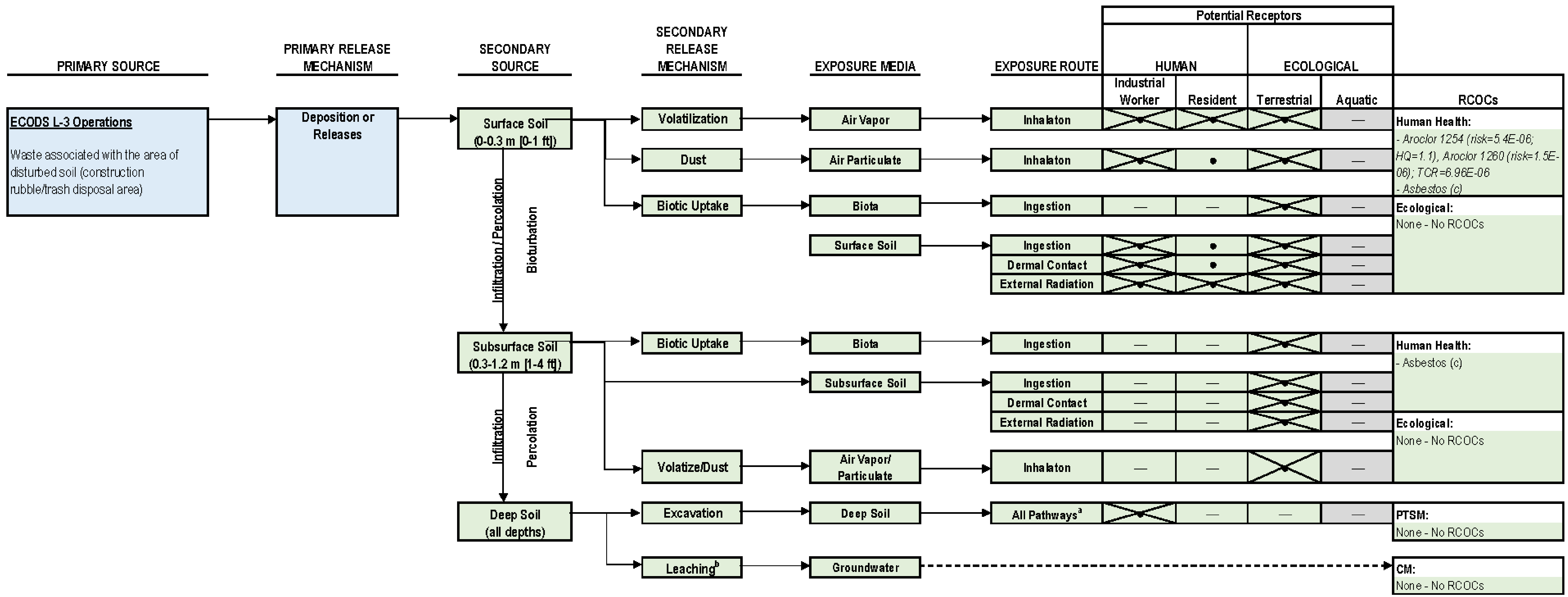
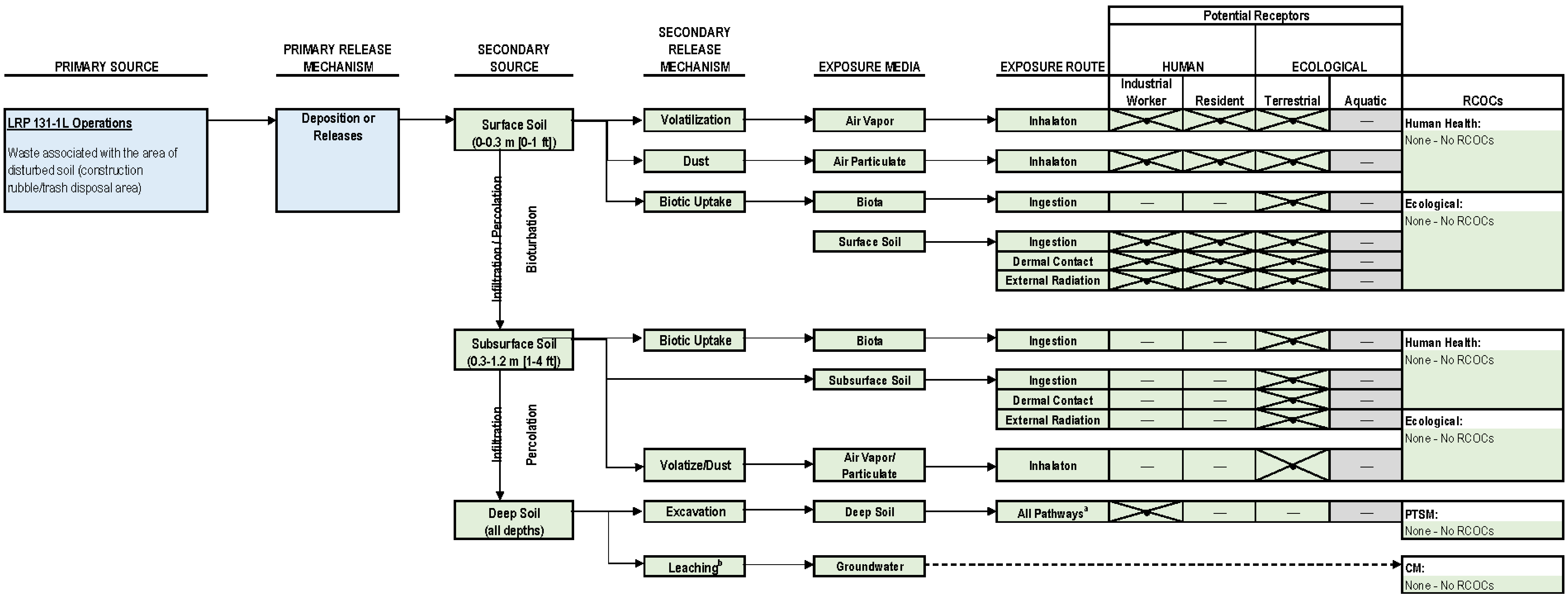


a - "All Pathways" represents ingestion, inhalation, dermal contact, and external radiation exposure for the principal threat source material (PTSM) evaluation for toxicity.
b - Leaching represents the potential of a contaminant in soil or sediment to migrate to groundwater above MCLs per the contaminant migration (CM) analysis and does not represent a human health or ecological exposure route.
c - Asbestos Containing Material (ACM) is likely present in unit soils that may pose a risk to human receptors if exposed.
- Receptors shaded gray were considered, but were determined not to be applicable to the subunit.

→ - Pathways: current, historic, and future
● - Complete exposure pathway for quantitative evaluation
O - Complete exposure pathway for qualitative evaluation
— - Incomplete exposure pathway
⇢ - Contaminant migration analysis
X - Complete exposure pathway, no RCOCs identified

Figure 3-9. Refined Conceptual Site Model for the ECODS L-3 Subunit



a - "All Pathways" represents ingestion, inhalation, dermal contact, and external radiation exposure for the principal threat source material (PTSM) evaluation for toxicity.
b - Leaching represents the potential of a contaminant in soil or sediment to migrate to groundwater above MCLs per the contaminant migration (CM) analysis and does not represent a human health or ecological exposure route.
c - Asbestos Containing Material (ACM) is present in subsurface soils (i.e., > 1 ft) that may pose a risk to human receptors
- Receptors shaded gray were considered, but were determined not to be applicable to the subunit.

→ - Pathways: current, historic, and future
● - Complete exposure pathway for quantitative evaluation
O - Complete exposure pathway for qualitative evaluation
— - Incomplete exposure pathway
⇢ - Contaminant migration analysis
X - Complete exposure pathway, no RCOCs identified

Figure 3-10. Refined Conceptual Site Model for the LRP 131-1L Subunit

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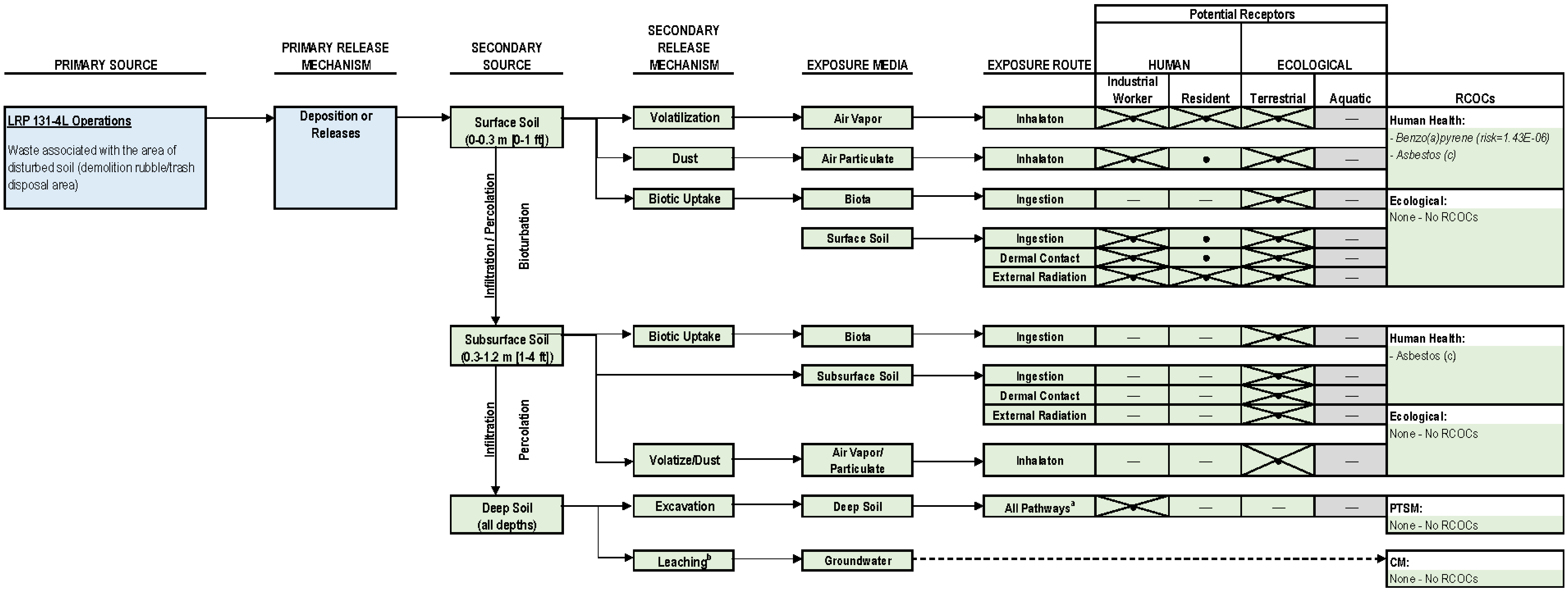

a - "All Pathways" represents ingestion, inhalation, dermal contact, and external radiation exposure for the principal threat source material (PTSM) evaluation for toxicity.
b - Leaching represents the potential of a contaminant in soil or sediment to migrate to groundwater above MCLs per the contaminant migration (CM) analysis and does not represent a human health or ecological exposure route.
c - Asbestos Containing Material (ACM) is present in unit soils that may pose a risk to human receptors if exposed.
- Receptors shaded gray were considered, but were determined not to be applicable to the subunit.

→ - Pathways: current, historic, and future
● - Complete exposure pathway for quantitative evaluation
O - Complete exposure pathway for qualitative evaluation
— - Incomplete exposure pathway
⇢ - Contaminant migration analysis
X - Complete exposure pathway, no RCOCs identified

Figure 3-11. Refined Conceptual Site Model for the LRP 131-4L Subunit

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Table 3-1. Alpha Spectroscopy Split Sample Results from the LRP 131-1L Subunit

Chemical Name	Sample Frequency				Result [pCi/g]		SRS Max Background [pCi/g]
	Total	Non-Detect	Estimated	Detect	Max	Median	
AMERICIUM-241	7	7	0	0	-	-	0.69
AMERICIUM-243	7	7	0	0	-	-	N/A
CURIUM-242	7	7	0	0	-	-	N/A
CURIUM-243/244	7	7	0	0	-	-	0.40
CURIUM-245/246	7	7	0	0	-	-	N/A
NEPTUNIUM-237	7	7	0	0	-	-	N/A
PLUTONIUM-238	7	7	0	0	-	-	14.6
PLUTONIUM-239/240	7	7	0	0	-	-	1.04
PLUTONIUM-242	7	7	0	0	-	-	N/A
THORIUM-228	7	1	6	0	1.60	1.42	4.17
THORIUM-230	7	2	5	0	1.67	1.48	2.78
THORIUM-232	7	0	7	0	2.52	1.56	2.79
URANIUM-233/234	7	1	6	0	1.15	0.90	1.76
URANIUM-235	7	7	0	0	-	-	0.17
URANIUM-238	7	2	5	0	1.29	1.00	1.9

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Table 3-2. Contingent Alpha Spectroscopy Selection Rationale

Sample Location	Depth Interval [ft bgs]	Gross Alpha [pCi/g]	Rationale
LRP 131-1L Subunit			
LAP-1L-007	1-4	46.3	Top three gross alpha screening result
LAP-1L-012	1-4	46.1	Top three gross alpha screening result
LAP-1L-015	8-12	44.9	Top three gross alpha screening result
LAP-1L-014	12-16	39.8	Top gross alpha screening result in the 12-16 ft interval and within subunit interior.
LAP-1L-013	4-8	39.6	Top gross alpha screening result in the 4-8 ft interval and within subunit interior.
LAP-1L-015	1-4	38.9	High gross alpha screening result in the shallow soil interval and within subunit interior.
LAP-1L-008	0-1	37.9	Top five surface soil alpha screening result.
LAP-1L-018	1-4	37.7	High gross alpha screening result in the shallow soil interval and within subunit interior.
LAP-1L-003	0-1	37.4	Top five surface soil alpha screening result. Corresponding split sample.
LAP-1L-009	0-1	36.2	Top five surface soil alpha screening result.
LAP-1L-010	0-1	33.3	Top five surface soil alpha screening result.
LAP-1L-012	0-1	32.8	Top five surface soil alpha screening result.
LRP 131-4L Subunit			
LAP-4L-025	1-4	44.8	Top ten gross alpha screening result.
LAP-4L-025	0-1	44.1	Top ten gross alpha screening result.
LAP-4L-015	1-4	43.2	Top ten gross alpha screening result.
LAP-4L-025	4-8	41.6	Top ten gross alpha screening result.
LAP-4L-036	8-12	40.7	Top ten gross alpha screening result.
LAP-4L-029	1-4	40.5	Top ten gross alpha screening result.
LAP-4L-003	12-16	40.1	Top ten gross alpha screening result.
LAP-4L-025	8-12	39.5	Top ten gross alpha screening result.
LAP-4L-005	12-16	39.3	Top ten gross alpha screening result.
LAP-4L-027	12-16	39.3	Top ten gross alpha screening result.
LAP-4L-015	12-16	38.2	Exceeds gross alpha trigger level and was chosen due to observed waste in sample.

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Table 3-2. Contingent Alpha Spectroscopy Selection Rationale (*continued/end*)

Sample Location	Depth Interval [ft bgs]	Gross Alpha [pCi/g]	Rationale
LRP 131-4L Subunit *(continued)*			
LAP-4L-010	0-1	35.6	Exceeds gross alpha trigger level and was chosen due to observed waste in sample.
LAP-4L-032	16-20	32.5	Exceeds gross alpha trigger level and is only sample in the 16-20 ft bgs interval.
LAP-4L-022	0-1	31.6	Exceeds gross alpha trigger level and was chosen due to observed waste in sample.
LAP-4L-009	1-4	30.9	Exceeds gross alpha trigger level and was chosen due to observed waste in sample.
LAP-4L-038	4-8	29.2	Exceeds gross alpha trigger level and was chosen due to observed waste in sample.
LAP-4L-029	12-16	25.6	Exceeds gross alpha trigger level and was chosen due to observed waste in sample.
LAP-4L-013	8-12	25.5	Exceeds gross alpha trigger level and was chosen due to observed waste in sample.
LAP-4L-016	4-8	25.0	Exceeds gross alpha trigger level and was chosen due to observed waste in sample.
LAP-4L-010	8-12	24.9	Exceeds gross alpha trigger level and was chosen due to observed waste in sample.
LAP-4L-030	20-24	23.2	Exceeds gross alpha trigger level and is only sample in the 20-24 ft bgs interval.

Table 3-3. Alpha Spectroscopy Results from the LRP 131-1L Subunit

Chemical Name	Sample Frequency				Result [pCi/g]		SRS Max Background [pCi/g]
	Total	Non-Detect	Estimated	Detect	Max	Median	
AMERICIUM-241	12	12	0	0	-	-	0.690
AMERICIUM-243	12	11	1	0	0.09	0.09	N/A
CURIUM-242	12	12	0	0	-	-	N/A
CURIUM-243/244	12	12	0	0	-	-	0.404
CURIUM-245/246	12	11	1	0	0.08	0.08	N/A
NEPTUNIUM-237	12	12	0	0	-	-	N/A
PLUTONIUM-238	12	8	4	0	0.11	0.09	14.6
PLUTONIUM-239/240	12	9	3	0	0.06	0.05	1.04
PLUTONIUM-242	12	11	1	0	0.02	0.02	N/A
THORIUM-228	12	0	0	12	2.04	1.29	4.17
THORIUM-230	12	0	2	10	1.01	0.68	2.78
THORIUM-232	12	0	0	12	1.90	1.34	2.79
URANIUM-233/234	12	0	0	12	0.94	0.66	1.76
URANIUM-235	12	10	2	0	0.09	0.07	0.170
URANIUM-238	12	0	0	12	0.90	0.58	1.90

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Table 3-4. Alpha Spectroscopy Split Sample Results from the LRP 131-4L Subunit

Chemical Name	Sample Frequency				Result [pCi/g]		SRS Max Background [pCi/g]
	Total	Non-Detect	Estimated	Detect	Max	Median	
AMERICIUM-241	11	11	0	0	-	-	0.69
AMERICIUM-243	11	11	0	0	-	-	N/A
CURIUM-242	11	11	0	0	-	-	N/A
CURIUM-243/244	11	11	0	0	-	-	0.40
CURIUM-245/246	11	11	0	0	-	-	N/A
NEPTUNIUM-237	11	11	0	0	-	-	N/A
PLUTONIUM-238	11	11	0	0	-	-	14.6
PLUTONIUM-239/240	11	11	0	0	-	-	1.04
PLUTONIUM-242	11	10	1	0	0.82	0.82	N/A
THORIUM-228	11	2	8	1	2.78	0.78	4.17
THORIUM-230	11	4	7	0	1.41	1.14	2.78
THORIUM-232	11	0	11	0	2.27	1.25	2.79
URANIUM-233/234	11	1	9	1	1.43	0.76	1.76
URANIUM-235	11	11	0	0	-	-	0.17
URANIUM-238	11	4	6	1	1.12	0.72	1.9

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Table 3-5. Alpha Spectroscopy Results from the LRP 131-4L Subunit

Chemical Name	Sample Frequency				Result [pCi/g]		SRS Max Background [pCi/g]
	Total	Non-Detect	Estimated	Detect	Max	Median	
AMERICIUM-241	21	21	0	0	-	-	0.690
AMERICIUM-243	21	18	3	0	0.06	0.05	N/A
CURIUM-242	21	21	0	0	-	-	N/A
CURIUM-243/244	21	21	0	0	-	-	0.404
CURIUM-245/246	21	21	0	0	-	-	N/A
NEPTUNIUM-237	21	21	0	0	-	-	N/A
PLUTONIUM-238	21	12	8	1	0.70	0.15	14.6
PLUTONIUM-239/240	21	15	6	0	0.09	0.05	1.04
PLUTONIUM-242	21	21	0	0	-	-	N/A
THORIUM-228	21	0	0	21	3.13	0.96	4.17
THORIUM-230	21	0	4	17	2.71	0.61	2.78
THORIUM-232	21	0	0	21	2.95	0.84	2.79
URANIUM-233/234	21	0	2	19	2.11	0.56	1.76
URANIUM-235	21	15	6	0	0.15	0.06	0.170
URANIUM-238	21	0	0	21	1.57	0.57	1.90

4.0 REMEDIAL ACTION OBJECTIVES AND PRELIMINARY REMEDIATION GOALS

4.1 Remedial Action Objectives

RAOs are site-specific or media-specific objectives for protection of human health and the environment. RAOs usually specify RCOCs for the potential receptors, media of concern, and exposure pathways. RAOs describe what the remediation must accomplish and are used as a framework for developing remedial alternatives for the CMS/FS.

Section 121(d) of the CERCLA (1980), as amended by the Superfund Amendments and Reauthorization Act (1986), requires that any remedial action comply with requirements or standards set forth under Federal and State environmental laws (i.e., ARARs), as well as non-promulgated advisories, guidance, or proposed standards that are not legally binding but provide useful approaches or recommendations (called TBC requirements).

ARARs and TBCs include action-specific, location-specific, and chemical-specific requirements that are to be achieved unless a waiver is invoked. In addition, the NCP requires the development of health-based, site-specific levels for constituents (i.e., risk-based levels) where such promulgated limits do not exist and where there is a concern with their potential health or environmental effects. RAOs are developed, as applicable, from ARARs, TBCs, or risk-based levels that address the constituent, receptor, and media of concern. RAOs are presented by subunit within the ECODS L-3, LRP 131-1L, and LRP 131-4L OU in which RCOCs have been identified from the assessments performed in Appendices B (CM), C (HHRA), D (ERA), and E (PTSM). RAOs are presented below by subunit.

4.1.1 ECODS L-3 Subunit

According to the analysis performed in Appendices B (CM), C (HHRA), D (ERA), and E (PTSM), and the results summarized in Chapter 3, there are no CM, ECO, or PTSM RCOCs identified for the ECODS L-3 subunit. However, PCBs (Aroclor 1254 and Aroclor 1260) were identified as posing a HH risk in surface soils. ACM is presumed to be present in unit soils.

The following problems warranting action are identified for the ECODS L-3 subunit:

- ACM is likely present in unit soils that may pose a risk to human receptors if exposed.
- PCBs are present in the surface soil that pose a risk greater than 1.0E-06 and a HQ greater than 1 to the hypothetical resident receptor scenario.
- PCBs are present in surface soil that exceed the TSCA ARAR threshold of 1 mg/kg for high occupancy (i.e., unrestricted land use).

Based on the problems warranting action, the following RAOs, as agreed by the Core Team in the March 2024 scoping meeting, apply for the ECODS L-3 subunit:

- Prevent exposure of human receptors to presumed ACM that is likely present in unit soils if exposed.
- Prevent exposure of a future resident to Aroclor 1254 and Aroclor 1260 in surface soils at levels exceeding 1.0E-06 risk and HQ of 1.
- Prevent exposure of human receptors to Aroclor 1254 and Aroclor 1260 in surface soils at levels exceeding ARAR threshold of 1 mg/kg.

4.1.2 LRP 131-1L Subunit

According to the analysis performed in Appendices B (CM), C (HHRA), D (ERA), and E (PTSM), and the results summarized in Chapter 3, there are no CM, HH, ECO, or PTSM RCOCs identified for the LRP 131-1L subunit.

There are no problems warranting action identified for the LRP 131-1L subunit.

4.1.3 LRP 131-4L Subunit

According to the analysis performed in Appendices B (CM), C (HHRA), D (ERA), and E (PTSM), and the results summarized in Chapter 3, there are no CM, ECO, or PTSM RCOCs identified for the ECODS L-3 subunit. However, benzo(a)pyrene was identified as a HH RCOC for the hypothetical resident. Additionally, ACM is present in subsurface soils.

The following problems warranting action are identified for the LRP 131-4L subunit:

- ACM is present in unit soils that may pose a risk to human receptors if exposed.
- Benzo(a)pyrene is present in the surface soil that poses a risk greater than 1.0E-06 for the hypothetical resident receptor.

Based on the problems warranting action, the following RAOs, as agreed by the Core Team in the March 2024 scoping meeting, apply for the LRP 131-4L subunit:

- Prevent exposure of human receptors to presumed ACM that is present in unit soils.
- Prevent exposure of a future resident to benzo(a)pyrene in surface soils at levels exceeding 1.0E-06.

4.2 Preliminary Remediation Goal Development

PRGs represent the preliminary media-specific goals and serve as a standard by which to measure whether a selected remedial action has met its RAO. PRGs can be qualitative statements (e.g., indirect actions that prevent receptor contact), numerical values often expressed as concentrations in media (e.g., risk-based soil or sediment concentrations) or specific actions to eliminate contact with contaminated media (e.g., installation of engineered barriers, placement of caps and covers, etc.) that achieve the RAO. PRGs become finalized as cleanup levels following public comment and approval of the SB/PP. The PRGs for the selected remedy are documented as final cleanup levels in the ROD. Numerical PRGs consist of a range of risk-based concentrations for RCOCs that provide a basis for selecting the final remedial action to achieve such values. Risk-based PRG calculations for the ECODS L-3, LRP 131-1L, and LRP 131-4L OU are provided in Appendix F.

The selection of final cleanup levels is made by the risk managers for the SRS. The risk managers are the key decision makers and include representatives of the USDOE, SCDES, and USEPA.

The development of PRGs for the ECODS L-3, LRP 131-1L, and LRP 131-4L OU is described below.

4.2.1 Contaminant Migration Preliminary Remediation Goals

The CM analysis is presented in Appendix B of this document. No CM RCOCs were identified for any subunits within the ECODS L-3, LRP 131-1L, and LRP 131-4L OU. Therefore, no CM PRGs are developed.

4.2.2 Human Health Preliminary Remediation Goals

The HHRA is presented in Appendix C of this document. Aroclor 1254 and Aroclor 1260 were identified as HH RCOCs in surface soil media at the ECODS L-3 subunit for the resident scenario (Figure 4-1 and Figure 4-2). Aroclor 1254 and Aroclor 1260 were detected above residential PRGs at three locations, EL3-03, EL3-04, and EL3-16. Benzo(a)pyrene was identified as a HH RCOC in surface soil at the LRP 131-4L subunit for the resident scenario (Figure 4-3). Benzo(a)pyrene was detected above residential PRGs at four locations, LAP-4L-025, LAP-4L-032, LAP-4L-034, and LAP-4L-039. The range of HH PRGs (risk = 1E-04 to 1E-06, HQ = 0.1 to 3) for the RCOCs at the ECODS L-3 and LRP 131-4L subunits are provided in Appendix F.

No HH RCOCs were identified for LRP 131-1L subunit. Therefore, no HH PRGs are developed for the LRP 131-1L subunit.

4.2.3 Ecological Preliminary Remediation Goals

The ERA is presented in Appendix D of this document. No ECO RCOCs were identified for any subunits within the ECODS L-3, LRP 131-1L, and LRP 131-4L OU. Therefore, no ECO PRGs are developed.

4.2.4 Principal Threat Source Material Preliminary Remediation Goals

The PTSM analysis is presented in Appendix E of this document. No PTSM RCOCs were identified for any subunits within the ECODS L-3, LRP 131-1L, and LRP 131-4L OU. Therefore, no PTSM PRGs are developed.

4.2.5 Applicable or Relevant and Appropriate Requirements Preliminary Remediation Goals

As presented in the RI (Chapter 3), there are no chemical-specific ARAR RCOCs identified for any media (i.e., soil) within the LRP 131-1L and LRP 131-4L subunits. For the ECODS L-3 subunit, PCBs (Aroclor 1254 and Aroclor 1260) were identified as ARAR RCOCs, exceeding the TSCA ARAR threshold of 1.0 mg/kg for high-occupancy (i.e., unrestricted land use), however, as noted in Section 3.10, the ARAR is not applicable. The PCB ARAR PRGs are provided in Appendix F for purposes of comparison.

4.3 Most Restrictive and Most Likely Preliminary Remediation Goals

The most restrictive of the range of HH PRGs is presented in Appendix F and is shown in Table 4-1 and Figure 4-1 through Figure 4-3 for the resident scenario only (i.e., no RCOCs were identified for the industrial worker scenario). When both a carcinogenic PRG (i.e., risk = 1E-06) and non-carcinogenic PRG (HQ = 1) are calculated for the same chemical, the more conservative of the two is presented. For the ECODS L-3 subunit, the PCB TSCA ARAR threshold for high-occupancy is presented for Aroclor 1254 and Aroclor 1260 for comparison, however, as described in Section 3.10, the ARAR is not applicable. Additionally, a range of background values is also presented in order to assist in the selection of the most restrictive, applicable PRG. The Most Likely PRG is the most restrictive (i.e., residential) risk-based concentration. If the risk-based PRG is less than the SRS background, then the SRS 95th percentile is identified as the Most Likely PRG.

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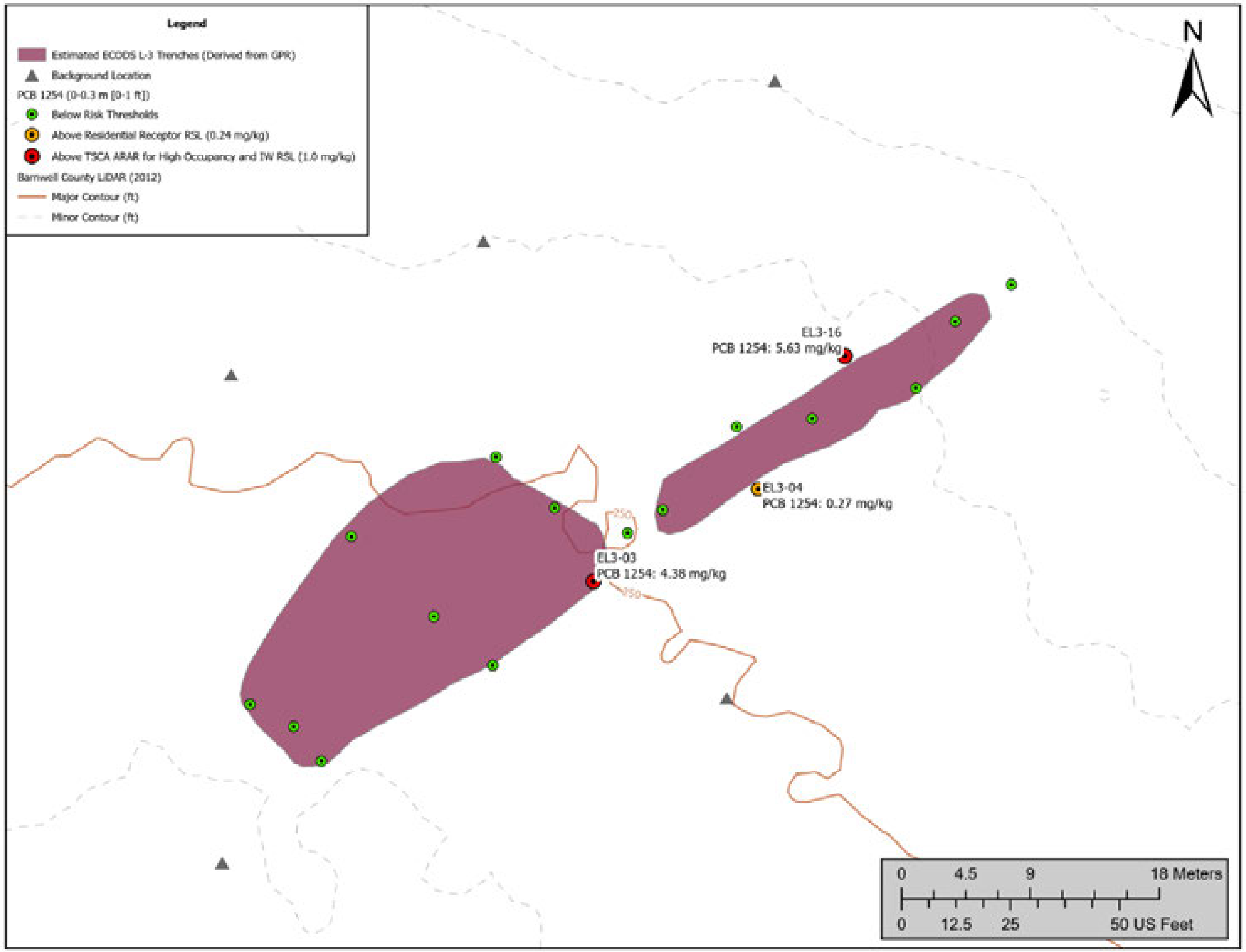

Figure 4-1. Aroclor 1254 Data for Surface Soil Media (0 to 0.3 m [0 to 1 ft]) at the ECODS L-3 Subunit

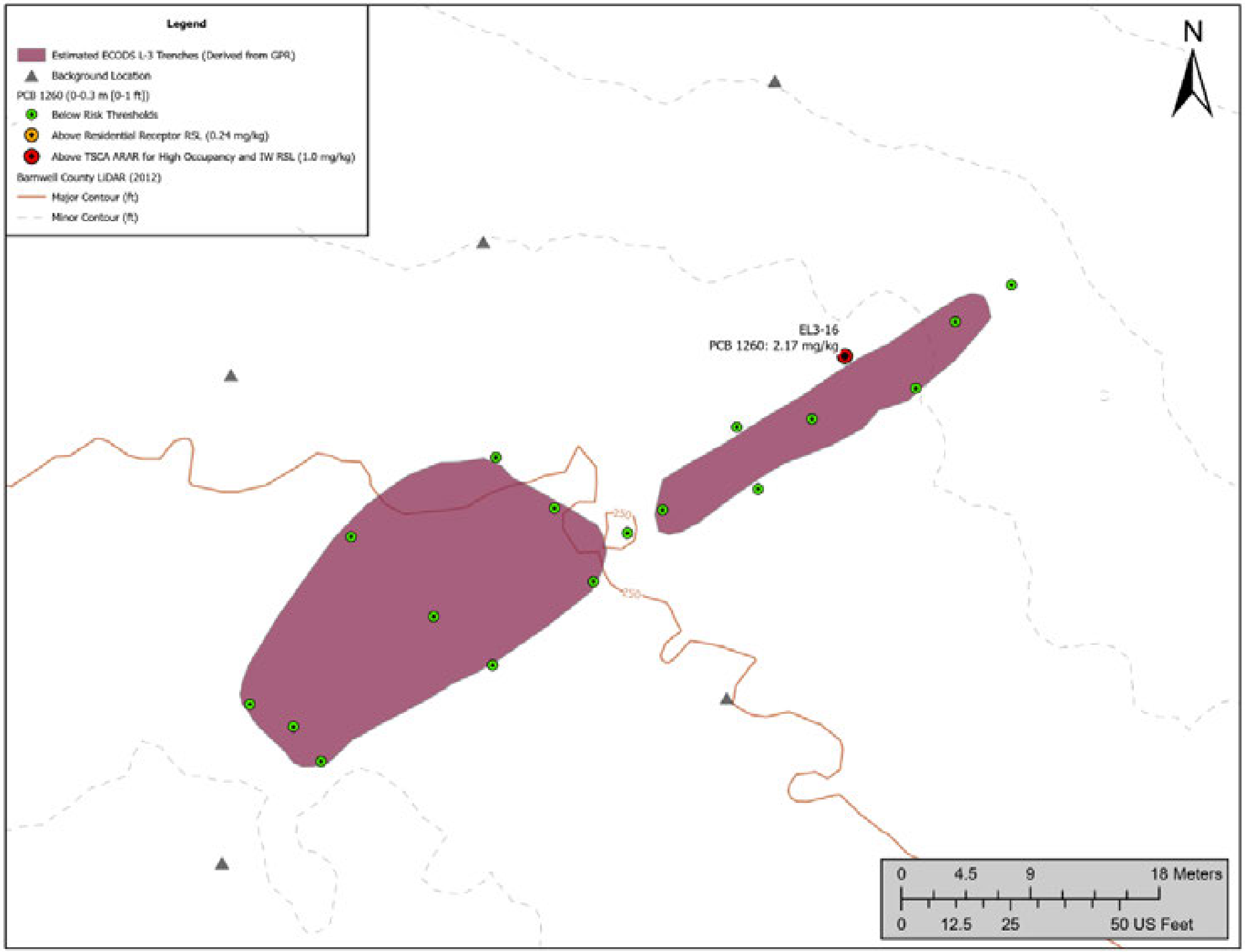

Figure 4-2. Aroclor 1260 Data for Surface Soil Media (0 to 0.3 m [0 to 1 ft]) at the ECODS L-3 Subunit

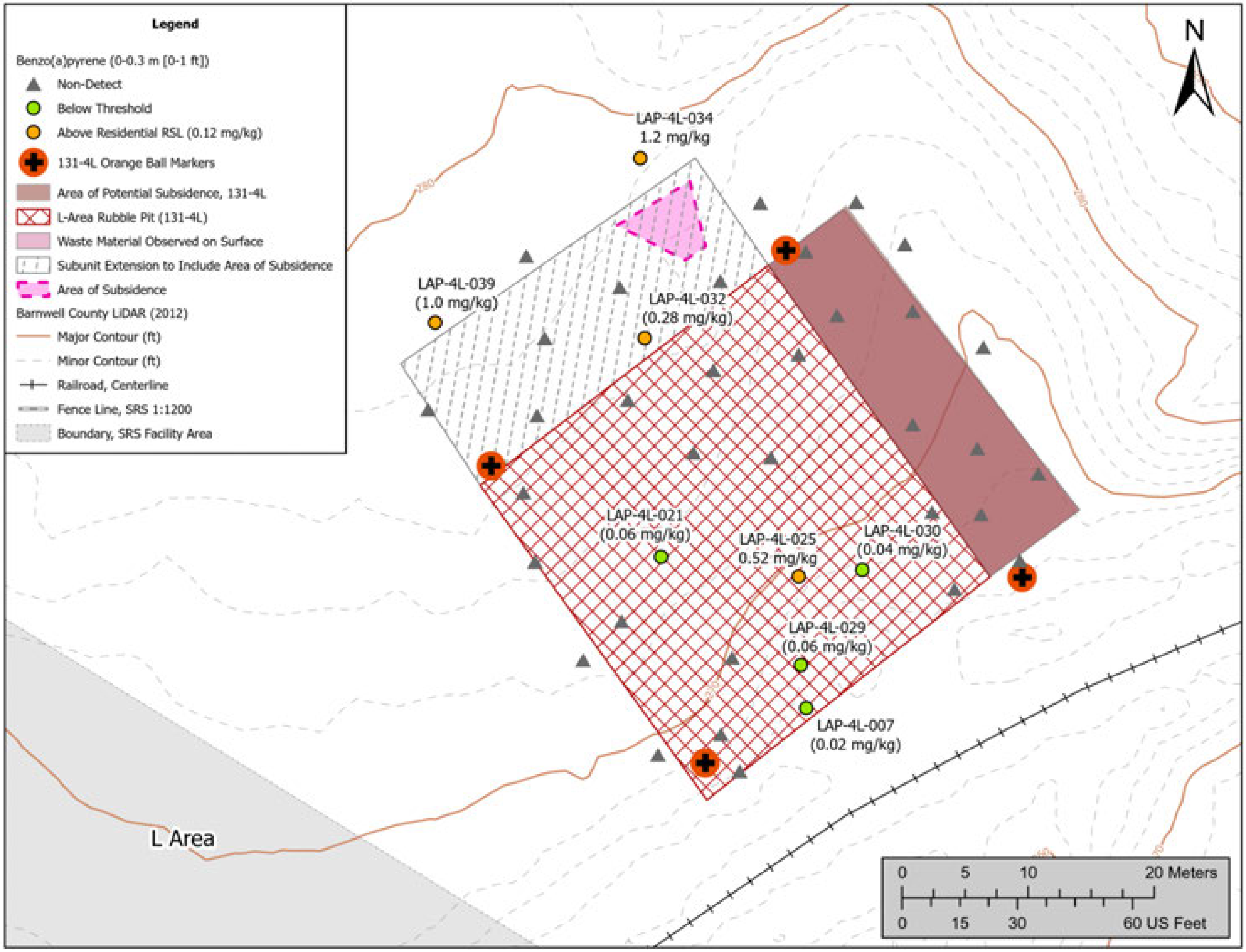

Figure 4-3. Benzo(a)pyrene Data for Surface Soil Media (0 to 0.3 m [0 to 1 ft]) at the LRP 131-4L Subunit

Table 4-1. Cleanup Levels (PRGs) for the ECODS L-3, LRP 131-1L, and LRP 131-4L OU

Media	HH RCOC	Units	Resident PRG[1]	ARAR PRG[2]	SRS Background 2X Average Concentration	SRS Background 95th Percentile[3]	SRS Background Maximum[3]	Most Likely PRG[4]
ECODS L-3 Subunit								
Soil	Aroclor 1254	mg/kg	*0.24*	1.0	NA[5]	NA[5]	NA[5]	0.24
Soil	Aroclor 1260	mg/kg	*0.24*	1.0	NA[5]	NA[5]	NA[5]	0.24
LRP 131-4L Subunit								
Soil	Benzo(a)pyrene	mg/kg	*0.12*	N/A[6]	0.025	0.036	0.008	0.12

1 – Resident PRGs are identified at risk = 1E-06 or HQ = 1 from Appendix F. For Aroclor 1254, the more conservative carcinogenic PRG is shown.
2 – For comparison purposes, the PCB TSCA ARAR threshold for high-occupancy is presented for Aroclor 1254 and Aroclor 1260 (see Section 3.10).
3 – SRS background concentrations from Background Soils Statistical Summary Report for the Savannah River Site (WSRC 2006), Appendix B-2 (all depths interval).
4 – Most Likely PRG is the most restrictive (i.e., residential) risk-based concentration. If the risk-based PRG is less than SRS background, then the SRS 95th percentile is identified as the Most Likely PRG. Source of the Most Likely PRG is identified in *italics*.
5 – Not available; SRS background concentrations not available for PCBs.
6 – Not applicable; not identified as an ARAR RCOC.

5.0 CORRECTIVE MEASURES STUDY / FEASIBILITY STUDY

This chapter describes the general response actions for the ECODS L-3, LRP 131-1L, and LRP 131-4L OU identifies potential remedial technologies for each general response action and screens remedial technologies with respect to effectiveness, implementability, and cost. According to the analyses performed in Appendix B (CM), Appendix C (HHRA), Appendix D (ERA), and Appendix E (PTSM), only the ECODS L-3 and LRP 131-4L subunits require a response action to restrict/eliminate exposure to unacceptable risks.

The ECODS L-3 subunit presents an unacceptable risk to human receptors. Aroclor 1254 and Aroclor 1260 are present in surface soils that have been determined to pose an unacceptable risk for the residential scenario. ACM is also likely present in unit soils. The potential for human exposure to asbestos is likely should disturbance of unit soils occur.

At the LRP 131-1L subunit, no risk to HH or ecological receptors was determined, as well as no PTSM. Additionally, there were no CM issues to groundwater. Because this subunit had no impact to the environment, further evaluation of the LRP 131-1L subunit is not needed.

The LRP 131-4L subunit presents an unacceptable risk to human receptors. Benzo(a)pyrene is present in surface soils that have been determined to pose an unacceptable risk for the residential scenario. ACM is also present in unit soils. The potential for human exposure to asbestos is likely should disturbance of unit soils occur.

The initial list of technologies applicable to the ECODS L-3 and LRP 131-4L subunits is based upon the approved likely response actions from March 19, 2024, scoping meeting with the USDOE, USEPA, and SCDES.

5.1 Identification and Screening of Technologies

The purpose of this section is to describe the applicability of the specific technology types identified for the ECODS L-3 and LRP 131-4L subunits. Identified technologies are screened using the NCP criteria: effectiveness, implementability, and cost. Technologies that pass this screening are retained and carried forward into the development of remedial action alternatives.

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5.1.1 General Response Action

General response actions are unit-specific actions that achieve RAOs and satisfy the requirements of the NCP. General response actions have been identified for the ECODS L-3, LRP 131-1L, and LRP 131-4L OU as follows:

- No Action
- Land Use Controls (LUCs)
- Containment
- Excavate and Disposal

These General Response Actions may be implemented singly or in combination.

5.1.1.1 No Action

The No Action response is not a technology but is required by the NCP as a baseline for comparison with other remedial actions. In this scenario, no efforts would be taken to monitor, remove, treat, or otherwise mitigate the potential spread of contaminants from the ECODS L-3, LRP 131-1L, and LRP 131-4L OU. Contaminant reduction would be achieved only through any natural attenuation that may occur.

5.1.1.2 Land Use Controls

LUCs include engineering controls (i.e., access controls) and institutional controls (i.e., administrative measures) that minimize the potential for human exposure to contaminants. Generally, LUCs are retained for use, if necessary, in conjunction with other remedial alternative(s) ultimately selected at the area or as a stand-alone alternative. LUCs already exist at SRS and can be implemented at the ECODS L-3, LRP 131-1L, and LRP 131-4L OU.

Access controls involve temporary or permanent physical restrictions to prevent or reduce human exposure to contaminants. Controls also can be used to prevent vandalism of on-site remedial equipment or disturbance of contaminated media. Regular monitoring and maintenance of access controls are required for this technology to effectively deter site entry. Access controls may include, but are not limited to, signs, fencing, barricades, or exclusion devices.

Administrative controls can be used to prevent or reduce future human exposure to contaminants remaining on the site. For example, excavation permit restrictions can be used to permanently prohibit excavation or subsurface construction. Administrative controls can also be temporary measures used while other remedial actions are taking place.

In the long-term, if the property is ever transferred to nonfederal ownership, the U.S. Government would, in compliance with Section 120(h) of CERCLA, create a deed for the new property owner. The deed would include notification disclosing the former waste management and disposal activities as well as remedial actions taken onsite and any continuing groundwater monitoring commitments.

5.1.1.3 Containment

Containment technologies minimize or eliminate human and ecological exposure to contaminants and minimize leaching, erosion, and bio-uptake of contaminated media through the use of engineered barriers including covers and caps.

5.1.1.4 Excavation and Disposal

Excavation and disposal response actions eliminate human and ecological exposure to contaminants by permanently removing the contaminated media from the unit. This type of response action is achieved by scraping, cutting, digging, and/or vacuuming with heavy moving equipment through the use of conventional construction methods.

5.1.2 Screening of Technology Types and Process Options

Various technologies and approaches exist for implementing the General Response Actions for the ECODS L-3, LRP 131-1L, and LRP 131-4L OU. The NCP requires that these potential technologies be screened against criteria of effectiveness, implementability, and cost.

- Effectiveness: An effective technology must achieve specified RAOs, be compatible with contaminant characteristics and waste unit conditions, and be protective of human health and the environment in both short-term and long-term scenarios. Technologies that do not meet RAOs, are significantly less effective than comparable approaches, or have not been

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demonstrated successfully at a similarly contaminated site are eliminated from further consideration.

- Implementability: Technologies are evaluated based on the technical feasibility, availability of resources and equipment, and the administrative or institutional feasibility of implementation. Implementable technologies are those that can be readily installed in a cost effective and timely fashion and that will not elicit substantial public concern from the surrounding community. Mobilization and permitting requirements must be workable and must have been previously demonstrated at similar projects. Consideration is also given to regulatory constraints such as waste handling, disposal, and treatment requirements that would affect the implementation of a technology.
- Cost: A qualitative cost evaluation is provided so that comparisons can be made among the alternatives. Qualitative evaluations take into consideration capital costs and operation and maintenance (O&M) costs. For screening purposes, the costs of technologies are typically described as high, medium, or low relative to others in the same general category.

General technologies were identified and screened initially during the scoping meeting conducted on March 19, 2024. General technologies that pass the initial screening process for effectiveness, implementability, and cost are retained and carried forward for consideration in the development of OU-specific remedial alternatives in Section 5.2. A summary of the general technology screen is provided below and summarized in Table 5-1.

5.1.2.1 No Action

This response would take no action to monitor, remove, treat, or otherwise mitigate the potential spread of contaminants from the ECODS L-3, LRP 131-1L, and LRP 131-4L OU. The No Action response could be readily implemented and would be the least expensive response.

Although the No Action response is ineffective at achieving RAOs or preventing access to the ECODS L-3, LRP 131-1L, and LRP 131-4L OU contaminants, it is required by the NCP and is retained as a baseline for comparison with other remedial actions. Therefore, No Action is retained for further consideration in the development of alternatives.

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5.1.2.2 Land Use Controls

This response action leaves in place hazardous substances that present a potential risk for residential and industrial worker scenarios. Both administrative and engineering controls would prevent exposure of potential human receptors to contaminants by limiting access to the land or resource use. LUCs are relatively simple and inexpensive to implement and may be retained as an independent alternative or in conjunction with another remedial alternative(s).

LUCs are relatively low in cost, provide a high degree of protection of human health, and are relatively simple to implement. Therefore, LUCs are retained for further consideration in the development of alternatives.

5.1.2.3 Containment

Containment technologies involve the construction of engineered caps and soil covers to isolate contaminated media. Technologies include soil covers, horizontal barriers, and synthetic membrane covers/liners. Properly constructed and maintained containments are effective and reliable at preventing direct exposure to contaminants and at minimizing leaching, erosion, mobility, and bio-uptake.

For the ECODS L-3, LRP 131-1L, and LRP 131-4L OU, there are no CM concerns. Therefore, a low permeability cover system to reduce infiltration will not be necessary. Containment simply needs to break the pathway for human receptors to be exposed to contaminants in surface soils.

The effectiveness of containment technologies depends upon the materials used and the design and effectiveness of the soil cover. Cover integrity must be maintained for as long as contaminants will persist or until degradation or decay of the contaminants renders them harmless. Maintenance activities include inspections and monitoring for settlement and erosion. LUCs would be required in conjunction with a containment remedy.

Containment alternatives are relatively high in cost, provide a high degree of protection of human health, and are considered a standard practice that has been performed at several waste units at SRS. Containment is retained for further consideration in the development of alternatives.

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5.1.2.4 Excavation and Disposal

Excavation and disposal of contaminated media in an appropriate facility is one of the most aggressive approaches to remediation. Contaminated media could be excavated and hauled to an approved disposal facility. Removing contaminated media from the ECODS L-3, LRP 131-1L, and LRP 131-4L OU would lower risk levels for human receptors by permanently removing the contaminated media.

The earthwork required for excavating the contaminated media is a standard construction practice and is readily accomplished. The action is highly effective in eliminating risk to human and ecological receptors due to the permanence of the removal. The cost of this action could be substantial based upon the volume of contaminated media present and the distance the media must be hauled to an approved waste disposal facility. Excavation and disposal will be retained for further consideration in the development of alternatives.

5.2 Development and Screening of Alternatives

Potential alternatives have been developed to address the contaminated media at the ECODS L-3 and LRP 131-4L subunits. In accordance with the NCP, it is desirable to offer a range of diverse alternatives to compare during the detailed analysis. The range of alternatives includes options that 1) restrict exposure to contaminated media; 2) reduce exposure to contaminated media and require the need for long-term management; and 3) removes all contaminant volume eliminating all exposure to contaminated media. As required by the NCP, the No Action alternative is provided as a baseline for comparison.

The RAOs identified for the ECODS L-3 subunit soil media are:

- Prevent exposure of human receptors to presumed ACM that is likely present in unit soils if exposed.
- Prevent exposure of a future resident to Aroclor 1254 and Aroclor 1260 in surface soils at levels exceeding 1.0E-06 risk and HQ of 1.
- Prevent exposure of human receptors to Aroclor 1254 and Aroclor 1260 in surface soils at levels exceeding ARAR threshold of 1 mg/kg.

The RAOs identified for the LRP 131-4L subunit soil media are:

- Prevent exposure of human receptors to presumed ACM that is present in unit soils. The primary route of exposure is the inhalation pathway.
- Prevent exposure of a future resident to benzo(a)pyrene in surface soils at levels exceeding 1.0E-06.

5.2.1 Development of Alternatives

Based on the technology screening and the RAOs for the ECODS L-3, LRP 131-1L, and LRP 131-4L OU, four (4) remedial alternatives have been developed.

5.2.1.1 <u>ECODS L-3 Subunit</u>

5.2.1.1.1 Alternative A-1: No Action

The No Action alternative is required by the NCP to serve as a baseline for comparison with other remedial alternatives. Under this alternative, no effort would be made to control access; limit exposure; or reduce toxicity, mobility, or volume of COCs at the ECODS L-3 subunit. This alternative would leave the ECODS L-3 subunit in its current condition with no additional controls. This alternative does not include five-year remedy reviews.

5.2.1.1.2 Alternative A-2: Land Use Controls

This alternative involves the use of administrative and engineering controls to limit access to the entire ECODS L-3 subunit. LUCs have been implemented successfully within SRS and are fully employed in all areas of the site to limit access at the site boundary and on-site facilities. LUCs would be implemented at the ECODS L-3 subunit through the use of warning and no trespassing signs; excavation permit restrictions; a Land Use Control Implementation Plan (LUCIP); and for the long term, deed restrictions would be put into place to preclude activities that could cause exposure to contaminated media exceeding acceptable risk levels in the event the property were to be transferred out of federal ownership. Five-year remedy reviews would be required under this alternative.

5.2.1.1.3 Alternative A-3: Soil Cover with Land Use Controls

This alternative consists of using a containment technology in which a 0.6 m (2 ft) soil cover would be placed over the entire area of the ECODS L-3 subunit. Specifically, this remedial alternative includes clearing and grubbing ~0.2 hectares (ha) (0.5 acres [ac]), hauling and placing ~1,729 cubic meters (m^3) (2,261 cubic yards [yd^3]) of clean soil to cover, grade, and contour the soil cover; hauling and placing ~93 m^3 (122 yd^3) of topsoil to construct a vegetated cover over the footprint; hauling and placing ~920 m^2 (1,100 yd^2) of sod over the topsoil; and constructing a stormwater management system. This alternative would require LUCs through the use of warning and no trespassing signs, excavation permit restrictions, a LUCIP, and deed restrictions would be put into place to preclude activities that could cause exposure to contaminated media exceeding acceptable risk levels in the event the property were to be transferred out of federal ownership. Maintenance of the soil cover and five-year remedy reviews are required.

5.2.1.1.4 Alternative A-4: Excavation and Disposal

This alternative consists of excavating all contaminated media within the ECODS L-3 subunit and disposing off-site. Specifically, this remedial alternative includes clearing ~0.2 ha (0.5 ac); constructing a stormwater management system, the removal and offsite disposal of ~8,047 m^3 (10,525 yd^3) of contaminated media to a depth of 3.7 m (12 ft) below the ground surface (the bottom depth of the disposal pits); contouring the site after removal of the contaminated media; backfilling with clean fill to grade; and constructing a vegetated cover over the footprint. This alternative would not require LUCs or five-year remedy reviews.

5.2.1.2 <u>LRP 131-4L Subunit</u>

5.2.1.2.1 Alternative B-1: No Action

The No Action alternative is required by the NCP to serve as a baseline for comparison with other remedial alternatives. Under this alternative, no effort would be made to control access; limit exposure; or reduce toxicity, mobility, or volume of COCs at the LRP 131-4L subunit. This alternative would leave the LRP 131-4L subunit in its current condition with no additional controls. This alternative does not include five-year remedy reviews.

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5.2.1.2.2 Alternative B-2: Land Use Controls

This alternative involves the use of administrative and engineering controls to limit access to the entire LRP 131-4L subunit. Because waste was determined beyond the known boundary of the subunit and to better define the extent of the buried waste, confirmatory drilling at 12 borings to a depth of 4.9 m (16 ft) bgs would be performed. A continuous core would be collected from the drilled borehole from the subsurface and visually inspected to determine the absence or presence of waste. No analytical samples are to be collected. This information would be used to establish the LUC boundary and would be provided in the LUCIP.

LUCs have been implemented successfully within SRS and are fully employed in all areas of the site to limit access at the site boundary and on-site facilities. LUCs would be implemented at the LRP 131-4L subunit through the use of warning and no trespassing signs; excavation permit restrictions; a LUCIP; and for the long term, deed restrictions would be put into place to preclude activities that could cause exposure to contaminated media exceeding acceptable risk levels in the event the property were to be transferred out of federal ownership. Five-year remedy reviews would be required under this alternative.

5.2.1.2.3 Alternative B-3: Soil Cover with Land Use Controls

This alternative consists of using a containment technology and LUCs to prevent exposure of the identified contaminants at the LRP 131-4L subunit. Because waste was determined beyond the known boundary of the subunit and to better define the extent of the buried waste, confirmatory drilling at 12 borings to a depth of 4.9 m (16 ft) bgs would be performed. A continuous core would be collected from the drilled borehole from the subsurface and visually inspected to determine the absence or presence of waste. No analytical samples are to be collected. This information would be used to establish the LUC boundary and would be provided in the LUCIP.

This alternative consists of a placing a 0.6 m (2 ft) soil cover over the entire area of the LRP 131-4L subunit. Specifically, this remedial alternative includes clearing and grubbing ~0.5 ha (1.2 ac); hauling and placing ~4,755 m^3 (5,200 yd^3) of clean soil to cover, grade, and contour the soil cover; hauling and placing ~257 m^3 (281 yd^3) of topsoil to construct a vegetated cover over the footprint; hauling and placing ~2,313 m^2 (2,530 yd^2) of sod over the topsoil; and constructing a stormwater

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management system. The estimated volume is based on the maximum extent of contamination, extending the boundary to the northwest to a nearby ditch feature. The ditch shows no evidence of buried waste present and acts as a maximum subunit boundary, to be confirmed by confirmatory sampling. The volume is subject to decrease based on the results of the confirmatory sampling. This alternative would also require LUCs to maintain the soil cover and five-year remedy reviews.

5.2.1.2.4 Alternative B-4: Excavation and Disposal

This alternative consists of excavating all contaminated media within the LRP 131-4L subunit and disposing off-site. Because waste was determined beyond the known boundary of the subunit and to better define the extent of the buried waste, confirmatory drilling at 12 borings to a depth of 4.9 m (16 ft) bgs would be performed. A continuous core would be collected from the drilled borehole from the subsurface and visually inspected to determine the absence or presence of waste. No analytical samples are to be collected. This information would be used to establish the extent of the contaminated material that would need to be removed.

Specifically, this remedial alternative includes clearing ~0.5 ha (1.2 ac), the removal and offsite disposal of ~21,592 m^3 (23,613 yd^3) of contaminated media to a depth of 4.3 m (14 ft) below the ground surface (the bottom depth of the disposal pits), contouring the site after removal of the contaminated media, backfilling with clean fill to grade, and constructing a vegetated cover over the footprint. The estimated volume is based on the maximum extent of contamination, extending the boundary to the northwest to a nearby ditch feature. The ditch shows no evidence of buried waste present and acts as a maximum subunit boundary, to be confirmed by confirmatory sampling. The volume is subject to decrease based on the results of the confirmatory sampling. This alternative would not require LUCs or five-year remedy reviews.

5.2.2 Screening of Alternatives

In this section, the alternatives for the ECODS L-3 and LRP 131-4L subunits are evaluated against the CERCLA criteria of effectiveness, implementability, and cost. The retained alternatives will be analyzed in detail in Section 5.3.

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For an alternative to be effective, it must achieve specified objectives, must be compatible with the contaminant characteristics and unit conditions, and must be protective of human health and the environment in the long term. The alternative must also be effective in reducing the risk to human health and the environment in the short term (during construction and construction execution). In addition, each alternative should be effective in decreasing the inherent threats or risks associated with hazardous substances or media by reducing their toxicity, mobility, or volume. Permanence of the action is also considered. Alternatives that do not provide adequate protection of human health and the welfare of the environment or that do so to a much lesser extent than a comparable alternative are screened out and not considered during the detailed analysis.

Implementability addresses both the technical and institutional feasibility of applying a technology. Under this criterion, technologies are evaluated based on the technical feasibility to construct, reliably operate, and meet technology-specific regulations for the particular treatment operation, maintenance, and monitoring of technical components of the alternative, if required, after the remedial action is complete. Institutional feasibility of an alternative refers to the ability to obtain necessary approvals and the availability of treatment, storage, and disposal services and capacity, as needed, as well as availability of specific equipment, technical specialists, and other related components.

The nature of the alternative should be such that it can be implemented in a cost effective and timely manner. In addition, the implementation of the technology should not elicit substantial public concerns in the community. Site accessibility, available area, and potential future use of the property may affect the implementation of a specific technology. Mobilization and permitting or approval requirements must be workable and previously demonstrated at similar projects. Preliminary consideration is also given to regulatory constraints such as waste handling, disposal, and treatment requirements that would affect the implementation of a technology. These considerations will be evaluated further during the detailed analysis for retained alternatives when action-specific ARARs are developed. Screened out alternatives will not be considered during the detailed analysis.

A qualitative cost evaluation is provided so that cost comparisons can be made among the alternatives. Remedial alternative costs are described as high, medium, or low relative to other

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technologies in the same general response action category. Qualitative evaluations take into consideration capital costs and O&M costs. These estimates are based on prior estimates, previous experience, and engineering judgment. Alternatives demonstrating comparable levels of applicability, effectiveness, and implementability but at a significantly greater cost will be rejected. Otherwise, cost will not be used as a criterion to screen technologies at this point in the CMS/FS process.

The proposed remedial alternatives for the ECODS L-3 and LRP 131-4L subunits were evaluated against the initial screening criteria of effectiveness, implementability, and cost. Tables 5-2 and 5-3 summarize the results of this screening. The results of the evaluation are described in the following sections.

5.2.2.1 ECODS L-3 Subunit

5.2.2.1.1 Alternative A-1: No Action

The No Action Alternative is not appropriate for the ECODS L-3 subunit as it does not meet the RAO goal defined in Chapter 4. However, in accordance with the NCP, this alternative is carried forward to serve as a baseline for comparison with other remedial alternatives.

5.2.2.1.2 Alternative A-2: Land Use Controls

Alternative A-2 proposes placing administrative and engineering controls on the contaminated media within the ECODS L-3 subunit to prevent exposure to human receptors. Human health and the environment would be protected in the long term through O&M of the controls, as well as in the short term due to no worker exposure to contaminated media during implementation. There is no reduction in toxicity, mobility or volume with this alternative. Alternative A-2 is readily implementable due to the previously successful implementation of LUCs at other locations on the SRS. This alternative is considered to be on the low end of the cost scale by requiring only signage, excavation permit restrictions, a LUCIP, and any necessary deed restrictions. Since PCBs and asbestos are highly unlikely to degrade over time, the signage is expected to require maintenance beyond the 30 years used in the cost estimate. This alternative is determined to be effective and is retained for detailed analysis.

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5.2.2.1.3 Alternative A-3: Soil Cover with Land Use Controls

Alternative A-3 proposes placing a 0.6 m (2 ft) layer of clean fill over the ECODS L-3, with LUCs to maintain the integrity of the cap. Human health and the environment would be protected in the long term as long as O&M of the soil cover and signage persists, as well as in the short term through the use of best management construction practices and strict adherence to the project-specific health and safety plan. There is no reduction in toxicity, mobility, or volume with this alternative. Alternative A-3 is readily implementable due to SRS's previously successful implementation of LUCs across the site and experience with the common construction methods and equipment used to implement this type of alternative. This alternative is considered to have a comparatively higher cost due to the stormwater management, transportation and placement of the fill material, the grading and contouring of the soil cover, placement of a vegetative cover, and the implementation of LUCs. Since PCBs and asbestos are highly unlikely to degrade over time, the cover is expected to require maintenance beyond the 30 years used in the cost estimate. This alternative is determined to be effective and is retained for detailed analysis.

5.2.2.1.4 Alternative A-4: Excavation and Disposal

Excavation and Disposal consists of excavating all contaminated media from the ECODS L-3 subunit and disposing of it offsite. Human health and the environment would be protected in the long term due to the permanence of removing contaminated media and in the short term through the use of best management construction practices and strict adherence to the project-specific health and safety plan. This alternative does not provide a reduction in toxicity, mobility, and volume through treatment of the contaminated media from this unit. Alternative A-4 is determined to be moderately implementable due to SRS's previous experience with the common construction methods and equipment used to implement this type of alternative, but special worker requirements, work controls (e.g., dust suppression) and permits would be required to excavate the ACM. This alternative is considered to have a relatively higher cost due to special permits, worker requirements, and work controls that must be put in place for contact with asbestos, the excavation of contaminated media from the entire subunit (to the bottom of the disposal pits), loaded and hauled to an approved off-site disposal facility, and the area filled to grade with clean fill. This alternative is determined to be effective and is retained for detailed analysis.

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5.2.2.2 LRP 131-4L Subunit

5.2.2.2.1 Alternative B-1: No Action

The No Action Alternative is not appropriate for the LRP 131-4L subunit as it does not meet the RAO goals defined in Chapter 4. However, in accordance with the NCP, this alternative is carried forward to serve as a baseline for comparison with other remedial alternatives.

5.2.2.2.2 Alternative B-2: Land Use Controls

Alternative B-2 proposes placing administrative and engineering controls on the contaminated media within the LRP 131-4L subunit to prevent exposure to human receptors. Human health and the environment would be protected in the long term through O&M of the controls, as well as in the short term due to no worker exposure to contaminated media during implementation There is no reduction in toxicity, mobility or volume with this alternative. Alternative B-2 is readily implementable due to the previously successful implementation of LUCs at other locations on the SRS. This alternative is considered to be on the low end of the cost scale by only requiring signage, excavation permit restrictions, a LUCIP, and any necessary deed restrictions. Since asbestos is highly unlikely to degrade over time, the signage is expected to require maintenance beyond the 30 years used in the cost estimate. This alternative is determined to be effective and is retained for detailed analysis.

5.2.2.2.3 Alternative B-3: Soil Cover with Land Use Controls

Alternative B-3 proposes placing a 0.6 m (2 ft) layer of clean fill over the LRP 131-4L, with LUCs to maintain the integrity of the cap. Human health and the environment would be protected in the long term as long as O&M of the soil cover and signage persists, as well as in the short term through the use of best management construction practices and strict adherence to the project-specific health and safety plan. There is no reduction in toxicity, mobility or volume with this alternative. Alternative B-3 is readily implementable due to SRS’s previously successful implementation of LUCs across the site and experience with the common construction methods and equipment used to implement this type of alternative. This alternative is considered to have a comparatively higher cost due to the stormwater management, transportation and placement of the fill material, the grading and contouring of the soil cover, placement of a vegetative cover, and the implementation of LUCs. Since asbestos is highly unlikely to degrade over time, the cover is expected to require maintenance beyond the 30 years used in the cost estimate. This alternative is determined to be effective and is retained for detailed analysis.

5.2.2.2.4 Alternative B-4: Excavation and Disposal

Excavation and Disposal consists of excavating all contaminated media from the LRP 131-4L subunit and disposing of it offsite. Human health and the environment would be protected in the long term due to the permanence of removing contaminated media and in the short term through the use of best management construction practices and strict adherence to the project-specific health and safety plan. This alternative does not provide a reduction in toxicity, mobility, and volume through treatment of the contaminated media from this unit. Alternative B-4 is determined to be moderately implementable due to SRS's previous experience with the common construction methods and equipment used to implement this type of alternative, but special worker requirements, work controls (e.g., dust suppression) and permits would be required to excavate the ACM. This alternative is considered to have a significantly higher cost due to special permits, worker requirements, and work controls that must be put in place for contact with asbestos, the excavation of contaminated media from the entire subunit (to the bottom of the disposal pits), loaded and hauled to an approved off-site disposal facility, and the area filled to grade with clean fill. This alternative is determined to be effective and is retained for detailed analysis.

5.3 Detailed Analysis of Alternatives

This section discusses the relative strengths and weaknesses of the alternatives retained from the screening of alternatives in section 5.2.2 with respect to each of the nine CERCLA evaluation criteria. The NCP requires that potential remedial alternatives undergo detailed analysis using relevant criteria that will be used by decision makers to select a final remedy. The results of the detailed analysis are then examined to compare alternatives and identify key tradeoffs among alternatives.

The statutory requirements that guide the evaluation of remedial alternatives under CERCLA state that a remedial action must:

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- Be protective of human health and the environment,
- Attain ARARs or define criteria for invoking a waiver,
- Be cost effective, and
- Use permanent solutions to the maximum extent.

USEPA has established nine evaluation criteria to address these statutory requirements under CERCLA. These criteria fall into the categories of threshold criteria, primary balancing criteria, and modifying criteria as outlined below.

Threshold Criteria

Each alternative must meet the following threshold criteria to be selected as a permanent remedy under CERCLA:

- **Overall protection of human health and the environment –** The overall protection of human health and the environment is evaluated for each alternative on the basis of the extent to which the alternative reduces the risk of exposure to contaminants from potential exposure pathways through engineered barriers or LUCs. Each alternative is examined as to whether it creates any unacceptable short-term risks to human health.
- **Compliance with ARARs –** Remedial actions under CERCLA must attain all ARARs. ARARs are cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal, State, or local environmental law that specifically addresses a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site. The summary of potential ARARs for the ECODS L-3, LRP 131-1L, and LRP 131-4L OU is provided in Table 5-4

Primary Balancing Criteria

Primary balancing criteria are factors that identify key tradeoffs among alternatives.

- **Long-term Effectiveness and Permanence –** Long-term effectiveness and permanence are evaluated for each alternative on the basis of the magnitude of residual risk and the adequacy and reliability of controls used to manage contaminated media that remain after response

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objectives have been achieved. Alternatives that offer long-term effectiveness and permanence halt or otherwise mitigate any potential for offsite contaminant transport and minimize the need for future engineered controls.

- **Reduction of Mobility, Toxicity, or Volume –** The statutory preference is to select a remedial action that reduces the toxicity, mobility, or volume of hazardous substances. The degree to which alternatives employ recycling or treatment is assessed, including how treatment is used to address the principal threats posed by the waste unit.
- **Short-term Effectiveness –** Evaluation of alternatives for short-term effectiveness takes into account protection of remedial workers, members of the community, and the environment during implementation of the remedial action and the time required to achieve RAOs/PRGs. Schedule estimates are based on projected availability of materials and labor and may have to be updated at the time of remediation.
- **Implementability –** Each alternative is evaluated with respect to the technical and administrative feasibility of implementing the alternatives as well as the availability of necessary equipment and services. This criterion includes the ability to obtain services, capacities, equipment, and specialists necessary to construct components of the alternative; the ability to operate the technologies and monitor their performance and effectiveness; and the ability to obtain necessary approvals from other agencies.
- **Cost –** Accuracy of present-worth costs is +50/-30% according to USEPA guidance. Detailed cost estimates are derived from current information including vendor quotes; conventional cost estimating guides; and costs associated with serial costs, site conditions, competitive market conditions, final project scope, and implementation schedule at the time that the remedial activities are initiated. Real interest rates on U.S. Treasury notes and bonds of specific maturity were used to estimate present-worth costs. Present-worth costs for review of the site remedy every five (5) years are given for each alternative for which residuals remain at the site. Present-worth costs for these items are based on an estimated time frame of operation.

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Modifying Criteria

Modifying criteria (i.e., State or support agency acceptance, community acceptance) will be considered during remedy selection.

- **State or Support Agency Acceptance –** The preferred alternative should be acceptable to State and support agencies. The State acceptance criterion is evaluated based on scoping meetings held between the USDOE, USEPA, and SCDES, and based on comments received on this CMS/FS, which are addressed in the final SB/PP document.
- **Community Acceptance –** The concerns of the community should also be considered in presenting alternatives that would be acceptable to the community. Community acceptance is evaluated based on comments on the SB/PP received during the public comment period. These comments are considered in the final remedy selection for the ROD. The largest population concentrations around SRS are located in Augusta, Georgia, and Aiken and North Augusta, South Carolina.

The retained alternatives are be evaluated against the seven CERCLA threshold and balancing criteria that provide the basis for evaluating the alternatives and selecting a remedy. The purpose of this section is to identify key advantages and disadvantages of each alternative. The remaining two modifying criteria will be evaluated in the SB/PP.

5.3.1 ECODS L-3 Subunit

A comparison of the ECODS L-3 subunit alternatives to the primary balancing and modifying criteria are discussed in Sections 5.3.1.1 – 5.3.1.4 and summarized in Table 5-5.

5.3.1.1 Alternative A-1: No Action

Alternative A-1 was carried forward as required by the NCP to serve as a baseline for comparison with other remedial alternatives. Alternative A-1 consists of performing no action to address the RAOs at the ECODS L-3 subunit. Contaminated media would remain in place and no LUCs or active remediation would be conducted to control current and/or future potential risk; to treat or remove contaminated media; or to reduce toxicity, mobility, or volume of the contaminated media.

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Protection of Human Health and the Environment

The No Action alternative would not address the risk to human receptors from exposure to the contaminated media. The No Action alternative would not achieve the RAOs and therefore would not be protective of human health and the environment and would not cause additional natural resource injury.

Compliance with ARARs

Table 5-4 lists the potential ARARs applicable to the ECODS L-3 subunit. The specific ARARs applicable to each alternative are listed below.

- ***Chemical-Specific ARARs***: 40 CFR 761.61 provides cleanup and disposal options for PCB remediation waste.
- ***Location-Specific ARARs***: No location-specific ARARs are associated with Alternative A-1.
- ***Action-Specific ARARs***: No location-specific ARARs are associated with Alternative A-1.

Long-Term Effectiveness

Potential future exposure to human health from contaminated media at the ECODS L-3 subunit would remain unchanged under the No Action alternative. This alternative does not provide long-term effectiveness or permanence.

Reduction of Toxicity, Mobility, or Volume

There is no reduction in the toxicity, mobility or volume of contaminated media associated with the No Action alternative.

Short-Term Effectiveness

The No Action alternative would not endanger either the remedial workers or the surrounding communities nor adversely affect the environment during implementation; however, the RAO would not be achieved. Under this alternative localized soil would remain impacted by leaving hazardous contaminants in place.

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Implementability

Since this alternative requires no action, implementability is not a consideration.

Cost

There is no present-worth cost estimated for the No Action alternative since there is no action implemented and no five-year remedy review required. Detailed cost estimates are included in Appendix I. A summary of the estimates cost is below.

Total Present-Worth Cost $0

5.3.1.2 Alternative A-2: Land Use Controls

Alternative A-2 was retained for detailed analysis. This alternative consists of using administrative and engineering controls to prevent/restrict access to human receptors from the contaminated media within the ECODS L-3 subunit.

LUCs would be implemented at the ECODS L-3 subunit through the use of warning signs (indicating the presence of asbestos and hazardous contaminants), no trespassing signs, excavation permit restrictions, implementation of a LUCIP, and deed restrictions would be put into place to preclude activities that could cause exposure to contaminated media exceeding acceptable risk levels in the event the property were to be transferred out of federal ownership. Periodic (annual) inspections would be required and periodic maintenance (e.g., sign repair) would be performed to ensure that the LUCs remain protective. Five-year remedy reviews would be required under this alternative.

Protection of Human Health and the Environment

The exposure pathway to human receptors is broken by controlling access and prohibiting unrestricted use of the contaminated media and thereby being protective of human health. Deed restrictions would also be put in place for the potential future resident to prevent possible exposure in the event the property was ever sold. Because no ECO RCOCs, CM RCOCs, or PTSM are identified for the ECODS L-3 subunit, no additional physical controls are needed for protection of the environment to prevent ecological exposure to contamination or to control migration of

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contaminants through environmental media. Alternative A-2 would achieve the RAOs and is therefore determined to be protective of human health and the environment. Alternative A-2 would not cause additional natural resource injury.

Compliance with ARARs

Table 5-4 lists the potential ARARs applicable to the ECODS L-3 subunit. The specific ARARs applicable to each alternative are listed below.

- ***Chemical-Specific ARARs***: 40 CFR 761.61 provides cleanup and disposal options for PCB remediation waste.
- ***Location-Specific ARARs***: No location-specific ARARs are associated with Alternative A-2.
- ***Action-Specific ARARs***: No location-specific ARARs are associated with Alternative A-2.

Long-Term Effectiveness

The long-term effectiveness for protecting human health can be achieved under this alternative as long as LUCs are maintained. LUCs would be maintained until the concentration of hazardous substances in the media is at such levels to allow for unrestricted use and exposure. The timeframe for LUCs is assumed for 30 years of duration as a basis for a cost estimate. The actual time requirement would likely be longer, as PCBs and asbestos do not quickly degrade. Remedy reviews would be performed every five (5) years. A LUCIP would be prepared by the USDOE that describes the implementation and maintenance actions for the remedial action, including periodic inspections. Periodic inspections would be performed to ensure warning signs are in place and no unauthorized encroachment onto the controlled area is occurring. Signs would be replaced and/or repaired as needed, and records for site use/site control permits would be maintained within the SRS infrastructure. The USDOE is responsible for implementing, maintaining, monitoring, reporting upon, and enforcing the LUCs. The LUCIP would remain in effect unless and until modifications are approved by the USEPA and SCDES as needed to be protective of human health and the environment.

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Reduction of Toxicity, Mobility, or Volume

There is no reduction in the toxicity, mobility, or volume of contaminated media associated with Alternative A-2. This alternative prevents human exposure to the contaminants through controlling access and limiting use.

Short-Term Effectiveness

This alternative poses no risk to workers or the community during implementation because no construction work would be performed which disturbs the contaminated media within the ECODS L-3 subunit. All of the contaminated media is also within an area with restricted access (site boundary); therefore, it is not accessible to members of the public or community. Since the ECODS L-3 subunit is located ~11.3 km, (7 mi) away from the nearest SRS boundary, there are no hazards to nearby communities since there are none in proximity. Under this alternative localized soil would remain impacted by leaving hazardous contaminants in place.

Implementability

LUCs have been easily implemented at many waste units at SRS. The implementation of LUCs presents no technical or administrative impediments.

Cost

Costs associated with this alternative include posting approximately four (4) warning signs around the perimeter of the subunit and periodic inspections to confirm the signs remain in place. SRS would also control access to and prohibit excavation of the subunit through the Site Use/Site Clearance permit system. For the long term, deed restrictions would be put into place to preclude activities that could cause exposure to contaminated media exceeding acceptable risk levels in the event the property were to be transferred out of federal ownership. A review of the remedy would be performed every five (5) years over an assumed 30-year duration. The detailed cost estimate is provided in Appendix I. A summary of the estimated present-worth cost is presented below:

Total Present-Worth Cost $382,557

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5.3.1.3 Alternative A-3: Soil Cover with Land Use Controls

Alternative A-3 was carried forward for a detailed analysis. This alternative consists of placing a 0.6 m (2 ft) soil cover over the ECODS L-3 subunit to prevent exposure to human receptors. A soil cover would be constructed using standard earth-moving equipment. This alternative would also require LUCs (e.g., signage and maintenance) to maintain the integrity of the soil cover.

Specifically, access for Alternative A-3 as shown on Figure 5-1 would be via the gravel road off of SRS Road C. The limit of disturbance would be ~0.2 ha (0.5 ac) to be cleared and grubbed. Placement of ~1,729 m^3 (2,261 yd^3) of clean fill would be hauled in from an onsite borrow pit to be placed and compacted. Approximately 93 m^3 (122 yd^3) of topsoil would be added for the placement of a vegetative cover. The vegetative cover would consist of ~920 m^2 (1,100 yd^2) of sod. Construction of storm water management would be necessary to divert any runoff around the area after installation of the soil cover. LUCs as described in section 5.3.1.2 would also be implemented under this alternative with additional O&M to ensure the integrity of the soil cover.

Protection of Human Health and the Environment

Alternative A-3 breaks the exposure pathway to human receptors by covering the contaminated media and applying LUCs to ensure the permanence of the soil cover. Because there are no ECO RCOCs, CM RCOCs, or PTSM identified for the ECODS L-3 subunit, no additional physical controls are needed for protection of the environment to prevent ecological exposure to contamination or to control migration of contaminants through environmental media. Alternative A-3 would achieve the RAOs and is therefore determined to be protective of human health and the environment. Alternative A-3 would not cause additional natural resource injury.

Compliance with ARARs

Table 5-4 lists the potential ARARs applicable to the ECODS L-3 subunit. The specific ARARs applicable to each alternative are listed below.

- ***Chemical-Specific ARARs***: 40 CFR 761.61 provides cleanup and disposal options for PCB remediation waste.
- ***Location-Specific ARARs***: No location-specific ARARs are associated with Alternative A-3.

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- ***Action-Specific ARARs***: The storm water management of the ECODS L-3 would trigger South Carolina Regulation 61-9.122.41 and SC Regulation 72-307 I and must comply with the substantive requirements for stormwater management and sediment control. To minimize erosion of sediment and manage storm water runoff that may occur during the remedial actions, best management practices (BMPs) would be employed.

Long-Term Effectiveness

Long-term effectiveness can be achieved under this alternative as long as the integrity of the soil cover is maintained and LUCs are in place. LUCs would include the O&M necessary to maintain the soil cover. Alternative A-3 would remain in place until the concentration of hazardous substances in the media is at such levels to allow for unrestricted use and exposure. The timeframe for alternative A-3 is assumed for 30 years of duration as a basis for a cost estimate. The actual time requirement would likely be longer, as PCBs and asbestos do not quickly degrade. Remedy reviews would be performed every five (5) years. A LUCIP would be prepared by the USDOE that describes the implementation and anticipated maintenance actions for the remedial action, including periodic inspections. Periodic inspections would be performed to ensure warning signs are in place, no unauthorized encroachment onto the controlled area is occurring, and the integrity of the cover is not compromised. Signs would be replaced and/or repaired as needed, any issues that arise with the soil cover would be repaired, and records for site use/site control permits would be maintained within the SRS infrastructure. The USDOE is responsible for implementing, maintaining, monitoring, reporting upon, and enforcing the alternative. The LUCIP would remain in effect unless and until modifications are approved by the USEPA and SCDES as needed to be protective of human health and the environment.

Reduction of Toxicity, Mobility, or Volume

There is no reduction in the toxicity, mobility, or volume of contaminated media associated with Alternative A-3. This alternative prevents human exposure to the contaminants by placing a physical barrier over the entire unit and applying administrative controls.

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Short-Term Effectiveness

This alternative can be completed in a short timeframe while posing no significant risk to the community or workers. Remedial workers would have the greatest risk of exposure during construction activities. Use of BMPs during construction and strict adherence to the project-specific health and safety plan would prevent worker exposure to hazardous material and would minimize any risk to surrounding communities while activities are performed. Under this alternative localized soil would remain impacted by leaving hazardous contaminants in place.

Implementability

A soil cover is readily implemented with standard earth-moving equipment, materials, and conventional construction methods. There are already many waste units around SRS where this practice has been implemented safely and effectively. LUCs have been easily implemented at many waste units at SRS. The implementation of LUCs presents no technical or administrative impediments.

Cost

Costs associated with this alternative include clearing and grubbing, hauling and placing clean soil, grading of soil, construction of a vegetated cover, construction of a stormwater management system, and the implementation of LUCs. A detailed cost estimate is provided in Appendix I. A summary of the estimated present-worth cost is presented below:

Total Present-Worth Cost $1,228,712

5.3.1.4 Alternative A-4: Excavation and Disposal

Alternative A-4 was retained for detailed analysis. This alternative proposes to excavate and dispose of all unit soils within the ECODS L-3 subunit to permanently remove the potential risk to human receptors. Excavation and disposal would be completed using standard earth-moving equipment.

Specifically, access to the ECODS L-3 subunit, as shown on Figure 5-1, would be via gravel road 71-35 off of SRS Road C and onto paved road 71-35.2. There is no established road that goes to

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the subunit. Current access from 71-35.2 is via foot traffic for approximately 61 m (200 ft). The limit of disturbance would be ~0.2 ha (0.5 ac) to be cleared and grubbed. Construction of storm water management would be necessary to divert any runoff around the area during implementation of the alternative. Excavation would include removing ~6,728 m^3 (8,800 yd^3) of contaminated media to a depth of 3.7 m (12 ft) bgs. The excavated material would be directly loaded into roll-off containers and staged at the site. This alternative assumes that the wastes would ultimately be hauled to the Three Rivers Landfill for disposal following the route shown on Figure 5-2. After excavation of the soils, confirmatory soil samples would be taken to determine that clean up levels have been met. Once confirmed, the area would be backfilled using ~6,728 m^3 (8,800 yd^3) of clean fill and 223 m^3 (244 yd^3) of topsoil to fill the excavated areas to grade. The clean fill would be hauled to the site from an on-site borrow pit. A vegetative cover would be constructed using ~ 2,012 m^2 (2,200 yd^2) of fertilizer, lime, seed, and mulch.

Protection of Human Health and the Environment

By removing all contaminated media from the unit and backfilling to grade, exposure to the human receptors is eliminated. Because there are no ECO RCOCs, CM RCOCs, or PTSM identified for the ECODS L-3 subunit, no additional physical controls are needed for protection of the environment to prevent ecological exposure to contamination or to control migration of contaminants through environmental media. Alternative A-4 provides protection of human health and the environment and would achieve the identified RAOs. Alternative A-4 would not cause additional natural resource injury.

Compliance with ARARs

Table 5-4 lists the potential ARARs applicable to the ECODS L-3 subunit. The specific ARARs applicable to each alternative are listed below.

- ***Chemical-Specific ARARs***: 40 CFR 761.61 provides cleanup and disposal options for PCB remediation waste.
- ***Location-Specific ARARs***: No location-specific ARARs are associated with Alternative A-4.

- ***Action-Specific ARARs***: Disposal and transportation of solid waste generated from Alternative A-4 would be handled in accordance with federal and state regulations (40 CFR 262.11(b) and SC Regulation 61-107.5(D)(3)). Disposal of the solid waste would also trigger South Carolina Regulation R-61-107 requirements, which requires disposal in a properly constructed and permitted disposal facility. This requirement can be achieved through use of an existing and approved on-site SRS facility or transporting the contaminated media to an approved facility such as Three Rivers Landfill which has an EPA determination of off-site acceptability for disposal of CERCLA waste. The storm water management of the ECODS L-3 would trigger SC Regulation 61-9.122.41 and SC Regulation 72-307 I, which must comply with the substantive requirements for stormwater management and sediment control. To minimize erosion of sediment and manage storm water runoff that may occur during the remedial actions, BMPs would be employed.

Long-Term Effectiveness

Long-term effectiveness can be achieved under this alternative by removing all contaminated media and backfilling the area to grade, thereby reducing potential exposure to the industrial worker and/or future resident. This alternative permanently removes and disposes of the contaminated soil and therefore offers long-term protection.

Reduction of Toxicity, Mobility, or Volume

This alternative does not employ any treatment to reduce the toxicity, mobility, or volume of the contaminated media from the unit.

Short-Term Effectiveness

This alternative can be completed in a short timeframe while posing no significant risk to the community. Use of BMPs during construction and transportation of contaminated media off-site would minimize any risk to surrounding communities. Remedial workers would have the greatest risk of exposure during excavation and hauling activities. Strict adherence to the project-specific health and safety plan would mitigate worker exposure to hazardous material while activities are

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performed. Under this alternative localized soil would be removed and replaced to eliminate the risk to human health and the environment and impacts to natural resources.

Implementability

Stormwater management can be achieved with standard equipment. Excavation and disposal are readily implemented with standard earth-moving equipment, materials, and conventional construction methods. There are several waste units around SRS where this practice has been implemented safely and effectively.

Cost

Costs for Alternative A-4 would include clearing and grubbing, excavation, transportation and disposal of contaminated media, sampling and analysis, hauling and placing of clean fill, and stormwater management. A detailed cost estimate is presented in Appendix I. A summary of the estimated present-worth cost is presented below:

Total Present-Worth Cost $1,654,216

5.3.2 LRP 131-4L Subunit

A comparison of the LRP 131-4L subunit alternatives to the primary balancing and modifying criteria are discussed in Sections 5.3.2.1 – 5.3.2.4 and summarized in Table 5-6.

5.3.2.1 Alternative B-1: No Action

Alternative B-1 was carried forward as required by the NCP to serve as a baseline for comparison with other remedial alternatives. Alternative B-1 consists of performing no action to address the RAOs at the LRP 131-4L subunit. Contaminated media would remain in place and no LUCs or active remediation would be conducted to control current and/or future potential risk; to treat or remove contaminated media; or to reduce toxicity, mobility, or volume of the contaminated media.

Protection of Human Health and the Environment

The No Action alternative would not address the risk to human receptors from exposure to the contaminated media. The No Action alternative would not achieve the RAOs and therefore would

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not be protective of human health and the environment. Alternative B-1 would not cause additional natural resource injury.

Compliance with ARARs

No chemical-specific, location-specific, or action-specific ARARs are associated with the Alternative B-1.

Long-Term Effectiveness

Potential future exposure to human health from contaminated media at the LRP 131-4L subunit would remain unchanged under the No Action alternative. This alternative does not provide long-term effectiveness or permanence.

Reduction of Toxicity, Mobility, or Volume

There is no reduction in the toxicity, mobility or volume of contaminated media associated with the No Action alternative.

Short-Term Effectiveness

The No Action alternative would not endanger either the remedial workers or the surrounding communities nor adversely affect the environment during implementation; however, the RAO would not be achieved. Under this alternative localized soil would remain impacted by leaving hazardous contaminants in place.

Implementability

Since this alternative requires no action, implementability is not a consideration.

Cost

There is no present-worth cost estimated for the No Action alternative since there is no action implemented and no five-year remedy review required. Detailed cost estimates are included in Appendix I. A summary of the estimates cost is below.

Total Present-Worth Cost $0

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5.3.2.2 Alternative B-2: Land Use Controls

Alternative B-2 was retained for detailed analysis. This alternative consists of using administrative and engineering controls to prevent/restrict access to human receptors from the contaminated media within the LRP 131-4L subunit.

LUCs would be implemented at the LRP 131-4L subunit through the use of warning signs indicating the presence of asbestos and hazardous contaminants, no trespassing signs, excavation permit restrictions, implementation of a LUCIP, and deed restrictions would be put into place to preclude activities that could cause exposure to contaminated media exceeding acceptable risk levels in the event the property were to be transferred out of federal ownership. Periodic (annual) inspections would be required and periodic maintenance (e.g., sign repair) would be performed to ensure that the LUCs remain protective. Because waste was determined beyond the known boundary of the subunit and to better define the extent of the buried waste, confirmatory drilling at 12 borings to a depth of 4.9 m (16 ft) bgs would be performed. Continuous core would be collected from the subsurface and visually inspected to determine the absence or presence of waste. No analytical samples are to be collected. Five-year remedy reviews would be required under this alternative.

Protection of Human Health and the Environment

The exposure pathway to human receptors is broken by controlling access and prohibiting unrestricted use of the contaminated media and thereby protective of human health. deed restrictions would be put into place to preclude activities that could cause exposure to contaminated media exceeding acceptable risk levels in the event the property were to be transferred out of federal ownership. Because there are no ECO RCOCs, CM RCOCs, or PTSM identified for the LRP 131-4L subunit, no additional physical controls are needed for protection of the environment to prevent ecological exposure to contamination or to control migration of contaminants through environmental media. Alternative B-2 would achieve the RAOs and is therefore determined to be protective of human health and the environment. Alternative B-2 would not cause additional natural resource injury.

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Compliance with ARARs

No chemical-specific, location-specific, or action-specific ARARs are associated with the Alternative B-2.

Long-Term Effectiveness

The long-term effectiveness for protecting human health can be achieved under this alternative as long as LUCs are maintained. LUCs would be maintained until the concentration of hazardous substances in the media is at such levels to allow for unrestricted use and exposure. The timeframe for LUCs is assumed for 30 years of duration as a basis for a cost estimate. The actual time requirement would likely be longer, as PAHs and asbestos do not quickly degrade. Remedy reviews would be performed every five (5) years. A LUCIP would be prepared by the USDOE that describes the implementation and maintenance actions for the remedial action, including periodic inspections. Periodic inspections would be performed to ensure warning signs are in place and no unauthorized encroachment onto the controlled area is occurring. Signs would be replaced and/or repaired as needed and records for site use/site control permits would be maintained within the SRS infrastructure. The USDOE is responsible for implementing, maintaining, monitoring, reporting upon, and enforcing the LUCs. The LUCIP would remain in effect unless and until modifications are approved by the USEPA and SCDES as needed to be protective of human health and the environment.

Reduction of Toxicity, Mobility, or Volume

There is no reduction in the toxicity, mobility or volume of contaminated media associated with Alternative B-2. This alternative prevents human exposure to the contaminants through controlling access and limiting use.

Short-Term Effectiveness

This alternative can be completed in a short timeframe while posing no risk to remedial workers. Remedial workers would have the greatest risk of exposure during the confirmatory drilling activities. Worker exposure to hazardous material would be managed by strict adherence to the project specific health and safety plan. All of the contaminated media is also within an area with

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restricted access (site boundary); therefore, it is not accessible to members of the public or community. Since the LRP 131-4L subunit is located ~11.3 km, (7 mi) away from the nearest SRS boundary, there are no hazards to nearby communities since there are none in proximity. Under this alternative localized soil would remain impacted by leaving hazardous contaminants in place.

Implementability

LUCs have been easily implemented at many waste units at SRS. The implementation of LUCs presents no technical or administrative impediments.

Cost

Costs associated with this alternative include posting approximately four (4) warning signs around the perimeter of the subunit and periodic inspections to confirm the signs remain in place. SRS would also control access to and prohibit excavation of the subunit through the Site Use/Site Clearance permit system. For the long term, deed restrictions would be put into place to preclude activities that could cause exposure to contaminated media exceeding acceptable risk levels in the event the property were to be transferred out of federal ownership. A review of the remedy would be performed every five (5) years over an assumed 30-year duration. The detailed cost estimate is provided in Appendix I. A summary of the estimated present-worth cost is presented below:

Total Present-Worth Cost $560,619

5.3.2.3 Alternative B-3: Soil Cover with Land Use Controls

Alternative B-3 was carried forward for a detailed analysis. This alternative consists of placing a 0.6 m (2 ft) soil cover over the LRP 131-4L subunit to prevent exposure to human receptors. A soil cover would be constructed using standard earth-moving equipment. This alternative would also require LUCs (e.g., signage and maintenance) to maintain the integrity of the soil cover.

Specifically, access for Alternative B-3 as shown on Figure 5-3 would be via the gravel road off of SRS 71-36 Road. The limit of disturbance would be ~0.2 ha (1.2 ac) to be cleared and grubbed. Because waste was determined beyond the known boundary of the subunit and to better define the extent of the buried waste, confirmatory drilling at 12 borings to a depth of 4.9 m (16 ft) bgs would be performed. Continuous core would be collected from the subsurface and visually inspected to determine the absence or presence of waste. No analytical samples are to be collected. Placement of ~4,755 m^3 (5,200 yd^3) of clean fill would be hauled in from an onsite borrow pit to be placed and compacted. Approximately 257 m^3 (281 yd^3) of topsoil would be added for the placement of a vegetative cover. The vegetative cover would consist of ~2,313 m^2 (2,530 yd^2) of sod. The estimated volume is based on the maximum extent of contamination, extending the boundary to the northwest to a nearby ditch feature. The ditch shows no evidence of buried waste present and acts as a maximum subunit boundary, to be confirmed by confirmatory sampling. The volume is subject to decrease based on the results of the confirmatory sampling. Construction of storm water management would be necessary to divert any runoff around the area after installation of the soil cover. LUCs as described in section 5.3.2.2 would also be implemented under this alternative with additional O&M to ensure the integrity of the soil cover.

Protection of Human Health and the Environment

Alternative B-3 breaks the exposure pathway to human receptors by covering the contaminated media and applying LUCs to ensure the permanence of the soil cover. Because there are no ECO RCOCs, CM RCOCs, or PTSM identified for the LRP 131-4L subunit, no additional physical controls are needed for protection of the environment to prevent ecological exposure to contamination or to control migration of contaminants through environmental media. Alternative B-3 would achieve the RAOs and is therefore determined to be protective of human health and the environment. Alternative B-3 would not cause additional natural resource injury.

Compliance with ARARs

Table 5-4 lists the potential ARARs applicable to the LRP 131-4L subunit. The specific ARARs applicable to each alternative are listed below.

- ***Chemical-Specific ARARs***: No location-specific ARARs are associated with Alternative B-3.
- ***Location-Specific ARARs***: No location-specific ARARs are associated with Alternative B-3.
- ***Action-Specific ARARs***: The storm water management of the LRP 131-4L would trigger SC Regulation 61-9.122.41 and SC Regulation 72-307 I and must comply with the substantive requirements for stormwater management and sediment control. To minimize erosion of

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sediment and manage storm water runoff that may occur during the remedial actions, BMPs would be employed.

Long-Term Effectiveness

Long-term effectiveness can be achieved under this alternative as long as the integrity of the soil cover is maintained and LUCs are in place. LUCs would include the O&M necessary to maintain the soil cover. Alternative B-3 would remain in place until the concentration of hazardous substances in the media is at such levels to allow for unrestricted use and exposure. The timeframe for alternative B-3 is assumed for 30 years of duration as a basis for a cost estimate. The actual time requirement would likely be longer, as PAHs and asbestos do not quickly degrade. Remedy reviews would be performed every five (5) years. A LUCIP would be prepared by the USDOE that describes the implementation and anticipated maintenance actions for the remedial action, including periodic inspections. Periodic inspections would be performed to ensure warning signs are in place, no unauthorized encroachment onto the controlled area is occurring, and the integrity of the cover is not compromised. Signs would be replaced and/or repaired as needed, any issues that arise with the soil cover would be repaired and records for site use/site control permits would be maintained within the SRS infrastructure. The USDOE is responsible for implementing, maintaining, monitoring, reporting upon, and enforcing the alternative. The LUCIP would remain in effect unless and until modifications are approved by the USEPA and SCDES as needed to be protective of human health and the environment.

Reduction of Toxicity, Mobility, or Volume

There is no reduction in the toxicity, mobility, or volume of contaminated media associated with Alternative B-3. This alternative prevents human exposure to the contaminants by placing a physical barrier over the entire unit and applying administrative controls.

Short-Term Effectiveness

This alternative can be completed in a short timeframe while posing no significant risk to the community or workers. Remedial workers would have the greatest risk of exposure during construction activities. Use of BMPs during construction and strict adherence to the project-

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specific health and safety plan would prevent worker exposure to hazardous material and would minimize any risk to surrounding communities while activities are performed. Under this alternative localized soil would remain impacted by leaving hazardous contaminants in place.

Implementability

A soil cover is readily implemented with standard earth-moving equipment, materials, and conventional construction methods. There are already many waste units around SRS where this practice has been implemented safely and effectively. LUCs have been easily implemented at many waste units at SRS. The implementation of LUCs presents no technical or administrative impediments.

Cost

Costs associated with this alternative include clearing and grubbing, hauling and placing clean soil, grading of soil, construction of a vegetated cover, construction of a stormwater management system and the implementation of LUCs. A detailed cost estimate is provided in Appendix I. A summary of the estimated present-worth cost is presented below:

Total Present-Worth Cost $1,543,338

5.3.2.4 Alternative B-4: Excavation and Disposal

Alternative B-4 was retained for detailed analysis. This alternative proposes to excavate and dispose of all unit soils within the LRP 131-4L subunit to permanently remove the potential risk to human receptors. Excavation and disposal would be completed using standard earth-moving equipment.

Specifically, access to the LRP 131-4L subunit, as shown on Figure 5-3, would be via the un-named gravel road off of SRS 71-36 Road. The limit of disturbance would be ~0.5 ha (1.2 ac) to be cleared and grubbed. Because waste was determined beyond the known boundary of the subunit and to better define the extent of the buried waste, confirmatory drilling at 12 borings to a depth of 4.9 m (16 ft) bgs would be performed. Continuous core would be collected from the subsurface and visually inspected to determine the absence or presence of waste. No analytical samples are to be collected. Construction of storm water management would be necessary to divert any runoff

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around the area during implementation of the alternative. Excavation would include removing ~21,592 m^3 (23,613 yd^3) of contaminated media to a depth of 4.3 m (14 ft) bgs. The estimated volume is based on the maximum extent of contamination, extending the boundary to the northwest to a nearby ditch feature. The ditch shows no evidence of buried waste present and acts as a maximum subunit boundary, to be confirmed by confirmatory sampling. The volume is subject to decrease based on the results of the confirmatory sampling. The excavated material would be directly loaded into roll-off containers and staged at the site. This alternative assumes that the wastes would ultimately be hauled to the Three Rivers Landfill for disposal following the route shown on Figure 5-4. After excavation of the soils, confirmatory soil samples would be taken to determine that clean up levels have been met. Once confirmed, the area would be backfilled using ~21,592 m^3 (23,613 yd^3) of clean fill and 514 m^3 (562 yd^3) of topsoil to fill the excavated areas to grade. The clean fill would be hauled to the site from an on-site borrow pit. A vegetative cover would be constructed using ~ 4,627 m^2 (5,060 yd^2) of fertilizer, lime, seed, and mulch.

Protection of Human Health and the Environment

By removing all contaminated media from the unit and backfilling to grade, exposure to the human receptors is eliminated. Because there are no ECO RCOCs, CM RCOCs, or PTSM identified for the LRP 131-4L subunit, no additional physical controls are needed for protection of the environment to prevent ecological exposure to contamination or to control migration of contaminants through environmental media. Alternative B-4 provides protection of human health and the environment and would achieve the identified RAOs. Alternative B-4 would not cause additional natural resource injury.

Compliance with ARARs

Table 5-4 lists the potential ARARs applicable to the LRP 131-4L subunit. The specific ARARs applicable to each alternative are listed below.

- ***Chemical-Specific ARARs***: No chemical-specific ARARs are associated with Alternative B-4.
- ***Location-Specific ARARs***: No location-specific ARARs are associated with Alternative B-4.

- ***Action-Specific ARARs***: Disposal and transportation of solid waste generated from Alternative B-4 would be handled in accordance with federal and state regulations (40 CFR 262.11(b) and SC Regulation 61-107.5(D)(3)). Disposal of the solid waste would also trigger South Carolina Regulation R-61-107 requirements, which requires disposal in a properly constructed and permitted disposal facility. This requirement can be achieved through use of an existing and approved on-site SRS facility or transporting the contaminated media to an approved facility such as Three Rivers Landfill, which has an EPA determination of off-site acceptability for disposal of CERCLA waste. The storm water management of the LRP 131-4L would trigger SC Regulation 61-9.122.41 and SC Regulation 72-307 I, which must comply with the substantive requirements for stormwater management and sediment control. To minimize erosion of sediment and manage storm water runoff that may occur during the remedial actions, BMPs would be employed.

Long-Term Effectiveness

Long-term effectiveness can be achieved under this alternative by removing all contaminated media and backfilling the area to grade, thereby reducing potential exposure to human receptors. This alternative permanently removes and disposes of the contaminated soil and therefore offers long-term protection.

Reduction of Toxicity, Mobility, or Volume

This alternative does not employ any treatment to reduce the toxicity, mobility, or volume of the contaminated media from the unit.

Short-Term Effectiveness

This alternative can be completed in a short timeframe while posing no significant risk to the community. Use of BMPs during construction and transportation of contaminated media off-site would minimize any risk to surrounding communities. Remedial workers would have the greatest risk of exposure during excavation and hauling activities. Strict adherence to the project-specific health and safety plan would mitigate worker exposure to hazardous material while activities are

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performed. Under this alternative localized soil would be removed and replaced to eliminate the risk to human health and the environment and impacts to natural resources.

Implementability

Stormwater management can be achieved with standard equipment. Excavation and disposal are readily implemented with standard earth-moving equipment, materials, and conventional construction methods. There are several waste units around SRS where this practice has been implemented safely and effectively.

Cost

Costs for Alternative B-4 would include clearing and grubbing, excavation, transportation and disposal of contaminated media, sampling and analysis, hauling and placing of clean fill, and stormwater management. A detailed cost estimate is presented in Appendix I. A summary of the estimated present-worth cost is presented below:

Total Present-Worth Cost $7,671,286

5.4 Comparative Analysis of Alternatives

This section identifies key advantages and disadvantages of each alternative in relation to the evaluation criteria. Tables 5-5 and 5-6 summarize the results of the comparative analysis. Tables 5-7 and 5-8 provides a summary of the comparative ranking analysis. Each alternative is ranked with respect to the other alternatives for the evaluation criteria.

5.4.1 ECODS L-3 Subunit

5.4.1.1 Overall Protection of Human Health and the Environment

Only Alternative A-1 is not protective of human health and the environment. Alternative A-2 limits exposure to the contaminated media through the implementation of administrative and engineering controls. Alternative A-3 breaks the exposure pathway to contaminated media through the use of a protective cover system in addition to the use of administrative and engineering controls. Alternative A-4 eliminates exposure to human health and the environment by removing all contaminated media at the site.

5.4.1.2 Compliance with ARARs

Chemical-specific ARARs for all alternatives include the management of PCB remediation waste. Alternative A-1 does not achieve the chemical-specific ARAR. Alternatives A-2, A-3, and A-4 achieve the chemical-specific ARAR through administrative and engineering controls, physical barriers, or the removal of the contaminated media from the unit. Alternatives A-3 and A-4 achieve the action-specific ARARs for minimizing erosion of sediment and the management of storm water runoff by employing BMPs. Alternative A-4, which includes disposal and transportation of solid waste, would meet SCDES requirements through the use of an existing approved disposal facility such as Three Rivers Landfill.

5.4.1.3 Long-term Effectiveness

Alternative A-1 is not effective in the long-term since exposure is not prevented and therefore, ranked the lowest. Alternatives A-2 and A-3 are ranked equally due to remaining effective as long as LUCs are in place. Alternative A-4 is the most effective in the long-term due to the elimination of all contaminated media within the subunit.

5.4.1.4 Reduction of Toxicity, Mobility, or Volume

None of the alternatives employ any treatment to reduce the toxicity, mobility, or volume of the contaminated media. As such, all alternatives are given an equally low ranking.

5.4.1.5 Short Term Effectiveness

Alternative A-1 is not effective in the short-term since exposure is not prevented and therefore, ranked lowest of all the alternatives. Alternatives A-3 and A-4 were ranked equally due to the injury risk to the industrial worker during implementation, although this is typically mitigated by health and safety measures. Implementation of Alternatives A-3 and A-4 would also require a longer time frame to implement. Alternative A-2 was ranked the highest due to posing no risk to the industrial worker or surrounding community during implementation and the short time frame to implement the alternative.

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5.4.1.6 Implementability

No implementation is required of Alternative A-1; therefore, this alternative was ranked highest. Alternative A-2 was ranked the same as Alternative A-1 even though this alternative requires administrative and engineering controls that are easy to implement. Alternatives A-3 and A-4 were ranked below Alternative 2 and equally ranked due to the extended time frame to implement.

5.4.1.7 Cost

The total present-worth cost for each of the alternatives is provided below:

- Alternative A-1 No Action $0
- Alternative A-2 Land Use Controls *$382,557*
- Alternative A-3 Soil Cover with Land Use Controls $*1,228,712*
- Alternative A-4 Excavation and Disposal $*1,654,216*

5.4.2 LRP 131-4L Subunit

5.4.2.1 Overall Protection of Human Health and the Environment

Only Alternative B-1 is not protective of human health and the environment. Alternative B-2 limits exposure to the contaminated media through the implementation of administrative and engineering controls. Alternative B-3 breaks the exposure pathway to contaminated media through the use of a protective cover system in addition to the use of administrative and engineering controls. Alternative B-4 eliminates exposure to human health and the environment by removing all contaminated media at the site.

5.4.2.2 Compliance with ARARs

There are no ARARs associated with Alternatives B-1 or B-2. Alternatives B-3 and B-4 achieve the action-specific ARARs for minimizing erosion of sediment and the management of storm water runoff by employing BMPs. Alternative B-4, which includes disposal and transportation of solid waste, would meet SCDES requirements through the use of an existing approved disposal facility such as Three Rivers Landfill.

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5.4.2.3 Long-term Effectiveness

Alternative B-1 is not effective in the long-term since exposure is not prevented and therefore, ranked the lowest. Alternatives B-2 and B-3 are ranked equally due to remaining effective as long as LUCs are in place. Alternative B-4 is the most effective in the long-term due to the elimination of all contaminated media within the subunit.

5.4.2.4 Reduction of Toxicity, Mobility, or Volume

None of the alternatives employ any treatment to reduce the toxicity, mobility, or volume of the contaminated media. As such, all alternatives are given an equally low ranking.

5.4.2.5 Short Term Effectiveness

Alternative B-1 is not effective in the short-term since exposure is not prevented and therefore, ranked lowest of all alternatives. Alternatives B-3 and B-4 were ranked equal due to the injury risk to the industrial worker during implementation, although this is typically mitigated by health and safety measures. Implementation of Alternatives B-3 and B-4 would also require a longer time-frame. Alternative B-2 was ranked highest due to only posing a slight risk to the industrial worker during the confirmatory drilling activities and the short time frame to implement.

5.4.2.6 Implementability

No implementation is required of Alternative B-1; therefore, this alternative was ranked highest. Alternative B-2 was ranked the same as Alternative B-1 even though this alternative requires administrative and engineering controls that are easy to implement. Alternatives B-3 and B-4 were ranked below Alternative B-2 and equally ranked due to the extended time frame to implement.

5.4.2.7 Cost

The total present-worth cost for each of the alternatives is provided below:

- Alternative B-1 No Action $0
- Alternative B-2 Land Use Controls *$560,619*
- Alternative B-3 Soil Cover with LUCs *$1,543,338*
- Alternative B-4 Excavation and Disposal *$7,671,286*

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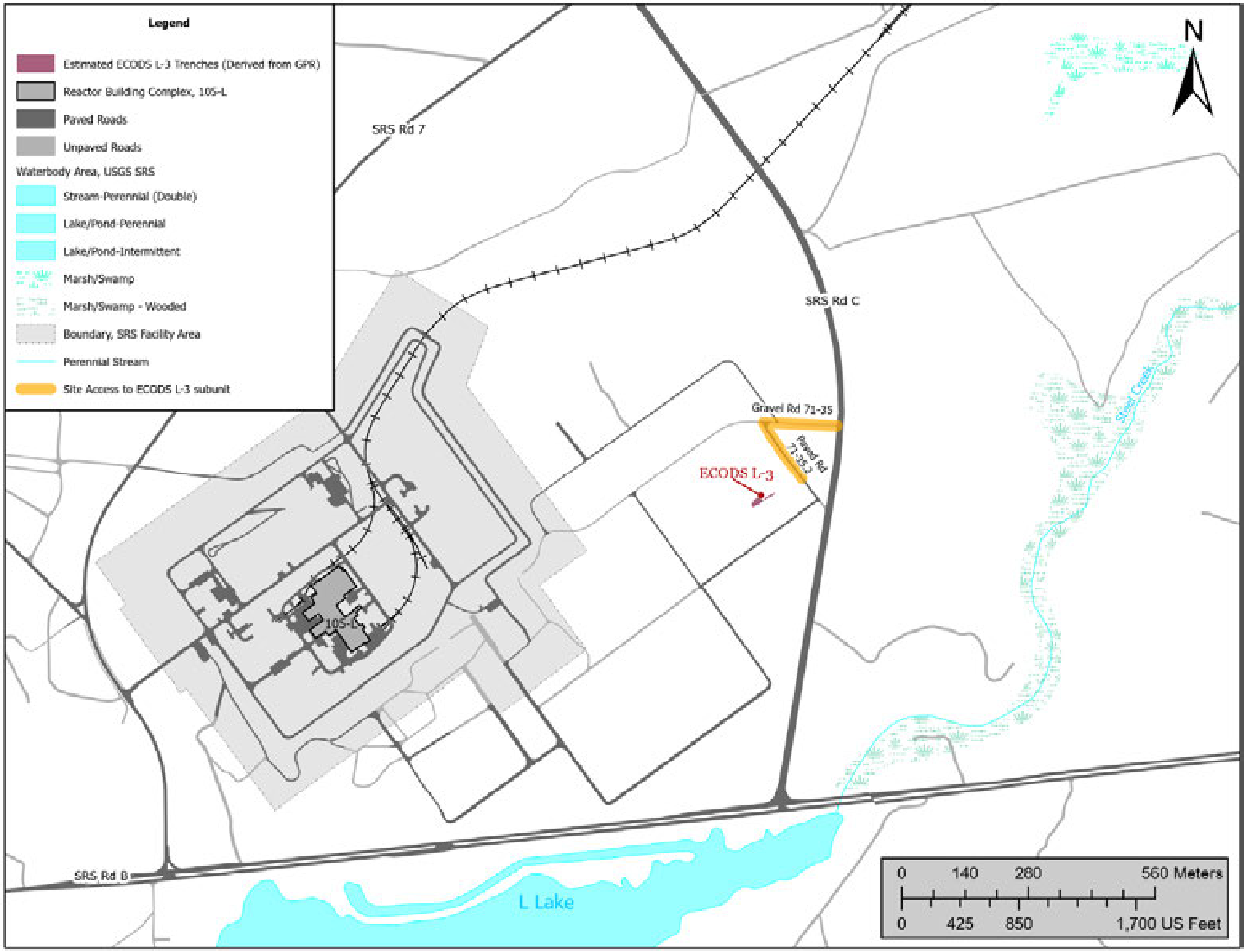

Figure 5-1. Access Road to ECODS L-3 Subunit

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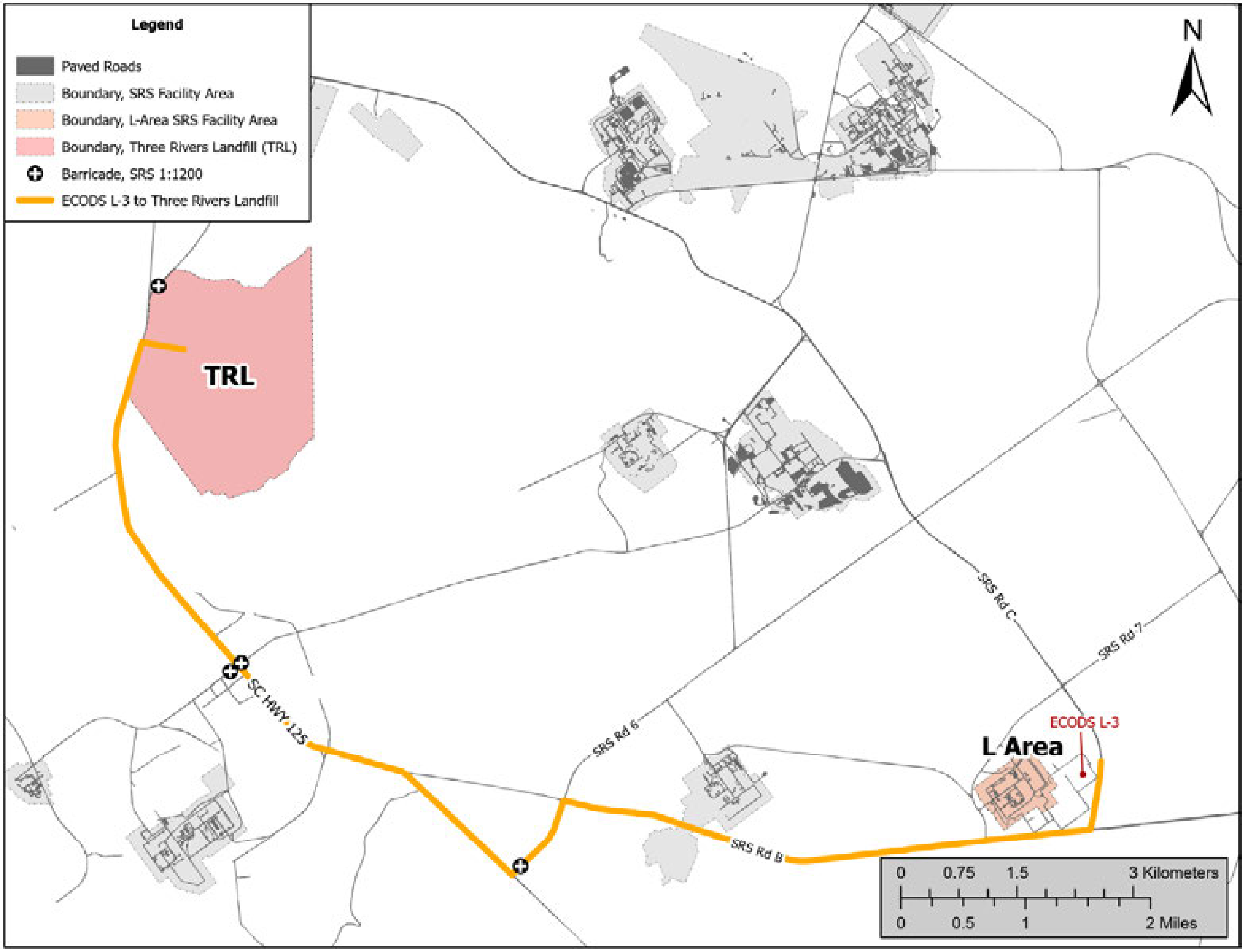

Figure 5-2. Transportation Route to Solid Waste Disposal Facilities at ECODS L-3 Subunit

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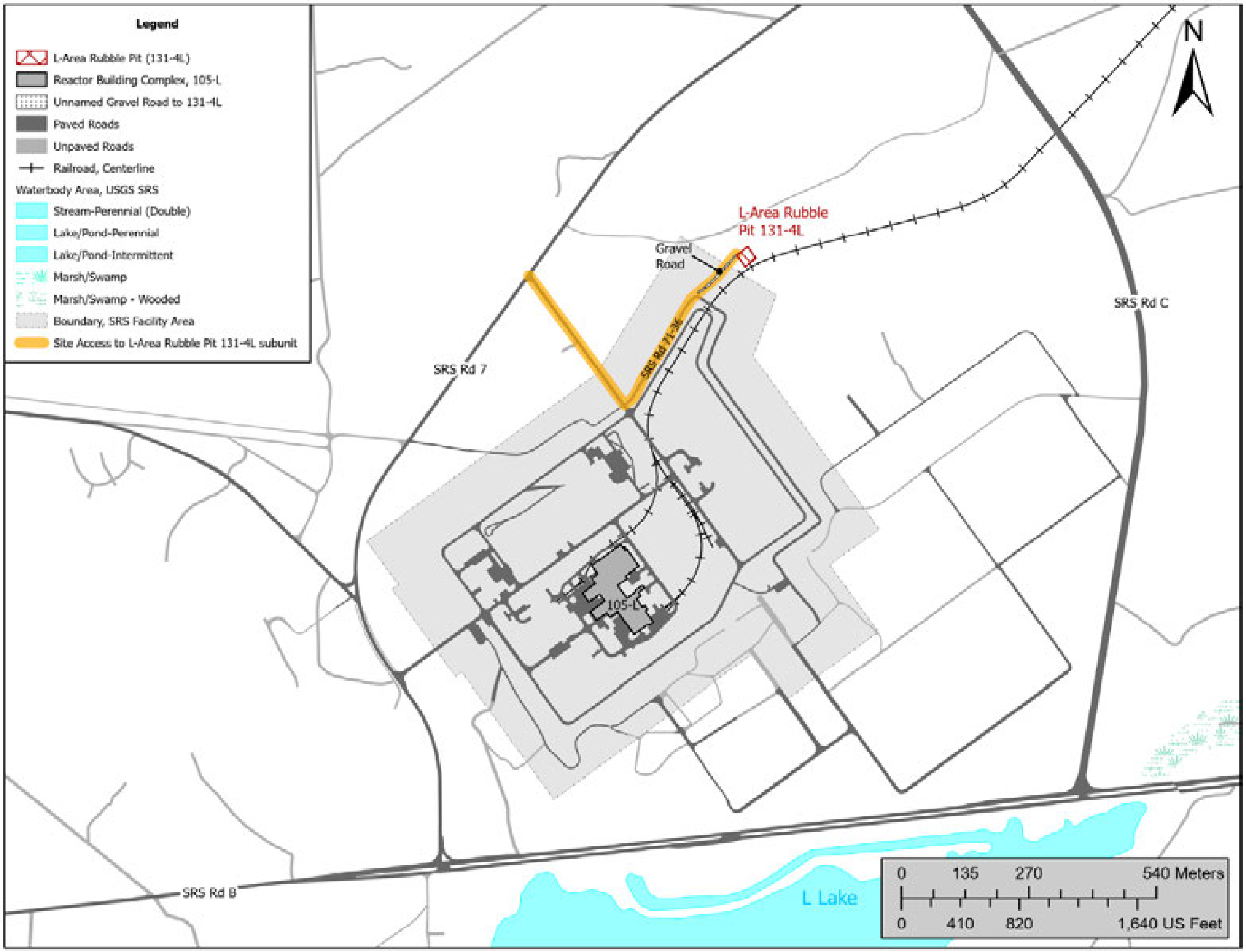

Figure 5-3. Access Road to LRP 131-4L Subunit

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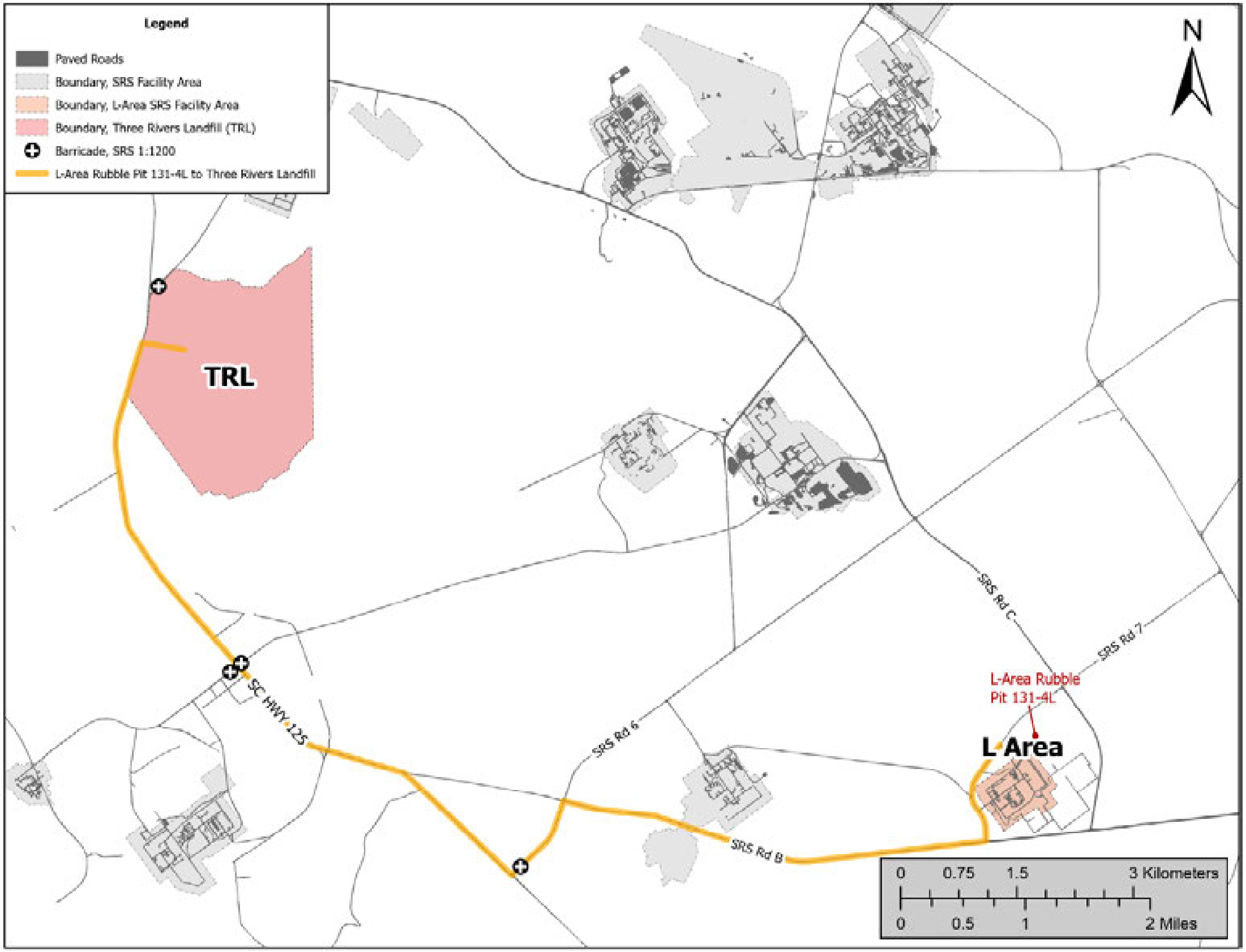

Figure 5-4. Transportation Route to Solid Waste Disposal Facilities at LRP 131-4L Subunit

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Table 5-1. Summary of the Screening of Technologies

General Response Action	Technology	Screening of Technologies			Technology Status
		Effectiveness	Implementability	Cost	
No Action	None	No Action is not a technology but is required by the NCP as a baseline comparison with other remedial actions. This response action does not achieve RAOs and short and long term exposure to contaminated media is not eliminated.	Requires no implementation. No efforts would be taken to monitor, remove, treat, or otherwise mitigate the potential spread of contaminants.	None	Retained
Land Use Controls	Engineering Controls	Engineering controls (access controls) are effective in using temporary or permanent physical restrictions to prevent or reduce human exposure to all contaminated media. Engineering controls can be used to prevent vandalism of on-site remedial equipment or disturbance of contaminated systems. Access controls may include, but are not limited to signs, fencing, barricades, or exclusion devices. Short-term exposure is limited to worker construction and implementation. Long-term exposure to workers is limited to the length of inspections, monitoring, and maintenance of access controls.	Readily implemented. Regular inspections, monitoring, and maintenance of access controls must be implemented for this technology to effectively deter site entry.	Low	Retained
	Institutional Controls	Institutional controls (administrative controls) are effective in preventing or reducing future human exposure to all contaminated media remaining on the site. These controls include worker protection controls such as site use permits and radiological worker protection program. Administrative controls can include controls such as excavation permit restrictions used to permanently prohibit excavation or subsurface construction. Administrative controls also can be temporary measures used while other remedial actions are taking place. Short-term and long-term exposure to contaminated media is eliminated with the implementation of this technology.	Readily implemented. Compliance with the various controls and programs must be enforced for this technology to effectively deter site entry.	Low	

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Table 5-1. Summary of the Screening of Technologies *(Continued/End)*

General Response Action	Technology	Screening of Technologies			Technology Status
		Effectiveness	Implementability	Cost	
Containment	Soil Cover	The effectiveness of containment technologies depends upon the materials used and the design and effectiveness of the soil cover. Cover integrity must be maintained for as long as contaminants will persist or until degradation or decay of the contaminants renders them harmless. Maintenance activities include inspections and monitoring for settlement and erosion. Land use controls would be required in conjunction with a containment remedy.	Readily implementable but would require a planned design and confirmation of placement of the soil layer followed by long term O&M of the cover system.	High	Retained
Excavation and Disposal	Excavation	Removing contaminated media would eliminate exposure of human receptors to contaminants in soil. Short-term exposure is limited to worker construction and implementation. Long term exposure is eliminated by removal of contaminated soil/ACM.	Readily implementable by excavating contaminated media and disposing in an approved disposal facility. The earthwork required for excavating the contaminated media is a standard construction practice and readily accomplished.	High	Retained

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Table 5-2. Alternative Screening for the ECODS L-3 Subunit

Alternative	*Effectiveness*	*Implementability*	*Cost*	*Status*	*Comments*
A-1) No Action	Not effective in reducing exposure of contaminated media to human receptors. Alternative does not treat or remove waste.	Not Applicable	None	Required	Alternative is required by NCP. Influenced by risk management decision to consider impact of removal/backfill alternatives on ecosystem.
A-2) Land Use Controls	Effective in reducing exposure from contaminated media to human receptors. Alternative leaves contaminated media in place.	Installation of warning signs and site inspections.	Low	Retained	Requires five-year remedy reviews.
A-3) Soil Cover with Land Use Controls	Effective in reducing exposure from contaminated media to human receptors. Alternative leaves contaminated media in place.	Involves clearing and grubbing of vegetation, management of surface water, and placing 0.61 m (2 ft) soil cover to break exposure pathway from contaminated media using standard earth-moving equipment. Installation of warning signs and site inspections.	High	Retained	Requires five-year remedy reviews. Requires LUCs to ensure the integrity of a soil cover.
A-4) Excavation and Disposal	Effective in eliminating exposure from contaminated media to human receptors after implementation.	Involves clearing and grubbing of vegetation, management of surface water, excavation and disposal of contaminated media at an offsite disposal facility, and backfilling for site restoration using standard earth-moving equipment.	High	Retained	Does not require five-year remedy reviews. Does not require LUCs.

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Table 5-3. Alternative Screening for the LRP 131-4L Subunit

Alternative	Effectiveness	Implementability	Cost	Status	Comments
B-1) No Action	Not effective in reducing exposure of contaminated media to human receptors. Alternative does not treat or remove waste.	Not Applicable	None	Required	Alternative is required by NCP. Influenced by risk management decision to consider impact of removal/backfill alternatives on ecosystem.
B-2) Land Use Controls	Effective in reducing exposure from contaminated media to human receptors. Alternative leaves contaminated media in place.	Installation of warning signs and site inspections.	Low	Retained	Requires five-year remedy reviews.
B-3) Soil Cover with Land Use Controls	Effective in reducing exposure from contaminated media to human receptors. Alternative leaves contaminated media in place.	Involves clearing and grubbing of vegetation, management of surface water, and placing 0.61 m (2 ft) soil cover to break exposure pathway from contaminated media using standard earth-moving equipment. Installation of warning signs and site inspections.	Med	Retained	Requires five-year remedy reviews. Requires LUCs to ensure the integrity of a soil cover.
B-4) Excavation and Disposal	Effective in eliminating exposure from contaminated media to human receptors after implementation.	Involves clearing and grubbing of vegetation, management of surface water, excavation and disposal of contaminated media at an offsite disposal facility, and backfilling for site restoration using standard earth-moving equipment.	High	Retained	Does not require five-year remedy reviews. Does not require LUCs.

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Table 5-4. Summary of Potential ARARs for the ECODS L-3, LRP 131-1L and LRP 131-4L OU

CHEMICAL-SPECIFIC ARARs/TBC			
Chemical	**Requirements**	**Prerequisite**	**Citation**
Bulk PCB remediation waste (self-implementing)	Unit meets the low occupancy thresholds and the residual PCB concentrations in the soil will be less than 25 mg/kg. May remain onsite without further conditions (e.g., no fencing or cap requirements).	Bulk PCB remediation waste remaining in a *low occupancy area* (as defined in 40 C.F.R. § 761.3) at concentrations ≤ 25 mg/kg. – **relevant and appropriate**	40 C.F.R. § 761.61(a)(4)(i)(B)(1)
LOCATION-SPECIFIC ARARs/TBC			
Location	**Requirements**	**Prerequisite**	**Citation**
NONE IDENTIFIED			
ACTION-SPECIFIC ARARs/TBC			
Action	Requirements	Prerequisite	Citation
All Land-disturbing Activities (i.e., excavation, clearing, grading, etc.)			
Managing storm water runoff from land- disturbing activities	Must comply with the substantive requirements for stormwater management and sediment control of *NPDES General Permit No. SCR100000*.	Large and small construction activities (as defined in R. 61-9) of more than 1 acre of land – **applicable**	SC Regulation 61-9.122.41 NPDES General Permit No. SCR100000
	The stormwater management and sediment control plan shall contain at a minimum the information provided in the following subsections:	Activities involving more than two (2) ac and less than five (5) ac of actual land disturbance which are not part of a larger common plan of development or sale – **applicable**	SC Regulation 72-307 I. – *South Carolina Storm Water Management and Sediment Reduction Regulations*
	A plan for temporary and permanent vegetative and structural erosion and sediment control measures which specify the erosion and sediment control measures to be used during all phases of the land disturbing activity and a description of their proposed operation;		SC Regulation 72-307 I.(3)(d)
	Provisions for stormwater runoff control during the land disturbing activity and during the life of the facility meeting the following requirements of subsections (e)1 and 2.		SC Regulation 72-307 I.(3)(e)

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Table 5-4. Summary of Potential ARARs for the ECODS L-3, LRP 131-1L and LRP 131-4L OU *(continued)*

ACTION-SPECIFIC ARARs/TBC *(continued)*			
Action	**Requirements**	**Prerequisite**	**Citation**
All Land-disturbing Activities (i.e., excavation, clearing, grading, etc.) (continued/end)			
Managing fugitive dust emissions from land disturbing activities	Emissions of fugitive particulate matter shall be controlled in such a manner and to the degree that it does not create an undesirable level of air pollution.	Activities that will generate fugitive particulate matter (Statewide) – **applicable**	SC Regulation 61-62.6 Section III(a)- *Control of Fugitive Particulate Matter Statewide*
Waste Characterization and Storage — (e.g., excavated contaminated soils)			
Characterization of solid waste	Must determine if the solid waste is excluded from regulation under 40 *CFR* 261.4.	Generation of solid waste as defined in 40 *CFR* 261.2 – **applicable**	40 *CFR* 262.11(a) SC Regulation 61-79 262.11*(a)*
	Must determine if waste is listed as hazardous waste in subpart D of 40 *CFR* Part 261.	Generation of solid waste which is not excluded under 40 *CFR* 261.4(a) – **applicable**	40 *CFR* 262.11(b) SC Regulation 61-79 262.11*(b)*
	Must determine whether the waste is identified in subpart C of 40 *CFR* Part 261 by using prescribed testing methods or applying generator knowledge based on information regarding material or processes used.	Generation of solid waste that is not listed in subpart D of 40 *CFR* Part 261 and not excluded under 40 *CFR* 261.4 – **applicable**	40 *CFR* 262.11(c) SC Regulation 61-79 262.11*(c)*
Disposal of solid waste	Shall ultimately dispose of solid waste at facilities and/or sites permitted or registered by the Department for processing or disposal of that waste stream.	Generation of solid waste intended for off-site disposal – **relevant and appropriate**	SC Regulation 61-107.5(D)(3)

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Table 5-4. Summary of Potential ARARs for the ECODS L-3, LRP 131-1L and LRP 131-4L OU *(continued/end)*

ACTION-SPECIFIC ARARs/TBC *(continued/end)*			
Action	**Requirements**	**Prerequisite**	**Citation**
Waste Characterization and Storage — (e.g., excavated contaminated soils/sediments) (continued/end)			
Bulk PCB remediation waste left in place at cleanup site (self-implementing)	May remain onsite without further conditions (e.g., no fencing or cap requirements).	Bulk PCB remediation waste remaining in a *low occupancy area* (as defined in 40 C.F.R. § 761.3) at concentrations ≤ 25 — **relevant and appropriate**	40 C.F.R. § 761.61(a)(4)(i)(B)(1)
Deed restrictions for caps, fences and low occupancy areas	Deed Restrictions	Use of procedures and requirements for a low occupancy area**— relevant and appropriate**	40 C.F.R. § 761.61(a)(8)
	Within 60 days of completion of cleanup activity shall record, in accordance with State law, a notation on the deed to the property, or on some other instrument which is normally examined during a title search, that will in perpetuity notify any potential purchaser of the property: NOTE: Any deed restriction ARARs will be met though the implementation of the final Land Use Control Implementation Plan at the time of future property transfers.		40 C.F.R. § 761.61(a)(8)(i)(A)
	that land has been used for PCB remediation waste disposal and is restricted to use as a low occupancy area as defined in 40 C.F.R. § 761.3.		40 C.F.R. § 761.61(a)(8)(i)(A)(1)
	the applicable cleanup levels left at the site, inside the fence, and/or under the cap.		40 C.F.R. § 761.61(a)(8)(i)(A)(3)

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Table 5-5. Comparison of the ECODS L-3 Subunit Alternatives to the CERCLA Criteria

Criterion	A-1 No Action	A-2 Land Use Controls	A-3 Soil Cover with LUCs	A-4 Excavation and Disposal
Overall Protection of Human Health and the Environment				
Human Health	Not protective of the future resident or on-site worker because there are no controls or remediation.	Meets the requirement by limiting exposure to the contaminated media through the use of administrative and engineering controls.	Meets the requirement by placement of a soil cover to eliminate the direct exposure pathways	Meets the requirement by excavation of the contaminated media to eliminate the direct exposure pathways.
Environment	Not applicable as contaminants are not at levels that pose a threat to the environment.	Not applicable as contaminants are not at levels that pose a threat to the environment.	Not applicable as contaminants are not at levels that pose a threat to the environment.	Not applicable as contaminants are not at levels that pose a threat to the environment.
Compliance with ARARs				
Chemical-Specific	Not compliant.	Meets the requirement by limiting exposure to the contaminated media through the use of administrative and engineering controls.	Meets the requirement by placement of a soil cover to eliminate the direct exposure pathways.	Meets the requirement by excavation of the contaminated media to eliminate the direct exposure pathways.
Location-Specific	No ARARs exist	No ARARs exist	No ARARs exist	No ARARs exist
Action-Specific	No ARARs exist	No ARARs exist	ARARs for control of the minimization of sediment erosion and management of storm water can be achieved.	ARARs for control of the minimization of sediment erosion, management of storm water and transportation of solid and PCB waste can be achieved.
Long Term Effectiveness				
Adequacy of Controls	None	Controls are adequate as long as they are maintained	Controls are adequate as long as they are maintained	No controls are required because contaminated media removed
Permanence	No	LUCs are permanent as long as controls are maintained	Cover system is permanent as long as it is maintained	Excavation of media will be permanent
Reduction of Mobility, Toxicity, or Volume				
Type of Reduction	No reduction	No reduction	No reduction	No reduction

Table 5-5. Comparison of the ECODS L-3 Subunit Alternatives to the CERCLA Criteria (*continued/end*)

Criterion	A-1 No Action	A-2 Land Use Controls	A-3 Soil Cover with LUCs	A-4 Excavation and Disposal
Short-Term Effectiveness				
Amount of Hazardous Material Destroyed or Treated	No reduction	No reduction	No reduction	No reduction
Risk to Remedial Worker	No risk	No risk	Minimal; Health and Safety Plan will be implemented to minimize potential for injury to remedial workers	Minimal; Health and Safety Plan will be implemented to minimize potential for injury to remedial workers
Risk to Community	None	None	None	None
Risk to Environment	None	None	None	None
Time to Implement and achieve RAO	Never	6 Months	12 Months	12 Months
Implementability				
Availability of Materials, Equipment, Contractors	N/A	Readily available	Readily available	Readily available
Ability to Construct and Operate the Technology	N/A	Proven technology at SRS	Proven technology at SRS	Proven technology at SRS
Ability to Obtain Permits/Approvals from Other Agencies	N/A	Prior history with similar permits/approvals at SRS	Prior history with similar permits/approvals at SRS	Prior history with similar permits/approvals at SRS
Cost				
Total Capital Cost	$0	$32,030	$1,006,950	$1,654,216
Present Worth O&M Cost	$0	$350,528	$221,762	$0
Total Cost	$0	$382,557	$1,228,712	$1,654,216

Table 5-6. Comparison of the LRP 131-4L Subunit Alternatives to the CERCLA Criteria

Criterion	B-1 No Action	B-2 Land Use Controls	B-3 Soil Cover with LUCs	B-4 Excavation and Disposal
Overall Protection of Human Health and the Environment				
Human Health	Not protective of the future resident or on-site worker because there are no controls or remediation.	Meets the requirement by limiting exposure to the contaminated media through the use of administrative and engineering controls.	Meets the requirement by placement of a soil cover to eliminate the direct exposure pathways	Meets the requirement by excavation of the contaminated media to eliminate the direct exposure pathways.
Environment	Not applicable as contaminants are not at levels that pose a threat to the environment.	Not applicable as contaminants are not at levels that pose a threat to the environment.	Not applicable as contaminants are not at levels that pose a threat to the environment.	Not applicable as contaminants are not at levels that pose a threat to the environment.
Compliance with ARARs				
Chemical-Specific	No ARARs exist	No ARARs exist	No ARARs exist	No ARARs exist
Location-Specific	No ARARs exist	No ARARs exist	No ARARs exist	No ARARs exist
Action-Specific	No ARARs exist	No ARARs exist	ARARs for control of the minimization of sediment erosion and management of storm water can be achieved.	ARARs for control of the minimization of sediment erosion, management of storm water and transportation of solid waste can be achieved.
Long Term Effectiveness				
Adequacy of Controls	None	Controls are adequate as long as they are maintained	Controls are adequate as long as they are maintained	No controls are required because contaminated media removed
Permanence	No	LUCs are permanent as long as controls are maintained	Cover system is permanent as long as it is maintained	Excavation of media will be permanent
Reduction of Mobility, Toxicity, or Volume				
Type of Reduction	No reduction	No reduction	No reduction	No Reduction

Table 5-6. Comparison of the LRP 131-4L Subunit Alternatives to the CERCLA Criteria (*continued/end)*

Criterion	B-1 No Action	B-2 Land Use Controls	B-3 Soil Cover with LUCs	B-4 Excavation and Disposal
Short-Term Effectiveness				
Amount of Hazardous Material Destroyed or Treated	No reduction	No reduction	No reduction	No reduction
Risk to Remedial Worker	No risk	Minimal; Health and Safety Plan will be implemented to minimize potential for injury to remedial workers	Minimal; Health and Safety Plan will be implemented to minimize potential for injury to remedial workers	Minimal; Health and Safety Plan will be implemented to minimize potential for injury to remedial workers
Risk to Community	None	None	None	None
Risk to Environment	None	None	None	None
Time to Implement and achieve RAO	Never	6 Months	12 Months	12 Months
Implementability				
Availability of Materials, Equipment, Contractors	N/A	Readily available	Readily available	Readily available
Ability to Construct and Operate the Technology	N/A	Proven technology at SRS	Proven technology at SRS	Proven technology at SRS
Ability to Obtain Permits/Approvals from Other Agencies	N/A	Prior history with similar permits/approvals at SRS	Prior history with similar permits/approvals at SRS	Prior history with similar permits/approvals at SRS
Cost				
Total Capital Cost	$0	$174,213	$1,294,659	$7,671,286
Present Worth O&M Cost	$0	$386,406	$248,679	$0
Total Cost	$0	$560,619	$1,543,338	7,671,286

Table 5-7. Comparative Alternative Analysis for ECODS L-3 Subunit

Response Action	Overall Protection of Human Health	Compliance with RAOs	Compliance with ARARs	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume	Short-Term Effectiveness	Implementability	Cost	Overall Ranking (1-20)
A-1) No Action	No	No	No	1	1	1	5	$0	8
A-2) Land Use Controls	Yes	Yes	Yes	4	1	5	5	$382,557	15
A-3) Soil Cover with LUCs	Yes	Yes	Yes	4	1	4	3	$1,228,712	12
A-4) Excavation and Disposal	Yes	Yes	Yes	5	1	4	3	$1,654,216	13

Note: Numeric range 1 through 5, where 1= worst and 5 = best

Table 5-8. Comparative Alternative Analysis for LRP 131-4L Subunit

Response Action	Overall Protection of Human Health	Compliance with RAOs	Compliance with ARARs	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume Through Treatment	Short-Term Effectiveness	Implementability	Cost	Overall Ranking (1-20)
B-1) No Action	No	No	N/A	1	1	1	5	$0	8
B-2) Land Use Controls	Yes	Yes	N/A	4	1	5	5	$560,619	15
B-3) Soil Cover with LUCs	Yes	Yes	Yes	4	1	4	3	$1,543,338	12
B-4) Excavation and Disposal	Yes	Yes	Yes	5	1	4	3	$7,671,286	13

Note: Numeric range 1 through 5, where 1= worst and 5 = best

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6.0 SUMMARY CONCLUSION

The subunits of the ECODS L-3, LRP 131-1L, and LRP 131-4L OU were evaluated per the EC&ACP Regulatory Handbook protocols for RFI/RI/BRA with CMS/FS. Based on the results of the BRA, the ECODS L-3 and the LRP 131-4L subunits present unacceptable human health risks to a hypothetical future resident. Additionally, ACM was identified as a problem warranting action for the ECODS L-3 and LRP 131-4L subunits. There were no problems warranting action identified for the LRP 131-1L subunit, and no response action was needed for this subunit.

6.1 ECODS L-3 Subunit

6.1.1 Problem Warranting Action

The problems warranting action for the ECODS L-3 subunit include:

- ACM is likely present in unit soils that may pose a risk to human receptors if exposed.
- PCBs are present in the surface soil (0 to 0.3 m [0 to 1 ft]) that pose a risk greater than 1.0E-06 and a HQ greater than 1 to the hypothetical resident receptor scenario. More specifically, Aroclor 1254 (EPC = 1.28 mg/kg) has a residential risk = 5.4E-06 and Aroclor 1260 (EPC = 0.356 mg/kg) has a residential risk of 1.5E-06. PCB TCR = 6.9E-06. Aroclor 1254 also has a HQ = 1.1 for a hypothetical residential scenario.
- PCBs are present in surface soil (0 to 0.3 m [0 to 1 ft]) that exceed the TSCA ARAR threshold of 1 mg/kg for high occupancy (i.e., unrestricted land use). Aroclor 1254 maximum detected concentration = 5.63 mg/kg and Aroclor 1260 maximum detected concentration = 2.17 mg/kg.

6.1.2 Remedial Action Objective(s)

The RAOs for the ECODS L-3 subunit include:

- Prevent exposure of human receptors to presumed ACM that is likely present in unit soils.
- Prevent exposure of a future resident to Aroclor 1254 and Aroclor 1260 in surface soils at levels exceeding 1E-06 risk and HQ of 1.

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- Prevent exposure of human receptors to Aroclor 1254 and Aroclor 1260 in surface soils at levels exceeding ARAR threshold of 1 mg/kg.

6.1.3 Remedial Alternatives Evaluation

Four (4) remedial alternatives were considered in the CMS/FS for the ECODS L-3 subunit. These are identified as Alternatives A-1 through A-4.

A-1. No Action

A-2. LUCs

A-3. Soil Cover with LUCs

A-4. Excavate and Disposal

6.2 LRP 131-4L Subunit

6.2.1 Problem Warranting Action

The problems warranting action for the ECODS L-3 subunit include:

- ACM is present in unit soils that may pose a risk to human receptors if exposed.
- Benzo(a)pyrene (EPC = 0.164 mg/kg) is present in the surface soil (0 to 0.3 m [0 to 1 ft]) that poses a risk greater than 1.0E-06 for the hypothetical resident receptor scenario (risk = 1.4E-06).

6.2.2 Remedial Action Objective(s)

The RAOs for the ECODS L-3 subunit include:

- Prevent exposure of human receptors to presumed ACM that is present in the unit soils.
- Prevent exposure of a future resident to benzo(a)pyrene in surface soils (0 to 0.3 m [0 to 1 ft]) at levels exceeding 1E-06 risk.

6.2.3 Remedial Alternatives Evaluation

Four (4) remedial alternatives were considered in the CMS/FS for the ECODS L-3 subunit. These are identified as Alternatives A-1 through A-4.

A-1. No Action

A-2. LUCs

A-3. Soil Cover with LUCs

A-4. Excavate and Disposal

6.3 Operable Unit Strategy

A summary of the Comparative Alternative Analysis for the ECODS L-3 subunit is provided in Table 5-6 and Table 5-7 for the LRP 131-4L subunit. A SB/PP will be developed for the ECODS L-3, LRP 131-1L, and LRP 131-4L OU that summarizes the remedial alternatives evaluated in the CMS/FS and identifies the following preferred alternatives for each subunit.

- ECODS L-3 subunit: Alternative A-2, LUCs to prevent human exposure to ACM that is likely present in unit soils and to PCBs (Aroclor 1254 and Aroclor 1260) that are present in surface soils that present an unacceptable risk to a hypothetical future resident. Implementation of this preferred alternative requires five-year remedy reviews.
- LRP 131-1L subunit: Alternative A-1, No Action is acceptable at this subunit due to no problems warranting action.
- LRP 131-4L subunit: Alternative A-2, LUCs to prevent human exposure to ACM that is present in unit soils and to benzo(a)pyrene that is present in surface soils that present an unacceptable risk to a hypothetical future resident. Implementation of this preferred alternative requires five-year remedy reviews.

The SB/PP Revision 0 is due for submittal on June 5, 2025

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7.0 IMPLEMENTATION SCHEDULE

A summary of the key deliverables and submittal dates for the ECODS L-3, LRP 131-1L, and LRP 131-4L OU is shown below. These dates are listed in the USEPA and SCDES approved OU implementation schedule and are included in the FFA.

Deliverable	Submittal Date
Submit Rev. 0, RFI/RI/BRA/CMS/FS	July 31, 2024
Submit Rev. 0, SB/PP	June 5, 2025
Submit Rev. 0, ROD	January 5, 2026
Issuance of the ROD	September 24, 2026
Submit Rev. 0, Corrective Measures Implementation/Remedial Action Implementation Plan	July 22, 2026
Submit Rev. 0, LUCIP	July 22, 2026
Remedial Action Start	December 28, 2027

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APPENDIX A

INVESTIGATION DATA/ DATA SUMMARY TABLES

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APPENDIX A. INVESTIGATION DATA/DATA SUMMARY TABLES

A.1 DATA SUMMARY TABLES

This appendix provides the data used in the contaminant migration analysis, human health and ecological risk assessments, and principal threat source material evaluation. Data summary and unit specific constituent screening tables are provided for Early Construction and Operational Disposal Site (ECODS) L-3, L-Area Rubble Pit (LRP) 131-1L, and LRP 131-4L subunits. Investigation data for each subunit is provided under separate cover on the electronic version of this document.

The data generated by the ProUCL software (v 5.2) for each detected analyte is presented in this appendix. Outputs from the software are used to summarize the data from each of the three (3) subunits to develop the data summary tables per Protocol DP-1 – *Unit-Source Data Processing* in the EC&ACP Regulatory Document Handbook. Distribution codes, Upper Confidence Limit (UCL) method, and 95% UCL are reported for each soil exposure group (0 to 0.3 m, 0.3 to 1.2 m, and all depths [0 to 1 ft, 1 to 4 ft, all depths]) as determined from the outputs. The output from the ProUCL data processing is not included due to the robust nature of the output files that are run for each individual analyte per depth interval. These results were verified by peer checking and can be reverified, if needed, by processing the soil data provided in electronic format through the ProUCL software that is available online (https://www.epa.gov/land-research/proucl-version-5100-documentation-downloads).

A.2 ECODS L-3 SUBUNIT SOIL DATA

The tables in this section present analytical data for the ECODS L-3 subunit soil in the following depth intervals: 0 to 0.3 m (0 to 1 ft) (Table A.2.1), 0.3 to 1.2 m (1 to 4 ft) (Table A.2.2), and all depths (Table A.2.3). These tables are followed by the unit-specific constituent screening table for the subunit soil at all depths (Table A.2.4).

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Table A.2-1. Data Summary Table ECODS L-3 Subunit Soil (0 to 0.3 m [0 to 1 ft])

ANALYTE NAME	Units	Samples	Non-Detects	Detects	J-Detects	Distr. Code	UCL Method	Mean	95% UCL	Max	Min	RME	Max Location	Qualifier of Max	Max Date
1,1-DICHLOROETHYLENE	mg/kg	18	16	2	1	X	3	3.84E-04	7.00E-04	2.62E-03	ND	7.00E-04	EL3-05		5/31/2002
ACETONE	mg/kg	18	13	5	4	G	7	2.59E-03	1.04E-02	2.86E-02	ND	1.04E-02	EL3-17		5/31/2002
ALUMINUM	mg/kg	18	0	18	0	N	1	5.98E+03	7.19E+03	1.47E+04	3.52E+03	7.19E+03	EL3-05		5/31/2002
ANTHRACENE	mg/kg	18	17	1	1	- -	- -	2.17E-02	- -	4.23E-02	ND	4.23E-02	EL3-07	J	6/3/2002
ANTIMONY	mg/kg	18	12	6	4	X	3	2.60E+00	5.13E+00	2.17E+01	ND	5.13E+00	EL3-03		6/4/2002
AROCLOR 1254	mg/kg	18	1	17	14	X	3	6.17E-01	1.28E+00	5.63E+00	ND	1.28E+00	EL3-16	J	5/31/2002
AROCLOR 1260	mg/kg	18	8	10	10	X	3	1.44E-01	3.56E-01	2.17E+00	ND	3.56E-01	EL3-16	J	5/31/2002
ARSENIC	mg/kg	18	5	13	4	L	6	9.66E-01	1.82E+00	4.10E+00	ND	1.82E+00	EL3-03		6/4/2002
BARIUM	mg/kg	18	0	18	12	N	1	2.78E+01	3.29E+01	6.19E+01	1.31E+01	3.29E+01	EL3-06	J	5/31/2002
BENZALDEHYDE	mg/kg	18	16	2	1	X	3	4.86E-02	7.30E-02	2.22E-01	ND	7.30E-02	EL3-09		6/4/2002
BENZENE	mg/kg	18	17	1	0	- -	- -	1.78E-04	- -	2.60E-03	ND	2.60E-03	EL3-06		5/31/2002
BENZO(G,H,I)PERYLENE	mg/kg	18	17	1	1	- -	- -	2.43E-02	- -	1.09E-01	ND	1.09E-01	EL3-07	J	6/3/2002
BENZO[A]ANTHRACENE	mg/kg	18	15	3	3	X	3	3.52E-02	4.89E-02	1.47E-01	ND	4.89E-02	EL3-07	J	6/3/2002
BENZO[A]PYRENE	mg/kg	18	16	2	1	X	3	4.15E-02	6.13E-02	1.82E-01	ND	6.13E-02	EL3-07		6/3/2002
BENZO[B]FLUORANTHENE	mg/kg	18	14	4	3	X	3	5.30E-02	7.69E-02	2.60E-01	ND	7.69E-02	EL3-07		6/3/2002
BENZO[K]FLUORANTHENE	mg/kg	18	17	1	1	- -	- -	2.57E-02	- -	1.01E-01	ND	1.01E-01	EL3-07	J	6/3/2002
BIS(2-ETHYLHEXYL)PHTHALATE (DEHP)	mg/kg	18	4	14	8	X	3	1.06E+00	2.63E+00	1.63E+01	ND	2.63E+00	EL3-03		6/4/2002
CADMIUM	mg/kg	18	16	2	1	X	3	6.37E-01	2.07E+00	1.08E+01	ND	2.07E+00	EL3-06		5/31/2002
CALCIUM	mg/kg	18	0	18	3	N	1	1.98E+03	3.49E+03	1.47E+04	5.62E+01	3.49E+03	EL3-03		6/4/2002
CARBON DISULFIDE	mg/kg	18	17	1	1	- -	- -	2.65E-04	- -	9.51E-04	ND	9.51E-04	EL3-06	J	5/31/2002
CHROMIUM	mg/kg	18	0	18	8	N	1	1.11E+01	1.77E+01	7.19E+01	3.52E+00	1.77E+01	EL3-06	J	5/31/2002
CHRYSENE	mg/kg	18	16	2	2	X	3	3.45E-02	4.90E-02	1.32E-01	ND	4.90E-02	EL3-07	J	6/3/2002
COBALT	mg/kg	18	10	8	4	X	3	3.96E-01	4.67E-01	6.77E-01	ND	4.67E-01	EL3-01		6/5/2002
COPPER	mg/kg	18	0	18	11	G	5	1.86E+01	3.12E+01	5.36E+01	1.71E+00	3.12E+01	EL3-03	J	6/4/2002
CYANIDE	mg/kg	18	17	1	1	- -	- -	1.85E-01	- -	1.22E+00	ND	1.22E+00	EL3-09	J	6/4/2002
DDE	mg/kg	18	17	1	1	- -	- -	3.02E-04	- -	5.84E-04	ND	5.84E-04	EL3-17	J	5/31/2002
DDT	mg/kg	18	17	1	1	- -	- -	3.92E-04	- -	1.07E-03	ND	1.07E-03	EL3-17	J	5/31/2002
DICHLOROMETHANE (METHYLENE CHLORIDE)	mg/kg	18	17	1	1	- -	- -	2.41E-04	- -	6.96E-04	ND	6.96E-04	EL3-01	J	6/5/2002
FLUORANTHENE	mg/kg	18	14	4	3	X	3	4.61E-02	7.33E-02	2.79E-01	ND	7.33E-02	EL3-07		6/3/2002
INDENO[1,2,3-CD]PYRENE	mg/kg	18	17	1	1	- -	- -	2.37E-02	- -	9.86E-02	ND	9.86E-02	EL3-07	J	6/3/2002
IRON	mg/kg	18	0	18	0	N	1	5.26E+03	6.45E+03	1.35E+04	2.62E+03	6.45E+03	EL3-05		5/31/2002
LEAD	mg/kg	18	0	18	4	N	1	9.00E+01	2.14E+02	1.30E+03	4.08E+00	2.14E+02	EL3-06		5/31/2002
MAGNESIUM	mg/kg	18	0	18	6	N	1	2.10E+02	3.17E+02	1.15E+03	6.97E+01	3.17E+02	EL3-03		6/4/2002
MANGANESE	mg/kg	18	0	18	12	N	1	6.82E+01	8.29E+01	1.39E+02	1.86E+01	8.29E+01	EL3-01		6/5/2002
MERCURY	mg/kg	18	0	18	6	L	6	4.54E-02	8.06E-02	3.61E-01	4.82E-03	8.06E-02	EL3-03		6/4/2002
METHYL ETHYL KETONE	mg/kg	18	17	1	1	- -	- -	2.75E-04	- -	1.57E-03	ND	1.57E-03	EL3-17	J	5/31/2002
METHYL TERTIARY BUTYL ETHER (MTBE)	mg/kg	18	10	8	8	X	3	1.65E-04	2.15E-04	4.00E-04	ND	2.15E-04	EL3-17	J	5/31/2002

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Table A.2-1. Data Summary Table ECODS L-3 Subunit Soil (0 to 0.3 m [0 to 1 ft]) *(Continued/End)*

ANALYTE NAME	Units	Samples	Non-Detects	Detects	J-Detects	Distr. Code	UCL Method	Mean	95% UCL	Max	Min	RME	Max Location	Qualifier of Max	Max Date
NICKEL	mg/kg	18	3	15	7	X	3	4.38E+00	7.89E+00	3.70E+01	ND	7.89E+00	EL3-06		5/31/2002
PHENANTHRENE	mg/kg	18	16	2	2	X	3	3.45E-02	5.21E-02	1.60E-01	ND	5.21E-02	EL3-07	J	6/3/2002
POTASSIUM	mg/kg	18	0	18	2	N	1	8.87E+01	1.09E+02	2.12E+02	4.93E+01	1.09E+02	EL3-03		6/4/2002
PYRENE	mg/kg	18	15	3	2	X	3	3.98E-02	6.18E-02	2.17E-01	ND	6.18E-02	EL3-07		6/3/2002
SELENIUM	mg/kg	18	17	1	1	- -	- -	2.34E-01	- -	1.51E+00	ND	1.51E+00	EL3-04	J	6/3/2002
SODIUM	mg/kg	18	17	1	1	- -	- -	1.99E+01	- -	7.66E+01	ND	7.66E+01	EL3-06	J	5/31/2002
STYRENE	mg/kg	18	17	1	1	- -	- -	7.34E-05	- -	3.68E-04	ND	3.68E-04	EL3-09	J	6/4/2002
TOLUENE	mg/kg	18	6	12	11	X	3	3.50E-04	4.73E-04	1.47E-03	ND	4.73E-04	EL3-06		5/31/2002
VANADIUM	mg/kg	18	0	18	0	N	1	1.07E+01	1.34E+01	3.10E+01	5.28E+00	1.34E+01	EL3-05		5/31/2002
XYLENES	mg/kg	18	17	1	1	- -	- -	9.29E-05	- -	1.98E-04	ND	1.98E-04	EL3-06	J	5/31/2002
ZINC	mg/kg	18	0	18	14	G	5	6.15E+01	1.21E+02	3.21E+02	3.14E+00	1.21E+02	EL3-03	J	6/4/2002

Distribution Code:
N Normal Distribution G Gamma Distribution
L Lognormal Distribution X Non-Parametric

UCL Method Code: (as determined by ProUCL)
1 Student's t UCL 3 Kaplan-Meier (KM) t UCL 5 Adjusted Gamma UCL
2 Approximate Gamma UCL 4 Hall's Bootstrap UCL 6 Land's H-Statistic (H) UCL
7 KM Adjusted Gamma UCL

ND: Non-Detect
RME: Reasonable Maximum Exposure
UCL: Upper Confidence Limit

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Table A.2-2. Data Summary Table ECODS L-3 Subunit Soil (0.3 to 1.2 m [1 to 4 ft])

ANALYTE NAME	Units	Samples	Non-Detects	Detects	J-Detects	Distr. Code	UCL Method	Mean	95% UCL	Max	Min	RME	Max Location	Qualifier of Max	Max Date
1,1'-BIPHENYL	mg/kg	18	17	1	1	- -	- -	5.52E-02	- -	6.29E-01	ND	6.29E-01	EL3-01	J	6/5/2002
1,1-DICHLOROETHYLENE	mg/kg	18	16	2	1	X	3	3.99E-04	7.50E-04	2.88E-03	ND	7.50E-04	EL3-17		5/31/2002
2-METHYLNAPHTHALENE	mg/kg	18	17	1	0	- -	- -	1.31E-01	- -	2.00E+00	ND	2.00E+00	EL3-01		6/5/2002
ACENAPHTHENE	mg/kg	18	17	1	0	- -	- -	5.35E-01	- -	9.27E+00	ND	9.27E+00	EL3-01		6/5/2002
ACETONE	mg/kg	18	12	6	5	X	3	2.00E-03	3.39E-03	1.14E-02	ND	3.39E-03	EL3-17		5/31/2002
ALUMINUM	mg/kg	18	0	18	0	N	1	9.40E+03	1.16E+04	2.19E+04	3.61E+03	1.16E+04	EL3-05		5/31/2002
ANTHRACENE	mg/kg	18	16	2	1	X	3	1.01E+00	3.34E+00	1.76E+01	ND	3.34E+00	EL3-01		6/5/2002
ANTIMONY	mg/kg	18	9	9	3	X	3	8.59E+00	1.56E+01	5.66E+01	ND	1.56E+01	EL3-01		6/5/2002
AROCLOR 1254	mg/kg	18	5	13	9	G	7	2.40E-01	8.46E-01	2.39E+00	ND	8.46E-01	EL3-14		6/6/2002
AROCLOR 1260	mg/kg	18	10	8	8	X	3	4.03E-02	6.34E-02	1.60E-01	ND	6.34E-02	EL3-16	J	5/31/2002
ARSENIC	mg/kg	18	2	16	6	X	3	3.23E+00	4.35E+00	9.06E+00	ND	4.35E+00	EL3-14		6/6/2002
BARIUM	mg/kg	18	0	18	12	N	1	4.28E+01	7.09E+01	2.79E+02	1.22E+01	7.09E+01	EL3-14		6/6/2002
BENZALDEHYDE	mg/kg	18	17	1	1	- -	- -	3.17E-02	- -	5.20E-02	ND	5.20E-02	EL3-09	J	6/4/2002
BENZENE	mg/kg	18	15	3	3	X	3	1.94E-04	3.69E-04	1.36E-03	ND	3.69E-04	EL3-16	J	5/31/2002
BENZO(G,H,I)PERYLENE	mg/kg	18	16	2	1	X	3	5.72E-01	1.85E+00	9.67E+00	ND	1.85E+00	EL3-01		6/5/2002
BENZO[A]ANTHRACENE	mg/kg	18	13	5	3	X	3	1.48E+00	4.20E+00	2.59E+01	ND	4.20E+00	EL3-01		6/5/2002
BENZO[A]PYRENE	mg/kg	18	14	4	2	G	7	1.19E+00	1.05E+01	2.06E+01	ND	1.05E+01	EL3-01		6/5/2002
BENZO[B]FLUORANTHENE	mg/kg	18	13	5	3	G	7	1.55E+00	1.37E+01	2.69E+01	ND	1.37E+01	EL3-01		6/5/2002
BENZO[K]FLUORANTHENE	mg/kg	18	16	2	1	X	3	5.77E-01	1.86E+00	9.72E+00	ND	1.86E+00	EL3-01		6/5/2002
BIS(2-ETHYLHEXYL)PHTHALATE (DEHP)	mg/kg	18	5	13	3	X	3	2.40E+00	6.00E+00	3.71E+01	ND	6.00E+00	EL3-06		5/31/2002
CADMIUM	mg/kg	18	12	6	4	X	3	1.51E+00	2.90E+00	1.19E+01	ND	2.90E+00	EL3-06		5/31/2002
CALCIUM	mg/kg	18	0	18	5	N	1	5.61E+03	1.08E+04	5.28E+04	4.97E+01	1.08E+04	EL3-01	J	6/5/2002
CARBAZOLE	mg/kg	18	16	2	1	X	3	8.03E-01	2.63E+00	1.38E+01	ND	2.63E+00	EL3-01		6/5/2002
CHROMIUM	mg/kg	18	0	18	9	G	5	2.43E+01	3.79E+01	8.01E+01	3.41E+00	3.79E+01	EL3-07		6/3/2002
CHRYSENE	mg/kg	18	14	4	2	G	7	1.23E+00	1.10E+01	2.14E+01	ND	1.10E+01	EL3-01		6/5/2002
COBALT	mg/kg	18	9	9	3	X	3	9.66E-01	1.44E+00	4.67E+00	ND	1.44E+00	EL3-01		6/5/2002
COPPER	mg/kg	18	0	18	13	N	1	3.02E+02	6.85E+02	3.89E+03	1.77E+00	6.85E+02	EL3-06		5/31/2002
DIBENZ[AH]ANTHRACENE	mg/kg	18	16	2	1	X	3	1.82E-01	5.36E-01	2.70E+00	ND	5.36E-01	EL3-01		6/5/2002
DIBENZOFURAN	mg/kg	18	17	1	0	- -	- -	3.02E-01	- -	5.10E+00	ND	5.10E+00	EL3-01		6/5/2002
FLUORANTHENE	mg/kg	18	13	5	3	X	3	2.00E+00	5.67E+00	3.50E+01	ND	5.67E+00	EL3-01		6/5/2002
FLUORENE	mg/kg	18	17	1	0	- -	- -	6.00E-01	- -	1.05E+01	ND	1.05E+01	EL3-01		6/5/2002
INDENO[1,2,3-CD]PYRENE	mg/kg	18	16	2	1	X	3	5.29E-01	1.71E+00	8.91E+00	ND	1.71E+00	EL3-01		6/5/2002
IRON	mg/kg	18	0	18	0	N	1	1.36E+04	1.73E+04	3.13E+04	2.32E+03	1.73E+04	EL3-05		5/31/2002
LEAD	mg/kg	18	0	18	3	N	1	4.29E+01	8.17E+01	3.96E+02	3.83E+00	8.17E+01	EL3-14		6/6/2002
MAGNESIUM	mg/kg	18	0	18	6	N	1	4.37E+02	7.00E+02	2.52E+03	7.47E+01	7.00E+02	EL3-01	J	6/5/2002
MANGANESE	mg/kg	18	0	18	12	G	5	9.56E+01	1.61E+03	4.47E+02	9.00E+00	4.47E+02	EL3-01		6/5/2002
MERCURY	mg/kg	18	1	17	3	X	3	5.41E-02	7.38E-02	1.61E-01	ND	7.38E-02	EL3-01		6/5/2002

Table A.2-2. Data Summary Table ECODS L-3 Subunit Soil (0.3 to 1.2 [1 to 4 ft]) *(Continued/End)*

ANALYTE NAME	Units	Samples	Non-Detects	Detects	J-Detects	Distr. Code	UCL Method	Mean	95% UCL	Max	Min	RME	Max Location	Qualifier of Max	Max Date
METHYL ETHYL KETONE	mg/kg	18	17	1	1	- -	- -	2.70E-04	- -	1.37E-03	ND	1.37E-03	EL3-08	J	6/4/2002
METHYL TERTIARY BUTYL ETHER (MTBE)	mg/kg	18	12	6	6	X	3	1.44E-04	1.98E-04	4.30E-04	ND	1.98E-04	EL3-16	J	5/31/2002
NAPHTHALENE	mg/kg	18	17	1	0	- -	- -	3.34E-01	- -	5.66E+00	ND	5.66E+00	EL3-01		6/5/2002
NICKEL	mg/kg	18	6	12	5	X	3	9.48E+00	1.56E+01	4.24E+01	ND	1.56E+01	EL3-07		6/3/2002
PHENANTHRENE	mg/kg	18	13	5	3	X	3	1.93E+00	5.48E+00	3.39E+01	ND	5.48E+00	EL3-01		6/5/2002
POTASSIUM	mg/kg	18	0	18	3	N	1	1.05E+02	1.29E+02	2.51E+02	4.10E+01	1.29E+02	EL3-14		6/6/2002
PYRENE	mg/kg	18	12	6	4	X	3	1.94E+00	5.43E+00	3.40E+01	ND	5.43E+00	EL3-01		6/5/2002
SODIUM	mg/kg	18	14	4	3	X	3	4.15E+01	7.68E+01	2.70E+02	ND	7.68E+01	EL3-14		6/6/2002
STYRENE	mg/kg	18	17	1	1	- -	- -	6.52E-05	- -	1.93E-04	ND	1.93E-04	EL3-02	J	6/5/2002
TOLUENE	mg/kg	18	5	13	12	X	3	4.77E-04	6.90E-04	2.37E-03	ND	6.90E-04	EL3-04		6/3/2002
VANADIUM	mg/kg	18	0	18	0	N	1	2.41E+01	3.12E+01	7.14E+01	5.08E+00	3.12E+01	EL3-05		5/31/2002
XYLENES	mg/kg	18	16	2	2	X	3	2.17E-04	3.00E-04	7.12E-04	ND	3.00E-04	EL3-07	J	6/3/2002
ZINC	mg/kg	18	2	16	13	X	3	1.39E+02	2.54E+02	9.17E+02	ND	2.54E+02	EL3-01	J	6/5/2002

Distribution Code:
N Normal Distribution
G Gamma Distribution
L Lognormal Distribution
X Non-Parametric

UCL Method Code: (as determined by ProUCL)
1 Student's t UCL
3 Kaplan-Meier (KM) t UCL
5 Adjusted Gamma UCL
2 Approximate Gamma UCL
4 Hall's Bootstrap UCL
6 Land's H-Statistic (H) UCL
7 KM Adjusted Gamma UCL

ND: Non-Detect
RME: Reasonable Maximum Exposure
UCL: Upper Confidence Limit

Table A.2-3. Data Summary Table ECODS L-3 Subunit Soil (All Depths)

ANALYTE NAME	Units	Samples	Non-Detects	Detects	J-Detects	Distr. Code	UCL Method	Mean	95% UCL	Max	Min	RME	Max Location	Top Sample	Bottom Sample	Qualifier of Max	Max Date
1,1'-BIPHENYL	mg/kg	61	60	1	1	- -	- -	3.29E-02	- -	6.29E-01	ND	6.29E-01	EL3-01	1	4	J	6/5/2002
1,1-DICHLOROETHYLENE	mg/kg	61	55	6	3	X	3	3.72E-04	5.00E-04	2.88E-03	ND	3.72E-04	EL3-17	1	4		5/31/2002
2-METHYLNAPHTHALENE	mg/kg	61	60	1	0	- -	- -	5.50E-02	- -	2.00E+00	ND	2.00E+00	EL3-01	1	4		6/5/2002
ACENAPHTHENE	mg/kg	61	60	1	0	- -	- -	1.75E-01	- -	9.27E+00	ND	9.27E+00	EL3-01	1	4		6/5/2002
ACETONE	mg/kg	61	44	17	15	X	3	1.71E-03	2.57E-03	2.86E-02	ND	1.71E-03	EL3-17	0	1		5/31/2002
ALUMINUM	mg/kg	61	0	61	0	N	1	7.98E+03	8.80E+03	2.19E+04	3.52E+03	8.80E+03	EL3-05	1	4		5/31/2002
ANTHRACENE	mg/kg	61	58	3	2	X	3	3.21E-01	9.06E-01	1.76E+01	ND	3.21E-01	EL3-01	1	4		6/5/2002
ANTIMONY	mg/kg	61	40	21	13	X	3	4.51E+00	6.81E+00	5.66E+01	ND	4.51E+00	EL3-01	1	4		6/5/2002
AROCLOR 1254	mg/kg	61	19	42	33	L	6	4.42E-02	4.72E-01	5.63E+00	ND	3.45E-01	EL3-16	0	1	J	5/31/2002
AROCLOR 1260	mg/kg	61	36	25	25	L	6	1.85E-02	7.08E-02	2.17E+00	ND	8.88E-02	EL3-16	0	1	J	5/31/2002
ARSENIC	mg/kg	61	15	46	18	X	3	2.86E+00	3.44E+00	1.31E+01	ND	2.86E+00	EL3-10	4	8		6/4/2002
BARIUM	mg/kg	61	0	61	43	N	1	3.30E+01	4.51E+01	2.85E+02	1.69E+00	4.51E+01	EL3-15	4	8	J	6/3/2002
BENZALDEHYDE	mg/kg	61	58	3	2	X	3	4.11E-02	4.73E-02	2.22E-01	ND	4.11E-02	EL3-09	0	1		6/4/2002
BENZENE	mg/kg	61	56	5	3	X	3	1.74E-04	2.74E-04	2.60E-03	ND	1.74E-04	EL3-06	0	1		5/31/2002
BENZO(G,H,I)PERYLENE	mg/kg	61	57	4	3	X	3	1.92E-01	4.94E-01	9.67E+00	ND	1.92E-01	EL3-01	1	4		6/5/2002
BENZO[A]ANTHRACENE	mg/kg	61	50	11	9	X	3	4.60E-01	1.20E+00	2.59E+01	ND	4.60E-01	EL3-01	1	4		6/5/2002
BENZO[A]PYRENE	mg/kg	61	52	9	6	X	3	3.77E-01	9.70E-01	2.06E+01	ND	3.77E-01	EL3-01	1	4		6/5/2002
BENZO[B]FLUORANTHENE	mg/kg	61	49	12	9	X	3	4.92E-01	1.25E+00	2.69E+01	ND	4.92E-01	EL3-01	1	4		6/5/2002
BENZO[K]FLUORANTHENE	mg/kg	61	57	4	3	L	6	3.86E-02	6.22E-02	9.72E+00	ND	1.95E-01	EL3-01	1	4		6/5/2002
BIS(2-ETHYLHEXYL)PHTHALATE (DEHP)	mg/kg	61	11	50	17	X	3	1.21E+00	2.30E+00	3.71E+01	ND	1.21E+00	EL3-06	1	4		5/31/2002
CADMIUM	mg/kg	61	49	12	9	X	3	7.32E-01	1.23E+00	1.19E+01	ND	7.32E-01	EL3-06	1	4		5/31/2002
CALCIUM	mg/kg	61	0	61	18	L	6	3.36E+03	7.16E+03	5.28E+04	5.01E+00	7.16E+03	EL3-01	1	4	J	6/5/2002
CARBAZOLE	mg/kg	61	59	2	1	X	3	2.63E-01	7.92E-01	1.38E+01	ND	2.63E-01	EL3-01	1	4		6/5/2002
CARBON DISULFIDE	mg/kg	61	60	1	1	- -	- -	2.44E-04	- -	9.51E-04	ND	9.51E-04	EL3-06	0	1	J	5/31/2002
CHROMIUM	mg/kg	61	0	61	27	G	8	1.87E+01	2.23E+01	8.01E+01	3.41E+00	2.23E+01	EL3-07	1	4		6/3/2002
CHRYSENE	mg/kg	61	52	9	7	X	3	3.85E-01	1.00E+00	2.14E+01	ND	3.85E-01	EL3-01	1	4		6/5/2002
COBALT	mg/kg	61	40	21	11	X	3	6.78E-01	8.48E-01	4.67E+00	ND	6.78E-01	EL3-01	1	4		6/5/2002
COPPER	mg/kg	61	2	59	45	X	3	3.33E+02	6.15E+02	8.37E+03	ND	3.33E+02	EL3-07	4	8	J	6/3/2002
CYANIDE	mg/kg	61	59	2	2	X	3	2.56E-01	2.93E-01	1.22E+00	ND	2.56E-01	EL3-09	0	1	J	6/4/2002
DDE	mg/kg	61	60	1	1	- -	- -	3.13E-04	- -	5.84E-04	ND	5.84E-04	EL3-17	0	1	J	5/31/2002
DDT	mg/kg	61	60	1	1	- -	- -	3.93E-04	- -	1.07E-03	ND	1.07E-03	EL3-17	0	1	J	5/31/2002
DIBENZ[AH]ANTHRACENE	mg/kg	61	59	2	1	X	3	7.73E-02	1.80E-01	2.70E+00	ND	7.73E-02	EL3-01	1	4		6/5/2002
DIBENZOFURAN	mg/kg	61	60	1	0	- -	- -	1.04E-01	- -	5.10E+00	ND	5.10E+00	EL3-01	1	4		6/5/2002
DICHLOROMETHANE (METHYLENE CHLORIDE)	mg/kg	61	60	1	1	- -	- -	2.29E-04	- -	6.96E-04	ND	6.96E-04	EL3-01	0	1	J	6/5/2002
DI-N-BUTYL PHTHALATE	mg/kg	61	60	1	1	- -	- -	2.11E-02	- -	8.11E-02	ND	8.11E-02	EL3-15	4	8	J	6/3/2002
FLUORANTHENE	mg/kg	61	47	14	11	X	3	6.20E-01	1.61E+00	3.50E+01	ND	6.20E-01	EL3-01	1	4		6/5/2002
FLUORENE	mg/kg	61	60	1	0	- -	- -	1.91E-01	- -	1.05E+01	ND	1.05E+01	EL3-01	1	4		6/5/2002
INDENO[1,2,3-CD]PYRENE	mg/kg	61	57	4	3	X	3	1.79E-01	4.58E-01	8.91E+00	ND	1.79E-01	EL3-01	1	4		6/5/2002
IRON	mg/kg	61	0	61	0	N	1	1.35E+04	1.54E+04	3.17E+04	2.32E+03	1.54E+04	EL3-10	4	8		6/4/2002
LEAD	mg/kg	61	0	61	25	N	1	4.95E+01	8.67E+01	1.30E+03	2.48E+00	8.67E+01	EL3-06	0	1		5/31/2002
MAGNESIUM	mg/kg	61	0	61	27	N	1	2.95E+02	3.94E+02	2.52E+03	1.99E+01	3.94E+02	EL3-01	1	4	J	6/5/2002

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Table A.2-3. Data Summary Table ECODS L-3 Subunit Soil (All Depths) *(Continued/End)*

ANALYTE NAME	Units	Samples	Non-Detects	Detects	J-Detects	Distr. Code	UCL Method	Mean	95% UCL	Max	Min	RME	Max Location	Top Sample	Bottom Sample	Qualifier of Max	Max Date
MANGANESE	mg/kg	61	0	61	40	G	8	6.55E+01	8.11E+01	4.47E+02	7.53E+00	8.11E+01	EL3-01	1	4		6/5/2002
MERCURY	mg/kg	61	7	54	21	L	6	2.01E-02	7.15E-02	3.79E+00	ND	9.77E-02	EL3-15	4	8	J	6/3/2002
METHYL ETHYL KETONE	mg/kg	61	59	2	2	X	3	4.19E-04	4.77E-04	1.57E-03	ND	4.19E-04	EL3-17	0	1	J	5/31/2002
METHYL TERTIARY BUTYL ETHER (MTBE)	mg/kg	61	41	20	20	X	3	1.40E-04	1.65E-04	4.30E-04	ND	1.40E-04	EL3-16	1	4	J	5/31/2002
NAPHTHALENE	mg/kg	61	60	1	0	- -	- -	1.15E-01	- -	5.66E+00	ND	5.66E+00	EL3-01	1	4		6/5/2002
NICKEL	mg/kg	61	27	34	16	X	3	5.76E+00	7.89E+00	4.24E+01	ND	5.76E+00	EL3-07	1	4		6/3/2002
PHENANTHRENE	mg/kg	61	51	10	8	X	3	5.91E-01	1.56E+00	3.39E+01	ND	5.91E-01	EL3-01	1	4		6/5/2002
POTASSIUM	mg/kg	61	0	61	22	N	1	9.05E+01	1.03E+02	2.66E+02	2.33E+01	1.03E+02	EL3-15	4	8		6/3/2002
PYRENE	mg/kg	61	48	13	10	X	3	5.98E-01	1.56E+00	3.40E+01	ND	5.98E-01	EL3-01	1	4		6/5/2002
SELENIUM	mg/kg	61	59	2	2	X	3	1.12E-01	1.96E-01	1.70E+00	ND	1.12E-01	EL3-04	4	8	J	6/3/2002
SODIUM	mg/kg	61	48	13	12	X	3	3.90E+01	5.42E+01	2.70E+02	ND	3.90E+01	EL3-14	1	4		6/6/2002
STYRENE	mg/kg	61	58	3	3	X	3	1.15E-04	1.24E-04	3.68E-04	ND	1.45E-04	EL3-09	0	1	J	6/4/2002
TOLUENE	mg/kg	61	19	42	40	X	3	3.81E-04	4.54E-04	2.37E-03	ND	3.81E-04	EL3-04	1	4		6/3/2002
VANADIUM	mg/kg	61	0	61	0	N	1	2.62E+01	3.00E+01	7.14E+01	5.08E+00	3.00E+01	EL3-05	1	4		5/31/2002
XYLENES	mg/kg	61	57	4	4	X	3	1.84E-04	2.05E-04	7.12E-04	ND	1.84E-04	EL3-07	1	4	J	6/3/2002
ZINC	mg/kg	61	5	56	44	X	3	1.22E+02	1.73E+02	1.12E+03	ND	1.22E+02	EL3-10	4	8	J	6/4/2002

Distribution Code:
N Normal Distribution; G Gamma Distribution
L Lognormal Distribution; X Non-Parametric

UCL Method Code: (as determined by ProUCL)
1 Student's t UCL; 3 Kaplan-Meier (KM) t UCL; 5 Adjusted Gamma UCL
2 Approximate Gamma UCL; 4 Hall's Bootstrap UCL; 6 Land's H-Statistic (H) UCL
7 KM Adjusted Gamma UCL; 8 Approximate Gamma UCL

ND: Non-Detect
RME: Reasonable Maximum Exposure
UCL: Upper Confidence Limit

Table A.2-4. Unit Specific Constituent Screening Table ECODS L-3 Subunit Soil (All Depths)

ANALYTE NAME	Units	Max Result[1]	Qualifier of Max	Max Location	Top Sample (ft)	Bottom Sample (ft)	SRS 2X Mean Background[2]	Is Max Detect>2X SRS Mean Bkg?[3]
Inorganics								
ALUMINUM	mg/kg	2.19E+04		EL3-05	1	4	1.34E+04	Yes
ANTIMONY	mg/kg	5.66E+01		EL3-01	1	4	2.65E+00	Yes
ARSENIC	mg/kg	1.31E+01		EL3-10	4	8	4.45E+00	Yes
BARIUM	mg/kg	2.85E+02	J	EL3-15	4	8	3.31E+01	Yes
CADMIUM	mg/kg	1.19E+01		EL3-06	1	4	4.44E-01	Yes
CALCIUM	mg/kg	5.28E+04		EL3-01	1	4	3.34E+02	Yes
CHROMIUM	mg/kg	8.01E+01		EL3-07	1	4	2.29E+01	Yes
COBALT	mg/kg	4.67E+00		EL3-01	1	4	1.40E+00	Yes
COPPER	mg/kg	8.37E+03		EL3-07	4	8	6.35E+00	Yes
CYANIDE	mg/kg	1.22E+00		EL3-09	0	1	N/A	Yes
IRON	mg/kg	3.17E+04		EL3-10	4	8	2.20E+04	Yes
LEAD	mg/kg	1.30E+03		EL3-06	0	1	1.08E+01	Yes
MAGNESIUM	mg/kg	2.52E+03		EL3-01	1	4	2.46E+02	Yes
MANGANESE	mg/kg	4.47E+02		EL3-01	1	4	6.33E+01	Yes
MERCURY	mg/kg	3.79E+00		EL3-15	4	8	6.68E-02	Yes
NICKEL	mg/kg	4.24E+01		EL3-07	1	4	4.15E+00	Yes
POTASSIUM	mg/kg	2.66E+02		EL3-15	4	8	2.13E+02	Yes
SELENIUM	mg/kg	1.70E+00		EL3-04	4	8	3.71E+00	No
SODIUM	mg/kg	2.70E+02		EL3-14	1	4	4.36E+01	Yes
VANADIUM	mg/kg	7.14E+01		EL3-05	1	4	5.81E+01	Yes
ZINC	mg/kg	1.12E+03		EL3-10	4	8	7.44E+00	Yes
Pesticides/Herbicides								
DDE	mg/kg	5.84E-04	J	EL3-17	0	1	N/A	Yes
DDT	mg/kg	1.07E-03		EL3-17	0	1	N/A	Yes

Table A.2-4. Unit Specific Constituent Screening Table ECODS L-3 Subunit Soil (All Depths) *(Continued)*

ANALYTE NAME	Units	Max Result[1]	Qualifier of Max	Max Location	Top Sample (ft)	Bottom Sample (ft)	SRS 2X Mean Background[2]	Is Max Detect>2X SRS Mean Bkg?[3]
Polychlorinated Biphenyls (PCBs)								
AROCLOR 1254	mg/kg	5.63E+00		EL3-16	0	1	N/A	Yes
AROCLOR 1260	mg/kg	2.17E+00		EL3-16	0	1	N/A	Yes
Semi-Volatile & Volatile Organic Compounds								
1,1'-BIPHENYL	mg/kg	6.29E-01	J	EL3-01	1	4	N/A	Yes
1,1-DICHLOROETHYLENE	mg/kg	2.88E-03		EL3-17	1	4	N/A	Yes
2-METHYLNAPHTHALENE	mg/kg	2.00E+00		EL3-01	1	4	N/A	Yes
ACENAPHTHENE	mg/kg	9.27E+00		EL3-01	1	4	N/A	Yes
ACETONE	mg/kg	2.86E-02		EL3-17	0	1	N/A	Yes
ANTHRACENE	mg/kg	1.76E+01		EL3-01	1	4	N/A	Yes
BENZALDEHYDE	mg/kg	2.22E-01		EL3-09	0	1	N/A	Yes
BENZENE	mg/kg	2.60E-03		EL3-06	0	1	N/A	Yes
BENZO(G,H,I)PERYLENE	mg/kg	9.67E+00		EL3-01	1	4	N/A	Yes
BENZO[A]ANTHRACENE	mg/kg	2.59E+01		EL3-01	1	4	N/A	Yes
BENZO[A]PYRENE	mg/kg	2.06E+01		EL3-01	1	4	N/A	Yes
BENZO[B]FLUORANTHENE	mg/kg	2.69E+01		EL3-01	1	4	N/A	Yes
BENZO[K]FLUORANTHENE	mg/kg	9.72E+00		EL3-01	1	4	N/A	Yes
BIS(2-ETHYLHEXYL)PHTHALATE (DEHP)	mg/kg	3.71E+01		EL3-06	1	4	N/A	Yes
CARBAZOLE	mg/kg	1.38E+01		EL3-01	1	4	N/A	Yes
CARBON DISULFIDE	mg/kg	9.51E-04		EL3-06	0	1	N/A	Yes
CHRYSENE	mg/kg	2.14E+01		EL3-01	1	4	N/A	Yes
DIBENZ[AH]ANTHRACENE	mg/kg	2.70E+00		EL3-01	1	4	N/A	Yes
DIBENZOFURAN	mg/kg	5.10E+00		EL3-01	1	4	N/A	Yes
DICHLOROMETHANE (METHYLENE CHLORIDE)	mg/kg	6.96E-04		EL3-01	0	1	N/A	Yes
DI-N-BUTYL PHTHALATE	mg/kg	8.11E-02		EL3-15	4	8	N/A	Yes
FLUORANTHENE	mg/kg	3.50E+01		EL3-01	1	4	N/A	Yes

Table A.2-4. Unit Specific Constituent Screening Table ECODS L-3 Subunit Soil (All Depths) *(Continued/End)*

ANALYTE NAME	Units	Max Result[1]	Qualifier of Max	Max Location	Top Sample (ft)	Bottom Sample (ft)	SRS 2X Mean Background[2]	Is Max Detect>2X SRS Mean Bkg?[3]
FLUORENE	mg/kg	1.05E+01		EL3-01	1	4	N/A	Yes
INDENO[1,2,3-CD]PYRENE	mg/kg	8.91E+00		EL3-01	1	4	N/A	Yes
METHYL ETHYL KETONE	mg/kg	1.57E-03		EL3-17	0	1	N/A	Yes
METHYL TERTIARY BUTYL ETHER (MTBE)	mg/kg	4.30E-04		EL3-16	1	4	N/A	Yes
NAPHTHALENE	mg/kg	5.66E+00		EL3-01	1	4	N/A	Yes
PHENANTHRENE	mg/kg	3.39E+01		EL3-01	1	4	N/A	Yes
PYRENE	mg/kg	3.40E+01		EL3-01	1	4	N/A	Yes
STYRENE	mg/kg	3.68E-04		EL3-09	0	1	N/A	Yes
TOLUENE	mg/kg	2.37E-03		EL3-04	1	4	N/A	Yes
XYLENES	mg/kg	7.12E-04		EL3-07	1	4	N/A	Yes

Table Notes:
J = estimated value
NA = not available
1 = Max = maximum detected concentration from all depth intervals
2 = *Background Soils Statistical Summary report for the Savannah River Site*, ERD-EN-2005-0223, Appendix B-2 (All Depth Intervals)
3 = Constituents identified as an USC if maximum detected concentration is greater than 2X SRS Mean Concentration

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A.3 LRP 131-1L SUBUNIT SOIL DATA

The tables in this section present analytical data for the LRP 131-1L subunit soil in the following depth intervals: 0 to 0.3 m (0 to 1 ft) (Table A.3.1), 0.3 to 1.2 m (1 to 4 ft) (Table A.3.2), and all depths (Table A.3.3). These tables are followed by the unit-specific constituent screening table for the subunit soil at all depths (Table A.3.4).

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Table A.3-1. Data Summary Table LRP 131-1L Subunit Soil (0 to 0.3 m [0 to 1 ft])

ANALYTE NAME	Units	Samples	Non-Detects	Detects	J-Detects	Distr. Code	UCL Method	Mean	95% UCL	Max	Min	RME	Max Location	Qualifier of Max	Max Date
2-HEXANONE	mg/kg	21	20	1	1	- -	- -	6.51E-02	- -	3.98E-03	ND	3.98E-03	LAP1L-013	J	11/3/2022
ACETONE	mg/kg	21	- -	21	2	N	1	1.86E-01	2.34E-01	3.97E-01	2.09E-02	2.34E-01	LAP1L-013		11/3/2022
ACTINIUM-228	pCi/g	1	- -	1	- -	- -	- -	1.42E+00	- -	1.42E+00	1.42E+00	1.42E+00	LAP1L-012		11/2/2022
ALUMINUM	mg/kg	21	- -	21	- -	N	1	2.04E+04	2.30E+04	3.50E+04	7.80E+03	2.30E+04	LAP1L-009		10/31/2022
AMERICIUM-243	pCi/g	5	4	1	1	- -	- -	3.29E-02	- -	8.88E-02	ND	8.88E-02	LAP1L-009	J	10/31/2022
ANTIMONY	mg/kg	21	- -	21	10	N	1	1.76E-01	1.99E-01	3.10E-01	9.30E-02	1.99E-01	LAP1L-009		10/31/2022
ARSENIC	mg/kg	21	- -	21	- -	N	1	2.94E+00	3.58E+00	6.50E+00	7.70E-01	3.58E+00	LAP1L-018		11/9/2022
BARIUM	mg/kg	21	- -	21	- -	N	1	3.23E+01	3.51E+01	4.50E+01	1.80E+01	3.51E+01	LAP1L-009		10/31/2022
BERYLLIUM	mg/kg	21	- -	21	- -	N	1	2.84E-01	3.30E-01	5.50E-01	9.40E-02	3.30E-01	LAP1L-003		11/8/2022
CADMIUM	mg/kg	21	2	19	18	X	3	2.90E-02	3.86E-02	1.30E-01	ND	3.86E-02	LAP1L-016		11/10/2022
CALCIUM	mg/kg	21	- -	21	- -	N	1	3.42E+02	4.25E+02	1.20E+03	8.20E+01	4.25E+02	LAP1L-018		11/9/2022
CESIUM-137	pCi/g	1	- -	1	- -	- -	- -	3.90E-01	- -	3.90E-01	3.90E-01	3.90E-01	LAP1L-012		11/2/2022
CHROMIUM	mg/kg	21	- -	21	- -	N	1	1.79E+01	2.00E+01	2.80E+01	7.90E+00	2.00E+01	LAP1L-006		11/9/2022
COBALT	mg/kg	21	- -	21	- -	N	1	1.22E+00	1.38E+00	2.00E+00	5.50E-01	1.38E+00	LAP1L-003		11/8/2022
COPPER	mg/kg	21	- -	21	- -	N	1	9.22E+00	1.17E+01	3.10E+01	2.60E+00	1.17E+01	LAP1L-018		11/9/2022
CUMENE (ISOPROPYLBENZENE)	mg/kg	21	20	1	- -	- -	- -	1.31E-02	- -	1.88E-03	ND	1.88E-03	LAP1L-012		11/2/2022
CURIUM-245/246	pCi/g	5	4	1	1	- -	- -	2.76E-02	- -	4.29E-02	ND	4.29E-02	LAP1L-012	J	11/2/2022
CYANIDE	mg/kg	21	15	6	- -	X	3	5.98E-01	6.99E-01	1.20E+00	ND	6.99E-01	LAP1L-001		10/31/2022
GROSS ALPHA	pCi/g	21	- -	21	7	N	1	2.77E+01	3.03E+01	3.79E+01	1.19E+01	3.03E+01	LAP1L-008		11/3/2022
IRON	mg/kg	21	- -	21	- -	N	1	1.10E+04	1.26E+04	1.90E+04	5.80E+03	1.26E+04	LAP1L-009		10/31/2022
LEAD	mg/kg	21	- -	21	- -	N	1	8.71E+00	9.63E+00	1.30E+01	4.60E+00	9.63E+00	LAP1L-003		11/8/2022
LEAD-212	pCi/g	1	- -	1	- -	- -	- -	1.09E+00	- -	1.09E+00	1.09E+00	1.09E+00	LAP1L-012		11/2/2022
LEAD-214	pCi/g	1	- -	1	- -	- -	- -	9.13E-01	- -	9.13E-01	9.13E-01	9.13E-01	LAP1L-012		11/2/2022
MAGNESIUM	mg/kg	21	- -	21	- -	N	1	3.27E+02	3.56E+02	4.40E+02	2.00E+02	3.56E+02	LAP1L-009		10/31/2022
MANGANESE	mg/kg	21	- -	21	- -	N	1	5.40E+01	6.91E+01	1.80E+02	1.30E+01	6.91E+01	LAP1L-018		11/9/2022
MERCURY	mg/kg	21	- -	21	2	N	1	3.63E-02	4.04E-02	6.10E-02	1.80E-02	4.04E-02	LAP1L-007		11/7/2022
METHYL ETHYL KETONE	mg/kg	21	5	16	7	G	7	1.01E-02	1.55E-02	4.39E-02	ND	1.55E-02	LAP1L-012		11/2/2022
NICKEL	mg/kg	21	- -	21	- -	N	1	5.56E+00	6.14E+00	8.80E+00	2.50E+00	6.14E+00	LAP1L-009		10/31/2022
NONVOLATILE BETA	pCi/g	21	- -	21	13	N	1	1.15E+01	1.29E+01	1.79E+01	4.47E+00	1.29E+01	LAP1L-012		11/2/2022
PLUTONIUM-238	pCi/g	5	3	2	2	- -	- -	6.07E-02	- -	9.10E-02	ND	9.10E-02	LAP1L-003	J	11/8/2022
PLUTONIUM-239/240	pCi/g	5	2	3	3	X	3	4.68E-02	5.66E-02	5.69E-02	ND	5.66E-02	LAP1L-012	J	11/2/2022
POTASSIUM	mg/kg	21	- -	21	9	N	1	2.27E+02	2.46E+02	3.50E+02	1.30E+02	2.46E+02	LAP1L-011		11/2/2022
POTASSIUM-40	pCi/g	1	- -	1	1	- -	- -	1.06E+00	- -	1.06E+00	1.06E+00	1.06E+00	LAP1L-012	J	11/2/2022
RADIUM-226	pCi/g	5	- -	5	- -	N	1	7.36E-01	9.05E-01	9.66E-01	5.34E-01	9.05E-01	LAP1L-008		11/3/2022

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Table A.3-1. Data Summary Table LRP 131-1L Subunit Soil (0 to 0.3 m [0 to 1 ft]) *(Continued/End)*

ANALYTE NAME	Units	Samples	Non-Detects	Detects	J-Detects	Distr. Code	UCL Method	Mean	95% UCL	Max	Min	RME	Max Location	Qualifier of Max	Max Date
RADIUM-228	pCi/g	5	- -	5	4	N	1	1.56E+00	1.65E+00	1.70E+00	1.44E+00	1.65E+00	LAP1L-009		10/31/2022
SELENIUM	mg/kg	21	1	20	13	X	3	3.31E-01	3.85E-01	5.80E-01	ND	3.85E-01	LAP1L-003		11/8/2022
SILVER	mg/kg	21	18	3	3	X	3	1.77E-02	2.09E-02	2.00E-02	ND	2.00E-02	LAP1L-003	J	11/8/2022
STRONTIUM-90	pCi/g	1	- -	1	1	- -	- -	8.14E-01	- -	8.14E-01	8.14E-01	8.14E-01	LAP1L-012	J	11/2/2022
STYRENE	mg/kg	21	18	3	2	X	3	6.79E-04	8.77E-04	1.85E-03	ND	8.77E-04	LAP1L-014	J	11/7/2022
THALLIUM	mg/kg	21	- -	21	8	N	1	9.09E-02	1.02E-01	1.60E-01	4.30E-02	1.02E-01	LAP1L-009		10/31/2022
THORIUM-228	pCi/g	5	- -	5	- -	N	1	1.40E+00	1.66E+00	1.72E+00	1.11E+00	1.66E+00	LAP1L-009		10/31/2022
THORIUM-230	pCi/g	5	- -	5	1	N	1	7.35E-01	9.75E-01	1.01E+00	4.23E-01	9.75E-01	LAP1L-009		10/31/2022
THORIUM-232	pCi/g	5	- -	5	- -	N	1	1.25E+00	1.51E+00	1.54E+00	9.51E-01	1.51E+00	LAP1L-008		11/3/2022
URANIUM-233/234	pCi/g	5	- -	5	- -	N	1	7.25E-01	8.07E-01	8.04E-01	6.03E-01	8.04E-01	LAP1L-003		11/8/2022
URANIUM-235	pCi/g	5	4	1	1	- -	- -	4.74E-02	- -	9.02E-02	ND	9.02E-02	LAP1L-008	J	11/3/2022
URANIUM-238	pCi/g	5	- -	5	- -	N	1	7.33E-01	8.89E-01	9.00E-01	5.40E-01	8.89E-01	LAP1L-009		10/31/2022
VANADIUM	mg/kg	21	- -	21	- -	N	1	3.31E+01	3.76E+01	5.70E+01	1.50E+01	3.76E+01	LAP1L-009		10/31/2022
ZINC	mg/kg	21	- -	21	- -	N	1	1.70E+01	2.00E+01	3.60E+01	6.80E+00	2.00E+01	LAP1L-016		11/10/2022

Distribution Code:
N Normal Distribution G Gamma Distribution
L Lognormal Distribution X Non-Parameric

UCL Method Code: (as determined by ProUCL)
1 Student's t UCL 3 Kaplan-Meier (KM) t UCL 5 Adjusted Gamma UCL
2 Approximate Gamma UCL 4 Hall's Bootstrap UCL 6 Land's H-Statistic (H) UCL
7 KM Adjusted Gamma UCL

ND: Non-Detect
RME: Reasonable Maximum Exposure
UCL: Upper Confidence Limit

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Table A.3-2. Data Summary Table LRP 131-1L Subunit Soil (0.3 to 1.2 m [1 to 4 ft])

ANALYTE NAME	Units	Samples	Non-Detects	Detects	J-Detects	Distr. Code	UCL Method	Mean	95% UCL	Max	Min	RME	Max Location	Qualifier of Max	Max Date
ACENAPHTHENE	mg/kg	21	20	1	1	- -	- -	1.41E+00	- -	2.40E+00	ND	2.40E+00	LAP1L-015	J	11/8/2022
ACETONE	mg/kg	21	5	16	1	X	3	2.35E-02	2.95E-02	5.20E-02	ND	2.95E-02	LAP1L-019		11/16/2022
ACTINIUM-228	pCi/g	1	- -	1	- -	- -	- -	1.16E+00	- -	1.16E+00	1.16E+00	1.16E+00	LAP1L-015		11/8/2022
ALUMINUM	mg/kg	21	- -	21	- -	N	1	1.65E+04	1.88E+04	3.20E+04	8.30E+03	1.88E+04	LAP1L-016		11/15/2022
ANTIMONY	mg/kg	21	- -	21	15	N	1	1.34E-01	1.55E-01	2.50E-01	4.20E-02	1.55E-01	LAP1L-006		11/9/2022
ARSENIC	mg/kg	21	- -	21	2	N	1	1.90E+00	2.29E+00	4.20E+00	2.60E-01	2.29E+00	LAP1L-016		11/15/2022
BARIUM	mg/kg	21	- -	21	- -	N	1	2.65E+01	2.94E+01	3.90E+01	1.30E+01	2.94E+01	LAP1L-004		11/17/2022
BENZO(G,H,I)PERYLENE	mg/kg	21	20	1	1	- -	- -	1.22E+00	- -	8.60E-01	ND	8.60E-01	LAP1L-015	J	11/8/2022
BENZO[A]ANTHRACENE	mg/kg	21	20	1	1	- -	- -	1.47E+00	- -	6.10E+00	ND	6.10E+00	LAP1L-015	J	11/8/2022
BENZO[A]PYRENE	mg/kg	21	20	1	1	- -	- -	1.29E+00	- -	2.30E+00	ND	2.30E+00	LAP1L-015	J	11/8/2022
BENZO[B]FLUORANTHENE	mg/kg	21	19	2	2	X	3	3.15E-01	9.19E-01	4.90E+00	ND	9.19E-01	LAP1L-015	J	11/8/2022
BENZO[K]FLUORANTHENE	mg/kg	21	20	1	1	- -	- -	1.29E+00	- -	2.20E+00	ND	2.20E+00	LAP1L-015	J	11/8/2022
BERYLLIUM	mg/kg	21	- -	21	- -	N	1	1.95E-01	2.25E-01	3.70E-01	1.10E-01	2.25E-01	LAP1L-006		11/9/2022
CADMIUM	mg/kg	21	11	10	10	X	3	1.45E-02	2.05E-02	4.50E-02	ND	2.05E-02	LAP1L-012	J	11/2/2022
CALCIUM	mg/kg	21	- -	21	2	N	1	1.39E+02	1.61E+02	3.00E+02	5.60E+01	1.61E+02	LAP1L-006		11/9/2022
CARBAZOLE	mg/kg	21	20	1	1	- -	- -	1.36E+00	- -	1.30E+00	ND	1.30E+00	LAP1L-015	J	11/8/2022
CHROMIUM	mg/kg	21	- -	21	- -	G	5	1.49E+01	1.74E+01	3.00E+01	7.40E+00	1.74E+01	LAP1L-006		11/9/2022
CHRYSENE	mg/kg	21	20	1	- -	- -	- -	1.50E+00	- -	6.70E+00	ND	6.70E+00	LAP1L-015		11/8/2022
COBALT	mg/kg	21	- -	21	- -	N	1	1.03E+00	1.19E+00	2.10E+00	5.70E-01	1.19E+00	LAP1L-004		11/17/2022
COPPER	mg/kg	21	- -	21	- -	G	5	5.34E+00	6.86E+00	2.00E+01	1.90E+00	6.86E+00	LAP1L-012		11/2/2022
DDE	mg/kg	21	18	3	3	X	3	1.59E-03	2.72E-03	3.60E-03	ND	2.72E-03	LAP1L-020	J	11/16/2022
DIBENZ[AH]ANTHRACENE	mg/kg	21	20	1	1	- -	- -	1.26E+00	- -	1.60E+00	ND	1.60E+00	LAP1L-015	J	11/8/2022
DIBENZOFURAN	mg/kg	21	20	1	1	- -	- -	1.29E+00	- -	2.40E+00	ND	2.40E+00	LAP1L-015	J	11/8/2022
FLUORANTHENE	mg/kg	21	20	1	- -	- -	- -	2.61E+00	- -	3.00E+01	ND	3.00E+01	LAP1L-015		11/8/2022
FLUORENE	mg/kg	21	20	1	1	- -	- -	1.41E+00	- -	2.20E+00	ND	2.20E+00	LAP1L-015	J	11/8/2022
GROSS ALPHA	pCi/g	21	- -	21	7	N	1	3.05E+01	3.38E+01	4.63E+01	1.75E+01	3.38E+01	LAP1L-007		11/7/2022
HEXACHLOROBUTADIENE	mg/kg	21	20	1	- -	- -	- -	1.61E+00	- -	2.90E-01	ND	2.90E-01	LAP1L-017		11/15/2022
INDENO[1,2,3-CD]PYRENE	mg/kg	21	20	1	1	- -	- -	1.32E+00	- -	3.00E+00	ND	3.00E+00	LAP1L-015	J	11/8/2022
IRON	mg/kg	21	- -	21	- -	N	1	9.09E+03	1.13E+04	2.50E+04	1.80E+03	1.13E+04	LAP1L-005		11/17/2022
LEAD	mg/kg	21	- -	21	- -	N	1	6.33E+00	6.95E+00	9.20E+00	3.40E+00	6.95E+00	LAP1L-021		11/16/2022
LEAD-212	pCi/g	1	- -	1	- -	- -	- -	9.89E-01	- -	9.89E-01	9.89E-01	9.89E-01	LAP1L-015		11/8/2022
LEAD-214	pCi/g	1	- -	1	- -	- -	- -	7.03E-01	- -	7.03E-01	7.03E-01	7.03E-01	LAP1L-015		11/8/2022
MAGNESIUM	mg/kg	21	- -	21	- -	N	1	2.27E+02	2.58E+02	4.60E+02	1.40E+02	2.58E+02	LAP1L-006		11/9/2022
MANGANESE	mg/kg	21	- -	21	- -	N	1	3.01E+01	3.50E+01	5.50E+01	6.80E+00	3.50E+01	LAP1L-021		11/16/2022
MERCURY	mg/kg	21	- -	21	2	N	1	2.88E-02	3.22E-02	5.00E-02	1.70E-02	3.22E-02	LAP1L-016		11/15/2022

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Table A.3-2. Data Summary Table LRP 131-1L Subunit Soil (0.3 to 1.2 m [1 to 4 ft]) *(Continued/End)*

ANALYTE NAME	Units	Samples	Non-Detects	Detects	J-Detects	Distr. Code	UCL Method	Mean	95% UCL	Max	Min	RME	Max Location	Qualifier of Max	Max Date
METHYL ETHYL KETONE	mg/kg	21	14	7	5	G	7	4.52E-03	7.91E-03	2.70E-02	ND	7.91E-03	LAP1L-013		11/3/2022
N-DIOCTYL PHTHALATE	mg/kg	21	19	2	2	X	3	8.60E-02	1.27E-01	1.10E-01	ND	1.10E-01	LAP1L-007	J	11/7/2022
NICKEL	mg/kg	21	--	21	--	N	1	4.95E+00	5.66E+00	9.60E+00	2.60E+00	5.66E+00	LAP1L-016		11/15/2022
NONVOLATILE BETA	pCi/g	21	--	21	11	N	1	1.25E+01	1.49E+01	2.94E+01	3.86E+00	1.49E+01	LAP1L-009	J	10/31/2022
PHENANTHRENE	mg/kg	21	20	1	--	--	--	2.44E+00	--	2.40E+01	ND	2.40E+01	LAP1L-015		11/8/2022
PLUTONIUM-238	pCi/g	4	3	1	1	--	--	8.44E-02	--	8.71E-02	ND	8.71E-02	LAP1L-015	J	11/8/2022
PLUTONIUM-242	pCi/g	4	3	1	1	--	--	3.13E-03	--	2.08E-02	ND	2.08E-02	LAP1L-015	J	11/8/2022
POTASSIUM	mg/kg	21	--	21	18	N	1	1.50E+02	1.72E+02	2.90E+02	9.20E+01	1.72E+02	LAP1L-006		11/9/2022
POTASSIUM-40	pCi/g	1	--	1	1	--	--	7.06E-01	--	7.06E-01	7.06E-01	7.06E-01	LAP1L-015	J	11/8/2022
PROMETHIUM-147	pCi/g	1	--	1	1	--	--	1.10E+00	--	1.10E+00	1.10E+00	1.10E+00	LAP1L-015	J	11/8/2022
PYRENE	mg/kg	21	20	1	--	--	--	2.24E+00	--	1.70E+01	ND	1.70E+01	LAP1L-015		11/8/2022
RADIUM-226	pCi/g	4	--	4	1	N	1	6.17E-01	9.44E-01	1.00E+00	3.34E-01	9.44E-01	LAP1L-007		11/7/2022
RADIUM-228	pCi/g	4	2	2	2	--	--	1.08E+00	--	1.93E+00	ND	1.93E+00	LAP1L-007	J	11/7/2022
SELENIUM	mg/kg	21	4	17	16	X	3	1.95E-01	2.35E-01	3.90E-01	ND	2.35E-01	LAP1L-005		11/17/2022
SILVER	mg/kg	21	20	1	1	--	--	7.45E-02	--	1.80E-02	ND	1.80E-02	LAP1L-011	J	11/2/2022
SODIUM	mg/kg	21	19	2	2	X	3	2.65E+01	3.08E+01	2.90E+01	ND	2.90E+01	LAP1L-007	J	11/7/2022
STYRENE	mg/kg	21	20	1	1	--	--	1.10E-02	--	9.71E-04	ND	9.71E-04	LAP1L-013	J	11/3/2022
THALLIUM	mg/kg	21	--	21	10	N	1	7.99E-02	8.97E-02	1.40E-01	4.90E-02	8.97E-02	LAP1L-018		11/10/2022
THORIUM-228	pCi/g	4	--	4	--	N	1	1.28E+00	1.53E+00	1.60E+00	1.12E+00	1.53E+00	LAP1L-007		11/7/2022
THORIUM-230	pCi/g	4	--	4	--	N	1	7.11E-01	8.86E-01	9.31E-01	6.04E-01	8.86E-01	LAP1L-007		11/7/2022
THORIUM-232	pCi/g	4	--	4	--	N	1	1.23E+00	1.47E+00	1.45E+00	9.61E-01	1.45E+00	LAP1L-015		11/8/2022
TOLUENE	mg/kg	21	19	2	2	X	3	6.90E-04	7.06E-04	6.99E-04	ND	6.99E-04	LAP1L-009	J	10/31/2022
URANIUM-233/234	pCi/g	4	--	4	--	N	1	6.75E-01	8.86E-01	9.35E-01	5.28E-01	8.86E-01	LAP1L-007		11/7/2022
URANIUM-235	pCi/g	4	3	1	1	--	--	3.92E-02	--	5.29E-02	ND	5.29E-02	LAP1L-012	J	11/2/2022
URANIUM-238	pCi/g	4	--	4	--	N	1	5.51E-01	6.28E-01	6.05E-01	4.57E-01	6.05E-01	LAP1L-012		11/2/2022
VANADIUM	mg/kg	21	--	21	--	N	1	2.61E+01	3.08E+01	6.10E+01	7.10E+00	3.08E+01	LAP1L-016		11/15/2022
ZINC	mg/kg	21	--	21	--	N	1	7.81E+00	8.82E+00	1.40E+01	4.30E+00	8.82E+00	LAP1L-016		11/15/2022

Distribution Code:
N Normal Distribution
G Gamma Distribution
L Lognormal Distribution
X Non-Parameric

UCL Method Code: (as determined by ProUCL)
1 Student's t UCL
2 Approximate Gamma UCL UCL
3 Kaplan-Meier (KM) t UCL
4 Hall's Bootstrap UCL
5 Adjusted Gamma UCL
6 Land's H-Statistic (H)

ND: Non-Detect
RME: Reasonable Maximum Exposure
UCL: Upper Confidence Limit

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Table A.3-3. Data Summary Table LRP 131-1L Subunit Soil (All Depths)

ANALYTE NAME	Units	Samples	Non-Detects	Detects	J-Detects	Distr. Code	UCL Method	Mean	95% UCL	Max	Min	RME	Max Location	Top Sample	Bottom Sample	Qualifier of Max	Max Date
2-HEXANONE	mg/kg	113	112	1	1	--	--	4.79E-02	--	3.98E-03	ND	3.98E-03	LAP1L-013	0	1	J	11/3/2022
4-NITROPHENOL	mg/kg	113	111	2	2	--	--	1.19E+00	--	1.20E-01	ND	1.20E-01	LAP1L-001	8	12	J	10/31/2022
ACENAPHTHENE	mg/kg	113	112	1	1	--	--	1.16E+00	--	2.40E+00	ND	2.40E+00	LAP1L-015	1	4	J	11/8/2022
ACETONE	mg/kg	113	20	93	24	X	3	5.05E-02	6.51E-02	3.97E-01	ND	6.51E-02	LAP1L-013	0	1		11/3/2022
ACTINIUM-228	pCi/g	2	--	2	--	--	--	1.29E+00	--	1.42E+00	1.16E+00	1.42E+00	LAP1L-012	0	1		11/2/2022
ALUMINUM	mg/kg	113	--	113	--	N	1	1.74E+04	1.84E+04	4.00E+04	6.50E+03	1.84E+04	LAP1L-012	4	8		11/2/2022
AMERICIUM-243	pCi/g	12	11	1	1	--	--	2.57E-02	--	8.88E-02	ND	8.88E-02	LAP1L-009	0	1	J	10/31/2022
ANTIMONY	mg/kg	113	--	113	78	G	2	1.33E-01	1.43E-01	3.20E-01	3.50E-02	1.43E-01	LAP1L-013	12	16		11/7/2022
ARSENIC	mg/kg	113	--	113	53	N	1	1.25E+00	1.47E+00	6.50E+00	1.20E-01	1.47E+00	LAP1L-018	0	1		11/9/2022
BARIUM	mg/kg	113	--	113	--	N	1	2.26E+01	2.45E+01	5.80E+01	4.50E+00	2.45E+01	LAP1L-012	4	8		11/2/2022
BENZO(G,H,I)PERYLENE	mg/kg	113	112	1	1	--	--	1.10E+00	--	8.60E-01	ND	8.60E-01	LAP1L-015	1	4	J	11/8/2022
BENZO[A]ANTHRACENE	mg/kg	113	112	1	1	--	--	1.15E+00	--	6.10E+00	ND	6.10E+00	LAP1L-015	1	4	J	11/8/2022
BENZO[A]PYRENE	mg/kg	113	111	2	2	X	3	5.27E-02	1.13E-01	2.30E+00	ND	1.13E-01	LAP1L-015	1	4	J	11/8/2022
BENZO[B]FLUORANTHENE	mg/kg	113	111	2	2	X	3	7.84E-02	1.88E-01	4.90E+00	ND	1.88E-01	LAP1L-015	1	4	J	11/8/2022
BENZO[K]FLUORANTHENE	mg/kg	113	112	1	1	--	--	1.11E+00	--	2.20E+00	ND	2.20E+00	LAP1L-015	1	4	J	11/8/2022
BERYLLIUM	mg/kg	113	--	113	20	N	1	1.51E-01	1.66E-01	5.50E-01	3.80E-02	1.66E-01	LAP1L-003	0	1		11/8/2022
BIS(2-ETHYLHEXYL)PHTHALATE (DEHP)	mg/kg	113	109	4	4	X	3	7.96E-02	1.12E-01	2.10E-01	ND	1.12E-01	LAP1L-021	12	16	J	11/16/2022
BUTYL BENZYL PHTHALATE	mg/kg	113	111	2	2	--	--	1.19E+00	--	6.90E-02	ND	6.90E-02	LAP1L-006	12	16	J	11/9/2022
CADMIUM	mg/kg	113	81	32	31	G	2	2.07E-02	2.32E-02	1.30E-01	ND	2.32E-02	LAP1L-016	0	1		11/10/2022
CALCIUM	mg/kg	113	--	113	67	N	1	1.11E+02	1.35E+02	1.20E+03	1.10E+01	1.35E+02	LAP1L-018	0	1		11/9/2022
CARBAZOLE	mg/kg	113	112	1	1	--	--	1.15E+00	--	1.30E+00	ND	1.30E+00	LAP1L-015	1	4	J	11/8/2022
CESIUM-137	pCi/g	2	1	1	--	--	--	2.13E-01	--	3.90E-01	ND	3.90E-01	LAP1L-012	0	1		11/2/2022
CHROMIUM	mg/kg	113	--	113	--	G	2	1.43E+01	15.29	3.00E+01	4.40E+00	1.53E+01	LAP1L-006	1	4		11/9/2022
CHRYSENE	mg/kg	113	112	1	--					6.70E+00	ND	0.00E+00	LAP1L-015	1	4		11/8/2022
COBALT	mg/kg	113	--	113	--	G	2	7.47E-01	8.16E-01	2.10E+00	1.80E-01	8.16E-01	LAP1L-004	1	4		11/17/2022
COPPER	mg/kg	113	--	113	5	N	1	5.02E+00	5.65E+00	3.10E+01	1.30E+00	5.65E+00	LAP1L-018	0	1		11/9/2022
CUMENE (ISOPROPYLBENZENE)	mg/kg	113	112	1	--	--	--	9.60E-03	--	1.88E-03	ND	1.88E-03	LAP1L-012	0	1		11/2/2022
CURIUM-245/246	pCi/g	12	11	1	1	--	--	2.34E-02	--	4.29E-02	ND	4.29E-02	LAP1L-012	0	1	J	11/2/2022
CYANIDE	mg/kg	113	105	8	1	X	3	3.10E-01	3.83E-01	1.40E+00	ND	3.83E-01	LAP1L-007	12	16		11/8/2022
DDE	mg/kg	113	110	3	3	X	3	1.19E-03	1.92E-03	3.60E-03	ND	1.92E-03	LAP1L-020	1	4	J	11/16/2022
DIBENZ[AH]ANTHRACENE	mg/kg	113	112	1	1	--	--	1.11E+00	--	1.60E+00	ND	1.60E+00	LAP1L-015	1	4	J	11/8/2022
DIBENZOFURAN	mg/kg	113	112	1	1	--	--	1.11E+00	--	2.40E+00	ND	2.40E+00	LAP1L-015	1	4	J	11/8/2022
DI-N-BUTYL PHTHALATE	mg/kg	113	112	1	1	--	--	1.19E+00	--	3.60E-02	ND	3.60E-02	LAP1L-007	8	12	J	11/8/2022
FLUORANTHENE	mg/kg	113	112	1	--	--	--	1.36E+00	--	3.00E+01	ND	3.00E+01	LAP1L-015	1	4		11/8/2022
FLUORENE	mg/kg	113	112	1	1	--	--	1.16E+00	--	2.20E+00	ND	2.20E+00	LAP1L-015	1	4	J	11/8/2022
GROSS ALPHA	pCi/g	113	2	111	42	X	3	2.88E+01	3.00E+01	4.63E+01	ND	3.00E+01	LAP1L-007	1	4		11/7/2022
HEXACHLOROBUTADIENE	mg/kg	113	112	1	--	--	--	1.19E+00	--	2.90E-01	ND	2.90E-01	LAP1L-017	1	4		11/15/2022
INDENO[1,2,3-CD]PYRENE	mg/kg	113	112	1	1	--	--	1.12E+00	--	3.00E+00	ND	3.00E+00	LAP1L-015	1	4	J	11/8/2022
IRON	mg/kg	113	--	113	--	N	1	5.01E+03	5.82E+03	2.50E+04	4.70E+02	5.82E+03	LAP1L-005	1	4		11/17/2022
LEAD	mg/kg	113	--	113	--	G	2	5.55E+00	5.93E+00	1.30E+01	1.30E+00	5.93E+00	LAP1L-003	0	1		11/8/2022
LEAD-212	pCi/g	2	--	2	--	--	--	1.04E+00	--	1.09E+00	9.89E-01	1.09E+00	LAP1L-012	0	1		11/2/2022
LEAD-214	pCi/g	2	--	2	--	--	--	8.08E-01	--	9.13E-01	7.03E-01	9.13E-01	LAP1L-012	0	1		11/2/2022

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Table A.3-3. Data Summary Table LRP 131-1L Subunit Soil (All Depths) *(Continued/End)*

ANALYTE NAME	Units	Samples	Non-Detects	Detects	J-Detects	Distr. Code	UCL Method	Mean	95% UCL	Max	Min	RME	Max Location	Top Sample	Bottom Sample	Qualifier of Max	Max Date
MAGNESIUM	mg/kg	113	- -	113	- -	G	2	1.87E+02	2.06E+02	4.60E+02	4.00E+01	2.06E+02	LAP1L-006	1	4		11/9/2022
MANGANESE	mg/kg	113	- -	113	- -	N	1	2.16E+01	2.56E+01	1.80E+02	2.40E+00	2.56E+01	LAP1L-018	0	1		11/9/2022
MERCURY	mg/kg	113	11	102	27	G	2	2.79E-02	3.05E-02	1.10E-01	ND	3.05E-02	LAP1L-019	12	16		11/16/2022
METHYL ACETATE	mg/kg	113	112	1	1	- -	- -	4.79E-02	- -	5.21E-03	ND	5.21E-03	LAP1L-007	16	20	J	11/8/2022
METHYL ETHYL KETONE	mg/kg	113	88	25	14	L	6	4.97E-03	5.08E-03	4.39E-02	ND	5.08E-03	LAP1L-012	0	1		11/2/2022
N-DIOCTYL PHTHALATE	mg/kg	113	108	5	5	X	3	5.70E-02	7.03E-02	1.10E-01	ND	7.03E-02	LAP1L-007	1	4	J	11/7/2022
NICKEL	mg/kg	113	- -	113	- -	N	1	4.10E+00	4.39E+00	9.60E+00	9.10E-01	4.39E+00	LAP1L-016	1	4		11/15/2022
N-NITROSODIPHENYLAMINE	mg/kg	113	112	1	1	- -	- -	1.19E+00	- -	2.20E-02	ND	2.20E-02	LAP1L-013	12	16	J	11/7/2022
NONVOLATILE BETA	pCi/g	113	9	104	60	G	2	1.27E+01	1.37E+01	3.92E+01	ND	1.37E+01	LAP1L-009	12	16	J	11/1/2022
PHENANTHRENE	mg/kg	113	112	1	- -	- -	- -	1.35E+00	- -	2.40E+01	ND	2.40E+01	LAP1L-015	1	4		11/8/2022
PLUTONIUM-238	pCi/g	12	8	4	4	X	3	8.36E-02	8.95E-02	1.06E-01	ND	8.95E-02	LAP1L-015	8	12	J	11/8/2022
PLUTONIUM-239/240	pCi/g	12	9	3	3	X	3	4.11E-02	4.65E-02	5.69E-02	ND	4.65E-02	LAP1L-012	0	1	J	11/2/2022
PLUTONIUM-242	pCi/g	12	11	1	1	- -	- -	2.34E-02	- -	2.08E-02	ND	2.08E-02	LAP1L-015	1	4	J	11/8/2022
POTASSIUM	mg/kg	113	1	112	90	L	6	1.57E+02	1.69E+02	4.00E+02	ND	1.69E+02	LAP1L-012	4	8		11/2/2022
POTASSIUM-40	pCi/g	2	- -	2	2	- -	- -	8.83E-01	- -	1.06E+00	7.06E-01	1.06E+00	LAP1L-012	0	1	J	11/2/2022
PROMETHIUM-147	pCi/g	2	1	1	1	- -	- -	7.44E-01	- -	1.10E+00	ND	1.10E+00	LAP1L-015	1	4	J	11/8/2022
PYRENE	mg/kg	113	112	1	- -	- -	- -	1.47E+00	- -	1.70E+01	ND	1.70E+01	LAP1L-015	1	4		11/8/2022
RADIUM-226	pCi/g	12	- -	12	3	N	1	6.62E-01	7.64E-01	1.00E+00	3.34E-01	7.64E-01	LAP1L-007	1	4		11/7/2022
RADIUM-228	pCi/g	12	3	9	7	X	3	1.39E+00	1.69E+00	2.53E+00	ND	1.69E+00	LAP1L-015	8	12		11/8/2022
SELENIUM	mg/kg	113	67	46	38	X	3	2.10E-01	2.32E-01	5.80E-01	ND	2.32E-01	LAP1L-003	0	1		11/8/2022
SILVER	mg/kg	113	108	5	5	X	3	1.88E-02	2.12E-02	2.30E-02	ND	2.12E-02	LAP1L-017	4	8	J	11/15/2022
SODIUM	mg/kg	113	111	2	2	X	3	2.65E+01	3.07E+01	2.90E+01	ND	2.90E+01	LAP1L-007	1	4	J	11/7/2022
STRONTIUM-90	pCi/g	2	1	1	1	- -	- -	2.14E-01	- -	8.14E-01	ND	8.14E-01	LAP1L-012	0	1	J	11/2/2022
STYRENE	mg/kg	113	109	4	3	X	3	5.55E-04	7.43E-04	1.85E-03	ND	7.43E-04	LAP1L-014	0	1	J	11/7/2022
THALLIUM	mg/kg	113	- -	113	80	G	2	6.28E-02	6.78E-02	1.60E-01	1.80E-02	6.78E-02	LAP1L-009	0	1		10/31/2022
THORIUM-228	pCi/g	12	- -	12	- -	N	1	1.40E+00	1.57E+00	2.04E+00	1.04E+00	1.57E+00	LAP1L-015	8	12		11/8/2022
THORIUM-230	pCi/g	12	- -	12	2	N	1	7.18E-01	8.18E-01	1.01E+00	4.23E-01	8.18E-01	LAP1L-009	0	1		10/31/2022
THORIUM-232	pCi/g	12	- -	12	- -	N	1	1.32E+00	1.47E+00	1.90E+00	9.51E-01	1.47E+00	LAP1L-015	8	12		11/8/2022
TOLUENE	mg/kg	113	108	5	4	X	3	6.90E-04	7.91E-04	1.05E-03	ND	7.91E-04	LAP1L-015	4	8		11/8/2022
URANIUM-233/234	pCi/g	12	- -	12	- -	N	1	6.77E-01	7.65E-01	9.35E-01	4.17E-01	7.65E-01	LAP1L-007	1	4		11/7/2022
URANIUM-235	pCi/g	12	10	2	2	X	3	5.18E-02	6.22E-02	9.02E-02	ND	6.22E-02	LAP1L-008	0	1	J	11/3/2022
URANIUM-238	pCi/g	12	- -	12	- -	N	1	6.41E-01	7.26E-01	9.00E-01	4.28E-01	7.26E-01	LAP1L-009	0	1		10/31/2022
VANADIUM	mg/kg	113	- -	113	- -	G	2	2.51E+01	2.70E+01	6.90E+01	7.10E+00	2.70E+01	LAP1L-013	12	16		11/7/2022
ZINC	mg/kg	113	- -	113	2	L	6	7.41E+00	8.23E+00	3.60E+01	1.60E+00	8.23E+00	LAP1L-016	0	1		11/10/2022

Distribution Code:
N Normal Distribution G Gamma Distribution
L Lognormal Distribution X Non-Parameric

UCL Method Code: (as determined by ProUCL)
1 Student's t UCL 3 Kaplan-Meier (KM) t UCL 5 Adjusted Gamma UCL
2 Approximate Gamma UCL 4 Hall's Bootstrap UCL 6 Land's H-Statistic (H) UCL
7 KM Adjusted Gamma UCL

ND: Non-Detect
RME: Reasonable Maximum Exposure
UCL: Upper Confidence Limit

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Table A.3-4. Unit Specific Constituent Screening Table LRP 131-1L Subunit Soil (All Depths)

ANALYTE NAME	Units	Max Result[1]	Qualifier of Max	Max Location	Top Sample (ft)	Bottom Sample (ft)	SRS 2X Mean Background[2]	Is Max Detect>2X SRS Mean Bkg?[3]
Inorganics								
ALUMINUM	mg/kg	4.00E+04		LAP1L-012	4	8	1.34E+04	Yes
ANTIMONY	mg/kg	3.20E-01		LAP1L-013	12	16	2.65E+00	No
ARSENIC	mg/kg	6.50E+00		LAP1L-018	0	1	4.45E+00	Yes
BARIUM	mg/kg	5.80E+01		LAP1L-012	4	8	3.31E+01	Yes
BERYLLIUM	mg/kg	5.50E-01		LAP1L-003	0	1	3.05E-01	Yes
CADMIUM	mg/kg	1.30E-01		LAP1L-016	0	1	4.44E-01	No
CALCIUM	mg/kg	1.20E+03		LAP1L-018	0	1	3.34E+02	Yes
CHROMIUM	mg/kg	3.00E+01		LAP1L-006	1	4	2.29E+01	Yes
COBALT	mg/kg	2.10E+00		LAP1L-004	1	4	1.40E+00	Yes
COPPER	mg/kg	3.10E+01		LAP1L-018	0	1	6.35E+00	Yes
CYANIDE	mg/kg	1.40E+00		LAP1L-007	12	16	N/A	Yes
IRON	mg/kg	2.50E+04		LAP1L-005	1	4	2.20E+04	Yes
LEAD	mg/kg	1.30E+01		LAP1L-003	0	1	1.08E+01	Yes
MAGNESIUM	mg/kg	4.60E+02		LAP1L-006	1	4	2.46E+02	Yes
MANGANESE	mg/kg	1.80E+02		LAP1L-018	0	1	6.33E+01	Yes
MERCURY	mg/kg	1.10E-01		LAP1L-019	12	16	6.68E-02	Yes
NICKEL	mg/kg	9.60E+00		LAP1L-016	1	4	4.15E+00	Yes
POTASSIUM	mg/kg	4.00E+02		LAP1L-012	4	8	2.13E+02	Yes
SELENIUM	mg/kg	5.80E-01		LAP1L-003	0	1	3.71E+00	No
SILVER	mg/kg	2.30E-02	J	LAP1L-017	4	8	6.37E-01	No
SODIUM	mg/kg	2.90E+01	J	LAP1L-007	1	4	4.36E+01	No
THALLIUM	mg/kg	1.60E-01		LAP1L-009	0	1	2.94E+00	No
VANADIUM	mg/kg	6.90E+01		LAP1L-013	12	16	5.81E+01	Yes
ZINC	mg/kg	3.60E+01		LAP1L-016	0	1	7.44E+00	Yes
Pesticides/Herbicides								
DDE	mg/kg	3.60E-03	J	LAP1L-020	1	4	N/A	Yes

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Table A.3-4. Unit Specific Constituent Screening Table LRP 131-1L Subunit Soil (All Depths) *(Continued)*

ANALYTE NAME	Units	Max Result[1]	Qualifier of Max	Max Location	Top Sample (ft)	Bottom Sample (ft)	SRS 2X Mean Background[2]	Is Max Detect>2X SRS Mean Bkg?[3]
Radionuclides								
ACTINIUM-228	pCi/g	1.42E+00		LAP1L-012	0	1	2.15E+00	No
AMERICIUM-243	pCi/g	8.88E-02	J	LAP1L-009	0	1	N/A	Yes
CESIUM-137	pCi/g	3.90E-01		LAP1L-012	0	1	9.31E-02	Yes
CURIUM-245/246	pCi/g	4.29E-02	J	LAP1L-012	0	1	N/A	Yes
GROSS ALPHA	pCi/g	4.63E+01		LAP1L-007	1	4	2.16E+01	Yes
LEAD-212	pCi/g	1.09E+00		LAP1L-012	0	1	2.24E+00	No
LEAD-214	pCi/g	9.13E-01		LAP1L-012	0	1	N/A	Yes
NONVOLATILE BETA	pCi/g	3.92E+01	J	LAP1L-009	12	16	1.73E+01	Yes
PLUTONIUM-238	pCi/g	1.06E-01	J	LAP1L-015	8	12	2.62E-01	No
PLUTONIUM-239/240	pCi/g	5.69E-02	J	LAP1L-012	0	1	9.33E-02	No
PLUTONIUM-242	pCi/g	2.08E-02	J	LAP1L-015	1	4	N/A	Yes
POTASSIUM-40	pCi/g	1.06E+00	J	LAP1L-012	0	1	2.52E+00	No
PROMETHIUM-147	pCi/g	1.10E+00	J	LAP1L-015	1	4	N/A	Yes
RADIUM-226	pCi/g	1.00E+00		LAP1L-007	1	4	1.28E+00	No
RADIUM-228	pCi/g	2.53E+00		LAP1L-015	8	12	2.11E+00	Yes
STRONTIUM-90	pCi/g	8.14E-01	J	LAP1L-012	0	1	8.68E-01	No
THORIUM-228	pCi/g	2.04E+00		LAP1L-015	8	12	2.21E+00	No
THORIUM-230	pCi/g	1.01E+00		LAP1L-009	0	1	1.35E+00	No
THORIUM-232	pCi/g	1.90E+00		LAP1L-015	8	12	2.09E+00	No
URANIUM-233/234	pCi/g	9.35E-01		LAP1L-007	1	4	1.29E+00	No
URANIUM-235	pCi/g	9.02E-02	J	LAP1L-008	0	1	9.42E-02	No
URANIUM-238	pCi/g	9.00E-01		LAP1L-009	0	1	1.01E+00	No

Table A.3-4. Unit Specific Constituent Screening Table LRP 131-1L Subunit Soil (All Depths) *(Continued)*

ANALYTE NAME	Units	Max Result[1]	Qualifier of Max	Max Location	Top Sample (ft)	Bottom Sample (ft)	SRS 2X Mean Background[2]	Is Max Detect>2X SRS Mean Bkg?[3]
Semi-Volatile & Volatile Organic Compounds								
2-HEXANONE	mg/kg	3.98E-03	J	LAP1L-013	0	1	N/A	Yes
4-NITROPHENOL	mg/kg	1.20E-01	J	LAP1L-001	8	12	N/A	Yes
ACENAPHTHENE	mg/kg	2.40E+00	J	LAP1L-015	1	4	N/A	Yes
ACETONE	mg/kg	3.97E-01		LAP1L-013	0	1	N/A	Yes
BENZO(G,H,I)PERYLENE	mg/kg	8.60E-01	J	LAP1L-015	1	4	N/A	Yes
BENZO[A]ANTHRACENE	mg/kg	6.10E+00	J	LAP1L-015	1	4	N/A	Yes
BENZO[A]PYRENE	mg/kg	2.30E+00	J	LAP1L-015	1	4	N/A	Yes
BENZO[B]FLUORANTHENE	mg/kg	4.90E+00	J	LAP1L-015	1	4	N/A	Yes
BENZO[K]FLUORANTHENE	mg/kg	2.20E+00	J	LAP1L-015	1	4	N/A	Yes
BIS(2-ETHYLHEXYL)PHTHALATE (DEHP)	mg/kg	2.10E-01	J	LAP1L-021	12	16	N/A	Yes
BUTYL BENZYL PHTHALATE	mg/kg	6.90E-02	J	LAP1L-006	12	16	N/A	Yes
CARBAZOLE	mg/kg	1.30E+00	J	LAP1L-015	1	4	N/A	Yes
CHRYSENE	mg/kg	6.70E+00		LAP1L-015	1	4	N/A	Yes
CUMENE (ISOPROPYLBENZENE)	mg/kg	1.88E-03		LAP1L-012	0	1	N/A	Yes
DIBENZ[AH]ANTHRACENE	mg/kg	1.60E+00	J	LAP1L-015	1	4	N/A	Yes
DIBENZOFURAN	mg/kg	2.40E+00	J	LAP1L-015	1	4	N/A	Yes
DI-N-BUTYL PHTHALATE	mg/kg	3.60E-02	J	LAP1L-007	8	12	N/A	Yes
FLUORANTHENE	mg/kg	3.00E+01		LAP1L-015	1	4	N/A	Yes
FLUORENE	mg/kg	2.20E+00	J	LAP1L-015	1	4	N/A	Yes
HEXACHLOROBUTADIENE	mg/kg	2.90E-01		LAP1L-017	1	4	N/A	Yes
INDENO[1,2,3-CD]PYRENE	mg/kg	3.00E+00	J	LAP1L-015	1	4	N/A	Yes
METHYL ACETATE	mg/kg	5.21E-03	J	LAP1L-007	16	20	N/A	Yes
METHYL ETHYL KETONE	mg/kg	4.39E-02		LAP1L-012	0	1	N/A	Yes
N-DIOCTYL PHTHALATE	mg/kg	1.10E-01	J	LAP1L-007	1	4	N/A	Yes
N-NITROSODIPHENYLAMINE	mg/kg	2.20E-02	J	LAP1L-013	12	16	N/A	Yes
PHENANTHRENE	mg/kg	2.40E+01		LAP1L-015	1	4	N/A	Yes

Table A.3-4. Unit Specific Constituent Screening Table LRP 131-1L Subunit Soil (All Depths) *(Continued/End)*

ANALYTE NAME	Units	Max Result[1]	Qualifier of Max	Max Location	Top Sample (ft)	Bottom Sample (ft)	SRS 2X Mean Background[2]	Is Max Detect>2X SRS Mean Bkg?[3]
PYRENE	mg/kg	1.70E+01		LAP1L-015	1	4	N/A	Yes
STYRENE	mg/kg	1.85E-03	J	LAP1L-014	0	1	N/A	Yes
TOLUENE	mg/kg	1.05E-03		LAP1L-015	4	8	N/A	Yes

Table Notes:

J = estimated value

NA = not available

1 = Max = maximum detected concentration from all depth intervals

2 = *Background Soils Statistical Summary report for the Savannah River Site*, ERD-EN-2005-0223, Appendix B-2 (All Depth Intervals)

3 = Constituents identified as an USC if maximum detected concentration is greater than 2X SRS Mean Concentration

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A.4 LRP 131-4L SUBUNIT SOIL DATA

The tables in this section present analytical data for the LRP 131-4L subunit soil in the following depth intervals: 0 to 0.3 m (0 to 1 ft) (Table A.4.1), 0.3 to 1.2 m (1 to 4 ft) (Table A.4.2), and all depths (Table A.4.3). These tables are followed by the unit-specific constituent screening table for the subunit soil at all depths (Table A.4.4).

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Table A.4-1. Data Summary Table LRP 131-4L Subunit Soil (0 to 0.3 m [0 to 1 ft])

ANALYTE NAME	Units	Samples	Non-Detects	Detects	J-Detects	Distr. Code	UCL Method	Mean	95% UCL	Max	Min	RME	Max Location	Qualifier of Max	Max Date
2,4,6-TRICHLOROPHENOL	mg/kg	41	40	1	1	- -	- -	2.17E-02	- -	3.00E-02	ND	3.00E-02	LAP4L-018	J	12/13/2022
2-NITROPHENOL	mg/kg	41	40	1	1	- -	- -	2.17E-02	- -	3.00E-02	ND	3.00E-02	LAP4L-018	J	12/13/2022
ACENAPHTHENE	mg/kg	41	38	3	3	X	3	1.22E-02	1.58E-02	5.50E-02	ND	1.58E-02	LAP4L-034	J	1/4/2023
ACENAPHTHYLENE	mg/kg	41	40	1	1	- -	- -	1.76E-01	- -	1.20E-01	ND	1.20E-01	LAP4L-025	J	1/11/2023
ACETONE	mg/kg	41	- -	41	2	L	6	5.80E-02	8.07E-02	3.55E-01	4.27E-03	8.07E-02	LAP4L-028		11/21/2022
ACTINIUM-228	pCi/g	1	- -	1	- -	- -	- -	4.18E+00	- -	4.18E+00	4.18E+00	4.18E+00	LAP4L-022		12/12/2022
ALUMINUM	mg/kg	41	- -	41	- -	N	1	1.17E+04	1.31E+04	2.90E+04	2.30E+03	1.31E+04	LAP4L-035		12/20/2022
ANTHRACENE	mg/kg	41	39	2	1	X	3	2.61E-02	4.51E-02	3.20E-01	ND	4.51E-02	LAP4L-034		1/4/2023
ANTIMONY	mg/kg	41	- -	41	23	G	5	1.49E-01	1.79E-01	8.30E-01	3.60E-02	1.79E-01	LAP4L-039		1/5/2023
AROCLOR 1254	mg/kg	41	39	2	1	X	3	1.20E-02	1.57E-02	7.20E-02	ND	1.57E-02	LAP4L-039		1/5/2023
ARSENIC	mg/kg	41	- -	41	- -	N	1	2.22E+00	2.45E+00	4.30E+00	6.60E-01	2.45E+00	LAP4L-035		12/20/2022
BARIUM	mg/kg	41	- -	41	- -	N	1	1.31E+01	1.50E+01	3.00E+01	3.20E+00	1.50E+01	LAP4L-040		1/5/2023
BENZALDEHYDE	mg/kg	41	40	1	1	- -	- -	1.43E-01	- -	6.40E-02	ND	6.40E-02	LAP4L-020	J	11/28/2022
BENZO(G,H,I)PERYLENE	mg/kg	41	35	6	5	X	3	5.13E-02	8.69E-02	5.90E-01	ND	8.69E-02	LAP4L-034		1/4/2023
BENZO[A]ANTHRACENE	mg/kg	41	31	10	8	L	6	1.11E-01	9.48E-02	1.80E+00	ND	9.48E-02	LAP4L-034		1/4/2023
BENZO[A]PYRENE	mg/kg	41	33	8	6	X	3	9.56E-02	1.64E-01	1.20E+00	ND	1.64E-01	LAP4L-034		1/4/2023
BENZO[B]FLUORANTHENE	mg/kg	41	29	12	10	G	5	1.80E-01	3.98E-01	2.50E+00	ND	3.98E-01	LAP4L-034		1/4/2023
BENZO[K]FLUORANTHENE	mg/kg	41	35	6	4	X	3	9.42E-02	1.44E-01	9.20E-01	ND	1.44E-01	LAP4L-034		1/4/2023
BERYLLIUM	mg/kg	41	- -	41	5	N	1	1.65E-01	1.84E-01	3.10E-01	4.50E-02	1.84E-01	LAP4L-011		12/19/2022
CADMIUM	mg/kg	41	15	26	23	L	6	2.83E-02	3.39E-02	2.50E-01	ND	3.39E-02	LAP4L-041		1/9/2023
CALCIUM	mg/kg	41	- -	41	1	L	6	1.46E+03	2.05E+03	2.00E+04	3.00E+01	2.05E+03	LAP4L-039		1/5/2023
CARBAZOLE	mg/kg	41	40	1	1	- -	- -	8.06E-02	- -	1.90E-01	ND	1.90E-01	LAP4L-034	J	1/4/2023
CHROMIUM	mg/kg	41	- -	41	- -	G	5	1.23E+01	1.41E+01	2.80E+01	3.30E+00	1.41E+01	LAP4L-022		12/12/2022
CHRYSENE	mg/kg	41	33	8	6	X	3	1.25E-01	2.30E-01	2.20E+00	ND	2.30E-01	LAP4L-034		1/4/2023
COBALT	mg/kg	41	- -	41	- -	N	1	7.14E-01	8.11E-01	1.50E+00	2.50E-01	8.11E-01	LAP4L-032		12/19/2022
COPPER	mg/kg	41	- -	41	3	N	1	1.69E+01	3.64E+01	4.80E+02	1.10E+00	3.64E+01	LAP4L-039		1/5/2023
CYANIDE	mg/kg	41	34	7	3	G	7	6.77E-01	1.63E+00	1.00E+01	ND	1.63E+00	LAP4L-003		1/12/2023
DDE	mg/kg	41	40	1	1	- -	- -	7.70E-04	- -	1.30E-03	ND	1.30E-03	LAP4L-036	J	1/3/2023
DDT	mg/kg	41	27	14	12	X	3	1.81E-03	2.16E-03	4.90E-03	ND	2.16E-03	LAP4L-041	J	1/9/2023
DIBENZ[AH]ANTHRACENE	mg/kg	41	39	2	2	X	3	2.56E-02	3.92E-02	2.30E-01	ND	3.92E-02	LAP4L-034	J	1/4/2023
DIBENZOFURAN	mg/kg	41	40	1	1	- -	- -	4.29E-02	- -	2.20E-02	ND	2.20E-02	LAP4L-034	J	1/4/2023
DIETHYL PHTHALATE	mg/kg	41	40	1	1	- -	- -	6.25E-02	- -	4.40E-01	ND	4.40E-01	LAP4L-040	J	1/5/2023
DI-N-BUTYL PHTHALATE	mg/kg	41	39	2	2	X	3	4.16E-02	6.56E-02	2.80E-01	ND	6.56E-02	LAP4L-003	J	1/12/2023
ENDOSULFAN II	mg/kg	41	40	1	1	- -	- -	9.08E-04	- -	1.50E-03	ND	1.50E-03	LAP4L-017	J	1/17/2023
FLUORANTHENE	mg/kg	41	32	9	7	L	6	1.68E-01	1.46E-01	2.60E+00	ND	1.46E-01	LAP4L-034		1/4/2023
FLUORENE	mg/kg	41	40	1	1	- -	- -	3.91E-02	- -	4.10E-02	ND	4.10E-02	LAP4L-034	J	1/4/2023
GROSS ALPHA	pCi/g	41	- -	41	18	N	1	2.36E+01	2.56E+01	4.41E+01	9.90E+00	2.56E+01	LAP4L-025		1/11/2023
INDENO[1,2,3-CD]PYRENE	mg/kg	41	35	6	4	X	3	6.42E-02	1.09E-01	8.50E-01	ND	1.09E-01	LAP4L-034		1/4/2023
IRON	mg/kg	41	- -	41	1	N	1	8.87E+03	9.84E+03	2.10E+04	3.10E+03	9.84E+03	LAP4L-040		1/5/2023
LEAD	mg/kg	41	- -	41	- -	G	5	6.87E+00	8.14E+00	3.50E+01	2.10E+00	8.14E+00	LAP4L-039		1/5/2023

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Table A.4-1. Data Summary Table LRP 131-4L Subunit Soil (0 to 0.3 m [0 to 1 ft]) *(Continued/End)*

ANALYTE NAME	Units	Samples	Non-Detects	Detects	J-Detects	Distr. Code	UCL Method	Mean	95% UCL	Max	Min	RME	Max Location	Qualifier of Max	Max Date
LEAD-212	pCi/g	1	- -	1	- -	- -	- -	2.74E+00	- -	2.74E+00	2.74E+00	2.74E+00	LAP4L-022		12/12/2022
LEAD-214	pCi/g	1	- -	1	- -	- -	- -	1.61E+00	- -	1.61E+00	1.61E+00	1.61E+00	LAP4L-022		12/12/2022
MAGNESIUM	mg/kg	41	- -	41	- -	G	5	1.68E+02	2.03E+02	8.60E+02	5.20E+01	2.03E+02	LAP4L-039		1/5/2023
MANGANESE	mg/kg	41	- -	41	- -	N	1	3.74E+01	4.55E+01	1.80E+02	4.50E+00	4.55E+01	LAP4L-041		1/9/2023
MERCURY	mg/kg	41	1	40	13	L	6	4.14E-02	4.92E-02	3.80E-01	ND	4.92E-02	LAP4L-039		1/5/2023
METHOXYCHLOR	mg/kg	41	40	1	1	- -	- -	1.46E-03	- -	2.20E-03	ND	2.20E-03	LAP4L-016	J	12/12/2022
METHYL ACETATE	mg/kg	41	40	1	1	- -	- -	9.14E-04	- -	2.64E-03	ND	2.64E-03	LAP4L-001	J	1/12/2023
METHYL ETHYL KETONE	mg/kg	41	29	12	7	X	3	3.08E-03	4.23E-03	2.40E-02	ND	4.23E-03	LAP4L-006		12/6/2022
N-DIOCTYL PHTHALATE	mg/kg	41	40	1	1	- -	- -	8.87E-02	- -	1.50E-01	ND	1.50E-01	LAP4L-018	J	12/13/2022
NICKEL	mg/kg	41	- -	41	- -	L	6	3.00E+00	3.70E+00	7.90E+00	7.00E-01	3.70E+00	LAP4L-035		12/20/2022
N-NITROSODIPROPYLAMINE	mg/kg	41	40	1	1	- -	- -	1.52E-01	- -	4.50E-01	ND	4.50E-01	LAP4L-015	J	12/8/2022
NONVOLATILE BETA	pCi/g	41	1	40	23	X	3	9.87E+00	1.10E+01	2.75E+01	ND	1.10E+01	LAP4L-036	J	1/3/2023
PHENANTHRENE	mg/kg	41	32	9	8	L	6	6.43E-02	5.80E-02	1.10E+00	ND	5.80E-02	LAP4L-034		1/4/2023
PLUTONIUM-238	pCi/g	3	1	2	2	- -	- -	1.39E-01	- -	1.74E-01	ND	1.74E-01	LAP4L-025	J	1/11/2023
POTASSIUM	mg/kg	41	- -	41	40	N	1	1.12E+02	1.23E+02	2.40E+02	5.70E+01	1.23E+02	LAP4L-024		11/29/2022
POTASSIUM-40	pCi/g	1	- -	1	1	- -	- -	5.64E+00	- -	5.64E+00	5.64E+00	5.64E+00	LAP4L-022	J	12/12/2022
PYRENE	mg/kg	41	22	19	17	L	6	1.65E-01	1.96E-01	2.30E+00	ND	1.96E-01	LAP4L-034		1/4/2023
RADIUM-226	pCi/g	3	- -	3	1	N	1	5.04E-01	6.69E-01	6.24E-01	3.93E-01	6.24E-01	LAP4L-022		12/12/2022
RADIUM-228	pCi/g	3	1	2	1	- -	- -	1.05E+00	- -	1.47E+00	ND	1.47E+00	LAP4L-022		12/12/2022
SELENIUM	mg/kg	41	1	40	37	X	3	2.02E-01	2.23E-01	3.80E-01	ND	2.23E-01	LAP4L-008	J	12/5/2022
SILVER	mg/kg	41	28	13	13	X	3	7.97E-03	1.01E-02	4.00E-02	ND	1.01E-02	LAP4L-027	J	12/8/2022
SODIUM	mg/kg	41	31	10	10	X	3	2.08E+01	2.22E+01	4.90E+01	ND	2.22E+01	LAP4L-039	J	1/5/2023
STYRENE	mg/kg	41	40	1	- -	- -	- -	1.97E-04	- -	1.11E-03	ND	1.11E-03	LAP4L-028		11/21/2022
TETRACHLOROETHYLENE (PCE)	mg/kg	41	38	3	2	X	3	3.37E-04	3.82E-04	1.22E-03	ND	3.82E-04	LAP4L-032		12/19/2022
THALLIUM	mg/kg	41	2	39	35	X	3	4.47E-02	5.07E-02	1.00E-01	ND	5.07E-02	LAP4L-027		12/8/2022
THORIUM-228	pCi/g	3	- -	3	- -	N	1	1.05E+00	1.65E+00	1.33E+00	6.51E-01	1.33E+00	LAP4L-022		12/12/2022
THORIUM-230	pCi/g	3	- -	3	1	N	1	5.07E-01	7.93E-01	6.15E-01	3.11E-01	6.15E-01	LAP4L-022		12/12/2022
THORIUM-232	pCi/g	3	- -	3	- -	N	1	9.05E-01	1.48E+00	1.14E+00	5.14E-01	1.14E+00	LAP4L-022		12/12/2022
TOLUENE	mg/kg	41	40	1	1	- -	- -	1.80E-04	- -	4.03E-04	ND	4.03E-04	LAP4L-028	J	11/21/2022
URANIUM-233/234	pCi/g	3	- -	3	1	N	1	5.03E-01	7.87E-01	6.59E-01	3.25E-01	6.59E-01	LAP4L-022		12/12/2022
URANIUM-238	pCi/g	3	- -	3	- -	N	1	4.67E-01	7.74E-01	6.61E-01	2.99E-01	6.61E-01	LAP4L-022		12/12/2022
VANADIUM	mg/kg	41	- -	41	- -	N	1	2.37E+01	2.65E+01	5.80E+01	6.80E+00	2.65E+01	LAP4L-035		12/20/2022
ZINC	mg/kg	41	- -	41	- -	N	1	8.16E+00	9.61E+00	2.40E+01	2.40E+00	9.61E+00	LAP4L-039		1/5/2023

Distribution Code:
N Normal Distribution G Gamma Distribution
L Lognormal Distribution X Non-Parametric

UCL Method Code: (as determined by ProUCL)
1 Student's t UCL 3 Kaplan-Meier (KM) t UCL 5 Adjusted Gamma UCL
2 Approximate Gamma UCL 4 Hall's Bootstrap UCL 6 Land's H-Statistic (H) UCL
7 KM Adjusted Gamma UCL

ND: Non-Detect
RME: Reasonable Maximum Exposure
UCL: Upper Confidence Limit

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Table A.4-2. Data Summary Table LRP 131-4L Subunit Soil (0.3 to 1.2 m [1 to 4 ft])

ANALYTE NAME	Units	Samples	Non-Detects	Detects	J-Detects	Distr. Code	UCL Method	Mean	95% UCL	Max	Min	RME	Max Location	Qualifier of Max	Max Date
2-METHYLNAPHTHALENE	mg/kg	41	39	2	2	X	3	2.20E-02	3.04E-02	1.40E-01	ND	3.04E-02	LAP4L-035	J	12/20/2022
ACENAPHTHENE	mg/kg	41	37	4	4	X	3	1.30E-02	1.77E-02	1.00E-01	ND	1.77E-02	LAP4L-011	J	12/19/2022
ACETONE	mg/kg	41	10	31	6	X	3	1.11E-02	1.40E-02	4.94E-02	ND	1.40E-02	LAP4L-027		12/8/2022
ACTINIUM-228	pCi/g	1	- -	1	- -	- -	- -	3.43E+00	- -	3.43E+00	3.43E+00	3.43E+00	LAP4L-025		1/11/2023
ALUMINUM	mg/kg	41	- -	41	- -	N	1	1.32E+04	1.43E+04	2.50E+04	5.90E+03	1.43E+04	LAP4L-035		12/20/2022
AMERICIUM-243	pCi/g	4	3	1	1	- -	- -	2.95E-02	- -	4.95E-02	ND	4.95E-02	LAP4L-009	J	11/21/2022
ANTHRACENE	mg/kg	41	36	5	5	X	3	2.91E-02	4.05E-02	1.60E-01	ND	4.05E-02	LAP4L-024	J	11/29/2022
ANTIMONY	mg/kg	41	- -	41	20	L	6	2.04E-01	2.49E-01	1.20E+00	5.30E-02	2.49E-01	LAP4L-040		1/5/2023
AROCLOR 1254	mg/kg	41	39	2	2	X	3	1.10E-02	1.32E-02	4.80E-02	ND	1.32E-02	LAP4L-021	J	11/29/2022
ARSENIC	mg/kg	41	- -	41	- -	N	1	2.58E+00	2.79E+00	4.60E+00	1.20E+00	2.79E+00	LAP4L-004		12/7/2022
BARIUM	mg/kg	41	- -	41	- -	G	5	1.38E+01	1.75E+01	4.40E+01	1.50E+00	1.75E+01	LAP4L-025		1/11/2023
BENZO(G,H,I)PERYLENE	mg/kg	41	32	9	8	X	3	8.45E-02	1.36E-01	8.30E-01	ND	1.36E-01	LAP4L-015	J	12/8/2022
BENZO[A]ANTHRACENE	mg/kg	41	27	14	13	X	3	1.52E-01	2.29E-01	1.20E+00	ND	2.29E-01	LAP4L-028		11/21/2022
BENZO[A]PYRENE	mg/kg	41	29	12	11	X	3	1.42E-01	2.20E-01	1.20E+00	ND	2.20E-01	LAP4L-015	J	12/8/2022
BENZO[B]FLUORANTHENE	mg/kg	41	28	13	11	G	7	2.02E-01	3.99E-01	2.20E+00	ND	3.99E-01	LAP4L-015		12/8/2022
BENZO[K]FLUORANTHENE	mg/kg	41	35	6	5	X	3	9.47E-02	1.45E-01	8.60E-01	ND	1.45E-01	LAP4L-015	J	12/8/2022
BERYLLIUM	mg/kg	41	- -	41	1	N	1	2.03E-01	2.27E-01	5.10E-01	4.90E-02	2.27E-01	LAP4L-036		1/3/2023
BIS(2-ETHYLHEXYL)PHTHALATE (DEHP)	mg/kg	41	40	1	1	- -	- -	9.06E-02	- -	1.00E-01	ND	1.00E-01	LAP4L-033	J	11/28/2022
CADMIUM	mg/kg	41	14	27	24	G	7	3.20E-02	4.46E-02	1.60E-01	ND	4.46E-02	LAP4L-040		1/5/2023
CALCIUM	mg/kg	41	- -	41	9	G	5	2.11E+03	3.32E+03	1.30E+04	1.50E+01	3.32E+03	LAP4L-011		12/19/2022
CHROMIUM	mg/kg	41	- -	41	- -	N	1	1.23E+01	1.35E+01	2.50E+01	4.50E+00	1.35E+01	LAP4L-004		12/7/2022
CHRYSENE	mg/kg	41	28	13	11	X	3	1.62E-01	2.46E-01	1.30E+00	ND	2.46E-01	LAP4L-015		12/8/2022
COBALT	mg/kg	41	- -	41	- -	N	1	7.74E-01	9.11E-01	3.10E+00	1.80E-01	9.11E-01	LAP4L-025		1/11/2023
COPPER	mg/kg	41	- -	41	2	N	1	1.12E+01	1.57E+01	7.50E+01	1.50E+00	1.57E+01	LAP4L-040		1/5/2023
CUMENE (ISOPROPYLBENZENE)	mg/kg	41	40	1	1	- -	- -	1.93E-04	- -	9.53E-04	ND	9.53E-04	LAP4L-028	J	11/21/2022
CYANIDE	mg/kg	41	39	2	1	X	3	4.85E-01	1.10E+00	1.10E+01	ND	1.10E+00	LAP4L-010		1/10/2023
CYCLOHEXANE	mg/kg	41	40	1	1	- -	- -	1.82E-04	- -	5.00E-04	ND	5.00E-04	LAP4L-021	J	11/29/2022
DDE	mg/kg	41	40	1	1	- -	- -	1.00E-03	- -	2.70E-03	ND	2.70E-03	LAP4L-021	J	11/29/2022
DDT	mg/kg	41	32	9	7	X	3	2.26E-03	3.10E-03	1.50E-02	ND	3.10E-03	LAP4L-034	J	1/4/2023
DIBENZ[AH]ANTHRACENE	mg/kg	41	37	4	4	X	3	2.80E-02	4.04E-02	2.00E-01	ND	4.04E-02	LAP4L-015	J	12/8/2022
DIETHYL PHTHALATE	mg/kg	41	40	1	1	- -	- -	5.35E-02	- -	2.80E-01	ND	2.80E-01	LAP4L-040	J	1/5/2023
DI-N-BUTYL PHTHALATE	mg/kg	41	38	3	3	X	3	4.29E-02	6.26E-02	2.80E-01	ND	6.26E-02	LAP4L-019	J	1/12/2023
FLUORANTHENE	mg/kg	41	27	14	12	X	3	2.29E-01	3.40E-01	1.50E+00	ND	3.40E-01	LAP4L-024	J	11/29/2022
FLUORENE	mg/kg	41	40	1	1	- -	- -	3.52E-02	- -	2.00E-02	ND	2.00E-02	LAP4L-028	J	11/21/2022
GAMMA-CHLORDANE	mg/kg	41	40	1	1	- -	- -	1.07E-03	- -	1.30E-03	ND	1.30E-03	LAP4L-021	J	11/29/2022
GROSS ALPHA	pCi/g	41	2	39	23	X	3	2.20E+01	2.45E+01	4.48E+01	ND	2.45E+01	LAP4L-025		1/11/2023
INDENO[1,2,3-CD]PYRENE	mg/kg	41	35	6	5	X	3	8.71E-02	1.44E-01	8.90E-01	ND	1.44E-01	LAP4L-015	J	12/8/2022
IRON	mg/kg	41	- -	41	2	N	1	1.02E+04	1.13E+04	2.00E+04	4.40E+03	1.13E+04	LAP4L-041		1/9/2023

Table A.4-2. Data Summary Table LRP 131-4L Subunit Soil (0.3 to 1.2 m [1 to 4 ft]) *(Continued/End)*

ANALYTE NAME	Units	Samples	Non-Detects	Detects	J-Detects	Distr. Code	UCL Method	Mean	95% UCL	Max	Min	RME	Max Location	Qualifier of Max	Max Date
LEAD	mg/kg	41	- -	41	- -	L	6	1.53E+01	1.58E+01	2.60E+02	1.90E+00	1.58E+01	LAP4L-040		1/5/2023
LEAD-212	pCi/g	1	- -	1	- -	- -	- -	2.21E+00	- -	2.21E+00	2.21E+00	2.21E+00	LAP4L-025		1/11/2023
LEAD-214	pCi/g	1	- -	1	- -	- -	- -	1.97E+00	- -	1.97E+00	1.97E+00	1.97E+00	LAP4L-025		1/11/2023
MAGNESIUM	mg/kg	41	- -	41	1	G	5	1.96E+02	2.54E+02	7.40E+02	1.70E+01	2.54E+02	LAP4L-021		11/29/2022
MANGANESE	mg/kg	41	- -	41	- -	G	5	3.29E+01	4.02E+01	1.10E+02	5.80E+00	4.02E+01	LAP4L-040		1/5/2023
MERCURY	mg/kg	41	3	38	14	X	3	8.47E-02	1.24E-01	6.60E-01	ND	1.24E-01	LAP4L-009		11/21/2022
METHOXYCHLOR	mg/kg	41	38	3	2	X	3	1.16E-03	1.62E-03	9.20E-03	ND	1.62E-03	LAP4L-015		12/8/2022
METHYL ACETATE	mg/kg	41	40	1	1	- -	- -	9.19E-04	- -	2.75E-03	ND	2.75E-03	LAP4L-014	J	12/13/2022
METHYLCYCLOHEXANE	mg/kg	41	39	2	2	X	3	3.36E-04	3.87E-04	9.80E-04	ND	3.87E-04	LAP4L-021	J	11/29/2022
N-DIOCTYL PHTHALATE	mg/kg	41	40	1	1	- -	- -	7.94E-02	- -	6.60E-02	ND	6.60E-02	LAP4L-028	J	11/21/2022
NICKEL	mg/kg	41	- -	41	- -	G	5	3.07E+00	3.69E+00	8.10E+00	6.50E-01	3.69E+00	LAP4L-036		1/3/2023
NONVOLATILE BETA	pCi/g	41	2	39	25	X	3	9.39E+00	1.05E+01	1.84E+01	ND	1.05E+01	LAP4L-008	J	12/5/2022
PHENANTHRENE	mg/kg	41	30	11	10	X	3	8.03E-02	1.28E-01	7.80E-01	ND	1.28E-01	LAP4L-011	J	12/19/2022
PLUTONIUM-238	pCi/g	4	3	1	1	- -	- -	7.43E-02	- -	1.24E-01	ND	1.24E-01	LAP4L-025	J	1/11/2023
PLUTONIUM-239/240	pCi/g	4	3	1	1	- -	- -	3.95E-02	- -	5.81E-02	ND	5.81E-02	LAP4L-015	J	12/8/2022
POTASSIUM	mg/kg	41	- -	41	41	N	1	1.09E+02	1.24E+02	2.10E+02	3.40E+01	1.24E+02	LAP4L-021	J	11/29/2022
PYRENE	mg/kg	41	25	16	15	X	3	1.80E-01	2.77E-01	1.40E+00	ND	2.77E-01	LAP4L-024	J	11/29/2022
RADIUM-226	pCi/g	4	- -	4	- -	- -	- -	5.19E-01	- -	5.78E-01	3.45E-01	5.78E-01	LAP4L-015		12/8/2022
RADIUM-228	pCi/g	4	1	3	3	X	3	9.84E-01	1.41E+00	1.29E+00	ND	1.29E+00	LAP4L-029	J	1/11/2023
SELENIUM	mg/kg	41	1	40	36	X	3	2.57E-01	3.25E-01	1.80E+00	ND	3.25E-01	LAP4L-004		12/7/2022
SILVER	mg/kg	41	21	20	20	X	3	9.99E-03	1.22E-02	4.20E-02	ND	1.22E-02	LAP4L-014	J	12/13/2022
SODIUM	mg/kg	41	27	14	14	X	3	3.18E+01	4.38E+01	3.00E+02	ND	4.38E+01	LAP4L-023	J	12/1/2022
STRONTIUM-90	pCi/g	1	- -	1	1	- -	- -	3.67E-01	- -	3.67E-01	3.67E-01	3.67E-01	LAP4L-025	J	1/11/2023
TETRACHLOROETHYLENE (PCE)	mg/kg	41	31	10	7	X	3	4.55E-04	5.51E-04	1.90E-03	ND	5.51E-04	LAP4L-032		12/19/2022
THALLIUM	mg/kg	41	2	39	32	X	3	4.55E-02	5.25E-02	1.10E-01	ND	5.25E-02	LAP4L-020		11/28/2022
THORIUM-228	pCi/g	4	- -	4	- -	N	1	1.08E+00	1.21E+00	1.19E+00	9.38E-01	1.19E+00	LAP4L-029		1/11/2023
THORIUM-230	pCi/g	4	- -	4	1	N	1	5.62E-01	6.89E-01	6.81E-01	4.34E-01	6.81E-01	LAP4L-025		1/11/2023
THORIUM-232	pCi/g	4	- -	4	- -	N	1	9.53E-01	1.12E+00	1.07E+00	7.62E-01	1.07E+00	LAP4L-009		11/21/2022
TOLUENE	mg/kg	41	40	1	1	- -	- -	1.81E-04	- -	4.62E-04	ND	4.62E-04	LAP4L-011	J	12/19/2022
URANIUM-233/234	pCi/g	4	- -	4	- -	N	1	5.79E-01	7.36E-01	7.50E-01	4.27E-01	7.36E-01	LAP4L-025		1/11/2023
URANIUM-235	pCi/g	4	2	2	2	- -	- -	5.24E-02	- -	6.11E-02	ND	6.11E-02	LAP4L-009	J	11/21/2022
URANIUM-238	pCi/g	4	- -	4	- -	N	1	5.25E-01	6.85E-01	6.49E-01	3.58E-01	6.49E-01	LAP4L-009		11/21/2022
VANADIUM	mg/kg	41	- -	41	- -	N	1	2.64E+01	2.86E+01	4.60E+01	1.30E+01	2.86E+01	LAP4L-035		12/20/2022
ZINC	mg/kg	41	- -	41	2	L	6	9.18E+00	1.21E+01	4.00E+01	1.50E+00	1.21E+01	LAP4L-040		1/5/2023

Distribution Code:
N Normal Distribution G Gamma Distribution
L Lognormal Distribution X Non-Parametric

UCL Method Code: (as determined by ProUCL)
1 Student's t UCL 3 Kaplan-Meier (KM) t UCL 5 Adjusted Gamma UCL
2 Approximate Gamma UCL 4 Hall's Bootstrap UCL 6 Land's H-Statistic (H) UCL
7 KM Adjusted Gamma UCL

ND: Non-Detect
RME: Reasonable Maximum Exposure
UCL: Upper Confidence Limit

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Table A.4-3. Data Summary Table LRP 131-4L Subunit Soil (All Depths)

ANALYTE NAME	Units	Samples	Non-Detects	Detects	J-Detects	Distr. Code	UCL Method	Mean	95% UCL	Max	Min	RME	Max Location	Top Sample	Bottom Sample	Qualifier of Max	Max Date
2,4,6-TRICHLOROPHENOL	mg/kg	192	191	1	1	- -	- -	1.38E-02	- -	3.00E-02	ND	3.00E-02	LAP4L-018	0	1	J	12/13/2022
2-METHYLNAPHTHALENE	mg/kg	192	189	3	3	X	3	1.80E-02	1.96E-02	1.40E-01	ND	1.96E-02	LAP4L-035	1	4	J	12/20/2022
2-NITROPHENOL	mg/kg	192	191	1	1	- -	- -	1.38E-02	- -	3.00E-02	ND	3.00E-02	LAP4L-018	0	1	J	12/13/2022
ACENAPHTHENE	mg/kg	192	180	12	12	X	3	1.20E-02	1.37E-02	1.40E-01	ND	1.37E-02	LAP4L-024	4	8	J	11/29/2022
ACENAPHTHYLENE	mg/kg	192	191	1	1	- -	- -	1.13E-01	- -	1.20E-01	ND	1.20E-01	LAP4L-025	0	1	J	1/11/2023
ACETONE	mg/kg	192	31	161	23	X	3	2.20E-02	2.73E-02	3.55E-01	ND	2.73E-02	LAP4L-028	0	1		11/21/2022
ACTINIUM-228	pCi/g	3	- -	3	- -	N	1	4.10E+00	5.18E+00	4.70E+00	3.43E+00	4.70E+00	LAP4L-027	12	16		12/8/2022
ALUMINUM	mg/kg	192	- -	192	- -	L	6	1.19E+04	1.27E+04	2.90E+04	2.30E+03	1.27E+04	LAP4L-035	0	1		12/20/2022
AMERICIUM-243	pCi/g	20	17	3	3	X	3	3.06E-02	3.59E-02	6.23E-02	ND	3.59E-02	LAP4L-036	8	12	J	1/3/2023
ANTHRACENE	mg/kg	192	178	14	13	X	3	2.43E-02	2.94E-02	3.20E-01	ND	2.94E-02	LAP4L-034	0	1		1/4/2023
ANTIMONY	mg/kg	192	2	190	130	X	3	1.47E-01	1.67E-01	1.20E+00	ND	1.67E-01	LAP4L-040	1	4		1/5/2023
AROCLOR 1254	mg/kg	192	183	9	6	L	6	3.34E-02	1.38E-02	4.10E+00	ND	1.38E-02	LAP4L-040	4	8		1/5/2023
ARSENIC	mg/kg	192	- -	192	5	G	2	2.15E+00	2.31E+00	1.40E+01	2.50E-01	2.31E+00	LAP4L-007	8	12		12/5/2022
BARIUM	mg/kg	192	- -	192	- -	L	6	1.12E+01	1.29E+01	1.60E+02	8.40E-01	1.29E+01	LAP4L-022	4	8		12/12/2022
BENZALDEHYDE	mg/kg	192	191	1	1	- -	- -	9.19E-02	- -	6.40E-02	ND	6.40E-02	LAP4L-020	0	1	J	11/28/2022
BENZENE	mg/kg	192	191	1	1	- -	- -	1.79E-04	- -	5.45E-04	ND	5.45E-04	LAP4L-040	4	8	J	1/5/2023
BENZO(G,H,I)PERYLENE	mg/kg	192	170	22	20	X	3	4.70E-02	6.23E-02	8.30E-01	ND	6.23E-02	LAP4L-015	1	4	J	12/8/2022
BENZO[A]ANTHRACENE	mg/kg	192	157	35	29	G	2	9.22E-02	1.30E-01	1.80E+00	ND	1.30E-01	LAP4L-034	0	1		1/4/2023
BENZO[A]PYRENE	mg/kg	192	162	30	24	X	3	8.35E-02	1.10E-01	1.20E+00	ND	1.10E-01	LAP4L-015	1	4	J	12/8/2022
BENZO[B]FLUORANTHENE	mg/kg	192	157	35	28	G	2	1.26E-01	1.79E-01	2.50E+00	ND	1.79E-01	LAP4L-034	0	1		1/4/2023
BENZO[K]FLUORANTHENE	mg/kg	192	173	19	16	X	3	7.07E-02	8.68E-02	9.20E-01	ND	8.68E-02	LAP4L-034	0	1		1/4/2023
BERYLLIUM	mg/kg	192	- -	192	14	L	6	1.92E-01	2.05E-01	6.30E-01	4.50E-02	2.05E-01	LAP4L-022	4	8		12/12/2022
BIS(2-ETHYLHEXYL)PHTHALATE (DEHP)	mg/kg	192	187	5	5	X	3	4.37E-02	4.61E-02	1.70E-01	ND	4.61E-02	LAP4L-002	12	16	J	12/14/2022
CADMIUM	mg/kg	192	105	87	77	X	3	1.02E-01	2.32E-01	1.50E+01	ND	2.32E-01	LAP4L-022	8	12		12/12/2022
CALCIUM	mg/kg	192	2	190	64	X	3	1.45E+03	1.94E+03	3.50E+04	ND	1.94E+03	LAP4L-021	8	12		11/29/2022
CARBAZOLE	mg/kg	192	189	3	3	X	3	3.31E-02	3.49E-02	1.90E-01	ND	3.49E-02	LAP4L-034	0	1	J	1/4/2023
CHROMIUM	mg/kg	192	- -	192	- -	G	2	1.19E+01	1.27E+01	5.50E+01	2.70E+00	1.27E+01	LAP4L-001	12	16		1/17/2023
CHRYSENE	mg/kg	192	161	31	24	G	2	1.01E-01	1.43E-01	2.20E+00	ND	1.43E-01	LAP4L-034	0	1		1/4/2023
COBALT	mg/kg	192	- -	192	- -	N	1	6.57E-01	7.18E-01	3.50E+00	1.40E-01	7.18E-01	LAP4L-005	4	8		12/6/2022
COPPER	mg/kg	192	- -	192	22	N	1	9.05E+00	1.34E+01	4.80E+02	8.40E-01	1.34E+01	LAP4L-039	0	1		1/5/2023
CUMENE (ISOPROPYLBENZENE)	mg/kg	192	190	2	1	X	3	3.03E-04	3.28E-04	2.19E-03	ND	3.28E-04	LAP4L-028	4	8		11/21/2022
CYANIDE	mg/kg	192	178	14	6	L	6	3.85E-01	2.99E-01	1.10E+01	ND	2.99E-01	LAP4L-010	1	4		1/10/2023
CYCLOHEXANE	mg/kg	192	190	2	1	X	3	2.99E-04	3.18E-04	1.84E-03	ND	3.18E-04	LAP4L-040	4	8		1/5/2023
DDE	mg/kg	192	188	4	4	X	3	4.75E-04	5.10E-04	2.70E-03	ND	5.10E-04	LAP4L-021	1	4	J	11/29/2022
DDT	mg/kg	192	159	33	28	G	2	1.60E-03	1.81E-03	1.50E-02	ND	1.81E-03	LAP4L-034	1	4	J	1/4/2023
DIBENZ[AH]ANTHRACENE	mg/kg	192	183	9	9	X	3	2.15E-02	2.48E-02	2.30E-01	ND	2.48E-02	LAP4L-034	0	1	J	1/4/2023
DIBENZOFURAN	mg/kg	192	189	3	3	X	3	1.84E-02	1.90E-02	5.00E-02	ND	1.90E-02	LAP4L-021	8	12	J	11/29/2022
DICHLOROMETHANE (METHYLENE CHLORIDE)	mg/kg	192	191	1	1	- -	- -	8.95E-04	- -	2.17E-03	ND	2.17E-03	LAP4L-015	12	16	J	12/8/2022
DIETHYL PHTHALATE	mg/kg	192	188	4	4	X	3	2.82E-02	3.40E-02	4.40E-01	ND	3.40E-02	LAP4L-040	0	1	J	1/5/2023
DI-N-BUTYL PHTHALATE	mg/kg	192	176	16	13	X	3	4.85E-02	5.78E-02	3.30E-01	ND	5.78E-02	LAP4L-013	8	12		1/10/2023
ENDOSULFAN II	mg/kg	192	191	1	1	- -	- -	7.64E-04	- -	1.50E-03	ND	1.50E-03	LAP4L-017	0	1	J	1/17/2023

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Table A.4-3. Data Summary Table LRP 131-4L Subunit Soil (All Depths) *(Continued)*

ANALYTE NAME	Units	Samples	Non-Detects	Detects	J-Detects	Distr. Code	UCL Method	Mean	95% UCL	Max	Min	RME	Max Location	Top Sample	Bottom Sample	Qualifier of Max	Max Date
FLUORANTHENE	mg/kg	192	157	35	28	G	2	1.51E-01	2.13E-01	2.60E+00	ND	2.13E-01	LAP4L-034	0	1		1/4/2023
FLUORENE	mg/kg	192	188	4	4	X	3	1.67E-02	1.76E-02	6.20E-02	ND	1.76E-02	LAP4L-024	8	12	J	11/29/2022
GAMMA-CHLORDANE	mg/kg	192	190	2	2	X	3	5.10E-04	5.46E-04	3.10E-03	ND	5.46E-04	LAP4L-021	8	12	J	11/29/2022
GROSS ALPHA	pCi/g	192	8	184	101	G	2	2.20E+01	2.31E+01	4.48E+01	ND	2.31E+01	LAP4L-025	1	4		1/11/2023
INDENO[1,2,3-CD]PYRENE	mg/kg	192	174	18	14	X	3	5.31E-02	6.96E-02	8.90E-01	ND	6.96E-02	LAP4L-015	1	4	J	12/8/2022
IRON	mg/kg	192	- -	192	8	N	1	9.72E+03	1.06E+04	5.80E+04	2.20E+03	1.06E+04	LAP4L-007	8	12		12/5/2022
LEAD	mg/kg	192	- -	192	- -	N	1	1.10E+01	1.40E+01	2.60E+02	1.50E+00	1.40E+01	LAP4L-040	1	4		1/5/2023
LEAD-212	pCi/g	3	- -	3	- -	N	1	2.96E+00	4.43E+00	3.92E+00	2.21E+00	3.92E+00	LAP4L-027	12	16		12/8/2022
LEAD-214	pCi/g	3	- -	3	- -	N	1	2.21E+00	3.47E+00	3.05E+00	1.61E+00	3.05E+00	LAP4L-027	12	16		12/8/2022
M,P-XYLENE	mg/kg	192	191	1	1	- -	- -	3.61E-04	- -	1.33E-03	ND	1.33E-03	LAP4L-040	4	8	J	1/5/2023
MAGNESIUM	mg/kg	192	- -	192	12	N	1	1.37E+02	1.59E+02	1.40E+03	1.20E+01	1.59E+02	LAP4L-021	8	12		11/29/2022
MANGANESE	mg/kg	192	- -	192	- -	N	1	3.67E+01	4.26E+01	4.20E+02	4.30E+00	4.26E+01	LAP4L-007	8	12		12/5/2022
MERCURY	mg/kg	192	25	167	74	X	3	4.44E-02	5.53E-02	6.60E-01	ND	5.53E-02	LAP4L-009	1	4		11/21/2022
METHOXYCHLOR	mg/kg	192	186	6	5	X	3	9.09E-04	9.99E-04	9.20E-03	ND	9.99E-04	LAP4L-015	1	4		12/8/2022
METHYL ACETATE	mg/kg	192	189	3	3	X	3	1.48E-03	1.51E-03	4.25E-03	ND	1.51E-03	LAP4L-020	8	12	J	11/28/2022
METHYL ETHYL KETONE	mg/kg	192	178	14	8	X	3	1.81E-03	2.07E-03	2.40E-02	ND	2.07E-03	LAP4L-006	0	1		12/6/2022
METHYLCYCLOHEXANE	mg/kg	192	186	6	5	L	6	3.19E-04	3.19E-04	3.35E-03	ND	3.19E-04	LAP4L-040	4	8		1/5/2023
NAPHTHALENE	mg/kg	192	191	1	1	- -	- -	4.25E-02	- -	3.80E-02	ND	3.80E-02	LAP4L-021	8	12	J	11/29/2022
N-DIOCTYL PHTHALATE	mg/kg	192	186	6	6	X	3	3.80E-02	3.97E-02	1.50E-01	ND	3.97E-02	LAP4L-018	0	1	J	12/13/2022
NICKEL	mg/kg	192	- -	192	- -	N	1	2.35E+00	2.57E+00	8.10E+00	3.60E-01	2.57E+00	LAP4L-036	1	4		1/3/2023
N-NITROSODIPROPYLAMINE	mg/kg	192	191	1	1	- -	- -	9.50E-02	- -	4.50E-01	ND	4.50E-01	LAP4L-015	0	1	J	12/8/2022
NONVOLATILE BETA	pCi/g	192	14	178	108	G	2	1.00E+01	1.07E+01	3.91E+01	ND	1.07E+01	LAP4L-008	8	12		12/5/2022
O-XYLENE	mg/kg	192	191	1	1	- -	- -	1.81E-04	- -	9.02E-04	ND	9.02E-04	LAP4L-040	4	8	J	1/5/2023
PHENANTHRENE	mg/kg	192	159	33	29	G	2	6.03E-02	8.56E-02	1.10E+00	ND	8.56E-02	LAP4L-024	4	8	J	11/29/2022
PLUTONIUM-238	pCi/g	20	12	8	7	G	5	1.38E-01	2.25E-01	6.99E-01	ND	2.25E-01	LAP4L-016	4	8		12/12/2022
PLUTONIUM-239/240	pCi/g	20	15	5	5	X	3	4.15E-02	5.01E-02	8.59E-02	ND	5.01E-02	LAP4L-025	8	12	J	1/11/2023
POTASSIUM	mg/kg	192	7	185	173	X	3	1.07E+02	1.14E+02	3.20E+02	ND	1.14E+02	LAP4L-029	4	8		1/11/2023
POTASSIUM-40	pCi/g	3	2	1	1	- -	- -	3.74E+00	- -	5.64E+00	ND	5.64E+00	LAP4L-022	0	1	J	12/12/2022
PYRENE	mg/kg	192	139	53	47	X	3	1.26E-01	1.69E-01	2.30E+00	ND	1.69E-01	LAP4L-034	0	1		1/4/2023
RADIUM-226	pCi/g	20	- -	20	2	N	1	6.28E-01	7.60E-01	1.85E+00	3.22E-01	7.60E-01	LAP4L-003	12	16		1/12/2023
RADIUM-228	pCi/g	20	4	16	14	X	3	1.05E+00	1.22E+00	1.94E+00	ND	1.22E+00	LAP4L-003	12	16		1/12/2023
SELENIUM	mg/kg	192	27	165	151	L	6	1.93E-01	2.08E-01	1.80E+00	ND	2.08E-01	LAP4L-004	1	4		12/7/2022
SILVER	mg/kg	192	122	70	70	X	3	8.85E-03	9.92E-03	6.20E-02	ND	9.92E-03	LAP4L-024	8	12	J	11/29/2022
SODIUM	mg/kg	192	134	58	57	X	3	3.75E+01	5.73E+01	2.30E+03	ND	5.73E+01	LAP4L-022	8	12		12/12/2022
STRONTIUM-90	pCi/g	3	2	1	1	- -	- -	2.46E-01	- -	3.67E-01	ND	3.67E-01	LAP4L-025	1	4	J	1/11/2023
STYRENE	mg/kg	192	191	1	- -	- -	- -	1.82E-04	- -	1.11E-03	ND	1.11E-03	LAP4L-028	0	1		11/21/2022
TETRACHLOROETHYLENE (PCE)	mg/kg	192	168	24	15	X	3	3.74E-04	4.10E-04	2.40E-03	ND	4.10E-04	LAP4L-040	4	8		1/5/2023
THALLIUM	mg/kg	192	24	168	142	G	2	4.05E-02	4.46E-02	1.80E-01	ND	4.46E-02	LAP4L-006	8	12		12/6/2022
THORIUM-228	pCi/g	20	- -	20	- -	G	5	1.04E+00	1.27E+00	3.13E+00	5.15E-01	1.27E+00	LAP4L-027	12	16		12/8/2022
THORIUM-230	pCi/g	20	- -	20	3	N	1	8.07E-01	1.03E+00	2.71E+00	3.11E-01	1.03E+00	LAP4L-003	12	16		1/12/2023
THORIUM-232	pCi/g	20	- -	20	- -	G	5	9.53E-01	1.17E+00	2.95E+00	4.37E-01	1.17E+00	LAP4L-027	12	16		12/8/2022

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Table A.4-3. Data Summary Table LRP 131-4L Subunit Soil (All Depths) *(Continued/End)*

ANALYTE NAME	Units	Samples	Non-Detects	Detects	J-Detects	Distr. Code	UCL Method	Mean	95% UCL	Max	Min	RME	Max Location	Top Sample	Bottom Sample	Qualifier of Max	Max Date
TOLUENE	mg/kg	192	188	4	3	X	3	3.01E-04	3.18E-04	1.98E-03	ND	3.18E-04	LAP4L-040	4	8		1/5/2023
URANIUM-233/234	pCi/g	20	- -	20	2	G	5	7.10E-01	8.88E-01	2.11E+00	2.79E-01	8.88E-01	LAP4L-003	12	16		1/12/2023
URANIUM-235	pCi/g	20	14	6	6	X	3	6.15E-02	7.17E-02	1.47E-01	ND	7.17E-02	LAP4L-003	12	16	J	1/12/2023
URANIUM-238	pCi/g	20	- -	20	- -	N	1	6.59E-01	7.96E-01	1.57E+00	2.99E-01	7.96E-01	LAP4L-003	12	16		1/12/2023
VANADIUM	mg/kg	192	- -	192	- -	N	1	2.79E+01	3.12E+01	3.10E+02	6.80E+00	3.12E+01	LAP4L-007	8	12		12/5/2022
ZINC	mg/kg	192	- -	192	15	N	1	7.34E+00	8.47E+00	7.40E+01	9.80E-01	8.47E+00	LAP4L-022	8	12		12/12/2022

Distribution Code:
N Normal Distribution G Gamma Distribution
L Lognormal Distribution X Non-Parametric

UCL Method Code: (as determined by ProUCL)
1 Student's t UCL 3 Kaplan-Meier (KM) t UCL 5 Adjusted Gamma UCL
2 Approximate Gamma UCL 4 Hall's Bootstrap UCL 6 Land's H-Statistic (H) UCL
7 KM Adjusted Gamma UCL

ND: Non-Detect
RME: Reasonable Maximum Exposure
UCL: Upper Confidence Limit

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Table A.4-4. Unit Specific Constituent Screening Table LRP 131-4L Subunit Soil (All Depths)

ANALYTE NAME	Units	Max Result[1]	Qualifier of Max	Max Location	Top Sample (ft)	Bottom Sample (ft)	SRS 2X Mean Background[2]	Is Max Detect>2X SRS Mean Bkg?[3]
Inorganics								
ALUMINUM	mg/kg	2.90E+04		LAP4L-035	0	1	1.34E+04	Yes
ANTIMONY	mg/kg	1.20E+00		LAP4L-040	1	4	2.65E+00	No
ARSENIC	mg/kg	1.40E+01		LAP4L-007	8	12	4.45E+00	Yes
BARIUM	mg/kg	1.60E+02		LAP4L-022	4	8	3.31E+01	Yes
BERYLLIUM	mg/kg	6.30E-01		LAP4L-022	4	8	3.05E-01	Yes
CADMIUM	mg/kg	1.50E+01		LAP4L-022	8	12	4.44E-01	Yes
CALCIUM	mg/kg	3.50E+04		LAP4L-021	8	12	3.34E+02	Yes
CHROMIUM	mg/kg	5.50E+01		LAP4L-001	12	16	2.29E+01	Yes
COBALT	mg/kg	3.50E+00		LAP4L-005	4	8	1.40E+00	Yes
COPPER	mg/kg	4.80E+02		LAP4L-039	0	1	6.35E+00	Yes
CYANIDE	mg/kg	1.10E+01		LAP4L-010	1	4	N/A	Yes
IRON	mg/kg	5.80E+04		LAP4L-007	8	12	2.20E+04	Yes
LEAD	mg/kg	2.60E+02		LAP4L-040	1	4	1.08E+01	Yes
MAGNESIUM	mg/kg	1.40E+03		LAP4L-021	8	12	2.46E+02	Yes
MANGANESE	mg/kg	4.20E+02		LAP4L-007	8	12	6.33E+01	Yes
MERCURY	mg/kg	6.60E-01		LAP4L-009	1	4	6.68E-02	Yes
NICKEL	mg/kg	8.10E+00		LAP4L-036	1	4	4.15E+00	Yes
POTASSIUM	mg/kg	3.20E+02		LAP4L-029	4	8	2.13E+02	Yes
SELENIUM	mg/kg	1.80E+00		LAP4L-004	1	4	3.71E+00	No
SILVER	mg/kg	6.20E-02	J	LAP4L-024	8	12	6.37E-01	No
SODIUM	mg/kg	2.30E+03		LAP4L-022	8	12	4.36E+01	Yes
THALLIUM	mg/kg	1.80E-01		LAP4L-006	8	12	2.94E+00	No
VANADIUM	mg/kg	3.10E+02		LAP4L-007	8	12	5.81E+01	Yes
ZINC	mg/kg	7.40E+01		LAP4L-022	8	12	7.44E+00	Yes

Table A.4-4. Unit Specific Constituent Screening Table LRP 131-4L Subunit Soil (All Depths) *(Continued)*

ANALYTE NAME	Units	Max Result[1]	Qualifier of Max	Max Location	Top Sample (ft)	Bottom Sample (ft)	SRS 2X Mean Background[2]	Is Max Detect>2X SRS Mean Bkg?[3]
Pesticides/Herbicides								
DDE	mg/kg	2.70E-03	J	LAP4L-021	1	4	N/A	Yes
DDT	mg/kg	1.50E-02	J	LAP4L-034	1	4	N/A	Yes
ENDOSULFAN II	mg/kg	1.50E-03	J	LAP4L-017	0	1	N/A	Yes
GAMMA-CHLORDANE	mg/kg	3.10E-03	J	LAP4L-021	8	12	N/A	Yes
METHOXYCHLOR	mg/kg	9.20E-03		LAP4L-015	1	4	N/A	Yes
Polychlorinated Biphenyls (PCBs)								
AROCLOR 1254	mg/kg	4.10E+00		LAP4L-040	4	8	N/A	Yes
Radionuclides								
ACTINIUM-228	pCi/g	4.70E+00		LAP4L-027	12	16	2.15E+00	Yes
AMERICIUM-243	pCi/g	6.23E-02	J	LAP4L-036	8	12	N/A	Yes
GROSS ALPHA	pCi/g	4.48E+01		LAP4L-025	1	4	2.16E+01	Yes
LEAD-212	pCi/g	3.92E+00		LAP4L-027	12	16	2.24E+00	Yes
LEAD-214	pCi/g	3.05E+00		LAP4L-027	12	16	N/A	Yes
NONVOLATILE BETA	pCi/g	3.91E+01		LAP4L-008	8	12	1.73E+01	Yes
PLUTONIUM-238	pCi/g	6.99E-01		LAP4L-016	4	8	2.62E-01	Yes
PLUTONIUM-239/240	pCi/g	8.59E-02	J	LAP4L-025	8	12	9.33E-02	No
POTASSIUM-40	pCi/g	5.64E+00	J	LAP4L-022	0	1	2.52E+00	Yes
RADIUM-226	pCi/g	1.85E+00		LAP4L-003	12	16	1.28E+00	Yes
RADIUM-228	pCi/g	1.94E+00		LAP4L-003	12	16	2.11E+00	No
STRONTIUM-90	pCi/g	3.67E-01	J	LAP4L-025	1	4	8.68E-01	No
THORIUM-228	pCi/g	3.13E+00		LAP4L-027	12	16	2.21E+00	Yes
THORIUM-230	pCi/g	2.71E+00		LAP4L-003	12	16	1.35E+00	Yes
THORIUM-232	pCi/g	2.95E+00		LAP4L-027	12	16	2.09E+00	Yes
URANIUM-233/234	pCi/g	2.11E+00		LAP4L-003	12	16	1.29E+00	Yes
URANIUM-235	pCi/g	1.47E-01	J	LAP4L-003	12	16	9.42E-02	Yes
URANIUM-238	pCi/g	1.57E+00		LAP4L-003	12	16	1.01E+00	Yes

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Table A.4-4. Unit Specific Constituent Screening Table LRP 131-4L Subunit Soil (All Depths) *(Continued)*

ANALYTE NAME	Units	Max Result[1]	Qualifier of Max	Max Location	Top Sample (ft)	Bottom Sample (ft)	SRS 2X Mean Background[2]	Is Max Detect>2X SRS Mean Bkg?[3]
Semi-Volatile & Volatile Organic Compounds								
2,4,6-TRICHLOROPHENOL	mg/kg	3.00E-02	J	LAP4L-018	0	1	N/A	Yes
2-METHYLNAPHTHALENE	mg/kg	1.40E-01	J	LAP4L-035	1	4	N/A	Yes
2-NITROPHENOL	mg/kg	3.00E-02	J	LAP4L-018	0	1	N/A	Yes
ACENAPHTHENE	mg/kg	1.40E-01	J	LAP4L-024	4	8	N/A	Yes
ACENAPHTHYLENE	mg/kg	1.20E-01	J	LAP4L-025	0	1	N/A	Yes
ACETONE	mg/kg	3.55E-01		LAP4L-028	0	1	N/A	Yes
ANTHRACENE	mg/kg	3.20E-01		LAP4L-034	0	1	N/A	Yes
BENZALDEHYDE	mg/kg	6.40E-02	J	LAP4L-020	0	1	N/A	Yes
BENZENE	mg/kg	5.45E-04	J	LAP4L-040	4	8	N/A	Yes
BENZO(G,H,I)PERYLENE	mg/kg	8.30E-01	J	LAP4L-015	1	4	N/A	Yes
BENZO[A]ANTHRACENE	mg/kg	1.80E+00		LAP4L-034	0	1	N/A	Yes
BENZO[A]PYRENE	mg/kg	1.20E+00	J	LAP4L-015	1	4	N/A	Yes
BENZO[B]FLUORANTHENE	mg/kg	2.50E+00		LAP4L-034	0	1	N/A	Yes
BENZO[K]FLUORANTHENE	mg/kg	9.20E-01		LAP4L-034	0	1	N/A	Yes
BIS(2-ETHYLHEXYL)PHTHALATE (DEHP)	mg/kg	1.70E-01	J	LAP4L-002	12	16	N/A	Yes
CARBAZOLE	mg/kg	1.90E-01	J	LAP4L-034	0	1	N/A	Yes
CHRYSENE	mg/kg	2.20E+00		LAP4L-034	0	1	N/A	Yes
CUMENE (ISOPROPYLBENZENE)	mg/kg	2.19E-03		LAP4L-028	4	8	N/A	Yes
CYCLOHEXANE	mg/kg	1.84E-03		LAP4L-040	4	8	N/A	Yes
DIBENZ[AH]ANTHRACENE	mg/kg	2.30E-01	J	LAP4L-034	0	1	N/A	Yes
DIBENZOFURAN	mg/kg	5.00E-02	J	LAP4L-021	8	12	N/A	Yes
DICHLOROMETHANE (METHYLENE CHLORIDE)	mg/kg	2.17E-03	J	LAP4L-015	12	16	N/A	Yes
DIETHYL PHTHALATE	mg/kg	4.40E-01	J	LAP4L-040	0	1	N/A	Yes
DI-N-BUTYL PHTHALATE	mg/kg	3.30E-01		LAP4L-013	8	12	N/A	Yes
FLUORANTHENE	mg/kg	2.60E+00		LAP4L-034	0	1	N/A	Yes
FLUORENE	mg/kg	6.20E-02	J	LAP4L-024	8	12	N/A	Yes

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Table A.4-4. Unit Specific Constituent Screening Table LRP 131-4L Subunit Soil (All Depths) *(Continued/End)*

ANALYTE NAME	Units	Max Result[1]	Qualifier of Max	Max Location	Top Sample (ft)	Bottom Sample (ft)	SRS 2X Mean Background[2]	Is Max Detect>2X SRS Mean Bkg?[3]
INDENO[1,2,3-CD]PYRENE	mg/kg	8.90E-01	J	LAP4L-015	1	4	N/A	Yes
M,P-XYLENE	mg/kg	1.33E-03	J	LAP4L-040	4	8	N/A	Yes
METHYL ACETATE	mg/kg	4.25E-03	J	LAP4L-020	8	12	N/A	Yes
METHYL ETHYL KETONE	mg/kg	2.40E-02		LAP4L-006	0	1	N/A	Yes
METHYLCYCLOHEXANE	mg/kg	3.35E-03		LAP4L-040	4	8	N/A	Yes
NAPHTHALENE	mg/kg	3.80E-02	J	LAP4L-021	8	12	N/A	Yes
N-DIOCTYL PHTHALATE	mg/kg	1.50E-01	J	LAP4L-018	0	1	N/A	Yes
N-NITROSODIPROPYLAMINE	mg/kg	4.50E-01	J	LAP4L-015	0	1	N/A	Yes
O-XYLENE	mg/kg	9.02E-04	J	LAP4L-040	4	8	N/A	Yes
PHENANTHRENE	mg/kg	1.10E+00	J	LAP4L-024	4	8	N/A	Yes
PYRENE	mg/kg	2.30E+00		LAP4L-034	0	1	N/A	Yes
STYRENE	mg/kg	1.11E-03		LAP4L-028	0	1	N/A	Yes
TETRACHLOROETHYLENE (PCE)	mg/kg	2.40E-03		LAP4L-040	4	8	N/A	Yes
TOLUENE	mg/kg	1.98E-03		LAP4L-040	4	8	N/A	Yes

Table Notes:
J = estimated value
NA = not available
1 = Max = maximum detected concentration from all depth intervals
2 = *Background Soils Statistical Summary report for the Savannah River Site,* ERD-EN-2005-0223, Appendix B-2 (All Depth Intervals)
3 = Constituents identified as an USC if maximum detected concentration is greater than 2X SRS Mean Concentration

APPENDIX B

CONTAMINANT FATE AND TRANSPORT

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LIST OF ABBREVIATIONS AND ACRONYMS

~	approximately
θ_e	effective moisture content
θ_{ei}	layer *i* effective moisture content
θ_w	water-filled soil porosity
θ_{wi}	layer *i* water-filled soil porosity
θ_a	air-filled soil porosity
η_e	effective porosity
η_{ei}	layer *i* effective porosity
η_t	total porosity
η_{ti}	layer *i* total porosity
ρ_b	dry soil bulk density
λ	decay rate constant
ac	acre
bgs	below ground surface
b_i	layer *i* Clapp and Hornberger "*b*" parameter based on soil texture
BRA	Baseline Risk Assessment
C_{gw}	groundwater concentration
CM	contaminant migration
CMS	Corrective Measures Study
COC	constituent of concern
COPC	constituent of potential concern
C_{sat}	saturation concentration
C_t	input contaminant soil concentration
d	mixing zone depth (minimum of d_i and d_a)
d_a	measured saturated zone thickness
DAF	dilution attenuation factor
d_i	calculated mixing zone depth
d_s	average source thickness
ECODS	Early Construction and Operational Disposal Site
ED	exposure duration
ft/ft	feet per feet
f_{oc}	soil organic carbon content as mass fraction
FS	Feasibility Study
ft	feet, foot
ft/yr	feet per year
H', *H*	Henry's Law Constant
ha	hectare
i	saturated zone hydraulic gradient

LIST OF ABBREVIATIONS AND ACRONYMS (*CONTINUED*)

I	infiltration rate through vadose zone
K_a	saturated zone hydraulic conductivity
K_d	soil-water partitioning coefficient
kg/L	kilogram per liter
K_{oc}	organic carbon partitioning coefficient
K_{si}	layer *i* Clapp and Hornberger "*K*" parameter based on soil texture
L	length of the source parallel to groundwater flow
L/kg	liter per kilogram
LRP 131-1L	L-Area Rubble Pit 131-1L
LRP 131-4L	L-Area Rubble Pit 131-4L
L_v	length from the bottom of the source zone to the top of the water table
m	meter
MCL	maximum contaminant level
mg/kg	milligram per kilogram
mg/L	milligram per liter
MLSSL	mass-limited soil screening level
NA	not available
NBN	no building number
NAPL	non-aqueous phase liquid
OU	Operable Unit
PCB	polychlorinated biphenyl
pCi/g	picocurie per gram
R	retardation coefficient
RCOC	refined constituent of concern
RCRA	Resource Conservation and Recovery Act
RFI	Resource Conservation and Recovery Act Facility Investigation
RGO	remedial goal options
RI	Remedial Investigation
RSL	regional screening level
S	solubility constant in water
SRNS	Savannah River Nuclear Solutions, LLC
SRS	Savannah River Site
SSL	soil screening limit
t	time of exposure
$T_{1/2}$, $t_{1/2}$	half-life
T_c	total depth of soil column

LIST OF ABBREVIATIONS AND ACRONYMS (*CONTINUED/END*)

T_e	evaluation time
T_{hi}	layer *i* vertical thickness
T_{Mean}, T_t	mean travel time
µg/L	microgram per liter
USEPA	United States Environmental Protection Agency
V_s	vadose zone mean pore water velocity
V_{si}	layer *i* mean pore water velocity
VZCOMML©	Vadose Zone Contaminant Migration Multi-Layered Model, Version 4.0
WSRC	Washington Savannah River Company; After 2004
WSRC	Westinghouse Savannah River Company; Prior to 2004
yr	year

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B-1. CONTAMINANT FATE AND TRANSPORT

The purpose of this appendix is to determine the fate and transport of contaminants associated with the Early Construction and Operational Disposal Site (ECODS) L-3, no building number (NBN), L-Area Rubble Pit 131-1L (LRP 131-1L), and L-Area Rubble Pit 131-4L (LRP 131-4L) Operable Unit (OU) [ECODS L-3, LRP 131-1L, and LRP 131-4L OU]. The ECODS L-3, LRP 131-1L, and LRP 131-4L OU is comprised of three subunits:

- ECODS L-3 Subunit
- LRP 131-1L Subunit
- LRP 131-4L Subunit

A site evaluation of the ECODS L-3 subunit was conducted in 2002, and results were reported in the *Site Evaluation Report for the Early Construction and Operational Disposal Site (ECODS) L-3 (NBN) (U)* (Westinghouse Savannah River Company, LLC [WSRC] 2003). The Core Team agreed that the 2002 site evaluation data is adequate for completing a Baseline Risk Assessment (BRA) per the approved Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI)/Remedial Investigation (RI) protocols (Savannah River Nuclear Solutions, LLC [SRNS] 2023) and for remedial decision making as supported by this combined RFI/RI/BRA/Corrective Measures Study (CMS)/Feasibility Study (FS) report. Investigative sampling of the LRP 131-1L subunit and the LRP 131-4L subunit was completed in November 2022 and January 2023, respectively, in accordance with the *RFI/RI Work Plan for the Early Construction and Operational Disposal Site L-3 (NBN), L-Area Rubble Pit (131-1L), and L-Area Rubble Pit (131-4L) Operable Unit (U)* (SRNS 2022). The Core Team met on November 9, 2023, and agreed that no data gaps exist that require additional sampling and data collection for the ECODS L-3, LRP 131-1L, and LRP 131-4L OU is complete.

The contaminant migration (CM) analyses were performed using the spreadsheet model VZCOMML© (V.4.0)[a], which accounts for decay processes, infiltration rate, soil properties,

[a] Vadose Zone Contaminant Migration Multi-Layered Model (VZCOMML©) Version 4.0, Copyright TXu 1-663-361, 2009, Savannah River Nuclear Services, LLC.

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vadose zone thickness, and chemical behavior. Soil screening limits (SSLs) were calculated by the model, and an exceedance of a SSL by a vadose zone constituent indicates that the resultant maximum groundwater concentration has the potential to exceed the regulatory limits (e.g., maximum contaminant levels [MCLs]) within the compliance period of 1,000 years (yr). Interpretation of the results and discussion of exceeding constituents are provided in the following sections of this appendix.

B-1.1. Contaminant Migration Model

B-1.1.1. Background

B-1.1.1.1. ECODS L-3 Subunit

The ECODS L-3 subunit is located in relatively flat terrain, approximately (~) 518 meters (m) (1,700 feet [ft]) east of the southeastern corner of the L Area perimeter fence and ~115 m (380 ft) west of C Road (Figure B-1). The area surrounding the ECODS L-3 subunit is wooded with heavy underbrush (Figure B-2). It contains no stressed vegetation or other visual indications of contamination. The ECODS L-3 subunit was used to dispose of construction debris and other non-radioactive waste materials, such as rubble and concrete, associated with the construction and early operation of L Area. The ECODS L-3 subunit was estimated to have been in use from November 1953 to June 1954. The subunit is ~18 m (60 ft) wide by ~60 m (200 ft) long. Waste disposed of in the ECODS L-3 subunit was buried in two trenches, one 15 m (50 ft) wide by 27 m (90 ft) long and the other 4.6 m (15 ft) wide by 27 m (90 ft) long, located end to end (Figure B-3). Drilling during the site evaluation sampling confirmed the bottom of the subunit at a maximum depth of 3.4 m (11 ft) below ground surface (bgs).

The ECODS L-3 subunit consists of a 3.4 m (11 ft) sandy loam source layer, consistent with reporting in the 2002 site evaluation report (WSRC 2003). Vadose zone layers below the source consisted of a 2.7 m (9 ft) clay loam layer, followed by a 1.5 m (5 ft) clay layer. Soil layer descriptions are based on the field geologic log for the nearest soil boring, LSW 4C (Attachment B-1). The water table was modeled at 7.6 m (25 ft) bgs based on water level data from nearby well cluster LSW 20.

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B-1.1.1.2. LRP 131-1L Subunit

The LRP 131-1L subunit is a former waste disposal area reportedly used for various construction debris and operated from 1973 to 1982 (DuPont 1983a). The LRP 131-1L subunit is located to the east of L Area, ~46 m (150 ft) outside of the facility boundary fence (Figure B-1). Plant records indicate that metal, lumber, poles, concrete, brick, tile, asphalt, tires, rubber, scrap metal, fence posts, hard plastics, wallboard, asbestos, glass, batteries, paint cans, drums, and transite were disposed of at the LRP 131-1L subunit (DuPont 1983a and DuPont 1983b). The term “pit” may be a misnomer as the 2022 characterization activities did not indicate that a pit was constructed or that waste was placed bgs. Recently discovered photos of the subunit show land disposal of material on the subunit surface, but not below surface (Figure B-4) (DuPont 1983b). There is no record of hazardous or radioactive material disposed of at the pit. The LRP 131-1L subunit delineated by orange ball waste unit markers is 12 m (40 ft) by 46 m (150 ft) (Figure B-5).

The LRP 131-1L subunit consists of a 3.7 m (12 ft) sandy loam source layer. The vadose zone below the source consisted of a 0.9 m (3 ft) clay layer. Soil layer descriptions are based on the field geologic logs from the 2022 RFI/RI Work Plan sampling activities at the LRP 131-1L subunit (Appendix J.1). The water table was modeled at 4.6 m (15 ft) bgs, supported by nearby groundwater monitoring well cluster LAW 3.

B-1.1.1.3. LRP 131-4L Subunit

The LRP 131-4L subunit is located north of the L-Area fence and east of Road 7 (Figure B-1). The subunit surface elevation ranges from ~81 to 84 m (266 to 276 ft) above mean sea level and slopes to the southeast toward railroad tracks, which head into L Area. Just before the railroad tracks on the southeastern end of the subunit, there is a depression and drainpipe which collects runoff and carries it under the railroad tracks. Orange ball markers are present to designate the subunit boundaries, an area ~30.5 m by 30.5 m (100 ft by 100 ft). However, during walkdowns to support a 1994 site evaluation effort, the subunit size was questioned due to land disturbance on the northwestern side of the subunit, outside of the orange ball markers (WSRC 1994). Additionally, during site walkdowns in preparation of the RFI/RI Work Plan for the LRP 131-4L subunit, surface disturbance and debris (e.g., rebar, concrete, asphalt) were observed on the northeastern side of the

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subunit, outside of the orange ball markers. Therefore, the LRP 131-4L subunit area was expanded to 36.6 m by 36.6 m (120 ft by 120 ft) for the RFI/RI Work Plan characterization, to include the disturbed land and observed debris (Figure B-6).

The LRP 131-4L subunit consists of a 5.3 m (17.5 ft) loam source layer. The vadose zone below the source consisted of a 2.0 m (6.5 ft) clay layer, followed by a 0.3 m (1 ft) sandy loam layer. Soil layer descriptions are based on the field geologic logs from the 2022 RFI/RI Work Plan sampling activities at the LRP 131-4L subunit (Appendix J.2). The water table was modeled at 7.6 m (25 ft) bgs based on 2003 potentiometric surface of the subunit area.

B-1.2. Screening Methods

This section describes screening methods used for identifying CM constituents of potential concern (COPCs) and CM constituents of concern (COCs) for Savannah River Site (SRS) OUs. The identification of CM COPCs and CM COCs is facilitated by the program VZCOMML© V.4.0.

This CM analysis follows the protocols and guidelines established in the *Environmental Compliance and Area Completion Projects Regulatory Document Handbook* (SRNS 2023). For the Tier I screen, each subunit is modeled under the most conservative assumptions for source thickness, depth to groundwater, and subsurface properties. United States Environmental Protection Agency (USEPA) default SSLs are calculated for the Tier I screen, which are then compared to the maximum concentrations of all detected constituents. Constituents with concentrations that are greater than the calculated Tier I SSLs have the potential to impact groundwater at levels exceeding action levels and therefore are retained as Tier I CM COPCs. A less conservative set of assumptions are used for the Tier II analyses to assess impact to groundwater at concentrations exceeding action levels within the evaluation time (T_e) of 1,000 yrs. The Tier II screen accounts for physical and chemical complexities associated with vadose zone transport and more accurately predicts risks of exposure via the CM pathway. Constituents with maximum source zone concentrations that exceed the Tier II SSLs within the T_e are retained as Tier II CM COCs.

Both the Tier I and Tier II screens include infinite source mass and limited source mass calculations. In reality, the consideration of an infinite source mass is not reasonable, so the mass-

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limited calculations (default mass-limited SSLs and SRS site-specific mass-limited SSLs [MLSSL]) consider the entire release of the source mass within a 70-yr exposure period. This prevents a source mass balance error (i.e., releasing more contaminant mass than is actually contained in the source) in the calculation, which is likely with the infinite source scenario. Equations used to calculate Tier I and Tier II SSLs and MLSSLs are provided below in the Section B-2.3.

The spreadsheet model VZCOMML© was developed at SRS to facilitate SSL calculations and Tier I/Tier II soil data CM screening. VZCOMML© simultaneously calculates SSLs for Target Analyte List and Target Compound List constituents and for specified radionuclides (a total of 219 constituents). VZCOMML© compares user-entered soil concentrations (i.e., maximum values, 95% UCLs) to calculate SSLs and identifies constituents that are Tier I CM COPCs and Tier II CM COCs. Chemical properties of analytes used by VZCOMML© (e.g., soil/water distribution coefficient [K_d], Henry's Law constant [H', H], etc.) are listed in Table B-1. VZCOMML© also contains assigned hydraulic functions for different types of soil layers (e.g., source layer, soil layer, or engineered barrier layer) and texture classifications (e.g., sand, loamy sand, clay, concrete) within the soil column. The Tier II screen completed by VZCOMML© also uses soil concentrations input by the user to calculate maximum groundwater concentrations and migration times.

If Tier II CM COCs are identified, it is up to the user to evaluate results and apply professional judgment, other modeling approaches, and/or knowledge of site conditions and geochemistry to further refine the list of CM COCs in an uncertainty discussion (Section B-2.6). Constituents that are retained following the uncertainty discussion are CM refined COCs (RCOCs), which are constituents that are mobile at that waste unit, can leach to the aquifer within a 1,000-yr travel time (per the approved RFI/RI/BRA protocols), and are predicted to exceed drinking water standards at a receptor well located adjacent to the edge of the waste unit within the T_e.

B-1.3. Soil Screening Equations

Equations used by VZCOMML© are consistent with USEPA Soil Screening Guidance (USEPA 1996, 2000). A conceptual framework of the model and vadose zone and screening parameters for VZCOMML© is provided in Figure B-7. Model assumptions include:

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- A receptor drinking water well at the downgradient edge of the source zone with the well screen located in the plume.
- Linear equilibrium isotherms were used rather than exponential isotherms (this is typically a conservative estimate [i.e., likely transports more contaminant to water table] of partitioning into the aqueous phase of a moving front).
- Uniformly distributed contamination in the subsurface (this is also typically a conservative estimate using the input concentration across the entire unit for each constituent).
- Instantaneous equilibrium partitioning within soil, vapor, and liquid phases (this is typically a conservative estimate [i.e., likely transports more contaminant to water table] of partitioning into the aqueous phase of a moving front for compounds that have lower Henry’s Law constants).

In the VZCOMML© model construction, the source zone layer thickness represents the vertical extent of contamination. Generally, Layer 1 is the source zone and Layers 2 through 5 (if applicable) are the vadose zone layers beneath the source zone and are used to simulate soil heterogeneity in the soil column. These layers can accommodate different hydraulic functions, soil textures, properties, and layer thicknesses for up to five total soil layers (including source layer). The aquifer layer represents the shallowest water table aquifer. Following is a discussion of the equations used by VZCOMML© for the soil screening process.

B-1.3.1. Dilution Attenuation Factor

The dilution attenuation factor (*DAF*) represents leachate dilution in the water table aquifer. The *DAF* calculation assumes that the aquifer is unconfined, unconsolidated, isotropic, and homogeneous. The minimum *DAF* is one, which indicates no dilution occurs in the aquifer. The USEPA recommends a default *DAF* of 20 for sites up to 0.2 hectare (ha) (0.5 acre [ac]) whenever site-specific data are not available (USEPA 1996). The *DAF* (dimensionless) is calculated as follows:

$$DAF = 1 + \frac{K_a \cdot i \cdot d}{I \cdot L}$$

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where;

K_a = saturated zone (aquifer) hydraulic conductivity (feet per year [ft/yr])

i = saturated zone (aquifer) hydraulic gradient (feet/feet [ft/ft])

I = infiltration rate through vadose zone (ft/yr)

L = length of the source (parallel to groundwater flow) (ft)

d_a = measured saturated zone (aquifer) thickness (ft)

d_i = calculated mixing zone depth (ft)

d = mixing zone depth (minimum of d_i and d_a) (ft)

If the input infiltration rate through the vadose zone is greater than any of the individual vadose zone layer saturated hydraulic conductivities, then the infiltration rate is adjusted to the maximum of the individual vadose zone layer saturated hydraulic conductivities. The calculated mixing zone depth (d_i) is defined as follows:

$$d_i = \sqrt{0.0112 \cdot L^2} + d_a\left(1 - e^{\left(-L \cdot I/(K_a \cdot i \cdot d_a)\right)}\right)$$

The actual mixing zone depth (d) value cannot exceed the actual aquifer thickness (d_a). Therefore, the mixing zone depth is the minimum of d_i or d_a. This can tend to underpredict localized contaminant concentrations in groundwater by immediately diluting the concentrations over the full aquifer extent when the contaminant reaches groundwater but is adjustable to accommodate mixing or lack thereof.

B-1.3.2. Soil Partitioning

The SSL soil concentration is back-calculated by two methods: 1) SSL (infinite source) and 2) MLSSL (finite source). The Tier I SSL assumes an infinite source and uses a linear equilibrium soil-water partitioning isotherm. The Tier I SSL (*TierI_SSL*, milligram per kilogram [mg/kg]) is calculated for organic contaminants and mercury (with vapor phase) as follows:

$$TierI\_SSL = \frac{MCL}{1000} \cdot DAF \cdot \left[K_d + \frac{(\theta_w + \theta_a \cdot H)}{\rho_b}\right]$$

where;

MCL = water-phase concentration limit standard (i.e., MCL or regional screening level [RSL]) (micrograms per liter [μg/L])

K_d = soil-water partitioning coefficient (liter per kilogram [L/kg])

θ_w = water-filled soil porosity (unitless)

n_t = total porosity (unitless)

θ_a = air-filled soil porosity (unitless), $\theta_a = n_t - \theta_w$

H = Henry's Law constant (dimensionless)

ρ_b = dry soil bulk density (kilogram per liter [kg/L])

The Tier I SSL (*TierI_SSL*, mg/kg) equation for inorganic contaminants (without vapor phase) is:

$$TierI\_SSL = \frac{MCL}{1000} \times DAF \times \left(K_d + \frac{\theta_w}{\rho_b}\right)$$

The Tier I SSL (*TierI_SSL*, picocurie per gram [pCi/g]) for radionuclides is:

$$TierI\_SSL = DefaultSSL \times \left(\frac{\lambda t}{1 - e^{(-\lambda t)}}\right)$$

where;

t = time of exposure (USEPA default value of 30 yrs)

λ = decay rate constant ($\frac{\ln(2)}{t_{1/2}}$ [yrs^{-1}])

$t_{½}$ = half-life (yrs)

For organic constituents, the soil-water partitioning coefficient (K_d) (L/kg) is defined by:

$$K_d = f_{OC} \cdot K_{OC}$$

where;

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f_{oc} = soil organic carbon content as mass fraction (unitless)

K_{oc} = organic carbon partitioning coefficient (L/kg)

For metals or radionuclides, the K_d is taken from literature and is dependent on the chemical form that exists and the geochemical environment at each site. Normally, the K_d is derived from laboratory column studies. K_d values for metals were determined from the 2021 *Geochemical Data Package for Performance Assessment Calculations Related to the Savannah River Site* (Kaplan 2021), using the most appropriate values for the specific vadose zone soil type. The water-filled soil porosity (θ_w) is based on a weighted average for all vadose zone layers and calculated as follows:

$$\theta_w = \sum_{i=1}^{n} \left(\frac{T_{hi}}{T_c}\right) \theta_{wi}$$

where;

T_{hi} = layer *i* vertical thickness (ft)

T_c = total depth of soil column (ft), $T_c = (d_s + L_v)$

d_s = average source thickness (ft)

L_v = length from the bottom of the source zone to the top of the water table (ft)

θ_{wi} = layer *i* water-filled soil porosity (unitless)

The soil texture is determined for the different layers or soil types observed in the vadose zone, and the soil layer parameters are used to calculate the volumetric water content as follows:

$$\theta_{wi} = n_{ti} \left(\frac{I}{K_{si}}\right)^{\left[\frac{1}{(2b_i+3)}\right]}$$

where;

n_{ti} = layer *i* total porosity (unitless)

K_{si} = layer *i* Clapp and Hornberger "*K*" parameter based on soil texture (ft/yr)

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b_i = layer *i* Clapp and Hornberger "*b*" parameter based on soil texture (dimensionless)

The vadose zone total porosity (n_t, unitless) and vadose zone effective porosity (n_e, unitless) are both based on a weighted average for all vadose zone layers and calculated as follows:

$$n_t = \sum_{i=1}^{n} \left(\frac{T_{hi}}{T_c}\right) \times n_{ti}$$

$$n_e = \sum_{i=1}^{n} \left(\frac{T_{hi}}{T_c}\right) \times n_{ei}$$

where;

n_{ei} = layer *i* effective porosity (unitless)

The effective moisture content θ_e (fraction) is a weighted average for all vadose zone layers as follows:

$$\theta_e = \sum_{i=1}^{n} \left(\frac{T_{hi}}{T_c}\right) \times \theta_{ei}$$

where;

θ_{ei} = layer *i* effective moisture content (unitless)

To solve the mass-balance violations inherent in the infinite source equation, USEPA developed the MLSSL (*TierI_MLSSL*, mg/kg) for organics and metals as follows:

$$TierI\_MLSSL = \frac{MCL}{1000} \cdot DAF \cdot \frac{I \times ED}{(\rho_b \times d_s)}$$

where;

ED = exposure duration (yr [USEPA default value of 70 yrs])

The MLSSL (*TierI_MLSSL,* pCi/g) equation for radionuclides is:

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$$TierI\_MLSSL = DefaultMLSSL \cdot \left(\frac{\lambda t}{1 - e^{(-\lambda t)}}\right)$$

B-1.3.3. Mean Travel Time

The mean travel time (T_{Mean} or T_t, yrs) through the vadose zone layers below the source is calculated in VZCOMML© as follows:

$$T_{Mean} = \frac{L_v \cdot R}{V_s}$$

The retardation coefficient (R, dimensionless) is calculated as:

$$R = 1 + \frac{(K_d \cdot \rho_\beta)}{\theta_e}$$

The mean pore water velocity in the vadose zone (V_s, ft/yr) is a weighted average calculated by:

$$V_s = \sum_{i=1}^{n} \left(\frac{T_{ti}}{T_t}\right) \cdot V_{si}$$

where;

V_{si} = layer *i* mean pore water velocity (ft/yr)

T_{ti} = layer *i* mean travel time (yr)

T_t = travel time (yr)

By applying Darcy's Law in the unsaturated zone and assuming steady-state conditions;

$$V_{si} = \frac{\mathrm{I}}{\theta_{wi}}$$

Darcy's Law is not applicable to unstable vadose zone flow, which typically exhibits fingering and other nonlinear behavior, however over most areas this method will typically be a conservative one (i.e., likely transports more contaminant on average to the water table) assuming appropriate

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hydraulic conductivity values are selected. One pitfall is that preferential pathways are not uncommon and can rapidly transport water (and contaminant) faster than Darcy-derived flow in small, localized areas.

B-1.3.4. Incorporating Decay

To account for radioactive decay, chemical degradation, hydrolysis, or biodegradation of constituents and for redistribution of mass in the vadose zone, the Tier I SSLs and Tier I MLSSLs are adjusted using first-order equations in the Tier II $SSL_{T1/2}$ ($TierII\_SSL_{T1/2}$) and Tier II $MLSSL_{T1/2}$ ($TierII\_MLSSL_{T1/2}$) as follows:

$$TierII\_SSL_{T1/2} = \left(\frac{TierI\_SSL}{e^{(-\lambda T_{Mean})}}\right) \cdot \left(\frac{T_c}{d_s}\right)$$

$$TierII\_MLSSL_{T1/2} = \frac{TierI\_MLSSL}{e^{(-\lambda ED)}}$$

where;

T_{Mean} = the mean travel time (yr)

A half-life ($T_{1/2}$, $t_{1/2}$) for a chemical compound is largely determined from literature sources. Because there is usually variability of the reported half-life of a chemical compound (e.g., aerobic and anaerobic rates), the most conservative (longest) half-life is selected as the rate constant in the equations. The rate constants used in the VZCOMML© model are primarily derived from the publications of P. H. Howard, et al and D. McKay, et al, but other references were also used such as USEPA's Estimation Program Interface Suite software and USEPA's Human Health Risk Assessment Parameters database.

VZCOMML© assumes equilibration, mass redistribution, and conservation of mass in the source zone between phases (i.e., volatilized, dissolved, or sorbed) and throughout the entire vadose zone volume. This results in more realistic SSLs, which accounts for vadose zone thickness, travel time, and chemical behavior in the subsurface.

The VZCOMML© Tier II screening decision logic for a constituent 'fails' if: 1) the mean travel time (T_{Mean}) through the vadose zone is less than 1,000 yrs, and 2) the source concentration exceeds the Tier II MLSSL$_{T1/2}$, and 3) the groundwater concentration exceeds an action level (i.e., the calculated concentration in groundwater would exceed the regulatory limit, such as MCLs or RSLs). In this case, the constituent would be retained as a CM COC and subject to further CM COC refinement steps.

B-1.3.5. Saturation Concentration

For organic (non-radioactive) constituents, the saturation concentration (C_{sat}) (mg/kg) is calculated from the solubility constant in water (S) (milligrams per liter [mg/L]) as follows:

$$C_{sat} = \frac{S}{\rho_b} \cdot (K_d + \rho_b + \theta_w + H \cdot \theta_a)$$

The C_{sat} is a theoretical concentration that represents a pure non-aqueous phase liquid (NAPL) or solid threshold concentration in soil. The C_{sat} is compared to the detected concentration to predict if a NAPL phase compound is present in the soil.

B-1.3.6. Groundwater Concentration

The concentration of constituents in groundwater in the water table aquifer is directly calculated by VZCOMML© for comparison to groundwater regulatory limits. The groundwater concentration (C_{gw} [µg/L]) is calculated as follows (Rucker 2011):

For organic contaminants (including mercury with vapor phase);

$$C_{gw} = \frac{\left(\frac{C_t \cdot 1000}{DAF}\right) \times e^{(-\lambda T_{mean})}}{\left(K_d + \frac{(\theta_w + H \cdot \theta_a)}{\rho_b}\right) \times \left(\frac{\lambda t}{1 - e^{(-\lambda t)}}\right)} \cdot \left(\frac{d_s}{T_c}\right)$$

where;

C_t = input contaminant soil concentration (mg/kg)

For inorganic contaminants (including metals [note: metals use an infinite half-life] and radionuclides and excluding mercury with vapor phase):

$$C_{gw} = \frac{\left(\frac{C_t \cdot 1000}{DAF}\right) \cdot e^{(-\lambda T_{mean})}}{\left(K_d + \frac{\theta_w}{\rho_b}\right) \cdot \left(\frac{\lambda t}{1 - e^{(-\lambda t)}}\right)} \cdot \left(\frac{d_s}{T_c}\right)$$

VZCOMML© assumes equilibration, redistribution, and conservation of mass of the source between phases (i.e., volatilized, dissolved, or sorbed) and distribution throughout the entire vadose zone volume. The concentration of constituents in groundwater in the water table aquifer is directly calculated by VZCOMML© for comparison to groundwater regulatory limits or standards.

B-1.4. ECODS L-3, LRP 131-1L, and LRP 131-4L OU Modeling Parameters

Vadose zone CM simulations are presented in this section, using the VZCOMML© spreadsheet, for the ECODS L-3, LRP 131-1L, and LRP 131-4L OU subunits. The vadose zone soil layers for the various subunits were modeled based on the best available data from previous soil boring activities, as well as recent soil core descriptions. The layers differed for each subunit and were modeled as shown in Table B-2.

These steps were used to perform the CM analysis for each subunit:

1. Analytical soil data were compiled and evaluated. The data were processed to purge all quality assurance data and rejected (R qualified) data. The data were further processed to select the maximum detected concentration and the 95% upper confidence limit (UCL) for each analyte (Appendix A). The 95% UCL was determined by ProUCL (USEPA 2022).

2. A conceptual site model was developed for each subunit, which includes depth of contamination (source zone; Layer 1), vadose zone thickness below the source (Soil Layers 2-5; as appropriate), and assigned values for several hydrogeological parameters.

3. VZCOMML© Tier I screen was performed, using two conservative assumptions: a) for each analyte, the maximum detected soil concentration was used to represent the soil concentration (C_t), and b) the thickness of the source zone was assumed to be equal to the depth of the deepest available soil sample. An analyte was retained as a Tier I CM COPC if the source zone concentration was greater than both the Tier I Source-Specific SSL and the Tier I MLSSL.

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4. VZCOMML© Tier II Simulation 1 was run, using two conservative assumptions: (a) for each analyte, the maximum detected soil concentration was used to represent the soil concentration (C_t), and (b) the thickness of the source zone was assumed to be equal to the depth of the deepest available soil sample. Analytes predicted to impact groundwater at concentrations exceeding action levels within the evaluation time of 1,000 yrs, under the conservative conditions simulated, were retained as Tier II CM COPCs. Action levels refer to the Tier II $SSL_{T1/2}$, the Tier II $MLSSL_{T1/2}$, and either the November 2023 USEPA MCL or RSL. For an analyte to be retained as a Tier II CM COPC in VZCOMML©, the "predicted concentration in aquifer" must be greater than all three action levels, and the analyte must have a mean travel time of less than 1,000 yrs.

5. Additional simulations were performed for any Tier II CM COPCs retained from Step 4. These simulations represent more realistic conditions than the maximally conservative Tier I Simulation 1. For example, the 95% UCL of an analyte may be used rather than the maximum concentration, when justified; or the actual depth of the maximum concentration may be used for Layer 1, rather than the depth of the deepest sample. Analytes predicted to adversely impact groundwater under the more realistic simulations were retained as CM COCs.

6. CM COCs were evaluated further, using additional lines of inquiry in an Uncertainty Discussion (Section B-2.6). After evaluation, retained analytes were identified as CM RCOCs.

7. Screening-level CM remedial goal options (RGOs) were calculated for each CM RCOC (generally, the CM RGO is the highest Tier II SSL concentration).

Table B-1 presents chemical and physical property parameters for each evaluated analyte. These parameters include organic carbon partitioning coefficient (K_{oc}), soil-water partitioning coefficient (K_d), half-life (biological degradation for organics; radioactive decay for radionuclides[$T_{1/2}$, $t_{1/2}$]), Henry's Law constant (H', H), solubility (S), and regulatory action level (USEPA MCL or RSL). In addition to chemical parameters, several physical parameters are also employed in CM simulations. Since the geologic environment of all evaluated subunits is similar, many of the same physical parameters were used for all subunits. These are presented in Table B-3. In contrast to

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global parameters listed in Table B-3, physical parameters, which are specific to certain subunits and refined simulations, are presented in Table B-4.

B-1.5. Results of the Tier I and Tier II Analyses

In this section, results of the Tier I and Tier II screening are presented for each of the three subunits of the ECODS L-3, LRP 131-1L, and LRP 131-4L OU. Certain constituents did not undergo SSL calculations. These constituents included compounds which lack both MCLs and RSLs (e.g., phenanthrene), constituents that are essential nutrients (e.g., calcium), and radiological progeny of radium-226 and radium-228 (the radium-226/228 MCL takes risk due to progeny into account). These analytes did not undergo CM COC evaluation and were listed as “NA” in Tables B-5, B-7, B-9, and B-11. However, travel times and groundwater concentrations were predicted for the compounds which lack MCLs/RSLs.

B-1.5.1. ECODS L-3 Subunit

B-1.5.1.1. ECODS L-3 Subunit Tier I Analysis

The Tier I analysis identified 27 constituents as CM COPCs: 1,1',-biphenyl; 2-methylnaphthalene; antimony; Aroclor 1254; Aroclor 1260; arsenic; barium; benzaldehyde; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; bis(2-ethylhexyl) phthalate; cadmium; cobalt; copper; dibenz(a,h)anthracene; dibenzofuran; fluorene; indeno(1,2,3-c,d)pyrene; iron; lead; manganese; mercury; naphthalene; nickel; pyrene; and zinc (Table B-5).

B-1.5.1.2. ECODS L-3 Subunit Tier II Analysis

The 27 constituents, which failed the Tier I screen, were evaluated in a Tier II simulation. Two constituents were further identified as Tier II CM COPCs following the first Tier II simulation: barium and nickel (Table B-6). The second Tier II simulation, which revised the source concentration from maximum detects to the calculated 95% UCL, did not identify any CM COCs (Table B-6).

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B-1.5.2. LRP 131-1L Subunit

B-1.5.2.1. LRP 131-1L Subunit Tier I Analysis

The Tier I analysis identified 11 constituents as CM COPCs: aluminum; arsenic; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; cobalt; dibenz(a,h)anthracene; dibenzofuran; hexachlorobutadiene; iron; and manganese (Table B-7).

B-1.5.2.2. LRP 131-1L Subunit Tier II Analysis

The 11 constituents, which failed the Tier I screen, were evaluated in a Tier II simulation. One constituent was further identified as a Tier II CM COPC following the first Tier II simulation: cobalt (Table B-8). The second Tier II simulation, which revised the source concentration from the maximum detect to the calculated 95% UCL, did not identify any CM COCs (Table B-8).

B-1.5.3. LRP 131-4L Subunit

B-1.5.3.1. LRP 131-4L Subunit Tier I Analysis

The Tier I analysis identified 21 constituents as CM COPCs: 2,4,6-trichlorophenol; aluminum; Aroclor 1254; arsenic; barium; benzaldehyde; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; cadmium; cobalt; copper; cyanide; dibenz(a,h)anthracene; iron; lead; manganese; naphthalene; N-nitrosodipropylamine; thallium; and vanadium (Table B-9).

B-1.5.3.2. LRP 131-4L Subunit Tier II Analysis

The 21 constituents, which failed the Tier I screen, were evaluated in a Tier II simulation. Four constituents were further identified as Tier II CM COPC following the first Tier II simulation: barium, cadmium, cyanide, N-nitrosodipropylamine (Table B-10). The second Tier II simulation, which revised the source concentration from maximum detects to the calculated 95% UCL, resulted in two retained CM COCs: cadmium and N-nitrosodipropylamine (Table B-10).

B-1.6. Uncertainty Discussion

Following the Tier II analyses, cadmium and N-nitrosodipropylamine were retained as CM COCs for the LRP 131-4L subunit. These constituents were evaluated further using additional lines of

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evidence to determine the appropriate CM RCOCs for the LRP 131-4L subunit. No CM RCOCs were determined for the ECODS L-3 and LRP 131-1L subunits, and therefore no further evaluation is warranted.

B-1.6.1. LRP 131-4L Subunit Uncertainty Analysis

Cadmium – The LRP 131-4L subunit had a maximum cadmium detection of 15.0 mg/kg and a mean of 0.102 mg/kg. The 2X mean SRS background for cadmium is 0.444 mg/kg and the maximum SRS background is 2.01 mg/kg (WSRC 2006). Of the 87 cadmium detections at the LRP 131-4L subunit, only two exceeded the 2X mean SRS background (15.0 mg/kg and 0.740 mg/kg). Cadmium was not retained as a CM RCOC for the LRP 131-4L subunit based on the following lines of evidence:

- Only two detections of cadmium above the 2X mean SRS background,
- Only one detection of cadmium above the maximum SRS background,
- It is a naturally occurring constituent that is common in SRS background soils,
- Rerunning Tier II simulation using the average concentration resulted in no exceedance of cadmium, and
- It does not appear to be unit related since it is indistinguishable from background.-

N-nitrosodipropylamine – The LRP 131-4L subunit had a maximum N-nitrosodipropylamine detection of 0.45 mg/kg. The only detected result was an estimated value (i.e., J-qualified) in the 0.0 to 0.3 m (0 to 1 ft) bgs interval. N-Nitrosodipropylamine is commonly used in laboratory research and is less commonly used in herbicides. Rerunning Tier II simulation with 0.0 to 0.3 m (0 to 1 ft) source zone resulted in no exceedance of N-nitrosodipropylamine. N-Nitrosodipropylamine was not retained as a CM RCOC for the LRP 131-4L subunit based on the following lines of evidence:

- Only one estimated detection of N-nitrosodipropylamine,
- Commonly used in laboratory research, and

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- Rerunning Tier II simulation using detected soil interval as the source zone thickness resulted in no exceedance of N-nitrosodipropylamine

B-1.7. Conclusions

This CM analysis performed using VZCOMML© resulted in no soil contaminants in the vadose zone with the potential to migrate to groundwater and exceed groundwater action levels within 1,000 yrs, therefore no CM RCOCs were retained. Table B-11 summarizes the Tier I and Tier II screening results.

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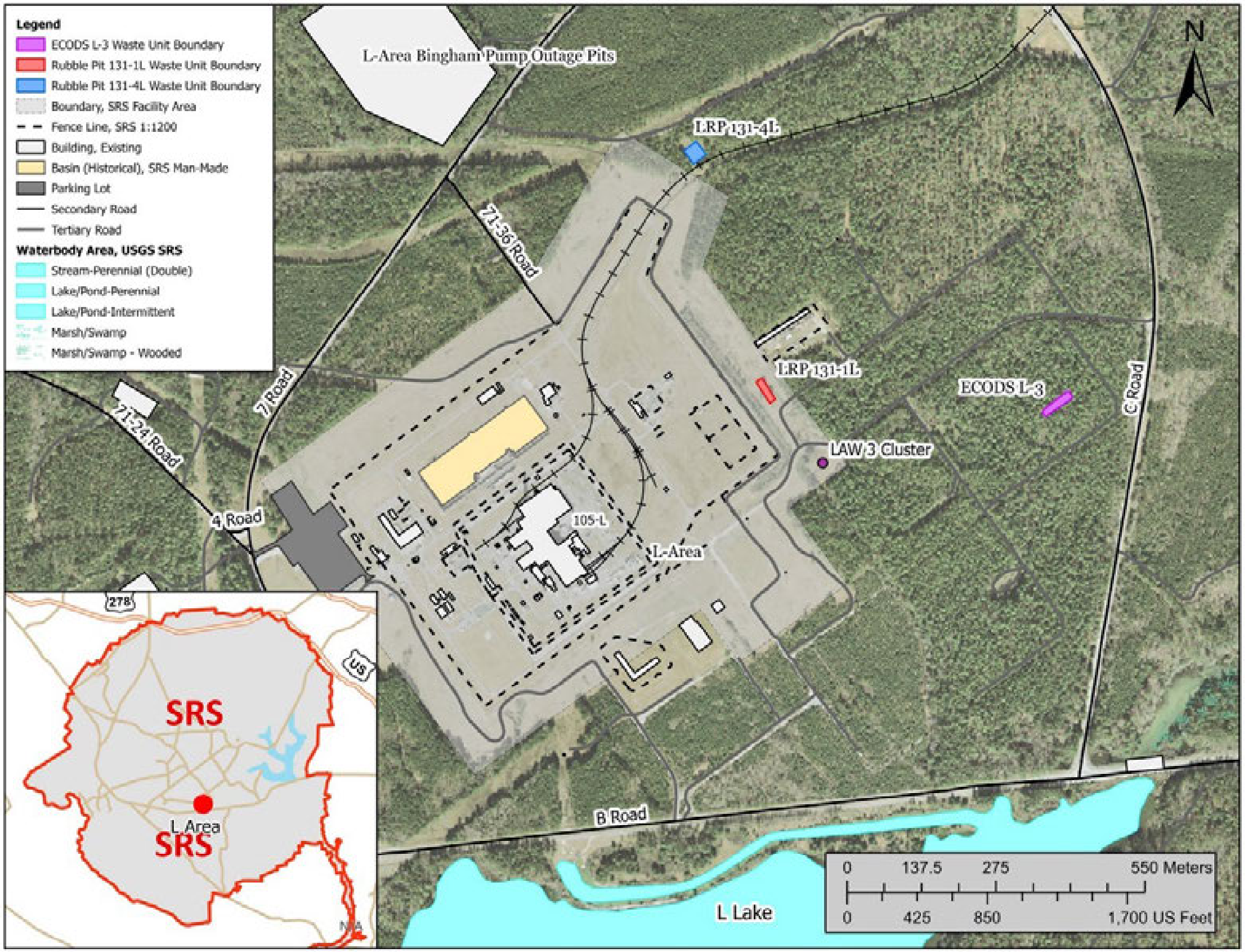

Figure B-1 Location of ECODS L-3, LRP 131-1L, and LRP 131-4L Operable Unit

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Figure B-2. Photo of ECODS L-3 Subunit

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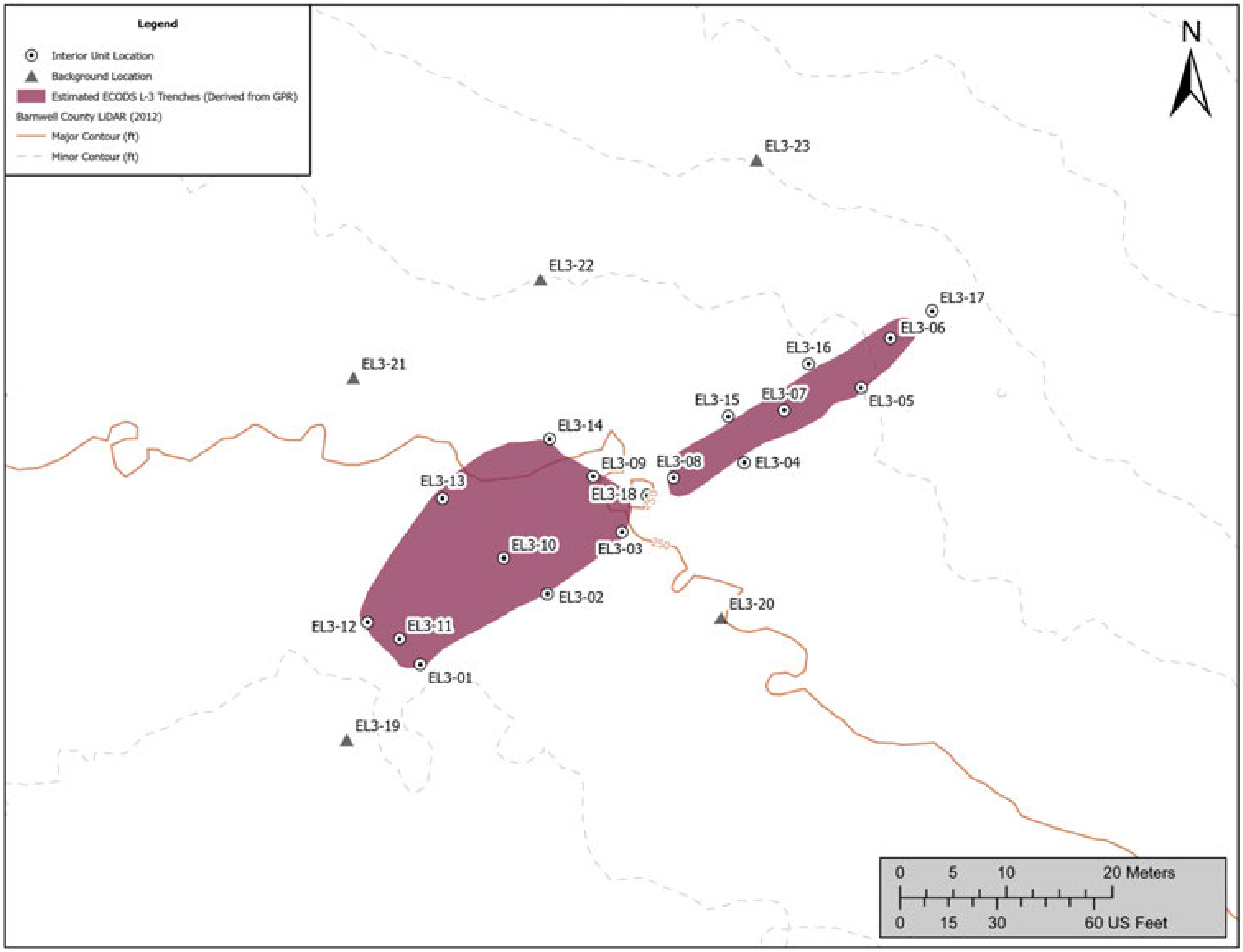

Figure B-3 ECODS L-3 Subunit Extent and Sampling Locations

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Figure B-4. Rubble on Surface of LRP 131-1L Subunit (Photo #17471-28 and Photo #17471-29)

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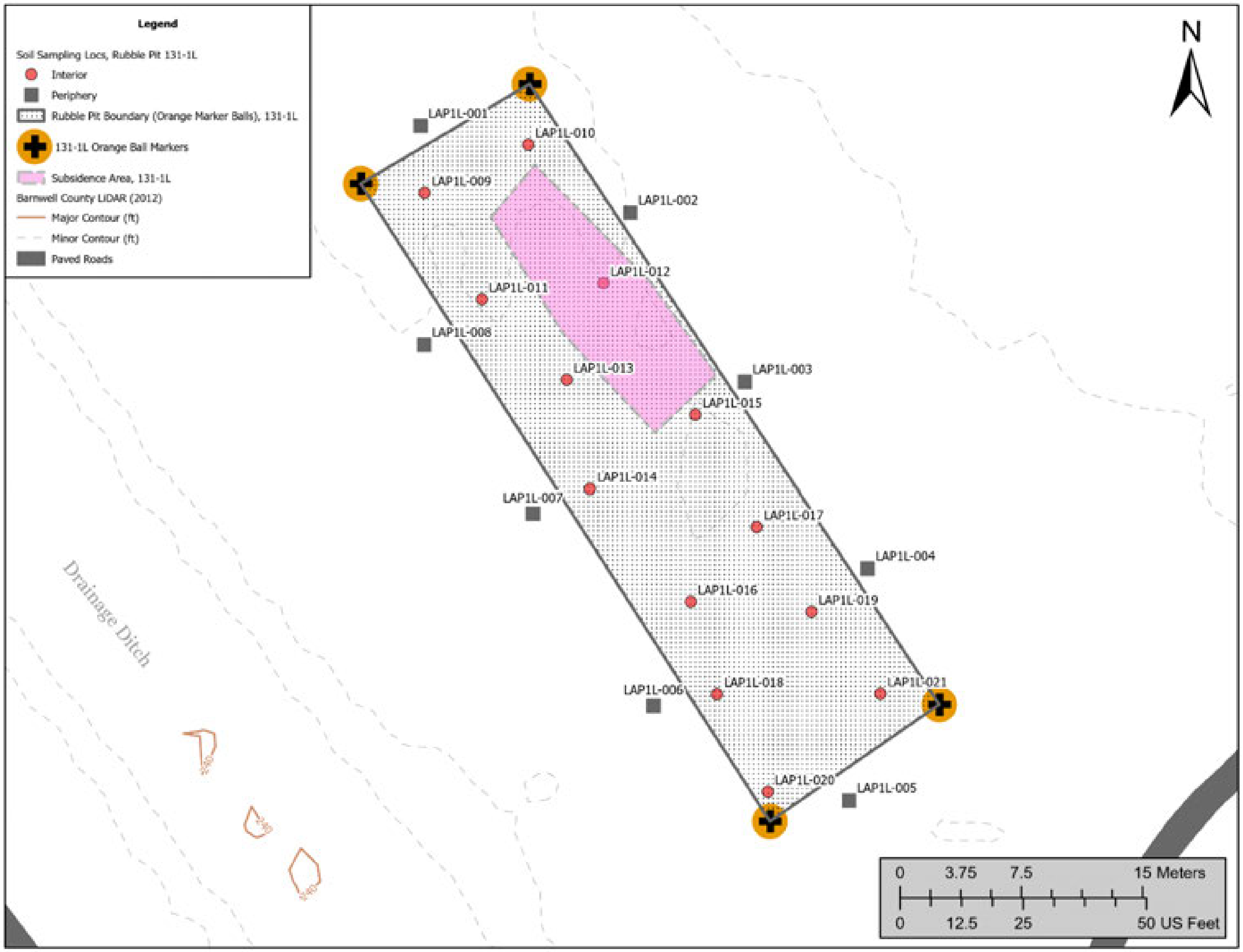

Figure B-5. LRP 131-1L Subunit Extent and Sampling Locations

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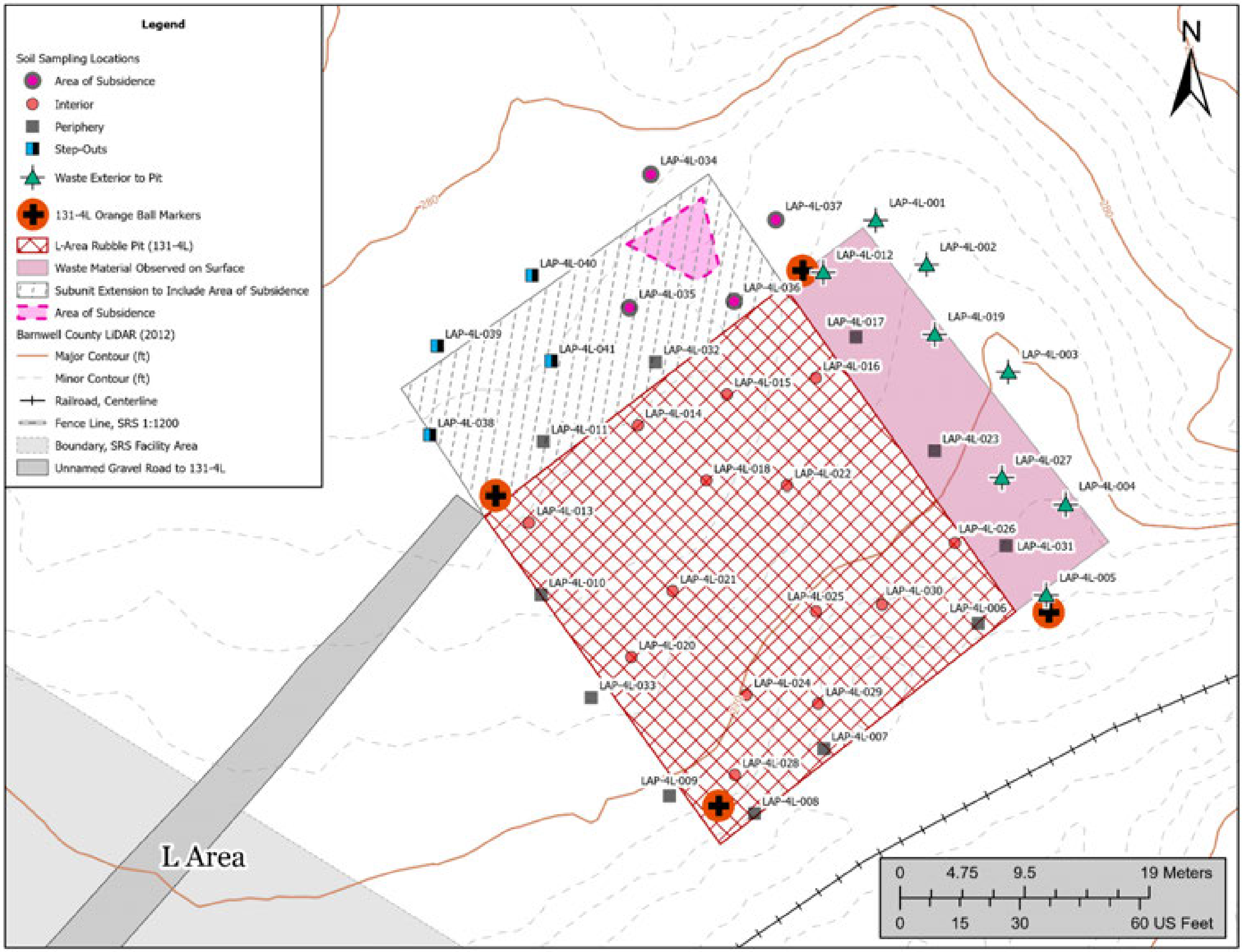

Figure B-6 L-Area Rubble Pit 131-4L RFI/RI Work Plan Sampling Locations

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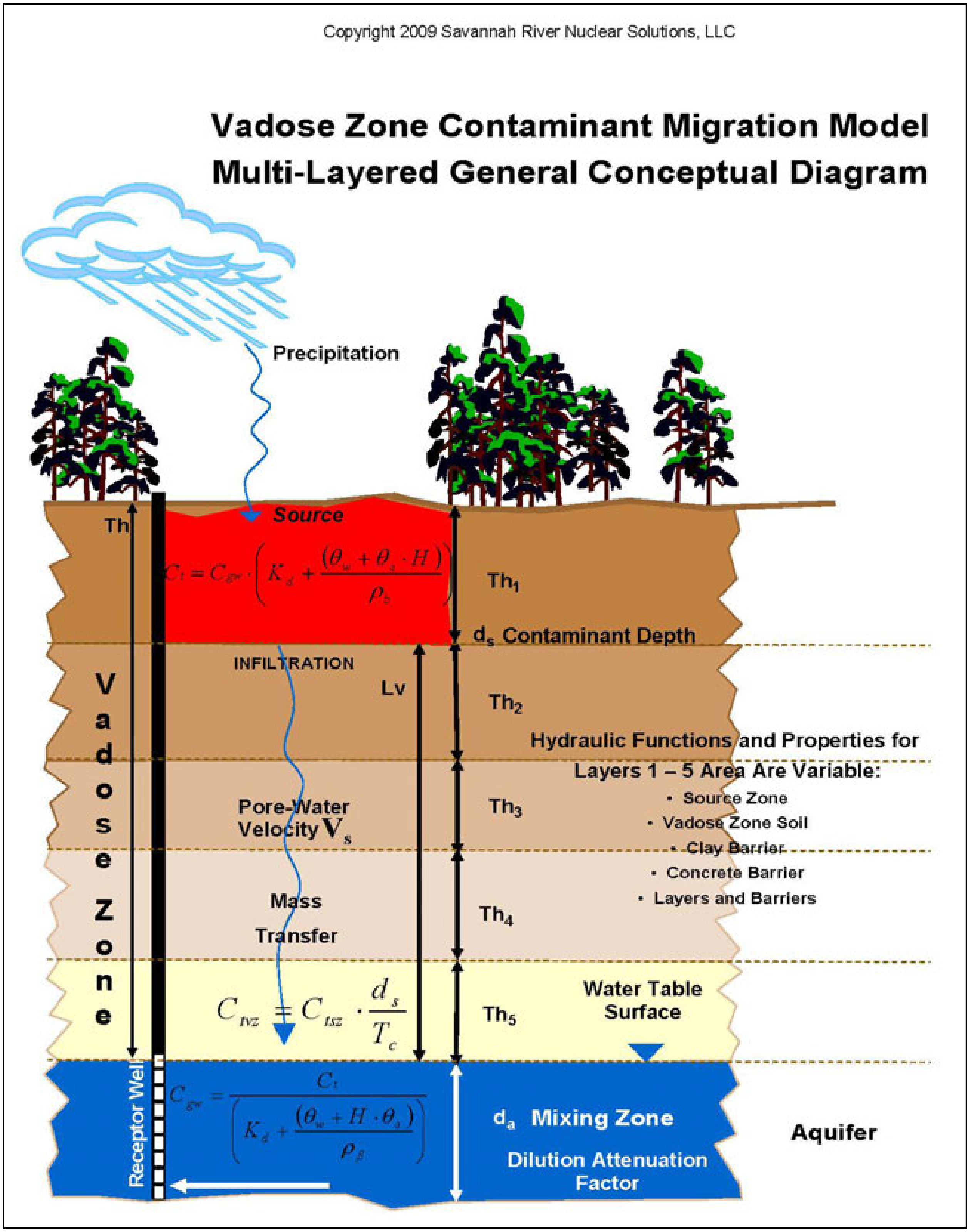

Figure B-7. VZCOMML© Contamination Migration Conceptual Diagram

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Table B-1. Chemical Parameters Used for Screening

Analyte	K_{OC} *[L/kg]*	K_d *[L/kg]*	$T_{1/2}$ *[yr]*	H' *[-]*	S *[mg/L]*	Action Level[A] *[µg/L or pCi/L]*
Volatile Organic Analytes						
1,1-Dichloroethylene	6.50E+01	1.30E-01	5.00E-01	1.07E+00	2.25E+03	7.00E+00
2-Hexanone (Methyl butyl ketone)	1.94E+01	3.88E-02	3.80E-02	1.54E-03	3.50E+04	3.40E+01
Acetone	2.20E+00	4.40E-03	1.90E-02	1.59E-03	1.00E+06	1.80E+04
Benzene	6.17E+01	1.23E-01	4.40E-02	2.28E-01	1.75E+03	5.00E+00
Carbon disulfide	5.40E+01	1.08E-01	9.34E-03	1.24E+00	1.19E+03	8.10E+02
Cyclohexane	4.82E+02	9.64E-01	5.00E-01	8.00E+00	5.50E+01	1.30E+04
Dichloromethane (Methylene chloride)	1.00E+01	2.00E-02	3.07E-01	8.98E-02	1.30E+04	5.00E+00
Isopropylbenzene (Cumene)	4.54E+02	9.08E-01	2.19E-02	4.92E+01	6.10E+01	3.90E+02
Methyl Acetate	2.20E+00	4.40E-03	1.00E+99	8.40E-04	2.50E+05	2.00E+04
Methyl ethyl ketone (2-Butanone)	4.51E+00	9.02E-03	1.90E-02	2.10E-03	2.68E+05	5.60E+03
Methyl tert-butyl ether (MBET)	1.23E+01	2.46E-02	5.00E-01	2.42E-02	5.10E+04	1.40E+01
Methylcyclohexane	6.07E+03	1.21E+01	6.28E-02	1.76E+03	1.40E+01	NA
m-Xylene	1.96E+02	3.92E-01	7.69E-02	3.01E-01	1.61E+02	1.90E+02
o-Xylene	2.41E+02	4.82E-01	7.69E-02	2.13E-01	1.78E+02	1.90E+02
p-Xylene	3.11E+02	6.22E-01	7.69E-02	3.14E-01	1.85E+02	1.90E+02
Styrene	9.12E+02	1.82E+00	7.70E-02	1.13E-01	3.10E+02	1.00E+02
Tetrachloroethylene	1.55E+02	3.10E-01	1.00E+01	7.54E-01	2.00E+02	5.00E+00
Toluene	1.40E+02	2.80E-01	6.00E-02	2.72E-01	5.26E+02	1.00E+03
Xylenes	2.38E+02	4.76E-01	7.70E-02	2.13E-01	1.61E+02	1.00E+04
Semivolatile Analytes						
1,1',-Biphenyl	6.25E+03	1.25E+01	1.92E-02	1.26E-01	6.94E+00	8.30E-01
2,4,6-Trichlorophenol	1.04E+03	2.08E+00	1.92E-01	3.19E-04	8.00E+02	4.10E+00
2-Methylnaphthalene	7.94E+03	1.59E+01	1.32E-01	1.36E-02	2.54E+01	3.60E+01
2-Nitrophenol	2.70E+01	5.40E-02	7.70E-02	7.13E-02	2.10E+03	NA
4-Nitrophenol	5.00E+01	1.00E-01	3.00E-03	1.03E-03	1.60E+04	NA
Acenaphthene	4.90E+03	9.80E+00	2.79E-01	6.36E-03	4.24E+00	5.30E+02
Anthracene	2.35E+04	4.70E+01	1.26E+00	2.67E-03	4.34E-02	1.80E+03

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Table B-1. Chemical Parameters Used for Screening *(continued)*

Analyte	K_{OC} *[L/kg]*	K_d *[L/kg]*	$T_{1/2}$ *[yr]*	H' *[-]*	S *[mg/L]*	Action Level[A] *[µg/L or pCi/L]*
Semivolatile Analyte (continued)s						
Benzaldehyde	1.78E+01	3.56E-02	5.48E-02	1.07E-03	3.00E+03	1.90E+01
Benzo(a)anthracene	3.58E+05	7.16E+02	1.86E+00	1.37E-04	9.40E-03	3.00E-02
Benzo(a)pyrene	9.69E+05	1.94E+03	1.45E+00	4.63E-05	1.62E-03	2.00E-01
Benzo(b)fluoranthene	1.23E+06	2.46E+03	1.67E+00	4.55E-03	1.50E-03	2.50E-01
Benzo(g,h,i)perylene	1.60E+06	3.20E+03	1.78E+00	5.13E-06	3.00E-04	NA
Benzo(k)fluoranthene	1.23E+06	2.46E+03	5.86E+00	3.40E-05	8.00E-04	2.50E+00
Bis(2-ethylhexyl) phthalate	1.11E+05	2.22E+02	6.30E-02	4.18E-06	3.40E-01	6.00E+00
Butylbenzyl phthalate	1.37E+04	2.74E+01	1.90E-02	5.17E-05	2.69E+00	3.50E+01
Carbazole	3.39E+03	6.78E+00	8.22E-02	6.26E-07	1.80E+00	NA
Chrysene	3.98E+05	7.96E+02	2.72E+00	3.88E-03	1.60E-03	2.50E+01
Dibenz(a,h)anthracene	1.79E+06	3.58E+03	2.58E+00	6.03E-07	2.49E-03	2.50E-02
Dibenzofuran	9.12E+03	1.82E+01	7.70E-02	3.05E-05	1.00E+01	7.90E+00
Diethyl phthalate	8.22E+01	1.64E-01	1.54E-01	1.85E-05	6.80E+02	2.90E+04
Di-n-butyl phthalate	1.57E+03	3.14E+00	6.30E-02	3.85E-08	1.12E+01	9.00E+02
Di-n-octyl phthalate	8.32E+07	1.66E+05	7.70E-02	2.74E-03	3.40E-01	NA
Fluoranthene	4.90E+04	9.80E+01	1.21E+00	6.60E-04	2.06E-01	8.00E+02
Fluorene	7.71E+03	1.54E+01	1.64E-01	2.61E-03	1.98E+00	2.90E+02
Hexachlorobutadiene	5.37E+04	1.07E+02	5.00E-01	3.34E-01	3.23E+00	8.60E-01
Indeno(1,2,3-c,d)pyrene	3.74E+06	7.48E+03	2.00E+00	6.56E-05	2.20E-05	2.50E-01
Naphthalene	1.19E+03	2.38E+00	1.32E-01	1.98E-02	3.10E+01	1.20E-01
N-Nitrosodiphenylamine	1.29E+03	2.58E+00	9.30E-02	2.05E-04	3.51E+01	1.40E+01
Phenanthrene	1.40E+04	2.80E+01	5.48E-01	1.60E-03	1.29E+00	NA
Pyrene	6.80E+04	1.36E+02	5.20E+00	4.51E-04	1.35E-01	1.20E+02
Pesticides/PCBs						
Aroclor 1254	3.09E+05	6.18E+02	3.42E+04	8.20E-03	4.10E-02	7.80E-03
Aroclor 1260	3.09E+05	6.18E+02	3.42E+04	1.03E-02	1.44E-02	7.80E-03

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Table B-1. Chemical Parameters Used for Screening *(continued)*

Analyte	K_{OC} *[L/kg]*	K_d *[L/kg]*	$T_{1/2}$ *[yr]*	H' *[-]*	S *[mg/L]*	Action Level[A] *[µg/L or pCi/L]*
Pesticides/PCBs (continued)						
Endosulfan II	2.22E+03	4.44E+00	2.22E+03	7.83E-04	2.80E-01	1.00E+02
gamma-Chlordane	5.13E+04	1.03E+02	3.80E+00	3.22E-04	5.60E-02	NA
Methoxychlor	8.00E+04	1.60E+02	1.00E+00	6.48E-04	4.50E-02	4.00E+01
p,p'-DDE	8.64E+04	1.73E+02	1.56E+01	8.61E-04	1.20E-01	4.60E-02
p,p'-DDT	6.78E+05	1.36E+03	1.56E+01	3.32E-04	2.50E-02	2.30E-01
Metal Analytes						
Aluminum	NA	1.00E+03	Infinite	NA	NA	2.00E+04
Antimony (metallic)	NA	3.00E+03	Infinite	NA	NA	6.00E+00
Arsenic, Inorganic	NA	1.50E+02	Infinite	NA	NA	1.00E+01
Barium	NA	1.90E+01	Infinite	NA	NA	2.00E+03
Beryllium and compounds	NA	7.90E+02	Infinite	NA	NA	4.00E+00
Cadmium	NA	2.50E+01	Infinite	NA	NA	5.00E+00
Calcium	NA	1.25E+01	Infinite	NA	NA	NA
Chromium, Total	NA	7.00E+02	Infinite	NA	NA	1.00E+02
Cobalt	NA	7.00E+01	Infinite	NA	NA	6.00E+00
Copper, Total	NA	6.00E+01	Infinite	NA	NA	1.30E+03
Cyanide (CN-)	NA	9.90E+00	Infinite	NA	NA	2.00E+02
Iron	NA	3.00E+02	Infinite	NA	NA	1.40E+04
Lead and compounds	NA	3.50E+03	Infinite	NA	NA	1.50E+01
Magnesium	NA	No Kd available	Infinite	NA	NA	NA
Manganese	NA	1.10E+02	Infinite	NA	NA	4.30E+02
Mercury (elemental)	NA	9.00E+02	Infinite	NA	NA	2.00E+00
Nickel Soluble Salts	NA	1.85E+01	Infinite	NA	NA	3.90E+02
Potassium	NA	1.75E+01	Infinite	NA	NA	NA
Selenium	NA	1.00E+03	Infinite	NA	NA	5.00E+01
Silver	NA	2.00E+01	Infinite	NA	NA	9.40E+01

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Table B-1. Chemical Parameters Used for Screening *(continued/end)*

Analyte	K_{OC} *[L/kg]*	K_d *[L/kg]*	$T_{1/2}$ *[yr]*	H' *[-]*	S *[mg/L]*	Action Level[A] *[µg/L or pCi/L]*
Metal Analytes (continued)						
Sodium, total recoverable	NA	1.75E+01	Infinite	NA	NA	NA
Thallium Soluble Salts	NA	5.00E+01	Infinite	NA	NA	2.00E+00
Vanadium, total recoverable	NA	1.00E+03	Infinite	NA	NA	8.60E+01
Zinc (metallic)	NA	2.50E+01	Infinite	NA	NA	6.00E+03
Radiological Analytes						
Actinium-228	NA	4.50E+02	7.00E-04	NA	NA	2.66E+01
Americium-243	NA	1.00E+02	7.38E+03	NA	NA	1.50E+01
Cesium-137	NA	5.00E+02	3.02E+01	NA	NA	2.00E+02
Curium-245/246	NA	3.10E+03	8.50E+03	NA	NA	1.50E+01
Lead-212	NA	2.70E+02	1.20E-03	NA	NA	2.12E+00
Plutonium-238	NA	1.00E+02	8.78E+01	NA	NA	1.50E+01
Plutonium-239/240	NA	1.00E+02	2.41E+04	NA	NA	1.50E+01
Potassium-40	NA	7.50E+01	1.28E+09	NA	NA	2.14E+00
Promethium-147	NA	2.40E+02	2.62E+00	NA	NA	6.00E+02
Radium-226	NA	1.00E+02	1.60E+03	NA	NA	5.00E+00
Radium-228	NA	1.00E+02	5.75E+00	NA	NA	5.00E+00
Strontium-90	NA	3.00E+00	2.86E+01	NA	NA	8.00E+00
Thorium-228	NA	1.00E+02	1.91E+00	NA	NA	1.50E+01
Thorium-230	NA	1.00E+02	7.70E+04	NA	NA	1.50E+01
Thorium-232	NA	1.00E+02	1.41E+10	NA	NA	1.50E+01
Uranium-233/234	NA	4.00E+01	2.45E+05	NA	NA	1.00E+01
Uranium-235	NA	4.00E+01	7.04E+08	NA	NA	5.00E-01
Uranium-238	NA	4.00E+01	4.47E+09	NA	NA	1.00E+01

A Action Level – The USEPA Regional Screening Level (RSL) was used when a MCL was not available.
NA = Not Available; Red = MCL; Black = RSL Table on www.epa.gov website (November 2023 revision; accessed December 2023)

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Table B-2. Vadose Zone Layers for the ECODS L-3, LRP 131-1L, and LRP 131-4L OU Subunits

Subsurface Layer	Layer Type	Texture Classification[A]	Layer Thickness
ECODS L-3 Subunit			
1	Source	Sandy Loam	3.4 m (11 ft)
2	Soil	Sandy Loam	2.7 m (9 ft)
3	Soil	Sandy Clay Loam	1.5 m (5 ft)
LRP 131-1L Subunit			
1	Source	Sandy Loam	3.7 m (12 ft)
2	Soil	Clay	0.91 m (3 ft)
LRP 131-4L Subunit			
1	Source	Loam	5.3 m (17.5 ft)
2	Soil	Clay	2.0 m (6.5 ft)
3	Soil	Sandy Loam	0.3 m (1.0 ft)

A Texture classifications based on United States Department of Agriculture soil triangle and texture classifications.

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Table B-3. Physical Parameters Used for Screening

Parameter	Symbol	Value	Units	Reference
Infiltration rate	I	0.60	ft/yr	Infiltration rate for site specific soil type, calculated in VZCOMML© based on Horton's Method
Aquifer saturated horizontal hydraulic conductivity	K_a	66	ft/yr	Hydraulic conductivity for a clay loam
Exposure duration	*ED*	70	yr	USEPA 2000
Evaluation time	T_e	1,000	yr	WSRC 1998
Dry bulk density	ρ_b	1.7	kg/L	Rucker 2011
Fraction organic carbon	f_{oc}	0.002	Decimal fraction	Rucker 2011

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Table B-4. Subunit-Specific Model Parameters

Subunit	Depth of Contamination [A]	Surface Depth to Water [B]	Depth from Source to Water Table [C]	Source Length [D]	Horizontal Hydraulic Gradient [B]	Dilution Attenuation Factor [E]	Total Porosity [E]	Aquifer Thickness
	[ft bgs]	*[ft bgs]*	*[ft]*	*[ft]*	*[ft/ft]*	*[-]*	*[-]*	*[ft]*
ECODS L-3	11	25	14	80	0.014	1.88	0.41	75
LRP 131-1L	12	15	3	150	0.014	1.70	0.40	70
LRP 131-4L	17.5	25	7.5	190	0.005	1.17	0.42	60

ft – feet/foot

bgs – below ground surface

[A] Depth of contamination based on the deepest detection from 2002 (ECODS L-3 subunit) and 2022 (LRP 131-1L and 131-4L subunits) soil sampling

[B] Determined conservatively based on potentiometric surface generated using 2003 synchronous water level data (most recent) or from nearby monitoring well clusters if available.

[C] Calculated from depth to water and depth of contamination measurements

[D] Estimated conservatively based on aerial extent of contamination and length parallel to 2003 regional groundwater flow direction

[E] Calculated within VZCOMML©

Table B-5. Tier I Screening Results for the ECODS L-3 Subunit

Analyte	Source Zone Concentration	Tier I Source-Specific SSL	Tier I Mass Limit SSL	Failing Analytes
	[mg/kg]			
1,1',-Biphenyl	6.29E-01	1.98E-02	3.51E-03	1,1',-Biphenyl
1,1-Dichloroethylene	2.88E-03	4.95E-03	2.96E-02	
2-Methylnaphthalene	2.00E+00	1.09E+00	1.52E-01	2-Methylnaphthalene
Acenaphthene	9.27E+00	9.93E+00	2.24E+00	
Acetone	2.86E-02	5.11E+00	7.62E+01	
Aluminum	2.19E+04	3.77E+04	8.47E+01	
Anthracene	1.76E+01	1.60E+02	7.62E+00	
Antimony (metallic)	5.66E+01	3.39E+01	2.54E-02	Antimony (metallic)
Aroclor 1254	5.63E+00	9.09E-03	3.30E-05	Aroclor 1254
Aroclor 1260	2.17E+00	9.09E-03	3.30E-05	Aroclor 1260
Arsenic, Inorganic	1.31E+01	2.83E+00	4.23E-02	Arsenic, Inorganic
Barium	2.85E+02	7.22E+01	8.47E+00	Barium
Benzaldehyde	2.22E-01	6.51E-03	8.04E-02	Benzaldehyde
Benzene	2.60E-03	2.74E-03	2.12E-02	
Benzo(a)anthracene	2.59E+01	4.05E-02	1.27E-04	Benzo(a)anthracene
Benzo(a)pyrene	2.06E+01	7.30E-01	8.47E-04	Benzo(a)pyrene
Benzo(b)fluoranthene	2.69E+01	1.16E+00	1.06E-03	Benzo(b)fluoranthene
Benzo(g,h,i)perylene	9.67E+00	NA	NA	NA
Benzo(k)fluoranthene	9.72E+00	1.16E+01	1.06E-02	
Bis(2-ethylhexyl) phthalate	3.71E+01	2.51E+00	2.54E-02	Bis(2-ethylhexyl) phthalate
Cadmium	1.19E+01	2.37E-01	2.12E-02	Cadmium
Calcium	5.28E+04	NA	NA	NA
Carbazole	1.38E+01	NA	NA	NA

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Table B-5. Tier I Screening Results for the ECODS L-3 Subunit *(continued)*

Analyte	Source Zone Concentration	Tier I Source-Specific SSL	Tier I Mass Limit SSL	Failing Analytes
	[mg/kg]			
Carbon disulfide	9.51E-04	5.63E-01	3.43E+00	
Chromium, Total	8.01E+01	1.32E+02	4.23E-01	
Chrysene	2.14E+01	3.75E+01	1.06E-01	
Cobalt	4.67E+00	7.93E-01	2.54E-02	Cobalt
Copper, Total	8.37E+03	1.47E+02	5.50E+00	Copper, Total
Cyanide (CN-)	1.22E+00	3.79E+00	8.47E-01	
Dibenz(a,h)anthracene	2.70E+00	1.69E-01	1.06E-04	Dibenz(a,h)anthracene
Dibenzofuran	5.10E+00	2.74E-01	3.34E-02	Dibenzofuran
Dichloromethane (Methylene chloride)	6.96E-04	1.64E-03	2.12E-02	
Di-n-butyl phthalate	8.11E-02	5.57E+00	3.81E+00	
Fluoranthene	3.50E+01	1.48E+02	3.39E+00	
Fluorene	1.05E+01	8.51E+00	1.23E+00	Fluorene
Indeno(1,2,3-c,d)pyrene	8.91E+00	3.52E+00	1.06E-03	Indeno(1,2,3-c,d)pyrene
Iron	3.17E+04	7.92E+03	5.93E+01	Iron
Lead and compounds	1.30E+03	9.89E+01	6.35E-02	Lead and compounds
Magnesium	2.52E+03	NA	NA	NA
Manganese	4.47E+02	8.93E+01	1.82E+00	Manganese
Mercury (elemental)	3.79E+00	3.39E+00	8.47E-03	Mercury (elemental)
Methyl ethyl ketone (2-Butanone)	1.57E-03	1.64E+00	2.37E+01	
Methyl tert-butyly ether (MTBE)	4.30E-04	4.56E-03	5.93E-02	
m-Xylene	7.12E-04	2.03E-01	8.04E-01	
Naphthalene	5.66E+00	5.72E-04	5.08E-04	Naphthalene

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Table B-5. Tier I Screening Results for the ECODS L-3 Subunit *(continued/end)*

Analyte	Source Zone Concentration	Tier I Source-Specific SSL	Tier I Mass Limit SSL	Failing Analytes
	[mg/kg]			
Nickel Soluble Salts	4.24E+01	1.37E+01	1.65E+00	Nickel Soluble Salts
o-Xylene	7.12E-04	2.32E-01	8.04E-01	
p,p'-DDE	5.84E-04	1.50E-02	1.95E-04	
p,p'-DDT	1.07E-03	5.88E-01	9.73E-04	
Phenanthrene	3.39E+01	NA	NA	NA
Potassium	2.66E+02	NA	NA	NA
p-Xylene	7.12E-04	2.85E-01	8.04E-01	
Pyrene	3.40E+01	3.08E+01	5.08E-01	Pyrene
Selenium	1.70E+00	9.42E+01	2.12E-01	
Sodium, total recoverable	2.70E+02	NA	NA	NA
Styrene	3.68E-04	3.73E-01	4.23E-01	
Toluene	2.37E-03	8.51E-01	4.23E+00	
Vanadium, total recoverable	7.14E+01	1.62E+02	3.64E-01	
Xylenes	7.12E-04	1.21E+01	4.23E+01	
Zinc (metallic)	1.12E+03	2.84E+02	2.54E+01	Zinc (metallic)

NA = Not Available

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Table B-6. Tier II Simulation Results for the ECODS L-3 Subunit

Analyte	Retardation	Mean Travel Time	Predicted Concentration in Aquifer	Action Level	Failing Analytes	Tier II $SSL_{T1/2}$	Tier II $MLSSL_{T1/2}$
	[unitless]	*[years]*	*[µg/L]*			*[mg/kg]*	
Simulation 1 – Maximum Detection for Constituent Source Concentration							
1,1',-Biphenyl	1.05E+02	6.10E+02		8.30E-01		Infinite	Infinite
2-Methylnaphthalene	1.34E+02	7.74E+02		3.60E+01		Infinite	Infinite
Aroclor 1254	5.16E+03	2.99E+04	1.16E+00	7.80E-03		3.78E-02	3.31E-05
Aroclor 1260	5.16E+03	2.99E+04	4.47E-01	7.80E-03		3.78E-02	3.31E-05
Benzaldehyde	1.30E+00	7.52E+00		1.90E+01		Infinite	Infinite
Benzo(a)anthracene	5.98E+03	3.46E+04		3.00E-02		Infinite	Infinite
Benzo(a)pyrene	1.62E+04	9.37E+04		2.00E-01		Infinite	Infinite
Benzo(b)fluoranthene	2.05E+04	1.19E+05		2.50E-01		Infinite	Infinite
Bis(2-ethylhexyl) phthalate	1.85E+03	1.07E+04		6.00E+00		Infinite	Infinite
Dibenz(a,h)anthracene	2.99E+04	1.73E+05		2.50E-02		Infinite	1.55E+04
Dibenzofuran	1.53E+02	8.88E+02		7.90E+00		Infinite	Infinite
Fluorene	1.30E+02	7.51E+02		2.90E+02		Infinite	Infinite
Indeno(1,2,3-c,d)pyrene	6.24E+04	3.62E+05		2.50E-01		Infinite	Infinite
Naphthalene	2.09E+01	1.21E+02		1.20E-01		Infinite	Infinite
Pyrene	1.14E+03	6.58E+03		1.20E+02		Infinite	5.72E+03
Antimony (metallic)	2.50E+04	1.45E+05	4.40E+00	6.00E+00		7.71E+01	NA
Arsenic, Inorganic	1.25E+03	7.26E+03	2.04E+01	1.00E+01		6.43E+00	NA
Barium	1.60E+02	9.25E+02	3.48E+03	2.00E+03	Barium	1.64E+02	NA
Cadmium	2.10E+02	1.21E+03	1.10E+02	5.00E+00		5.38E-01	NA
Cobalt	5.85E+02	3.39E+03	1.55E+01	6.00E+00		1.80E+00	NA
Copper, Total	5.02E+02	2.91E+03	3.25E+04	1.30E+03		3.35E+02	NA

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Table B-6. Tier II Simulation Results for the ECODS L-3 Subunit *(continued/end)*

Analyte	Retardation	Mean Travel Time	Predicted Concentration in Aquifer	Action Level	Failing Analytes	Tier II $SSL_{T1/2}$	Tier II $MLSSL_{T1/2}$
	[unitless]	*[years]*	*[µg/L]*			*[mg/kg]*	
Iron	2.50E+03	1.45E+04	2.47E+04	1.40E+04		1.80E+04	NA
Lead and compounds	2.92E+04	1.69E+05	8.67E+01	1.50E+01		2.25E+02	NA
Manganese	9.19E+02	5.33E+03	9.48E+02	4.30E+02		2.03E+02	NA
Mercury (elemental)	7.51E+03	4.35E+04	9.83E-01	2.00E+00		7.71E+00	NA
Nickel Soluble Salts	1.55E+02	9.00E+02	5.31E+02	3.90E+02	Nickel Soluble Salts	3.11E+01	NA
Zinc (metallic)	2.10E+02	1.21E+03	1.04E+04	6.00E+03		6.46E+02	NA
Simulation 2 – 95% UCL for Constituent Source Concentration							
Barium	1.60E+02	9.25E+02	5.50E+02	2.00E+03		1.64E+02	NA
Nickel Soluble Salts	1.55E+02	9.00E+02	9.88E+01	3.90E+02		3.11E+01	NA

NA = Not Available

Table B-7. Tier I Screening Results for the LRP 131-1L Subunit

Analyte	Source Zone Concentration	Tier I Source-Specific SSL	Tier I Mass Limit SSL	Failing Analytes
	(mg/kg)			
2-Hexanone (Methyl butyl ketone)	3.98E-03	1.10E-02	1.19E-01	
Acenaphthene	2.40E+00	8.98E+00	1.86E+00	
Acetone	3.97E-01	4.78E+00	6.31E+01	
Aluminum	4.00E+04	3.41E+04	7.01E+01	Aluminum
Antimony (metallic)	3.20E-01	3.07E+01	2.10E-02	
Arsenic, Inorganic	6.50E+00	2.56E+00	3.51E-02	Arsenic, Inorganic
Barium	5.80E+01	6.52E+01	7.01E+00	
Benzo(a)anthracene	6.10E+00	3.66E-02	1.05E-04	Benzo(a)anthracene
Benzo(a)pyrene	2.30E+00	6.60E-01	7.01E-04	Benzo(a)pyrene
Benzo(b)fluoranthene	4.90E+00	1.05E+00	8.76E-04	Benzo(b)fluoranthene
Benzo(g,h,i)perylene	8.60E-01	NA	NA	NA
Benzo(k)fluoranthene	2.20E+00	1.05E+01	8.76E-03	
Beryllium and compounds	5.50E-01	5.38E+00	1.40E-02	
Bis(2-ethylhexyl) phthalate	2.10E-01	2.27E+00	2.10E-02	
Butylbenzyl phthalate	6.90E-02	1.64E+00	1.23E-01	
Cadmium	1.30E-01	2.14E-01	1.75E-02	
Calcium	1.20E+03	NA	NA	NA
Carbazole	1.30E+00	NA	NA	NA
Chromium, Total	3.00E+01	1.19E+02	3.51E-01	
Chrysene	6.70E+00	3.39E+01	8.76E-02	
Cobalt	2.10E+00	7.17E-01	2.10E-02	Cobalt
Copper, Total	3.10E+01	1.33E+02	4.56E+00	
Cyanide (CN-)	1.40E+00	3.42E+00	7.01E-01	
Dibenz(a,h)anthracene	1.60E+00	1.52E-01	8.76E-05	Dibenz(a,h)anthracene
Dibenzofuran	2.40E+00	2.47E-01	2.77E-02	Dibenzofuran
Di-n-butyl phthalate	3.60E-02	5.04E+00	3.16E+00	
Di-n-octyl phthalate	1.10E-01	NA	NA	NA
Fluoranthene	3.00E+01	1.34E+02	2.80E+00	
Fluorene	2.20E+00	7.69E+00	1.02E+00	

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Table B-7. Tier I Screening Results for the LRP 131-1L Subunit *(continued/end)*

Analyte	Source Zone Concentration	Tier I Source-Specific SSL	Tier I Mass Limit SSL	Failing Analytes
	(mg/kg)			
Hexachlorobutadiene	2.90E-01	1.58E-01	3.02E-03	Hexachlorobutadiene
Indeno(1,2,3-c,d)pyrene	3.00E+00	3.18E+00	8.76E-04	
Iron	2.50E+04	7.16E+03	4.91E+01	Iron
Isopropylbenzene (Cumene)	1.88E-03	3.52E+00	1.37E+00	
Lead and compounds	1.30E+01	8.94E+01	5.26E-02	
Magnesium	4.60E+02	NA	NA	NA
Manganese	1.80E+02	8.07E+01	1.51E+00	Manganese
Mercury (elemental)	1.10E-01	3.07E+00	7.01E-03	
Methyl Acetate	5.21E-03	5.31E+00	7.01E+01	
Methyl ethyl ketone (2-Butanone)	4.39E-02	1.53E+00	1.96E+01	
Nickel Soluble Salts	9.60E+00	1.24E+01	1.37E+00	
N-Nitrosodiphenylamine	2.20E-02	6.51E-02	4.91E-02	
p,p'-DDE	3.60E-03	1.35E-02	1.61E-04	
Phenanthrene	2.40E+01	NA	NA	NA
Potassium	4.00E+02	NA	NA	NA
Pyrene	1.70E+01	2.78E+01	4.21E-01	
Selenium	5.80E-01	8.52E+01	1.75E-01	
Silver	2.30E-02	3.23E+00	3.30E-01	
Sodium, total recoverable	2.90E+01	NA	NA	NA
Styrene	1.85E-03	3.38E-01	3.51E-01	
Thallium Soluble Salts	1.60E-01	1.71E-01	7.01E-03	
Toluene	1.05E-03	7.75E-01	3.51E+00	
Vanadium, total recoverable	6.90E+01	1.46E+02	3.02E-01	
Zinc (metallic)	3.60E+01	2.57E+02	2.10E+01	

NA = Not Available

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Table B-8. Tier II Simulation Results for the LRP 131-1L Subunit

Analyte	Retardation	Mean Travel Time	Predicted Concentration in Aquifer	Action Level	Failing Analytes	Tier II $SSL_{T1/2}$	Tier II $MLSSL_{T1/2}$
	(unitless)	*(years)*	*(µg/L)*			*(mg/kg)*	
Simulation 1 – Maximum Detection for Constituent Source Concentration							
Aluminum	7.88E+03	1.02E+04	1.88E+04	2.00E+04		4.26E+04	NA
Arsenic, Inorganic	1.18E+03	1.52E+03	2.03E+01	1.00E+01		3.20E+00	NA
Benzo(a)anthracene	5.64E+03	7.27E+03		3.00E-02		Infinite	Infinite
Benzo(a)pyrene	1.53E+04	1.97E+04		2.00E-01		Infinite	Infinite
Benzo(b)fluoranthene	1.94E+04	2.50E+04		2.50E-01		Infinite	Infinite
Cobalt	5.53E+02	7.12E+02	1.41E+01	6.00E+00	Cobalt	8.96E-01	NA
Dibenz(a,h)anthracene	2.82E+04	3.63E+04		2.50E-02		Infinite	1.28E+04
Dibenzofuran	1.45E+02	1.86E+02		7.90E+00		Infinite	Infinite
Hexachlorobutadiene	8.47E+02	1.09E+03		8.60E-01		Infinite	Infinite
Iron	2.36E+03	3.05E+03	3.91E+04	1.40E+04		8.94E+03	NA
Manganese	8.68E+02	1.12E+03	7.68E+02	4.30E+02		1.01E+02	NA
Simulation 2 – 95% UCL for Constituent Source Concentration							
Cobalt	5.53E+02	7.12E+02	5.46E+00	6.00E+00		8.96E-01	NA

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Table B-9. Tier I Screening Results for the LRP 131-4L Subunit

Analyte	Source Zone Concentration	Tier I Source-Specific SSL	Tier I Mass Limit SSL	Failing Analytes
	(mg/kg or pCi/g)			
2,4,6-Trichlorophenol	3.00E-02	1.09E-02	6.79E-03	2,4,6-Trichlorophenol
2-Methylnaphthalene	1.40E-01	6.79E-01	5.97E-02	
2-Nitrophenol	3.00E-02	NA	NA	NA
Acenaphthene	1.40E-01	6.21E+00	8.78E-01	
Acetone	3.55E-01	3.90E+00	2.98E+01	
Aluminum	2.90E+04	2.35E+04	3.31E+01	Aluminum
Anthracene	3.20E-01	9.97E+01	2.98E+00	
Antimony (metallic)	1.20E+00	2.11E+01	9.94E-03	
Aroclor 1254	4.10E+00	5.66E-03	1.29E-05	Aroclor 1254
Arsenic, Inorganic	1.40E+01	1.76E+00	1.66E-02	Arsenic, Inorganic
Barium	1.60E+02	4.50E+01	3.31E+00	Barium
Benzaldehyde	6.40E-02	4.81E-03	3.15E-02	Benzaldehyde
Benzene	5.45E-04	1.87E-03	8.28E-03	
Benzo(a)anthracene	1.80E+00	2.52E-02	4.97E-05	Benzo(a)anthracene
Benzo(a)pyrene	1.20E+00	4.55E-01	3.31E-04	Benzo(a)pyrene
Benzo(b)fluoranthene	2.50E+00	7.22E-01	4.14E-04	Benzo(b)fluoranthene
Benzo(g,h,i)perylene	8.30E-01	NA	NA	NA
Benzo(k)fluoranthene	9.20E-01	7.22E+00	4.14E-03	
Beryllium and compounds	6.30E-01	3.71E+00	6.63E-03	
Bis(2-ethylhexyl) phthalate	1.70E-01	1.56E+00	9.94E-03	
Cadmium	1.50E+01	1.48E-01	8.28E-03	Cadmium
Calcium	3.50E+04	NA	NA	NA
Carbazole	1.90E-01	NA	NA	NA
Chromium, Total	5.50E+01	8.22E+01	1.66E-01	
Chrysene	2.20E+00	2.34E+01	4.14E-02	
Cobalt	3.50E+00	4.94E-01	9.94E-03	Cobalt
Copper, Total	4.80E+02	9.18E+01	2.15E+00	Copper, Total
Cyanide (CN-)	1.10E+01	2.37E+00	3.31E-01	Cyanide (CN-)

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Table B-9. Tier I Screening Results for the LRP 131-4L Subunit *(continued)*

Analyte	Source Zone Concentration	Tier I Source-Specific SSL	Tier I Mass Limit SSL	Failing Analytes
	(mg/kg or pCi/g)			
Cyclohexane	1.84E-03	2.53E+01	2.15E+01	
Dibenz(a,h)anthracene	2.30E-01	1.05E-01	4.14E-05	Dibenz(a,h)anthracene
Dibenzofuran	5.00E-02	1.71E-01	1.31E-02	
Dichloromethane (Methylene chloride)	2.17E-03	1.21E-03	8.28E-03	
Diethyl phthalate	4.40E-01	1.17E+01	4.81E+01	
Di-n-butyl phthalate	3.30E-01	3.51E+00	1.49E+00	
Di-n-octyl phthalate	1.50E-01	NA	NA	NA
Endosulfan II	1.50E-03	NA	NA	NA
Fluoranthene	2.60E+00	9.22E+01	1.33E+00	
Fluorene	6.20E-02	5.31E+00	4.81E-01	
gamma-Chlordane	3.10E-03	NA	NA	NA
Indeno(1,2,3-c,d)pyrene	8.90E-01	2.19E+00	4.14E-04	
Iron	5.80E+04	4.93E+03	2.32E+01	Iron
Isopropylbenzene (Cumene)	2.19E-03	1.96E+00	6.46E-01	
Lead and compounds	2.60E+02	6.16E+01	2.49E-02	Lead and compounds
Magnesium	1.40E+03	NA	NA	NA
Manganese	4.20E+02	5.56E+01	7.12E-01	Manganese
Mercury (elemental)	6.60E-01	2.11E+00	3.31E-03	
Methoxychlor	9.20E-03	7.52E+00	6.63E-02	
Methyl Acetate	4.25E-03	4.33E+00	3.31E+01	
Methyl ethyl ketone (2-Butanone)	2.40E-02	1.24E+00	9.28E+00	
Methylcyclohexane	3.35E-03	NA	NA	NA
m-Xylene	1.33E-03	1.32E-01	3.15E-01	
Naphthalene	3.80E-02	3.61E-04	1.99E-04	Naphthalene
Nickel Soluble Salts	8.10E+00	8.55E+00	6.46E-01	
N-Nitrosodipropylamine	4.50E-01	2.95E-06	1.82E-05	N-Nitrosodipropylamine

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Table B-9. Tier I Screening Results for the LRP 131-4L Subunit *(continued/end)*

Analyte	Source Zone Concentration	Tier I Source-Specific SSL	Tier I Mass Limit SSL	Failing Analytes
	(mg/kg or pCi/g)			
o-Xylene	9.02E-04	1.51E-01	3.15E-01	
p,p'-DDE	2.70E-03	9.34E-03	7.62E-05	
p,p'-DDT	1.50E-02	3.66E-01	3.81E-04	
Phenanthrene	1.10E+00	NA	NA	NA
Potassium	3.20E+02	NA	NA	NA
p-Xylene	1.33E-03	1.83E-01	3.15E-01	
Pyrene	2.30E+00	1.92E+01	1.99E-01	
Selenium	1.80E+00	5.87E+01	8.28E-02	
Silver	6.20E-02	2.23E+00	1.56E-01	
Sodium, total recoverable	2.30E+03	NA	NA	NA
Styrene	1.11E-03	2.36E-01	1.66E-01	
Tetrachloroethylene	2.40E-03	3.16E-03	8.28E-03	
Thallium Soluble Salts	1.80E-01	1.18E-01	3.31E-03	Thallium Soluble Salts
Toluene	1.98E-03	5.61E-01	1.66E+00	
Vanadium, total recoverable	3.10E+02	1.01E+02	1.42E-01	Vanadium, total recoverable
Xylenes	1.33E-03	7.86E+00	1.66E+01	
Zinc (metallic)	7.40E+01	1.77E+02	9.94E+00	

NA = Not Available

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Table B-10. Tier II Simulation Results for the LRP 131-4L Subunit

Analyte	Retardation	Mean Travel Time	Predicted Concentration in Aquifer	Action Level	Failing Analytes	Tier II $SSL_{T1/2}$	Tier II $MLSSL_{T1/2}$
	(unitless)	*(years)*	*(µg/L)*			*(mg/kg)*	
Simulation 1 – Maximum Detection for Constituent Source Concentration							
2,4,6-Trichlorophenol	1.51E+01	5.78E+01		4.10E+00		Infinite	Infinite
Aluminum	6.78E+03	2.59E+04	1.73E+04	2.00E+04		3.35E+04	NA
Aroclor 1254	4.19E+03	1.60E+04	2.86E+00	7.80E-03		1.12E-02	1.29E-05
Arsenic, Inorganic	1.02E+03	3.89E+03	5.56E+01	1.00E+01		2.52E+00	NA
Barium	1.30E+02	4.97E+02	4.98E+03	2.00E+03	Barium	6.43E+01	NA
Benzaldehyde	1.24E+00	4.75E+00		1.90E+01		Infinite	Infinite
Benzo(a)anthracene	4.85E+03	1.86E+04		3.00E-02		Infinite	Infinite
Benzo(a)pyrene	1.31E+04	5.03E+04		2.00E-01		Infinite	Infinite
Benzo(b)fluoranthene	1.67E+04	6.38E+04		2.50E-01		Infinite	Infinite
Cadmium	1.70E+02	6.52E+02	3.55E+02	5.00E+00	Cadmium	2.11E-01	NA
Cobalt	4.75E+02	1.82E+03	2.97E+01	6.00E+00		7.06E-01	NA
Copper, Total	4.08E+02	1.56E+03	4.76E+03	1.30E+03		1.31E+02	NA
Cyanide (CN-)	6.81E+01	2.61E+02	6.51E+02	2.00E+02	Cyanide (CN-)	3.38E+00	NA
Dibenz(a,h)anthracene	2.43E+04	9.29E+04		2.50E-02		Infinite	6.07E+03
Iron	2.03E+03	7.78E+03	1.15E+05	1.40E+04		7.05E+03	NA
Lead and compounds	2.37E+04	9.08E+04	4.43E+01	1.50E+01		8.80E+01	NA
Manganese	7.46E+02	2.86E+03	2.27E+03	4.30E+02		7.94E+01	NA
Naphthalene	1.71E+01	6.56E+01		1.20E-01		Infinite	Infinite
N-Nitrosodipropylamine	1.33E+00	5.07E+00	1.04E+00	1.10E-02	N-Nitrosodipropylamine	4.76E-03	2.06E-02
Thallium Soluble Salts	3.40E+02	1.30E+03	2.14E+00	2.00E+00		1.68E-01	NA
Vanadium, total recoverable	6.78E+03	2.59E+04	1.85E+02	8.60E+01		1.44E+02	NA
Simulation 2 – 95% UCL for Constituent Source Concentration							
Barium	1.30E+02	4.97E+02	4.01E+02	2.00E+03		6.43E+01	NA
Cadmium	1.70E+02	6.52E+02	5.50E+00	5.00E+00	Cadmium	2.11E-01	NA
Cyanide (CN-)	6.81E+01	2.61E+02	1.77E+01	2.00E+02		3.38E+00	NA
N-Nitrosodipropylamine	1.33E+00	5.07E+00	1.04E+00	1.10E-02	N-Nitrosodipropylamine	4.76E-03	2.06E-02

NA = Not Available

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Table B-11. Summary Table of Tier I and Tier II Screening Results

OU Subunit	# of Tier I COPCs	Tier I COPCs	Tier II COCs	CM RCOCs
ECODS L-3	27	1,1',-biphenyl, 2-methylnaphthalene, antimony, arsenic, barium, benzaldehyde, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, bis(2-ethylhexyl) phthalate, cadmium, cobalt, copper, dibenz(a,h)anthracene, dibenzofuran, fluorene, indeno(1,2,3-c,d)pyrene, iron, lead, manganese, mercury, naphthalene, nickel, Aroclor 1254, Aroclor 1260, pyrene, zinc	None	None
LRP 131-1L	11	aluminum, arsenic, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, cobalt, dibenz(a,h)anthracene, dibenzofuran, hexachlorobutadiene, iron, manganese	None	None
LRP 131-4L	21	2,4,6-trichlorophenol, aluminum, arsenic, barium, benzaldehyde, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, cadmium, cobalt, copper, cyanide, dibenzo(a,h)anthracene, iron, lead, manganese, naphthalene, N-nitrosodipropylamine, Aroclor 1254, thallium, vanadium	cadmium, N-nitrosodipropylamine	None

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Attachment B-1. LSW 4C Lithology

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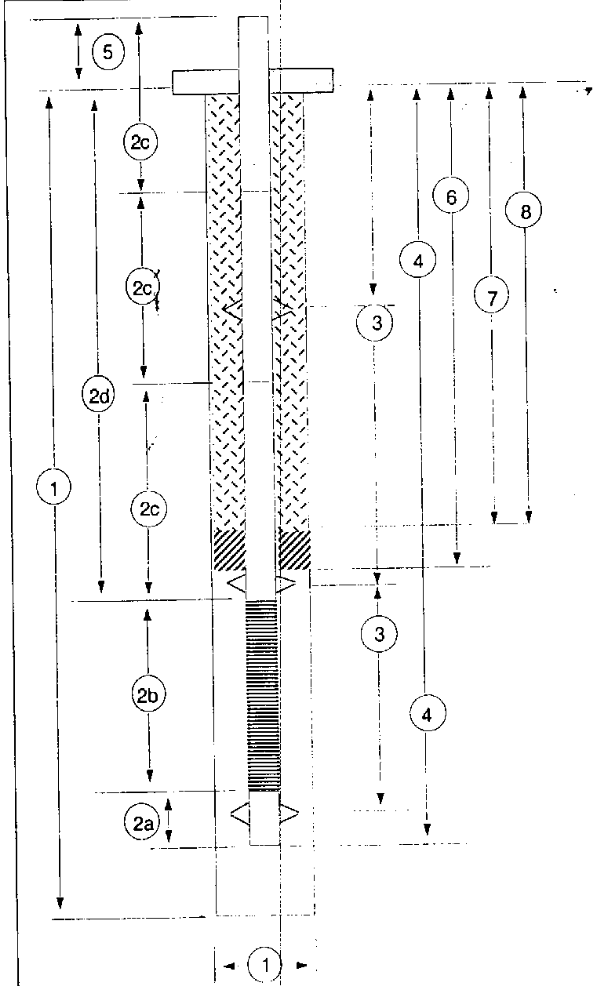
OSR 30-5# (Rev 4-6-99)

Monitoring Well Construction Diagram

Drilling Subcontractor	Driller Name	Tech O.S./Co. Name
Prosonic	Michael Coleman	Jim Furlow
Well Number	**Date of Well Installation**	**Water Level Reference Point Elevation**
LSW-04	9/19/01	250.93

SRS North Grid Coordinate	SRS East Grid Coordinate	Latitude (deg/min/sec)	Longitude (deg/min/sec)
46312.48	52272.36	33-12-48.54	81-37-8.94



Note—All measurements are from ground surface at start of boring (measurements to nearest 0.1 foot).

1. Total Drilled Depth/Hole Diameter 177.5'/6"
   a) Surface Casing (if installed) Depth/Diameter N/A
2. Casing/Screen Tally (Measured to Nearest 0.01 foot)
   a) Sump and Plug Length 5.26'
   b) Screen Length 5.66', 5.66'
   c) Casing Joint Lengths (Measured in Uphole Sequence from Top of Screen) 4.90', 10.05 (from top of lower screen); 10.01', 10.01', 10.00', 10.04', 10.04', 10.02', 10.00', 10.01', 10.01, 10.04', 10.04', 4.88
   d) Depth to Top of Screen 109.20, 129.81
3. Depths to Centralizers N/A
4. Total Depth of Installed Well 140.73
5. Casing Stick Up (Standard 2.5' A.G.S.) 2.3'
6. Depth to Top of Filter Pack 106.70', 128.20'
7. Depth to Top of Bentonite Seal 100.50', 116.50'
8. Length of Grout Column 100.50'

OSR 30-3

FIELD GEOLOGIC LOG

PROJECT: L-Area Southern Groundwater Characterization	REFERENCE DATUM:	DATE: 9/14/01	SHEET 1 OF 9
WELL NO.: LSW-04	SRP COORDINATES:	DRILLING CONTRACTOR: Prosonic	
LOGGED BY: Jim Furlow	COMPANY: SAIC	DRILLER: Michael Coleman	
		DRILLING METHOD: Rotosonic	

RUN NUMBER	DEPTH, FEET	LITHOLOGY	PERCENT RECOVERY	SAMPLE DESCRIPTION	DRILLING COMMENTS
1	0–7.5		100	0 – 7.5' Clayey Sand: greyish orange (10YR 7/4), fine to medium grained, subangular, some gravel to ½", soft to firm, low plasticity, damp.	
2	7.5–17.5		100	7.5' – 17.5' Clayey Sand: yellowish gray (5Y 8/1) to dark yellowish orange (10YR 6/6) to moderate reddish brown (10R 4/6), fine to coarse grained, mostly fine grained, subangular to subrounded, very clayey 7.5' – 10', low plasticity, faintly laminated, damp to dry.	
3	17.5–20		100		

OSR 30-3

FIELD GEOLOGIC LOG

PROJECT: L-Area Southern Groundwater Characterization	REFERENCE DATUM	DATE: 9/14/01	SHEET 2 OF 9
		DRILLING CONTRACTOR: Prosonic	
WELL NO.: LSW-04	SRP COORDINATES	DRILLER: Michael Coleman	
LOGGED BY: Jim Furlow	COMPANY: SAIC	DRILLING METHOD: Rotosonic	

RUN NUMBER	DEPTH, FEET	LITHOLOGY	PERCENT RECOVERY	SAMPLE DESCRIPTION	DRILLING COMMENTS
3	20–27		100	17.5'–27.5' Clayey Sand: white (N9) to moderate reddish brown (10R 4/6) to dark yellowish orange (10YR 6/6), fine to very fine grained, subangular, low plasticity, dry to damp.	
4	28–37		100	27.5'–37.5' Clayey Sand: moderate reddish brown (10R 4/6) to dark yellowish orange (10YR 6/6), fine grained, subangular, highly laminated, soft, low plasticity, damp.	
5	38–40		100	37.5'–40.0' Clayey Sand: as above	

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FIELD GEOLOGIC LOG

PROJECT: L-Area Southern Groundwater Characterization		DATE: 9/14/01	SHEET 3 OF 9
	REFERENCE DATUM:	DRILLING CONTRACTOR: Prosonic	
WELL NO.: LSW-04	SRP COORDINATES:	DRILLER: Michael Coleman	
LOGGED BY: Jim Furtow	COMPANY: SAIC	DRILLING METHOD: Rotosonic	

RUN NUMBER	DEPTH, FEET	LITHOLOGY	PERCENT RECOVERY	SAMPLE DESCRIPTION	DRILLING COMMENTS
5	40–47		100	40.0'-47.5' Silty Sand: moderate reddish brown (10R4/6) to white (N9) to dark yellowish orange (10YR 6/6), fine grained, subangular to subrounded, slightly clayey, soft, damp, highly laminated to mottled.	
6	48–57		100	47.5'-56.0' Clayey Sand to Sandy Clay: pale yellowish orange (10YR 8/6) to pale red purple (5RP 6/2) to grayish orange pink (5YR 7/2), very fine to fine grained, silty, soft, damp, highly laminated, moderate to high plasticity	
				56.0'-57.5' Sandy Clay: light brownish gray (5YR 6/1) to moderate orange pink (10R 7/4), fine grained, soft to firm, highly laminated, high plasticity.	
7	58–60		100		

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FIELD GEOLOGIC LOG

PROJECT: L-Area Southern Groundwater Characterization	REFERENCE DATUM:	DATE: 9/14/01	SHEET 4 OF 9
		DRILLING CONTRACTOR: Prosonic	
WELL NO.: LSW-04	SRP COORDINATES:	DRILLER: Michael Coleman	
LOGGED BY: Jim Furlow	COMPANY: SAIC	DRILLING METHOD: Rotosonic	

RUN NUMBER	DEPTH, FEET	LITHOLOGY	PERCENT RECOVERY	SAMPLE DESCRIPTION	DRILLING COMMENTS
7	60–67		100	57.5'–67.5' Clayey Sand: grayish pink (5R 8/2) to pale red (5R 6/2), very fine to coarse grained, mostly fine grained, subangular, becomes silty and less clayey 66'-67.5', soft, low plasticity, laminated, damp.	
8	68–77		100	67.5'–70.0' Clayey Sand: moderate orange pink (10R 7/4) to pale yellowish orange (10YR 8/6), very fine to medium grained, mostly very fine grained, subangular, silty, laminated, soft, damp to wet. 70.0'–77.5' Silty Sand: pale yellowish orange (10YR 8/6) to dark yellowish orange (10YR 6/6), fine grained, subangular, soft to loose, wet, becomes only slightly silty 75.0–77.5'.	
9	78–80		100		

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FIELD GEOLOGIC LOG

PROJECT: L-Area Southern Groundwater Characterization		DATE: 9/14/01	SHEET 5 OF 9
	REFERENCE DATUM:	DRILLING CONTRACTOR: Prosonic	
WELL NO.: LSW-04	SRP COORDINATES:	DRILLER: Michael Coleman	
LOGGED BY: Jim Furlow	COMPANY: SAIC	DRILLING METHOD: Rotosonic	

RUN NUMBER	DEPTH, FEET	LITHOLOGY	PERCENT RECOVERY	SAMPLE DESCRIPTION	DRILLING COMMENTS
9	80–87		100	77.5'–85.5' Sand: dark yellowish orange (10YR6/6), fine grained, subangular, slightly silty to silty, loose to soft, wet. 85.5'–87.5' Clayey Sand: dark yellowish orange (10YR 6/6), fine to medium grained, subangular to subrounded, silty, soft, laminated, wet.	
10	88–97		100	87.5'–97.5' Clayey Sand to Silty Sand: dark yellowish orange (10YR 6/6) to pale reddish brown (10R 5/4) to yellowish gray (5Y 8/1), fine to medium grained, subangular, laminated, soft to firm, wet.	
11	98–100		100		

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FIELD GEOLOGIC LOG

PROJECT: L-Area Southern Groundwater Characterization	REFERENCE DATUM:	DATE: 9/14/01	SHEET 6 OF 9
		DRILLING CONTRACTOR: Prosonic	
WELL NO.: LSW-04	SRP COORDINATES:	DRILLER: Michael Coleman	
LOGGED BY: Jim Furlow	COMPANY: SAIC	DRILLING METHOD: Rotosonic	

RUN NUMBER	DEPTH, FEET	LITHOLOGY	PERCENT RECOVERY	SAMPLE DESCRIPTION	DRILLING COMMENTS
11	100–107.5		100	97.5'-107.5' Silty Sand to Clayey Sand: very pale orange (10YR 8/2) to dark yellowish orange (10YR 6/6), fine to medium grained, subangular, soft to stiff, low plasticity, laminated, wet.	
12	107.5–117.5		100	107.5'-109.5' Alternating Clayey Sand and Clay: pale yellowish orange (10YR 8/6) to dark yellowish orange (10YR 6/6), fine grained, subangular, laminated, soft, low to high plasticity, wet to dry.	
				109.5'-114.0' Sand: dark yellowish orange (10YR 6/6), fine to medium grained, clean to slightly silty, subangular, loose, wet.	
				114.0'-115.5' Clayey Sand: dark yellowish orange (10YR 6/6) to grayish brown (5YR 3/2), fine to medium grained, soft, plastic, wet.	
				115.5'-117.5' Clay: dark yellowish orange (10YR 6/6), silty to sandy, stiff to hard, low to moderate plasticity, dense, dry, laminated.	Tan Clay
	117.5–120			117.5'-119.5' Clayey Sand: dark yellowish orange (10YR 6/6), fine grained, subangular, stiff, dense, lignitic, laminated, damp.	

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FIELD GEOLOGIC LOG

PROJECT: L-Area Southern Groundwater Characterization		DATE: 9/17/01	SHEET 7 OF 9
	REFERENCE DATUM	DRILLING CONTRACTOR: Prosonic	
WELL NO.: LSW-04	SRP COORDINATES	DRILLER: Michael Coleman	
LOGGED BY: Jim Furlow	COMPANY: SAIC	DRILLING METHOD: Rotosonic	

RUN NUMBER	DEPTH, FEET	LITHOLOGY	PERCENT RECOVERY	SAMPLE DESCRIPTION	DRILLING COMMENTS
13	120–127		100	119.5'-127.5' Clayey Sand to Sandy Clay: yellowish gray (5Y8/1) to grayish orange (10YR 7/4), very fine to fine grained, subangular, soft, dense, laminated, becomes silty and sandier in lower portion, fine to medium grained.	
14	128–137		100	127.5'-137.5' Sand: yellowish grey (5Y8/1) to pale yellowish orange (10YR 8/4), fine grained, subangular, slightly silty 127.5'-132.0', then silty 132.0'-137.5'; loose to soft, wet, faintly laminated 135.0'-137.5'.	
15	138–140		100		

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FIELD GEOLOGIC LOG

PROJECT: L- Area Southern Groundwater Characterization		DATE: 9/17/01	SHEET 8 OF 9
	REFERENCE DATUM:	DRILLING CONTRACTOR: Prosonic	
WELL NO.: LSW-04	SRP COORDINATES:	DRILLER: Michael Coleman	
LOGGED BY: Jim Furlow	COMPANY: SAIC	DRILLING METHOD: Rotosonic	

RUN NUMBER	DEPTH, FEET	LITHOLOGY	PERCENT RECOVERY	SAMPLE DESCRIPTION	DRILLING COMMENTS
15	140–147		100	137.5'-144.0' Silty Sand to Clayey Sand: pale yellowish orange (10YR 8/6), fine to medium grained, subangular, soft, faintly laminated, locally lignitic, wet. 144.0'-147.5' Clayey Sand: dark yellowish brown (10YR4/2), very fine to fine grained, subangular to subrounded, soft, low to moderate plasticity, locally lignitic/carbonaceous, wet. Becomes white (N9), very clayey, laminated in last 3 inches of run.	
16	148–157		100	147.5'-155.0' Silty Sand to Clayey Sand: yellowish gray (5Y8/1) to dark yellowish orange (10YR6/6), very fine to fine grained, soft to loose, locally very clayey, lignitic, wet. 155.0'-157.5' Sand: dark yellowish orange (10YR 6/6), very fine grained, subangular, loose, slightly silty, wet.	
17	158–160		100	157.5'-162.5' Sand: pale yellowish orange (10YR 8/6), very fine grained, angular to subangular, loose, clean to slightly silty, wet	

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FIELD GEOLOGIC LOG

PROJECT: L-Area Southern Groundwater Characterization	REFERENCE DATUM:	DATE: 9/17/01	SHEET 9 OF 9
		DRILLING CONTRACTOR: Prosonic	
WELL NO.: LSW-04	SRP COORDINATES:	DRILLER: Michael Coleman	
LOGGED BY: Jim Furlow	COMPANY: SAIC	DRILLING METHOD: Rotosonic	

RUN NUMBER	DEPTH, FEET	LITHOLOGY	PERCENT RECOVERY	SAMPLE DESCRIPTION	DRILLING COMMENTS
17	160, 1, 2		100		
18	3, 4, 5, 6, 7		100	162.5'–167.5' : Sand: yellowish gray (5Y8/1) to dark yellowish orange (10YR6/6), very fine to fine grained, angular to subangular, clean to slightly silty, loose, wet.	
19	8, 9, 170, 1, 2		100	167.5'–170.5' Sand: dark yellowish orange (10YR 6/6), fine grained, subangular, silty to slightly clayey, soft, lignitic, wet. 170.5'–172.5' Clayey Sand: dark yellowish orange (10YR 6/6), very fine to fine grained, subangular, stiff, low to moderate plasticity, laminated, wet.	
20	3, 4, 5, 6, 7		100	172.5'–174.0' Silty Clay: dark yellowish orange (10YR6/6), stiff to hard, low plasticity, dense, dry 174.0'–177.5' Sandy Clay to Clayey Sand: grayish black (N2), fine grained to silty, stiff to soft, low plasticity, some small gravel to ½" dia.; wet.	
	8, 9, 180			T.D. 177.5' 9/17/01	

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APPENDIX C

HUMAN HEALTH RISK ASSESSMENT

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LIST OF ABBREVIATIONS AND ACRONYMS

BRA	baseline risk assessment
CMS	corrective measures study
COC	constituent of concern
COPC	constituent of potential concern
CSM	conceptual site model
DUR	Data Usability Report
ECODS	Early Construction and Operational Disposal Site
EPC	exposure point concentration
FS	feasibility study
ft	feet
HHRA	human health risk assessment
HI	hazard index
HQ	hazard quotient
LRP	L-Area Rubble Pit
m	meter
MCL	maximum contaminant level
NBN	no building number
OU	operable unit
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
pCi/g	picocuries per gram
PRG	preliminary remediation goal
RCOC	refined constituent of concern
RCRA	Resource Conservation and Recovery Act
RfD	reference dose
RFI	RCRA facility investigation
RI	remedial investigation
RME	reasonable maximum exposure
RSL	regional screening level
SRS	Savannah River Site
TCR	total cumulative risk
UCL	upper confidence limit
USEPA	U.S. Environmental Protection Agency

C-1. INTRODUCTION

The human health risk assessment (HHRA) in support of the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI)/Remedial Investigation (RI) Report with Baseline Risk Assessment (BRA) and Corrective Measures Study (CMS)/Feasibility Study (FS) for the Early Construction and Operational Disposal Site (ECODS) L-3, No Building Number (NBN), L-Area Rubble Pit (LRP) (131-1L), and LRP (131-4L) [hereafter referred to as ECODS L-3, LRP 131-1L, and LRP 131-4L] Operable Unit (OU) is presented in this appendix. The evaluation contained herein assesses the risks of contamination to human receptors to identify the problems warranting action from a human health standpoint to support subsequent remediation as deemed necessary.

The ECODS L-3, LRP 131-1L, and LRP 131-4L OU is located in L Area in an area currently designated for industrial use. The three subunits are listed in Appendix C of the FFA and will receive final disposition as a remedial action under the Savannah River Site (SRS) RCRA/Comprehensive Environmental Response, Compensation, and Liability Act program.

No current or projected future development of these subunits is planned, nor is the current land use expected to change. Nevertheless, to support the risk management decision-making, both the residential (unrestricted) and industrial land use scenarios are evaluated.

The HHRA is conducted and presented for each subunit for the evaluation of risk to human health receptors. Exposure is assessed by screening environmental data from the ECODS L-3, LRP 131-1L, and LRP 131-4L OU RI/BRA database and evaluating the potential for exposure. This approach allows for remedial decisions to be made on a smaller scale within the larger OU area. The media type that is evaluated in this section is surface soil.

The basis for this evaluation is the preliminary conceptual site models (CSMs), which are presented in Chapter 2. The CSMs are graphical representations of the ECODS L-3, LRP 131-1L, and LRP 131-4L subunit sources of contamination and potential impacts to human health and the environment. The preliminary CSMs establish the focus for the risk assessment, identifying the sources of contamination, the release mechanisms into exposure media, the exposure routes associated with media, and the potential receptors evaluated in the risk assessment. As depicted in Figures 2-12 through 2-14, the CSMs include the following elements:

- Primary sources of contamination
- Primary environmental release mechanisms
- Secondary sources of contamination
- Secondary release mechanisms
- Exposure media
- Exposure routes
- Human receptors

C-1.1 Background

As discussed, the ECODS L-3, LRP 131-1L, and LRP 131-4L OU consists of three subunits.

C-1.1.1 ECODS L-3

The ECODS L-3 subunit was used to dispose of construction debris and other non-radioactive waste materials, such as rubble and concrete, associated with the construction and early operation of L Area. The ECODS L-3 subunit is estimated to have been in use from November 1953 to June 1954. The original subunit was estimated to be ~18 meters (m) (60 feet [ft]) wide by ~60 m (200 ft) long (Figure C-1). The 2002 site evaluation effort determined the trench dimensions were actually ~15 m (50 ft) wide by 27 m (90 ft) long and 4.6 m (15 ft) wide by 27 m (90 ft) long. A detailed description is provided in Chapters 1 and 2.

Figure C-1 shows the sampling locations for the ECODS L-3 subunit.

C-1.1.2 LRP 131-1L

The LRP 131-1L subunit was used for various non-radioactive construction debris. Typical debris disposed of in similar units includes metal, lumber, poles, and concrete. The LRP 131-1L subunit delineated by orange ball waste unit markers is 12 m (40 ft) by 46 m (150 ft) (Figure C-2). A detailed description is provided in Chapters 1 and 2.

Figure C-2 shows the sampling locations for the LRP 131-1Lsubunit.

C-1.1.3 LRP 131-4L

The LRP 131-4L subunit received inert rubble from the L-Area Powerhouse Stack and Silo demolition. The rubble consisted primarily of concrete and asphalt material with some metal. The LRP 131-4L subunit is an unlined pit, reported to have operated from 1973 to 1983, before it was

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filled and seeded in 1983. The size of the subunit is considered to be ~36.6 m by 36.6 m (120 ft by 120 ft) (Figure C-3). A detailed description is provided in Chapters 1 and 2.

Figure C-3 shows the sampling locations for the LRP 131-4L subunit.

C-1.2 Data

Characterization activities for the ECODS L-3, LRP 131-1L, and LRP 131-4L OU are described in detail in Chapter 3.

Groundwater is not part of this OU. Groundwater will be investigated and remediated, as applicable, under the L-Area Groundwater OU.

All data used in the HHRA for the ECODS L-3, LRP 131-1L, and LRP 131-4L are presented in Appendix A. The ProUCL (USEPA 2022) software package was used to calculate the 95% upper confidence limit (UCL) on the arithmetic mean that is presented in Appendix A. The data distribution and recommended 95% UCL as determined by ProUCL for each constituent are presented as footnotes to the tables in Appendix A. Non-detected constituent concentrations were processed in accordance with the ProUCL User's Guide. The Data Usability Reports (DURs) for the 2022 Workplan Characterization Samples (SRNS 2022) are presented in Appendix I. The reports provide an assessment of the precision, accuracy, representativeness, comparability, and completeness data quality indicators and measurement performance criteria. The DURs concluded that that the data quality objectives were met, and the data is considered usable for the purposes of decision-making in the RI/BRA. In addition, the *Site Evaluation Report for the Early Construction and Operational Disposal Site (ECODS) L-3 (NBN) (U)* presents a Laboratory Quality Discussion (Section IV, Appendix G) and a Site Evaluation Validation Report (Section V, Appendix G) for the samples that were collected in 2002 (WSRC 2003).

C-1.3 Receptors

The purpose of the HHRA is to evaluate the potential for adverse effects associated with exposure to constituents present in the ECODS L-3, LRP 131-1L, and LRP 131-4L OU. The assessment estimates the risk potential in the absence of any remedial action and provides a basis for determining whether remedial actions are necessary to reduce or eliminate risks to human health.

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A streamlined approach that considers both standardized and site-specific receptor scenarios/exposure assumptions has been used for this evaluation.

The receptors evaluated include future resident and future industrial worker. A description of each is presented below.

The *future resident* receptor scenario evaluates long-term risks to individuals assumed to have unrestricted use of the area that consists of the ECODS L-3, LRP 131-1L, and LRP 131-4L subunits. This scenario considers residents (adults and children) that hypothetically live on the subunits and are exposed chronically, both indoors and outdoors, to subunit contaminants. The standard exposure assumptions are 26 years, 350 days per year, and 24 hours per day. Exposure routes associated with soil include inhalation of particulates and vapors, external exposure to radiation, dermal absorption, and incidental ingestion.

The *future industrial worker* scenario is a standard United States Environmental Protection Agency (USEPA) exposure scenario, which addresses long-term risks to workers who are exposed to subunit contaminants within an industrial setting. The standard exposure assumptions are 25 years, 250 days per year, and 8 hours per day. This receptor is referred to as "composite worker" by USEPA and is analogous to the term "industrial worker" used herein. The future industrial worker scenario considers an adult who hypothetically works on-unit in an outdoor setting for the majority of time. Exposure routes include inhalation, external exposure to radiation, dermal absorption, and incidental ingestion of soil.

C-1.4 Sources of Risk-Based Threshold Values

The USEPA publishes regional screening levels (RSLs) for nonradiological constituents and preliminary remediation goals (PRGs) for radiological constituents that are risk-based concentrations (or activity concentrations) that can be used to evaluate potentially contaminated waste sites. Both RSLs and PRGs combine current USEPA toxicity values with standard exposure factors that represent reasonable maximum exposure (RME) conditions to estimate contaminant concentrations in exposure media that the agency considers protective of humans over a lifetime. The concentrations are based on direct exposure pathways for which generally accepted methods, models, and assumptions have been developed for specific land use conditions.

The *USEPA Regional Screening Levels (RSLs) website* (USEPA 2023a) is the source of risk-based threshold values for nonradiological constituents used in this evaluation. The website was accessed in December 2023. The default resident and industrial worker RSLs are provided in Attachment C-1.

The *USEPA Superfund Radionuclide Preliminary Remediation Goals (PRGs) for Superfund website* (USEPA 2023b) is the source of the radionuclide threshold values used in this evaluation. The website was accessed in December 2023. The PRGs for a residential scenario were obtained by using the website calculator function to derive site-specific peak PRGs. These site-specific PRGs are calculated by eliminating the fruit and vegetable consumption pathways and using all other default parameters. The site-specific residential PRGs are provided in Attachment C-2. The peak PRGs for the industrial worker assume all default exposure parameters and are provided in Attachment C-3.

C-2. HUMAN HEALTH RISK ASSESSMENT PROCESS

C-2.1 Soil Media

The primary dataset used for the human health screening and risk/hazard calculations is the 0 to 0.3 m (0 to 1 ft) depth sample interval. Concentrations of detected constituents in the 0 to 0.3 m (0 to 1 ft) depth interval include both the maximum and the 95% UCL on the mean concentration for screening and risk/hazard calculations, respectively.

A summary of the processes undertaken to evaluate human health associated with the various exposure media is described below.

C-2.1.1 Constituents of Potential Concern

The process used to identify constituents of potential concern (COPCs) in each subunit within the ECODS L-3, LRP 131-1L, and LRP 131-4L OU is described below. Maximum detected concentrations of nonradiological constituents were compared to the hazard quotient (HQ) = 0.1 residential soil RSLs for noncarcinogens; for carcinogens, the residential soil RSL is used as a screening threshold. Maximum detected activity concentrations of radiological constituents were compared to residential soil PRGs. For naturally occurring, non-anthropogenic constituents,

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maximum soil concentrations from the 0 to 0.3 m (0 to 1 ft) sampling interval were also compared to two times the SRS average background concentrations (WSRC 2006). Constituents exceeding both the RSL/PRG residential screening thresholds and the SRS background values are identified as COPCs. COPCs are carried forward to the risk/hazard calculation (Section C-2.1.2). Appendix A presents the soil datasets for each subunit, ECODS L-3 subunit surface soil (Table A.2.1), LRP 131-1L subunit surface soil (Table A.3.1) and LRP 131-4L subunit surface soil (Table A.4.1).

Constituents recognized as essential human nutrients (i.e., calcium, magnesium, potassium, and sodium) are not subject to further evaluation since these constituents are deemed necessary for health and consumed in normal diets.

Section C-2.2 presents the results of the soil COPC screening step.

C-2.1.2 Risk/Hazard Calculation

The next step in the HHRA is to calculate risk or hazard for the resident and industrial worker for ECODS L-3, LRP 131-1L, and LRP 131-4L subunits. Risk and hazard estimate calculations are based on a RME exposure point concentration (EPC), which is the lesser of the maximum detected concentration and the 95% UCL on the mean concentration. Appendix A tables indicate the EPCs for each of the COPCs.

For carcinogens, the risk estimates for constituents are calculated using the following equation:

$$risk\ estimate = \left(\frac{[EPC]}{[RSL\ or\ PRG]}\right) \times 1E\text{-}06$$

The risk estimates by constituent grouping (i.e., inorganic, organic, and radionuclide) are then summed to provide the total risk by grouping. The total media risk is the sum of the total groupings. Constituents with an individual cancer risk greater than 1E-06 are identified as constituents of concern (COCs) and are further evaluated in the refinement of COCs step (Section C-2.2).

For noncarcinogens, hazard estimates (or HQs) are calculated individually for each nonradiological constituent using the following equation:

$$hazard\ estimate\ (HQ) = \frac{[EPC]}{[RSL]}$$

Individual constituent HQs are summed to provide the total hazard index (HI). If the total HI is less than 1, then no COCs are identified. If the total HI is greater than 1, then the constituents are segregated based on relevant target organ or system toxicity, and the grouped constituent HQs are summed. Constituents are identified as COCs if the constituent organ/system HQ is greater than 0.1 and the total organ HI is greater than 1. Constituents identified as COCs are further evaluated in the refinement of COCs step (Section C-2.2).

C-2.2 Refinement of Constituents of Concern/Results

To identify human health refined COCs (RCOCs) by subunit within the ECODS L-3, LRP 131-1L, and LRP 131-4L OU, an uncertainty analysis is performed for each individual COC. This includes an interpretive discussion of the applicable uncertainty factors (lines of evidence) and a recommendation of whether the constituent should or should not be carried forward for further remedial evaluation. The major categories of uncertainty used in this evaluation and the major emphasis include:

- Unit related uncertainty, which includes uncertainties related to the nature and extent of contamination, consistency with history of use, and presence in background;
- Data quality uncertainty, which includes uncertainties related to data quality and physical characteristics; and
- Risk assessment uncertainty, which includes uncertainties related to toxicity data and changes in constituent concentrations due to radioactive decay.

For the uncertainty evaluation, subunit concentrations are compared to SRS all-depths background concentrations (WSRC 2006) as one line of evidence to assist in the identification of RCOCs.

Note that for the background comparisons involving a particular decay chain, activities of the parent and its daughter products are considered. For example, the thorium series (thorium-232) evaluation includes not only the measured concentration of thorium-232, specifically, but also includes any analytical results from its daughter products (e.g., radium-228, actinium-228, thorium-228, radium-224, lead-212, bismuth-212, and thallium-208) since these isotopes are assumed to be in secular equilibrium. This same approach was applied for the uranium-238 decay

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series, including its daughter products (e.g., uranium-234, thorium-230, radium-226, lead-214, and bismuth-214). Therefore, background comparisons for the thorium-232 decay series and the uranium-238 decay series includes consideration of the range of concentrations for the entire decay chain (i.e., includes daughter products).

There is uncertainty in assessing human health risk if RSLs or PRGs are not available due to the lack of a screening threshold. This uncertainty is inherent in the HHRA process and is documented in the uncertainty discussion for individual analytes that lack screening thresholds as indicated in Table C-1. The lack of human health thresholds presents an uncertainty that may under- or over-represent the risk to human receptors. The HHRA presented herein follows the currently accepted approach and methodologies to assessing risk to support informed management decisions for the ECODS L-3, LRP 131-1L, and LRP 131-4L OU.

C-2.2.1 ECODS L-3 Subunit

C-2.2.1.1 <u>Soil Media</u>

Table C-1 presents the results of soil screening for the ECODS L-3 subunit. Human health COPCs for soil include aluminum, antimony, Aroclor 1254, Aroclor 1260, benzo[a]pyrene, cadmium, chromium, iron, and lead. These constituents had maximum detected concentrations that exceeded human health (residential) risk-based screening levels and exceeded two times SRS mean background concentrations.

Table C-2 presents the total HI (2.37) and total media risk (6.62E-05) for the resident exposure scenario and the associated COCs: Aroclor 1254, Aroclor 1260, and chromium.

Table C-3 presents the total HI (0.406) and total media risk (4.50E-06) for the industrial worker exposure scenario and the associated COCs: Aroclor 1254 and chromium.

The refinement/uncertainty evaluation is presented for each of these COCs.

<u>Aroclor 1254</u> is identified as a COC for the residential (risk = 5.44E-06 and HQ = 1.1) and the industrial worker (risk = 1.32E-06) scenarios. It was detected in 17/18 samples, with 14 results being estimated values (i.e., J-qualified). Concentrations range from nondetect to 5.63 mg/kg, with

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a mean concentration of 0.617 mg/kg. Sample location EL3-16 (Figure C-1) had the highest detected concentration. The EPC used in the risk calculations was 1.28 mg/kg.

Aroclor 1254 is a manufactured polychlorinated biphenyl (PCB) that is not found naturally in the environment. PCBs are commonly found in heat transfer systems, electrical equipment, asphalt materials, hydraulic fluids, lubricants, paints, coatings, fire retardants, and carbonless copy paper. Its presence is consistent with the historical use of the unit.

Aroclor 1254 is recommended for further remedial evaluation as a human health RCOC in surface soil for the future resident scenario based on the following lines-of-evidence:

- Its presence is consistent with the historical use of the unit.
- The residential risk is >1E-06 and HQ > 1.

Aroclor 1254 is not recommended for further remedial evaluation as a human health RCOC in surface soil for the future industrial worker scenario based on the following lines-of-evidence:

- The industrial risk is only slightly above the 1E-06 threshold.
- The concentration is less than the Toxic Substances Control Act ARAR concentration for low occupancy (i.e., industrial) of 25 mg/kg (see Chapter 3, section 3.10).

Aroclor 1260 is identified as a COC for the residential (risk = 1.48E-06) scenario only. It was detected in 10/18 samples, with 10 results being estimated values (i.e., J-qualified). Concentrations range from nondetect to 2.17 mg/kg, with a mean concentration of 0.144 mg/kg. Sample location EL3-16 (Figure C-1) had the highest detected concentration. The EPC used in the risk calculations was 0.356 mg/kg.

Aroclor 1260 is a manufactured PCB that is not found naturally in the environment. PCBs are commonly found in heat transfer systems, electrical equipment, asphalt materials, hydraulic fluids, lubricants, paints, coatings, fire retardants, and carbonless copy paper. Its presence is consistent with the historical use of the unit.

Aroclor 1260 is recommended for further remedial evaluation as a human health RCOC in surface soil for the future resident scenario based on the following lines-of-evidence:

- Its presence is consistent with the historical use of the unit.
- The residential risk is >1E-06.

Chromium is identified as a COC for the residential (risk = 5.88E-05) and the industrial worker (risk = 2.79E-06) scenarios. Chromium was detected in 18/18 samples, with 8 results being estimated values (i.e., J-qualified). Concentrations range from 3.52 mg/kg to 71.9 mg/kg with a mean concentration of 11.1 mg/kg. Sample location EL3-06 (Figure C-1) had the highest detected concentration. The EPC used in the risk calculations was 17.7 mg/kg.

The maximum detected concentration in the SRS soil background dataset is 54.3 mg/kg (WSRC 2006). Only the maximum detected value (71.9 mg/kg) at location EL3-06 is above the range of concentrations found in background soil at SRS. Upon reviewing the analytical results, it was noted that a field duplicate at the same location was analyzed and was significantly less (26.3 mg/kg) than the regular sample (71.9 mg/kg). All results would have been less than the background soil concentration range if the field duplicate value was evaluated rather than the regular sample value.

Chromium occurs in the environment primarily in two valence states, trivalent chromium and hexavalent chromium. Trivalent chromium is much less toxic than hexavalent chromium. The trivalent form is considered noncancerous, whereas the hexavalent form is considered cancerous. Chromium compounds in the trivalent chromium or hexavalent chromium forms are used for chrome plating, the manufacture of dyes and pigments, and leather and wood preservation.

Hexavalent chromium is not a naturally occurring constituent that is common in the environment. Hexavalent chromium is an environmental concern where burning was used. Trivalent chromium is converted to hexavalent chromium during the burning process. Hexavalent chromium is more toxic and mobile in the environment than trivalent chromium. The USEPA recommends that valence-state specific data for chromium be collected when chromium is likely to be an important contaminant at the site. Since this was not the case at this waste unit, (i.e., chromium not a significant contaminant or risk driver), the valence state of chromium was not determined, and the chemical analysis was for total chromium.

The risk estimate used the hexavalent chromium RSL (residential RSL = 0.3 mg/kg, industrial worker RSL = 6.33 mg/kg) to perform the data screening. This overly conservative approach tends to bias the calculation high. Based on unit history, it is likely the trivalent form of chromium is most prevalent at the site. The RSLs for trivalent chromium are 85,000 mg/kg for the residential exposure scenario, and 360,000 mg/kg for the industrial worker exposure scenario. The maximum detected concentration at the waste unit is much less than these concentrations, and a calculation using the 95% UCL would yield a HQ = 2.08E-04 for the residential scenario and a HQ = 4.92E-05 for the industrial worker scenario.

Hexavalent chromium was not analyzed for in the soil samples collected as part of the SRS Background Soil Study (WSRC 2006). Since there is no SRS background value for hexavalent chromium, a recent characterization effort was conducted at similar waste sites, ECODS N-1 and Central Shops Scrap Lumber Pile (CSSLP), to evaluate the unit related concentrations versus the site-specific background concentrations. The risk assessment determined that unit-related concentrations of hexavalent chromium were not significantly different from the site-specific background concentrations (SRNS 2021).

Chromium is not recommended for further remedial evaluation as a human health RCOC in the surface soil for either receptor scenario based on the following lines-of-evidence:

- It is a naturally occurring constituent that is common in SRS background soils.
- Only one location (EL3-06) is above the SRS background soil concentration range for total chromium. If the field duplicate value (26.3 mg/kg) at EL3-06 would have been used instead of the regular value (71.9 mg/kg), none of the results would have exceeded the background soil concentration range.
- The valence state of chromium was not determined. The analytical result was for total chromium.
- Risk estimate is biased high because the most conservative RSL (hexavalent chromium) was used, but this form is not expected to be present based on unit history.
- Using the trivalent chromium RSL, the revised HQ = 2.08E-04 for the resident and 4.92E-05 for the industrial worker, which are less than the threshold value of HQ =1.

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- Recent hexavalent chromium analyses at a similar site waste site determined that unit related concentrations vs background concentrations were indistinguishable.

C-2.2.1.2 HHRA Conclusion for ECODS L-3

Soil media:

Resident scenario: Human health RCOCs include Aroclor 1254 (risk = 5.44E-06; HQ = 1.1) and Aroclor 1260 (risk = 1.48E-06) with a total cumulative risk (TCR) = 6.9E-06. Figures C-4 and C-5 show the concentrations of the identified RCOCs at each sampling location, respectively.

Industrial Worker scenario: none.

C-2.2.2 LRP 131-1L Subunit

C-2.2.2.1 Soil Media

Table C-4 presents the results of soil screening for the LRP 131-1L subunit. Human health COPCs for soil include aluminum, arsenic, chromium, iron, manganese, vanadium, cesium-137, uranium-235 and uranium-238 (thorium-230). These constituents had maximum detected concentrations that exceeded human health (residential) risk-based screening levels and exceeded two times SRS mean background concentrations.

Table C-5 presents the total HI (8.49E-01) and total media risk (1.58E-04) for the resident exposure scenario and the associated COCs: arsenic, chromium, cesium-137, uranium-235 and uranium-238.

Table C-6 presents the total HI (5.83E-02) and total media risk (5.87E-05) for the industrial worker exposure scenario and the associated COCs: arsenic, chromium, cesium-137, uranium-235 and uranium-238.

The refinement/uncertainty evaluation is presented for each of these COCs.

Arsenic is identified as a COC for the residential (risk = 5.29E-06) and the industrial worker (risk = 1.19E-06) scenarios. It was detected in 21/21 samples, with all results being quantifiable values. Concentrations range from 0.77 mg/kg to 6.5 mg/kg, with a mean concentration of 2.94 mg/kg.

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Sample location LAP1L-018 (Figure C-2) had the highest detected concentration. The EPC used in the risk calculations was 3.58 mg/kg.

Arsenic is a naturally occurring constituent that is common in the environment. The maximum detected concentration in the SRS Soil background dataset is 22.9 mg/kg. Soil concentrations from this subunit are within the range of concentrations found in background soil at SRS.

Arsenic is widely distributed in the earth's crust, being present in soil and minerals. Organic arsenic compounds are used as pesticides, primarily in cotton fields and fruit orchards. However, no significant quantities of pressure treated wood were used in LRP 131-1L subunit and no arsenic pesticides were used at SRS. Arsenic pesticides were commonly used to combat the boll weevil by local cotton farmers prior to the establishment of SRS.

Arsenic is not recommended for further remedial evaluation as human health RCOC in soil for any receptor scenario based on the following lines of evidence:

- Unit concentrations are within the background soil concentration range.
- It is a naturally occurring constituent that is common in SRS background soils.
- Arsenic products were either not used or were of limited use at SRS.

Chromium is identified as a COC for the residential (risk = 6.63E-05) and the industrial worker (risk = 3.15E-06) scenarios. Chromium was detected in 21/21 samples, with all results being quantifiable values. Concentrations range from 7.9 mg/kg to 28.0 mg/kg, with a mean concentration of 17.9 mg/kg. Sample location LAP1L-006 (Figure C-2) had the highest detected concentration. The EPC used in the risk calculations was 20.0 mg/kg.

The maximum detected concentration in the SRS Soil background dataset is 54.3 mg/kg. Soil concentrations from this subunit are within the range of concentrations found in background soil at SRS.

Chromium occurs in the environment primarily in two valence states, trivalent chromium and hexavalent chromium. Trivalent chromium is much less toxic than hexavalent chromium. The trivalent form is considered noncancerous, whereas the hexavalent form is considered cancerous.

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Chromium compounds in the trivalent chromium or hexavalent chromium forms are used for chrome plating, the manufacture of dyes and pigments, and leather and wood preservation.

Hexavalent chromium is not a naturally occurring constituent that is common in the environment. Hexavalent chromium is an environmental concern where burning was used. Trivalent chromium is converted to hexavalent chromium during the burning process. Hexavalent chromium is more toxic and mobile in the environment as compared to trivalent chromium. The USEPA recommends that valence-specific state data for chromium be collected when chromium is likely to be an important contaminant at the site. Since this was not the case at this waste unit (i.e., chromium not a significant contaminant or risk driver), the valence state of chromium was not determined, the chemical analysis was for total chromium.

The risk estimate used the hexavalent chromium RSL (residential RSL = 0.3 mg/kg, industrial worker RSL = 6.33 mg/kg) to perform the data screening. This overly conservative approach tends to bias the calculation high. Based on unit history, it is likely the trivalent form of chromium is most prevalent at the site. The RSLs for trivalent chromium are 85,000 mg/kg for the residential exposure scenario, and 360,000 mg/kg for the industrial worker exposure scenario. The maximum detected concentration at the waste unit is much less than these concentrations, and a calculation using the 95% UCL would yield a HQ = 2.35E-04 for the residential scenario and a HQ = 5.56E-05 for the industrial worker scenario.

Hexavalent chromium was not analyzed for in the soil samples collected as part of the SRS Background Soil Study (WSRC 2006). Since there is no SRS background value for hexavalent chromium, a recent characterization effort was conducted at similar waste sites, ECODS N-1 and CSSLP, to evaluate the unit related concentrations versus the site-specific background concentrations. The risk assessment determined that unit related concentrations of hexavalent chromium were not significantly different from the site-specific background concentrations (SRNS 2021).

Chromium is not recommended for further remedial evaluation as a human health RCOC in the surface soil for either receptor scenario based on the following lines-of-evidence:

- It is a naturally occurring constituent that is common in SRS background soils.

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- All sample results are within the SRS background soil concentration range for total chromium.
- The valence state of chromium was not determined, analytical result was for total chromium.
- Risk estimate is biased high because the most conservative RSL (hexavalent chromium) was used, but this form is not expected to be present based on unit history.
- Using the trivalent chromium RSL, the revised HQ = 2.35E-04 for the resident and 5.56E-05 for the industrial worker, which are less than the threshold value of HQ =1.
- Recent hexavalent chromium analyses at a similar site waste site determined that unit related concentrations vs background concentrations were indistinguishable.

Cesium-137 is a COC for the residential (risk = 6.45E-06) and the industrial worker (risk = 4.30E-06) scenarios. Cesium-137 was only analyzed in one sample and was detected with an activity concentration of 3.90E-01 pCi/g. The sample was taken at location LAP1L-012 (Figure C-2).

Cesium-137 is an anthropogenic (man-made) radionuclide that is not found naturally in the environment. However, cesium-137 is common in SRS background soils as a result of fallout from nuclear weapons testing. The maximum detected activity concentration in the SRS Soil background data for cesium-137 is 2.06 pCi/g. The only detected activity concentration is less than background. Its presence is also not consistent with the historical use at this subunit, as no indication of any radiological waste was ever reported.

Cesium-137 is not recommended for further remedial evaluation as a human health RCOC in soil for any receptor scenario based on the following lines of evidence:

- Unit activity concentrations are consistent with the SRS soil background activity concentration range.
- Its presence is not consistent with historical use and there is no indication of any radiological waste that was ever disposed of.

Uranium-235 is a COC for the residential (risk = 1.97E-06) and the industrial worker (risk = 1.23E-06) scenarios. Uranium-235 was detected as an estimated value (i.e., J-qualified) in 1/5 samples at location LAP1L-008 (Figure C-2), with an activity concentration of 9.02E-02 pCi/g.

Uranium is a naturally occurring constituent that is common in the environment. The maximum detected activity concentration in the SRS Soil background data for uranium-235 is 0.17 pCi/g. The only detected activity concentration is less than the SRS soil background activity concentration range.

Uranium-235 is not recommended for further remedial evaluation as a human health RCOC in soil for any receptor scenario based on the following lines of evidence:

- Unit activity concentrations are consistent with the SRS soil background activity concentration range.
- It is a naturally occurring constituent that is common in SRS background soils.

Uranium-238 is a COC for the residential (risk = 7.80E-05) and the industrial worker (risk = 4.88E-05) scenarios. The Uranium Series (uranium-238) evaluation includes not only the measured activity concentration of uranium-238, but also considers any analytical results from its daughter products (e.g., uranium-234, thorium-230, radium-226, lead-214, and bismuth-214) since these isotopes are assumed to be in secular equilibrium. The risk calculations were performed using the highest EPC (0.975 pCi/g for thorium-230) for the entire series. Thorium-230 was detected in 5/5 samples, with all results being quantifiable values. Activity concentrations for thorium-230 range from 0.423 pCi/g to 1.01 pCi/g, with a mean concentration of 0.735 pCi/g. Sample location LAP1L-009 (Figure C-2) had the highest detected activity concentration. The daughter products are not evaluated separately since they are considered in the uranium-238 peak PRG.

Uranium is a naturally occurring constituent that is common in the environment. The maximum detected activity concentration for the uranium-238 decay chain in the SRS Soil background data set is 2.78 pCi/g (for thorium-230). The maximum detected activity concentration for any daughter in the uranium decay series is less than background.

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Uranium-238 is a naturally occurring constituent of primordial origin with a half-life of 4.5 billion years. The main contributors to external exposure from primordial nuclides are potassium-40, uranium-238, and thorium-232 (and their daughter products).

Uranium-238 is not recommended for further remedial evaluation as a human health RCOC in soil for any receptor scenario based on the following lines of evidence:

- Unit activity concentrations are consistent with the SRS soil background activity concentration range.
- It is a naturally occurring constituent that is common in SRS background soils.

C-2.2.2.2 HHRA Conclusion for LRP 131-1L Subunit

Soil media:

Resident scenario: none.

Industrial Worker scenario: none.

C-2.2.3 LRP 131-4L Subunit

C-2.2.3.1 Soil Media

Table C-7 presents the results of the soil screening for the LRP 131-4L subunit. Human health COPCs for soil for include aluminum, arsenic, chromium, copper, cyanide, iron, manganese, vanadium, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(ah)anthracene, n-nitrosodipropylamine, potassium-40, thorium-232 (actinium-228 and lead-212), and uranium-238 (lead-214). These constituents had maximum detected concentrations or activity concentrations that exceeded human health (residential) risk-based screening levels and exceeded two times SRS mean background concentrations.

Table C-8 presents the total HI (6.64E-01) and total media risk (6.51E-04) for the resident exposure scenario and the associated COCs arsenic, chromium, benzo(a)pyrene, n-nitrosodipropylamine, potassium-40, thorium-232, and uranium-238.

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Table C-9 presents the total HI (5.18E-02) and total media risk (3.85E-04) for the industrial worker exposure scenario and associated COCs chromium, n-nitrosodipropylamine, potassium-40, thorium-232, and uranium-238.

The refinement/uncertainty evaluation is presented below for each COC.

Arsenic is identified as a COC for the resident (risk = 3.62E-06) scenario only. It was detected in 41/41 samples, with all results being quantifiable values. Concentrations range from 0.66 to 4.3 mg/kg, with a mean concentration of 2.2 mg/kg. Sample location LAP4L-035 (Figure C-3) had the highest detected concentration. The EPC used in the risk calculations was 2.45 mg/kg.

Arsenic is a naturally occurring constituent that is common in the environment. The maximum detected concentration in the SRS Soil background dataset is 22.9 mg/kg (WSRC 2006). Soil concentrations from this subunit are within the range of concentrations found in background soil at SRS.

Arsenic is widely distributed in the earth's crust, being present in soil and minerals. Organic arsenic compounds are used as pesticides, primarily in cotton fields and fruit orchards. However, no significant quantities of pressure treated wood were used in LRP 131-4L subunit and no arsenic pesticides were used at SRS. Arsenic pesticides were commonly used to combat the boll weevil by local cotton farmers prior to the establishment of SRS.

Arsenic is not recommended for further remedial evaluation as human health RCOC in soil for any receptor scenario based on the following lines of evidence:

- Unit concentrations are within the background soil concentration range.
- It is a naturally occurring constituent that is common in SRS background soils.
- Arsenic products were either not used or were of limited use at SRS.

Chromium is identified as a COC for the resident (risk = 4.69E-05) and the industrial worker (risk = 2.23E-06) scenarios. It was detected in 41/41 samples, with all results being quantifiable values. Concentrations range from 3.3 mg/kg to 28.0 mg/kg, with a mean concentration of 12.3 mg/kg. Sample location LAP4L-022 had the highest detected concentration (Figure C-3). The EPC used in the risk calculations was 14.1 mg/kg.

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The maximum detected concentration in the SRS Soil background dataset is 54.3 mg/kg. Soil concentrations from this subunit are within the range of concentrations found in background soil at SRS.

Chromium occurs in the environment primarily in two valence states, trivalent chromium and hexavalent chromium. Trivalent chromium is much less toxic than hexavalent chromium. The trivalent form is considered noncancerous, whereas the hexavalent form is considered cancerous. Chromium compounds in the trivalent chromium or hexavalent chromium forms are used for chrome plating, the manufacture of dyes and pigments, and leather and wood preservation.

Hexavalent chromium is not a naturally occurring constituent that is common in the environment. Hexavalent chromium is an environmental concern where burning was used. Trivalent chromium is converted to hexavalent chromium during the burning process. Hexavalent chromium is more toxic and mobile in the environment as compared to trivalent chromium. The USEPA recommends that valence-specific state data for chromium be collected when chromium is likely to be an important contaminant at the site. Since this was not the case at this waste unit, (i.e., chromium not a significant contaminant or risk driver), the valence state of chromium was not determined, the chemical analysis was for total chromium.

The risk estimate used the hexavalent chromium RSL (residential RSL = 0.3 mg/kg, industrial worker RSL = 6.33 mg/kg) to perform the data screening. This overly conservative approach tends to bias the calculation high. Based on unit history, it is likely the trivalent form of chromium is most prevalent at the site. The RSLs for trivalent chromium are 85,000 mg/kg for the residential exposure scenario, and 360,000 mg/kg for the industrial worker exposure scenario. The maximum detected concentration at the waste unit is much less than these concentrations, and a calculation using the 95% UCL would yield a HQ = 1.66E-04 for the residential scenario and a HQ = 3.92E-05 for the industrial worker scenario.

Hexavalent chromium was not analyzed for in the soil samples collected as part of the SRS Background Soil Study (WSRC 2006). Since there is no SRS background value for hexavalent chromium a recent characterization effort was conducted at similar waste sites, ECODS N-1 and CSSLP, to evaluate the unit related concentrations versus the site-specific background

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concentrations. The risk assessment determined that unit related concentrations of hexavalent chromium were not significantly different from the site-specific background concentrations (SRNS 2021).

Chromium is not recommended for further remedial evaluation as a human health RCOC in the surface soil for either receptor scenario based on the following lines-of-evidence:

- It is a naturally occurring constituent that is common in SRS background soils.
- All sample results are within the SRS background soil concentration range for total chromium.
- The valence state of chromium was not determined, analytical result was for total chromium.
- Risk estimate is biased high because the most conservative RSL (hexavalent chromium) was used, but this form is not expected to be present based on unit history.
- Using the trivalent chromium RSL, the revised HQ = 1.66E-04 for the resident and 3.92E-05 for the industrial worker, which are less than the threshold value of HQ =1.
- Recent hexavalent chromium analyses at a similar site waste site determined that unit related concentrations vs background concentrations were indistinguishable.

Benzo(a)pyrene is a COC for the resident (risk = 1.43E-06) scenario only. It was detected in 8/41 samples with six results being estimated values (i.e., J-qualified). Concentrations range from nondetect to 1.2 mg/kg, with a mean concentration of 9.56E-02 mg/kg. The highest detected was at sample location LAP4L-34 (Figure C-3). The EPC used in the risk calculation was 0.164 mg/kg.

Benzo(a)pyrene is a polycyclic aromatic hydrocarbon (PAH). PAHs are sourced from asphalt, coal tar, fumes produced by internal combustion engines, and smoke from the burning of organic materials (i.e., wood burning, cigarette smoke). Its presence is consistent with the historical use of the unit as it received inert rubble from the L-Area Powerhouse Stack and Silo demolition. The rubble consisted primarily of concrete and asphalt material with some metal.

Benzo(a)pyrene is recommended for further remedial evaluation as a human health RCOC in surface soil for the future resident scenario based on the following lines-of-evidence:

- Its presence is consistent with the historical use of the unit.
- The residential risk is >1E-06.

N-Nitrosodipropylamine is a COC for the resident (risk = 5.81E-06) and the industrial worker (risk = 1.37E-06) scenarios. It was detected in 1/41 samples, with a concentration of 0.45 mg/kg. The only detected result was an estimated value (i.e., J-qualified) at sample location LAP4L-015 (Figure C-3). The maximum detected concentration was used as the EPC in the risk calculation.

N-nitrosodipropylamine is a lab contaminant that is produced in small amounts for research. N-nitrosodipropylamine can also be found in cutting oils and tobacco products.

N-nitrosodipropylamine is not recommended for further remedial evaluation as a human health RCOC in soil for the residential and industrial worker scenarios for the following lines-of-evidence:

- The contaminant was only detected in one out of 41 samples.
- The only detected result was an estimated value, and the maximum detected concentration was used in the risk calculation (biased high).

Potassium-40 is a COC for the resident (risk = 3.92E-05) and the industrial worker (risk = 2.58E-05) scenarios. It was only analyzed in one sample and was detected with an estimated activity concentration (i.e., J-qualified) of 5.64 pCi/g. The sample was collected at location LAP4L-022 (Figure C-3). The maximum detected concentration was used as the EPC in the risk calculation.

Potassium-40 is a naturally occurring constituent that is common in the environment. The SRS background maximum activity concentration is 8.53 pCi/g. The only detected value does not exceed the SRS background maximum activity concentration.

Potassium-40 is a naturally occurring constituent of primordial origin with a half-life of 1.2 billion years. Primordial nuclides are those that are long-lived and have existed in the earth’s crust throughout history. The main contributors to external exposure from primordial nuclides are potassium-40, uranium-238, and thorium-232 (and their daughter products).

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Potassium-40 is not associated with any of the reactor processes at SRS. Potassium-40 is not recommended for further remedial evaluation as a human health RCOC in soil for the residential and industrial worker scenarios based on the following lines of evidence.

- It is a naturally occurring constituent that is common is SRS background soils.
- The estimated activity concentration (i.e., J-qualified) of 5.64 pCi/g is within the background soil concentration range.
- Potassium-40 is not associated with any of the reactor processes and is not considered a Department of Energy-added constituent.

Thorium-232 is a COC for the resident (risk = 4.24E-04) and the industrial worker (risk = 2.74E-04) scenarios. The Thorium Series (thorium-232) evaluation includes not only the measured activity concentration of thorium-232 specifically, but also considers any analytical results from its daughter products (e.g., radium-228, actinium-228, thorium-228, radium-224, lead-212, bismuth-212, and thallium-208) since these isotopes are assumed to be present in secular equilibrium. The risk calculations were performed using the highest EPC (4.18 pCi/g for actinium-228) of the entire series. Actinium-228 was only analyzed in one sample and collected at location LAP4L-022 (Figure C-3). The daughter products are not evaluated separately since they are considered in the thorium-232 peak PRG.

Background comparisons for the thorium-232 series includes consideration of the range of activity concentrations for the entire decay chain (i.e., includes daughter products). The SRS Soil background maximum detected activity concentration is 6.75 pCi/g, based on the radium-228 result (WSRC 2006). Soil activity concentrations from this subunit are within SRS background concentrations.

Thorium-232 is a naturally occurring constituent of primordial origin with a half-life of 14 billion years. As previously discussed, primordial nuclides are those that are long lived and have existed in the earth's crust throughout history. The main contributors to external exposure from primordial nuclides are potassium-40, uranium-238, and thorium-232 (and their daughter products). Thorium series concentrations are typical of natural thorium.

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Thorium-232 is not recommended for further remedial evaluation as human health RCOC in soils for any of the receptor scenarios based on the following lines of evidence:

- It is a naturally occurring constituent that is common is SRS background soils.
- Unit activity concentrations are consistent within the SRS soil background activity concentration range.

Uranium-238 is a COC for the resident (risk = 1.29E-04) and the industrial worker (risk = 8.06E-05) scenarios. The Uranium Series (uranium-238) evaluation includes not only the measured activity concentration of uranium-238, but also considers any analytical results from its daughter products (e.g., uranium-234, thorium-230, radium-226, lead-214, and bismuth-214). since these isotopes are assumed to be in secular equilibrium. The risk calculations were performed using the highest EPC (1.61 pCi/g for lead-214) for the entire series. Lead-214 was only analyzed in one sample collected at location LAP4L-022 (Figure C-3). The daughter products are not evaluated separately since they are considered in the uranium-238 peak PRG.

Background comparisons for the uranium-238 series includes consideration of the range of activity concentrations for the entire decay chain (i.e., includes daughter products). The SRS Soil background maximum detected activity concentration is 2.78 pCi/g, based on the thorium-230 result (WSRC 2006). Soil activity concentrations from this subunit are within SRS background concentrations.

Uranium-238 is a naturally occurring constituent of primordial origin with a half-life of 4.5 billion years. The main contributors to external exposure from primordial nuclides are potassium-40, uranium-238, and thorium-232 (and their daughter products).

Uranium-238 is not recommended for further remedial evaluation as a human health RCOC in soil for any receptor scenario based on the following lines of evidence:

- It is a naturally occurring constituent that is common in SRS background soils.
- Unit activity concentrations are consistent with the SRS soil background activity concentration range.

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C-2.2.3.2 HHRA Conclusion for LRP 131-4L Subunit

Soil media:

Resident scenario: The only constituent retained as a human health RCOC is benzo(a)pyrene (risk = 1.43E-06). Figure C-6 identifies the concentrations of the identified RCOC at each sample location.

Industrial Worker scenario: none.

C-3. SUMMARY/CONCLUSION OF THE HUMAN HEALTH RISK ASSESSMENT

The table presented below shows the overall summary of the HHRA by subunit. The revised CSMs are presented in Chapter 3 (Figures 3-9 through 3-11).

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Summary of the ECODS L-3, LRP 131-1L, and LRP 131-4L OU Human Health Risk Assessment

Subunit	Human Health Residential RCOCs	Human Health Industrial Worker RCOCs
ECODS L-3	Soil (0-0.3 m [0-1 ft]) Aroclor 1254 (risk = 5.44E-06; HQ = 1.1) Aroclor 1260 (risk = 1.48E-06) TCR = 6.9E-06	Soil (0-0.3 m [0-1 ft]) None
LRP 131-1L	Soil (0-0.3m [0-1 ft]) None	Soil (0-0.3 m [0-1 ft]) None
LRP 131-4L	Soil (0-0.3m [0-1 ft]) Benzo(a)pyrene (risk = 1.42E-06)	Soil (0-0.3 m [0-1 ft]) None

C-4. REFERENCES

SRNS, 2021. *Resource Conservation and Recovery Act Facility Investigation/Remedial Investigation Report with Baseline Risk Assessment and Corrective Measures Study/Feasibility Study for the Early Construction and Operational Disposal Site N-1 (NBN), Central Shops Scrap Lumber Pile (631-2G), and Building 690-N, Process Heat Exchanger Repair Facility (aka Ford Building) Operable Unit*, SRNS-RP-2021-00548, Revision 1, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC

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USEPA, 2022. *Statistical Software ProUCL v5.2 for Environmental Applications for Data Sets With and Without Nondetect Observations*, United States Environmental Protection Agency

USEPA, 2023a. *USEPA Regional Screening Levels website*, U. S. Environmental Protection Agency, National Center for Environmental Assessment, Arlington, VA, (November) accessed December 2023, https://www.epa.gov/risk/regional-screening-levels-rsls

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USEPA, 2023b. *Preliminary Remediation Goals for Radionuclides for Superfund website,* U. S. Environmental Protection Agency, Office of Land and Emergency Management, Washington, DC, (February) accessed December 2023, https://epa-prgs.ornl.gov/radionuclides

WSRC, 2003. *Site Evaluation Report for the Early Construction and Operational Disposal Site (ECODS) L-3*, WSRC-RP-2003-4048, Revision 0, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC.

WSRC, 2006. *Background Soils Statistical Summary Report for the Savannah River Site*, ERD-EN-2005-0223 Revision 1, Washington Savannah River Company, Savannah River Site, Aiken, SC

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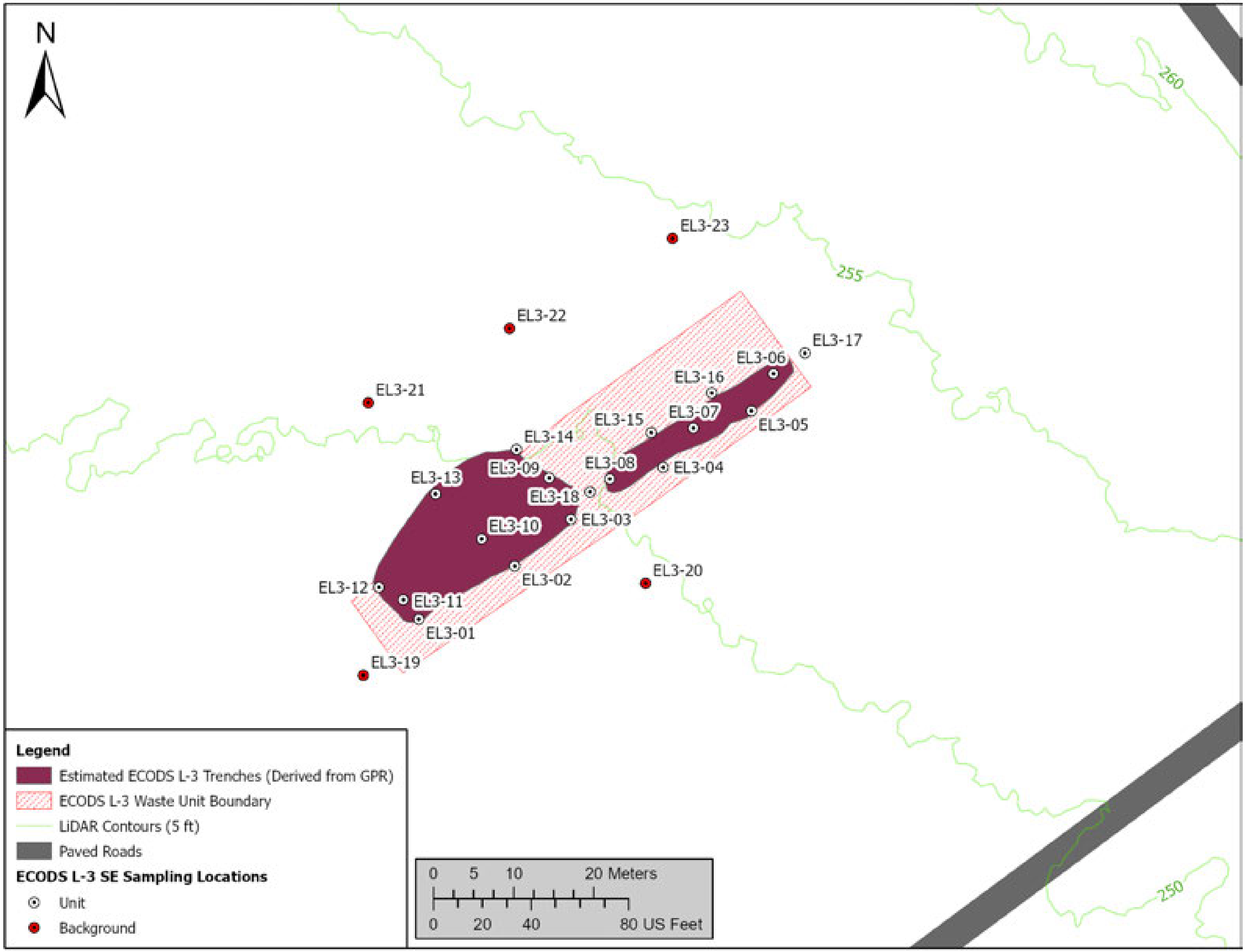

Figure C-1. ECODS L-3 Subunit Sample Location Map

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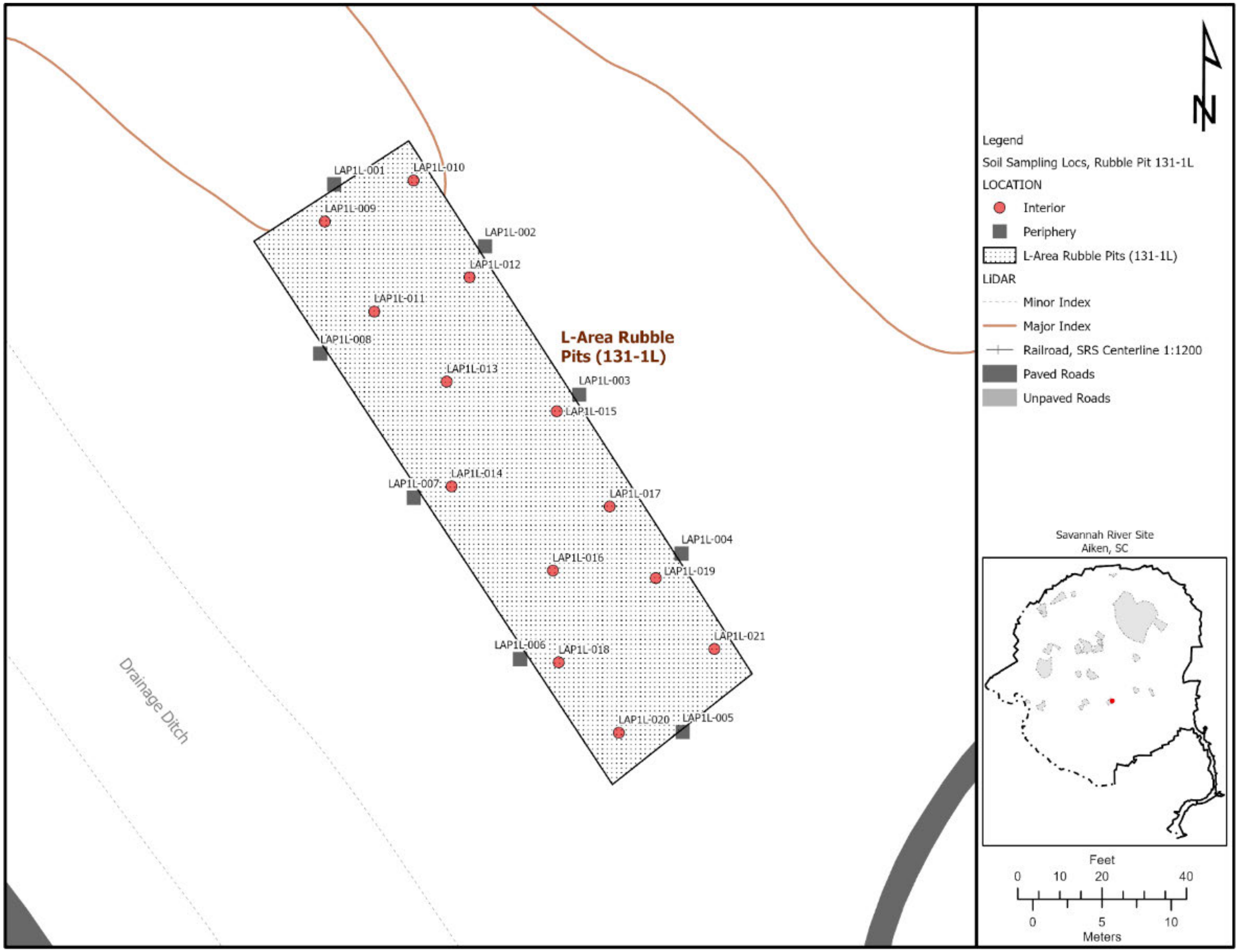

Figure C-2. LRP 131-1L Subunit Sample Location Map

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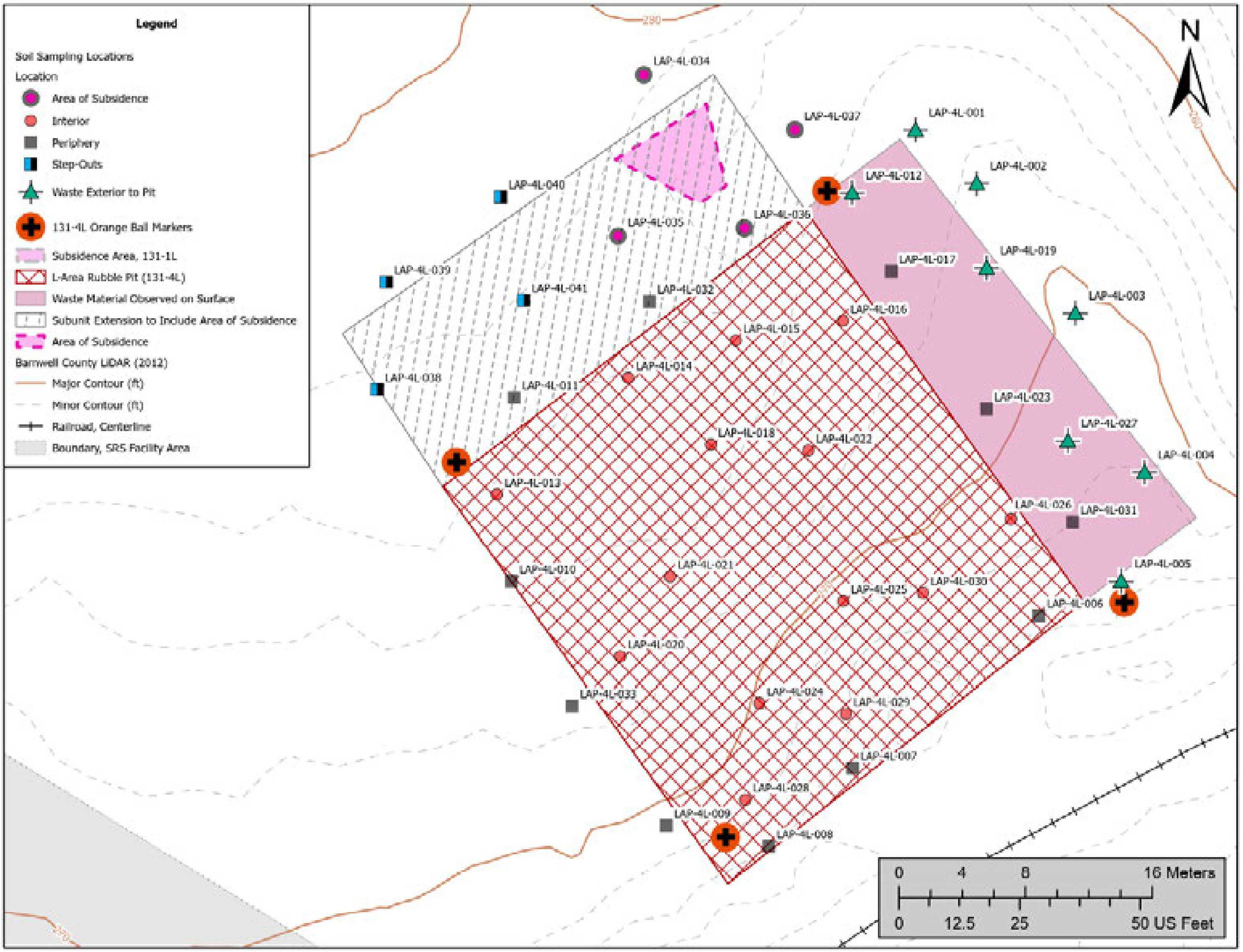

Figure C-3. LRP 131-4L Subunit Sample Location Map

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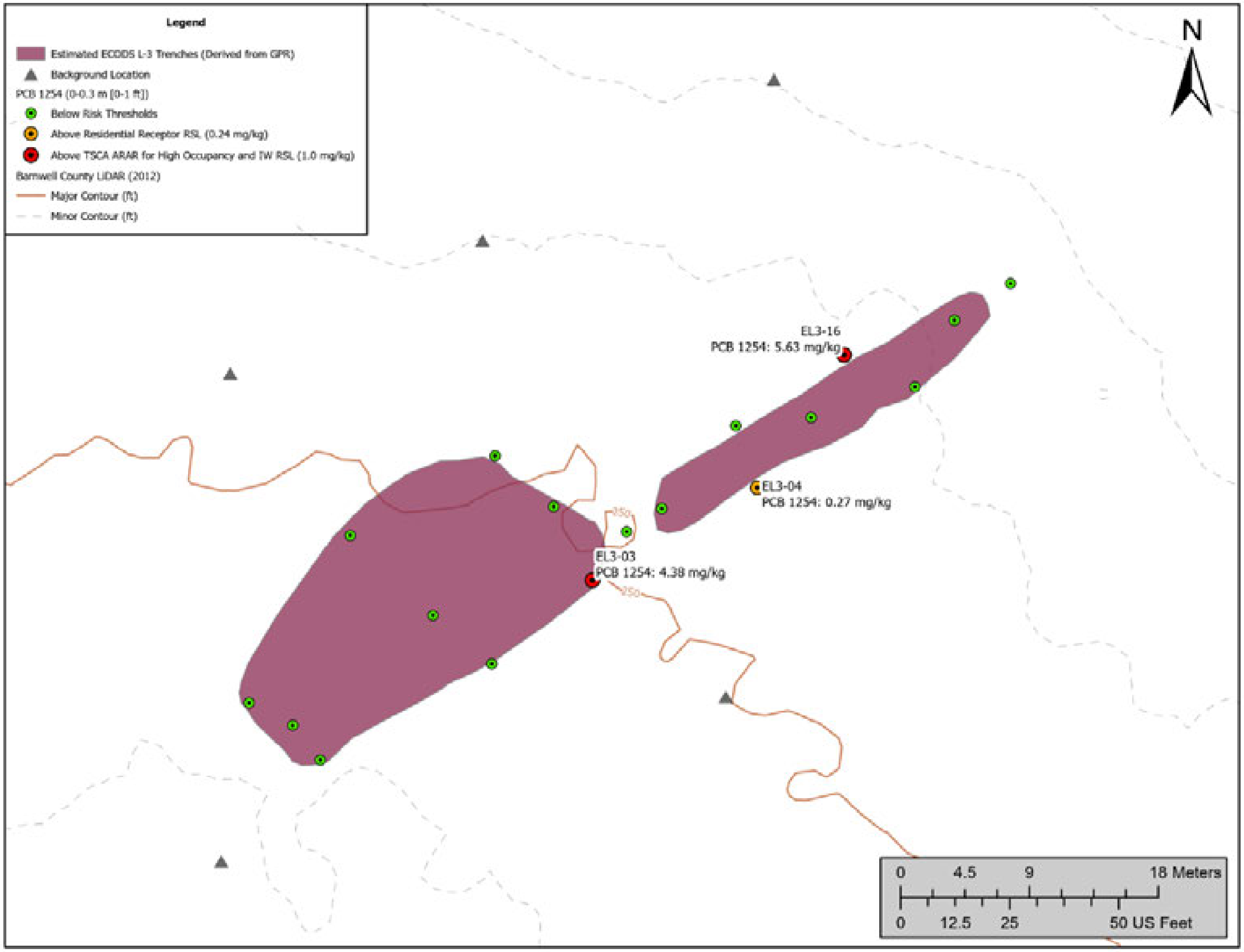

Figure C-4. Aroclor 1254 Data for Soil Media (0 to 0.3 m [0 to 1 ft]) at the ECODS L-3

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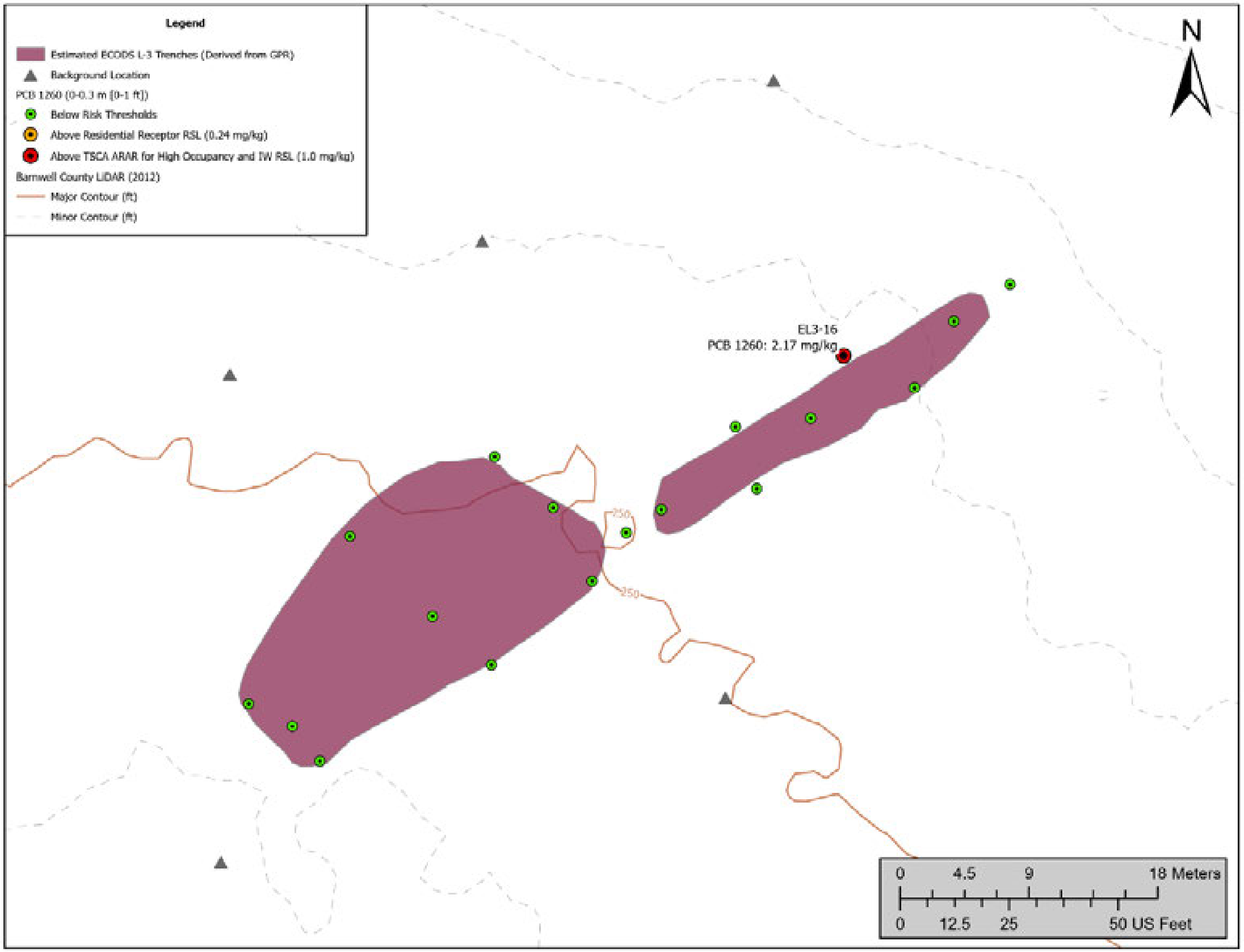

Figure C-5. Aroclor 1260 Data for Soil Media (0 to 0.3 m [0 to 1 ft]) at the ECODS L-3

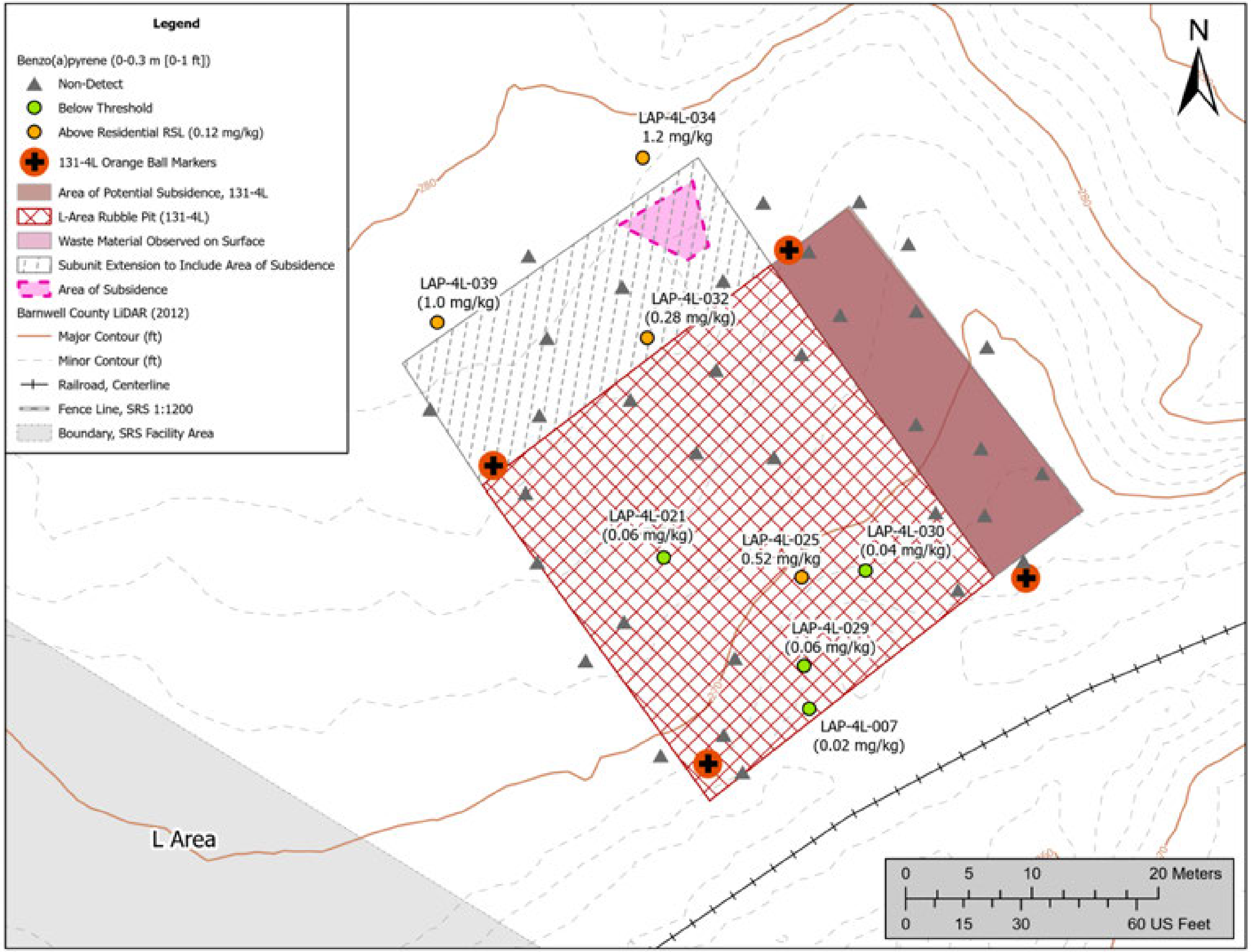

Figure C-6. Benzo(a)pyrene Data for Soil Media (0 to 0.3 m [0 to 1 ft]) at the LRP 131-4L

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Table C-1. Human Health COPC Screening for ECODS L-3 Subunit Soil Media (0-0.3 m [0-1 ft])

Analyte	Detected Maximum Concentration[1]	Qualifier	Human Health Screening Value[2,6]	Human Health Screening Value Source	Exceeds Human Health Screening Value?	2X Average Background Concentration[3,7]	Exceeds 2X Average Background?[4]	COPC?[5]
***Inorganics** (mg/kg)*								
ALUMINUM	1.47E+04		7.70E+03	0.1xRSL	YES	1.05E+04	YES	**YES**
ANTIMONY	2.17E+01		3.10E+00	0.1xRSL	YES	2.69E+00	YES	**YES**
ARSENIC	4.10E+00		6.80E-01	RSL	YES	4.28E+00	no	no
BARIUM	6.19E+01	J	1.50E+03	0.1xRSL	no	3.91E+01	YES	no
CADMIUM	1.08E+01		7.10E-01	0.1xRSL	YES	4.83E-01	YES	**YES**
CALCIUM	1.47E+04		EN	--	--	4.76E+02	YES	no
CHROMIUM	7.19E+01	J	3.00E-01	RSL	YES	1.54E+01	YES	**YES**
COBALT	6.77E-01		2.30E+00	0.1xRSL	no	1.55E+00	no	no
COPPER	5.36E+01	J	3.10E+02	0.1xRSL	no	4.34E+00	YES	no
CYANIDE	1.22E+00	J	2.30E+00	0.1xRSL	no	NA	--	no
IRON	1.35E+04		5.50E+03	0.1xRSL	YES	1.27E+04	YES	**YES**
LEAD	1.30E+03		4.00E+01	0.1xRSL	YES	1.03E+01	YES	**YES**
MAGNESIUM	1.15E+03		EN	--	--	2.75E+02	YES	no
MANGANESE	1.39E+02		1.80E+02	0.1xRSL	no	1.53E+02	no	no
MERCURY	3.61E-01		1.10E+00	0.1xRSL	no	7.10E-02	YES	no
NICKEL	3.70E+01		1.40E+02	0.1xRSL	no	3.48E+00	YES	no
POTASSIUM	2.12E+02		EN	--	--	2.16E+02	no	no
SELENIUM	1.51E+00	J	3.90E+01	0.1xRSL	no	2.99E+00	no	no
SODIUM	7.66E+01	J	EN	--	--	4.02E+01	YES	no
VANADIUM	3.10E+01		3.90E+01	0.1xRSL	no	3.91E+01	no	no
ZINC	3.21E+02	J	2.30E+03	0.1xRSL	no	9.47E+00	YES	no

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Table C-1. Human Health COPC Screening for ECODS L-3 Subunit Soil Media (0-0.3 m [0-1 ft]) *(continued)*

Analyte	Detected Maximum Concentration[1]	Qualifier	Human Health Screening Value[2,6]	Human Health Screening Value Source	Exceeds Human Health Screening Value?	2X Average Background Concentration[3,7]	Exceeds 2X Average Background?[4]	COPC?[5]
Organics (mg/kg)								
1,1-DICHLOROETHYLENE	2.62E-03		2.30E+01	0.1xRSL	no	NA	--	no
ACETONE	2.86E-02		7.00E+03	0.1xRSL	no	NA	--	no
ANTHRACENE	4.23E-02	J	1.80E+03	0.1xRSL	no	NA	--	no
BENZALDEHYDE	2.22E-01		1.70E+02	RSL	no	NA	--	no
BENZENE	2.60E-03		1.20E+00	RSL	no	NA	--	no
BENZO(G,H,I)PERYLENE	1.09E-01	J	NA	--	--	NA	--	no
BENZO[A]ANTHRACENE	1.47E-01	J	1.10E+00	RSL	no	NA	--	no
BENZO[A]PYRENE	1.82E-01		1.10E-01	RSL	YES	NA	--	**YES**
BENZO[B]FLUORANTHENE	2.60E-01		1.10E+00	RSL	no	NA	--	no
BENZO[K]FLUORANTHENE	1.01E-01	J	1.10E+01	RSL	no	NA	--	no
BIS(2-ETHYLHEXYL)PHTHALATE (DEHP)	1.63E+01		3.90E+01	RSL	no	NA	--	no
CARBON DISULFIDE	9.51E-04	J	7.70E+01	0.1xRSL	no	NA	--	no
CHRYSENE	1.32E-01	J	1.10E+02	RSL	no	NA	--	no
DICHLOROMETHANE (METHYLENE CHLORIDE)	6.96E-04	J	3.50E+01	0.1xRSL	no	NA	--	no
FLUORANTHENE	2.79E-01		2.40E+02	0.1xRSL	no	NA	--	no
INDENO[1,2,3-CD]PYRENE	9.86E-02	J	1.10E+00	RSL	no	NA	--	no
METHYL ETHYL KETONE	1.57E-03	J	2.70E+03	0.1xRSL	no	NA	--	no
METHYL TERTIARY BUTYL ETHER (MTBE)	4.00E-04	J	4.70E+01	RSL	no	NA	--	no
PHENANTHRENE	1.60E-01	J	NA	--	--	NA	--	no
PYRENE	2.17E-01		1.80E+02	0.1xRSL	no	NA	--	no

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Table C-1. Human Health COPC Screening for ECODS L-3 Subunit Soil Media (0-0.3 m [0-1 ft]) ***(continued/end)***

Analyte	Detected Maximum Concentration[1]	Qualifier	Human Health Screening Value[2,6]	Human Health Screening Value Source	Exceeds Human Health Screening Value?	2X Average Background Concentration[3,7]	Exceeds 2X Average Background?[4]	COPC?[5]
Organics (mg/kg)								
STYRENE	3.68E-04	J	6.00E+02	0.1xRSL	no	NA	--	no
TOLUENE	1.47E-03		4.90E+02	0.1xRSL	no	NA	--	no
XYLENES	1.98E-04	J	5.80E+01	0.1xRSL	no	NA	--	no
Pesticides/PCBs *(pCi/g)*								
AROCLOR 1254	5.63E+00	J	1.20E-01	0.1xRSL	YES	NA	--	**YES**
AROCLOR 1260	2.17E+00	J	2.40E-01	RSL	YES	NA	--	**YES**
DDE	5.84E-04	J	2.00E+00	RSL	no	NA	--	no
DDT	1.07E-03	J	1.90E+00	RSL	no	NA	--	no

1 - Maximum detected concentration from surface soil interval (0-0.3 m [0-1ft]) from Table A.2.1.
2 - Nonradiological Regional Screening Levels (RSLs) are residential soil default values from the generic USEPA RSLs website, accessed December 2023 (see Attachment C-1).
3 - Background screening values obtained from Background Soils Statistical Summary Report for the Savannah River Site, Table B-1, ERD-EN-2005-0223, Rev 1, October 2006, Appendix B-1 (0-1 ft interval).
4 - For screening purposes, maximum concentration of the naturally-occurring (nonanthropogenic) constituents are compared to 2X average background concentration.
5 - Constituents are identified as constituents of potential concern (COPCs) if the maximum detected concentration exceeds the human health screening value and the 2X average background concentration (if available).
6 - RSL for hexavalent chromium (most conservative) used.
7 - Background concentration for total chromium used.

EN - essential nutrient
NA - not available

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Table C-2. Human Health Risk/Hazard Calculation for ECODS L-3 Subunit Soil Media (0-0.3 m [0-1 ft]) Residential Scenario

Analyte[1]	Exposure Point Concentration[2]	Residential RSL[3,7]	Residential Hazard Estimate[4]	Residential Risk Estimate[5]	Target Organ	COC?[6]
Noncarcinogenic Hazard Estimate						
Chemical Constituents *(mg/kg)*						
ALUMINUM	7.19E+03	7.74E+04	9.29E-02	--	Neurological	no
ANTIMONY	5.13E+00	3.13E+01	1.64E-01	--	Hematological	no
CADMIUM	2.07E+00	7.14E+00	2.89E-01	--	Urinary	no
CHROMIUM	1.77E+01	2.34E+02	7.56E-02	--	Other	no
IRON	6.45E+03	5.48E+04	1.18E-01	--	Hepatic	no
LEAD	2.14E+02	4.00E+02	5.36E-01	--	Neurological	no
AROCLOR 1254	1.28E+00	1.17E+00	1.09E+00	--	Ocular	**YES**
BENZO[A]PYRENE	6.13E-02	1.78E+01	3.44E-03	--	Developmental	no
	Total Hazard Index (HI)=		**2.37E+00**			
Carcinogenic Risk Estimate						
Chemical Constituents *(mg/kg)*						
CADMIUM	2.07E+00	2.12E+03	--	9.75E-10	NA	no
CHROMIUM	1.77E+01	3.01E-01	--	5.88E-05	NA	**YES**
AROCLOR 1254	1.28E+00	2.35E-01	--	5.44E-06	NA	**YES**
AROCLOR 1260	3.56E-01	2.40E-01	--	1.48E-06	NA	**YES**
BENZO[A]PYRENE	6.13E-02	1.15E-01	--	5.33E-07	NA	no
		Total Chemical Risk =		**6.62E-05**		
		Total Media Risk =		**6.62E-05**		

1 - Analytes from Table C-1 that were identified as constituents of potential concern (COPCs).
2 - EPC - reasonable maximum exposure (RME) exposure point concentration (EPC) is the lesser of the maximum detected concentration and the 95% upper confidence limit (UCL) on the mean concentration (see Table A.2.1).
3 - Nonradiological Regional Screening Levels (RSLs) are residential soil default values from the generic USEPA RSLs website, accessed December 2023 (see Attachment C-1).
4 - Residential Hazard Estimate = EPC/RSL
5 - Residential Risk Estimate = (EPC/[RSL])*1E-06
6 - For noncarcinogens, no constituents are identified as constituents of concern (COCs) if the total media HI (Hazard Index) < 1. If the total media HI ≥ 1, then the constituents are segregated based on relevant target organs. Hazard quotients (HQs) are summed according to target organs (see table below). Constituents are identified as COCs if the total organ HI>1. For carcinogens, constituents are identified as COCs if the individual cancer risk ≥ 1E-06.
7 - RSL for hexavalent chromium (most conservative) used.

NA - Not applicable

Table C-2. Human Health Risk/Hazard Calculation for ECODS L-3 Subunit Soil Media (0-0.3 m [0-1 ft]) Residential Scenario *(continued/end)*

Developmental	BENZO[A]PYRENE	3.44E-03
	Total Developmental	3.44E-03
Neurological	ALUMINUM	9.29E-02
	LEAD	5.36E-01
	Total Neurological	6.29E-01
Urinary	CADMIUM	2.89E-01
	Total Urinary	2.89E-01
Hematological	ANTIMONY	1.64E-01
	Total Hematological	1.64E-01
Hepatic	IRON	1.18E-01
	Total Hepatic	1.18E-01
Ocular	AROCLOR 1254	1.09E+00
	Total Ocular	**1.09E+00**
Other	CHROMIUM	7.56E-02
	Total Other	7.56E-02

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Table C-3. Human Health Risk/Hazard Calculation for ECODS L-3 Subunit Soil Media (0-0.3 m [0-1 ft]) Industrial Scenario

Analyte[1]	Exposure Point Concentration[2]	Industrial RSL[3,7]	Industrial Hazard Estimate[4]	Industrial Risk Estimate[5]	Target Organ	COC?[6]
Noncarcinogenic Hazard Estimate						
***Chemical Constituents** (mg/kg)*						
ALUMINUM	7.19E+03	1.12E+06	6.42E-03	--	Neurological	no
ANTIMONY	5.13E+00	4.67E+02	1.10E-02	--	Hematological	no
CADMIUM	2.07E+00	9.97E+01	2.07E-02	--	Urinary	no
CHROMIUM	1.77E+01	3.48E+03	5.08E-03	--	Other	no
IRON	6.45E+03	8.18E+05	7.88E-03	--	Hepatic	no
LEAD	2.14E+02	8.00E+02	2.68E-01	--	Neurological	no
AROCLOR 1254	1.28E+00	1.47E+01	8.70E-02	--	Ocular	no
BENZO[A]PYRENE	6.13E-02	2.22E+02	2.76E-04	--	Developmental	no
	Total Hazard Index (HI)=		**4.06E-01**			
Carcinogenic Risk Estimate						
***Chemical Constituents** (mg/kg)*						
CADMIUM	2.07E+00	9.26E+03	--	2.23E-10	NA	no
CHROMIUM	1.77E+01	6.33E+00	--	2.79E-06	NA	**YES**
AROCLOR 1254	1.28E+00	9.72E-01	--	1.32E-06	NA	**YES**
AROCLOR 1260	3.56E-01	9.91E-01	--	3.59E-07	NA	no
BENZO[A]PYRENE	6.13E-02	2.11E+00	--	2.91E-08	NA	no
			Total Chemical Risk =	**4.50E-06**		
			Total Media Risk =	**4.50E-06**		

1 - Analytes from Table C-1 that were identified as constituents of potential concern (COPCs).
2 - EPC - reasonable maximum exposure (RME) exposure point concentration (EPC) is the lesser of the maximum detected concentration and the 95% upper confidence limit (UCL) on the mean concentration (see Table A.2.1).
3 - Nonradiological Regional Screening Levels (RSLs) are industrial soil default values from the generic USEPA website, accessed December 2023 (see Attachment C-1).
4 - Industrial Hazard Estimate = EPC/RSL
5 - Industrial Risk Estimate = (EPC/RSL)*1E-06
6 - For noncarcinogens, no constituents are identified as constituents of concern (COCs) if the total media Hazard Index (HI) < 1. If the total media HI ≥ 1, then the constituents are segregated based on relevant target organs. Hazard quotients (HQs) are summed according to target organs. Constituents are identified as COCs if the total organ HI > 1. For carcinogens, constituents are identified as COCs if the individual cancer risk ≥ 1E-06.
7 - RSL for hexavalent chromium (most conservative) used.

NA - not applicable

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Table C-4. Human Health COPC Screening for LRP 131-1L Subunit Soil Media (0-0.3 m [0-1 ft])

Analyte	Detected Maximum Concentration[1]	Qualifier	Human Health Screening Value[2,6,7]	Human Health Screening Value Source	Exceeds Human Health Screening Value?	2X Average Background Concentration[3,7,8]	Exceeds 2X Average Background?[4]	COPC?[5]
***Inorganics** (mg/kg)*								
ALUMINUM	3.50E+04		7.70E+03	0.1xRSL	YES	1.05E+04	YES	**YES**
ANTIMONY	3.10E-01		3.10E+00	0.1xRSL	no	2.69E+00	no	no
ARSENIC	6.50E+00		6.80E-01	RSL	YES	4.28E+00	YES	**YES**
BARIUM	4.50E+01		1.50E+03	0.1xRSL	no	3.91E+01	YES	no
BERYLLIUM	5.50E-01		1.60E+01	0.1xRSL	no	2.88E-01	YES	no
CADMIUM	1.30E-01		7.10E-01	0.1xRSL	no	4.83E-01	no	no
CALCIUM	1.20E+03		EN	--	--	4.76E+02	YES	no
CHROMIUM	2.80E+01		3.00E-01	RSL	YES	1.54E+01	YES	**YES**
COBALT	2.00E+00		2.30E+00	0.1xRSL	no	1.55E+00	YES	no
COPPER	3.10E+01		3.10E+02	0.1xRSL	no	4.34E+00	YES	no
CYANIDE	1.20E+00		2.30E+00	0.1xRSL	no	NA	--	no
IRON	1.90E+04		5.50E+03	0.1xRSL	YES	1.27E+04	YES	**YES**
LEAD	1.30E+01		4.00E+01	0.1xRSL	no	1.03E+01	YES	no
MAGNESIUM	4.40E+02		EN	--	--	2.75E+02	YES	no
MANGANESE	1.80E+02		1.80E+02	0.1xRSL	YES	1.53E+02	YES	**YES**
MERCURY	6.10E-02		1.10E+00	0.1xRSL	no	7.10E-02	no	no
NICKEL	8.80E+00		1.40E+02	0.1xRSL	no	3.48E+00	YES	no
POTASSIUM	3.50E+02		EN	--	--	2.16E+02	YES	no
SELENIUM	5.80E-01		3.90E+01	0.1xRSL	no	2.99E+00	no	no
SILVER	2.00E-02	J	3.90E+01	0.1xRSL	no	7.28E-01	no	no
THALLIUM	1.60E-01		7.80E-02	0.1xRSL	YES	3.12E+00	no	no
VANADIUM	5.70E+01		3.90E+01	0.1xRSL	YES	3.91E+01	YES	**YES**
ZINC	3.60E+01		2.30E+03	0.1xRSL	no	9.47E+00	YES	no

Table C-4. Human Health COPC Screening for LRP 131-1L Subunit Soil Media (0-0.3 m [0-1 ft]) *(continued)*

Analyte	Detected Maximum Concentration[1]	Qualifier	Human Health Screening Value[2,6,7]	Human Health Screening Value Source	Exceeds Human Health Screening Value?	2X Average Background Concentration[3,7,8]	Exceeds 2X Average Background?[4]	COPC?[5]
***Organics** (mg/kg)*								
2-HEXANONE	3.98E-03	J	2.00E+01	0.1xRSL	no	NA	--	no
ACETONE	3.97E-01		7.00E+03	0.1xRSL	no	NA	--	no
CUMENE (ISOPROPYLBENZENE)	1.88E-03		1.90E+02	0.1xRSL	no	NA	--	no
METHYL ETHYL KETONE	4.39E-02		2.70E+03	0.1xRSL	no	NA	--	no
STYRENE	1.85E-03	J	6.00E+02	0.1xRSL	no	NA	--	no
***Radionuclides** (pCi/g)*								
AMERICIUM-243	8.88E-02	J	1.67E-01	PRG	no	NA	--	no
CURIUM-245/246	4.29E-02	J	2.75E+00	PRG	no	NA	--	no
CESIUM-137	3.90E-01		6.05E-02	PRG	YES	2.84E-01	YES	**YES**
PLUTONIUM-238	9.10E-02	J	4.28E+00	PRG	no	5.77E-01	no	no
PLUTONIUM-239/240	5.69E-02	J	3.79E+00	PRG	no	8.36E-02	no	no
POTASSIUM-40	1.06E+00	J	1.44E-01	PRG	YES	2.33E+00	no	no
STRONTIUM-90	8.14E-01	J	4.21E+00	PRG	no	7.43E-01	YES	no
THORIUM-232	1.54E+00		9.85E-03	PRG	YES	1.80E+00	no	no
RADIUM-228	1.70E+00		9.85E-03	+D-Th	YES	1.80E+00	no	no
ACTINIUM-228	1.42E+00		9.85E-03	+D-Th	YES	1.80E+00	no	no
THORIUM-228	1.72E+00		9.85E-03	+D-Th	YES	1.80E+00	no	no
LEAD-212	1.09E+00		9.85E-03	+D-Th	YES	1.80E+00	no	no

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Table C-4. Human Health COPC Screening for LRP 131-1L Subunit Soil Media (0-0.3 m [0-1 ft]) *(continued/end)*

Analyte	Detected Maximum Concentration[1]	Qualifier	Human Health Screening Value[2,6,7]	Human Health Screening Value Source	Exceeds Human Health Screening Value?	2X Average Background Concentration[3,7,8]	Exceeds 2X Average Background?[4]	COPC?[5]
***Radionuclides** (pCi/g)*								
URANIUM-238	9.00E-01		1.25E-02	PRG	YES	1.01E+00	no	no
URANIUM-233/234	8.04E-01		1.25E-02	+D-U	YES	1.01E+00	no	no
THORIUM-230	1.01E+00		1.25E-02	+D-U	YES	1.01E+00	YES	**YES**
RADIUM-226	9.66E-01		1.25E-02	+D-U	YES	1.01E+00	no	no
LEAD-214	9.13E-01		1.25E-02	+D-U	YES	1.01E+00	no	no
URANIUM-235	9.02E-02	J	4.58E-02	PRG	YES	7.98E-02	YES	**YES**

1 - Maximum detected concentration from surface soil interval (0-0.3 m [0-1 ft]) from Table A.3.1.
2 - Nonradiological Regional Screening Levels (RSLs) are residential soil default values from the generic USEPA RSLs website, accessed December 2023 (see Attachment C-1). Radiological Preliminary Remediation Goals (PRGs) are residential site-specific soil values derived using the USEPA Radionuclide for Superfund website calculator and eliminating the fruit and vegetable pathways. All other inputs are default parameters, accessed December 2023. (see Attachment C-2).
3 - Background screening values obtained from Background Soils Statistical Summary Report for the Savannah River Site, Table B-1, ERD-EN-2005-0223, Rev 1, October 2006, Appendix B-1 (0-1 ft interval).
4 - For screening purposes, maximum concentration of the naturally-occurring (nonanthropogenic) constituents are compared to 2X average background concentration.
5 - Constituents are identified as constituents of potential concern (COPCs) if the maximum detected concentration exceeds the human health screening value and the 2X average background concentration (if available).
6 - RSL for hexavalent chromium (most conservative) used.
7 - Radionuclides take into account secular equilibrium and therefore the parent PRG was used to screen the entire decay for the thorium-232 and uranium-238 series. If any of the radionuclides in the decay chain are identified as COPCs the parent nuclide is carried forward for risk calculations.
8 - Background concentration for total chromium used.

EN - essential nutrient
NA - not available

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Table C-5. Human Health Risk/Hazard Calculation for LRP 131-1L Subunit Soil Media (0-0.3 m [0-1 ft]) Residential Scenario

Analyte[1]	Exposure Point Concentration[2,7]	Residential RSL/PRG[3,8]	Residential Hazard Estimate[4]	Residential Risk Estimate[5]	Target Organ	COC?[6]
Noncarcinogenic Hazard Estimate						
Chemical Constituents *(mg/kg)*						
ALUMINUM	2.30E+04	7.74E+04	2.97E-01	--	Neurological	no
ARSENIC	3.58E+00	3.49E+01	1.03E-01	--	Dermal	no
CHROMIUM	2.00E+01	2.34E+02	8.53E-02	--	Other	no
IRON	1.26E+04	5.48E+04	2.31E-01	--	Hepatic	no
MANGANESE	6.91E+01	1.83E+03	3.78E-02	--	Neurological	no
VANADIUM	3.76E+01	3.93E+02	9.57E-02	--	Dermal	no
		Total Hazard Index (HI)=	**8.49E-01**			
Carcinogenic Risk Estimate						
Chemical Constituents *(mg/kg)*						
ARSENIC	3.58E+00	6.77E-01	--	5.29E-06	NA	**YES**
CHROMIUM	2.00E+01	3.01E-01	--	6.63E-05	NA	**YES**
			Total Chemical Risk =	**7.16E-05**		
Radionuclide Constituents *(pCi/g)*						
CESIUM-137	3.90E-01	6.05E-02	--	6.45E-06	NA	**YES**
URANIUM-235	9.02E-02	4.58E-02	--	1.97E-06	NA	**YES**
URANIUM-238	9.75E-01	1.25E-02	--	7.80E-05	NA	**YES**
			Total Radionuclide Risk =	**8.64E-05**		
			Total Media Risk =	**1.58E-04**		

1 - Analytes from Table C-4 that were identified as constituents of potential concern (COPCs).
2 - EPC - reasonable maximum exposure (RME) exposure point concentration (EPC) is the lesser of the maximum detected concentration and the 95% upper confidence limit (UCL) on the mean concentration (see Table A.3.1).
3 - Nonradiological Regional Screening Levels (RSLs) are residential soil default values from the USEPA RSLs website, accessed December 2023 (see Attachment C-1). Radiological Preliminary Remediation Goals (PRGs) are site-specific residential soil values derived using the USEPA Radionuclide PRGs for Superfund website calculator and eliminating the fruit and vegetable pathways. All other inputs are default parameters, accessed December 2023. (see Attachment C-2).
4 - Residential Hazard Estimate = EPC/RSL
5 - Residential Risk Estimate = (EPC/[RSL or PRG])*1E-06
6 - For noncarcinogens, no constituents are identified as constituents of concern (COCs) if the total media Hazard Index (HI) < 1. If the total media HI ≥ 1, then the constituents are segregated based on relevant target organs. Hazard quotients (HQs) are summed according to target organs. Constituents are identified as COCs if the total organ HI > 1. For carcinogens, constituents are identified as COCs if the individual cancer risk ≥ 1E-06.
7 - For radionuclides within a decay chain (i.e., thorium-232 and uranium-238) the most conservative EPC (highest activity) within each series is used to estimate the risk. Risk is calculated using parent PRG.
8 - RSL for hexavalent chromium (most conservative) used.

NA - not applicable

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Table C-6. Human Health Risk/Hazard Calculation for LRP 131-1L Subunit Soil Media (0-0.3 m [0-1 ft]) Industrial Scenario

Analyte[1]	Exposure Point Concentration[2,7]	Industrial RSL/PRG[3,8]	Industrial Hazard Estimate[4]	Industrial Risk Estimate[5]	Target Organ	COC?[6]
Noncarcinogenic Hazard Estimate						
***Chemical Constituents** (mg/kg)*						
ALUMINUM	2.30E+04	1.12E+06	2.05E-02	--	Neurological	no
ARSENIC	3.58E+00	4.79E+02	7.48E-03	--	Dermal	no
CHROMIUM	2.00E+01	3.48E+03	5.73E-03	--	Other	no
IRON	1.26E+04	8.18E+05	1.55E-02	--	Hepatic	no
MANGANESE	6.91E+01	2.56E+04	2.70E-03	--	Neurological	no
VANADIUM	3.76E+01	5.83E+03	6.45E-03	--	Dermal	no
	Total Hazard Index (HI)=		**5.83E-02**			
Carcinogenic Risk Estimate						
***Chemical Constituents** (mg/kg)*						
ARSENIC	3.58E+00	3.00E+00	--	1.19E-06	NA	**YES**
CHROMIUM	2.00E+01	6.33E+00	--	3.15E-06	NA	**YES**
		Total Chemical Risk=		**4.35E-06**		
***Radionuclide Constituents** (pCi/g)*						
CESIUM-137	3.90E-01	9.07E-02	--	4.30E-06	NA	**YES**
URANIUM-235	9.02E-02	7.31E-02	--	1.23E-06	NA	**YES**
URANIUM-238	9.75E-01	2.00E-02	--	4.88E-05	NA	**YES**
		Total Radionuclide Risk =		**5.43E-05**		
		Total Media Risk =		**5.87E-05**		

1 - Analytes from Table C-4 that were identified as constituents of potential concern (COPCs).
2 - EPC - reasonable maximum exposure (RME) exposure point concentration (EPC) is the lesser of the maximum detected concentration and the 95% upper confidence limit (UCL) on the mean concentration (see Table A.3.1).
3 - Nonradiological Regional Screening Levels (RSLs) are industrial soil default values from the USEPA RSLs website, accessed December 2023 (see Attachment C-1). Radiological Preliminary Remediation Goals (PRGs) are industrial soil default values from the USEPA Radionuclide PRGs for Superfund website, accessed December 2023 (see Attachment C-3).
4 - Industrial Hazard Estimate = EPC/RSL
5 - Industrial Risk Estimate = (EPC/[RSL or PRG])*1E-06
6 - For noncarcinogens, no constituents are identified as constituents of concern (COCs) if the total media Hazard Index (HI) < 1. If the total media HI ≥ 1, then the constituents are segregated based on relevant target organs. Hazard quotients (HQs) are summed according to target organs. Constituents are identified as COCs if the total organ HI > 1. For carcinogens, constituents are identified as COCs if the individual cancer risk ≥ 1E-06.
7 - For radionuclides within a decay chain (i.e., thorium-232 and uranium-238) the most conservative EPC (highest activity) within each series is used to estimate the risk. Risk is calculated using parent PRG.
8 - RSL for hexavalent chromium (most conservative) used.

NA - not applicable

Table C-7. Human Health COPC Screening for LRP 131-4L Subunit Soil Media (0-0.3 m [0-1 ft])

Analyte	Detected Maximum Concentration[1]	Qualifier	Human Health Screening Value[2,6,7]	Human Health Screening Value Source	Exceeds Human Health Screening Value?	2X Average Background Concentration[3,7,8]	Exceeds 2X Average Background?[4]	COPC?[5]
***Inorganics** (mg/kg)*								
ALUMINUM	2.90E+04		7.70E+03	0.1xRSL	YES	1.05E+04	YES	**YES**
ANTIMONY	8.30E-01		3.10E+00	0.1xRSL	no	2.69E+00	no	no
ARSENIC	4.30E+00		6.80E-01	RSL	YES	4.28E+00	YES	**YES**
BARIUM	3.00E+01		1.50E+03	0.1xRSL	no	3.91E+01	no	no
BERYLLIUM	3.10E-01		1.60E+01	0.1xRSL	no	2.88E-01	YES	no
CADMIUM	2.50E-01		7.10E-01	0.1xRSL	no	4.83E-01	no	no
CALCIUM	2.00E+04		EN	--	--	4.76E+02	YES	no
CHROMIUM	2.80E+01		3.00E-01	RSL	YES	1.54E+01	YES	**YES**
COBALT	1.50E+00		2.30E+00	0.1xRSL	no	1.55E+00	no	no
COPPER	4.80E+02		3.10E+02	0.1xRSL	YES	4.34E+00	YES	**YES**
CYANIDE	1.00E+01		2.30E+00	0.1xRSL	YES	NA	--	**YES**
IRON	2.10E+04		5.50E+03	0.1xRSL	YES	1.27E+04	YES	**YES**
LEAD	3.50E+01		4.00E+01	0.1xRSL	no	1.03E+01	YES	no
MAGNESIUM	8.60E+02		EN	--	--	2.75E+02	YES	no
MANGANESE	1.80E+02		1.80E+02	0.1xRSL	YES	1.53E+02	YES	**YES**
MERCURY	3.80E-01		1.10E+00	0.1xRSL	no	7.10E-02	YES	no
NICKEL	7.90E+00		1.40E+02	0.1xRSL	no	3.48E+00	YES	no
POTASSIUM	2.40E+02		EN	--	--	2.16E+02	YES	no
SELENIUM	3.80E-01	J	3.90E+01	0.1xRSL	no	2.99E+00	no	no
SILVER	4.00E-02	J	3.90E+01	0.1xRSL	no	7.28E-01	no	no
SODIUM	4.90E+01	J	EN	--	--	4.02E+01	YES	no

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Table C-7. Human Health COPC Screening for LRP 131-4L Subunit Soil Media (0-0.3 m [0-1 ft]) *(continued)*

Analyte	Detected Maximum Concentration[1]	Qualifier	Human Health Screening Value[2,6,7]	Human Health Screening Value Source	Exceeds Human Health Screening Value?	2X Average Background Concentration[3,7,8]	Exceeds 2X Average Background?[4]	COPC?[5]
Inorganics *(mg/kg)*								
THALLIUM	1.00E-01		7.80E-02	0.1xRSL	YES	3.12E+00	no	no
VANADIUM	5.80E+01		3.90E+01	0.1xRSL	YES	3.91E+01	YES	**YES**
ZINC	2.40E+01		2.30E+03	0.1xRSL	no	9.47E+00	YES	no
Organics *(mg/kg)*								
2,4,6-TRICHLOROPHENOL	3.00E-02	J	6.30E+00	0.1xRSL	no	NA	--	no
2-NITROPHENOL	3.00E-02	J	NA	--	--	NA	--	no
ACENAPHTHENE	5.50E-02	J	3.60E+02	0.1xRSL	no	NA	--	no
ACENAPHTHYLENE	1.20E-01	J	NA	--	--	NA	--	no
ACETONE	3.55E-01		7.00E+03	0.1xRSL	no	NA	--	no
ANTHRACENE	3.20E-01		1.80E+03	0.1xRSL	no	NA	--	no
BENZALDEHYDE	6.40E-02	J	1.70E+02	RSL	no	NA	--	no
BENZO(G,H,I)PERYLENE	5.90E-01		NA	--	--	NA	--	no
BENZO[A]ANTHRACENE	1.80E+00		1.10E+00	RSL	YES	NA	--	**YES**
BENZO[A]PYRENE	1.20E+00		1.10E-01	RSL	YES	NA	--	**YES**
BENZO[B]FLUORANTHENE	2.50E+00		1.10E+00	RSL	YES	NA	--	**YES**
BENZO[K]FLUORANTHENE	9.20E-01		1.10E+01	RSL	no	NA	--	no
CARBAZOLE	1.90E-01	J	NA	--	--	NA	--	no
CHRYSENE	2.20E+00		1.10E+02	RSL	no	NA	--	no
DIBENZ[AH]ANTHRACENE	2.30E-01	J	1.10E-01	RSL	YES	NA	--	**YES**
DIBENZOFURAN	2.20E-02	J	7.80E+00	0.1xRSL	no	NA	--	no
DIETHYL PHTHALATE	4.40E-01	J	5.10E+03	0.1xRSL	no	NA	--	no

Table C-7. Human Health COPC Screening for LRP 131-4L Subunit Soil Media (0-0.3 m [0-1 ft]) *(continued)*

Analyte	Detected Maximum Concentration[1]	Qualifier	Human Health Screening Value[2,6,7]	Human Health Screening Value Source	Exceeds Human Health Screening Value?	2X Average Background Concentration[3,7,8]	Exceeds 2X Average Background?[4]	COPC?[5]
***Organics** (mg/kg)*								
DI-N-BUTYL PHTHALATE	2.80E-01	J	6.30E+02	0.1xRSL	no	NA	--	no
ENDOSULFAN II	1.50E-03	J	NA	--	--	NA	--	no
FLUORANTHENE	2.60E+00		2.40E+02	0.1xRSL	no	NA	--	no
FLUORENE	4.10E-02	J	2.40E+02	0.1xRSL	no	NA	--	no
INDENO[1,2,3-CD]PYRENE	8.50E-01		1.10E+00	RSL	no	NA	--	no
METHYL ACETATE	2.64E-03	J	7.80E+03	0.1xRSL	no	NA	--	no
METHYL ETHYL KETONE	2.40E-02		2.70E+03	0.1xRSL	no	NA	--	no
N-DIOCTYL PHTHALATE	1.50E-01	J	6.30E+01	0.1xRSL	no	NA	--	no
N-NITROSODIPROPYLAMINE	4.50E-01	J	7.80E-02	RSL	YES	NA	--	**YES**
PHENANTHRENE	1.10E+00		NA	--	--	NA	--	no
PYRENE	2.30E+00		1.80E+02	0.1xRSL	no	NA	--	no
STYRENE	1.11E-03		6.00E+02	0.1xRSL	no	NA	--	no
TETRACHLOROETHYLENE (PCE)	1.22E-03		8.10E+00	0.1xRSL	no	NA	--	no
TOLUENE	4.03E-04	J	4.90E+02	0.1xRSL	no	NA	--	no
***Pesticides/PCBs** (mg/kg)*								
AROCLOR 1254	7.20E-02		1.20E-01	0.1xRSL	no	NA	--	no
DDE	1.30E-03	J	2.00E+00	RSL	no	NA	--	no
DDT	4.90E-03	J	1.90E+00	RSL	no	NA	--	no
METHOXYCHLOR	2.20E-03	J	3.20E+01	0.1xRSL	no	NA	--	no

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Table C-7. Human Health COPC Screening for LRP 131-4L Subunit Soil Media (0-0.3 m [0-1 ft]) *(continued/end)*

Analyte	Detected Maximum Concentration[1]	Qualifier	Human Health Screening Value[2,6,7]	Human Health Screening Value Source	Exceeds Human Health Screening Value?	2X Average Background Concentration[3,7,8]	Exceeds 2X Average Background?[4]	COPC?[5]
Radionuclides *(pCi/g)*								
PLUTONIUM-238	1.74E-01	J	4.28E+00	PRG	no	5.77E-01	no	no
POTASSIUM-40	5.64E+00	J	1.44E-01	PRG	YES	2.33E+00	YES	**YES**
THORIUM-232	1.14E+00		9.85E-03	PRG	YES	1.80E+00	no	no
RADIUM-228	1.47E+00		9.85E-03	+D-Th	YES	1.80E+00	no	no
ACTINIUM-228	4.18E+00		9.85E-03	+D-Th	YES	1.80E+00	YES	**YES**
THORIUM-228	1.33E+00		9.85E-03	+D-Th	YES	1.80E+00	no	no
LEAD-212	2.74E+00		9.85E-03	+D-Th	YES	1.80E+00	YES	**YES**
URANIUM-238	6.61E-01		1.25E-02	PRG	YES	1.01E+00	no	no
URANIUM-233/234	6.59E-01		1.25E-02	+D-U	YES	1.01E+00	no	no
THORIUM-230	6.15E-01		1.25E-02	+D-U	YES	1.01E+00	no	no
RADIUM-226	6.24E-01		1.25E-02	+D-U	YES	1.01E+00	no	no
LEAD-214	1.61E+00		1.25E-02	+D-U	YES	1.01E+00	YES	**YES**

1 - Maximum detected concentration from surface soil interval (0-0.3 m [0-1ft]) from Table A.4.1.
2 - Nonradiological Regional Screening Levels (RSLs) are residential soil default values from the generic USEPA RSLs website, accessed December 2023 (see Attachment C-1).Radiological Preliminary Remediation Goals (PRGs) are site-specific residential soil values derived using the USEPA Radionuclide PRGs for Superfund website calculator and eliminating the fruit and vegetable pathways. All other inputs are default parameters, accessed December 2023.(see Attachment C-2).
3 - Background screening values obtained from Background Soils Statistical Summary Report for the Savannah River Site, Table B-1, ERD-EN-2005-0223, Rev 1, October 2006, Appendix B-1 (0-1 ft interval).
4 - For screening purposes, maximum concentration of the naturally-occurring (nonanthropogenic) constituents are compared to 2X average background concentration.
5 - Constituents are identified as constituents of potential concern (COPCs) if the maximum detected concentration exceeds the human health screening value and the 2X average background concentration (if available).
6 - RSL for hexavalent chromium (most conservative) used.
7 - Radionuclides take into account secular equilibrium and therefore the parent PRG was used to screen the entire decay for the thorium-232 and uranium-238 series. If any of the radionuclides in the decay chain are identified as COPCs the parent nuclide is carried forward for risk calculations.
8 - Background concentration for total chromium used.

EN - essential nutrient
NA - not available

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Table C-8. Human Health Risk/Hazard Calculation for LRP 131-4L Subunit Soil Media (0-0.3 m [0-1 ft]) Residential Scenario

Analyte[1]	Exposure Point Concentration[2,7]	Residential RSL/PRG[3,8]	Residential Hazard Estimate[4]	Residential Risk Estimate[5]	Target Organ	COC?[6]
Noncarcinogenic Hazard Estimate						
Chemical Constituents *(mg/kg)*						
ALUMINUM	1.31E+04	7.74E+04	1.69E-01	--	Neurological	no
ARSENIC	2.45E+00	3.49E+01	7.01E-02	--	Dermal	no
CHROMIUM	1.41E+01	2.34E+02	6.03E-02	--	Other	no
COPPER	3.64E+01	3.13E+03	1.16E-02	--	Gastrointestinal	no
CYANIDE	1.63E+00	2.28E+01	7.16E-02	--	Reproductive	no
IRON	9.84E+03	5.48E+04	1.80E-01	--	Hepatic	no
MANGANESE	4.55E+01	1.83E+03	2.49E-02	--	Neurological	no
VANADIUM	2.65E+01	3.93E+02	6.74E-02	--	Dermal	no
BENZO[A]PYRENE	1.64E-01	1.78E+01	9.21E-03	--	Developmental	no
	Total Hazard Index (HI)=		**6.64E-01**			
Carcinogenic Risk Estimate						
Chemical Constituents *(mg/kg)*						
ARSENIC	2.45E+00	6.77E-01	--	3.62E-06	NA	**YES**
CHROMIUM	1.41E+01	3.01E-01	--	4.69E-05	NA	**YES**
BENZO[A]ANTHRACENE	9.48E-02	1.13E+00	--	8.39E-08	NA	no
BENZO[A]PYRENE	1.64E-01	1.15E-01	--	1.43E-06	NA	**YES**
BENZO[B]FLUORANTHENE	3.98E-01	1.15E+00	--	3.46E-07	NA	no
DIBENZ[AH]ANTHRACENE	3.92E-02	1.15E-01	--	3.41E-07	NA	no
N-NITROSODIPROPYLAMINE	4.50E-01	7.75E-02	--	5.81E-06	NA	**YES**
		Total Chemical Risk =		**5.85E-05**		

Table C-8. Human Health Risk/Hazard Calculation for LRP 131-4L Subunit Soil Media (0-0.3 m [0-1 ft]) Residential Scenario (*continued/end)*

Analyte[1]	Exposure Point Concentration[2,7]	Residential RSL/PRG[3,8]	Residential Hazard Estimate[4]	Residential Risk Estimate[5]	Target Organ	COC?[6]
Radionuclide Constituents *(pCi/g)*						
POTASSIUM-40	5.64E+00	1.44E-01	--	3.92E-05	NA	**YES**
THORIUM-232	4.18E+00	9.85E-03	--	4.24E-04	NA	**YES**
URANIUM-238	1.61E+00	1.25E-02	--	1.29E-04	NA	**YES**
		Total Radionuclide Risk =		**5.92E-04**		
		Total Media Risk =		**6.51E-04**		

1 - Analytes from Table C-7 that were identified as constituents of potential concern (COPCs).
2 - EPC - reasonable maximum exposure (RME) exposure point concentration (EPC) is the lesser of the maximum detected concentration and the 95% upper confidence limit (UCL) on the mean concentration (see Table A.4.1).
3 - Nonradiological Regional Screening Levels (RSLs) are residential soil default values from the USEPA RSLs website, accessed December 2023 (see Attachment C-1). Radiological Preliminary Remediation Goals (PRGs) are site-specific residential soil values derived using the USEPA Radionuclide PRGs for Superfund website calculator and eliminating the fruit and vegetable pathways. All other inputs are default parameters, accessed December 2023.(see Attachment C-2).
4 - Residential Hazard Estimate = EPC/RSL
5 - Residential Risk Estimate = (EPC/[RSL or PRG])*1E-06
6 - For noncarcinogens, no constituents are identified as constituents of concern (COCs) if the total media Hazard Index (HI) < 1. If the total media HI ≥ 1, then the constituents are segregated based on relevant target organs. Hazard quotients (HQs) are summed according to target organs. Constituents are identified as COCs if the total organ HI > 1. For carcinogens, constituents are identified as COCs if the individual cancer risk ≥ 1E-06.
7 - For radionuclides within a decay chain (i.e., thorium-232 and uranium-238) the most conservative EPC (highest activity) within each series is used to estimate the risk. Risk is calculated using parent PRG.
8 -RSL for hexavalent chromium (most conservative) used.

NA - not applicable

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Table C-9. Human Health Risk/Hazard Calculation for LRP 131-4L Subunit Soil Media (0-0.3 m [0-1 ft]) Industrial Scenario

Analyte[1]	Exposure Point Concentration[2,7]	Industrial RSL/PRG[3,8]	Industrial Hazard Estimate[4]	Industrial Risk Estimate[5]	Target Organ	COC?[6]
Noncarcinogenic Hazard Estimate						
Chemical Constituents *(mg/kg)*						
ALUMINUM	1.31E+04	1.12E+06	1.17E-02	--	Neurological	no
ARSENIC	2.45E+00	4.79E+02	5.11E-03	--	Dermal	no
CHROMIUM	1.41E+01	3.48E+03	4.05E-03	--	Other	no
COPPER	3.64E+01	4.67E+04	7.80E-04	--	Gastrointestinal	no
CYANIDE	1.63E+00	1.47E+02	1.11E-02	--	Reproductive	no
IRON	9.84E+03	8.18E+05	1.20E-02	--	Hepatic	no
MANGANESE	4.55E+01	2.56E+04	1.78E-03	--	Neurological	no
VANADIUM	2.65E+01	5.83E+03	4.54E-03	--	Dermal	no
BENZO[A]PYRENE	1.64E-01	2.22E+02	7.39E-04	--	Developmental	no
	Total Hazard Index (HI) =		**5.18E-02**			
Carcinogenic Risk Estimate						
Chemical Constituents *(mg/kg)*						
ARSENIC	2.45E+00	3.00E+00	--	8.16E-07	NA	no
CHROMIUM	1.41E+01	6.33E+00	--	2.23E-06	NA	**YES**
BENZO[A]ANTHRACENE	9.48E-02	2.06E+01	--	4.60E-09	NA	no
BENZO[A]PYRENE	1.64E-01	2.11E+00	--	7.77E-08	NA	no
BENZO[B]FLUORANTHENE	3.98E-01	2.11E+01	--	1.89E-08	NA	no
DIBENZ[AH]ANTHRACENE	3.92E-02	2.11E+00	--	1.86E-08	NA	no
N-NITROSODIPROPYLAMINE	4.50E-01	3.28E-01	--	1.37E-06	NA	**YES**
		Total Chemical Risk =		**4.54E-06**		

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Table C-9. Human Health Risk/Hazard Calculation for LRP 131-4L Subunit Soil Media (0-0.3 m [0-1 ft]) Industrial Scenario *(continued/end)*

Analyte[1]	Exposure Point Concentration[2,7]	Industrial RSL/PRG[3,8]	Industrial Hazard Estimate[4]	Industrial Risk Estimate[5]	Target Organ	COC?[6]
Radionuclide Constituents *(pCi/g)*						
POTASSIUM-40	5.64E+00	2.19E-01	--	2.58E-05	NA	**YES**
THORIUM-232	4.18E+00	1.53E-02	--	2.74E-04	NA	**YES**
URANIUM-238	1.61E+00	2.00E-02	--	8.06E-05	NA	**YES**
		Total Radionuclide Risk =		**3.80E-04**		
		Total Media Risk =		**3.85E-04**		

1 - Analytes from Table C-7 that were identified as constituents of potential concern (COPCs).
2 - EPC - reasonable maximum exposure (RME) exposure point concentration (EPC) is the lesser of the maximum detected concentration and the 95% upper confidence limit (UCL) on the mean concentration (see Table A.4.1).
3 - Nonradiological Regional Screening Levels (RSLs) are industrial soil default values from the USEPA RSLs website, accessed December 2023 (see Attachment C-1). Radiological Preliminary Remediation Goals (PRGs) are industrial soil default values from the USEPA Radionuclide PRGs for Superfund website, accessed December 2023 (see Attachment C-3).
4 - Industrial Hazard Estimate = EPC/RSL
5 - Industrial Risk Estimate = (EPC/[RSL or PRG])*1E-06
6 - For noncarcinogens, no constituents are identified as constituents of concern (COCs) if the total media Hazard Index (HI) < 1. If the total media HI ≥ 1, then the constituents are segregated based on relevant target organs. Hazard quotients (HQs) are summed according to target organs. Constituents are identified as COCs if the total organ HI > 1. For carcinogens, constituents are identified as COCs if the individual cancer risk ≥ 1E-06.
7 - For radionuclides within a decay chain (i.e., thorium-232 and uranium-238) the most conservative EPC (highest activity) within each series is used to estimate the risk. Risk is calculated using parent PRG.
8 - RSL for hexavalent chromium (most conservative) used.

NA - not applicable

Attachment C-1. USEPA Regional Screening Levels Table

RSLs for Default Resident and Default Industrial Worker Scenarios

(November 2023)
Website accessed December 2023

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Attachment C-1. USEPA Regional Screening Levels Table RSLs for Default Resident and Default Industrial Worker Scenarios (November 2023)

SFO (mg/kg-day)$^{-1}$	key	IUR (µg/m^3)$^{-1}$	key	RfD$_o$ (mg/kg-day)	key	RfC$_i$ (mg/m^3)	key	VOC	Analyte	CAS No.	Resident Soil (mg/kg)	key	Industrial Soil (mg/kg)	key	Tap Water (µg/L)	key	MCL (µg/L)
Inorganics																	
				1.0E+00	P	5.0E-03	P		Aluminum	7429-90-5	7.7E+04	n	1.1E+06	nm	2.0E+04	n	
				4.0E-04	I	3.0E-04	A		Antimony (metallic)	7440-36-0	3.1E+01	n	4.7E+02	n	7.8E+00	n	6.0E+00
1.5E+00	I	4.3E-03	I	3.0E-04	I	1.5E-05	C		Arsenic, Inorganic	7440-38-2	6.8E-01	c*G	3.0E+00	cG	5.2E-02	c	1.0E+01
				2.0E-01	I	5.0E-04	H		Barium	7440-39-3	1.5E+04	n	2.2E+05	nm	3.8E+03	n	2.0E+03
		2.4E-03	I	2.0E-03	I	2.0E-05	I		Beryllium and compounds	7440-41-7	1.6E+02	n	2.3E+03	n	2.5E+01	n	4.0E+00
		1.8E-03	I	1.0E-04	A	1.0E-05	A		Cadmium (Diet)	7440-43-9	7.1E+00	n	1.0E+02	n			
5.0E-01	C	8.4E-02	G	3.0E-03	I	1.0E-04	I		Chromium (VI)	18540-29-9	3.0E-01	c	6.3E+00	c	3.5E-02	c	
		9.0E-03	P	3.0E-04	P	6.0E-06	P		Cobalt	7440-48-4	2.3E+01	n	3.5E+02	n	6.0E+00	n	
				4.0E-02	H				Copper	7440-50-8	3.1E+03	n	4.7E+04	n	8.0E+02	n	1.3E+03
				6.0E-04	I	8.0E-04	G	V	Cyanide (CN-)	57-12-5	2.3E+01	n	1.5E+02	n	1.5E+00	n	2.0E+02
				7.0E-01	P				Iron	7439-89-6	5.5E+04	n	8.2E+05	nm	1.4E+04	n	
									Lead and Compounds	7439-92-1	4.0E+02	G	8.0E+02	G	1.5E+01	G	1.5E+01
				2.4E-02	G	5.0E-05	I		Manganese (Non-diet)	7439-96-5	1.8E+03	n	2.6E+04	n	4.3E+02	n	
						3.0E-04	I	V	Mercury (elemental)	7439-97-6	1.1E+01	ns	4.6E+01	ns	6.3E-01	n	2.0E+00
		2.6E-04	C	2.0E-02	I	1.4E-05	C		Nickel Soluble Salts	7440-02-0	1.4E+03	n	1.8E+04	n	3.9E+02	n	
				5.0E-03	I	2.0E-02	C		Selenium	7782-49-2	3.9E+02	n	5.8E+03	n	1.0E+02	n	5.0E+01
				5.0E-03	I				Silver	7440-22-4	3.9E+02	n	5.8E+03	n	9.4E+01	n	
				1.0E-05	X				Thallium (Soluble Salts)	7440-28-0	7.8E-01	n	1.2E+01	n	2.0E-01	n	2.0E+00
				5.0E-03	G	1.0E-04	A		Vanadium and Compounds	7440-62-2	3.9E+02	n	5.8E+03	n	8.6E+01	n	
				3.0E-01	I				Zinc and Compounds	7440-66-6	2.3E+04	n	3.5E+05	nm	6.0E+03	n	
Organics																	
				9.0E-01	I			V	Acetone	67-64-1	7.0E+04	n	1.1E+06	nms	1.8E+04	n	
				6.0E-02	I			V	Acenaphthene	83-32-9	3.6E+03	n	4.5E+04	n	5.3E+02	n	
				3.0E-01	I			V	Anthracene	120-12-7	1.8E+04	n	2.3E+05	nm	1.8E+03	n	
1.0E-01	E	6.0E-05	E					V	Benz[a]anthracene	56-55-3	1.1E+00	c	2.1E+01	c	3.0E-02	c	
4.0E-03	P			1.0E-01	I			V	Benzaldehyde	100-52-7	1.7E+02	c*	8.2E+02	c	1.9E+01	c	
5.5E-02	I	7.8E-06	I	4.0E-03	I	3.0E-02	I	V	Benzene	71-43-2	1.2E+00	c*	5.1E+00	c*	4.6E-01	c*	5.0E+00

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Attachment C-1. USEPA Regional Screening Levels Table *RSLs for Default Resident and Default Industrial Worker Scenarios* (November 2023) *(continued)*

SFO (mg/kg-day)$^{-1}$	key	IUR (µg/m3)$^{-1}$	key	RfDo (mg/kg-day)	key	RfCi (mg/m3)	key	VOC	Analyte	CAS No.	Resident Soil (mg/kg)	key	Industrial Soil (mg/kg)	key	Tap Water (µg/L)	key	MCL (µg/L)
Organics (continued)																	
1.0E+00	I	6.0E-04	I	3.0E-04	I	2.0E-06	I		Benzo[a]pyrene	50-32-8	1.1E-01	c	2.1E+00	c	2.5E-02	c	2.0E-01
1.0E-01	E	6.0E-05	E						Benzo[b]fluoranthene	205-99-2	1.1E+00	c	2.1E+01	c	2.5E-01	c	
1.0E-02	E	6.0E-06	E						Benzo[k]fluoranthene	207-08-9	1.1E+01	c	2.1E+02	c	2.5E+00	c	
1.4E-02	I	2.4E-06	C	2.0E-02	I				Bis(2-ethylhexyl)phthalate	117-81-7	3.9E+01	c*	1.6E+02	c	5.6E+00	c*	6.0E+00
				1.0E-01	I	7.0E-01	I	V	Carbon Disulfide	75-15-0	7.7E+02	ns	3.5E+03	ns	8.1E+02	n	
1.0E-03	E	6.0E-07	E						Chrysene	218-01-9	1.1E+02	c	2.1E+03	c	2.5E+01	c	
				1.0E-01	I	4.0E-01	I	V	Cumene	98-82-8	1.9E+03	ns	9.9E+03	ns	4.5E+02	n	
1.0E+00	E	6.0E-04	E						Dibenz[a,h]anthracene	53-70-3	1.1E-01	c	2.1E+00	c	2.5E-02	c	
				1.0E-03	X			V	Dibenzofuran	132-64-9	7.8E+01	n	1.2E+03	n	7.9E+00	n	
				1.0E-01	I				Dibutyl Phthalate	84-74-2	6.3E+03	n	8.2E+04	n	9.0E+02	n	
				5.0E-02	I	2.0E-01	I	V	Dichloroethylene, 1,1-	75-35-4	2.3E+02	n	1.0E+03	n	2.8E+02	n	7.0E+00
				8.0E-01	I				Diethyl Phthalate	84-66-2	5.1E+04	n	6.6E+05	nm	1.5E+04	n	
				4.0E-02	I				Fluoranthene	206-44-0	2.4E+03	n	3.0E+04	n	8.0E+02	n	
				4.0E-02	I			V	Fluorene	86-73-7	2.4E+03	n	3.0E+04	n	2.9E+02	n	
				5.0E-03	I	3.0E-02	I	V	Hexanone, 2-	591-78-6	2.0E+02	n	1.3E+03	n	3.8E+01	n	
1.0E-01	E	6.0E-05	E						Indeno[1,2,3-cd]pyrene	193-39-5	1.1E+00	c	2.1E+01	c	2.5E-01	c	
				1.0E+00	X			V	Methyl Acetate	79-20-9	7.8E+04	ns	1.2E+06	nms	2.0E+04	n	
				6.0E-01	I	5.0E+00	I	V	Methyl Ethyl Ketone (2-Butanone)	78-93-3	2.7E+04	n	1.9E+05	nms	5.6E+03	n	
1.8E-03	C	2.6E-07	C			3.0E+00	I	V	Methyl tert-Butyl Ether (MTBE)	1634-04-4	4.7E+01	c	2.1E+02	c	1.4E+01	c	
2.0E-03	I	1.0E-08	I	6.0E-03	I	6.0E-01	I	V	Methylene Chloride	75-09-2	5.7E+01	c**	1.0E+03	c**	1.1E+01	c**	5.0E+00
7.0E+00	I	2.0E-03	C						Nitroso-di-N-propylamine, N-	621-64-7	7.8E-02	c	3.3E-01	c	1.1E-02	c	
				1.0E-02	P				Octyl Phthalate, di-N-	117-84-0	6.3E+02	n	8.2E+03	n	2.0E+02	n	
				2.0E-03	X				Picric Acid (2,4,6-Trinitrophenol)	88-89-1	1.3E+02	n	1.6E+03	n	4.0E+01	n	
				3.0E-02	I			V	Pyrene	129-00-0	1.8E+03	n	2.3E+04	n	1.2E+02	n	
				2.0E-01	I	1.0E+00	I	V	Styrene	100-42-5	6.0E+03	ns	3.5E+04	ns	1.2E+03	n	1.0E+02
2.1E-03	I	2.6E-07	I	6.0E-03	I	4.0E-02	I	V	Tetrachloroethylene	127-18-4	2.4E+01	c**	1.0E+02	c**	1.1E+01	c**	5.0E+00
				8.0E-02	I	5.0E+00	I	V	Toluene	108-88-3	4.9E+03	ns	4.7E+04	ns	1.1E+03	n	1.0E+03
				2.0E-01	I	1.0E-01	I	V	Xylenes	1330-20-7	5.8E+02	ns	2.5E+03	ns	1.9E+02	n	1.0E+04

Attachment C-1. USEPA Regional Screening Levels Table *RSLs for Default Resident and Default Industrial Worker Scenarios* (November 2023) *(continued/end)*

SFO (mg/kg-day)$^{-1}$	key	IUR (µg/m3)$^{-1}$	key	RfDo (mg/kg-day)	key	RfCi (mg/m3)	key	VOC	Analyte	CAS No.	Resident Soil (mg/kg)	key	Industrial Soil (mg/kg)	key	Tap Water (µg/L)	key	MCL (µg/L)
Pesticides/PCBs																	
2.0E+00	G	5.7E-04	G	2.0E-05	I			V	Aroclor 1254	11097-69-1	2.4E-01	c**	9.7E-01	c*	7.8E-03	c*	
2.0E+00	G	5.7E-04	G					V	Aroclor 1260	11096-82-5	2.4E-01	c	9.9E-01	c	7.8E-03	c	
3.4E-01	I	9.7E-05	C	5.0E-04	A			V	Dichlorodiphenyldichloroethylene, p,p`- (DDE)	72-55-9	2.0E+00	c*	9.3E+00	c*	4.6E-02	c	
3.4E-01	I	9.7E-05	I	5.0E-04	I				Dichlorodiphenyltrichloroethane, p,p`- (DDT)	50-29-3	1.9E+00	c*	8.5E+00	c*	2.3E-01	c*	
				5.0E-03	I				Methoxychlor	72-43-5	3.2E+02	n	4.1E+03	n	3.7E+01	n	4.0E+01

A = Agency for Toxic Substances and Disease Registry (ATSDR)
C = California EPA
C_{sat} = soil saturation concentration
E = Relative Potency Factor
G = User's Guide
H = Health Effects Assessment Summary Tables (HEAST)
I = Integrated Risk Information System (IRIS)
P = Provisional Peer-Reviewed Toxicity Values
X = Provisional Peer-Reviewed Toxicity Values
c = cancer
n = noncancer
* = where: n SL < 100X c SL
** = where n SL < 10X c SL
R = Relative Bioavailability (RBA)
m = ceiling limit exceeded
s = C_{sat} exceeded
SFO = oral slope factor
IUR = inhalation unit risk
RfDo = chronic oral reference dose
RfCi = chronic inhalation reference concentration
SL = screening level
V = volatile organic compound
MCL = maximum contaminant level

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Attachment C-2. USEPA Radionuclide Preliminary Remediation Goals Table - Site-Specific PRGs for Resident Scenario

(February 2023)
(Website accessed December 2023)

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Attachment C-2A. Site-Specific Resident Equation Inputs for Soil

Variable	Site-Specific Value	Variable	Site-Specific Value
A (PEF Dispersion Constant)	16.2302	ET_{res-i} (soil exposure time - indoor resident) hr/day	16.416
B (PEF Dispersion Constant)	18.7762	ET_{res-o} (soil exposure time - outdoor resident) hr/day	1.752
City (Climate Zone)	Default	GSF_i (gamma shielding factor - indoor) unitless	0.4
C (PEF Dispersion Constant)	216.108	$IFA_{res-adj}$ (age-adjusted soil inhalation factor - resident) m^3	161000
Cover thickness for GSF_o (gamma shielding factor) cm	0 cm	$IFS_{res-adj}$ (age-adjusted soil ingestion factor - resident) mg	1120000
Cover thickness for GSF_b (gamma shielding factor) cm	0 cm	IRA_{res-a} (soil inhalation rate - resident adult) m^3/day	20
$CF_{res-produce}$ (contaminated plant fraction) unitless	0	IRA_{res-c} (soil inhalation rate - resident child) m^3/day	10
ED_{res-a} (produce exposure duration - resident adult) yr	0	IRS_{res-a} (soil intake rate - resident adult) mg/day	100
ED_{res-c} (produce exposure duration - resident child) yr	0	IRS_{res-c} (soil intake rate - resident child) mg/day	200
EF_{res-a} (produce exposure frequency - resident adult) day/yr	0	t_{res} (time - resident) yr	26
EF_{res-c} (produce exposure frequency - resident child) day/yr	0	TR (target cancer risk) unitless	0.000001
TR (produce target cancer risk) unitless	0.000001	Soil type	Default
F(x) (function dependent on U_m/U_t) unitless	0.194	U_m (mean annual wind speed) m/s	4.69
PEF (particulate emission factor) m^3/kg	1359344438	U_t (equivalent threshold value)	11.32
Q/C_{wind} (g/m^2-s per kg/m^3)	93.77	V (fraction of vegetative cover) unitless	0.5
A_s (acres)	0.5		
Site area for ACF (area correction factor) m^2	1000000 m^2		
ED_{res} (soil exposure duration - resident) yr	26		
ED_{res-a} (soil exposure duration - resident adult) yr	20		
ED_{res-c} (soil exposure duration - resident child) yr	6		
EF_{res} (soil exposure frequency - resident) day/yr	350		
EF_{res-a} (soil exposure frequency - resident adult) day/yr	350		
EF_{res-c} (soil exposure frequency - resident child) day/yr	350		
ET_{res} (soil exposure time - resident) hr/day	24		
ET_{res-a} (soil exposure time - resident adult) hr/day	24		
ET_{res-c} (soil exposure time - resident child) hr/day	24		

Attachment C-2B. Site-Specific Resident PRGs for Soil

Isotope	**Ingestion PRG *(pCi/g)***	**Inhalation PRG *(pCi/g)***	**External Exposure PRG *(pCi/g)***	**Total PRG *(pCi/g)***
Peak PRG for Americium-243	4.82E+00	2.28E+02	1.74E-01	1.67E-01
Peak PRG for Cesium-137	2.79E+01	9.97E+04	6.06E-02	6.05E-02
Peak PRG for Curium 245/246	4.90E+00	2.22E+02	6.45E+00	2.75E+00
Peak PRG for Plutonium-238	4.40E+00	1.79E+02	6.53E+01	4.28E+00
Peak PRG for Plutonium-239/240	3.92E+00	1.52E+02	5.54E+02	3.79E+00
Peak PRG for Potassium-40	1.53E+01	3.80E+04	1.45E-01	1.44E-01
Peak PRG for Strontium-90	8.87E+00	2.62E+04	8.00E+00	4.21E+00
Peak PRG for Thorium-232	3.08E-01	3.65E+01	1.02E-02	9.85E-03
Peak PRG for Uranium-235	6.08E-01	2.69E+01	4.96E-02	4.58E-02
Peak PRG for Uranium-238	1.44E-01	5.83E+01	1.36E-02	1.25E-02

PRG = preliminary remediation goal
* Output generated from USEPA PRGs for Superfund website calculator using Radiological PRGs site-specific residential soil values and eliminating the fruit and vegetable pathways. All other inputs are default parameters, accessed December 2023.

Attachment C-3. USEPA Radionuclide Preliminary Remediation Goals for Superfund Table - Default PRGs for Industrial Worker Scenario

(February 2023)
(Website accessed December 2023)

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Default Industrial Worker Equation Inputs for Soil

Isotope	Composite Worker Soil Total PRG* (pCi/g)
CESIUM-137	9.07E-02
POTASSIUM-40	2.19E-01
THORIUM-232	1.53E-02
URANIUM-235	2.00E-02
URANIUM-238	7.31E-02

PRG = preliminary remediation goal
*Output generated from EPA February 2023 PRG Summary Table

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APPENDIX D

ECOLOGICAL RISK ASSESSMENT

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LIST OF ABBREVIATIONS AND ACRONYMS

AUF	area use factor
BCG	Biota Concentration Guides
BHC	benzene hexacloride
COPC	constituent of potential concern
COPEC	constituent of potential ecological concern
CSM	Conceptual Site Model
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethylene
DDT	dichlorodiphenyltrichloroethane
DEHP	Bis(2-ethylhexyl)phthalate
DUR	Data Usability Report
EPC	exposure point concentration
ERA	Ecological Risk Assessment
ESL	ecological screening level
ESV	ecological screening value
ft	feet
GIS	Geographical Information System
HQ	hazard quotient
LANL	Los Alamos National Laboratory
LOAEL	Low Observed Adverse Effect Level
LRP	L-Area Rubble Pit
m	meter
mg/kg	milligram per kilogram
MTBE	methyl tertiary butyl ether
NOAEL	No Observed Adverse Effect Level
OU	operable unit
PAUF	population area use factor
PCB	polychlorinated biphenyl
PCE	tetrachloroethylene
pCi/g	picocuries per gram
RCOC	refined constituent of concern
RESRAD	RESidual RADioactivity
RME	reasonable maximum exposure
RSV	refinement screening value
SRS	Savannah River Site
TCE	trichloroethylene
TES	threatened and endangered species
UCL	upper confidence limit
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service

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D-1. INTRODUCTION

The ecological risk assessment (ERA) presented in this appendix supports the Early Construction and Operational Disposal Site (ECODS) L-3 (No Building Number [NBN]), L-Area Rubble Pile (131-1L) (LRP 131-1L) and L-Area Rubble Pile (131-4L) (LRP 131-4L) Operable Unit (OU). From this point forward, the investigation area will be referred to as the ECODS L-3, LRP 131-1L, and LRP 131-4L OU.

The ERA process is in accordance with the preliminary conceptual site models (CSMs) presented in Section 2.3 (Figures 2-12 through 2-14). The CSM is a graphical depiction of the known and suspected sources of contamination within the ECODS L-3, LRP 131-1L, and LRP 131-4L OU; the types of contaminants and potentially affected media; the known and potential routes of migrations; and the potential ecological receptors, including terrestrial receptors. Concentrations of constituents present in soil are screened in a multi-step process against screening values to determine the potential for impact to the receptor groups.

The ECODS L-3, LRP 131-1L, and LRP 131-4L OU is comprised of three subunits (Figure D-1); the ERA is conducted and presented for all of these subunits. The subunits include the ECODS L-3 Subunit, the LRP 131-1L Subunit, and the LRP 131-4L Subunit. Subunits represent geographically distinct locations within the ECODS L-3, LRP 131-1L, and LRP 131-4L OU, each of which contain environmental media to which a receptor may be exposed, allowing for the summary of data and evaluation of potential exposure. This approach allows for remedial decisions to be made on a smaller scale within the larger OU area.

D-1.1 Background

The ECODS L-3, LRP 131-1L, and LRP 131-4L OU consists of three subunits located within or near L Area (Figure D-1). Each of the subunits are described in the following subsections and include information on the environmental setting that is pertinent to the ERA. The risk assessment considers environmental media associated with the ECODS L-3, LRP 131-1L, and 131-4L OU subunits, including surface and subsurface soil.

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D-1.1.1 ECODS L-3

The ECODS L-3 Subunit was used to dispose of construction debris and other non-radioactive waste materials, such as rubble and concrete, associated with the construction and early operation of L Area. The ECODS L-3 Subunit is estimated to have been in use from November 1953 to June 1954. The original subunit was approximately 18 m (60 ft) wide by 60 m (200 ft) long. The 2002 SE effort determined the trench dimensions were actually ~15 m (50ft) wide by 27 m (90 ft) long and 4.6 m (15 ft) wide by 27 m (90 ft) long (Figure D-2). A detailed description is provided in Chapter 1 and 2.

D-1.1.2 L-Area Rubble Pile 131-1L

The LRP 131-1L Subunit was used for various non-radioactive construction debris. Typical debris disposed of in similar units includes metal, lumber, poles, and concrete. The LRP 131-1L Subunit, delineated by orange ball waste unit markers, is 12 m (40 ft) by 46 m (150 ft) (Figure D-3). A detailed description is provided in Chapters 1 and 2.

D-1.1.3 L-Area Rubble Pile 131-4L

The LRP 131-4L Subunit received inert rubble from the L-Area Powerhouse Stack and Silo demolition. The rubble consisted primarily of concrete and asphalt material with some metal. The LRP 131-4L Subunit is an unlined pit, reported to have operated from 1972 to 1983, before it was filled and seeded in 1983. The size of the subunit is considered to be approximately 36.6 m by 36.6 m (120 ft by 120 ft) (Figure D-4). A detailed description is provided in Chapter 1 and 2.

D-1.2 Data

Characterization activities for soil media for the ECODS L-3, LRP 131-1L, and 131-4L OU are described in detail in Chapter 3.

Groundwater is not part of this OU. Groundwater for this area is being addressed under the L-Area Southern Groundwater OU.

All data used in the ERA for the ECODS L-3, LRP 131-1L, and 131-4L OU are presented in Appendix A. The ProUCL (USEPA 2022) software package was used to calculate the 95% upper confidence limit (UCL) on the arithmetic mean; these data are presented in Appendix A. The data distribution and recommended 95%UCL as determined by ProUCL for each constituent are presented as footnotes to the tables in Appendix A. Non-detected constituent concentrations were processed in accordance with the ProUCL User's Guide. The LRP 131-1L and LRP 131-4L Data Usability Reports (DURs) for the 2022 Workplan Characterization Samples are presented in Appendices I.1 and I.2. The reports provide an assessment of the precision, accuracy, representativeness, comparability, and completeness data quality indicators and measurement performance criteria. The DURs concluded that that the data quality objectives were met, and that the data are considered usable for the purposes of decision-making in the Remedial Investigation/Baseline Risk Assessment. In addition, the *Site Evaluation Report for Early Construction and Operational Disposal Site (ECODS) L-3 (U)* presents a Laboratory Quality Discussion (Section IV) and a Site Evaluation Validation Report (Section V) for the samples that were collected in 2002 (WSRC 2003).

D-1.3 Habitats/Receptors/Preliminary Assessment and Measurement Endpoints

The ECODS L-3, LRP 131-1L and LRP 131-4L OU includes soil media. The ecological setting, including wildlife and habitats are discussed in Section 2.1. A review of threatened, endangered, and sensitive (TES) species survey information and Geographic Information System (GIS) data were reviewed for the ECODS L-3, LRP 131-1L, and LRP 131-4L OU. Field surveys were conducted within the vicinity of these units in 1993 and 1994 and found little in the way of specialized habitats that may support TES species. The TES survey for the L-Area Oil and Chemicals and Acid/Caustic Basins (United States Forest Service [USFS] 1993) was conducted in May 1993, showing no occurrence of any TES plant or animal populations/individuals. The survey did note that bald eagle and ospreys feed on adjacent L Lake which is ~ 750 m (2,460 ft) from the ECODS L-3 unit, the closest unit, but no observations of these species were noted in the survey. The TES survey of the L-Area Bingham Pump Outage Pit, conducted in 1994, also indicated that the vicinity of the Bingham Pump Outage Pit does not meet the needs of most SRS listed TES plants or animal species with the exception of the Loggerhead Shrike, although no observations were made for this species. No unique or sensitive ecosystems were found within the ECODS L-3, LRP 131-1L, and LRP 131-4L OU area or TES flora within the vicinity. Most SRS TES species

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are associated with Carolina bays or mesic valley conditions associated with floodplains or wetlands located within/near wet areas. The area within and around the ECODS L-3, LRP 131-1L, and LRP 131-4L OU is a modified habitat and TES species are unlikely to be present because of the modified upland habitat, disturbance, and historic use. Additionally, review of current GIS data did not reveal any TES species observations or protected areas within the vicinity of the ECODS L-3, LRP 131-1L, and LRP 131-4L OU. The habitats within the ECODS L-3, LRP 131-1L and LRP 131-4L OU support terrestrial receptors.

Assessment endpoints are tailored to groups of organisms with similar feeding strategies and/or exposure scenarios appropriate for the ECODS L-3, LRP 131-1L and LRP 131-4L OU. Based on these considerations, the following assessment and measurement endpoints and their representative receptors were selected as discussed below. The assessment endpoints are assessed by a preliminary comparison that is expressed as a hazard quotient (HQ) calculation based on the screening of ECODS L-3, LRP 131-1L and LRP 131-4L OU soil data summarized in Appendix A.:

- Protection of soil-dwelling invertebrate communities to maintain species diversity and nutrient cycling. Soil-dwelling invertebrate communities are selected because the soil invertebrate community is ecologically important, is susceptible to constituents in soil, and may be exposed at the ECODS L-3, LRP 131-1L and LRP 131-4L OU. The soil-dwelling invertebrate community is essential for decomposition of detritus and for energy and nutrient cycling. It is also an important component of the diet of insectivorous mammals and birds. Earthworms are chosen as the representative species of soil-dwelling invertebrates because they are important in promoting soil fertility, are highly exposed to soil constituents, and have toxicity information available. The measurement endpoint is a comparison of the measured constituent concentration in soil-to-earthworm toxicity benchmarks.
- Protection of herbivorous mammal communities to ensure that exposure of contaminants in forage and soils does not have a negative impact on growth, survival, and reproduction. Herbivorous mammals are ecologically important because they provide a food base for higher trophic level receptors and are susceptible to soil constituents within the

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ECODS L-3, LRP 131-1L and LRP 131-4L OU. Rabbits are chosen as the representative species of herbivorous mammals because they are exposed to soil constituents by their consumption of plant material, and they ingest soil during feeding.

- Protection of insectivorous mammal communities to ensure that exposure of contaminants in prey, forage, and soils does not have a negative impact on growth or survival. Insectivorous mammals are ecologically important because they help to control the size of the terrestrial invertebrate population that might otherwise damage populations of plant primary producers. They also are susceptible to soil constituents within the ECODS L-3, LRP 131-1L and LRP 131-4L OU. Shrews are chosen as the representative species of the insectivorous mammals because they are highly exposed to constituents by their consumption of large quantities of terrestrial invertebrates. They also ingest soil during feeding, including soil within the bodies of earthworms and other prey.

- Protection of omnivorous mammal communities to ensure that exposure of contaminants in prey, forage, and abiotic media does not have a negative impact on growth, survival, and reproduction. Mammalian omnivores are ecologically important because they consume a variety of small mammals and plants, helping balance the populations of terrestrial invertebrates, rodents, and other small mammals as well as disperse seeds for plant reproduction. They also are susceptible to soil constituents at the waste unit. The mouse was chosen as the representative receptor because of its omnivorous food habits and largely to represent the importance of rodents as a food source for higher consumers (carnivores and omnivores), making it important in the functional food web. They are ubiquitous, abundant, and ingest soil during feeding, including soil within the bodies of earthworms and other prey.

- Protection of insectivorous, herbivorous, and omnivorous bird communities to ensure that exposure of contaminants in prey, forage, surface water, and soils does not have a negative impact on growth, survival, and reproduction. Insectivorous birds are ecologically important because they help to control the size of the terrestrial invertebrate population that might otherwise damage populations of plant primary producers. American robins are chosen as the representative terrestrial species because they are representative of birds that forage for ground-dwelling invertebrates and fruits, with a relatively high potential

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exposure to contaminants from its diet. The American robin is considered in several functional roles for avian receptors: an insectivore, herbivore, and omnivore. They also ingest soil during feeding, including soil within the bodies of earthworms and other prey. The violet-green swallow is selected as the representative avian aerial insectivore because 100 percent of its diet can be assumed to come from emergent aquatic insects, which allows for the consideration of bioaccumulation from aquatic sources to a high-level avian receptor.

- Protection of carnivorous bird communities to ensure that exposure of contaminants in prey does not have a negative impact on growth, survival, and reproduction. American kestrels are selected as the representative species because abundant information has been gathered concerning the kestrel's biology, and it represents an organism with high susceptibility to contaminant biomagnification from soil via terrestrial pathways. The American kestrel is considered in two functional roles for avian receptors: intermediate carnivore and top carnivore.
- Protection of top carnivorous mammal communities to ensure that exposure of contaminants in prey does not have a negative impact on growth, survival, and reproduction. Carnivorous mammals are ecologically important because they maintain ecosystem structure and function by feeding on primary consumers (herbivores), reducing the impacts of herbivory. The fox is selected as the representative top carnivore because they represent a mammal with a relatively high contaminant biomagnification potential due to their largely carnivorous feeding habits.

The preliminary CSM for the ECODS L-3, LRP 131-1L, and LRP 131-4L OU is provided in Section 2.3 (Figures 2-12 through 2-14). Data used in this evaluation are provided in Appendix A of this document.

D-1.4 Sources of Literature-Based Thresholds

Ecological threshold levels are media- and receptor-specific values that can be used to evaluate (i.e., screen) soil data from potentially contaminated sites. The thresholds are derived from several sources and are used to evaluate potential contaminants based on No Observed Adverse Effect

Level (NOAEL) and Low Observed Adverse Effect Level (LOAEL) thresholds. The ECODS L-3, LRP 131-1L, and LRP 131-4L OU ecological screening values (ESVs) are used in the initial screening-level effects evaluation (Attachment D-1) and are based on NOAEL thresholds. For constituents that exceed ESVs and background screening, refinement screening values (RSVs) are used for the refinement-level risk calculation. The RSVs are based on LOAEL thresholds appropriate for refinement of the soil medium.

The threshold values used for the ESV and RSV assessments were derived from two sources: 1) the U.S. Environmental Protection Agency (USEPA) Region 4 Ecological Risk Assessment Supplement Guidance March 2018 Update (USEPA 2018); and 2) the Los Alamos National Laboratory (LANL) ECORISK Database Tool (LANL 2022). A brief discussion of the hierarchy of values and generic methodology used to derive values in these sources follows:

- The USEPA Region 4 Ecological Risk Assessment Supplement Guidance March 2018 Update (USEPA 2018) provides threshold values for hazardous waste sites for soil (Table 3) for non-radiological constituents and is provided in Attachment D-2, Table D-2.1 (EPA Region 4 Screening Table for *Soil Screening Values*).
    - o The soil screening values in EPA Region 4 Screening Table for *Soil Screening Values*, *Table 3* typically address toxicity through direct exposure (i.e., toxicity to soil invertebrates such as earthworms, plants, and wildlife). The hierarchy for soil benchmarks is as follows: EPA Ecological Screening levels, U.S. Department of Energy laboratories (i.e., LANL and Oak Ridge National Laboratory), and equilibrium partitioning modeled values for organic chemicals. The EPA Soil Screening Values, Table 3, (Attachment D-2, Table D.2-1) provides only a screening-level threshold for ESV threshold screening.
- LANL developed the ECORISK Database Tool (LANL 2022) to document and archive ecological screening levels. The LANL database tool includes thresholds for soil. LANL develops literature-based toxicity reference values (TRVs) for various chemical exposure pathways and using the derived TRVs as well as dose rates (for radionuclides) and other benchmarks, LANL calculated No Effect and Low Effect ecological screening levels (ESLs) for various media and receptors. Details of this process are described in *Toxicity*

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Reference Value Development Methods for the Los Alamos National Laboratory (LANL 2014). The ECORISK Database Tool compiles the resulting No Effect and Low Effect ESLs by media (surface water, sediment, soil) and receptor. The minimum ESL available from all receptors for a given media and constituent was used as the threshold level as follows: the minimum No Effect ESL was used as the threshold for the screening-level assessment, and the minimum Low Effect ESL was used as the threshold for the refinement-level assessment. The LANL screening values for the soil medium are provided in Attachment D-3, Table D.3-1.

The screening values derived from these sources are compared in the tables that are presented in Attachment D-1. The derived ESV/RSV for a given constituent are identified by source as follows:

- Table D.1-1. Derivations of Screening-Level ESVs for Soil Media – No Effect
    - The source of the "EPA R4 Soil" column is the Screening-Level column from EPA Table 3 for soils (Attachment D-2); and
    - The source of the "LANL Soil" column is the LANL ECORISK Database No Effect ESL for soil from Attachment D-3, Table D.3-1.
- Table D.1-2. Derivations of Refinement-Level RSVs for Soil Media - Low Effect
    - There are no EPA Region 4 RSV values for soil, so "NA" is listed under "EPA R4 Soil"
    - The source of the "LANL Soil" column is the LANL ECORISK Database Low Effect ESL for soil from Attachment D-3, Table D.3-1.

D-2. ECOLOGICAL RISK ASSESSMENT PROCESS

This ECODS L-3, LRP 131-1L, and LRP 131-4L OU ERA consists of steps designed to provide a scientifically based and defensible assessment of exposure and hazard assessment for ecological receptors that will support a risk management decision regarding site remediation. The ERA for the ECODS L-3, LRP 131-1L, and LRP 131-4L OU includes a screening-level ecological effects evaluation (Section D.2.1) in which constituent concentrations in soil media are compared to relevant ecological screening levels; constituents that exceed ESVs or that have no ESV are

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considered contaminants of potential ecological concern (COPECs). COPECs that result from the screening-level evaluation are carried forward to a refinement-level risk (hazard) calculation (Section D.2.2) in which refinement level HQs are calculated for each COPEC. The refinement-level screening is based on LOAEL or chronic level thresholds and the 95% UCL on the mean. Constituents that fail the refinement-level screening are considered constituents of potential concern (COPCs). Uncertainties associated with the screening thresholds, background concentrations, nature and extent of contamination, age of data, or constituents that result from the screening and refinement processes are discussed in an uncertainty evaluation presented in Section D.2.3. The uncertainty discussion concludes with a determination of whether the constituent should or should not be considered a refined constituent of concern (RCOC). If RCOCs are identified, final action consideration is warranted.

D-2.1 Screening-Level Effects Evaluation

The purpose of the ecological screening-level effects evaluation for the ECODS L-3, LRP 131-1L, and LRP 131-4L OU is to conduct a conservative screen to identify constituents that may pose unacceptable risk to ecological receptors. The screening level evaluation is the initial step in determining constituents that require further evaluation. Screening is conducted by comparing the maximum concentration to the ESVs found in Attachment D-1, Tables D.1-1 (ESV screening) and D.1-2 (RSV screening) and to two times the average Savannah River Site (SRS) background level (soil media only). The maximum and data summary statistical values for each constituent with detected results for each subunit are presented in Appendix A as follows:

ECODS L-3

- Table A.2.1. ECODS L-3 Subunit Soil 0 to 0.3 m (0 to 1 ft)
- Table A.2.2. ECODS L-3 Subunit Soil 0.3 to 1.2 m (1 to 4 ft)

LRP 131-1L

- Table A.3.1. LRP 131-1L Subunit Soil 0 to 0.3 m (0 to 1 ft)
- Table A.3.2. LRP 131-1L Subunit Soil 0.3 to 1.2 m (1 to 4 ft)

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LRP 131-4L

- Table A.4.1. LRP 131-4L Subunit Soil 0 to 0.3 m (0 to 1 ft)
- Table A.4.2. LRP 131-4L Subunit Soil 0.3 to 1.2 m (1 to 4 ft)

The background data used in the screening level effects evaluation for soils are taken the from *Background Soils Statistical Summary Report for the Savannah River Site* (WSRC 2006). The report provides statistical summaries for many naturally occurring constituents at SRS.

Since maximum media concentrations are used in this step of the process, the assumption is made that ecological receptors are exposed to the highest (i.e., worst) concentration of a given constituent present at the unit. The combination of maximum media concentrations and conservative threshold values provide confidence that the COPCs resulting from the screenings are indeed protective.

Constituents that are recognized as essential nutrients (calcium, magnesium, potassium, and sodium) are identified as such and are not subject to further evaluation. These constituents are deemed necessary for life processes, therefore, consumption from natural sources is deemed not to be detrimental.

The ecological effects evaluation identifies the potential for adverse ecological effects based on conservative assumptions. The most conservative value (i.e., lowest concentration) between the EPA Region 4 and the NOAEL-based LANL values are used to conduct the screening-level assessment to ecological health.

The ecological effects evaluation identifies the potential for adverse ecological effects based on conservative assumptions. The most conservative value (i.e., lowest concentration) between the EPA Region 4 and the NOAEL-based LANL values are used to conduct the screening-level assessment.

D-2.1.1 ESV Screening - Soil Media

The screening evaluation process is outlined below:

Compare the unit maximum detected concentration to the ESV concentration (No Effect Screening Level) for the surface interval (0 to 0.3 m [0 to 1 ft]) and subsurface interval (0.3 to

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1.2 m [1 to 4 ft]) and calculate a screening level HQ for each interval. Calculation of the HQ is illustrated in the equation below:

$$HQ = Maximum/(NOAEL - based\ ESV)$$

- Compare the unit maximum concentration of the naturally-occurring (non-anthropogenic) constituents for each interval to two times the average SRS background concentration (WSRC 2006)
- Constituents exceeding the ESV (i.e., HQ >1), or those with no ESV and exceeding the background screen, are identified as COPECs and are carried forward to step D.2.2. Constituents that are not identified as COPECs are dropped from further evaluation.

Tables summarizing the ecological screening-level effects evaluation for the ECODS L-3, LRP 131-1L, and 131-4L OU are as follows:

- Table D-1 (for soil, 0 to 0.3 m [0 to 1 ft] interval in the ECODS L-3 Subunit)
- Table D-3 (for soil, 0.3 to 1.2 m [1 to 4 ft] interval in the ECODS L-3 Subunit)
- Table D-5 (for soil, 0 to 0.3 m [0 to 1 ft] interval in LRP 131-1L Subunit)
- Table D-7 (for soil, 0.3 to 1.2 m [1 to 4 ft] interval in the LRP 131-1L Subunit)
- Table D-9 (for soil, 0 to 0.3 m [0 to 1 ft] interval in the LRP 131-4L Subunit)
- Table D-11 (for soil, 0.3 to 1.2 m [1 to 4 ft] interval in the LRP 131-4L Subunit)

The refinement tables are discussed below in Section D.2.2.

D-2.2 Refinement-Level Risk (Hazard) Calculation

The refinement evaluation uses the RSVs found in Attachment D-1 Table D.1-2. Because of the conservative approach of the initial screening-level evaluation (i.e., ESV screening), some of the constituents identified for further evaluation may or may not pose a possible unacceptable risk to ecological receptors. The refined screening process applies a more realistic approach to screening to further refine the list to those constituents that require further discussion and scrutiny. The method used to further refine ecological COPCs is based on the calculation of a refinement-level

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HQ by comparing the Exposure Point Concentration (EPC) to a LOAEL RSV. LOAEL-based RSVs are derived from Low Effect ESLs. The EPC is represented by the lower of the 95% UCL on the mean and maximum detected concentrations. Calculation of the HQ is illustrated in the equation below:

$$HQ = EPC/(LOAEL - based\ RSV)$$

Constituents with an HQ >1 are further discussed in Section D.2.3.

D-2.2.1 RSV Screening - Soil Media

For the COPECs identified in Section D.2.1.1, the refinement level process is outlined below:

- Calculate a refinement level HQ using the EPC and RSV (LOAEL-based ESL).
- Carry forward constituents with refinement-levels HQ > 1 or with no RSV identified as COPCs to Section D.2.3. Constituents that are not identified as COPCs are dropped from further evaluation.

D-2.3 Results/Refinement of Constituents of Concern

The refinement level risk calculation is based on LOAEL thresholds. Constituents that fail the refinement-level screening are considered COPCs. Tables summarizing the ecological refinement-level effects evaluation for the ECODS L-3, LRP 131-1L, and 131-4L OU subunits are as follows:

- Table D-2 (for soil 0 to 0.3 m [0 to 1 ft] interval in the ECODS L-3 Subunit)
- Table D-4 (for soil 0.3 to 1.2 m [1 to 4 ft] interval in the ECODS L-3 Subunit)
- Table D-6 (for soil 0 to 0.3 m [0 to 1 ft] interval in the LRP 131-1L Subunit)
- Table D-8 (for soil 0.3 to 1.2 m [1 to 4 ft] interval in the LRP 131-1L Subunit)
- Table D-10 (for soil 0 to 0.3 m [0 to 1 ft] interval in the LRP 131-4L Subunit)
- Table D-12 (for soil 0.3 to 1.2 m [1 to 4 ft] interval in the LRP 131-4L Subunit)

There is uncertainty associated with the ESVs and TRVs used in this ERA because the toxicity data are not unit specific. There are also limitations in toxicity values from the established sources

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used that may not include variations in physiological or biochemical factors that may influence the risk among species, behavioral and ecological parameters that may make a species' sensitivity to a contaminant different from that of the test organism, limited information on long-term effects on natural populations, or the exposure of the receptors based on contaminant distribution within the landscape in relation to the receptors' movement/exposure within the landscape. In addition, the ERA estimates the risk to populations of ecological receptors from individual contaminants and although cumulative risk is possible with exposure to multiple contaminants simultaneously, these effects are not addressed and can be antagonistic or synergistic resulting in differing threats from exposure. Finally, the lack of toxicity thresholds adds to the uncertainty of assessing risk. If ESVs/TRVs are not available, there is uncertainty in assessing the risk to receptors because of the lack of thresholds from which to compare and is documented in the lines of evidence presented in the uncertainty discussion. These uncertainties may under- or over-represent the risk to receptors, but the ERA presented herein follows the currently accepted approach and methodologies to assessing risk to support informed management decisions for the ECODS L-3, LRP 131-1L, and LRP 131-4L OU.

Uncertainties associated with the screening thresholds, background concentrations, nature and extent of contamination, age of data, or constituents that result from the screening and refinement processes are discussed in the uncertainty evaluation presented below. The uncertainty discussion concludes with a determination of whether the constituent is considered a RCOC. The major categories of uncertainty used in this evaluation and the major emphasis include the following:

- Unit-related uncertainty, which includes uncertainties related to the nature and extent of contamination, consistency with history of use, and presence in background;
- Data quality uncertainty and risk assessment uncertainties, which include uncertainties related to data quality and physical characteristics; and
- Risk assessment uncertainty, which includes uncertainties related to toxicity data and changes in constituent activity concentrations due to radioactive decay.

Using the three considerations described above, the COPCs identified in Section D.2.3 are further evaluated to generate the results of the ERA as presented below by subunit.

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In the uncertainty evaluation, exposure area concentrations are compared to background concentrations as one line of evidence to assist in the identification of RCOCs. A brief description of the primary sources of background information is provided below:

- *Background Soils Statistical Summary Report for the Savannah River Site* (WSRC 2006) provides statistical summaries for many naturally-occurring constituents at SRS. The all-depth interval is the primary source of information used in this evaluation.

As an additional line of evidence, toxicity uncertainty is addressed for radionuclides with no available ESLs by comparing unit activity concentrations to Tier 3 Biota Concentration Guides (BCGs) generated from the RESidual RADioactivity (RESRAD) BIOTA database (Argonne National Laboratory [ANL] 2006), which is provided in Attachment D-5. The RESRAD Tier 3 values were generated by Savannah River National Laboratory based on the most conservative activity for each nuclide available for terrestrial systems (terrestrial animals and terrestrial plants) and aquatic systems (aquatic animals and riparian animals) (SRNL 2018).

In this ERA, average unit concentrations are given more significance than maximum concentrations since the wildlife receptors under consideration are not sedentary and their exposure is over a larger area than that encountered at a single sampling location. The exception to the assumption of non-sedentary behavior are soil invertebrates (i.e., earthworm). However, this is offset by the fact that the soil invertebrate endpoints are established at the community-level, and effects caused by a maximum concentration at a single location would not cause community-level impacts.

As a protective assumption appropriate for ecological risk screening, the area use factor (AUF) is set to 1 when calculating the HQ, making the conservative assumption that the organism receives all of its exposure from the contaminated site. This approach may overestimate risks to receptors whose home ranges are larger than the area of contamination being evaluated. To account for this overestimation of risk, the HQ can be modified by applying a population area use factor (PAUF), which uses the estimated area occupied by the population of a receptor species to assess the likelihood of any individual within the assessment population encountering the contaminated area. The PAUF is calculated based on the ratio of the subunit area to the known home range of the receptor (Mirenda 2012) to reflect the fact that receptors utilize an area beyond just the contaminated site. Calculated AUFs based on ECODS L-3, LRP 131-1L, and LRP 131-4L OU subunit areas can be found in Attachment D-6. PAUF-adjusted HQs based on mean concentrations are discussed in the uncertainty section and presented in Attachment D-7.

D-2.3.1 ECODS L-3 Subunit

Results of the ESV screening (Step D.2.1), refinement-level risk calculations (Step D.2.2), and a discussion of associated uncertainties for each constituent of potential concern for the ECODS L-3 Subunit are provided below.

D-2.3.1.1 Screening Results for ECODS L-3 Subunit for Soil Media (0 to 0.3 m [0 to 1 ft])

Using maximum detected values, Table D-1 identifies the following constituents as COPECs based on ESV screening in the 0 to 0.3 m (0 to 1 ft) soil interval evaluated for terrestrial receptors: aluminum, antimony, cadmium, chromium, copper, cyanide, iron, lead, mercury, nickel, zinc, Aroclor 1254 (a polychlorinated biphenyl [PCB]), Aroclor 1260 (a PCB), and bis(2-ethylhexyl)phthalate.

Sampling locations described for the ECODS L-3 Subunit are shown in Figure D-2.

D-2.3.1.2 Refinement Results for ECODS L-3 Subunit for Soil Media (0 to 0.3 m [0 to 1 ft])

Using EPC values (i.e., 95% UCL on the mean), Table D-2 identifies the following constituents as COPCs based on RSV screening in the 0 to 0.3 m (0 to 1 ft) ft soil interval: aluminum, cadmium, cyanide, iron, lead, zinc, Aroclor 1254, and bis(2-ethylhexyl)phthalate.

D-2.3.1.3 Uncertainty Discussion for ECODS L-3 Subunit for Soil Media (0 to 0.3 m [0 to 1 ft])

An uncertainty analysis is performed for each COPC below, including an interpretive discussion of the lines of evidence and applicable uncertainty factors resulting in a recommendation whether the constituent should be considered an RCOC. HQ calculations for receptors that pertain to RSV exceedance from Section D.2.2 are referred to in this discussion and can be found in Attachment D-4, Table D.4-1 for the 0 to 0.3 m (0 to 1 ft) interval soil medium. AUF adjusted calculations are shown in Attachment D-6, Table D.6-11. Sampling locations are provided in Figure D-2.

Aluminum was detected in 18 of 18 samples. None of the samples were J-qualified (i.e., estimated). The maximum detected concentration was 14,700 mg/kg at the EL3-05 location in 2002 (Figure D-2). The mean detected concentration was 5,980 mg/kg and the EPC was 7,190 mg/kg. Aluminum came through screening because there is no RSV available. However, aluminum is naturally occurring, and the maximum detected concentration is within background levels. The maximum SRS background for all-depths for aluminum is 23,700 mg/kg.

Aluminum is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- It is naturally occurring.
- There is no screening threshold.
- It is below SRS background levels.

Cadmium was detected in two of 18 samples with only one of the samples J-qualified (i.e., estimated). In 2002, the maximum detected concentration was 10.8 mg/kg at the EL3-06 location. The mean detected concentration was 0.637 mg/kg, which is less than the RSV (1.6 mg/kg), and the EPC was 2.07 mg/kg. The uncertainty evaluation (Attachment D-4, Table D.4-1) shows an HQ exceedance for the American robin (avian omnivore) HQ = 1.29E+00 using a protective AUF set to 1, indicating the animal receives all of its exposure from the contaminated site. When the AUF is adjusted to a unit-specific PAUF (Mirenda 2012) using the mean concentration of cadmium (0.637 mg/kg), the resultant PAUF-adjusted HQ = 1.69E-03 for American robin (avian omnivore) (Attachment D-7, Table D.7-1). The maximum SRS background for all-depths for aluminum is 2.01 mg/kg.

Cadmium is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- The detected mean is less than the RSV.
- The PAUF-adjusted HQs are <1.
- The mean concentration is below the SRS background levels.

Cyanide was detected in one of 18 samples with one J-qualified (estimated) result. In 2002, the maximum detected concentration was 1.22 mg/kg at the EL3-09 location. The detected mean was 0.185 mg/kg, and the EPC was 1.22 mg/kg. The mean was less than the RSV (0.98 mg/kg). The uncertainty evaluation (Attachment D-4, Table D.4-1) shows HQ exceedances for the American

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robin (avian herbivore) HQ = 1.22, American robin (avian omnivore) HQ = 1.24, and American robin (avian insectivore) HQ = 1.23 using a protective AUF set to 1 indicating the animal receives all of its exposure from the contaminated site. When the AUF is adjusted to a unit-specific PAUF (Mirenda 2012) using the mean concentration of cyanide (0.185 mg/kg), the resultant PAUF-adjusted HQ = 1.47E-03 for American robin (avian herbivore); HQ = 1.50E-03 for the American robin (avian omnivore); and HQ = 1.49E-03 for the American robin (avian insectivore). PAUF adjusted calculations are shown in Attachment D-7, Table D.7-1. The maximum unit-specific background detected was 0.249 mg/kg at the EL3-21 location.

Cyanide is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- The detected mean is less than the RSV.
- Low frequency of detection.
- The PAUF-adjusted HQs are <1.

__Iron__ was detected in 18 of 18 samples. None of the detected samples were J-qualified (i.e., estimated). The maximum detected concentration was 13,500 mg/kg at the EL3-05 location in 2002. The mean detected concentration was 5,260 mg/kg and the EPC was 6,450 mg/kg. Iron came through screening because there is no RSV available. However, iron is naturally occurring, and the mean detected concentration is well within background. The SRS background maximum is 44,300 mg/kg.

Iron is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- It is naturally occurring.
- There is no screening threshold.
- It is within SRS background levels.

__Lead__ was detected in 18 of 18 samples with four J-qualified (i.e., estimated) results, and a maximum of 1,300 mg/kg at the EL3-06 location. The mean detected concentration was 90 mg/kg and the EPC was 214 mg/kg. Both the mean and the EPC exceed the RSV of 23 mg/kg. The uncertainty evaluation presented in Attachment D-4, Table D.4-1 shows HQ exceedances for the American kestrel (insectivore/carnivore) HQ = 1.34, American robin (avian herbivore) HQ = 5.96, American robin (avian omnivore) HQ = 9.32, American robin (avian insectivore) HQ = 7.66,

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Montane shrew (mammalian insectivore) HQ = 1.26. The RSV HQ calculation is conducted using a protective assumption appropriate for risk screening where the AUF is set to 1 to indicate the animal receives all of its exposure from the contaminated site. When the AUF is adjusted to a unit-specific population AUF (PAUF) (Mirenda 2012) using the mean concentration of lead, the resultant PAUF-adjusted HQ = 1.78E-05 American kestrel (insectivore/carnivore), HQ = 1.99E-02 (American robin, avian herbivore), HQ = 3.12E-02 American robin (avian omnivore), HQ = 2.56E-02 American robin (avian insectivore), and HQ = 4.55E-03 Montane shrew (mammalian insectivore). PAUF adjusted calculations are shown in Attachment D-7, Table D.7-1. Lead is naturally occurring. The maximum value for all depth intervals from SRS background soils (WSRC 2006) is 26.6 mg/kg which is greater than the maximum background concentration for all depths at the unit (4.85 mg/kg).

Lead is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- Lead is naturally occurring
- The PAUF-adjusted HQs are <1

Zinc was detected in 18 of 18 samples with 14 samples being J-qualified (i.e, estimated) results, and a maximum of 321 mg/kg at the EL3-03 location. The mean detected concentration was 61.5 mg/kg and the EPC was 121 mg/kg. The mean is less than the RSV of 120 mg/kg, while the EPC is nearly identical to the RSV. The uncertainty evaluation presented in Attachment D-4, Table D.4-1 shows HQ exceedances for the American robin (avian herbivore) HQ = 1.01, and American robin (avian insectivore) HQ = 1.01. The RSV HQ calculation is conducted using a protective assumption appropriate for risk screening where the AUF is set to 1 to indicate the animal receives all of its exposure from the contaminated site. When the AUF is adjusted to a unit-specific PAUF (Mirenda 2012) using the mean concentration of zinc, the resultant PAUF-adjusted HQ = 4.08E-03 (American robin, avian herbivore), and HQ = 2.23E-03 American robin (avian insectivore). PAUF adjusted calculations are shown in Attachment D-7, Table D.7-1. Zinc is naturally occurring. The maximum value for all depth intervals from SRS background soils (WSRC 2006) is 20.7 mg/kg which is greater than the maximum background concentration at the unit (6.22 mg/kg).

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Zinc is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- Zinc is naturally occurring.
- The mean concentration is less than RSV.
- The PAUF-adjusted HQs are <1.

Aroclor 1254 was detected in 17 of 18 samples with 14 samples being J-qualified (i.e., estimated) results. In 2002, the maximum detected was 5.63 mg/kg at the EL3-16 location. The mean detected concentration was 0.617 mg/kg, and the EPC was 1.28 mg/kg. The mean is less that the RSV (1.2 mg/kg), while the EPC is slightly higher than the RSV. The uncertainty evaluation (Attachment D-4, Table D.4-1) shows HQ exceedances for the American robin (avian omnivore) HQ = 3.12, and American robin (avian insectivore) with a HQ =1.62 using a protective AUF of 1 indicating the animal receives all of its exposure from the contaminated site. When the AUF is adjusted to a unit-specific PAUF (Mirenda 2012) using the mean concentration of Aroclor 1254, the resultant PAUF-adjusted HQ = 6.23E-03 for the American robin (avian omnivore), and HQ = 1.20E-02 (American robin (avian insectivore) based on a 0.134 ha unit size for ECODS L-3, and a population area of 16.8 ha for the American robin. PAUF adjusted calculations are shown in Attachment D-7, Table D.7-1.

Aroclor 1254 is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- PAUF-adjusted HQs were <1.0.
- The mean concentration < RSV.

Bis(2-ethylhexyl)phthalate was detected in 14 of 18 samples with eight J-qualified (i.e., estimated) results. In 2002, the maximum detected was 16.3 mg/kg at the EL3-03 location. The mean detected concentration was 1.06 mg/kg, and the EPC was 2.63 mg/kg. The mean and the EPC are greater than the RSV (0.2 mg/kg). The uncertainty evaluation (Attachment D-4, Table D.4-1) shows HQ exceedances for the American kestrel (insectivore/carnivore) HQ = 2.74E+00, American robin (avian omnivore) HQ = 1.32E-01, and American robin (avian insectivore) with a HQ = 6.58E+00 using a protective AUF of 1 indicating the animal receives all of its exposure from the contaminated site. When the AUF is adjusted to a unit-specific PAUF (Mirenda 2012) using the mean concentration of bis(2-ethylhexyl)phthalate, the resultant PAUF-adjusted HQ = 3.48E-05 for the American kestrel (insectivore/carnivore), HQ = 4.22E-02 for the American robin (avian omnivore), and HQ = 2.11E-02 (American robin (avian insectivore) based on a 0.134 ha unit size for ECODS L-3, and a population area of 4,240 ha for the American kestrel and 16.8 ha for the American robin. PAUF adjusted calculations are shown in Attachment D-7, Table D.7-1. In addition, bis(2-ethylhexyl)phthalate is a common laboratory artifact, which was detected in unit-specific and field QA/QC field duplicate samples, with the highest levels detected in background samples. Therefore, bis(2-ethylhexyl)phthalate is not likely unit related.

Bis(2-ethylhexyl)phthalate is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- It is a common laboratory artifact.
- PAUF-adjusted HQs were < 1.
- The RSV may be overly protective.

Summary: The constituents identified as COPCs were ultimately screened out based on various lines of evidence. For all constituents, PAUF-adjusted HQs were well below 1.0. Aluminum, cadmium, iron, lead, and zinc are naturally occurring. Aluminum, cadmium, iron, and lead are within SRS background levels. Cadmium, cyanide, and zinc have mean detected concentrations less than the RSV. In summary, no constituents are identified as RCOCs for the ECODS L-3 subunit for the 0 to 0.3 m (0 to 1 ft) ft surface soil interval.

D-2.3.1.4 Screening Results for ECODS L-3 Subunit for Soil Media (0.3 to 1.2 m [1 to 4 ft])

Using maximum detected values, Table D-3 identifies the following constituents as COPECs based on ESV screening in the soil media (0.3 to 1.2 m [1 to 4 ft] interval) evaluated for terrestrial receptors: aluminum; antimony; arsenic; cadmium; chromium; copper; iron; lead; manganese; mercury; nickel; vanadium; zinc; 1,1’-biphenyl; Aroclor 1254; Aroclor 1260; benzo(g,h,i)perylene; benzo[a]anthracene; benzo[a]pyrene; benzo[b]fluoranthene; benzo[k]fluoranthene; bis(2-ethylhexyl)phthalate; carbazole; chrysene; dibenz[a,h]anthracene; dibenzofuran; fluoranthene; fluorene; indeno[1,2,3-c,d]pyrene; naphthalene; phenanthrene; and pyrene. Sampling locations described for the ECODS L-3 Subunit are shown in Figure D-2.

D-2.3.1.5 Refinement Results for ECODS L-3 Subunit for Soil Media (0.3 to 1.2 m [1 to 4 ft])

Using EPC values (i.e., 95% UCL on the mean), Table D-4 identifies the following constituents as COPCs based on RSV screening in the soil medium (0.3 to 1.2 m [1 to 4 ft]): aluminum;

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cadmium; copper; iron; lead; vanadium; zinc; 1,1'-biphenyl; Aroclor 1254; and bis(2-ethylhexyl)phthalate.

D-2.3.1.6 Uncertainty Discussion for ECODS L-3 Subunit for Soil Media (0.3 to 1.2 m [1 to 4 ft])

An uncertainty analysis was performed for each COPC below, including an interpretive discussion of the lines of evidence and applicable uncertainty factors resulting in a recommendation whether the constituent should be considered an RCOC. HQ calculations for receptors that pertain to RSV exceedance from Section D.2.2 are referred to in this discussion and can be found in Attachment D-4, Table D.4-2, for the 0.3 to 1.2 m [1 to 4 ft] interval for the soil medium. PAUF adjusted calculations are shown in Attachment D-7, Table D.7-2. Sampling locations are provided in Figure D-2.

Aluminum was detected in 18 of 18 samples. None of the samples were J-qualified (i.e., estimated). The maximum detected concentration was 21,900 mg/kg at the EL3-05 location in 2002 (Figure D-2). The mean detected concentration was 9,400 mg/kg and the EPC was 11,600 mg/kg. Aluminum came through screening because there is no RSV available. However, aluminum is naturally occurring, and the maximum detected concentration is within background levels. The maximum SRS background for all-depths for aluminum is 23,700 mg/kg.

Aluminum is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- It is naturally occurring.
- There is no screening threshold.
- It is below SRS background levels.

Cadmium was detected in 6 of 18 samples with four of the samples J-qualified (i.e., estimated). In 2002, the maximum detected concentration was 11.9 mg/kg at the EL3-06 location. The mean detected concentration was 1.51 mg/kg and the EPC was 2.9 mg/kg, which is less than the RSV (3.0 mg/kg). The uncertainty evaluation (Attachment D-4, Table D.4-2) show an HQ exceedance for American robin (avian insectivore) HQ = 1.81E+00 using a protective AUF set to 1 indicating the animal receives all of its exposure from the contaminated site. When the AUF is adjusted to a unit-specific PAUF (Mirenda 2012) using the mean concentration of cadmium (1.57 mg/kg), the

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resultant PAUF-adjusted HQ = 9.36E-03 for the American robin (avian insectivore) (Attachment D-7, Table D.7-2). The maximum SRS background for all-depths for cadmium is 2.01 mg/kg.

Cadmium is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- The mean detected concentration is less than the RSV.
- The PAUF-adjusted HQs are <1.
- It is naturally occurring

<u>*Copper*</u> was detected in 18 of 18 samples with 13 J-qualified results. In 2002, the maximum was 3,890 mg/kg (sampling location EL3-06) with a detected mean of 302 mg/kg, and an EPC of 685 mg/kg. The uncertainty evaluation (Attachment D-4, Table D.4-2) shows HQ exceedances for the American kestrel (insectivore/carnivore) HQ = 2.86E+00, American robin (avian herbivore) HQ = 6.85E+00, American robin (avian omnivore) HQ = 1.14E+01, American robin (avian insectivore) HQ = 1.59E+01, Earthworm (soil-dwelling invertebrate) HQ =1.29E+00, Deer mouse (mammalian omnivore) HQ = 6.85E+00, Montane shrew (mammalian insectivore) HQ = 9.79E+00, Mountain cottontail (mammalian herbivore) HQ = 1.59E+00 using a protective AUF set to 1 indicating the animal receives all of its exposure from the contaminated site. When the AUF is adjusted to a unit-specific PAUF (Mirenda 2012) using the mean concentration of copper, the resultant PAUF-adjusted HQ = 3.98E-05 (American kestrel, insectivore/carnivore), HQ = 2.41E-02 (American robin, avian herbivore), HQ = 4.02E-02 (American robin, avian omnivore), and HQ = 5.61E-02 (American robin (avian insectivore), HQ = 5.70E-01 (Earthworm, soil-dwelling invertebrate), HQ = 1.35E-01 (Deer mouse, mammalian omnivore), HQ = 3.71E-02 (Montane shrew, mammalian insectivore), and HQ = 7.60E-04 (Mountain cottontail, mammalian herbivore), (Attachment D-7, Table D.7-2). The maximum value for all depth intervals based on SRS background soil is 74.2 mg/kg (WSRC 2006) which is less than the unit detected mean. The maximum unit background for copper is 3.76 mg/kg at the EL3-19 location (Table A.1.6) which is lower than the detected mean at the unit. Copper is naturally occurring.

Copper is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- It is naturally occurring.
- The PAUF-adjusted HQs are <1.

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Iron was detected in 18 of 18 samples. None of the results were J-qualified (i.e., estimated). The maximum detected concentration was 31,300 mg/kg at the EL3-05 location in 2002. The mean detected concentration was 13,600 mg/kg and the EPC was 17,300 mg/kg. Iron came through the screening because there is no RSV available. However, iron is naturally occurring, and the mean detected concentration is well within background. The SRS background maximum is 44,300 mg/kg.

Iron is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- It is naturally occurring.
- There is no screening threshold.
- It is within SRS background levels.

Lead was detected in 18 of 18 samples with three J-qualified (i.e, estimated) results, and a maximum of 396 mg/kg at the EL3-14 location in 2002. The mean detected concentration was 42.9 mg/kg and the EPC was 81.7 mg/kg. Both the mean and the EPC exceed the RSV of 23 mg/kg. The uncertainty evaluation presented in Attachment D-4, Table D.4-2 shows HQ exceedances for the American robin (avian herbivore) HQ = 2.27, American robin (avian omnivore) HQ = 3.35, and American robin (avian insectivore) HQ = 2.92. The RSV HQ calculation is conducted using a protective assumption appropriate for risk screening where the AUF is set to 1 to indicate the animal receives all of its exposure from the contaminated site. When the AUF is adjusted to a unit-specific PAUF (Mirenda 2012) using the mean concentration of lead, the resultant PAUF-adjusted HQ = 9.49E-03 (American robin, avian herbivore), HQ = 1.42E-02 (American robin, avian omnivore), and HQ = 1.22E-02 (American robin, avian insectivore). PAUF adjusted calculations are shown in Attachment D-7, Table D.7-2. Lead is naturally occurring. The maximum value for all depth intervals from SRS background soils (WSRC 2006) is 26.6 mg/kg which is less than the mean concentration at the unit (90 mg/kg).

Lead is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- Lead is naturally occurring.
- The PAUF-adjusted HQs are <1.

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Vanadium was detected in 18 of 18 samples in 2002. None of the samples were J-qualified (i.e., estimated). The maximum detected concentration was 71.4 mg/kg at EL3-05. The mean detected concentration was 24.1 mg/kg and the EPC was 31.2 mg/kg, which both exceed the RSV of 9.5 mg/kg. The uncertainty evaluation presented in Attachment D-4, Table D.4-2 shows HQ exceedances for the American robin (avian herbivore) HQ = 2.4, American robin (avian omnivore) HQ = 3.29, and American robin (avian insectivore) HQ = 2.84. The RSV HQ calculation is conducted using a protective assumption appropriate for risk screening where the AUF is set to 1 to indicate the animal receives all of its exposure from the contaminated site. When the AUF is adjusted to a unit-specific PAUF (Mirenda 2012) using the mean concentration of lead, the resultant PAUF-adjusted HQ = 9.62E-01 American robin (avian herbivore), HQ = 9.62E-01 American robin (avian omnivore), and HQ = 9.62E-01 American robin (avian insectivore). A PAUF-adjusted HQ for earthworms (soil-dwelling invertebrate) was not calculated because there is no RSL for vanadium. PAUF adjusted calculations are shown in Attachment D-7, Table D.7-2. The SRS soils background maximum for vanadium is 104 mg/kg (WSRC 2006).

Vanadium is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- Vanadium is naturally occurring.
- The PAUF-adjusted HQs are <1.
- Concentrations are below SRS background levels.

Zinc was detected in 16 of 18 samples with 13 samples being J-qualified (i.e, estimated) results, and a maximum of 917 mg/kg at the EL3-01 location in 2002. The mean detected concentration was 139 mg/kg and the EPC was 254 mg/kg. The mean is slightly more than the RSV of 120 mg/kg, while the EPC is greater than the RSV. The uncertainty evaluation presented in Attachment D-4, Table D.4-2 shows HQ exceedances for the American robin (avian herbivore) HQ = 2.12, American robin (avian insectivore) HQ = 2.12, and American robin (avian omnivore) HQ = 1.16. The RSV HQ calculation is conducted using a protective assumption appropriate for risk screening where the AUF is set to 1 to indicate the animal receives all of its exposure from the contaminated site. When the AUF is adjusted to a unit-specific PAUF (Mirenda 2012) using the mean concentration of zinc, the resultant PAUF-adjusted HQ = 9.23E-03 (American robin, avian herbivore), HQ = 9.23E-03 (American robin, avian insectivore), and HQ = 5.04E-03 (American

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robin, avian omnivore). PAUF adjusted calculations are shown in Attachment D-7, Table D.7-2. Zinc is naturally occurring. The maximum value for all depth intervals from SRS background soils (WSRC 2006) is 20.7 mg/kg which is less than the mean concentration at the unit (139 mg/kg).

Zinc is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- Zinc is naturally occurring.
- The PAUF-adjusted HQs are <1

1,1'-Biphenyl was detected in one of 18 samples. One sample was J-qualified (i.e., estimated). The maximum detected concentration was 0.629 mg/kg at the EL3-01 location in 2002 (Figure D-2). The mean detected concentration was 0.052 mg/kg and the EPC was 0.629 mg/kg. The detected mean is less than the RSV (0.2 mg/kg). The unit-specific maximum background for all depths was 0.629 mg/kg from the EL3-1 location which is greater than the detected mean at the unit. 1,1'Biphenyl does not have a receptor-specific threshold to evaluate in the uncertainty evaluation (Table D.4-4).

1,1'-Biphenyl is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- The mean was < RSV.
- Low frequency of detection

Aroclor 1254 was detected in 13 of 18 samples with nine samples being J-qualified (i.e., estimated) results. In 2002, the maximum detected was 2.39 mg/kg at the EL3-14 location. The mean detected concentration was 0.24 mg/kg, and the EPC was 0.846 mg/kg. The mean and the EPC less that the RSV (1.2 mg/kg). The uncertainty evaluation (Attachment D-4, Table D.4-2) shows HQ exceedances for the American robin (avian omnivore) HQ = 1.07, and American robin (avian insectivore) with a HQ =2.06 using a protective AUF of 1 indicating the animal receives all of its exposure from the contaminated site. When the AUF is adjusted to a unit-specific PAUF (Mirenda 2012) using the mean concentration of Aroclor 1254, the resultant PAUF-adjusted HQ = 2.42E-03 for the American robin (avian omnivore), and HQ = 4.67E-02 (American robin (avian insectivore) based on a 0.134 ha unit size for ECODS L-3, and a population area of 16.8 ha for the American robin. PAUF adjusted calculations are shown in Attachment D-7, Table 7-2.

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Aroclor 1254 is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- PAUF-adjusted HQs were <1.0.
- The mean concentration < the RSV may be overly protective.

__Bis(2-ethylhexyl)phthalate__ was detected in 13 of 18 samples with three J-qualified (i.e., estimated) results. The maximum was 37.1 mg/kg from the EL3-06 location in 2002. The detected mean was 2.4 mg/kg, and the EPC was 6.0 mg/kg. The detected mean and EPC are greater than the RSV (0.2 mg/kg). The uncertainty evaluation (Attachment D-4, Table D.4-2) shows HQ exceedances for the American kestrel (insectivore/carnivore) HQ = 6.25 and American robin (avian omnivore) HQ = 15 using a protective AUF set to 1 indicating the animal receives all of its exposure from the contaminated site. When the AUF is adjusted to a unit-specific PAUF (Mirenda 2012) using the mean concentration of bis(2-ethylhexyl)phthalate (2.4 mg/kg), the resultant PAUF-adjusted HQ = 7.90E-05 for American kestrel, insectivore/carnivore, and HQ = 4.79E-02 for the American robin, avian omnivore (Attachment D-7, Table D.7-2). In addition, bis(2-ethylhexyl)phthalate is a common laboratory artifact, which was detected in unit-specific and field QA/QC field duplicate samples, with the highest levels detected in background samples. Therefore, bis(2-ethylhexyl)phthalate is not likely unit related.

Bis(2-ethylhexyl)phthalate is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- It is a common laboratory artifact
- PAUF-adjusted HQs were <1.0
- The RSV may be overly protective

__Summary__: The constituents identified as COPCs were ultimately screened out based on various lines of evidence. For all constituents with receptor-species thresholds, PAUF-adjusted HQs were well below 1.0. Aluminum, cadmium, copper, lead, vanadium, and zinc are naturally occurring and fall within or near background levels. Aroclor 1254 has a RSV value that may be overly protective. 1,1'-Biphenyl had a low frequency of detection with a mean value less than the RSV. In summary, no constituents are identified as RCOCs for the ECODS L-3 subunit for the 0.3 to 1.2 m (1 to 4 ft) surface soil interval.

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D-2.3.2 L-Area Rubble Pit 131-1L Subunit

Results of the ESV screening (Step D.2.1), refinement-level risk calculations (Step D.2.2), and a discussion of associated uncertainties for each COPC for the LRP 131-1L Subunit are provided below.

D-2.3.2.1 Screening Results for the LRP 131-1L Subunit for Soil Media (0 to 0.3 m [0 to 1 ft])

Using maximum detected values, Table D-5 identifies the following constituents as COPECs based on ESV screening in the 0 to 0.3 m (0 to 1 ft) ft soil interval evaluated for terrestrial receptors: aluminum, chromium, copper, cyanide, iron, lead, vanadium, americium-243, curium-245/246, and lead-214. Sampling locations for the LRP 131-1L Subunit are shown in Figure D-3.

D-2.3.2.2 Refinement Results for the LRP 131-1L Subunit for Soil Media (0 to 0.3 m [0 to 1 ft])

Using EPC values (i.e., 95% UCL on the mean), Table D-6 identifies the following constituent as a COPC based on RSV screening in the 0 to 0.3 m (0 to 1 ft) ft soil interval: aluminum, iron, vanadium, americium-243, curium-245/246, and lead-214.

D-2.3.2.3 Uncertainty Discussion for the LRP 131-1L Subunit for Soil Media (0 to 0.3 m [0 to 1 ft])

An uncertainty analysis is performed for each COPC below, including an interpretive discussion of the lines of evidence and applicable uncertainty factors resulting in a recommendation whether the constituent should be considered an RCOC. HQ calculations for receptors that pertain to RSV exceedance from Section D.2.1 are referred to in this discussion and can be found in Attachment D-4, Table D.4-3 for the soil medium (0 to 0.3 m [0 to 1 ft] interval). PAUF adjusted calculations are shown in Attachment D-7, Table D.7-3. Sampling locations are provided in Figure D-3.

Aluminum was detected in 21 of 21 samples. None of the samples were J-qualified (i.e., estimated). The maximum detected concentration was 35,000 mg/kg at the LAP1L-09 location in 2022 (Figure D-3). The mean detected concentration was 20,400 mg/kg and the EPC was 23,000 mg/kg. Aluminum came through screening because there is no RSV available. However, aluminum is naturally occurring, and the mean concentration is within background levels. The maximum SRS background for all-depths for aluminum is 23,700 mg/kg.

Aluminum is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- Aluminum is naturally occurring.
- There is no screening threshold.
- Mean concentration is below SRS background levels.

Iron was detected in 21 of 21 samples with no J-qualified (i.e., estimated) results. The maximum, collected in 2022 from the LAP1L-009 location, was 19,000 mg/kg. The detected mean was 11,000 mg/kg and the EPC was 12,600 mg/kg. Iron came through the screening because there is no RSV available. However, iron is naturally occurring, and the maximum detected concentration is within background levels. The SRS background soil maximum for iron is 44,300 mg/kg (WSRC 2006) which is greater than the detected max (35,400 mg/kg) and EPC (23,000 mg/kg).

Iron is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- Iron is naturally occurring.
- There is no screening threshold.
- Iron is below SRS background levels.

Vanadium was detected in 21 of 21 samples with no J-qualified (i.e., estimated) results. The maximum, collected in 2022 from LRP1L-009 location, was 57 mg/kg. The detected mean was 33.1 mg/kg, and the EPC was 37.6 mg/kg. The RSV (9.5 mg/kg) was less than the mean. The uncertainty evaluation (Attachment D-4, Table D.4-3) shows HQ exceedances for the American robin (avian herbivore) HQ = 2.89, American robin (avian omnivore) HQ = 3.42, and American robin (avian insectivore) HQ = 3.96 using a protective AUF set to 1 indicating the animal receives all of its exposure from the contaminated site. When the AUF is adjusted to a unit-specific PAUF (Mirenda 2012) using the mean concentration of vanadium, the resultant PAUF-adjusted HQ = 8.44E-03 (American robin, avian herbivore), HQ = 9.98E-03 (American robin, avian omnivore), and HQ = 1.16E-02 (American robin, avian insectivore) (Attachment D-7, Table D.7-3). The SRS background soil maximum for vanadium is 104.0 mg/kg (WSRC 2006) which is greater than the detected mean (33.1 mg/kg), EPC (37.6 mg/kg), and the unit maximum (57.0 mg/kg).

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Vanadium is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- Vanadium is naturally occurring .
- The PAUF-adjusted HQs are <1.
- Concentrations are below SRS background levels.

Americium-243 was detected in one of five samples. One of the samples was J-qualified (i.e., estimated). The maximum detected concentration was 0.090 pCi/g at the LAP4L-009 location in 2022 (Figure D-4). The mean detected concentration was 0.033 pCi/g and the EPC was 0.090 pCi/g. Americium-243 came through screening because there is no RSV available.

Americium-243 is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- There is no screening threshold available.
- There is no history of any radiological waste disposed of at this unit

Curium-245/246 was detected in one of five samples with one J-qualified (i.e., estimated) result. The maximum, collected in 2022 from LAP1L-012 location, was 0.043 mg/kg. The detected mean was 0.028 mg/kg. Curium-245/246 came through the screening because there is no RSV available. Additionally, curium-245/246 is not associated with the history of LRP 131-1L and a screening threshold is not available from RESRAD indicating this radioisotope is not a threat to ecological health.

Curium-245/246 is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- There is no screening threshold.
- No history of any radiological waste disposed of at this unit.

Lead-214 was detected in one of one sample. None of the samples were J-qualified (i.e., estimated). In 2022, the single detection of lead-214 was 0.913 pCi/g at location LRP1L-012. Lead-214 came through the screening because there is no RSV available. Lead-214 is naturally occurring and the half-life is short at about 26.81 minutes. Further, assuming secular equilibrium with the parent radionuclide (uranium-238), the detected concentration is within the SRS background maximum concentration for the uranium-238 decay series (2.78 pCi/g).

Lead-214 is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- Lead-214 is naturally occurring.
- There is no screening threshold.
- Lead-214 is below SRS background levels.

<u>Summary</u>: Vanadium was ultimately screened out as it is naturally occurring and falls within background levels. Also, PAUF-adjusted HQs were well below 1.0. No constituents are identified as RCOCs for the LRP 131-1L subunit for the 0 to 0.3 m (0 to 1 ft) ft surface soil interval.

D-2.3.2.4 <u>Screening Results for LRP 131-1L Soil Media (0.3 to 1.2 m [1 to 4 ft])</u>

Using maximum detected values, Table D-7 identifies the following constituents as COPECs based on ESV screening in the 0.3 to 1.2 m (1 to 4 ft) soil interval evaluated for terrestrial receptors: aluminum; chromium; copper; iron; vanadium; benzo[a]anthracene; benzo[a]pyrene; benzo[b]fluoranthene; benzo[k]fluoranthene; carbazole; chrysene; dibenz[a,h]anthracene; dibenzofuran; fluoranthene, hexachlorobutadiene; indeno[1,2,3-cd]pyrene; phenanthrene; pyrene; lead-214; plutonium-242; promethium-247; and radium-228. Sampling locations described for the LRP 131-1L Subunit are shown in Figure D-3.

D-2.3.2.5 <u>Refinement Results for LRP 131-1L for Soil Media (0.3-1.2 m [1-4 ft])</u>

Using EPC values (i.e., 95% UCL on the mean), Table D-8 identifies aluminum, iron, vanadium, fluoranthene, hexachlorobutadiene, phenanthrene, and lead-214 as COPCs based on RSV screening in subsurface soil.

D-2.3.2.6 <u>Uncertainty Discussion for LRP 131-1L Subunit for Soil Media (0.3-1.2 m [1-4 ft])</u>

An uncertainty analysis is performed for each COPC below, including an interpretive discussion of the lines of evidence and applicable uncertainty factors, resulting in a recommendation of whether the constituent should be considered an RCOC. HQ calculations for receptors that pertain to RSV exceedance from Section D.2.2 are referred to in this discussion and can be found in Attachment D-4, Table D.4-4, for the soil medium (0.3 to 1.2 m [1 to 4 ft] interval). PAUF adjusted calculations are shown in Attachment D-7, Table D.7-4. Sampling locations are provided in Figure D-3.

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Aluminum was detected in 21 of 21 samples. None of the samples were J-qualified (i.e., estimated). The maximum detected concentration was 32,000 mg/kg at the LAP1L-016 location in 2022 (Figure D-3). The mean detected concentration was 16,500 mg/kg and the EPC was 18,800 mg/kg. Aluminum came through screening because there is no RSV available. However, aluminum is naturally occurring, and the mean detected concentration is within background levels. The maximum SRS background for all-depths for aluminum is 23,700 mg/kg.

Aluminum is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- Aluminum is naturally occurring.
- There is no screening threshold.
- Aluminum mean concentration is below SRS background levels.

Iron was detected in 21 of 21 samples with no J-qualified (i.e., estimated) results. The maximum, collected in 2022 from the LAP1L-005 location, was 25,000 mg/kg. The detected mean was 9,090 mg/kg and the EPC was 11,300 mg/kg. Iron came through the screening because there is no RSV available. However, iron is naturally occurring, and the maximum detected concentration is within background levels. The SRS background soil maximum for iron is 44,300 mg/kg (WSRC 2006) which is greater than the detected max (35,400 mg/kg) and EPC (23,000 mg/kg).

Iron is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- Iron is naturally occurring.
- There is no screening threshold.
- Iron is below SRS background levels.

Vanadium was detected in 21 of 21 samples with two J-qualified (i.e., estimated) results. The maximum, collected in 2022 from LRP1L-016 location, was 61 mg/kg. The detected mean was 26.1 mg/kg, and the EPC was 30.8 mg/kg. The RSV (9.5 mg/kg) was less than the mean. The uncertainty evaluation (Attachment D-4, Table D.4-4) shows HQ exceedances for the American robin (avian herbivore) HQ = 2.37, American robin (avian omnivore) HQ = 2.8, and American robin (avian insectivore) HQ = 3.24 using a protective AUF set to 1 indicating the animal receives all of its exposure from the contaminated site. When the AUF is adjusted to a unit-specific PAUF (Mirenda 2012) using the mean concentration of vanadium, the resultant PAUF-adjusted

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HQ = 6.64E-03 (American robin, avian herbivore), HQ = 7.85E-03 (American robin, avian omnivore), and HQ = 9.09E-09 (American robin, avian insectivore) (Attachment D-7, Table D.7-4). The SRS background soil maximum for vanadium is 104.0 mg/kg (WSRC 2006) which is greater than the detected mean (26.1 mg/kg), EPC 30.8 mg/kg), and the unit maximum (61 mg/kg).

Vanadium is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- Vanadium is naturally occurring.
- The PAUF-adjusted HQs are <1.
- Concentrations are below SRS background levels.

Fluoranthene was detected in one of 21 samples with no J-qualified (i.e., estimated) results. The maximum, collected in 2022 from LRP1L-015 location, was 30 mg/kg. The detected mean was 2.61 mg/kg and the EPC was 30 mg/kg. The RSV (23 mg/kg) was greater than the mean, but less than the maximum concentration. The uncertainty evaluation (Attachment D-4, Table D.4-4) shows HQ exceedances for the Earthworm (soil-dwelling invertebrates) HQ = 1.3 using a protective AUF set to 1 indicating the animal receives all of its exposure from the contaminated site. When the AUF is adjusted to a unit-specific PAUF (Mirenda 2012) using the mean concentration of fluoranthene, the resultant PAUF-adjusted HQ = 1.13E-01 (Earthworm, soil-dwelling invertebrate) (Attachment D-7, Table D.7-4).

Fluoranthene is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- Low frequency of detection
- The PAUF-adjusted HQs are <1

Hexachlorobutadiene was detected in one of 21 samples with no J-qualified (i.e., estimated) results. The maximum, collected in 2022 from the LAP1L-017 location, was 0.29 mg/kg. The detected mean was 1.61 mg/kg, and the EPC was 0.29 mg/kg. Hexachlorobutadiene came through the screening because there is no RSV available.

Hexachlorobutadiene is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- Low frequency of detection
- There is no screening threshold.

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Phenanthrene was detected in one of 21 samples with no J-qualified (i.e., estimated) results. The maximum, collected in 2022 from LRP1L-015 location, was 24 mg/kg. The detected mean was 2.44 mg/kg and the EPC was 24 mg/kg. The RSV (12 mg/kg) was greater than the mean, but less than the maximum concentration. The uncertainty evaluation (Attachment D-4, Table D.4-4) shows HQ exceedances for the Earthworm (soil-dwelling invertebrates) HQ = 2.0 using a protective AUF set to 1 indicating the animal receives all of its exposure from the contaminated site. When the AUF is adjusted to a unit-specific PAUF (Mirenda 2012) using the mean concentration of phenanthrene, the resultant PAUF-adjusted HQ = 2.03E-01 (Earthworm, soil-dwelling invertebrate) (Attachment D-7, Table D.7-4).

Phenanthrene is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- Low frequency of detection
- The PAUF-adjusted HQs are <1

Lead-214 was detected in one of one sample. None of the samples were J-qualified (i.e., estimated). In 2022, the single detection of lead-214 was 0.703 pCi/g at location LRP1L-015. Lead-214 came through the screening because there is no RSV available. Lead-214 is naturally occurring and the half-life is short at about 26.81 minutes. Further, assuming secular equilibrium with the parent radionuclide (uranium-238), the detected concentration is within the SRS background maximum concentration for the uranium-238 decay series (2.78 pCi/g).

Lead-214 is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- Lead-214 is naturally occurring.
- There is no screening threshold.
- Lead-214 is below SRS background levels.

Summary: Aluminum, iron, and vanadium are naturally occurring and fall within background levels. Vanadium, fluoranthene, and phenanthrene were finally screened out due to PAUF-adjusted HQs being well below 1.0. In summary, no constituents are identified as RCOCs for the LRP 131-1L subsurface (0.3 to 1.2 m [1 to 4 ft]) soil interval.

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D-2.3.3 L-Area Rubble Pit 131-4L Subunit

Results of the ESV screening (Section D.2.1), refinement-level risk calculations (Section D.2.2), and a discussion of associated uncertainties for each constituent of potential concern for the LRP 131-4L Subunit are provided below.

D-2.3.3.1 Screening Results for the LRP 131-4L Soil Media (0-0.3 m [0-1 ft])

Using maximum detected values, Table D-9 identifies the following constituents as COPECs based on ESV screening in the 0 to 0.3 m (0 to 1 ft) ft soil interval evaluated for terrestrial receptors: aluminum, chromium, copper, cyanide, iron, lead, mercury, vanadium, 2-nitrophenol, Aroclor 1254, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, carbazole, chrysene, diethyl phthalate, di-n-butyl phthalate, fluoranthene, methoxychlor, methyl acetate, n-nitroso-dipropylamine, pyrene, actinium-228, lead-212, lead-214, and potassium-40. Sampling locations described for the LRP 131-4L are shown in Figure D-4.

The radionuclide constituents were identified as COPECs since there are no published ESVs available for these constituents. There also were no screening values for aluminum or iron. The COPECs are carried forward and processed further in the refinement-level evaluation step discussed below.

D-2.3.3.2 Refinement Results for the LRP 131-4L for Soil Media (0-0.3 m [0-1 ft])

Using EPC values (i.e., 95% UCL on the mean), Table D-10 identifies the following constituents as COPCs based on RSV screening in the 0 to 0.3 m (0 to 1 ft) ft soil interval: aluminum, cyanide, iron, vanadium, 2-nitrophenol, methyl acetate, n-nitrosodipropylamine, actinium-228, lead-212, lead-214, and potassium-40.

The radionuclide constituents were identified as COPCs since there are no published RSVs available for these constituents. There were also no screening values for aluminum or iron. The COPCs are discussed further below.

D-2.3.3.3 Uncertainty Discussion for LRP 131-4L for Soil Media (0-0.3 m [0-1 ft])

An uncertainty analysis was performed for each COPC below, including an interpretive discussion of the lines of evidence and applicable uncertainty factors resulting in a recommendation whether the constituent should be considered an RCOC. HQ calculations for receptors that pertain to RSV exceedance from Section D.2.2 are referred to in this discussion and can be found in Attachment D-4 in Table D.4-5 for the soil medium (0 to 0.3 m [0 to 1 ft] interval). PAUF adjusted calculations are shown in Attachment D-7, Table 7. Sampling locations are provided in Figure D-4.

Aluminum was detected in 41 of 41 samples. None of the samples were J-qualified (i.e., estimated). The maximum detected concentration was 29,000 mg/kg at the LAP4L-035 location in 2022 (Figure D-4). The mean detected concentration was 11,700 mg/kg and the EPC was 13,100 mg/kg. Aluminum came through screening because there is no RSV available. However, aluminum is naturally occurring, and the maximum detected concentration is within background levels. The maximum SRS background for all-depths for aluminum is 23,700 mg/kg.

Aluminum is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- Aluminum is naturally occurring.
- There is no screening threshold.
- Mean concentration and EPC are below SRS background levels.

Cyanide was detected in seven of 41 samples. Three of the samples were J-qualified (i.e., estimated). In 2023, the maximum detected concentration was 10 mg/kg at the LAP4L-003 location. The detected mean was 0.68 mg/kg, and the EPC was 1.63 mg/kg. The mean was less than the RSV (0.98 mg/kg). The uncertainty evaluation (Attachment D-4, Table D.4-5) shows HQ exceedances for the American robin (avian herbivore) HQ = 1.00, American robin (avian omnivore) HQ = 1.65, and American robin (avian insectivore) HQ = 1.67 using a protective AUF set to 1 indicating the animal receives all of its exposure from the contaminated site. When the AUF is adjusted to a unit-specific PAUF (Mirenda 2012) using the mean concentration of cyanide (0.638 mg/kg), the resultant PAUF-adjusted HQ = 4.49E-03 for the American robin (avian herbivore); HQ = 4.54E-03 for the American robin (avian omnivore); and HQ = 4.58E-03 for the American robin (avian insectivore). PAUF-adjusted calculations are shown in Attachment D-7, Table D.7-5.

Cyanide is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

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- PAUF adjusted HQs are less than 1
- Mean concentration < RSV

Iron was detected in 41 of 41 samples. One of the detected samples were J-qualified (i.e., estimated). The maximum detected concentration was 21,000 mg/kg at the LAP4L-040 location in 2023. The mean detected concentration was 8,870 mg/kg and the EPC was 9,840 mg/kg. Iron came through screening because there is no RSV available. However, iron is naturally occurring, and the mean detected concentration is well within background. The SRS background maximum is 44,300 mg/kg.

Iron is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- It is naturally occurring.
- There is no screening threshold.
- It is within SRS background levels.

Vanadium was detected in 41 of 41 samples with no J-qualified (i.e., estimated) results. The maximum, collected in 2022 from LAP4L-035 location, was 58 mg/kg. The detected mean was 23.7 mg/kg, and the EPC was 26.5 mg/kg. The RSV (9.5 mg/kg) was less than the mean and the EPC. The uncertainty evaluation (Attachment D-4, Table D.4-5) shows HQ exceedances for the American robin (avian herbivore) HQ = 2.04, American robin (avian omnivore) HQ = 2.41, and American robin (avian insectivore) HQ = 2.79 using a protective AUF set to 1 indicating the animal receives all of its exposure from the contaminated site. When the AUF is adjusted to a unit-specific PAUF (Mirenda 2012) using the mean concentration of vanadium, the resultant PAUF-adjusted HQ = 1.21E-02 (American robin, avian herbivore), HQ = 1.43E-02 (American robin, avian omnivore), and HQ = 1.66E-02 (American robin, avian insectivore) (Attachment D-7, Table D.7-5). The SRS background soil maximum for vanadium is 104.0 mg/kg (WSRC 2006) which is greater than the detected mean (23.7 mg/kg), EPC (26.5 mg/kg), and the unit maximum (58 mg/kg).

Vanadium is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- Vanadium is naturally occurring
- The PAUF-adjusted HQs are <1
- Concentrations are below SRS background levels

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2-Nitrophenol was detected in one of 41 samples. The one detected sample was J-qualified (i.e., estimated). The maximum detected concentration was 0.03 mg/kg at the LAP4L-018 location in 2022. The mean detected concentration was 0.022 mg/kg and the EPC was 0.03 mg/kg. 2-Nitrophenol came through screening because there is no RSV available. 2-Nitrophenol is primarily used to make dyes, paint coloring, rubber chemicals, and substances that kill molds, which were not processes conducted at SRS.

2-Nitrophenol is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- There is no screening threshold.
- Low frequency of detection.
- Not associated with SRS processes.

Methyl acetate was detected in one of 41 samples. The one detected sample was J-qualified (i.e., estimated). The maximum detected concentration was 2.64E-03 mg/kg at the LAP4L-001 location in 2023. The mean detected concentration was 9.14E-04 mg/kg and the EPC was 2.64E-03 mg/kg. Methyl acetate came through screening because there is no RSV available.

Methyl acetate is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- There is no screening threshold.
- Low frequency of detection.

N-Nitrosodipropylamine was detected in one of 41 samples. The one detected sample was J-qualified (i.e., estimated). The maximum detected concentration was 0.45 mg/kg at the LAP4L-015 location in 2022. The mean detected concentration was 0.152 mg/kg and the EPC was 0.45 mg/kg. N-Nitrosodipropylamine came through screening because there is no RSV available. It has no known commercial use.

N-Nitrosodipropylamine is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- There is no screening threshold.
- Low frequency of detection.

Actinium-228 was detected in one of one sample. None of the samples were J-qualified (i.e., estimated). The maximum detected concentration was 4.18 pCi/g at the LAP4L-022 location in

2022 (Figure D-4). The mean detected concentration was 4.18 pCi/g and the EPC was 4.18 pCi/g. Actinium-228 came through screening because there is no RSV available. However, actinium-228 is naturally occurring and is a daughter product of the thorium-232 decay chain. The SRS maximum background activity is 4.17 pCi/g. In addition, a screening threshold is not available from RESRAD indicating this radioisotope is not a threat to ecological health.

Actinium-228 is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- It is a naturally occurring radionuclide.
- There is no screening threshold available.
- No history of radiological waste disposed of at this unit.
- Is a daughter product of the thorium-232 decay series and within SRS background concentrations.

Lead-212 was detected in one of one sample. The sample was not J-qualified (i.e., estimated). In 2022, the maximum detected concentration was 2.74 pCi/g at the LAP4L-022 location (Figure D-4). The mean detected concentration was 2.74 pCi/g and the EPC was 2.74 pCi/g. Lead-212 came through screening because there is no RSV available. Lead-212 is naturally occurring and the half-life is short at 10.6 hours. Further, the maximum is within background, the SRS background maximum for the thorium-232 decay series is 4.17 pCi/g.

Lead-212 is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- It is a naturally occurring radionuclide.
- There is no screening threshold available.
- No history of radiological waste disposed of at this unit.
- Is a daughter product of the thorium-232 decay series and within SRS background concentrations.

Lead-214 was detected in one of one sample. The sample was not J-qualified (i.e., estimated). In 2022, the maximum detected concentration was 1.61 pCi/g at the LAP4L-022 location (Figure D-4). The mean detected concentration was 1.61 pCi/g and the EPC was 1.61 pCi/g. Lead-214 came through screening because there is no RSV available. Lead-214 is naturally occurring and the half-life is short at 26.4 minutes. Further, the maximum is within background, the SRS background maximum for the uranium-238 decay series is 2.78 pCi/g.

Lead-214 is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- It is a naturally occurring radionuclide.
- There is no screening threshold available.
- No history of radiological waste disposed of at this unit.
- Is a daughter product of the uranium-238 decay series and within SRS background concentrations.

Potassium-40 was detected in one of one sample. The only detected result was J-qualified (i.e., estimated) results. In 2022, the maximum detected concentration was 5.64 pCi/g at the LAP4L-022 location. The mean detected concentration was 5.64 pCi/g and the EPC was 5.64 pCi/g. Potassium-40 came through screening because there is no RSV available. Potassium-40 is naturally occurring. The maximum detected activity (5.64 pCi/g) is below the RESRAD Biota screening value of 119 pCi/g (Attachment D-5. Also, the mean detected is less than SRS background (8.53 pCi/g) (WSRC 2006). Additionally, the maximum detected concentration (5.64 pCi/g) is less than the RESRAD biota level of 119 pCi/g (Attachment 6). Further, potassium-40 was not used in SRS reactor processes, so the detections are regarded as non-DOE related.

Potassium-40 is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- It is a naturally occurring radionuclide
- There is no screening threshold available
- It is well below the RESRAD Biota level.
- It is not DOE related
- It is within background
- No history of radiological waste disposed of at this unit

Summary: Most constituents in this soil interval were identified as COPCs because they have no screening thresholds available. Only cyanide and vanadium exceeded the available screening threshold, but both had PAUF-adjusted HQs that were less than 1. All other constituents were screened out due to estimated results, short half-lives, low frequency of detection, for falling within background levels, or not being associated processes. In summary, no constituents are identified as RCOCs for the LRP 131-4L subunit for the 0 to 0.3 m (0 to 1 ft) ft surface soil interval.

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D-2.3.3.4 Screening Results for LRP 131-4L for Soil Media (0.3 to 1.2 m) [1 to 4 ft])

Using maximum detected values, Table D-11 identifies the following constituents as COPECs based on ESV screening in the 0.3 to 1.2 m (1 to 4 ft) soil interval evaluated for terrestrial receptors: aluminum, chromium, copper, cyanide, iron, lead, mercury, vanadium, 2-nitrophenol, Aroclor 1254, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, bis(2-ethylhexyl)phthalate, chrysene, cyclohexane, diethyl phthalate, di-n-butyl phthalate, fluoranthene, methoxychlor, methyl acetate, methylcyclohexane, pyrene, actinium-228, americium-243, lead-212, and lead-214. Sampling locations described for the LRP 131-4L Subunit are shown in Figure D-4.

The radionuclide constituents were identified as COPECs since there are no published ESVs available for these constituents. There were also no screening values for aluminum, iron, cyclohexane, methyl acetate, or meythlcyclohexane. The COPECs are carried forward and processed further in the refinement-level evaluation step discussed below.

D-2.3.3.5 Refinement Results for LRP 131-4L for Soil Media (0.3 to 1.2 m) [1 to 4 ft])

Using EPC values (i.e., 95% UCL on the mean), Table D-12 identifies the following constituents as COPCs based on RSV screening in the 0.3 to 1.2 m (1 to 4 ft) soil interval: aluminum, cyanide, iron, vanadium, cyclohexane, methyl acetate, methylcyclohexane, actinium-228, americium-243, lead-212, and lead-214.

The radionuclide constituents were identified as COPCs since there are no published RSVs available for these constituents. There also were no screening values for aluminum, iron, cyclohexane, methyl acetate, and methylcyclohexane. The COPCs are discussed further below.

D-2.3.3.6 Uncertainty Discussion for LRP 131-4L for Soil Media (0.3-1.2 m) [1-4 ft])

An uncertainty analysis is performed for each COPC below, including an interpretive discussion of the lines of evidence and applicable uncertainty factors, resulting in a recommendation whether the constituent should be considered an RCOC. HQ calculations for receptors that pertain to RSV exceedance from Section D.2.2 are referred to in this discussion and can be found in Attachment D-4, Table D.4-6, for the subsurface soil medium (0.3 to 1.2 m [1 to 4 ft] interval).

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AUF adjusted calculations are shown in Attachment D-7, Table D.7-6. Sampling locations are provided in Figure D-4.

Aluminum was detected in 41 of 41 samples. None of the samples were J-qualified (i.e., estimated). The maximum detected concentration was 25,000 mg/kg at the LAP4L-035 location in 2022 (Figure D-4). The mean detected concentration was 13,200 mg/kg and the EPC was 14,300 mg/kg. Aluminum came through screening because there is no RSV available. However, aluminum is naturally occurring, and the maximum detected concentration is within background levels. The maximum SRS background for all-depths for aluminum is 23,700 mg/kg.

Aluminum is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- Aluminum is naturally occurring.
- There is no screening threshold.
- The mean detected concentration and EPC are below SRS background levels.

Cyanide was detected in two of 41 samples. One of the samples was J-qualified (i.e., estimated). In 2023, the maximum detected concentration was 11 mg/kg at the LAP4L-010 location. The detected mean was 0.485 mg/kg, and the EPC was 1.1 mg/kg. The mean was less than the RSV (0.98 mg/kg). The uncertainty evaluation (Attachment D-4, Table D.4-6) shows HQ exceedances for the American robin (avian herbivore) HQ = 1.10, American robin (avian omnivore) HQ = 1.11, and American robin (avian insectivore) HQ = 1.13 using a protective AUF set to 1 indicating the animal receives all of its exposure from the contaminated site. When the AUF is adjusted to a unit-specific PAUF (Mirenda 2012) using the mean concentration of cyanide (0.485 mg/kg), the resultant PAUF-adjusted HQ = 3.32E-03 for the American robin (avian herbivore); HQ = 3.25E-03 for the American robin (avian omnivore); and HQ = 3.28E-03 for the American robin (avian insectivore). PAUF-adjusted calculations are shown in Attachment D-7, Table D.7-6.

Cyanide is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- PAUF adjusted HQs are less than 1.
- Low frequency of detection.

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Iron was detected in 41 of 41 samples. Two of the detected samples were J-qualified (i.e., estimated). The maximum detected concentration was 20,000 mg/kg at the LAP4L-041 location in 2023. The mean detected concentration was 10,200 mg/kg and the EPC was 11,300 mg/kg. Iron came through screening because there is no RSV available. However, iron is naturally occurring, and the mean detected concentration is well within background. The SRS background maximum is 44,300 mg/kg.

Iron is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- It is naturally occurring.
- There is no screening threshold.
- It is within SRS background levels.

Vanadium was detected in 41 of 41 samples with no J-qualified (i.e., estimate) results. The maximum, collected in 2022 from LAP4L-035 location, was 46 mg/kg. The detected mean was 26.4 mg/kg and the EPC was 28.6 mg/kg. The RSV (9.5 mg/kg) was less than the mean and the EPC. The uncertainty evaluation (Attachment D-4, Table D.4-6) shows HQ exceedances for the American robin (avian herbivore) HQ = 2.20, American robin (avian omnivore) HQ = 2.60, and American robin (avian insectivore) HQ = 3.01 using a protective AUF set to 1 indicating the animal receives all of its exposure from the contaminated site. When the AUF is adjusted to a unit-specific PAUF (Mirenda 2012) using the mean concentration of vanadium, the resultant PAUF-adjusted HQ = 1.35E-02 (American robin, avian herbivore), HQ = 1.59E-02 (American robin, avian omnivore), and HQ = 1.85E-02 (American robin, avian insectivore) (Attachment D-7, Table D.7-6). The SRS background soil maximum for vanadium is 104.0 mg/kg (WSRC 2006) which is greater than the detected mean (26.4 mg/kg), EPC (28.6 mg/kg), and the unit maximum (46 mg/kg).

Vanadium is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- Vanadium is naturally occurring
- The PAUF-adjusted HQs are <1
- Concentrations are below SRS background levels

Cyclohexane was detected in one of 41 samples. The one detected sample was J-qualified (i.e., estimated). The maximum detected concentration was 5.00E-04 mg/kg at the LAP4L-021 location in 2022. The mean detected concentration was 1.82E-04 mg/kg and the EPC was 5.00E-04 mg/kg. Cyclohexane came through screening because there is no RSV available. Cyclohexane is primarily used in oil extraction, to make other chemicals, and as a catalyst solvent, which were not used in processes conducted at SRS.

Cyclohexane is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- There is no screening threshold.
- Low frequency of detection.
- Not associated with SRS processes.

Methyl acetate was detected in one of 41 samples. The one detected sample was J-qualified (i.e., estimated). The maximum detected concentration was 2.75E-03 mg/kg at the LAP4L-014 location in 2022. The mean detected concentration was 9.19E-04 mg/kg and the EPC was 2.75E-03 mg/kg. Methyl acetate came through screening because there is no RSV available.

Methyl acetate is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- There is no screening threshold.
- Low frequency of detection.

Methylcyclohexane was detected in two of 41 samples. Both detected samples were J-qualified (i.e., estimated). The maximum detected concentration was 9.80E-04 mg/kg at the LAP4L-021 location in 2022. The mean detected concentration was 3.36E-04 mg/kg and the EPC was 3.87E-04 mg/kg. Methylcyclohexane came through screening because there is no RSV available.

Methylcyclohexane is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- There is no screening threshold.
- Low frequency of detection.

Actinium-228 was detected in one of one sample. None of the samples were J-qualified (i.e., estimated). The maximum detected concentration was 3.43 pCi/g at the LAP4L-025 location in 2023 (Figure D-4). The mean detected concentration was 3.43 pCi/g and the EPC was 3.43 pCi/g.

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Actinium-228 came through screening because there is no RSV available. However, actinium-228 is naturally occurring and is a daughter product in the thorium-232 decay chain. The SRS maximum background activity is 4.17 pCi/g.

Actinium-228 is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- It is a naturally occurring radionuclide.
- There is no screening threshold available.
- No history of radiological waste disposed of at this unit.
- It is daughter product of the thorium-232 decay series and within SRS background concentrations.

Americium-243 was detected in one of four samples. One of the samples was J-qualified (i.e., estimated). The maximum detected concentration was 0.050 pCi/g at the LAP4L-009 location in 2022 (Figure D-4). The mean detected concentration was 0.030 pCi/g and the EPC was 0.050 pCi/g. Americium-243 came through screening because there is no RSV available.

Americium-243 is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- There is no screening threshold available.
- No history of radiological waste disposed of at this unit.

Lead-212 was detected in one of one sample. The sample was not J-qualified (i.e., estimated). In 2023, the maximum detected concentration was 2.21 pCi/g at the LAP4L-025 location (Figure D-4). The mean detected concentration was 2.21 pCi/g and the EPC was 2.21 pCi/g. Lead-212 came through screening because there is no RSV available. Lead-212 is naturally occurring and the half-life is short at 10.6 hours. Further, the maximum is within background, the SRS background maximum for the thorium-232 decay series is 4.17 pCi/g.

Lead-212 is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- It is a naturally occurring radionuclide.
- There is no screening threshold available.
- It is daughter product of the thorium-232 decay series and within SRS background concentrations.

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- No history of radiological waste disposed of at this unit.

Lead-214 was detected in one of one sample. The sample was not J-qualified (i.e., estimated). In 2022, the maximum detected concentration was 1.97 pCi/g at the LAP4L-025 location (Figure D-4). The mean detected concentration was 1.97 pCi/g and the EPC was 1.97 pCi/g. Lead-214 came through screening because there is no RSV available. Lead-214 is naturally occurring and the half-life is short at 26.4 minutes. Further, the maximum is within background, the SRS background maximum for the uranium-238 decay series is 2.78 pCi/g.

Lead-214 is not recommended for further remedial evaluation as an ecological RCOC in surface soil based on the following lines of evidence:

- It is a naturally occurring radionuclide.
- There is no screening threshold available.
- No history of radiological waste disposed of at this unit.
- It is daughter product of the uranium-238 decay series and within SRS background concentrations.

Summary: Radionuclide constituents in this soil interval were identified as COPCs because they have no screening thresholds available. Aluminum and vanadium had screening thresholds that were exceeded but are naturally occurring and fall within background levels. Other reasons constituents were screened out were due to short half-lives, mean/EPC values were below thresholds, or constituents were not part of SRS processes. In summary, no constituents are identified as RCOCs for the LRP 131-4L Subunit in the 0.3 to 1.2 m (1 to 4 ft) subsurface soil interval.

D-2.3.4 Screening Level Effects Conclusion

The following three possible decisions can be made upon completion of the screening level evaluation:

- There are adequate data to conclude that ecological risks are negligible, therefore, there is no need for remediation on the basis of ecological risk.

- The information indicates a potential for adverse ecological effects and a more thorough assessment is warranted.

- The information is not adequate to make a decision at this point and the ecological risk assessment process will continue to address data gaps.

The screening level ecological effects evaluation for the ECODS L-3, LRP 131-1L, and LRP 131-4L OU indicates that additional information is not needed to make remedial decision recommendations for the protection of ecological receptors. Site-specific biological sampling or additional studies are not warranted. No problems warranting action are identified.

D-3. SUMMARY/CONCLUSION OF ECOLOGICAL RISK ASSESSMENT

The following table presents the overall summary of the ERA by subunit. The revised CSMs are presented in Chapter 3 (Figures 3-4 through 3-6).

Subunit	ERA Soil 0 to 0.3 m (0 to 1 ft) RCOCs	ERA Soil 0.3 to 1.2 m (1 to 4 ft) RCOCs
ECODS L-3	None	None
LRP 131-1L	None	None
LRP 131-4L	None	None

ERA = ecological risk assessment   RCOC = refined constituent of concern   NA = not applicable

D-4. REFERENCES

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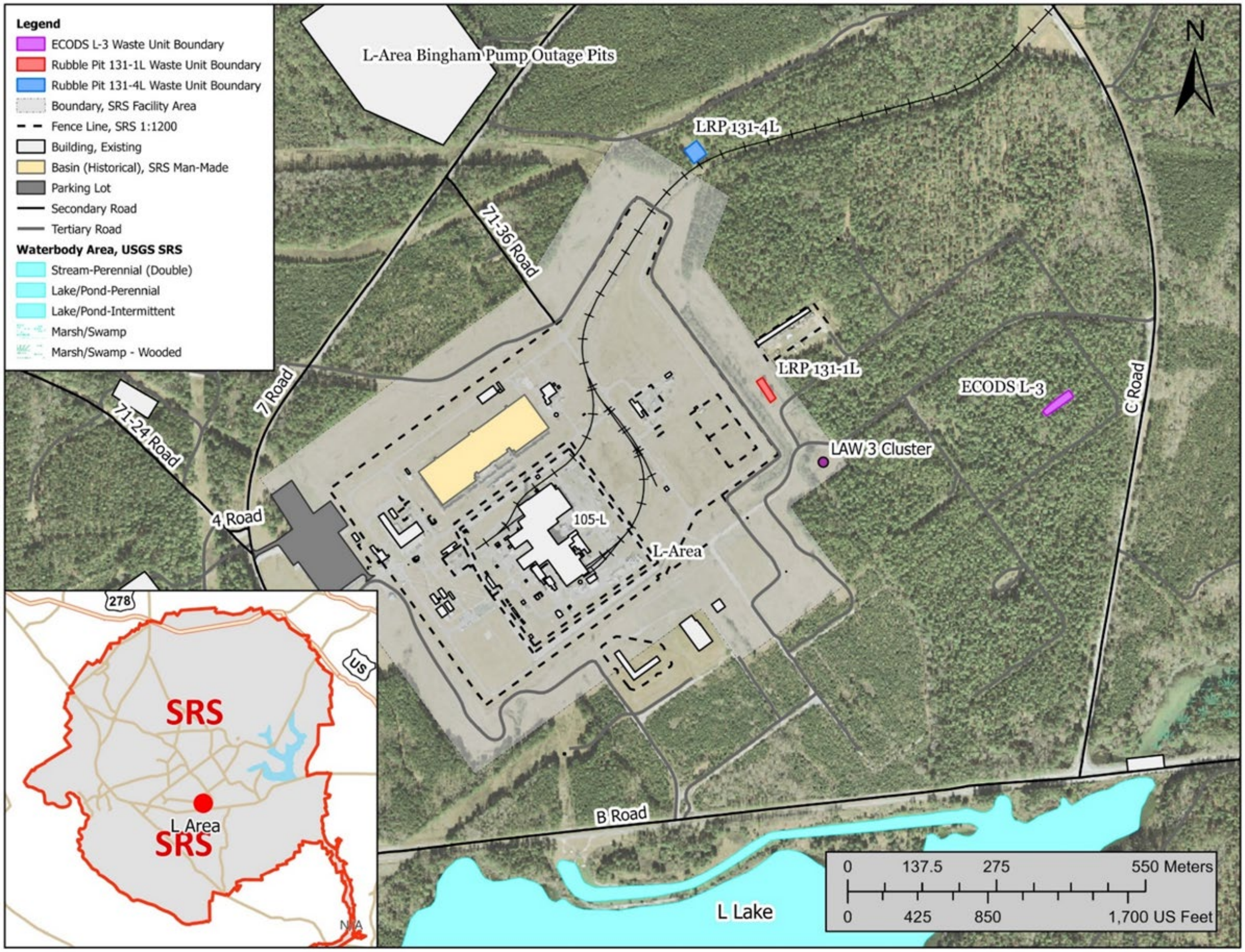

Figure D-1. ECODS L-3, LRP 131-1L, and LRP-131-4L OU Location

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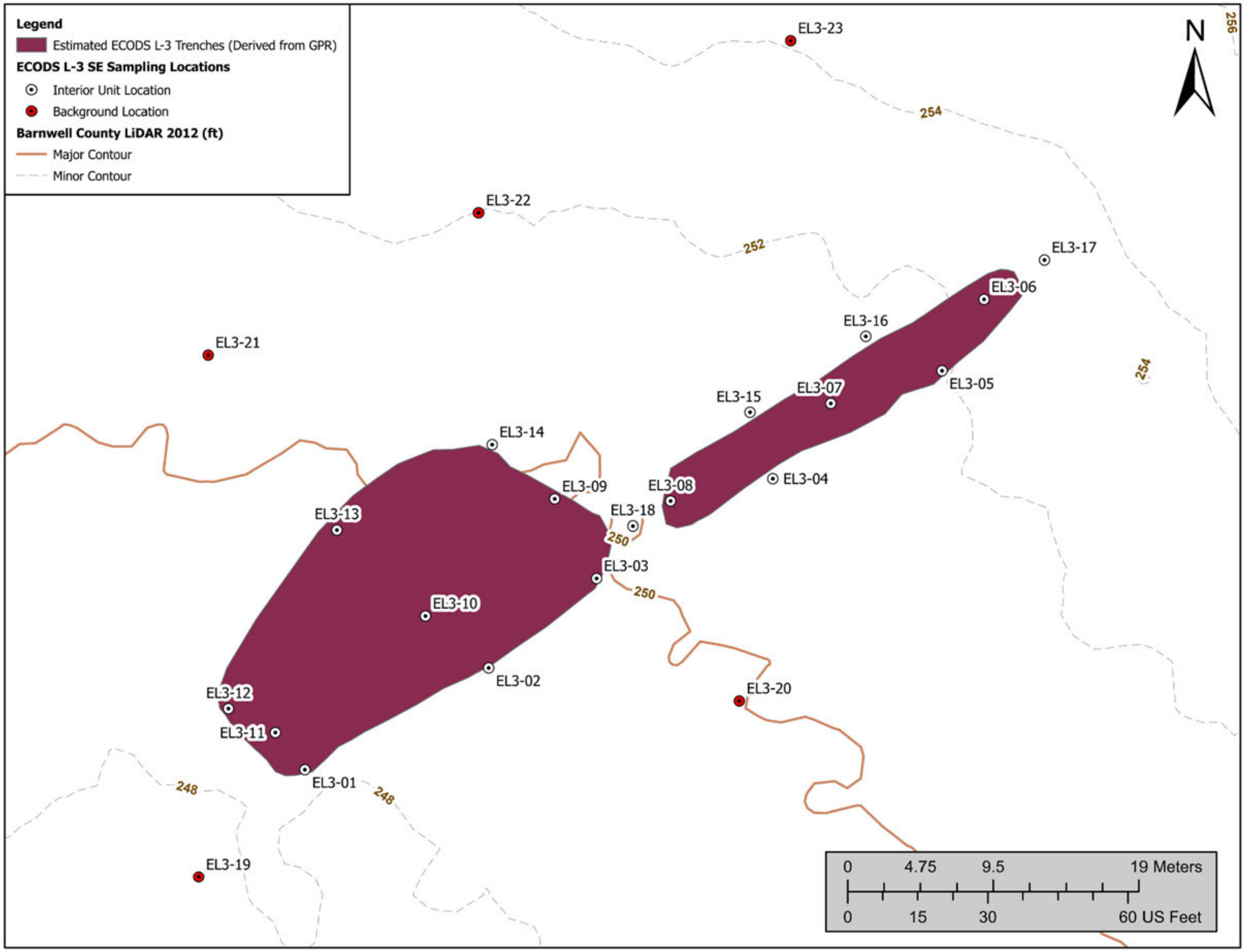

Figure D-2. ECODS L-3 Sample Location Map

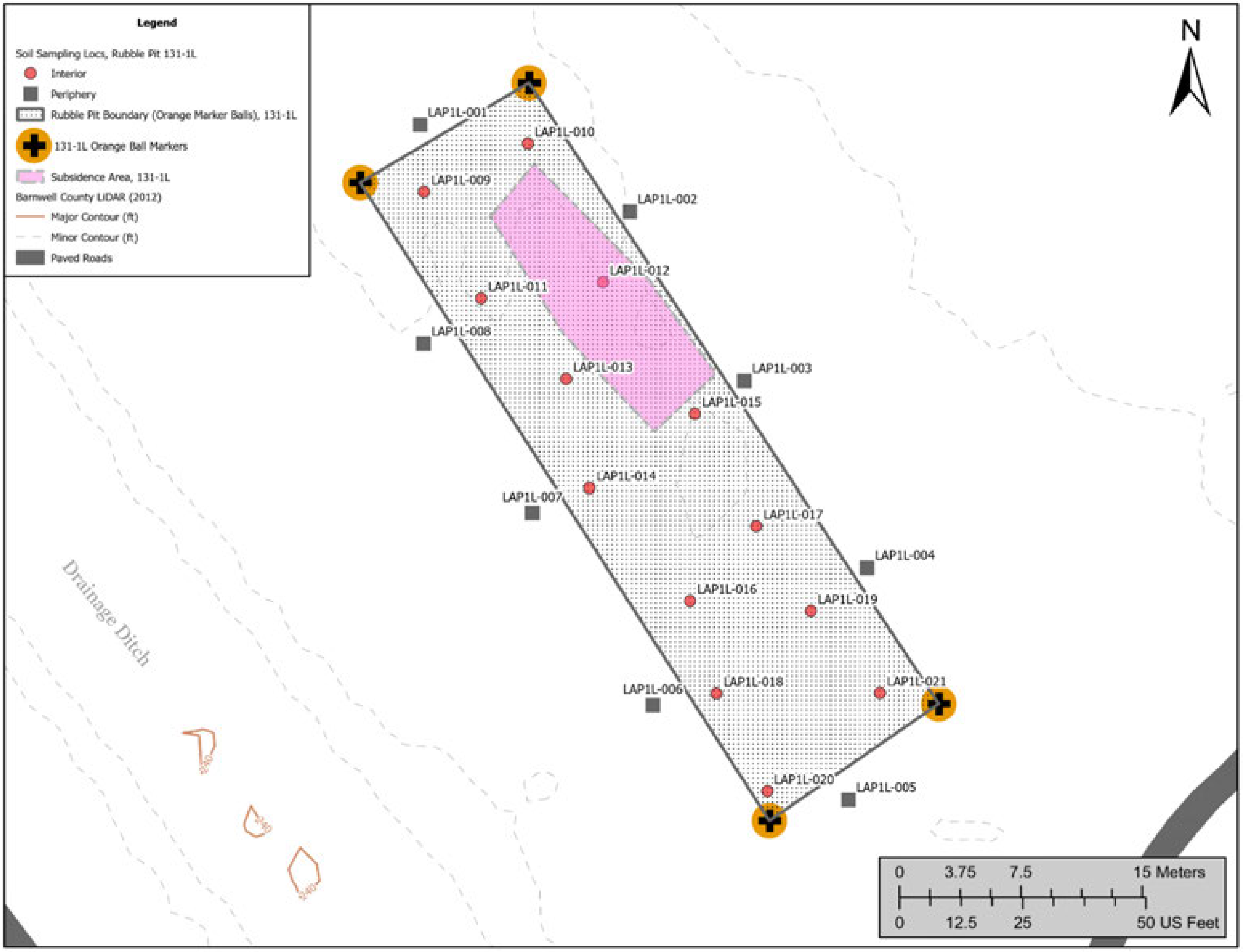

Figure D-3. L-Area Rubble Pile 131-1L Sample Location Map

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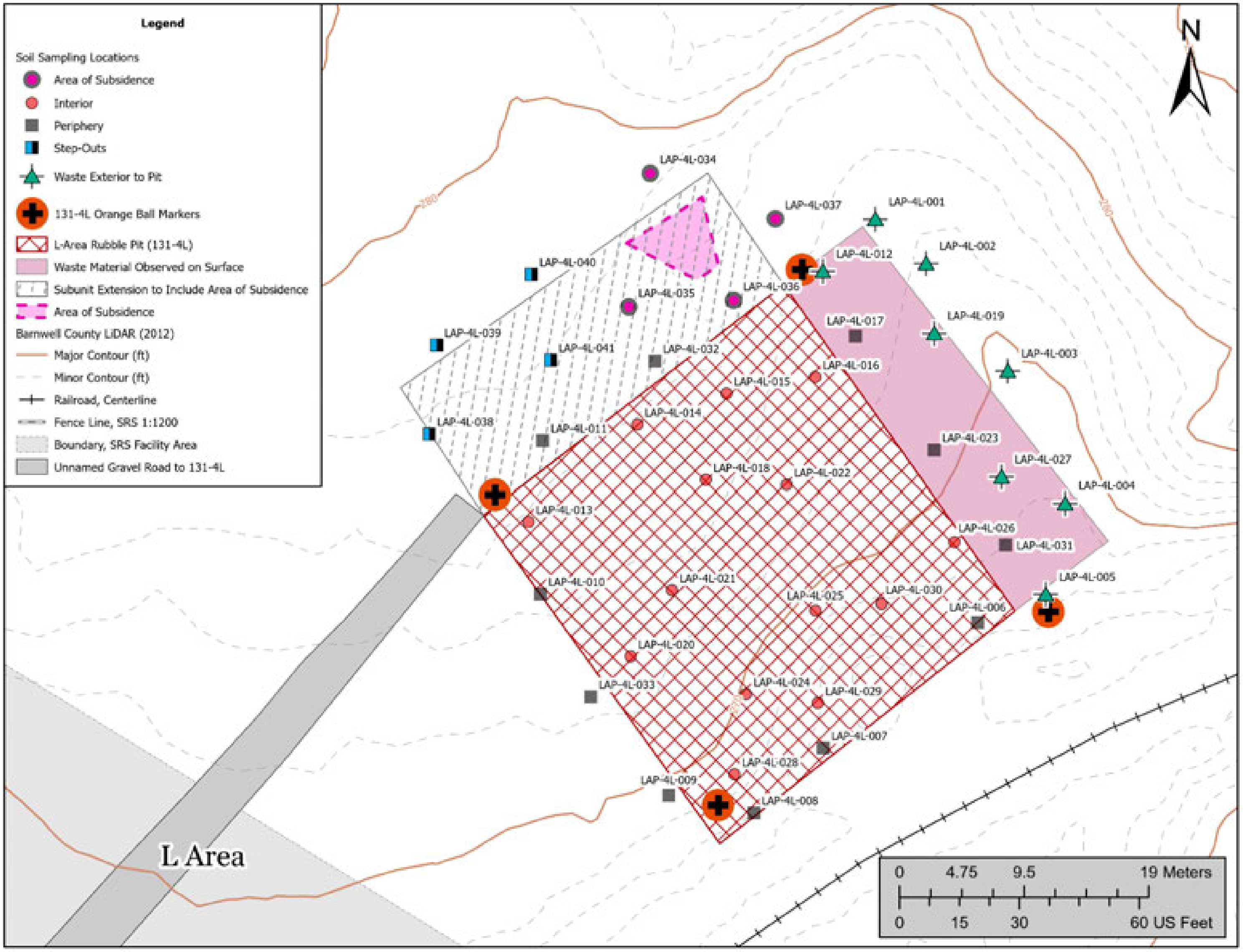

Figure D-4. L-Area Rubble Pile 131-4L Sample Location Map

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Table D-1. Screening Level Evaluation for ECODS L-3 Subunit (Soil 0 to 0.3 m [0 to 1 ft])

Analyte	Detected Maximum Concentration[1]	Qualifier	ESV[2]	ESV Source[3]	Screening Level HQ[4]	Maximum Exceeds ESV (HQ>1)?	2X Average Background[5]	Maximum Exceeds Background?	COPEC?[6]
Inorganics (mg/kg)									
ALUMINUM	1.47E+04		NA	NA	NA	---	1.05E+04	YES	YES
ANTIMONY	2.17E+01		2.70E-01	a	8.04E+01	YES	2.69E+00	YES	YES
ARSENIC	4.10E+00		6.80E+00	b	6.03E-01	no	4.28E+00	no	no
BARIUM	6.19E+01	J	3.30E+02	a,b	1.88E-01	no	3.91E+01	YES	no
CADMIUM	1.08E+01		2.70E-01	b	4.00E+01	YES	4.83E-01	YES	YES
CALCIUM	1.47E+04		NA	Nutrient	NA	no	4.76E+02	YES	no
CHROMIUM	7.19E+01	J	2.30E+01	a,b	3.13E+00	YES	1.54E+01	YES	YES
COBALT	6.77E-01		1.30E+01	a	5.21E-02	no	1.55E+00	no	no
COPPER	5.36E+01	J	1.40E+01	b	3.83E+00	YES	4.34E+00	YES	YES
CYANIDE	1.22E+00	J	9.80E-02	b	1.24E+01	YES	NA	---	YES
IRON	1.35E+04		NA	NA	NA	---	1.27E+04	YES	YES
LEAD	1.30E+03		1.10E+01	a,b	1.18E+02	YES	1.03E+01	YES	YES
MAGNESIUM	1.15E+03		NA	Nutrient	NA	no	2.75E+02	YES	no
MANGANESE	1.39E+02		2.20E+02	a	6.32E-01	no	1.53E+02	no	no
MERCURY	3.61E-01		1.30E-02	a,b	2.78E+01	YES	7.10E-02	YES	YES
NICKEL	3.70E+01		1.00E+01	b	3.70E+00	YES	3.48E+00	YES	YES
POTASSIUM	2.12E+02		NA	Nutrient	NA	no	2.16E+02	no	no
SELENIUM	1.51E+00	J	5.20E-01	a	2.90E+00	YES	2.99E+00	no	no
SODIUM	7.66E+01	J	NA	Nutrient	NA	no	4.02E+01	YES	no
VANADIUM	3.10E+01		4.70E+00	b	6.60E+00	YES	3.91E+01	no	no
ZINC	3.21E+02	J	4.60E+01	a	6.98E+00	YES	9.47E+00	YES	YES
Organics (mg/kg)									
1,1-DICHLOROETHYLENE	2.62E-03		4.00E-02	a	6.55E-02	no	NA	---	no
ACETONE	2.86E-02		1.20E+00	a,b	2.38E-02	no	NA	---	no
ANTHRACENE	4.23E-02	J	2.90E+01	a	1.46E-03	no	NA	---	no
AROCLOR 1254	5.63E+00	J	4.10E-02	a,b	1.37E+02	YES	NA	---	YES
AROCLOR 1260	2.17E+00	J	4.10E-02	a	5.29E+01	YES	NA	---	YES
BENZALDEHYDE	2.22E-01		2.90E+01	a	7.66E-03	no	NA	---	no

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Table D-1. Screening Level Evaluation for ECODS L-3 Subunit (Soil 0 to 0.3 m [0 to 1 ft]) *(Continued)*

Analyte	Detected Maximum Concentration[1]	Qualifier	ESV[2]	ESV Source[3]	Screening Level HQ[4]	Maximum Exceeds ESV (HQ>1)?	2X Average Background[5]	Maximum Exceeds Background?	COPEC?[6]
Organics (mg/kg) (continued)									
BENZO(G,H,I)PERYLENE	1.09E-01	J	1.10E+00	a	9.91E-02	no	NA	---	no
BENZO[A]ANTHRACENE	1.47E-01	J	7.30E-01	b	2.01E-01	no	NA	---	no
BENZO[A]PYRENE	1.82E-01		1.10E+00	a	1.65E-01	no	NA	---	no
BENZO[B]FLUORANTHENE	2.60E-01		1.10E+00	a	2.36E-01	no	NA	---	no
BENZO[K]FLUORANTHENE	1.01E-01	J	1.10E+00	a	9.18E-02	no	NA	---	no
BIS(2-ETHYLHEXYL) PHTHALATE (DEHP)	1.63E+01		2.00E-02	a,b	8.15E+02	YES	NA	---	YES
CARBON DISULFIDE	9.51E-04	J	5.00E-03	a	1.90E-01	no	NA	---	no
CHRYSENE	1.32E-01	J	1.10E+00	a	1.20E-01	no	NA	---	no
DDE	5.84E-04	J	2.10E-02	a	2.78E-02	no	NA	---	no
DDT	1.07E-03	J	2.10E-02	a	5.10E-02	no	NA	---	no
DICHLOROMETHANE (METHYLENE CHLORIDE)	6.96E-04	J	2.10E-01	a	3.31E-03	no	NA	---	no
FLUORANTHENE	2.79E-01		1.10E+00	a	2.54E-01	no	NA	---	no
INDENO[1,2,3-CD]PYRENE	9.86E-02	J	1.10E+00	a	8.96E-02	no	NA	---	no
METHYL ETHYL KETONE	1.57E-03	J	1.00E+00	a	1.57E-03	no	NA	---	no
METHYL TERTIARY BUTYL ETHER (MTBE)	4.00E-04	J	1.25E+01	a	3.20E-05	no	NA	---	no
PHENANTHRENE	1.60E-01	J	5.50E+00	b	2.91E-02	no	NA	---	no
PYRENE	2.17E-01		1.10E+00	a	1.97E-01	no	NA	---	no
STYRENE	3.68E-04	J	1.20E+00	a,b	3.07E-04	no	NA	---	no
TOLUENE	1.47E-03		1.50E-01	a	9.80E-03	no	NA	---	no
XYLENES	1.98E-04	J	1.00E-01	a	1.98E-03	no	NA	---	no

1 - Maximum detected concentration from Appendix A Table A.2.1 ECODS L-3 Subunit Soil (0 to 0.3 m [0 to 1 ft]).
2 - ESV from Attachment D-1 Table D.1-1.
3 - ESV Source
a - Table 3 in *EPA Region 4 Ecological Risk Assessment Supplemental Guidance*, March Update (2018).
b - Los Alamos National Laboratory No Effect ESL for soil media (2022)
4 - Screening Level Hazard Quotient (HQ) = maximum detected concentration / ESV
5 - Background screening values obtained from *Background Soils Statistical Summary Report for Savannah River Site*, ERD-EN-2005,0223, Rev. 1, 10/06. For screening purposes, maximum concentration of only the naturally occurring (nonanthropogenic) constituents are compared to 2X average background concentration.
6 - COPEC = constituent of potential ecological concern. Analyte identified as a COPEC if the maximum detected concentration exceeds the ecological screening value (i.e., HQ>1), if available, and exceeds 2X average SRS background concentration.
NA = Not available, ESV for this constituent is not available.
EN = Essential nutrient, not subject to further evaluation.

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Table D-2. Refinement Level Evaluation for ECODS L-3 Subunit (Soil 0 to 0.3 m [0 to 1 ft])

Analyte[1]	Exposure Point Concentration[2]	RSV[3]	RSV Source[4]	Refinement Level HQ[5]	EPC Exceeds RSV (HQ>1)?	COPC?[6]
Inorganics (mg/kg)						
ALUMINUM	7.19E+03	---	NA	NC	YES	YES
ANTIMONY	5.13E+00	2.30E+01	b	2.23E-01	no	no
CADMIUM	2.07E+00	1.60E+00	b	1.29E+00	YES	YES
CHROMIUM	1.77E+01	7.30E+01	b	2.42E-01	no	no
COPPER	3.12E+01	4.30E+01	b	7.26E-01	no	no
CYANIDE	1.22E+00	9.80E-01	b	1.24E+00	YES	YES
IRON	6.45E+03	---	NA	NC	YES	YES
LEAD	2.14E+02	2.30E+01	b	9.32E+00	YES	YES
MERCURY	8.06E-02	1.30E-01	b	6.20E-01	no	no
NICKEL	7.89E+00	2.10E+01	b	3.76E-01	no	no
ZINC	1.21E+02	1.20E+02	b	1.01E+00	YES	YES
Organics (mg/kg)						
AROCLOR 1254	1.28E+00	4.10E-01	b	3.12E+00	YES	YES
AROCLOR 1260	3.56E-01	1.20E+00	b	2.97E-01	no	no
BIS(2-ETHYLHEXYL)PHTHALATE (DEHP)	2.63E+00	2.00E-01	b	1.32E+01	YES	YES

1 - Analytes identified as COPECs from Table D-1
2 - EPC = reasonable maximum exposure (RME) exposure point concentration (EPC) is the lesser of the maximum detected concentration and the 95% upper confidence limit (UCL) on the mean concentration. RME from Appendix A Table A.2.1 LRP 131-1L Subunit Soil (0 to 0.3 m [0 to 1 ft])
3 - RSV from Attachment D-1 Table D.1-2
4 – RSV Source:
a = Table 3 in EPA Region 4 Ecological Risk Assessment Supplemental Guidance March Update (2018).
b = Los Alamos National Laboratory Low Effect ESL for soil media (2022)
5 - Refinement Level Hazard Quotient (HQ) = EPC / RSV
6 - COPC = constituent of potential concern. Analyte identified as a COPC if the refinement level HQ>1

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Table D-3. Screening Level Evaluation for ECODS L-3 Subunit (Soil 0.3 to 1.2 m [1 to 4 ft])

Analyte	Detected Maximum Concentration[1]	Qualifier	ESV[2]	ESV Source[3]	Screening Level HQ[4]	Maximum Exceeds ESV (HQ>1)?	2X Average Background[5]	Maximum Exceeds Background?	COPEC?[6]
Inorganics (mg/kg)									
ALUMINUM	2.19E+04		NA	NA	NA	---	1.05E+04	YES	YES
ANTIMONY	5.66E+01		2.70E-01	a	2.10E+02	YES	2.69E+00	YES	YES
ARSENIC	9.06E+00		6.80E+00	b	1.33E+00	YES	4.28E+00	YES	YES
BARIUM	2.79E+02		3.30E+02	a,b	8.45E-01	no	3.91E+01	YES	no
CADMIUM	1.19E+01		2.70E-01	b	4.41E+01	YES	4.83E-01	YES	YES
CALCIUM	5.28E+04	J	NA	Nutrient	NA	no	4.76E+02	YES	no
CHROMIUM	8.01E+01		2.30E+01	a,b	3.48E+00	YES	1.54E+01	YES	YES
COBALT	4.67E+00		1.30E+01	a	3.59E-01	no	1.55E+00	YES	no
COPPER	3.89E+03		1.40E+01	b	2.78E+02	YES	4.34E+00	YES	YES
IRON	3.13E+04		NA	NA	NA	---	1.27E+04	YES	YES
LEAD	3.96E+02		1.10E+01	a,b	3.60E+01	YES	1.03E+01	YES	YES
MAGNESIUM	2.52E+03	J	NA	Nutrient	NA	no	2.75E+02	YES	no
MANGANESE	4.47E+02		2.20E+02	a	2.03E+00	YES	1.53E+02	YES	YES
MERCURY	1.61E-01		1.30E-02	a,b	1.24E+01	YES	7.10E-02	YES	YES
NICKEL	4.24E+01		1.00E+01	b	4.24E+00	YES	3.48E+00	YES	YES
POTASSIUM	2.51E+02		NA	Nutrient	NA	no	2.16E+02	YES	no
SODIUM	2.70E+02		NA	Nutrient	NA	no	4.02E+01	YES	no
VANADIUM	7.14E+01		4.70E+00	b	1.52E+01	YES	3.91E+01	YES	YES
ZINC	9.17E+02	J	4.60E+01	a	1.99E+01	YES	9.47E+00	YES	YES
Organics (mg/kg)									
1,1'-BIPHENYL	6.29E-01	J	2.00E-01	a	3.15E+00	YES	NA	---	YES
1,1-DICHLOROETHYLENE	2.88E-03		4.00E-02	a	7.20E-02	no	NA	---	no
2-METHYLNAPHTHALENE	2.00E+00		1.60E+01	b	1.25E-01	no	NA	---	no
ACENAPHTHENE	9.27E+00		2.90E+01	a	3.20E-01	no	NA	---	no

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Table D-3. Screening Level Evaluation for ECODS L-3 Subunit (Soil 0.3 to 1.2 m [1 to 4 ft]) *(Continued)*

Analyte	Detected Maximum Concentration[1]	Qualifier	ESV[2]	ESV Source[3]	Screening Level HQ[4]	Maximum Exceeds ESV (HQ>1)?	2X Average Background[5]	Maximum Exceeds Background?	COPEC?[6]
Organics (mg/kg) (continued)									
ACETONE	1.14E-02		1.20E+00	a,b	9.50E-03	no	NA	---	no
ANTHRACENE	1.76E+01		2.90E+01	a	6.07E-01	no	NA	---	no
AROCLOR 1254	2.39E+00		4.10E-02	a,b	5.83E+01	YES	NA	---	YES
AROCLOR 1260	1.60E-01	J	4.10E-02	a	3.90E+00	YES	NA	---	YES
BENZALDEHYDE	5.20E-02	J	2.90E+01	a	1.79E-03	no	NA	---	no
BENZENE	1.36E-03	J	1.20E-01	a	1.13E-02	no	NA	---	no
BENZO(G,H,I)PERYLENE	9.67E+00		1.10E+00	a	8.79E+00	YES	NA	---	YES
BENZO[A]ANTHRACENE	2.59E+01		7.30E-01	b	3.55E+01	YES	NA	---	YES
BENZO[A]PYRENE	2.06E+01		1.10E+00	a	1.87E+01	YES	NA	---	YES
BENZO[B]FLUORANTHENE	2.69E+01		1.10E+00	a	2.45E+01	YES	NA	---	YES
BENZO[K]FLUORANTHENE	9.72E+00		1.10E+00	a	8.84E+00	YES	NA	---	YES
BIS(2-ETHYLHEXYL) PHTHALATE (DEHP)	3.71E+01		2.00E-02	a,b	1.86E+03	YES	NA	---	YES
CARBAZOLE	1.38E+01		7.00E-02	a	1.97E+02	YES	NA	---	YES
CHRYSENE	2.14E+01		1.10E+00	a	1.95E+01	YES	NA	---	YES
DIBENZ[AH]ANTHRACENE	2.70E+00		1.10E+00	a	2.45E+00	YES	NA	---	YES
DIBENZOFURAN	5.10E+00		1.50E-01	a	3.40E+01	YES	NA	---	YES
FLUORANTHENE	3.50E+01		1.10E+00	a	3.18E+01	YES	NA	---	YES
FLUORENE	1.05E+01		3.70E+00	b	2.84E+00	YES	NA	---	YES
INDENO[1,2,3-CD]PYRENE	8.91E+00		1.10E+00	a	8.10E+00	YES	NA	---	YES
METHYL ETHYL KETONE	1.37E-03	J	1.00E+00	a	1.37E-03	no	NA	---	no
METHYL TERTIARY BUTYL ETHER (MTBE)	4.30E-04	J	1.25E+01	a	3.44E-05	no	NA	---	no
NAPHTHALENE	5.66E+00		3.40E+00	b	1.66E+00	YES	NA	---	YES

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Table D-3. Screening Level Evaluation for ECODS L-3 Subunit (Soil 0.3 to 1.2 m [1 to 4 ft]) *(Continued/End)*

Analyte	Detected Maximum Concentration[1]	Qualifier	ESV[2]	ESV Source[3]	Screening Level HQ[4]	Maximum Exceeds ESV (HQ>1)?	2X Average Background[5]	Maximum Exceeds Background?	COPEC?[6]
Organics (mg/kg) (continued)									
PHENANTHRENE	3.39E+01		5.50E+00	b	6.16E+00	YES	NA	---	YES
PYRENE	3.40E+01		1.10E+00	a	3.09E+01	YES	NA	---	YES
STYRENE	1.93E-04	J	1.20E+00	a,b	1.61E-04	no	NA	---	no
TOLUENE	2.37E-03		1.50E-01	a	1.58E-02	no	NA	---	no
XYLENES	7.12E-04	J	1.00E-01	a	7.12E-03	no	NA	---	no

1 - Maximum detected concentration from Appendix A Table A.2.2 ECODS L-3 Subunit Soil (0.3 to 1.2 m [1 to 4 ft]).
2 - ESV from Attachment D-1 Table D.1-1.
3 – ESV Source
a = Table 3 in EPA Region 4 Ecological Risk Assessment Supplemental Guidance March Update (2018).
b = Los Alamos National Laboratory No Effect ESL for soil media (2022)
4 - Screening Level Hazard Quotient (HQ) = maximum detected concentration / ESV
5 - Background screening values obtained from *Background Soils Statistical Summary Report for Savannah River Site*, ERD-EN-2005,0223, Rev. 1, 10/06. For screening purposes, maximum concentration of only the naturally occurring (nonanthropogenic) constituents are compared to 2X average background concentration.
6 - COPEC = constituent of potential ecological concern. Analyte is identified as a COPEC if the maximum detected concentration exceeds the ecological screening value (i.e., HQ>1), if available, and exceeds 2X average SRS background concentration.
NA = not available, ESV for this constituent is not available.
EN = Essential nutrient, not subject to further evaluation.

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Table D-4. Refinement Level Evaluation for ECODS L-3 Subunit (Soil 0.3 to 1.2 m [1 to 4 ft])

Analyte[1]	Exposure Point Concentration[2]	RSV[3]	RSV Source[4]	Refinement Level HQ[5]	EPC Exceeds RSV (HQ>1)?	COPC?[6]
Inorganics (mg/kg)						
ALUMINUM	1.16E+04	---	NA	NC	YES	YES
ANTIMONY	1.56E+01	2.30E+01	b	6.78E-01	no	no
ARSENIC	4.35E+00	3.10E+01	b	1.40E-01	no	no
CADMIUM	2.90E+00	1.60E+00	b	1.81E+00	YES	YES
CHROMIUM	3.79E+01	7.30E+01	b	5.19E-01	no	no
COPPER	6.85E+02	4.30E+01	b	1.59E+01	YES	YES
IRON	1.73E+04	---	NA	NC	YES	YES
LEAD	8.17E+01	2.30E+01	b	3.55E+00	YES	YES
MANGANESE	4.47E+02	2.70E+03	b	1.66E-01	no	no
MERCURY	7.38E-02	1.30E-01	b	5.68E-01	no	no
NICKEL	1.56E+01	2.10E+01	b	7.41E-01	no	no
VANADIUM	3.12E+01	9.50E+00	b	3.29E+00	YES	YES
ZINC	2.54E+02	1.20E+02	b	2.12E+00	YES	YES
Organics (mg/kg)						
1,1'-BIPHENYL	6.29E-01	2.00E-01	a	3.15E+00	YES	YES
AROCLOR 1254	8.46E-01	4.10E-01	b	2.06E+00	YES	YES
AROCLOR 1260	6.34E-02	1.20E+00	b	5.28E-02	no	no
BENZO(G,H,I)PERYLENE	1.85E+00	2.50E+02	b	7.41E-03	no	no
BENZO[A]ANTHRACENE	4.20E+00	7.30E+00	b	5.75E-01	no	no
BENZO[A]PYRENE	1.05E+01	1.90E+02	b	5.54E-02	no	no
BENZO[B]FLUORANTHENE	1.37E+01	4.40E+02	b	3.12E-02	no	no
BENZO[K]FLUORANTHENE	1.86E+00	7.10E+02	b	2.62E-03	no	no
BIS(2-ETHYLHEXYL)PHTHALATE (DEHP)	6.00E+00	2.00E-01	b	3.00E+01	YES	YES
1,1'-BIPHENYL	6.29E-01	2.00E-01	a	3.15E+00	YES	YES
CARBAZOLE	2.63E+00	7.90E+02	b	3.33E-03	no	no

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Table D-4. Refinement Level Evaluation for ECODS L-3 Subunit (Soil 0.3 to 1.2 m [1 to 4 ft]) (*continued/end*)

Analyte[1]	Exposure Point Concentration[2]	RSV[3]	RSV Source[4]	Refinement Level HQ[5]	EPC Exceeds RSV (HQ>1)?	COPC?[6]
Organics (mg/kg) (continued)						
CHRYSENE	1.10E+01	3.10E+01	b	3.54E-01	no	no
DIBENZ[AH]ANTHRACENE	5.36E-01	1.40E+02	b	3.83E-03	no	no
DIBENZOFURAN	5.10E+00	6.10E+01	b	8.36E-02	no	no
FLUORANTHENE	5.67E+00	2.30E+01	b	2.47E-01	no	no
FLUORENE	1.05E+01	1.90E+01	b	5.53E-01	no	no
INDENO[1,2,3-CD]PYRENE	1.71E+00	7.10E+02	b	2.41E-03	no	no
NAPHTHALENE	5.66E+00	2.70E+01	b	2.10E-01	no	no
PHENANTHRENE	5.48E+00	1.20E+01	b	4.57E-01	no	no
PYRENE	5.43E+00	2.00E+01	b	2.72E-01	no	no

1 - Analytes identified as COPECs from Table D-3
2 - EPC = reasonable maximum exposure (RME) exposure point concentration (EPC) is the lesser of the maximum detected concentration and the 95% upper confidence limit (UCL) on the mean concentration. RME from Appendix A Table A.2.2 ECODS L-3 Subunit (0.3 to 1.2 m [1 to 4 ft])
3 - RSV from Attachment D-1 Table D.1-2
4 - RSV Source:
a = Table 3 in EPA Region 4 Ecological Risk Assessment Supplemental Guidance March Update (2018).
b = Los Alamos National Laboratory Low Effect ESL for soil media (2022)
5 - Refinement Level Hazard Quotient (HQ) = EPC / RSV
6 - COPC = constituent of potential concern. Analyte identified as a COPC if the refinement level HQ>1

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Table D-5. Screening Level Evaluation for the LRP 131-1L Subunit (Soil 0 to 0.3 m [0 to 1 ft])

Analyte	Detected Maximum[1]	Qualifier	ESV[2]	ESV Source[3]	Screening Level HQ[4]	Maximum Exceeds ESV (HQ>1)?	2X Average Background[5]	Maximum Exceeds Background?	COPEC?[6]
Inorganics (mg/kg)									
ALUMINUM	3.50E+04		NA	NA	NA	---	1.05E+04	YES	YES
ANTIMONY	3.10E-01		2.70E-01	a	1.15E+00	YES	2.69E+00	no	no
ARSENIC	6.50E+00		6.80E+00	b	9.56E-01	no	4.28E+00	YES	no
BARIUM	4.50E+01		3.30E+02	a,b	1.36E-01	no	3.91E+01	YES	no
BERYLLIUM	5.50E-01		2.50E+00	a	2.20E-01	no	2.88E-01	YES	no
CADMIUM	1.30E-01		2.70E-01	b	4.81E-01	no	4.83E-01	no	no
CALCIUM	1.20E+03		NA	Nutrient	NA	no	4.76E+02	YES	no
CHROMIUM	2.80E+01		2.30E+01	a,b	1.22E+00	YES	1.54E+01	YES	YES
COBALT	2.00E+00		1.30E+01	a	1.54E-01	no	1.55E+00	YES	no
COPPER	3.10E+01		1.40E+01	b	2.21E+00	YES	4.34E+00	YES	YES
CYANIDE	1.20E+00		9.80E-02	b	1.22E+01	YES	NA	---	YES
IRON	1.90E+04		NA	NA	NA	---	1.27E+04	YES	YES
LEAD	1.30E+01		1.10E+01	a,b	1.18E+00	YES	1.03E+01	YES	YES
MAGNESIUM	4.40E+02		NA	Nutrient	NA	no	2.75E+02	YES	no
MANGANESE	1.80E+02		2.20E+02	a	8.18E-01	no	1.53E+02	YES	no
MERCURY	6.10E-02		1.30E-02	a,b	4.69E+00	YES	7.10E-02	no	no
NICKEL	8.80E+00		1.00E+01	b	8.80E-01	no	3.48E+00	YES	no
POTASSIUM	3.50E+02		NA	Nutrient	NA	no	2.16E+02	YES	no
SELENIUM	5.80E-01		5.20E-01	a	1.12E+00	YES	2.99E+00	no	no
SILVER	2.00E-02	J	2.60E+00	b	7.69E-03	no	7.28E-01	no	no
THALLIUM	1.60E-01		5.00E-02	a	3.20E+00	YES	3.12E+00	no	no
VANADIUM	5.70E+01		4.70E+00	b	1.21E+01	YES	3.91E+01	YES	YES
ZINC	3.60E+01		4.60E+01	a	7.83E-01	no	9.47E+00	YES	no
Organics (mg/kg)									
2-HEXANONE	3.98E-03	J	3.60E-01	a,b	1.11E-02	no	NA	---	no
ACETONE	3.97E-01		1.20E+00	a,b	3.31E-01	no	NA	---	no
CUMENE (ISOPROPYLBENZENE)	1.88E-03		4.00E-02	a	4.70E-02	no	NA	---	no
METHYL ETHYL KETONE	4.39E-02		1.00E+00	a	4.39E-02	no	NA	---	no

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Table D-5. Screening Level Evaluation for the LRP 131-L Subunit (Soil 0 to 0.3 m [0 to 1 ft]) *(continued/end)*

Analyte	Detected Maximum[1]	Qualifier	ESV[2]	ESV Source[3]	Screening Level HQ[4]	Maximum Exceeds ESV (HQ>1)?	2X Average Background[5]	Maximum Exceeds Background?	COPEC?[6]
Organics (mg/kg) (continued)									
STYRENE	1.85E-03	J	1.20E+00	a,b	1.54E-03	no	NA	---	no
Radionuclides (pCi/g)									
ACTINIUM-228	1.42E+00		NA	NA	NA	---	1.95E+00	no	no
AMERICIUM-243	8.88E-02	J	NA	NA	NA	---	NA	---	YES
CESIUM-137	3.90E-01		1.40E+03	b	2.79E-04	no	2.84E-01	YES	no
CURIUM-245/246	4.29E-02	J	NA	NA	NA	---	NA	---	YES
LEAD-212	1.09E+00		NA	NA	NA	---	2.19E+00	no	no
LEAD-214	9.13E-01		NA	NA	NA	---	NA	---	YES
PLUTONIUM-238	9.10E-02	J	8.20E+02	b	1.11E-04	no	5.77E-01	no	no
PLUTONIUM-239/240	5.69E-02	J	8.70E+02	b	6.54E-05	no	8.36E-02	no	no
POTASSIUM-40	1.06E+00	J	NA	NA	NA	---	2.33E+00	no	no
RADIUM-226	9.66E-01		1.50E+00	b	6.44E-01	no	1.37E+00	no	no
RADIUM-228	1.70E+00		1.20E+00	b	1.42E+00	YES	1.92E+00	no	no
STRONTIUM-90	8.14E-01	J	3.40E+02	b	2.39E-03	no	7.43E-01	YES	no
THORIUM-228	1.72E+00		4.30E+01	b	4.00E-02	no	1.97E+00	no	no
THORIUM-230	1.01E+00		5.20E+01	b	1.94E-02	no	1.13E+00	no	no
THORIUM-232	1.54E+00		6.20E+00	b	2.48E-01	no	1.80E+00	no	no
URANIUM-233/234	8.04E-01		2.20E+03	b	3.65E-04	no	1.15E+00	no	no
URANIUM-235	9.02E-02	J	1.60E+03	b	5.64E-05	no	7.98E-02	YES	no
URANIUM-238	9.00E-01		1.10E+03	b	8.18E-04	no	1.01E+00	no	no

1 - Maximum detected concentration from Appendix A Table A.3.1 LRP 131-1L Soil Media (0 to 0.3 m [0 to 1 ft])
2 - ESV from Attachment D-1 Table D.1-1.
3 - ESV Source
a = Table 3 in *EPA Region 4 Ecological Risk Assessment Supplemental Guidance* March 2018 Update (2018), Table 3.
b = Los Alamos National Laboratory No Effect ESL for soil media (2022)
4 - Screening Level Hazard Quotient (HQ) = maximum detected concentration / ESV
5 - Background screening values obtained from the Background Soils Statistical Summary Report for the Savannah River Site, ERD-EN-2005-0223, Rev. 1, October 2006
6 - COPEC = constituent of potential ecological concern. Analyte is identified as a COPEC if the maximum detected concentration exceeds the ecological screening value (i.e., HQ>1), if available, and exceeds 2X average SRS background concentration.
EN = Essential nutrient, not subject to further evaluation
NA = Not available, ESV for this constituent is not available.

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Table D-6. Refinement Level Evaluation for the LRP 131-1L Subunit (Soil 0 to 0.3 m [0 to 1 ft])

Analyte[1]	Exposure Point Concentration[2]	RSV[3]	RSV Source[4]	Refinement Level HQ[5]	Exceeds RSV (HQ>1)?	COPC?[6]
Inorganics (mg/kg)						
ALUMINUM	2.30E+04	---	NA	NC	---	YES
CHROMIUM	2.00E+01	7.30E+01	b	2.73E-01	no	no
COPPER	1.17E+01	4.30E+01	b	2.72E-01	no	no
CYANIDE	6.99E-01	9.80E-01	b	7.13E-01	no	no
IRON	1.26E+04	---	NA	NC	---	YES
LEAD	9.63E+00	2.30E+01	b	4.19E-01	no	no
VANADIUM	3.76E+01	9.50E+00	b	3.96E+00	YES	YES
AMERICIUM-243	8.88E-02	NA	NA	---	---	YES
CURIUM-245/246	4.29E-02	NA	NA	---	---	YES
LEAD-214	9.13E-01	NA	NA	---	---	YES

1 - Analytes identified as COPECs from Table D-5
2 - EPC = reasonable maximum exposure (RME) exposure point concentration (EPC) is the lesser of the maximum detected concentration and the 95% upper confidence limit (UCL) on the mean concentration. RME from Appendix A Table A.3.1 LRP 131-1L Subunit (0 to 0.3 m [0 to 1 ft])
3 - RSV from Attachment D-1 Table D.1.2
4 - RSV Source
a = Table 3 in EPA Region 4 Ecological Risk Assessment Supplemental Guidance March 2018 Update (2018)
b = Los Alamos National Laboratory Low Effect ESL for Soil Media (2022)
5 - Refinement Level Hazard Quotient (HQ) = EPC / RSV
6 - COPC = constituent of potential concern. Analyte identified as a COPC if the refinement level HQ>1

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Table D-7. Screening Level Evaluation for the LRP 131-1L Subunit (Soil 0.3 to 1.2 m [1 to 4 ft])

Analyte	Detected Maximum Concentration[1]	Qualifier	ESV[2]	ESV Source[3]	Screening Level HQ[4]	Maximum Exceeds ESV (HQ>1)?	2X Average Background[5]	Maximum Exceeds Background?	COPEC?[6]
Inorganics (mg/kg)									
ALUMINUM	3.20E+04		NA	NA	NA	---	1.05E+04	YES	YES
ANTIMONY	2.50E-01		2.70E-01	a	9.26E-01	no	2.69E+00	no	no
ARSENIC	4.20E+00		6.80E+00	b	6.18E-01	no	4.28E+00	no	no
BARIUM	3.90E+01		3.30E+02	a,b	1.18E-01	no	3.91E+01	no	no
BERYLLIUM	3.70E-01		2.50E+00	a	1.48E-01	no	2.88E-01	YES	no
CADMIUM	4.50E-02	J	2.70E-01	b	1.67E-01	no	4.83E-01	no	no
CALCIUM	3.00E+02		NA	Nutrient	NA	no	4.76E+02	no	no
CHROMIUM	3.00E+01		2.30E+01	a,b	1.30E+00	YES	1.54E+01	YES	YES
COBALT	2.10E+00		1.30E+01	a	1.62E-01	no	1.55E+00	YES	no
COPPER	2.00E+01		1.40E+01	b	1.43E+00	YES	4.34E+00	YES	YES
IRON	2.50E+04		NA	NA	NA	---	1.27E+04	YES	YES
LEAD	9.20E+00		1.10E+01	a,b	8.36E-01	no	1.03E+01	no	no
MAGNESIUM	4.60E+02		NA	Nutrient	NA	no	2.75E+02	YES	no
MANGANESE	5.50E+01		2.20E+02	a	2.50E-01	no	1.53E+02	no	no
MERCURY	5.00E-02		1.30E-02	a,b	3.85E+00	YES	7.10E-02	no	no
NICKEL	9.60E+00		1.00E+01	b	9.60E-01	no	3.48E+00	YES	no
POTASSIUM	2.90E+02		NA	Nutrient	NA	no	2.16E+02	YES	no
SELENIUM	3.90E-01		5.20E-01	a	7.50E-01	no	2.99E+00	no	no
SILVER	1.80E-02	J	2.60E+00	b	6.92E-03	no	7.28E-01	no	no
SODIUM	2.90E+01	J	NA	Nutrient	NA	no	4.02E+01	no	no
THALLIUM	1.40E-01		5.00E-02	a	2.80E+00	YES	3.12E+00	no	no
VANADIUM	6.10E+01		4.70E+00	b	1.30E+01	YES	3.91E+01	YES	YES
ZINC	1.40E+01		4.60E+01	a	3.04E-01	no	9.47E+00	YES	no
Organics (mg/kg)									
ACENAPHTHENE	2.40E+00	J	2.90E+01	a	8.28E-02	no	NA	---	no
ACETONE	5.20E-02		1.20E+00	a,b	4.33E-02	no	NA	---	no
BENZO(G,H,I)PERYLENE	8.60E-01	J	1.10E+00	a	7.82E-01	no	NA	---	no

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Table D-7. Screening Level Evaluation LRP for 131-1L Subunit (Soil 0.3 to 1.2 m [1 to 4 ft]) *(continued)*

Analyte	Detected Maximum Concentration[1]	Qualifier	ESV[2]	ESV Source[3]	Screening Level HQ[4]	Maximum Exceeds ESV (HQ>1)?	2X Average Background[5]	Maximum Exceeds Background?	COPEC?[6]
Organics (mg/kg) (continued)									
BENZO[A]ANTHRACENE	6.10E+00	J	7.30E-01	b	8.36E+00	YES	NA	---	YES
BENZO[A]PYRENE	2.30E+00	J	1.10E+00	a	2.09E+00	YES	NA	---	YES
BENZO[B]FLUORANTHENE	4.90E+00	J	1.10E+00	a	4.45E+00	YES	NA	---	YES
BENZO[K]FLUORANTHENE	2.20E+00	J	1.10E+00	a	2.00E+00	YES	NA	---	YES
CARBAZOLE	1.30E+00	J	7.00E-02	a	1.86E+01	YES	NA	---	YES
CHRYSENE	6.70E+00		1.10E+00	a	6.09E+00	YES	NA	---	YES
DDE	3.60E-03	J	2.10E-02	a	1.71E-01	no	NA	---	no
DIBENZ[AH]ANTHRACENE	1.60E+00	J	1.10E+00	a	1.45E+00	YES	NA	---	YES
DIBENZOFURAN	2.40E+00	J	1.50E-01	a	1.60E+01	YES	NA	---	YES
FLUORANTHENE	3.00E+01		1.10E+00	a	2.73E+01	YES	NA	---	YES
FLUORENE	2.20E+00	J	3.70E+00	b	5.95E-01	no	NA	---	no
HEXACHLOROBUTADIENE	2.90E-01		NA	NA	NA	---	NA	---	YES
INDENO[1,2,3-CD]PYRENE	3.00E+00	J	1.10E+00	a	2.73E+00	YES	NA	---	YES
METHYL ETHYL KETONE	2.70E-02		1.00E+00	a	2.70E-02	no	NA	---	no
N-DIOCTYL PHTHALATE	1.10E-01	J	9.10E-01	a,b	1.21E-01	no	NA	---	no
PHENANTHRENE	2.40E+01		5.50E+00	b	4.36E+00	YES	NA	---	YES
PYRENE	1.70E+01		1.10E+00	a	1.55E+01	YES	NA	---	YES
STYRENE	9.71E-04	J	1.20E+00	a,b	8.09E-04	no	NA	---	no
TOLUENE	6.99E-04	J	1.50E-01	a	4.66E-03	no	NA	---	no
Radionuclides (pCi/g)									
ACTINIUM-228	1.16E+00		NA	NA	NA	---	1.95E+00	no	no
LEAD-212	9.89E-01		NA	NA	NA	---	2.19E+00	no	no
LEAD-214	7.03E-01		NA	NA	NA	---	NA	---	YES
PLUTONIUM-238	8.71E-02	J	8.20E+02	b	1.06E-04	no	5.77E-01	no	no
PLUTONIUM-242	2.08E-02	J	NA	NA	NA	---	NA	---	YES
POTASSIUM-40	7.06E-01	J	NA	NA	NA	---	2.33E+00	no	no
PROMETHIUM-147	1.10E+00	J	NA	NA	NA	---	NA	---	YES

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Table D-7. Screening Level Evaluation for the LRP 131-1L Subunit (Soil 0.3 to 1.2 m [1 to 4 ft]) *(continued/end)*

Analyte	Detected Maximum Concentration[1]	Qualifier	ESV[2]	ESV Source[3]	Screening Level HQ[4]	Maximum Exceeds ESV (HQ>1)?	2X Average Background[5]	Maximum Exceeds Background?	COPEC?[6]
Radionuclides (pCi/g) (continued)									
RADIUM-226	1.00E+00		1.50E+00	b	6.67E-01	no	1.37E+00	no	no
RADIUM-228	1.93E+00	J	1.20E+00	b	1.61E+00	YES	1.92E+00	YES	YES
THORIUM-228	1.60E+00		4.30E+01	b	3.72E-02	no	1.97E+00	no	no
THORIUM-230	9.31E-01		5.20E+01	b	1.79E-02	no	1.13E+00	no	no
THORIUM-232	1.45E+00		6.20E+00	b	2.34E-01	no	1.80E+00	no	no
URANIUM-233/234	9.35E-01		2.20E+03	b	4.25E-04	no	1.15E+00	no	no
URANIUM-235	5.29E-02	J	1.60E+03	b	3.31E-05	no	7.98E-02	no	no
URANIUM-238	6.05E-01		1.10E+03	b	5.50E-04	no	1.01E+00	no	no

1 - Maximum detected concentration from Appendix A Table A.3.2 LRP 131-1L Subunit Soil Media (0.3 to 1.2 m [1 to 4 ft])
2 - ESV from Attachment D-1 Table D.1-1.
3 - ESV Source
a = Table 3 in EPA Region 4 Ecological Risk Assessment Supplemental Guidance March 2018 Update (2018), Table 3.
b = Los Alamos National Laboratory No Effect ESL for soil media (2022)
4 - Screening Level Hazard Quotient (HQ) = maximum detected concentration / ESV
5 - Background screening values obtained from the Background Soils Statistical Summary Report for the Savannah River Site, ERD-EN-2005-0223, Rev. 1, October 2006.
6 - COPEC = constituent of potential ecological concern. Analyte identified as a COPEC if the maximum detected concentration exceeds the ecological screening value (i.e., HQ>1), if available, and exceeds 2X average background concentration
EN = Essential nutrient, not subject to further evaluation
NA = not available, ESV for this constituent is not available.

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Table D-8. Refinement Level Evaluation for LRP 131-1L Subunit (Soil 0.3 to 1.2 m [1 to 4 ft])

Analyte[1]	Exposure Point Concentration[2]	RSV[3]	RSV Source[4]	Refinement Level HQ[5]	EPC Exceeds RSV (HQ>1)?	COPC?[6]
Inorganics (mg/kg)						
ALUMINUM	1.88E+04	---	NA	NC	---	YES
CHROMIUM	1.74E+01	7.30E+01	b	2.38E-01	no	no
COPPER	6.86E+00	4.30E+01	b	1.59E-01	no	no
IRON	1.13E+04	---	NA	NC	---	YES
VANADIUM	3.08E+01	9.50E+00	b	3.24E+00	YES	YES
Organics (mg/kg)						
BENZO[A]ANTHRACENE	6.10E+00	7.30E+00	b	8.36E-01	no	no
BENZO[A]PYRENE	2.30E+00	1.90E+02	b	1.21E-02	no	no
BENZO[B]FLUORANTHENE	9.19E-01	4.40E+02	b	2.09E-03	no	no
BENZO[K]FLUORANTHENE	2.20E+00	7.10E+02	b	3.10E-03	no	no
CARBAZOLE	1.30E+00	7.90E+02	b	1.65E-03	no	no
CHRYSENE	6.70E+00	3.10E+01	b	2.16E-01	no	no
DIBENZ[AH]ANTHRACENE	1.60E+00	1.40E+02	b	1.14E-02	no	no
DIBENZOFURAN	2.40E+00	6.10E+01	b	3.93E-02	no	no
FLUORANTHENE	3.00E+01	2.30E+01	b	1.30E+00	YES	YES
HEXACHLOROBUTADIENE	2.90E-01	NA	NA	---	---	YES
INDENO[1,2,3-CD]PYRENE	3.00E+00	7.10E+02	b	4.23E-03	no	no
PHENANTHRENE	2.40E+01	1.20E+01	b	2.00E+00	YES	YES
PYRENE	1.70E+01	2.00E+01	b	8.50E-01	no	no
Radionuclides (pCi/g)						
LEAD-214	7.03E-01	NA	NA	---	---	YES

1 - Analytes identified as COPECs from Table D-7
2 - EPC = reasonable maximum exposure (RME) exposure point concentration (EPC) is the lesser of the maximum detected concentration and the 95% upper confidence limit (UCL) on the mean concentration. RME from Appendix A Table A.3.2 LRP 131-1L Subunit Soil (0.3 to 1.2 m [1 to 4 ft])
3 - RSV from Attachment D-1 Table D.1-2
4 - RSV Source
a = Table 3 in EPA Region 4 Ecological Risk Assessment Supplemental Guidance March 2018 Update (2018)
b = Los Alamos National Laboratory Low Effect ESL for Soil Media (2022)
5 - Refinement Level Hazard Quotient (HQ) = EPC / RSV
6 - COPC = constituent of potential concern. Analyte identified as a COPC if the refinement level HQ>1.
NA = Not available

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Table D-9. Screening Level Evaluation for LRP 131-4L Subunit (Soil 0 to 0.3 m [0 to 1 ft])

Analyte	Maximum Concentration[1]	Qualifier	ESV[2]	ESV Source[3]	Screening Level HQ[4]	Maximum Exceeds ESV (HQ>1)?	2X Average Background[5]	Maximum Exceeds Background?	COPEC?[6]
Inorganics (mg/kg)									
ALUMINUM	2.90E+04		NA	NA	NA	---	1.05E+04	YES	YES
ANTIMONY	8.30E-01		2.70E-01	a	3.07E+00	YES	2.69E+00	no	no
ARSENIC	4.30E+00		6.80E+00	b	6.32E-01	no	4.28E+00	YES	no
BARIUM	3.00E+01		3.30E+02	a,b	9.09E-02	no	3.91E+01	no	no
BERYLLIUM	3.10E-01		2.50E+00	a	1.24E-01	no	2.88E-01	YES	no
CADMIUM	2.50E-01		2.70E-01	b	9.26E-01	no	4.83E-01	no	no
CALCIUM	2.00E+04		NA	Nutrient	NA	no	4.76E+02	YES	no
CHROMIUM	2.80E+01		2.30E+01	a,b	1.22E+00	YES	1.54E+01	YES	YES
COBALT	1.50E+00		1.30E+01	a	1.15E-01	no	1.55E+00	no	no
COPPER	4.80E+02		1.40E+01	b	3.43E+01	YES	4.34E+00	YES	YES
CYANIDE	1.00E+01		9.80E-02	b	1.02E+02	YES	NA	---	YES
IRON	2.10E+04		NA	NA	NA	---	1.27E+04	YES	YES
LEAD	3.50E+01		1.10E+01	a,b	3.18E+00	YES	1.03E+01	YES	YES
MAGNESIUM	8.60E+02		NA	Nutrient	NA	no	2.75E+02	YES	no
MANGANESE	1.80E+02		2.20E+02	a	8.18E-01	no	1.53E+02	YES	no
MERCURY	3.80E-01		1.30E-02	a,b	2.92E+01	YES	7.10E-02	YES	YES
NICKEL	7.90E+00		1.00E+01	b	7.90E-01	no	3.48E+00	YES	no
POTASSIUM	2.40E+02		NA	Nutrient	NA	no	2.16E+02	YES	no
SELENIUM	3.80E-01		5.20E-01	a	7.31E-01	no	2.99E+00	no	no
SILVER	4.00E-02	J	2.60E+00	b	1.54E-02	no	7.28E-01	no	no
SODIUM	4.90E+01	J	NA	Nutrient	NA	no	4.02E+01	YES	no
THALLIUM	1.00E-01		5.00E-02	a	2.00E+00	YES	3.12E+00	no	no
VANADIUM	5.80E+01		4.70E+00	b	1.23E+01	YES	3.91E+01	YES	YES
ZINC	2.40E+01		4.60E+01	a	5.22E-01	no	9.47E+00	YES	no
Organics (mg/kg)									
2,4,6-TRICHLOROPHENOL	3.00E-02	J	9.94E+00	a	3.02E-03	no	NA	---	no
2-NITROPHENOL	3.00E-02	J	NA	NA	NA	---	NA	---	YES
ACENAPHTHENE	5.50E-02	J	2.90E+01	a	1.90E-03	no	NA	---	no
ACENAPHTHYLENE	1.20E-01	J	2.90E+01	a	4.14E-03	no	NA	---	no
ACETONE	3.55E-01		1.20E+00	a,b	2.96E-01	no	NA	---	no
ANTHRACENE	3.20E-01		2.90E+01	a	1.10E-02	no	NA	---	no

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Table D-9. Screening Level Evaluation for LRP 131-4L Subunit (Soil 0 to 0.3 m [0 to 1 ft]) *(continued)*

Analyte	Maximum Concentration[1]	Qualifier	ESV[2]	ESV Source[3]	Screening Level HQ[4]	Maximum Exceeds ESV (HQ>1)?	2X Average Background[5]	Maximum Exceeds Background?	COPEC?[6]
Organics (mg/kg) (continued)									
AROCLOR 1254	7.20E-02		4.10E-02	a,b	1.76E+00	YES	NA	---	YES
BENZALDEHYDE	6.40E-02	J	2.90E+01	a	2.21E-03	no	NA	---	no
BENZO(G,H,I)PERYLENE	5.90E-01		1.10E+00	a	5.36E-01	no	NA	---	no
BENZO[A]ANTHRACENE	1.80E+00		7.30E-01	b	2.47E+00	YES	NA	---	YES
BENZO[A]PYRENE	1.20E+00		1.10E+00	a	1.09E+00	YES	NA	---	YES
BENZO[B]FLUORANTHENE	2.50E+00		1.10E+00	a	2.27E+00	YES	NA	---	YES
BENZO[K]FLUORANTHENE	9.20E-01		1.10E+00	a	8.36E-01	no	NA	---	no
CARBAZOLE	1.90E-01	J	7.00E-02	a	2.71E+00	YES	NA	---	YES
CHRYSENE	2.20E+00		1.10E+00	a	2.00E+00	YES	NA	---	YES
DDE	1.30E-03	J	2.10E-02	a	6.19E-02	no	NA	---	no
DDT	4.90E-03	J	2.10E-02	a	2.33E-01	no	NA	---	no
DIBENZ[AH]ANTHRACENE	2.30E-01	J	1.10E+00	a	2.09E-01	no	NA	---	no
DIBENZOFURAN	2.20E-02	J	1.50E-01	a	1.47E-01	no	NA	---	no
DIETHYL PHTHALATE	4.40E-01	J	NA	NA	NA	---	NA	---	YES
DI-N-BUTYL PHTHALATE	2.80E-01	J	NA	NA	NA	---	NA	---	YES
ENDOSULFAN II	1.50E-03	J	6.50E-03	a	2.31E-01	no	NA	---	no
FLUORANTHENE	2.60E+00		1.10E+00	a	2.36E+00	YES	NA	---	YES
FLUORENE	4.10E-02	J	3.70E+00	b	1.11E-02	no	NA	---	no
INDENO[1,2,3-CD]PYRENE	8.50E-01		1.10E+00	a	7.73E-01	no	NA	---	no
METHOXYCHLOR	2.20E-03	J	2.10E-03	a	1.05E+00	YES	NA	---	YES
METHYL ACETATE	2.64E-03	J	NA	NA	NA	---	NA	---	YES
METHYL ETHYL KETONE	2.40E-02		1.00E+00	a	2.40E-02	no	NA	---	no
N-DIOCTYL PHTHALATE	1.50E-01	J	9.10E-01	a,b	1.65E-01	no	NA	---	no
N-NITROSODIPROPYLAMINE	4.50E-01	J	NA	NA	NA	---	NA	---	YES
PHENANTHRENE	1.10E+00		5.50E+00	b	2.00E-01	no	NA	---	no
PYRENE	2.30E+00		1.10E+00	a	2.09E+00	YES	NA	---	YES
STYRENE	1.11E-03		1.20E+00	a,b	9.25E-04	no	NA	---	no
TETRACHLOROETHYLENE (PCE)	1.22E-03		6.00E-02	a	2.03E-02	no	NA	---	no
TOLUENE	4.03E-04	J	1.50E-01	a	2.69E-03	no	NA	---	no

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Table D-9. Screening Level Evaluation for the LRP 131-4L Subunit (Soil 0 to 0.3 m [0 to 1 ft]) *(continued/end)*

Analyte	Maximum Concentration[1]	Qualifier	ESV[2]	ESV Source[3]	Screening Level HQ[4]	Maximum Exceeds ESV (HQ>1)?	2X Average Background[5]	Maximum Exceeds Background?	COPEC?[6]
Radionuclides (pCi/g)									
ACTINIUM-228	4.18E+00		NA	NA	NA	---	1.95E+00	YES	YES
LEAD-212	2.74E+00		NA	NA	NA	---	2.19E+00	YES	YES
LEAD-214	1.61E+00		NA	NA	NA	---	NA	---	YES
PLUTONIUM-238	1.74E-01	J	8.20E+02	b	2.12E-04	no	5.77E-01	no	no
POTASSIUM-40	5.64E+00	J	NA	NA	NA	---	2.33E+00	YES	YES
RADIUM-226	6.24E-01		1.50E+00	b	4.16E-01	no	1.37E+00	no	no
RADIUM-228	1.47E+00		1.20E+00	b	1.23E+00	YES	1.92E+00	no	no
THORIUM-228	1.33E+00		4.30E+01	b	3.09E-02	no	1.97E+00	no	no
THORIUM-230	6.15E-01		5.20E+01	b	1.18E-02	no	1.13E+00	no	no
THORIUM-232	1.14E+00		6.20E+00	b	1.84E-01	no	1.80E+00	no	no
URANIUM-233/234	6.59E-01		2.20E+03	b	3.00E-04	no	1.15E+00	no	no

1 - Maximum detected concentration from Appendix A Table A.4.1 LRP 131-4L Subunit Soil (0 to 0.3 m [0 to 1 ft]).
2 - ESV from Attachment D-1 Table D.1-1.
3 - ESV Source
a = Table 3, EPA Region 4 Ecological Risk Assessment Supplemental Guidance March 2018 Update (2018)
b = Los Alamos National Laboratory No Effect ESL for soil media (2022)
4 - Screening Level Hazard Quotient (HQ) = maximum detected concentration/ESV
5 - Background screening values obtained from the Background Soils Statistical Summary Report for the Savannah River Site, ERD-EN-2005-0223, Rev. 1, October 2006.
6 - COPEC = constituent of potential ecological concern. Analyte is identified as a COPEC if the maximum detected concentration exceeds the ecological screening value (i.e., HQ>1), if available, and exceeds 2X average SRS background concentration.
EN = Essential nutrient, not subject to further evaluation
NA = Not available, ESV for this constituent is not available.

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Table D-10. Refinement Level Evaluation for LRP 131-4L Subunit (Soil 0 to 0.3 m [0 to 1 ft])

Analyte[1]	Exposure Point Concentration[2]	RSV[3]	RSV Source[4]	Refinement Level HQ[5]	HQ Exceeds RSV (HQ>1)?	COPC?[6]
Inorganics (mg/kg)						
ALUMINUM	1.31E+04	---	NA	NC	---	YES
CHROMIUM	1.41E+01	7.30E+01	b	1.93E-01	no	no
COPPER	3.64E+01	4.30E+01	b	8.47E-01	no	no
CYANIDE	1.63E+00	9.80E-01	b	1.67E+00	YES	YES
IRON	9.84E+03	---	NA	NC	---	YES
LEAD	8.14E+00	2.30E+01	b	3.54E-01	no	no
MERCURY	4.92E-02	1.30E-01	b	3.78E-01	no	no
VANADIUM	2.65E+01	9.50E+00	b	2.79E+00	YES	YES
Organics (mg/kg)						
2-NITROPHENOL	3.00E-02	NA	NA	---	---	YES
AROCLOR 1254	1.57E-02	4.10E-01	b	3.83E-02	no	no
BENZO[A]ANTHRACENE	9.48E-02	7.30E+00	b	1.30E-02	no	no
BENZO[A]PYRENE	1.64E-01	1.90E+02	b	8.63E-04	no	no
BENZO[B]FLUORANTHENE	3.98E-01	4.40E+02	b	9.05E-04	no	no
CARBAZOLE	1.90E-01	7.90E+02	b	2.41E-04	no	no
CHRYSENE	2.30E-01	3.10E+01	b	7.42E-03	no	no
DIETHYL PHTHALATE	4.40E-01	3.60E+03	b	1.22E-04	no	no
DI-N-BUTYL PHTHALATE	6.56E-02	1.10E-01	b	5.96E-01	no	no
FLUORANTHENE	1.46E-01	2.30E+01	b	6.35E-03	no	no
METHOXYCHLOR	2.20E-03	1.00E+01	b	2.20E-04	no	no
METHYL ACETATE	2.64E-03	NA	NA	---	---	YES
N-NITROSODIPROPYLAMINE	4.50E-01	NA	NA	---	---	YES
PYRENE	1.96E-01	2.00E+01	b	9.80E-03	no	no

Table D-10. Refinement Level Evaluation for LRP 131-4L Subunit (Soil 0 to 0.3 m [0 to 1 ft]) *(continued/end)*

Analyte[1]	Exposure Point Concentration[2]	RSV[3]	RSV Source[4]	Refinement Level HQ[5]	HQ Exceeds RSV (HQ>1)?	COPC?[6]
Radionuclides (pCi/g)						
ACTINIUM-228	4.18E+00	NA	NA	---	---	YES
LEAD-212	2.74E+00	NA	NA	---	---	YES
LEAD-214	1.61E+00	NA	NA	---	---	YES
POTASSIUM-40	5.64E+00	---	NA	NC	---	YES

1 - Analytes identified as COPECs from Table D-9
2 - EPC = reasonable maximum exposure (RME) exposure point concentration (EPC) is the lesser of the maximum detected concentration and the 95% upper confidence limit (UCL) on the mean concentration. RME from Appendix A Table A.4.1 LRP 131-4L Subunit (0 to 0.3 m [0 to 1 ft])
3 - RSV from Attachment D-1 Table D.1-2
4 - RSV Source
a = Table 3 in EPA Region 4 Ecological Risk Assessment Supplemental Guidance March 2018 Update (2018)
b = Los Alamos National Laboratory Low Effect ESL for Soil Media (2022)
5 - Refinement Level Hazard Quotient (HQ) = EPC / RSV
6 - COPC = constituent of potential concern. Analyte identified as a COPC if the refinement level HQ>1.
NA = Not available
NC = Not calculated

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Table D-11. Screening Level Evaluation for LRP 131-4L Subunit (Soil 0.3 to 1.2 m [1 to 4 ft])

Analyte	Maximum Concentration[1]	Qualifier	ESV[2]	ESV Source[3]	Screening Level HQ[4]	Max Exceeds ESV (HQ>1)?	2X Average Background[5]	Max Exceeds Background?	COPEC?[6]
Inorganics (mg/kg)									
ALUMINUM	2.50E+04		NA	NA	NA	---	1.05E+04	YES	YES
ANTIMONY	1.20E+00		2.70E-01	a	4.44E+00	YES	2.69E+00	no	no
ARSENIC	4.60E+00		6.80E+00	b	6.76E-01	no	4.28E+00	YES	no
BARIUM	4.40E+01		3.30E+02	a,b	1.33E-01	no	3.91E+01	YES	no
BERYLLIUM	5.10E-01		2.50E+00	a	2.04E-01	no	2.88E-01	YES	no
CADMIUM	1.60E-01		2.70E-01	b	5.93E-01	no	4.83E-01	no	no
CALCIUM	1.30E+04		NA	Nutrient	NA	no	4.76E+02	YES	no
CHROMIUM	2.50E+01		2.30E+01	a,b	1.09E+00	YES	1.54E+01	YES	YES
COBALT	3.10E+00		1.30E+01	a	2.38E-01	no	1.55E+00	YES	no
COPPER	7.50E+01		1.40E+01	b	5.36E+00	YES	4.34E+00	YES	YES
CYANIDE	1.10E+01		9.80E-02	b	1.12E+02	YES	NA	---	YES
IRON	2.00E+04		NA	NA	NA	---	1.27E+04	YES	YES
LEAD	2.60E+02		1.10E+01	a,b	2.36E+01	YES	1.03E+01	YES	YES
MAGNESIUM	7.40E+02		NA	Nutrient	NA	no	2.75E+02	YES	no
MANGANESE	1.10E+02		2.20E+02	a	5.00E-01	no	1.53E+02	no	no
MERCURY	6.60E-01		1.30E-02	a,b	5.08E+01	YES	7.10E-02	YES	YES
NICKEL	8.10E+00		1.00E+01	b	8.10E-01	no	3.48E+00	YES	no
POTASSIUM	2.10E+02	J	NA	Nutrient	NA	no	2.16E+02	no	no
SELENIUM	1.80E+00		5.20E-01	a	3.46E+00	YES	2.99E+00	no	no
SILVER	4.20E-02	J	2.60E+00	b	1.62E-02	no	7.28E-01	no	no
SODIUM	3.00E+02	J	NA	Nutrient	NA	no	4.02E+01	YES	no
THALLIUM	1.10E-01		5.00E-02	a	2.20E+00	YES	3.12E+00	no	no
VANADIUM	4.60E+01		4.70E+00	b	9.79E+00	YES	3.91E+01	YES	YES
ZINC	4.00E+01		4.60E+01	a	8.70E-01	no	9.47E+00	YES	no

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Table D-11. Screening Level Evaluation for the LRP 131-4L Subunit (Soil 0.3 to 1.2 m [1 to 4 ft]) *(Continued)*

Analyte	Maximum Concentration[1]	Qualifier	ESV[2]	ESV Source[3]	Screening Level HQ[4]	Max Exceeds ESV (HQ>1)?	2X Average Background[5]	Max Exceeds Background?	COPEC?[6]
Organics (mg/kg)									
2-METHYLNAPHTHALENE	1.40E-01	J	1.60E+01	b	8.75E-03	no	NA	---	no
ACENAPHTHENE	1.00E-01	J	2.90E+01	a	3.45E-03	no	NA	---	no
ACETONE	4.94E-02		1.20E+00	a,b	4.12E-02	no	NA	---	no
ANTHRACENE	1.60E-01	J	2.90E+01	a	5.52E-03	no	NA	---	no
AROCLOR 1254	4.80E-02	J	4.10E-02	a,b	1.17E+00	YES	NA	---	YES
BENZO(G,H,I)PERYLENE	8.30E-01	J	1.10E+00	a	7.55E-01	no	NA	---	no
BENZO[A]ANTHRACENE	1.20E+00		7.30E-01	b	1.64E+00	YES	NA	---	YES
BENZO[A]PYRENE	1.20E+00	J	1.10E+00	a	1.09E+00	YES	NA	---	YES
BENZO[B]FLUORANTHENE	2.20E+00		1.10E+00	a	2.00E+00	YES	NA	---	YES
BENZO[K]FLUORANTHENE	8.60E-01	J	1.10E+00	a	7.82E-01	no	NA	---	no
BIS(2-ETHYLHEXYL)PHTHALATE (DEHP)	1.00E-01	J	2.00E-02	a,b	5.00E+00	YES	NA	---	YES
CHRYSENE	1.30E+00		1.10E+00	a	1.18E+00	YES	NA	---	YES
CUMENE (ISOPROPYLBENZENE)	9.53E-04	J	4.00E-02	a	2.38E-02	no	NA	---	no
CYCLOHEXANE	5.00E-04	J	NA	NA	NA	---	NA	---	YES
DDE	2.70E-03	J	2.10E-02	a	1.29E-01	no	NA	---	no
DDT	1.50E-02	J	2.10E-02	a	7.14E-01	no	NA	---	no
DIBENZ[AH]ANTHRACENE	2.00E-01	J	1.10E+00	a	1.82E-01	no	NA	---	no
DIETHYL PHTHALATE	2.80E-01	J	NA	NA	NA	---	NA	---	YES
DI-N-BUTYL PHTHALATE	2.80E-01	J	NA	NA	NA	---	NA	---	YES
FLUORANTHENE	1.50E+00	J	1.10E+00	a	1.36E+00	YES	NA	---	YES
FLUORENE	2.00E-02	J	3.70E+00	b	5.41E-03	no	NA	---	no
GAMMA-CHLORDANE	1.30E-03	J	2.00E-02	a	6.50E-02	no	NA	---	no
INDENO[1,2,3-CD]PYRENE	8.90E-01	J	1.10E+00	a	8.09E-01	no	NA	---	no
METHOXYCHLOR	9.20E-03		2.10E-03	a	4.38E+00	YES	NA	---	YES
METHYL ACETATE	2.75E-03	J	NA	NA	NA	---	NA	---	YES
METHYLCYCLOHEXANE	9.80E-04	J	NA	NA	NA	---	NA	---	YES
N-DIOCTYL PHTHALATE	6.60E-02	J	9.10E-01	a,b	7.25E-02	no	NA	---	no

Table D-11. Screening Level Evaluation for LRP 131-4L Subunit (Soil 0.3 to 1.2 m[1 to 4 ft]) *(Continued/End)*

Analyte	Maximum Concentration[1]	Qualifier	ESV[2]	ESV Source[3]	Screening Level HQ[4]	Max Exceeds ESV (HQ>1)?	2X Average Background[5]	Max Exceeds Background?	COPEC?[6]
Organics (mg/kg)(continued)									
PHENANTHRENE	7.80E-01	J	5.50E+00	b	1.42E-01	no	NA	---	no
PYRENE	1.40E+00	J	1.10E+00	a	1.27E+00	YES	NA	---	YES
TETRACHLOROETHYLENE (PCE)	1.90E-03		6.00E-02	a	3.17E-02	no	NA	---	no
TOLUENE	4.62E-04	J	1.50E-01	a	3.08E-03	no	NA	---	no
Radionuclides (pCi/g)									
ACTINIUM-228	3.43E+00		NA	NA	NA	---	1.95E+00	YES	YES
AMERICIUM-243	4.95E-02	J	NA	NA	NA	---	NA	---	YES
LEAD-212	2.21E+00		NA	NA	NA	---	2.19E+00	YES	YES
LEAD-214	1.97E+00		NA	NA	NA	---	NA	---	YES
PLUTONIUM-238	1.24E-01	J	8.20E+02	b	1.51E-04	no	5.77E-01	no	no
PLUTONIUM-239/240	5.81E-02	J	8.70E+02	b	6.68E-05	no	8.36E-02	no	no
RADIUM-226	5.78E-01		1.50E+00	b	3.85E-01	no	1.37E+00	no	no
RADIUM-228	1.29E+00	J	1.20E+00	b	1.08E+00	YES	1.92E+00	no	no
STRONTIUM-90	3.67E-01	J	3.40E+02	b	1.08E-03	no	7.43E-01	no	no
THORIUM-228	1.19E+00		4.30E+01	b	2.77E-02	no	1.97E+00	no	no
THORIUM-230	6.81E-01		5.20E+01	b	1.31E-02	no	1.13E+00	no	no
THORIUM-232	1.07E+00		6.20E+00	b	1.73E-01	no	1.80E+00	no	no
URANIUM-233/234	7.50E-01		2.20E+03	b	3.41E-04	no	1.15E+00	no	no
URANIUM-235	6.11E-02	J	1.60E+03	b	3.82E-05	no	7.98E-02	no	no
URANIUM-238	6.49E-01		1.10E+03	b	5.90E-04	no	1.01E+00	no	no

1 - Maximum detected concentration from Appendix A Table A.4.2 LRP 131-4L Subunit Soil (0.3 to 1.2 m [1 to 4 ft]).
2 - ESV from Attachment D-1 Table D.1-1.
3 - ESV Source
a = Table 3, EPA Region 4 Ecological Risk Assessment Supplemental Guidance March 2018 Update (2018)
b = Los Alamos National Laboratory No Effect ESL for soil media (2022)
4 - Screening Level Hazard Quotient (HQ) = maximum detected concentration/ESV
5 - Background screening values obtained from the Background Soils Statistical Summary Report for the Savannah River Site, ERD-EN-2005-0223, Rev. 1, October 2006.
6 - COPEC = constituent of potential ecological concern. Analyte identified as a COPEC if the maximum detected concentration exceeds the ecological screening value (i.e., HQ>1), if available, and exceeds 2X average background concentration.
EN = Essential nutrient, not subject to further evaluation
NA = not available, ESV for this constituent is not available.

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Table D-12. Refinement Level Evaluation for LRP 131-4L Subunit (Soil 0.3 to 1.2 m [1 to 4 ft])

Analyte[1]	Exposure Point Concentration[2]	Refinement Screening Value[3]	RSV Source[4]	Refinement Level HQ[5]	Exceeds RSV (HQ>1)?	COPC?[6]
Inorganics (mg/kg)						
ALUMINUM	1.43E+04	---	NA	NC	---	YES
CHROMIUM	1.35E+01	7.30E+01	b	1.85E-01	no	no
COPPER	1.57E+01	4.30E+01	b	3.66E-01	no	no
CYANIDE	1.10E+00	9.80E-01	b	1.13E+00	YES	YES
IRON	1.13E+04	---	NA	NC	---	YES
LEAD	1.58E+01	2.30E+01	b	6.89E-01	no	no
MERCURY	1.24E-01	1.30E-01	b	9.54E-01	no	no
VANADIUM	2.86E+01	9.50E+00	b	3.01E+00	YES	YES
Organics (mg/kg)						
AROCLOR 1254	1.32E-02	4.10E-01	b	3.22E-02	no	no
BENZO[A]ANTHRACENE	2.29E-01	7.30E+00	b	3.14E-02	no	no
BENZO[A]PYRENE	2.20E-01	1.90E+02	b	1.16E-03	no	no
BENZO[B]FLUORANTHENE	3.99E-01	4.40E+02	b	9.07E-04	no	no
BIS(2-ETHYLHEXYL)PHTHALATE (DEHP)	1.00E-01	2.00E-01	b	5.00E-01	no	no
CHRYSENE	2.46E-01	3.10E+01	b	7.94E-03	no	no
CYCLOHEXANE	5.00E-04	NA	NA	---	---	YES
DIETHYL PHTHALATE	2.80E-01	3.60E+03	b	7.78E-05	no	no
DI-N-BUTYL PHTHALATE	6.26E-02	1.10E-01	b	5.69E-01	no	no
FLUORANTHENE	3.40E-01	2.30E+01	b	1.48E-02	no	no
METHOXYCHLOR	1.62E-03	1.00E+01	b	1.62E-04	no	no
METHYL ACETATE	2.75E-03	NA	NA	---	---	YES
METHYLCYCLOHEXANE	3.87E-04	NA	NA	---	---	YES
PYRENE	2.77E-01	2.00E+01	b	1.39E-02	no	no
Radionuclides (pCi/g)						
ACTINIUM-228	3.43E+00	NA	NA	---	---	YES
AMERICIUM-243	4.95E-02	NA	NA	---	---	YES
LEAD-212	2.21E+00	NA	NA	---	---	YES
LEAD-214	1.97E+00	NA	NA	---	---	YES

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Table D-12. Refinement Level Evaluation for LRP 131-4L Subunit (Soil 0.3 to 1.2 m [1 to 4 ft]) *(continued/end)*

1 - Analytes identified as COPECs from Table D-11
2 - EPC = reasonable maximum exposure (RME) exposure point concentration (EPC) is the lesser of the maximum detected concentration and the 95% upper confidence limit (UCL) on the mean concentration. RME from Appendix A Table A.4.2 LRP 131-4L Subunit (0.3 to 1.2 m [1-4 ft])
3 - RSV from Attachment D-1 Table D.1-2
4 - RSV Sources
a = Table 3 in EPA Region 4 Ecological Risk Assessment Supplemental Guidance March 2018 Update (2018)
b = Los Alamos National Laboratory Low Effect ESL for Soil Media (2022)
5 – Refinement Level Hazard Quotient (HQ) = EPC / RSV
6 – COPC = constituent of potential concern. Analyte identified as a COPC if the refinement level HQ>1
NA = Not available
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Attachment D-1. Derivation of ECODS L-3, LRP 131-1L and LRP 131-4L ESVs and RSVs

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Table D.1-1. Derivations of Screening Level ESVs for Soil Media – No Effect

Analyte	EPA R4 Soil[1]	LANL Soil[2]	ESV[3]	Notes
Inorganics (mg/kg)				
Aluminum	---	---	---	
Antimony	2.70E-01	2.30E+00	2.70E-01	
Arsenic	1.80E+01	6.80E+00	6.80E+00	
Barium	3.30E+02	7.20E+02	3.30E+02	
Beryllium	2.50E+00	3.50E+01	2.50E+00	
Cadmium	3.60E-01	2.70E-01	2.70E-01	
Calcium	---	---	---	
Chromium	2.30E+01	2.30E+01	2.30E+01	
Cobalt	1.30E+01	7.60E+01	1.30E+01	
Copper	2.80E+01	1.40E+01	1.40E+01	
Cyanide	1.00E-01	9.80E-02	9.80E-02	
Iron	---	---	---	
Lead	1.10E+01	1.10E+01	1.10E+01	
Magnesium	---	---	---	
Manganese	2.20E+02	2.20E+02	2.20E+02	
Mercury	1.30E-02	1.30E-02	1.30E-02	
Nickel	3.80E+01	1.00E+01	1.00E+01	
Potassium	---	---	---	
Selenium	5.20E-01	5.20E-01	5.20E-01	
Silver	4.20E+00	2.60E+00	2.60E+00	
Sodium	---	---	---	
Thallium	5.00E-02	5.00E-01	5.00E-02	
Vanadium	7.80E+00	4.70E+00	4.70E+00	
Zinc	4.60E+01	4.70E+01	4.60E+01	
Organics (mg/kg)				
1,1’-Biphenyl	2.00E-01	---	2.00E-01	
1,1-Dichloroethylene	4.00E-02	--	4.00E-02	
2-Methylnaphthalene	2.90E+01	1.60E+01	1.60E+01	5
2-Methylnaphthalene	2.90E+01	1.60E+01	1.60E+01	4
Acenaphthene	2.90E+01	2.50E-01	2.50E-01	4
Acenaphthylene	2.90E+01	1.20E+02	2.90E+01	4
Acetone	1.20E+00	1.20E+00	1.20E+00	
Aldrin	3.00E-02	3.70E-02	3.00E-02	
alpha-benzene hexachloride (BHC)	3.00E-04	5.90E+01	3.00E-04	
alpha-chlordane	2.90E-03	2.70E-01	2.90E-03	
Anthracene	2.90E+01	2.10E+02	2.90E+01	4
Aroclor 1242	4.10E-02	4.10E-02	4.10E-02	
Aroclor 1254	4.10E-02	4.10E-02	4.10E-02	
Aroclor 1260	4.10E-02	8.80E-01	4.10E-02	
Benzaldehyde	---	---		
Benzene	1.20E-01	2.40E+01	1.20E-01	
Benzo(g,h,i)perylene	1.10E+00	2.50E+01	1.10E+00	5
Benzo[a]anthracene	1.10E+00	7.30E-01	7.30E-01	5
Benzo[a]pyrene	1.10E+00	6.20E+01	1.10E+00	5
Benzo[b]fluoranthene	1.10E+00	4.40E+01	1.10E+00	5
Benzo[k]fluoranthene	1.10E+00	7.10E+01	1.10E+00	5
beta-benzene hexachloride (BHC)	3.00E-04	2.70E-01	3.00E-04	

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Table D.1-1. Derivations of Screening Level ESVs for Soil Media – No Effect *(continued)*

Analyte	EPA R4 Soil[1]	LANL Soil[2]	ESV[3]	Notes
Organics (mg/kg) (continued)				
Bis(2-ethylhexyl)phthalate (DEHP)	2.00E-02	2.00E-02	2.00E-02	
Butylbenzyl phthalate	5.90E-01	9.00E+01	5.90E-01	
Caprolactam	---	---	---	
Carbazole	7.00E-02	7.90E+01	7.00E-02	
Carbon Disulfide	5.00E-03	8.10E-01	5.00E-03	
Chloroform	5.00E-02	8.00E+00	5.00E-02	
Chloromethane (Methyl Chloride)	---	---	---	
Chrysene	1.10E+00	3.10E+00	1.10E+00	5
Cumene (Isopropylbenzene)	4.00E-02	---	4.00E-02	
Dichlorodiphenyldichloroethane (DDD)	2.10E-02	6.30E-03	6.30E-03	
Dichlorodiphenyldichloroethylene (DDE)	2.10E-02	1.10E-01	2.10E-02	
Dichlorodiphenyltrichloroethane (DDT)	2.10E-02	4.40E-02	2.10E-02	
Dibenz[A,H]anthracene	1.10E+00	1.40E+01	1.10E+00	5
Dibenzofuran	1.50E-01	---	1.50E-01	
Dichloromethane	2.10E-01	---	2.10E-01	
Dieldrin	2.90E-03	4.50E-03	2.90E-03	
Dimethyl phthalate	---	1.00E+02	1.00E+02	
Di-N-butylphthalate	1.10E-02	1.10E-02	1.10E-02	
Endosulfan sulfate	6.50E-03	---	6.50E-03	
Endrin	1.90E-03	1.40E-03	1.40E-03	
Endrin ketone	---	---	---	
Fluoranthene	1.10E+00	2.20E+01	1.10E+00	5
Fluorene	2.90E+01	3.70E+00	3.70E+00	5
gamma-BHC	2.40E+00	4.90E-03	4.90E-03	
gamma-chlordane	2.00E-02	2.20E+00	2.00E-02	
Heptachlor epoxide	1.50E-04	---	1.50E-04	
Indeno[1,2,3-cd]pyrene	1.10E+00	7.10E+01	1.10E+00	5
Lindane (Gamma BHC)	---	9.50E-03	9.50E-03	
m,p-Xylene	1.00E-01	1.40E+00	1.00E-01	7
Methyl acetate	---	---	---	
Methyl ethyl ketone	1.00E+00	---	1.00E+00	
Methyl tertiary butyl ether (MTBE)	---	---	---	
Methylmercury	3.50E-04	3.50E-04	3.50E-04	
Naphthalene	2.90E+01	1.00E+00	3.40E+00	5
Pentachlorophenol	2.10E+00	3.60E+00	2.10E+00	
Phenanthrene	2.90E+01	5.50E+00	5.50E+00	4
Pyrene	1.10E+00	1.00E+01	1.10E+00	5
Styrene	1.20E+00	3.20E+00	3.20E+00	
Tetrachloroethylene (PCE)	6.00E-02	1.80E-01	6.00E-02	
Toluene	1.50E-01	2.30E+01	1.50E-01	
Xylenes	1.00E-01	---	1.00E-01	
Radionuclides (pCi/g)				
Actinium-228	---	---	---	
Barium-133	---	---	---	
Bismuth-214	---	---	---	
Cesium-137	---	1.40E+03	1.40E+03	6
Lead-212	---	---	---	

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Table D.1-1. Derivations of Screening Level ESVs for Soil Media – No Effect *(continued/ end)*

Analyte	EPA R4 Soil[1]	LANL Soil[2]	ESV[3]	Notes
Radionuclides (pCi/g) (continued)				
Lead-214	---	---	---	
Potassium-40	---	---	---	
Radium-226	---	8.20E+00	8.20E+00	
Radium-228	---	1.10E+01	1.10E+01	
Thallium-208	---	---	---	
Thorium-228	---	4.30E+02	4.30E+02	
Thorium-230	---	5.20E+02	5.20E+02	
Thorium-232	---	6.20E+01	6.20E+01	
Tritium	---	2.40E+05	2.40E+05	
Uranium-233/234	---	4.40E+03	4.40E+03	8
Uranium-235	---	4.40E+03	4.40E+03	
Uranium-238	---	2.00E+03	2.00E+03	

1 - Table 3 in EPA Region 4 Ecological Risk Assessment Supplemental Guidance March 2018 Update (2018) (Attachment D-2)
2 - Los Alamos National Laboratory No Effect ESL for Soil Media (Attachment D-3) 2022 update, electronic file 2022
3 - Ecological Screening Value= lowest (most conservative) screening value between the EPA Region 4 soil value and the LANL soil value.
4 - Values for EPA Region 4 soil are for total Low Molecular Weight PAHs
5 - Values for EPA Region 4 soil are for total High Molecular Weight PAHs
6 - Screening value is for Cesium-137 + Barium-137
7 - Values are for “Xylenes”
8 - Screening value is for Uranium-234.

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Table D.1-2. Derivations of Refinement Level RSVs for Soil Media – Low Effect

Analyte	EPA R4 Soil[1]	LANL Soil[2]	RSV[3]	Notes
Inorganic (mg/kg)				
Aluminum	NA	---	---	
Antimony	NA	2.30E+01	2.30E+01	
Arsenic	NA	3.10E+01	3.10E+01	
Barium	NA	2.60E+02	2.60E+02	
Beryllium	NA	2.50E+01	2.50E+01	
Boron	NA	1.00E+01	1.00E+01	
Cadmium	NA	3.00E+00	3.00E+00	
Chromium	NA	7.30E+01	7.30E+01	5
Chromium(+6)	NA	3.40E+00	3.40E+00	
Cobalt	NA	1.30E+02	1.30E+02	
Copper	NA	4.30E+01	4.30E+01	
Cyanide	NA	9.80E-01	9.80E-01	6
Iron	NA	---	---	
Lead	NA	2.30E+01	2.30E+01	
Lithium	NA	3.50E+02	3.50E+02	
Manganese	NA	1.10E+03	1.10E+03	
Molybdenum	NA	1.50E+02	1.50E+02	
Selenium	NA	1.00E+00	1.00E+00	
Silver	NA	2.60E+01	2.60E+01	
Strontium (stable)	NA	9.50E+02	9.50E+02	
Thallium	NA	5.00E-01	5.00E-01	
Titanium	NA	7.70E+02	7.70E+02	
Uranium	NA	2.50E+02	2.50E+02	
Vanadium	NA	9.50E+00	9.50E+00	
Zinc	NA	1.20E+02	1.20E+02	
Organic (mg/kg)				
1,2-Dichlorobenzene	NA	9.20E+00	9.20E+00	
1,3-Dichlorobenzene	NA	7.40E+00	7.40E+00	
1,4-Dichlorobenzene	NA	3.50E+00	3.50E+00	
2-Methylnaphthalene	NA	1.60E+02	1.60E+02	
Acenaphthene	NA	2.00E+00	2.00E+00	
Acenaphthylene	NA	1.20E+03	1.20E+03	
Acetone	NA	6.30E+00	6.30E+00	
Aldrin	NA	1.80E-01	1.80E-01	
alpha-chlordane	NA	1.30E+00	1.30E+00	
4-Amino-2,6-dinitrotoluene	NA	1.20E+02	1.20E+02	
2-Amino-4,6-dinitrotoluene	NA	1.40E+02	1.40E+02	
Anthracene	NA	9.00E+00	9.00E+00	4
Aroclor 1016	NA	3.10E+00	3.10E+00	
Aroclor 1242	NA	4.10E-01	4.10E-01	
Aroclor 1248	NA	7.30E-02	7.30E-02	
Aroclor 1254	NA	4.10E-01	4.10E-01	
Aroclor 1260	NA	8.80E+00	8.80E+00	
Benzene	NA	2.40E+02	2.40E+02	
Benzo(g,h,i)perylene	NA	2.50E+02	2.50E+02	
Benzo[a]anthracene	NA	7.30E+00	7.30E+00	
Benzo[a]pyrene	NA	1.90E+02	1.90E+02	
Benzo[b]fluoranthene	NA	1.80E+02	1.80E+02	

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Table D.1-2. Derivations of Refinement Level RSVs for Soil Media – Low Effect *(continued)*

Analyte	EPA R4 Soil[1]	LANL Soil[2]	RSV[3]	Notes
Organic (mg/kg) (continued)				
Benzo[k]fluoranthene	NA	7.10E+02	7.10E+02	
Benzoic Acid	NA	1.00E+01	1.00E+01	
Benzyl Alcohol	NA	1.20E+03	1.20E+03	
alpha-benzene hexachloride (BHC)	NA	5.90E+02	5.90E+02	
beta-benzene hexachloride (BHC)	NA	1.30E+00	1.30E+00	
gamma-benzene hexachloride (BHC)	NA	9.50E-02	9.50E-02	
Bis(2-ethylhexyl)phthalate (DEHP)	NA	2.00E-01	2.00E-01	
2-Butanone	NA	9.20E+02	9.20E+02	
Butyl Benzyl Phthalate	NA	9.00E+02	9.00E+02	
Carbazole	NA	7.90E+02	7.90E+02	
Carbon Disulfide	NA	8.10E+00	8.10E+00	
4-Chloroaniline	NA	1.00E+01	1.00E+01	
Chlorobenzene	NA	2.40E+01	2.40E+01	
Chloroform	NA	2.10E+01	2.10E+01	
2-Chlorophenol	NA	3.90E+00	3.90E+00	
Chrysene	NA	3.10E+01	3.10E+01	
Dichlorodiphenyldichloroethane (DDD)	NA	3.20E-02	3.20E-02	7
Dichlorodiphenyldichloroethylene (DDE)	NA	5.50E-01	5.50E-01	8
Dichlorodiphenyltrichloroethane (DDT)	NA	2.20E-01	2.20E-01	9
Dibenzo(a,h)anthracene	NA	1.40E+02	1.40E+02	
Dibenzofuran	NA	6.10E+01	6.10E+01	
1,1-Dichloroethane	NA	2.10E+03	2.10E+03	
1,2-Dichloroethane	NA	1.60E+00	1.60E+00	
1,1-Dichloroethene	NA	1.10E+02	1.10E+02	
cis/trans-1.2-Dichloroethene	NA	2.40E+02	2.40E+02	
Dieldrin	NA	9.00E-03	9.00E-03	
Diethyl Phthalate	NA	1.00E+03	1.00E+03	
Dimethyl Phthalate	NA	1.00E+02	1.00E+02	
Di-n-Butyl Phthalate	NA	1.10E-01	1.10E-01	
1,3-Dinitrobenzene	NA	1.60E-01	1.60E-01	
2,4-Dinitrotoluene	NA	6.00E+01	6.00E+01	
2,6-Dinitrotoluene	NA	4.00E+01	4.00E+01	
Di-n-octylphthalate	NA	9.10E+00	9.10E+00	
Diphenylamine	NA	1.30E+01	1.30E+01	
Endosulfan	NA	6.40E+00	6.40E+00	
Endrin	NA	1.40E-02	1.40E-02	
Fluoranthene	NA	2.30E+01	2.30E+01	
Fluorene	NA	1.90E+01	1.90E+01	
Fluoride	NA	1.20E+03	1.20E+03	
gamma-chlordane	NA	1.10E+01	1.10E+01	
Heptachlor	NA	5.90E-01	5.90E-01	
Hexachlorobenzene	NA	7.90E-01	7.90E-01	
2-Hexanone	NA	3.60E+00	3.60E+00	
HMX	NA	1.60E+02	1.60E+02	
Indeno[1,2,3-cd]pyrene	NA	7.10E+02	7.10E+02	
Iodomethane	NA	7.60E-02	7.60E-02	
Kepone	NA	1.10E-01	1.10E-01	
m,p-Xylene	NA	1.80E+00	1.80E+00	10

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Table D.1-2. Derivations of Refinement Level RSVs for Soil Media – Low Effect *(continued)*

Analyte	EPA R4 Soil[1]	LANL Soil[2]	RSV[3]	Notes
Organic (mg/kg) (continued)				
Mercury (inorganic)	NA	1.30E-01	1.30E-01	
Mercury methyl	NA	3.50E-03	3.50E-03	
4,4-Methoxychlor	NA	1.00E+01	1.00E+01	
4-Methyl-2-pentanone	NA	9.70E+01	9.70E+01	
Methylene Chloride	NA	2.20E+01	2.20E+01	
2-Methylphenol	NA	7.00E+00	7.00E+00	
3-Methylphenol	NA	7.00E+00	7.00E+00	
Naphthalene	NA	1.00E+01	1.00E+01	
Nickel	NA	2.10E+01	2.10E+01	
2-Nitroaniline	NA	1.00E+01	1.00E+01	
Nitrobenzene	NA	2.20E+01	2.20E+01	
Nitroglycerine	NA	1.30E+02	1.30E+02	
2-Nitrotoluene	NA	9.80E+01	9.80E+01	
3-Nitrotoluene	NA	1.20E+02	1.20E+02	
4-Nitrotoluene	NA	2.10E+02	2.10E+02	
Pentachloronitrobenzene	NA	7.00E+00	7.00E+00	
Pentachlorophenol	NA	3.60E+00	3.60E+00	
PETN	NA	1.00E+03	1.00E+03	
Phenanthrene	NA	---	---	
Phenol	NA	8.00E+00	8.00E+00	
Pyrene	NA	2.00E+01	2.00E+01	
RDX	NA	4.40E+00	4.40E+00	
Styrene	NA	1.20E+01	1.20E+01	
2,3,7,8-Tetrachlorodibenzodioxin (TCDD)	NA	1.20E+02	1.20E+02	
Tetrachloroethene	NA	9.40E-01	9.40E-01	
Tetryl	NA	7.20E+00	7.20E+00	
Toluene	NA	2.30E+02	2.30E+02	
Toxaphene (Technical Grade)	NA	4.10E+01	4.10E+01	
1,2,4-Trichlorobenzene	NA	2.70E+00	2.70E+00	
1,1,1-Trichloroethane	NA	2.60E+03	2.60E+03	
Trichloroethene	NA	4.20E+02	4.20E+02	
Trichlorofluoromethane	NA	3.50E+02	3.50E+02	
1,3,5-Trinitrobenzene	NA	2.80E+01	2.80E+01	
2,4,6-Trinitrotoluene	NA	1.30E+01	1.30E+01	
Vinyl Chloride	NA	1.20E+00	1.20E+00	
Radionuclides (pCi/g)				
Americium-241	NA	4.30E+05	4.30E+05	
Cesium-134	NA	6.80E+03	6.80E+03	
Cesium-137	NA	1.40E+04	1.40E+04	4
Cobalt-60	NA	7.60E+03	7.60E+03	
Europium-152	NA	5.20E+03	5.20E+03	
Lead-210	NA	1.20E+04	1.20E+04	
Neptunium-237	NA	5.00E+02	5.00E+02	
Plutonium-238	NA	8.20E+03	8.20E+03	
Plutonium-239, 240	NA	8.70E+03	8.70E+03	
Plutonium-241	NA	1.70E+05	1.70E+05	
Radium-226	NA	1.50E+01	1.50E+01	
Radium-228	NA	1.20E+01	1.20E+01	

Table D.1-2. Derivations of Refinement Level RSVs for Soil Media – Low Effect *(continued/end)*

Analyte	EPA R4 Soil[1]	LANL Soil[2]	RSV[3]	Notes
Radionuclide (pCi/g) (continued)				
Sodium-22	NA	4.60E+04	4.60E+04	
Strontium-90 + Yittrium-90	NA	3.40E+03	3.40E+03	
Thorium-228	NA	4.30E+02	4.30E+02	
Thorium-229	NA	4.70E+02	4.70E+02	
Thorium-230	NA	5.20E+02	5.20E+02	
Thorium-232	NA	6.20E+01	6.20E+01	
Tritium	NA	3.60E+05	3.60E+05	
Uranium-233	NA	4.40E+03	4.40E+03	
Uranium-234	NA	4.40E+03	4.40E+03	
Uranium-235	NA	4.40E+03	4.40E+03	
Uranium-236	NA	4.70E+04	4.70E+04	
Uranium-238	NA	2.00E+04	2.00E+04	

1 – Table 3 in EPA Region 4 Ecological Risk Assessment Supplemental Guidance March 2018 Update (2018) (Attachment D-2)
2 – Los Alamos National Laboratory Low Effect ESL for Soil Media (2022) (Attachment D-3)
3 – Refinement Screening Value= lowest (most conservative) screening value between the EPA Region 4 soil value and the LANL soil value
4 – Screening value is for Cesium-137 + Barium-137
5 – Values for Chromium (Total)
6 – Value for Cyanide (total)
7 – Value for 4,4'-DDD
8 – Value for 4,4'-DDE
9 – Value for 4,4'-DDT
10 – Value for Xylenes

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Attachment D-2. EPA Region 4 Soil Screening Values for Hazardous Waste Sites (Table 3) (March 2018)

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Table D.2-1. Region 4 Soil Screening Values for Hazardous Waste Sites

Chemical	CAS	Screening-Level (mg/kg)	Ref.	Receptor	Plants	Ref.	Soil Invertebrates	Ref.	Mammalian	Ref.	Avian	Ref.
Inorganic Compounds												
Metals												
Aluminum	7429-90-5	Narrative	a	All	Narrative	a	Narrative	a				
Antimony	7440-36-0	0.27	a	All	5	b	78	a	0.27	a		
Arsenic	7440-38-2	18	a	All	18	a	6.8	c	46	a	43	a
Barium	7440-39-9	330	a	All	110	c	330	a	2,000	a	820	c
Beryllium	7440-41-7	2.5	c	All	2.5	c	40	a	21	a		
Boron	7440-42-8	7.5	c	All	36	c			55	c	2	c
Cadmium	7440-43-9	0.36	a	All	32	a	140	a	0.36	a	0.77	a
Chromium – Total	7440-47-3	23	c	M,A					63	c	23	c
Chromium III	16065-83-1	26	a	M,A					34	a	26	a
Chromium VI	18540-29-9	0.34	c	All	0.35	c	0.34	c	130	a	140	c
Cobalt	7440-48-4	13	a	All	13	a			230	a	120	a
Copper	7440-50-8	28	a	All	70	a	80	a	49	a	28	a
Iron	7439-89-6	Narrative	a	All			Narrative	a				
Lead	7439-92-1	11	a	All	120	a	1,700	a	56	a	11	a
Lithium	7439-92-2	2	b	P,M	2	b			75	c		
Manganese	7439-96-5	220	a	All	220	a	450	a	4,000	a	4,300	a
Mercury (total)	7439-97-6	0.013	c	All	0.3	b	0.05	c	1.7	c	0.013	c
Methylmercury	22967-92-6	0.00035	c	All			2.5	c	0.0031	c	0.00035	c
Molybdenum	7439-98-7	2	b	All	2	b			4.8	f	15	c
Nickel	7440-02-0	38	a	All	38	a	280	a	130	a	210	a
Selenium	7782-49-2	0.52	a	All	0.52	a	4.1	a	0.63	a	1.2	a
Silver	7440-22-4	4.2	a	All	560	a			14	a	4.2	a
Strontium	7440-24-6	96	c	M					95	c		
Thallium	7440-28-0	0.05	c	All	0.05	c			0.42	c	4.5	c
Tin	7440-31-5	7.6	g	All	50	b			7.62	g		
Uranium	7440-61-1	25	c	All	25	c			480	c	1,100	c
Vanadium	7440-62-2	7.8	a	All	60	c			280	a	7.8	a
Zinc	7440-66-6	46	a	All	160	a	120	a	79	a	46	a
Other Inorganic												
Ammonia	7664-41-7											
Bromine (Total)	7726-95-6	10	b	P	10	b						
Cyanide (Total)	57-12-5	0.1	c	M,A					330	c	0.098	c

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Table D.2-1. Region 4 Soil Screening Values for Hazardous Waste Sites *(continued)*

Chemical	CAS	Screening-Level (mg/kg)	Ref.	Receptor	Plants	Ref.	Soil Invertebrates	Ref.	Mammalian	Ref.	Avian	Ref.
Inorganic Compounds *(Continued)*												
Other Inorganics *(Continued)*												
Fluoride	16984-48-8	32	c	M,A					870	c	120	c
Fluorine	7782-41-4	200	b	P	200	b						
Iodine	7553-56-2	4	b	P	4	b						
Volatile Organic Compounds (VOCs)												
Chlorinated Alkanes												
1,1,1,2-Tetrachloroethane	630-20-6	0.07	d	SI			0.07	d	225	g		
1,1,2,2-Tetrachloroethane	79-34-5	0.127	g	All			0.19	d	0.127	g		
1,1,1-Trichloroethane	71-55-6	0.04	d	All			0.04	d	260	c		
1,1,2-Trichloroethane	79-00-5	0.32	d	All			0.32	d	28.6	g		
1,1-Dichloroethane	75-34-3	0.14	d	All			0.14	d	210	c		
1,2-Dichloroethane	107-06-2	0.4	d	All			0.40	d	27	c	0.85	c
1,2-Dichloropropane	78-87-5	0.28	d	All			0.28	d	32.7	g		
Dichloromethane (Methylene chloride)	75-09-2	0.21	d	All	1,600	c	0.21	d	2.6	c		
Trichloromethane (Chloroform)	67-66-3	0.05	d	All			0.05	d	8	c		
Tetrachloromethane (Carbon tetrachloride)	56-23-5	0.05	d	All			0.05	d	2.98	g		
Chlorinated Alkenes												
1,1-Dichloroethene/Dichloroethylene	75-35-4	0.04	d	All			0.04	d	11	c		
1,2-Dichloroethane (cis and trans)	540-59-0	0.04	d	All			0.04	d	24	c		
1,2-cis-Dichloroethylene	156-59-2	0.04	d	All			0.04	d				
1,2-trans-Dichloroethylene	156-60-5	0.04	d	All			0.04	d	0.784	g		
1,3-Dichloropropane	542-75-6	0.001	d	All			0.001	d				
Tetrachloroethylene (PCE)	127-18-4	0.06	d	All	10	c	0.06	d	0.18	c		
Trichloroethylene (TCE)	79-01-6	0.06	d	All			0.06	d	42	c		
Vinyl chloride	75-01-4	0.03	d	All			0.03	d	0.12	c		
Chlorobenzenes												
Chlorobenzene	108-90-7	2.4	c	All			2.4	c	43	c		
1,2-Dichlorobenzene	95-50-1	0.09	d	All			0.09	d	0.92	c		
1,3-Dichlorobenzene	541-73-1	0.08	d	All			0.08	d	0.74	c		
1,4-Dichlorobenzene	106-46-7	0.88	c	SI,M			1.2	c	0.89	c		
1,2,3-Trichlorobenzene	87-61-6	20	e	SI			20	e				
1,2,4-Trichlorobenzene	120-82-1	0.27	c	All			1.2	c	0.27	c		
1,3,5-Trichlorobenzene	108-70-3	0.07	d	All			0.07	d				

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Table D.2-1. Region 4 Soil Screening Values for Hazardous Waste Sites *(continued)*

Chemical	CAS	Screening-Level (mg/kg)	Ref.	Receptor	Plants	Ref.	Soil Invertebrates	Ref.	Mammalian	Ref.	Avian	Ref.
Volatile Organic Compound (VOCs) *(Continued)*												
Monoaromatic Hydrocarbons												
1,2,4-Trimethylbenzene	95-63-6	0.09	d	All			0.09	d				
1,3,5-Trimethylbenzene	108-67-8	0.16	d	All			0.16	d				
Benzene	71-43-2	0.12	d	All			0.12	d	24	c		
Cymene, p- (4-Isopropyltoluene)	99-87-6	0.18	d	All			0.18	d				
Ethylbenzene	100-41-4	0.27	d	All			0.27	d	5.16	g		
Isopropylbenzene (Cumene)	98-82-8	0.04	d	All			0.04	d				
Styrene (Vinyl benzene)	100-42-5	1.2	c	All	3.2	c	1.2	c				
Toluene	108-88-3	0.15	d	All	200	c	0.15	d	23	c		
Xylenes (total)	1330-20-7	0.1	d	All	100	c	0.1	d	1.4	c	41	c
Ketones												
2-Butanone (Methyl Ethyl Ketone)	78-93-3	1.0	d	All			1.0	d	350	c		
2-Hexanone	591-78-6	0.36	c	SI,M,A			2.5	d	5.4	c	0.36	c
Acetone	67-64-1	1.2	c	M,A			0.04	d	1.2	c	7.5	c
Other VOCs												
Tribromomethane (Bromoform)	75-25-2	0.07	d	All			0.07	d	15.9	g		
Bromomethane (Methyl bromide)	74-83-9	0.002	d	All			0.002	d	0.24	g		
Carbon disulfide	75-15-0	0.005	d	All			0.005	d	0.81	c		
Ethylene glycol	107-21-1	0.31	d	All			0.31	d				
Hexachloroethane	67-72-1	0.024	d	All			0.024	d	0.6	g		
Hexane	110-54-3	0.007	d	All			0.007	d				
Chloroanilines												
3-Chloroaniline	108-42-9	20	b	P,SI	20	b	30	e				
4-Chloroaniline	106-47-8	1	c	P,SI	1	c	1.8	c	1.1	g		
3,4-Dichloroaniline	95-76-1	20	e	SI			20	e				
2,4,5-Trichloroaniline	636-30-6	20	e	P,SI	20	b	20	e				
Pentachloroaniline	527-20-8	100	e	SI			100	e				
Semivolatile Organic Compound (SVOCs)												
Chlorobenzenes												
1,2,3,4-Tetrachlorobenzene	634-66-2	10	e	SI			10	e				
1,2,4,5-Tetrachlorobenzene	95-94-3	0.18	d	All			0.18	d	2.02	g		
Hexachlorobenzene	118-74-1	0.079	c	All	10	c	10	c	0.2	c	0.079	c
Pentachlorobenzene	608-93-5	0.5	g	All			20	e	0.5	g		

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Table D.2-1. Region 4 Soil Screening Values for Hazardous Waste Sites *(continued)*

Chemical	CAS	Screening-Level (mg/kg)	Ref.	Receptor	Plants	Ref.	Soil Invertebrates	Ref.	Mammalian	Ref.	Avian	Ref.
Semivolatile Organic Compound (SVOCs) (Continued)												
Dichlorophenols												
Dichlorophenols (2,3-), (2,4-), (2,5-), (2,6-)	120-83-2	0.05	d	All			0.05	d	87.5	g		
Dichlorophenols (3,4-), (3,5-)	95-77-2	20	e	P,SI	20	b	20	e				
Trichlorophenols												
2,4,5-Trichlorophenol	95-95-4	4	b	P,SI,M	4	b	9	e	14.1	g		
2,4,6-Trichlorophenol	88-06-2	9.94	g	SI,M			10	e	9.94	g		
Tetrachlorophenols												
2,3,4,5-Tetrachlorophenol	4901-51-3	20	e	SI			20	e				
Tetrachlorophenols (2,3,4,6-), (2,3,5,6-)	58-90-2	0.04	d	All			0.04	d	0.2	g		
Other Phenols												
Chlorophenols (2-), (4-)	95-57-8	0.06	d	All			0.06	d	0.54	c	0.39	c
3-Chlorophenol	108-43-0	7	e	P,SI	7	b	10	e				
2,4-Dimethylphenol	105-67-9	0.04	d	SI			0.04	d				
2,4-Dinitrophenol	51-28-5	0.061	g	All	20	b	0.15	d	0.061	g		
4-Nitrophenol	100-02-7	5.12	g	SI,M			7	e	5.12	g		
2-Methylphenol (o-Cresol)	95-48-7	0.1	d	All	0.67	c	0.1	d	580	c		
3-Methylphenol (m-Cresol)	108-39-4	0.09	d	All	0.69	c	0.09	d	3.49	g		
4-Methylphenol (p-Cresol)	106-44-5	0.08	d	All			0.08	d	163	g		
Nonylphenol	25154-52-3	1.27	d	SI			1.27	d				
Pentachlorophenol (PCP)	87-86-5	2.1	a	All	5	a	31	a	2.8	a	2.1	a
Phenol	108-95-2	0.79	c	All	0.79	c	1.8	c	37	c		
Energetic SVOCs												
2-Amino-4,6-dinitrotoluene	35572-78-2	14	c	SI,M,P	14	c	43	c	16	c		
4-Amino-2,6-dinitrotoluene	19406-51-0	12	c	SI,M,P	33	c	18	c	12	c		
1,3-Dinitrobenzene	99-65-0	0.034	d	All			0.034	d	0.072	c	0.079	c
2,4-Dinitrobenzene	121-14-2	6	c	SI,M,P	6	c	18	c	14	c		
2,6-Dinitrobenzene	606-20-2	4	c	All			30	c	4.0	c	52	c
HMX (Octahydro-tetranitro-1,3,5,7-tetrazocine)	2691-41-0	16	c	SI,M,P	2,700	c	16	c	290	c		
Nitroglycerine	55-63-0	13	c	SI,M,P	21	c	13	c	70	c		
2-Nitrotoluene	88-72-2	0.19	d	All			0.19	d	9.8	c		
3-Nitrotoluene	99-08-1	0.13	d	All			0.13	d	12	c		
4-Nitrotoluene	99-99-0	0.14	d	All			0.14	d	21	c		
PETN (Pentaerythrite-tetranitrate)	78-11-5	2.2	d	SI,M			2.2	d	100	c		
RDX (Hexahydro-1,3,5-trinitro-1,3,5-triazine	121-82-4	2.3	c	All	45.9	h	8.4	c	16	c	2.3	c

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Table D.2-1. Region 4 Soil Screening Values for Hazardous Waste Sites *(continued)*

Chemical	CAS	Screening-Level (mg/kg)	Ref.	Receptor	Plants	Ref.	Soil Invertebrates	Ref.	Mammalian	Ref.	Avian	Ref.
Semivolatile Organic Compound (SVOCs) (Continued)												
Energetic SVOCs *(Continued)*												
Tetryl (Methyl-2,4,6-trinitrophenulnitroamine)	479-45-8	0.018	d	All	25	h	0.018	d	1.5	c		
1,3,5-Trinitrobenzene	99-35-4	0.3	h	All	0.3	h	10	c				
2,4,6-Trinitrotoluene (TNT)	118-96-7	7.5	c	All	62	c	32	c	95	c	7.5	c
Other SVOCs												
1,1'-Biphenyl	92-52-4	0.2	d	All	60	b	0.2	d				
3,3'-Dichlorobenzidine	91-94-1	0.03	d	All			0.03	d	0.646	g		
Benzoic acid	65-85-0	0.01	d	All			0.01	d	1	c		
Benzyl alcohol	100-51-6	0.002	d	All			0.002	d	120	c		
Carbazole	86-74-8	0.07	d	All			0.07	d	79	c		
Dibenzofuran	132-64-9	0.15	d	All	6.1	c	0.15	d				
Hexachlorobutadiene	87-68-3	0.009	d	All			0.009	d	0.04	g		
Hexachlorocyclopentadiene	77-47-4	0.001	d	All	10	b	0.001	d	0.755	g		
N-Nitrosodiphenylamine	86-30-6	0.545	g	All			20	e	0.545	g		
Nitrobenzene	98-95-3	2.2	c	SI,M			2.2	c	4.8	c		
Pentachloronitrobenzene	82-68-8	0.09	d	All			0.09	d	11	c	0.7	c
Phthalates												
Bis(2-ethylhexyl)phthalate	117-81-7	0.02	c	All			8.4	d	0.06	c	0.02	c
Butylbenzyl phthalate	85-68-7	0.59	d	All			0.59	d	90	c		
Diethylphthalate	84-66-2	0.25	d	All	100	c	0.25	d	3,600	c		
Dimethylphthalate	131-11-3	0.35	d	All			10	c	38	c		
Di-N-butyl phthalate	84-74-2	0.011	c	All	160	c	0.22	d	180	c	0.011	c
Di-N-octyl phthalate	117-84-0	0.91	c	All			303	d	0.91	c		
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (PAHs)												
Acenaphthene	83-32-9	See Total			0.25	c	0.38	d	130	c		
Acenaphthylene	208-96-8	See Total					0.34	d	120	c		
Anthracene	120-12-7	See Total			6.8	c	0.0015	d	210	c		
Fluorene	86-73-7	See Total					3.7	c	250	c		
1-Methylnaphthalene	90-12-0	See Total					0.14	d				
2-Methylnaphthalene	91-57-6	See Total					0.11	d	16	c		
2,6-Dimethylnaphthalene	581-42-0	See Total					0.44	d				
2,3,5-Trimethylnaphthalene	2245-38-7	See Total					0.13	d				
Naphthalene	91-20-3	See Total			1.0	c	0.16	d	9.6	c		

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Table D.2-1. Region 4 Soil Screening Values for Hazardous Waste Sites *(continued)*

Chemical	CAS	Screening-Level (mg/kg)	Ref.	Receptor	Plants	Ref.	Soil Invertebrates	Ref.	Mammalian	Ref.	Avian	Ref.
Semivolatile Organic Compound (SVOCs) (Continued)												
Polycyclic Aromatic Hydrocarbons (PAHs) *(Continued)*												
Low Molecular Weight (PAHs) *(Continued)*												
1-Methylphenanthrene	932-69-9	See Total					0.5	d			3.4	c
Phenanthrene	85-01-8	See Total					5.5	c	11	c		
Total Low Molecular Weight PAHs		*29*	*a*	*All*			*29*	*a*	*100*	*a*		
High Molecular Weight (PAHs)												
Benzo(a)anthracene	56-55-3	See Total			18	c	4.69	d	3.4	c	0.73	c
Benzo(b)fluoranthene	205-99-2	See Total			18	c	2.7	d	44	c		
Benzo(k)fluoranthene	207-08-9	See Total					0.13	d	71	c		
Benzo(g,h,i)perylene	191-24-2	See Total					0.07	d	25	c		
Benzo(a)pyrene	50-32-8	See Total					0.13	d	62	c		
Benzo(e)pyrene	192-97-2	See Total					0.25	d				
Chrysene	218-01-9	See Total					5.18	d	3.1	c		
Dibenzo(a,h)anthracene	53-70-3	See Total					0.06	d	14	c		
Fluoranthene	206-44-0	See Total					10	c	22	c		
Indeno(1,2,3-cd)pyrene	193-39-5	See Total					0.08	d	71	c		
Perylene	198-55-0	See Total					0.17	d				
Pyrene	129-00-0	See Total					10	c	23	c	33	c
Total High Molecular Weight PAHs		*1.1*	*a*	*M*			*18*	*a*	*1.1*	*a*		
Pesticides/Herbicides												
Acrolein	107-02-8	0.0003	d	All			0.0003	d	5.27	g		
Aldrin	309-00-2	0.03	c	SI,M			0.030	c	0.037	c		
Atrazine	1912-24-9	0.00005	d	SI			0.000	d				
alpha-benzene hexachloride (BHC)	319-84-6	0.0003	d	SI,M			0.00	d	59	c		
beta-benzene hexachloride (BHC)	319-85-7	0.0003	d	All			0.0003	d	0.27	c	14	
gamma-benzene hexachloride (BHC) (Lindane)	58-89-9	0.0031	d	All	0.1	c	0.0031	d	0.0095	c	0.21	
Carbaryl	63-25-2	0.0003	d	All			0.0003	d				
Carbofuran	1563-66-2	0.0008	d	All			0.0008	d				
alpha-Chlordane	5103-71-9	0.0029	d	All	2.2	c	0.0029	d	0.27	c	0.27	
gamma-Chlordane	12789-03-6	0.02	d	All	2.2	c	0.02	d	2.3	c	2.2	
Chloropyrifos	2921-88-2	0.003	d	All			0.003	d				
Dinoseb	88-85-7	0.015	d	All			0.015	d	0.022	g		
DDT/DDE/DDD (total)		0.021	a	All								
Diazinon	333-41-5	0.0037	d	All			0.0037	d				

Table D.2-1. Region 4 Soil Screening Values for Hazardous Waste Sites *(continued/end)*

Chemical	CAS	Screening-Level (mg/kg)	Ref.	Receptor	Plants	Ref.	Soil Invertebrates	Ref.	Mammalian	Ref.	Avian	Ref.
Pesticides/Herbicides *(continued)*												
Dieldrin	60-57-1	0.0029	d	All	10	c	0.0029	d	0.0049	a	0.022	a
alpha-Endosulfan	959-98-8	0.0009	d	All			0.0009	d	0.119	g		
Endosulfans (alpha and beta)	115-29-7	0.0009	d	All			0.0009	d	0.64	c	15	c
Endosulfan sulfate	1031-07-8	0.0065	d	All			0.0007	d	0.036	g		
Endrin	72-20-8	0.0019	c	All	0.0034	c	0.0019	d	0.023	c	0.0014	c
Guthion	86-50-0	0.00006	d	All			0.00006	d				
Heptachlor	76-44-8	0.0016	d	All	0.4	c	0.0016	d	0.059	c	0.3	c
Heptachlor epoxide	1024-57-3	0.00015	d	All			0.00015	d	0.152	g		
Hexachlorocyclopentadiene	77-47-4	0.0064	d	All	10	c	0.0064	d	0.755	g		
Kepone (Chlordecone)	143-50-0	0.017	d	All			0.017	d	0.022	c	1.3	c
Malathion	121-75-5	0.00004	d	All			0.00004	d				
Methoxychlor	72-43-5	0.0021	d	All			0.0021	d	5.1	c	18	c
Mirex	2385-85-5	0.0036	d	All			0.0036	d				
Parathion	56-38-2	0.00019	d	All			0.00019	d				
2,4,5-TP (Silvex)	93-72-1	0.055	d	All			0.055	d				
Simazine	122-34-9	0.0083	d	All			0.0083	d				
Toxaphene	8001-35-2	0.00015	d	All			0.00015	d	5.9	c	4.1	c
Trifluralin	1582-09-8	0.079	d	All			0.079	d				
Polychlorinated Biphenyls (PCBs) and Dioxins/Furans												
PCDDs, PCDFs (ΣTEQ)	1746-01-6	0.00000315	f	All			5	c	0.00000315	f	0.000016	f
PCBs (total)	1336-36-3	0.41	c	All	40	b	0.33	d	0.371	f	0.041	c
Other												
2-Nitroaniline	88-74-4	0.02	d	SI,M			0.02	d	5.3	c		
Diphenylamine	122-39-4	1.01	g	All			1.1	d	1.01	g	10	c
Trichlorofluoromethane	75-69-4	16.4	g	M					16.4	g		

Notes: All = All receptors; A – Avian, M – Mammals, P – Plants, SI – Soil Invertebrates, LMWPAHs have less than 4 rings, HMWPAHs have 4 or more rings

Table 3 Sources:

a – USEPA (2007): Ecological Soil Screening Levels.
b – Efroymson, R.A, M.E. Will, G.W. Suter, and A.C. Wooten, 1997a. *Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Terrestrial Plants: 1997 Revision*, ES/ER/TM-95/R4, Oak Ridge National Laboratory, Oak Ridge, TN
c – Los Alamos National Laboratory (LANL), 2017. ECORISK Database Release 4.1, September 2017. http:/www.lanl.gov/environment/protection/eco-risk-assessment.php (µg/kg dw)
d – ECOSAR & Region 4 soil model.
e – Efroymson, R.A, M.E. Will, G.W. Suter, 1997b. Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Process: 1997 Revision, ES/ER/TM-126/R2, Oak Ridge National Laboratory, Oak Ridge, TN.
f – Efroymson, R.A, G.W. Suter, B.E. Sample, and D.S. Jones, 1997c. *Preliminary Remediation Goals for Ecological Endpoints*, ES/ER/TM-162/R2, Oak Ridge National Laboratory, Oak Ridge, TN.
g – EPA Region 5 RCRA Ecological Screening Levels (2003).

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Attachment D-3. Los Alamos National Laboratory Ecological Screening Levels

**Ecorisk Database, Release 4.4,
Los Alamos National Laboratory, Los Alamos, NM (2022)**

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Table D.3-1. LANL No Effect and Low Effect ESLs

Analyte	No Effect ESL Soil	Low Effect ESL Soil	Notes
Inorganic (mg/kg)			
Aluminum	0.00E+00	0.00E+00	
Antimony	2.30E+00	2.30E+01	
Arsenic	6.80E+00	3.10E+01	
Cadmium	2.70E-01	1.60E+00	
Chromium (total)	2.30E+01	7.30E+01	
Cobalt	1.30E+01	1.30E+02	
Copper	1.40E+01	4.30E+01	
Cyanide (total)	9.80E-02	9.80E-01	
Lead	1.10E+01	2.30E+01	
Manganese	2.20E+02	1.10E+03	
Mercury (inorganic)	1.30E-02	1.30E-01	
Nickel	1.00E+01	2.10E+01	
Selenium	5.20E-01	1.00E+00	
Thallium	5.00E-02	5.00E-01	
Vanadium	4.70E+00	9.50E+00	
Zinc	4.70E+01	1.20E+02	
Organic (mg/kg)			
1,1-Dichloroethane	2.10E+02	2.10E+03	
2,4,6-Trinitrotoluene	7.50E+00	1.30E+01	
2-Hexanone	3.60E-01	3.60E+00	
2-Methylnaphthalene	1.60E+01	1.60E+02	
2-Nitrotoluene	9.80E+00	9.80E+01	
Acenaphthene	2.50E-01	2.00E+00	
Acenaphthylene	1.20E+02	1.20E+03	
Acetone	1.20E+00	6.30E+00	
alpha-Chlordane	2.70E-01	1.30E+00	
Anthracene	6.80E+00	9.00E+00	
Aroclor-1254	4.10E-02	4.10E-01	
Aroclor-1260	8.80E-01	1.20E+00	
Benzaldehyde	NA	NA	
Benzene	2.40E+01	2.40E+02	
Benzo(a)anthracene	7.30E-01	7.30E+00	
Benzo(a)pyrene	6.20E+01	1.90E+02	
Benzo(b)fluoranthene	1.80E+01	1.80E+02	
Benzo(g,h,i)perylene	2.50E+01	2.50E+02	
Benzo(k)fluoranthene	7.10E+01	7.10E+02	
Bis(2-ethylhexyl)phthalate	2.00E-02	2.00E-01	
Carbazole	7.90E+01	7.90E+02	
Carbon Disulfide	8.10E-01	8.10E+00	
Chrysene	3.10E+00	3.10E+01	
Cumene (Isopropylbenzene)	NA	NA	
Cyclohexane	NA	NA	
Dichlorodiphenyldichloroethane (DDD)	6.30E-03	3.20E-02	
Dichlorodiphenyldichloroethylene (DDE)	1.10E-01	5.50E-01	
Dichlorodiphenyltrichloroethane (DDT)	4.40E-02	2.20E-01	
Dibenzo(a,h)anthracene	1.40E+01	1.40E+02	
Dibenzofuran	6.10E+00	6.10E+01	

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Table D.3-1. LANL No Effect and Low Effect ESLs *(continued)*

Analyte	No Effect ESL Soil	Low Effect ESL Soil	Notes
Organic (mg/kg) (continued)			
Dichloroethane (Methylene Chloride)	2.60E+00	2.20E+01	
Diethyl Phthalate	1.00E+02	1.00E+03	
Di-n-Butyl Phthalate	1.10E-02	1.10E-01	
Endosulfan	6.40E-01	6.40E+00	
Fluoranthene	1.00E+01	2.30E+01	
Fluorene	3.70E+00	1.90E+01	
gamma-Chlordane	2.20E+00	1.10E+01	
Indeno(1,2,3-CD)pyrene	7.10E+01	7.10E+02	
Methoxychlor	5.10E+00	1.00E+01	
Methyl Acetate	NA	NA	
Methyl Ethyl Ketone	NA	NA	
Methyl Tertiary Butyl Ether (MTBE)	NA	NA	
Methylcyclohexane	NA	NA	
N-Dioctyl Phthalate	9.10E-01	9.10E+00	
N-Nitrosodipropylamine	NA	NA	
Naphthalene	1.00E+00	1.00E+01	
Phenanthrene	5.50E+00	1.20E+01	
Pyrene	1.00E+01	2.00E+01	
Styrene	1.20E+00	1.20E+01	
Tetrachloroethene (TCE)	1.80E-01	9.40E-01	
Trichloroethene (TCE)	4.20E+01	4.20E+02	
Toluene	2.30E+01	2.30E+02	
Xylene (Total)	1.40E+00	1.80E+00	
Radionuclide (pCi/g)			
Actinium-228	NA	NA	
Americium-243	NA	NA	
Cesium-137	1.40E+03	1.40E+04	Cesium-137 + Barium-137
Curium-245/246	NA	NA	
Lead-212	NA	NA	
Lead-214	NA	NA	
Plutonium-238	8.20E+02	8.20E+03	
Plutonium239/240	8.70E+02	8.70E+03	
Potassium-40	NA	NA	
Radium-226	1.50E+00	1.50E+01	
Radium-228	1.20E+00	1.20E+01	
Strontium-90	3.40E+02	3.40E+03	Strontium-90 + Yttrium-90
Thorium-228	4.30E+01	4.30E+02	
Thorium-230	5.20E+01	5.20E+02	
Thorium-232	6.20E+00	6.20E+01	
Tritium	3.60E+04	3.60E+05	
Uranium-233/234	4.40E+02	4.40E+03	
Uranium-235	4.40E+02	4.40E+03	
Uranium-238	4.40E+02	4.40E+03	

ESL = ecological screening level
NA = Not Available

Table D.3-2. LANL Receptor-Specific Ecological Screening Levels (2022)

Analyte	American kestrel (Avian top carnivore)	American kestrel (insectivore/ carnivore)	American robin (Avian herbivore)	American robin (Avian insectivore)	American robin (Avian omnivore)	Deer mouse (Mammalian omnivore)	Earthworm (Soil-dwelling invertebrate)	Gray fox (Mammalian top carnivore)	Montane shrew (Mammalian insectivore)	Mountain cottontail (Mammalian herbivore)
Acenaphthene	NA	NA	NA	NA	NA	1.60E+03	NA	2.90E+05	1.30E+03	5.30E+03
Acenaphthylene	NA	NA	NA	NA	NA	1.60E+03	NA	2.80E+05	1.20E+03	5.40E+03
Acetone	6.60E+05	8.40E+03	7.50E+01	1.70E+03	1.40E+02	6.30E+00	NA	3.90E+04	7.90E+01	8.00E+00
Aldrin	NA	NA	NA	NA	NA	3.70E-01	NA	6.60E+01	1.80E-01	6.00E+01
Aluminum	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Americium-241	5.80E+05	4.70E+05	4.60E+04	1.00E+05	6.10E+04	3.30E+05	1.90E+03	2.60E+05	3.40E+05	1.50E+05
4-Amino-2,6-dinitrotoluene	NA	NA	NA	NA	NA	2.30E+02	1.80E+02	6.70E+04	1.20E+02	3.20E+03
2-Amino-4,6-dinitrotoluene	NA	NA	NA	NA	NA	2.30E+02	4.30E+02	9.70E+04	1.60E+02	1.10E+03
Anthracene	NA	NA	NA	NA	NA	3.00E+03	NA	3.80E+05	2.10E+03	1.20E+04
Antimony	NA	NA	NA	NA	NA	2.30E+01	7.80E+02	4.60E+02	7.90E+01	2.70E+01
Aroclor-1016	NA	NA	NA	NA	NA	5.90E+00	NA	7.20E+02	3.10E+00	1.30E+02
Aroclor-1242	6.20E+01	1.90E+00	9.20E+00	4.10E-01	7.80E-01	3.00E+00	NA	4.00E+02	1.50E+00	1.10E+02
Aroclor-1248	6.30E+01	1.90E+00	9.40E+00	4.10E-01	7.80E-01	1.40E-01	NA	1.90E+01	7.30E-02	5.30E+00
Aroclor-1254	7.60E+01	1.90E+00	1.10E+01	4.10E-01	7.90E-01	4.80E+00	NA	7.20E+01	2.40E+00	2.40E+02
Aroclor-1260	5.60E+02	5.90E+00	5.20E+01	1.20E+00	2.40E+00	4.80E+01	NA	1.50E+02	2.40E+01	4.50E+03
Arsenic	7.40E+03	1.00E+03	3.40E+02	1.50E+02	2.10E+02	5.10E+01	6.80E+01	1.30E+03	3.10E+01	1.80E+02
Barium	4.40E+04	1.30E+04	1.20E+03	1.40E+03	1.30E+03	8.70E+03	3.20E+03	1.90E+05	1.00E+04	1.40E+04
Benzene	NA	NA	NA	NA	NA	2.40E+02	NA	1.80E+05	4.90E+02	3.80E+02
Benzo(a)anthracene	2.80E+02	6.40E+01	7.30E+00	8.80E+00	8.00E+00	3.40E+01	NA	1.10E+03	4.00E+01	6.10E+01
Benzo(a)pyrene	NA	NA	NA	NA	NA	2.60E+02	NA	1.10E+04	1.90E+02	8.30E+02
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	5.10E+02	NA	2.40E+04	4.40E+02	1.30E+03
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	4.60E+02	NA	3.60E+04	2.50E+02	4.70E+03
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	9.90E+02	NA	4.30E+04	7.10E+02	3.30E+03
Benzoic Acid	NA	NA	NA	NA	NA	1.30E+01	NA	2.00E+04	1.00E+01	4.60E+01
Benzyl Alcohol	NA	NA	NA	NA	NA	1.20E+03	NA	1.10E+06	2.70E+03	1.90E+03
Beryllium	NA	NA	NA	NA	NA	5.60E+02	4.00E+02	4.20E+03	3.50E+02	8.90E+02
alpha-benzene hexachloride (BHC)	NA	NA	NA	NA	NA	1.00E+03	NA	1.80E+05	5.90E+02	8.00E+03
beta-benzene hexachloride (BHC)	2.60E+04	6.90E+02	7.80E+02	1.40E+02	2.40E+02	2.30E+00	NA	4.10E+02	1.30E+00	1.80E+01

Table D.3-2. LANL Receptor-Specific Ecological Screening Levels (2022) *(continued)*

Analyte	American kestrel (Avian top carnivore)	American kestrel (insectivore/ carnivore)	American robin (Avian herbivore)	American robin (Avian insectivore)	American robin (Avian omnivore)	Deer mouse (Mammalian omnivore)	Earthworm (Soil-dwelling invertebrate)	Gray fox (Mammalian top carnivore)	Montane shrew (Mammalian insectivore)	Mountain cottontail (Mammalian herbivore)
gamma-benzene hexachloride (BHC)	1.50E+02	4.00E+00	4.50E+00	8.50E-01	1.40E+00	1.60E-01	NA	2.90E+01	9.50E-02	1.20E+00
Bis(2-ethylhexyl)phthalate	9.30E+01	9.60E-01	1.60E+02	2.00E-01	4.00E-01	1.10E+01	NA	5.00E+03	6.00E+00	1.90E+04
Boron	4.70E+03	1.80E+02	1.00E+01	3.50E+01	1.50E+01	5.50E+02	NA	2.10E+05	1.30E+03	8.40E+02
2-Butanone	NA	NA	NA	NA	NA	9.20E+02	NA	3.50E+06	6.90E+03	1.20E+03
Butyl Benzyl Phthalate	NA	NA	NA	NA	NA	1.60E+03	NA	2.30E+05	9.00E+02	2.40E+04
Cadmium	2.30E+03	7.70E+00	2.30E+01	1.60E+00	3.00E+00	6.80E+00	7.60E+02	7.40E+03	3.60E+00	1.40E+02
Carbazole	NA	NA	NA	NA	NA	7.90E+02	NA	1.30E+05	1.10E+03	1.40E+03
Carbon Disulfide	NA	NA	NA	NA	NA	8.10E+00	NA	1.90E+03	1.20E+01	1.40E+01
Cesium-134	1.00E+04	1.00E+04	6.80E+03	2.10E+04	1.20E+04	1.10E+04	1.00E+04	7.30E+03	1.10E+04	6.50E+03
Cesium-137	3.90E+04	4.30E+04	1.40E+04	4.50E+04	2.60E+04	2.30E+04	2.30E+04	1.50E+04	2.40E+04	1.40E+04
Cesium-137 + Barium-137	3.90E+04	4.30E+04	1.40E+04	4.50E+04	2.60E+04	2.30E+04	2.30E+04	1.50E+04	2.40E+04	1.40E+04
alpha-Chlordane	2.20E+02	6.50E+00	8.90E+01	1.30E+00	2.70E+00	5.30E+00	NA	8.10E+02	2.70E+00	5.40E+02
gamma-Chlordane	1.30E+03	5.60E+01	1.00E+02	1.10E+01	2.00E+01	4.30E+01	NA	4.20E+03	2.30E+01	6.30E+02
4-Chloroaniline	NA	NA	NA	NA	NA	NA	1.80E+01	NA	NA	NA
Chlorobenzene	NA	NA	NA	NA	NA	5.30E+02	2.40E+01	2.50E+05	4.30E+02	1.70E+03
Chloroform	NA	NA	NA	NA	NA	2.10E+01	NA	2.40E+04	2.20E+01	5.20E+01
2-Chlorophenol	3.10E+03	1.40E+02	3.90E+00	2.60E+01	6.80E+00	5.40E+00	NA	3.40E+03	2.30E+01	7.40E+00
Chromium (total)	2.70E+03	5.60E+02	1.60E+02	7.30E+01	1.00E+02	1.10E+04	NA	1.80E+05	6.30E+03	4.10E+04
Chromium(+6)	3.60E+04	1.40E+04	2.10E+03	1.40E+03	1.60E+03	5.50E+03	3.40E+00	4.60E+04	3.30E+03	1.00E+04
Chrysene	NA	NA	NA	NA	NA	3.10E+01	NA	1.10E+03	3.10E+01	6.30E+01
Cobalt	5.20E+03	1.40E+03	3.00E+02	1.70E+02	2.10E+02	1.00E+03	NA	1.40E+04	6.40E+02	2.80E+03
Cobalt-60	1.50E+04	1.50E+04	1.50E+04	1.50E+04	1.50E+04	7.60E+03	7.60E+03	7.60E+03	7.60E+03	7.60E+03
Copper	3.50E+03	2.40E+02	1.00E+02	4.30E+01	6.00E+01	1.00E+02	5.30E+02	6.70E+03	7.00E+01	4.30E+02
Cyanide (total)	5.90E+00	3.60E+00	1.00E+00	9.80E-01	9.90E-01	3.30E+03	NA	3.30E+04	3.30E+03	7.90E+03
4,4'-DDD	4.60E+00	1.50E-01	6.60E-01	3.20E-02	6.20E-02	1.50E+01	NA	2.00E+03	8.30E+00	5.10E+02
4,4'-DDE	1.00E+02	2.60E+00	2.40E+01	5.50E-01	1.00E+00	1.80E+01	NA	2.90E+03	9.30E+00	1.30E+03
4,4'-DDT	2.40E+02	5.10E+00	7.20E+01	1.00E+00	2.10E+00	4.40E-01	NA	9.10E+01	2.20E-01	5.30E+01
Dibenzo(a,h)anthracene	NA	NA	NA	NA	NA	2.20E+02	NA	8.50E+03	1.40E+02	8.40E+02

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Table D.3-2. LANL Receptor-Specific Ecological Screening Levels (2022) *(continued)*

Analyte	American kestrel (Avian top carnivore)	American kestrel (insectivore/ carnivore)	American robin (Avian herbivore)	American robin (Avian insectivore)	American robin (Avian omnivore)	Deer mouse (Mammalian omnivore)	Earthworm (Soil-dwelling invertebrate)	Gray fox (Mammalian top carnivore)	Montane shrew (Mammalian insectivore)	Mountain cottontail (Mammalian herbivore)
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	NA	NA	NA	NA	NA	1.50E+01	NA	4.80E+03	9.20E+00	1.20E+02
1,3-Dichlorobenzene	NA	NA	NA	NA	NA	1.20E+01	NA	3.80E+03	7.40E+00	1.30E+02
1,4-Dichlorobenzene	NA	NA	NA	NA	NA	6.00E+00	1.20E+01	1.80E+03	3.50E+00	4.90E+01
1,1-Dichloroethane	NA	NA	NA	NA	NA	2.10E+03	NA	2.50E+06	2.90E+03	4.10E+03
1,2-Dichloroethane	2.70E+03	4.40E+01	1.60E+00	9.00E+00	2.80E+00	2.70E+02	NA	3.60E+05	9.10E+02	3.90E+02
1,1-Dichloroethene	NA	NA	NA	NA	NA	1.40E+02	NA	1.40E+05	1.10E+02	4.40E+02
cis/trans-1,2-Dichloroethene	NA	NA	NA	NA	NA	2.50E+02	NA	2.50E+05	2.40E+02	6.40E+02
Dieldrin	9.30E+01	3.00E+00	1.70E+01	6.40E-01	1.20E+00	1.70E-02	NA	2.30E+00	9.00E-03	6.90E-01
Diethyl Phthalate	NA	NA	NA	NA	NA	3.60E+04	NA	2.50E+07	3.60E+04	8.80E+04
Dimethyl Phthalate	NA	NA	NA	NA	NA	4.60E+02	1.00E+02	5.90E+05	9.80E+02	7.40E+02
Di-n-Butyl Phthalate	2.00E+01	5.20E-01	3.80E+00	1.10E-01	2.10E-01	8.60E+02	NA	1.40E+05	4.50E+02	4.00E+04
1,3-Dinitrobenzene	1.20E+03	9.30E+01	7.90E-01	1.60E+01	1.50E+00	1.60E-01	NA	1.90E+02	2.20E+00	2.10E-01
Dinitrotoluene[2,4-]	NA	NA	NA	NA	NA	2.00E+02	1.80E+02	2.00E+04	1.40E+02	7.40E+02
Dinitrotoluene[2,6-]	1.80E+05	6.80E+03	5.20E+02	1.30E+03	7.40E+02	4.00E+01	4.40E+01	1.30E+04	7.60E+01	6.70E+01
Di-n-octylphthalate	NA	NA	NA	NA	NA	1.80E+01	NA	1.30E+04	9.10E+00	8.40E+04
Diphenylamine	6.50E+03	8.10E+01	1.30E+02	1.60E+01	2.90E+01	NA	NA	NA	NA	NA
Endosulfan	2.50E+04	2.00E+03	1.50E+02	3.70E+02	2.10E+02	6.40E+00	NA	9.50E+02	1.10E+01	1.00E+01
Endrin	2.10E+00	6.80E-02	4.60E-01	1.40E-02	2.80E-02	4.50E-01	NA	6.30E+01	2.30E-01	2.10E+01
Europium-152	1.00E+04	1.00E+04	1.00E+04	1.00E+04	1.00E+04	5.30E+03	5.30E+03	5.20E+03	5.30E+03	5.20E+03
Fluoranthene	NA	NA	NA	NA	NA	3.80E+02	2.30E+01	3.90E+04	2.20E+02	2.70E+03
Fluorene	NA	NA	NA	NA	NA	6.80E+02	1.90E+01	1.00E+05	5.10E+02	2.30E+03
Fluoride	2.20E+04	9.10E+03	1.70E+03	1.20E+03	1.40E+03	2.10E+03	NA	2.40E+04	1.60E+03	4.80E+03
Heptachlor	4.50E+02	1.40E+01	7.70E+01	3.00E+00	5.90E+00	1.10E+00	NA	1.50E+02	5.90E-01	4.60E+01
Hexachlorobenzene	1.20E+02	3.70E+00	8.30E+02	7.90E-01	1.50E+00	3.90E+00	1.00E+02	5.90E+02	2.00E+00	9.10E+03
Hexafluoropropylene oxide dimer acid (GenX)	NA	NA	NA	NA	NA	8.40E+02	NA	3.90E+03	8.40E+02	9.70E+02

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Table D.3-2. LANL Receptor-Specific Ecological Screening Levels (2022) *(continued)*

Analyte	American kestrel (Avian top carnivore)	American kestrel (insectivore/ carnivore)	American robin (Avian herbivore)	American robin (Avian insectivore)	American robin (Avian omnivore)	Deer mouse (Mammalian omnivore)	Earthworm (Soil-dwelling invertebrate)	Gray fox (Mammalian top carnivore)	Montane shrew (Mammalian insectivore)	Mountain cottontail (Mammalian herbivore)
Hexanone[2-]	2.90E+03	1.70E+01	4.70E+00	3.60E+00	4.10E+00	2.30E+01	NA	2.20E+04	2.00E+01	6.50E+01
HMX	NA	NA	NA	NA	NA	7.90E+02	1.60E+02	1.50E+05	2.90E+03	1.10E+03
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	1.10E+03	NA	4.60E+04	7.10E+02	5.10E+03
Iodomethane	9.20E+01	5.90E-01	7.60E-02	1.20E-01	9.50E-02	NA	NA	NA	NA	NA
Kepone	3.80E+02	1.20E+01	9.20E+01	2.60E+00	5.10E+00	2.10E-01	NA	2.90E+01	1.10E-01	1.00E+01
Lead	1.00E+03	1.60E+02	3.60E+01	2.30E+01	2.80E+01	2.30E+02	8.40E+03	7.00E+03	1.70E+02	6.00E+02
Lead-210	8.80E+04	8.70E+04	6.00E+04	6.10E+04	5.60E+04	4.50E+04	1.20E+04	4.40E+04	4.50E+04	4.20E+04
Lithium	NA	NA	NA	NA	NA	4.80E+02	NA	4.10E+03	3.50E+02	7.50E+02
Manganese	1.20E+05	5.00E+04	2.70E+03	4.70E+03	3.50E+03	5.40E+03	4.50E+03	1.50E+05	1.00E+04	7.50E+03
Mercury (inorganic)	3.20E+00	5.80E-01	6.70E-01	1.30E-01	2.20E-01	3.00E+01	5.00E-01	7.60E+02	1.70E+01	2.30E+02
Mercury (methyl)	9.00E-02	1.50E-02	6.60E-01	3.50E-03	7.10E-03	3.10E-02	1.20E+01	7.40E-01	1.50E-02	9.80E+00
Methoxychlor[4,4'-]	2.10E+04	8.80E+02	1.10E+03	1.80E+02	3.10E+02	1.80E+01	NA	2.00E+03	1.00E+01	1.60E+02
Methyl-2-pentanone[4-]	NA	NA	NA	NA	NA	9.70E+01	NA	1.80E+05	1.50E+02	1.70E+02
Methylene Chloride	NA	NA	NA	NA	NA	2.20E+01	NA	3.60E+04	7.90E+01	3.20E+01
Methylnaphthalene[2-]	NA	NA	NA	NA	NA	2.40E+02	NA	4.90E+04	1.60E+02	1.10E+03
Methylphenol[2-]	NA	NA	NA	NA	NA	5.80E+03	NA	1.60E+06	1.50E+04	8.80E+03
Methylphenol[3-]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Molybdenum	1.10E+04	9.00E+02	1.80E+02	1.50E+02	1.60E+02	NA	NA	NA	NA	NA
Naphthalene	2.10E+04	7.80E+02	3.40E+01	1.50E+02	5.70E+01	2.70E+01	NA	1.60E+04	7.90E+01	4.00E+01
Neptunium-237	1.70E+04	1.30E+04	5.90E+03	2.10E+03	2.00E+03	3.30E+04	5.00E+02	5.90E+03	3.60E+04	1.30E+04
N-ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)	NA	NA	NA	NA	NA	1.60E+02	NA	7.90E+02	1.60E+02	1.90E+02
Nickel	8.10E+03	4.40E+02	5.00E+02	8.10E+01	1.30E+02	4.00E+01	1.30E+03	2.50E+03	2.10E+01	5.40E+02
Nitroaniline[2-]	NA	NA	NA	NA	NA	1.00E+01	NA	4.40E+03	1.30E+01	2.20E+01
Nitrobenzene	NA	NA	NA	NA	NA	4.80E+01	2.20E+01	4.10E+04	2.10E+02	6.70E+01
Nitroglycerine	NA	NA	NA	NA	NA	7.40E+02	1.30E+02	7.30E+05	1.30E+04	9.30E+02
Nitrotoluene[2-]	NA	NA	NA	NA	NA	9.80E+01	NA	6.00E+04	2.20E+02	1.50E+02
Nitrotoluene[3-]	NA	NA	NA	NA	NA	1.20E+02	NA	7.00E+04	1.90E+02	2.10E+02
Nitrotoluene[4-]	NA	NA	NA	NA	NA	2.10E+02	NA	1.30E+05	4.10E+02	3.60E+02

Table D.3-2. LANL Receptor-Specific Ecological Screening Levels (2022) *(continued)*

Analyte	American kestrel (Avian top carnivore)	American kestrel (insectivore/ carnivore)	American robin (Avian herbivore)	American robin (Avian insectivore)	American robin (Avian omnivore)	Deer mouse (Mammalian omnivore)	Earthworm (Soil-dwelling invertebrate)	Gray fox (Mammalian top carnivore)	Montane shrew (Mammalian insectivore)	Mountain cottontail (Mammalian herbivore)
Pentachloronitrobenzene	1.10E+03	3.30E+01	2.10E+02	7.00E+00	1.30E+01	2.20E+02	NA	3.50E+04	1.10E+02	9.30E+03
Pentachlorophenol	5.70E+02	1.70E+01	2.90E+02	3.60E+00	7.20E+00	1.50E+01	1.50E+02	2.30E+03	8.10E+00	1.80E+03
Perchlorate Ion	4.00E+00	8.00E+00	2.40E-01	6.40E+01	4.90E-01	1.00E+00	3.50E+01	1.60E+01	1.50E+02	1.30E+00
Perfluorobutanesulfonic acid (PFBS)	9.30E+01	4.90E+01	1.10E+02	1.40E+01	2.50E+01	3.20E+01	NA	4.00E+02	3.20E+01	6.60E+02
Perfluorobutanoic acid (PFBA)	NA	NA	NA	NA	NA	1.20E+02	NA	3.50E+02	1.20E+02	2.60E+02
Perfluorodecanoic acid (PFDA)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Perfluoroheptanoic acid (PFHpA)	NA	NA	NA	NA	NA	NA	1.00E+02	NA	NA	NA
Perfluorohexanesulfonic acid (PFHxS)	NA	NA	NA	NA	NA	NA	1.00E+02	NA	NA	NA
Perfluorohexanoic acid (PFHxA)	NA	NA	NA	NA	NA	4.50E+02	NA	3.50E+02	4.50E+02	9.40E+02
Perfluorononanoic acid (PFNA)	NA	NA	NA	NA	NA	1.90E+00	1.00E+02	2.20E+00	1.10E+00	1.10E+01
Perfluorooctanesulfonic acid (PFOS)	4.80E-01	3.50E-01	2.80E+00	1.10E-01	2.20E-01	8.50E-02	1.40E+02	3.30E-01	4.40E-02	2.80E+00
Perfluorooctanoic acid (PFOA)	NA	NA	NA	NA	NA	1.40E+00	NA	1.20E+00	1.40E+00	4.20E+01
PETN	NA	NA	NA	NA	NA	1.00E+03	NA	4.70E+05	1.00E+04	1.20E+03
Phenanthrene	NA	NA	NA	NA	NA	1.50E+02	1.20E+01	1.90E+04	1.10E+02	6.20E+02
Phenol	NA	NA	NA	NA	NA	3.70E+02	1.80E+01	4.30E+05	6.40E+03	4.70E+02
Plutonium-238	1.30E+06	1.20E+06	4.30E+04	1.00E+05	5.90E+04	1.70E+06	8.20E+03	4.50E+05	1.90E+06	1.60E+05
Plutonium-239, 240	1.50E+06	1.40E+06	4.40E+04	1.00E+05	6.10E+04	2.80E+06	8.70E+03	5.10E+05	3.30E+06	1.70E+05
Plutonium-241	7.30E+06	7.30E+06	7.00E+06	7.20E+06	7.10E+06	3.70E+06	1.70E+05	3.60E+06	3.70E+06	3.50E+06
Pyrene	3.00E+04	1.60E+03	6.80E+02	3.30E+02	4.40E+02	3.10E+02	2.00E+01	3.10E+04	2.30E+02	1.10E+03
Radium-226	9.30E+03	7.90E+02	3.40E+02	8.20E+01	8.40E+01	3.80E+03	1.50E+01	3.70E+03	5.10E+03	1.60E+03
Radium-228	1.60E+04	1.00E+03	4.60E+02	1.10E+02	1.10E+02	4.90E+03	1.20E+01	5.60E+03	7.70E+03	1.70E+03
RDX	1.40E+03	2.20E+01	4.30E+00	4.50E+00	4.40E+00	5.10E+01	1.50E+01	2.20E+04	5.30E+01	1.20E+02
Selenium	1.40E+02	7.50E+00	1.90E+00	1.40E+00	1.60E+00	1.20E+00	4.10E+01	1.30E+02	1.00E+00	3.40E+00
Silver	6.00E+03	1.30E+02	1.00E+02	2.60E+01	4.10E+01	2.40E+02	NA	4.40E+04	1.40E+02	1.50E+03
Sodium-22	1.10E+05	1.40E+05	1.70E+05	1.60E+05	1.60E+05	9.00E+04	6.50E+04	4.00E+04	9.00E+04	8.70E+04
Strontium (stable)	NA	NA	NA	NA	NA	9.50E+02	NA	1.90E+05	1.00E+04	1.10E+03
Strontium-90 + Yittrium-90	2.00E+04	2.50E+04	3.40E+03	2.80E+04	7.90E+03	1.60E+04	1.70E+04	8.00E+03	1.70E+04	1.10E+04

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Table D.3-2. LANL Receptor-Specific Ecological Screening Levels (2022) *(continued/end)*

Analyte	American kestrel (Avian top carnivore)	American kestrel (insectivore/ carnivore)	American robin (Avian herbivore)	American robin (Avian insectivore)	American robin (Avian omnivore)	Deer mouse (Mammalian omnivore)	Earthworm (Soil-dwelling invertebrate)	Gray fox (Mammalian top carnivore)	Montane shrew (Mammalian insectivore)	Mountain cottontail (Mammalian herbivore)
Styrene	NA	NA	NA	NA	NA	NA	1.20E+01	NA	NA	NA
Tetrachlorodibenzodioxin[2,3,7,8-]	NA	NA	NA	NA	NA	3.80E-06	1.00E+01	6.80E-04	1.90E-06	2.70E-04
Tetrachloroethene	NA	NA	NA	NA	NA	1.70E+00	NA	6.30E+02	9.40E-01	4.70E+01
Tetryl	NA	NA	NA	NA	NA	7.20E+00	NA	4.60E+03	2.80E+02	8.90E+00
Thallium	1.00E+03	4.80E+02	6.90E+01	4.50E+01	5.50E+01	7.20E+00	NA	5.00E+01	4.20E+00	1.20E+01
Thorium-228	1.60E+04	1.60E+04	1.10E+04	1.30E+04	1.20E+04	8.20E+03	4.30E+02	8.30E+03	8.30E+03	7.70E+03
Thorium-229	3.10E+04	2.70E+04	8.50E+03	1.20E+04	9.50E+03	1.50E+04	4.70E+02	1.50E+04	1.50E+04	1.30E+04
Thorium-230	1.70E+06	2.20E+05	1.20E+04	2.20E+04	1.40E+04	7.80E+05	5.20E+02	6.80E+05	1.10E+06	9.40E+04
Thorium-232	5.10E+05	2.90E+04	1.50E+03	2.60E+03	1.70E+03	1.90E+05	6.20E+01	1.40E+05	5.00E+05	1.10E+04
Titanium	NA	NA	NA	NA	NA	1.50E+03	NA	8.60E+04	7.70E+02	2.80E+04
Toluene	NA	NA	NA	NA	NA	2.50E+02	NA	1.20E+05	2.30E+02	6.60E+02
Total Petroleum Hydrocarbon (Fraction 2, Fraction 3)	NA	NA	NA	NA	NA	NA	1.98E+03	NA	NA	NA
Toxaphene (Technical Grade)	5.50E+03	1.90E+02	6.90E+02	4.10E+01	7.80E+01	1.10E+02	NA	1.30E+04	5.90E+01	2.90E+03
Trichlorobenzene[1,2,4-]	NA	NA	NA	NA	NA	5.10E+00	1.20E+01	1.10E+03	2.70E+00	1.20E+02
Trichloroethane[1,1,1-]	NA	NA	NA	NA	NA	4.00E+03	NA	3.10E+06	2.60E+03	2.00E+04
Trichloroethene	NA	NA	NA	NA	NA	5.40E+02	NA	4.20E+05	4.20E+02	1.90E+03
Trichlorofluoromethane	NA	NA	NA	NA	NA	6.50E+02	NA	4.20E+05	3.50E+02	1.20E+04
Trinitrobenzene[1,3,5-]	NA	NA	NA	NA	NA	1.10E+03	2.80E+01	1.00E+05	7.20E+03	1.50E+03
Trinitrotoluene[2,4,6-]	5.70E+03	2.40E+03	1.30E+01	2.20E+02	2.60E+01	4.40E+02	5.80E+01	1.20E+05	9.10E+03	5.40E+02
Tritium	5.50E+06	6.10E+06	3.00E+06	6.00E+06	4.40E+06	3.30E+06	4.80E+05	2.20E+06	3.40E+06	2.50E+06
Uranium	2.60E+05	1.40E+05	1.50E+04	1.10E+04	1.20E+04	1.80E+03	NA	1.20E+04	1.20E+03	2.60E+03
Uranium-233	7.10E+06	6.90E+06	1.40E+05	8.20E+05	2.80E+05	2.90E+06	2.20E+04	2.30E+06	5.10E+06	1.30E+05
Uranium-234	2.60E+06	2.60E+06	1.40E+05	6.90E+05	2.70E+05	1.20E+06	2.20E+04	1.10E+06	1.50E+06	1.20E+05
Uranium-235	1.00E+05	1.00E+05	6.30E+04	9.50E+04	7.90E+04	5.20E+04	1.60E+04	5.20E+04	5.20E+04	3.80E+04
Vanadium	2.30E+02	1.10E+02	1.30E+01	9.50E+00	1.10E+01	1.00E+03	NA	6.90E+03	6.10E+02	1.50E+03
Vinyl Chloride	NA	NA	NA	NA	NA	1.30E+00	NA	1.10E+03	1.20E+00	3.40E+00
Xylene (Total)	1.30E+05	1.90E+03	8.90E+02	4.10E+02	5.60E+02	2.40E+00	NA	9.30E+02	1.80E+00	9.50E+00
Zinc	7.00E+03	5.90E+02	8.70E+02	1.20E+02	2.20E+02	1.70E+03	9.30E+02	9.40E+04	9.80E+02	1.80E+04

ESL = ecological screening level; NA = Not Available

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Attachment D-4. Uncertainty Tables

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Table D.4-1. Uncertainty Evaluation for ECODS L-3 Subunit (Soil 0-0.3 m [0-1 ft])

Analyte[1]	EPC[2]	RSV Source[3]	American Kestrel			
			Avian Top Predator		Insectivore/Carnivore	
			RSV	HQ	RSV	HQ
Inorganics (mg/kg)						
ALUMINUM	7.19E+03	NA	NA	NC	NA	NC
CADMIUM	2.07E+00	b	2.30E+03	8.98E-04	7.70E+00	2.68E-01
CYANIDE	1.22E+00	b	5.90E+00	2.07E-01	3.60E+00	3.39E-01
IRON	6.45E+03	NA	NA	NC	NA	NC
LEAD	2.14E+02	b	1.00E+03	2.14E-01	1.60E+02	1.34E+00
ZINC	1.21E+02	b	7.00E+03	1.73E-02	5.90E+02	2.06E-01
Organics (mg/kg)						
AROCLOR 1254	1.28E+00	b	7.60E+01	1.68E-02	1.90E+00	6.73E-01
BIS(2-ETHEYLHEXYL) PHTHLATE (DEHP)	2.63E+00	b	9.30E+01	2.83E-02	9.60E-01	2.74E+00

Analyte[1]	EPC[2]	RSV Source[3]	American Robin					
			Avian Herbivore		Avian Omnivore		Avian Insectivore	
			RSV	HQ	RSV	HQ	RSV	HQ
Inorganics (mg/kg)								
ALUMINUM	7.19E+03	NA	NA	NC	NA	NC	NA	NC
CADMIUM	2.07E+00	b	2.30E+01	8.98E-02	1.60E+00	1.29E+00	3.00E+00	6.89E-01
CYANIDE	1.22E+00	b	1.00E+00	1.22E+00	9.80E-01	1.24E+00	9.90E-01	1.23E+00
IRON	6.45E+03	NA	NA	NC	NA	NC	NA	NC
LEAD	2.14E+02	b	3.60E+01	5.96E+00	2.30E+01	9.32E+00	2.80E+01	7.66E+00
ZINC	1.21E+02	b	1.20E+02	1.01E+00	1.20E+02	1.01E+00	2.20E+02	5.52E-01
Organics (mg/kg)								
AROCLOR 1254	1.28E+00	b	1.10E+01	1.16E-01	4.10E-01	3.12E+00	7.90E-01	1.62E+00
BIS(2-ETHEYLHEXYL) PHTHLATE (DEHP)	2.63E+00	b	1.60E+02	1.64E-02	2.00E-01	1.32E+01	4.00E-01	6.58E+00

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Table D.4-1. Uncertainty Evaluation for ECODS L-3 Subunit (Soil 0-0.3 m [0-1 ft]) *(continued/end)*

Analyte[1]	EPC[2]	RSV Source[3]	Deer Mouse Mammalian Omnivore		Montane Shrew Mammalian Insectivore		Mountain Cottontail Mammalian Herbivore		Gray Fox Mammalian Top Carnivore	
			RSV	HQ	RSV	HQ	RSV	HQ	RSV	HQ
Inorganics (mg/kg)										
ALUMINUM	7.19E+03	b	NA	NC	NA	NC	NA	NC	NA	NC
CADMIUM	2.07E+00	b	NA	NC	3.60E+00	5.74E-01	NA	NC	NA	NC
CYANIDE	1.22E+00	b	NA	NC	3.30E+03	3.70E-04	NA	NC	NA	NC
IRON	6.45E+03	NA	NA	NC	NA	NC	NA	NC	NA	NC
LEAD	2.14E+02	b	NA	NC	1.70E+02	1.26E+00	NA	NC	NA	NC
ZINC	1.21E+02	b	NA	NC	9.80E+02	1.24E-01	NA	NC	NA	NC
Organics (mg/kg)										
AROCLOR 1254	1.28E+00	b	NA	NC	2.40E+00	5.33E-01	NA	NC	NA	NC
BIS(2-ETHEYLHEXYL) PHTHLATE (DEHP)	2.63E+00	b	NA	NC	6.00E+00	4.39E-01	NA	NC	NA	NC

Analyte[1]	EPC[2]	RSV Source[3]	Earthworm Soil-dwelling Invertebrate	
			RSV	HQ
Inorganics (mg/kg)				
ALUMINUM	1.16E+04	NA	NA	NC
CADMIUM	2.90E+00	b	NA	NC
COPPER	6.85E+02	b	NA	NC
IRON	1.73E+04	NA	NA	NC
LEAD	8.17E+01	b	NA	NC
VANADIUM	3.12E+01	b	NA	NC
ZINC	2.54E+02	b	NA	NC
Organics (mg/kg)				
1,1'-BIPHENYL	6.29E-01	NA	NA	NC
AROCLOR 1254	8.46E-01	NA	NA	NC
BIS(2-ETHYLHEXYL) PHTHALATE (DEHP)	6.00E+00	NA	NA	NC

1 – Analytes identified as COPCs from Table D-2
2 - EPC = reasonable maximum exposure (RME) exposure point concentration (EPC) is the lesser of the maximum detected concentration and the 95% upper confidence limit (UCL) on the mean concentration. RME from Appendix A Table A.1.1 ECODS L-3 Subunit Soil (0-1 ft)
3 – RSV Source
a = Table 3 in EPA Region 4 Ecological Risk Assessment Supplemental Guidance March Update (2018).
b = Los Alamos National Laboratory Low Effect ESL for soil media (2022)
Hazard Quotient (HQ) = EPC/RSV
Highlighted cells indicate analytes with a HQ greater than 1.
NA = Not available; NC = Not calculated

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Table D.4-2. Uncertainty Evaluation for ECODS L-3 Subunit (Soil 0.3-1.2 m [1-4 ft])

			American Kestrel			
			Avian Top Predator		Insectivore/Carnivore	
Analyte[1]	EPC[2]	RSV Source[3]	RSV	HQ	RSV	RSV
Inorganic (mg/kg)						
ALUMINUM	1.16E+04	NA	NA	NC	NA	NC
CADMIUM	2.90E+00	b	2.30E+03	1.26E-03	7.70E+00	3.76E-01
COPPER	6.85E+02	b	3.50E+03	1.96E-01	2.40E+02	2.86E+00
IRON	1.73E+04	NA	NA	NC	NA	NC
LEAD	8.17E+01	b	1.00E+03	8.17E-02	1.60E+02	5.11E-01
VANADIUM	3.12E+01	b	2.30E+02	1.36E-01	1.10E+02	2.84E-01
ZINC	2.54E+02	b	7.00E+03	3.63E-02	5.90E+02	4.31E-01
Organics (mg/kg)						
1,1'-BIPHENYL	6.29E-01	NA	NA	NC	NA	NC
AROCLOR 1254	8.46E-01	b	7.60E+01	1.11E-02	1.90E+00	4.45E-01
BIS(2-ETHYLHEXYL) PHTHALATE (DEHP)	6.00E+00	b	9.30E+01	6.45E-02	9.60E-01	6.25E+00

			American Robin					
			Avian Omnivore		Avian Insectivore		Avian Omnivore	
Analyte[1]	EPC[2]	RSV Source[3]	RSV	RSV	RSV	HQ	RSV	HQ
Inorganic (mg/kg)								
ALUMINUM	1.16E+04	NA	NA	NC	NA	NC	NA	NC
CADMIUM	2.90E+00	b	2.30E+01	1.26E-01	1.60E+00	1.81E+00	3.00E+00	9.66E-01
COPPER	6.85E+02	b	1.00E+02	6.85E+00	4.30E+01	1.59E+01	6.00E+01	1.14E+01
IRON	1.73E+04	NA	NA	NC	NA	NC	NA	NC
LEAD	8.17E+01	b	3.60E+01	2.27E+00	2.30E+01	3.55E+00	2.80E+01	2.92E+00
VANADIUM	3.12E+01	b	1.30E+01	2.40E+00	9.50E+00	3.29E+00	1.10E+01	2.84E+00
ZINC	2.54E+02	b	1.20E+02	2.12E+00	1.20E+02	2.12E+00	2.20E+02	1.16E+00
Organics (mg/kg)								
1,1'-BIPHENYL	6.29E-01	NA	NA	NC	NA	NC	NA	NC
AROCLOR 1254	8.46E-01	b	1.10E+01	7.69E-02	4.10E-01	2.06E+00	7.90E-01	1.07E+00
BIS(2-ETHYLHEXYL) PHTHALATE (DEHP)	6.00E+00	b	1.60E+02	3.75E-02	2.00E-01	3.00E+01	4.00E-01	1.50E+01

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Table D.4-2. Uncertainty Evaluation ECODS L-3 Subunit (Soil 0.3-1.2 m [1-4 ft])) *(continued/end)*

			Deer Mouse Mammalian Omnivore		Montane Shrew Mammalian Insectivore		Mountain Cottontail Mammalian Herbivore		Gray Fox Mammalian Top Carnivore	
Analyte[1]	**EPC[2]**	**RSV Source[3]**	**RSV**	**HQ**	**RSV**	**RSV**	**RSV**	**HQ**	**RSV**	**HQ**
Inorganic (mg/kg)										
ALUMINUM	1.16E+04		0.00E+00	NC	NA	NC	0.00E+00	NC	NA	NC
CADMIUM	2.90E+00	b	6.80E+00	4.26E-01	3.60E+00	8.05E-01	1.40E+02	2.07E-02	NA	NC
COPPER	6.85E+02	b	1.00E+02	6.85E+00	7.00E+01	9.79E+00	4.30E+02	1.59E+00	NA	NC
IRON	1.73E+04	NA	NA	NC	NA	NC	NA	NC	NA	NC
LEAD	8.17E+01	b	2.30E+02	3.55E-01	1.70E+02	4.81E-01	6.00E+02	1.36E-01	NA	NC
VANADIUM	3.12E+01	b	1.00E+03	3.12E-02	6.10E+02	5.12E-02	1.50E+03	2.08E-02	NA	NC
ZINC	2.54E+02	b	1.70E+03	1.50E-01	9.80E+02	2.60E-01	1.80E+04	1.41E-02	NA	NC
Organic (mg/kg)										
1,1'-BIPHENYL	6.29E-01	NA	NA	NC	NA	NC	NA	NC		
AROCLOR 1254	8.46E-01	b	4.80E+00	1.76E-01	2.40E+00	3.53E-01	NA	NC	NA	NC
BIS(2-ETHYLHEXYL) PHTHALATE (DEHP)	6.00E+00	b	1.10E+01	5.45E-01	6.00E+00	1.00E+00	NA	NC	NA	NC

			Earthworm Soil-dwelling Invertebrate	
Analyte[1]	**EPC[2]**	**RSV Source[3]**	**RSV**	**HQ**
Inorganics (mg/kg)				
ALUMINUM	1.16E+04	NA	NA	NC
CADMIUM	2.90E+00	b	7.60E+02	3.81E-03
COPPER	6.85E+02	b	5.30E+02	1.29E+00
IRON	1.73E+04	NA	NA	NC
LEAD	8.17E+01	b	8.40E+03	9.73E-03
VANADIUM	3.12E+01	b	NA	NC
ZINC	2.54E+02	b	9.30E+02	2.74E-01
Organics (mg/kg)				
1,1'-BIPHENYL	6.29E-01	NA	NA	NC
AROCLOR 1254	8.46E-01	NA	NA	NC
BIS(2-ETHYLHEXYL) PHTHALATE (DEHP)	6.00E+00	NA	NA	NC

1 – Analytes identified as COPCs from Table D-4
2 – EPC = reasonable maximum exposure (RME) exposure point concentration (EPC) is the lesser of the maximum detected concentration and the 95% upper confidence limit (UCL) on the mean concentration. RME from Appendix A Table A.1.2 ECODS L-3 Subunit Soil (1-4 ft)
3 – RSV Source
a = Table 3 in EPA Region 4 Ecological Risk Assessment Supplemental Guidance March Update (2018).
b = Los Alamos National Laboratory Low Effect ESL for soil media (2022
Hazard Quotient (HQ) = EPC/RSV
Highlighted cells indicate analytes with a HQ greater than 1.
NA = Not available
NC = Not calculated

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Table D.4-3. Uncertainty Evaluation for LRP 131-1L Subunit (Soil 0-0.3 m [0-1 ft])

Analyte[1]	EPC[2]	RSV Source[3]	American Kestrel			
			Avian Top Predator		Insectivore/Carnivore	
			RSV	HQ	RSV	HQ
Inorganics (mg/kg)						
ALUMINUM	2.04E+04	NA	NA	NC	NA	NC
IRON	1.10E+04	NA	NA	NC	NA	NC
VANADIUM	3.31E+01	b	2.30E+02	1.34E-01	1.10E+02	3.95E-06
Radionuclides (pCi/g)						
CURIUM-245/246	2.76E-02	NA	NA	NC	NA	NC
LEAD-214	9.13E-01	NA	NA	NC	NA	NC

Analyte[1]	EPC[2]	RSV Source[3]	American Robin					
			Avian Herbivore		Avian Omnivore		Avian Insectivore	
			RSV	HQ	RSV	HQ	RSV	HQ
Inorganics (mg/kg)								
ALUMINUM	2.04E+04	NA	NA	NC	NA	NC	NA	NC
IRON	1.10E+04	NA	NA	NC	NA	NC	NA	NC
VANADIUM	3.31E+01	b	1.30E+01	2.89E+00	9.50E+00	3.96E+00	1.10E+01	3.42E+00
Radionuclides (pCi/g)								
CURIUM-245/246	2.76E-02	NA	NA	NC	NA	NC	NA	NC
LEAD-214	9.13E-01	NA	NA	NC	NA	NC	NA	NC

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Table D.4-3. Uncertainty Evaluation for LRP 131-1L Subunit (Soil 0-0.3 m [0-1 ft]) *(continued/end)*

			Deer Mouse		Montane Shrew		Mountain Cottontail		Gray Fox	
			Mammalian Omnivore		Mammalian Insectivore		Mammalian Herbivore		Mammalian Top Carnivore	
Analyte[1]	**EPC[2]**	**RSV Source[3]**	**RSV**	**HQ**	**RSV**	**HQ**	**RSV**	**HQ**	**RSV**	**HQ**
Inorganics (mg/kg)										
ALUMINUM	2.04E+04	NA	NA	NC	NA	NC	NA	NC	NA	NC
IRON	1.10E+04	NA	NA	NC	NA	NC	NA	NC	NA	NC
VANADIUM	3.31E+01	b	1.00E+03	3.76E-02	6.10E+02	6.16E-02	1.50E+03	2.51E-02	6.90E+03	5.45E-03
Radionuclides (pCi/g)										
CURIUM-245/246	2.76E-02	NA	NA	NC	NA	NC	NA	NC	NA	NC
LEAD-214	9.13E-01	NA	NA	NC	NA	NC	NA	NC	NA	NC

			Earthworm	
			Soil-Dwelling Invertebrate	
Analyte[1]	**EPC[2]** *(mg/kg)*	**RSV Source[3]**	**RSV**	**HQ**
Inorganic (mg/kg)				
ALUMINUM	2.04E+04	NA	NA	NC
IRON	1.10E+04	NA	NA	NC
VANADIUM	3.31E+01	b	NA	NC
Radionuclides (pCi/g)				
CURIUM-245/246	2.76E-02	NA	NA	NC
LEAD-214	9.13E-01	NA	NA	NC

1 – Analytes identified as COPCs from Table D-6
2 - EPC = reasonable maximum exposure (RME) exposure point concentration (EPC) is the lesser of the maximum detected concentration and the 95% upper confidence limit (UCL) on the mean concentration. RME from Appendix A Table A.2.1 LRP 131-1L Subunit Soil (0-1 ft)
3 – RSV Source
a = Table 3 in EPA Region 4 Ecological Risk Assessment Supplemental Guidance March Update (2018).
b = Los Alamos National Laboratory Low Effect ESL for soil media (2022)
Hazard Quotient (HQ) = EPC/RSV
Highlighted cells indicate analytes with a HQ greater than 1.
NA = Not available
NC = Not calculated

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Table D.4-4. Uncertainty Evaluation for LRP 131-1L Subunit (Soil 0.3-1.2 m [1-4 ft])

Analyte[1]	EPC[2]	RSV Source[3]	American Kestrel: Avian Top Carnivore RSV	American Kestrel: Avian Top Carnivore HQ	American Kestrel: Insectivore/Carnivore RSV	American Kestrel: Insectivore/Carnivore HQ
Inorganics (mg/kg)						
ALUMINUM	1.88E+04	NA	NA	NC	NA	NC
IRON	1.13E+04	NA	NA	NC	NA	NC
VANADIUM	3.08E+01	b	2.30E+02	1.34E-01	1.10E+02	2.80E-01
Organics (pCi/g)						
FLUORANTHENE	3.00E+01	b	NA	NC	NA	NC
HEXACHLOROBUTADIENE	2.90E-01	NA	NA	NC	NA	NC
PHENANTHRENE	2.40E+01	b	NA	NC	NA	NC
Radionuclides (pCi/g)						
LEAD-214	7.03E-01	NA	NA	NC	NA	NC

Analyte[1]	EPC[2]	RSV Source[3]	American Robin: Avian Herbivore RSV	American Robin: Avian Herbivore HQ	American Robin: Avian Omnivore RSV	American Robin: Avian Omnivore HQ	American Robin: Avian Insectivore RSV	American Robin: Avian Insectivore HQ
Inorganics (mg/kg)								
ALUMINUM	1.88E+04	NA	NA	NC	NA	NC	NA	NC
IRON	1.13E+04	NA	NA	NC	NA	NC	NA	NC
VANADIUM	3.08E+01	b	1.30E+01	2.37E+00	9.50E+00	3.24E+00	1.10E+01	2.80E+00
Organics (pCi/g)								
FLUORANTHENE	3.00E+01	b	NA	NC	NA	NC	NA	NC
HEXACHLOROBUTADIENE	2.90E-01	NA	NA	NC	NA	NC	NA	NC
PHENANTHRENE	2.40E+01	b	NA	NC	NA	NC	NA	NC
Radionuclides (pCi/g)								
LEAD-214	7.03E-01	NA	NA	NC	NA	NC	NA	NC

Table D.4-4. Uncertainty Evaluation for LRP 131-1L Subunit (Soil 0.3-1.2 m [1-4 ft]) *(continued/end)*

Analyte[1]	EPC[2]	RSV Source[3]	Deer Mouse Mammalian Omnivore		Montane Shrew Mammalian Insectivore		Mountain Cottontail Mammalian Herbivore		Grey Fox Mammalian Top Carnivore	
			RSV	HQ	RSV	HQ	RSV	HQ	RSV	HQ
Inorganic (mg/kg)										
ALUMINUM	1.88E+04	NA	NA	NC	NA	NC	NA	NC	NA	NC
IRON	1.13E+04	NA	NA	NC	NA	NC	NA	NC	NA	NC
VANADIUM	3.08E+01	b	1.00E+03	3.08E-02	6.10E+02	5.04E-02	1.50E+03	2.05E-02	6.90E+03	4.46E-03
Organics (mg/kg)										
FLUORANTHENE	3.00E+01	b	3.80E+02	7.89E-02	2.20E+02	1.36E-01	2.70E+03	1.11E-01	3.90E+04	7.69E-04
HEXACHLOROBUTADIENE	2.90E-01	NA	NA	NC	NA	NC	NA	NC	NA	NC
PHENANTHRENE	2.40E+01	b	1.50E+02	1.60E-01	1.10E+02	2.18E-01	6.20E+02	3.87E-02	1.90E+04	1.26E-03
Radionuclides (pCi/g)										
LEAD-214	7.03E-01	NA	NA	NC	NA	NC	NA	NC	NA	NC

Analyte[1]	EPC[2]	RSV Source[3]	Earthworm Soil-dwelling Invertebrate	
			RSV	HQ
Inorganics (mg/kg)				
ALUMINUM	1.88E+04	NA	NA	NC
IRON	1.13E+04	NA	NA	NC
VANADIUM	3.08E+01	b	NA	NC
Organics (mg/kg)				
FLUORANTHENE	3.00E+01	b	2.30E+01	1.3E+00
HEXACHLOROBUTADIENE	2.90E-01	NA	NA	NC
PHENANTHRENE	2.40E+01	b	1.20E+01	2.00E+00
Radionuclides (pCi/g)				
LEAD-214	7.03E-01	NA	NA	NC

1 - Analytes identified as COPCs from Table D-8
2 - EPC = reasonable maximum exposure (RME) exposure point concentration (EPC) is the lesser of the maximum detected concentration and the 95% upper confidence limit (UCL) on the mean concentration. RME from Appendix A Table A.1.2 LRP 131-1L Subunit Soil (1-4 ft)
3 – RSV Source
a = Table 3 in EPA Region 4 Ecological Risk Assessment Supplemental Guidance March Update (2018).
b = Los Alamos National Laboratory Low Effect ESL for soil media (2022)
Hazard Quotient (HQ) = EPC/RSV
Highlighted cells indicate analytes with a HQ greater than 1.
NA = Not Available
NC = Not Calculated

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Table D.4-5. Uncertainty Evaluation for LRP 131-4L Subunit (Soil 0-0.3 m [0-1 ft])

			American Kestrel			
		RSV	Avian Top Carnivore		Insectivore/Carnivore	
Analyte[1]	EPC[2]	Source[3]	RSV	HQ	RSV	HQ
Inorganics (mg/kg)						
ALUMINUM	1.31E+04	NA	NA	NC	NA	NC
CYANIDE	1.63E+00	b	5.9E+00	2.77E-01	3.60E+00	4.53E-01
IRON	9.84E+03	NA	NA	NC	NA	NC
VANADIUM	2.65E+01	b	2.30E+02	1.15E-01	1.10E+02	2.41E-01
Organics (mg/kg)						
2-NITROPHENOL	3.00E-02	NA	NA	NC	NA	NC
METYL ACETATE	2.64E-03	NA	NA	NC	NA	NC
N-NITROSODIPROPYLAMINE	4.50E-01	NA	NA	NC	NA	NC
Radionuclides (pCi/g)						
ACTINIUM-228	4.18E+00	NA	NA	NC	NA	NC
LEAD 212	2.74E+00	NA	NA	NC	NA	NC
LEAD-214	1.61E+00	NA	NA	NC	NA	NC
POTASSIUM-40	5.64E+00	NA	NA	NC	NA	NC

			American Robin					
		RSV	Avian Herbivore		Avian Insectivore		Avian Omnivore	
Analyte[1]	EPC[2]	Source[3]	RSV	HQ	RSV	HQ	RSV	HQ
Inorganics (mg/kg)								
ALUMINUM	1.31E+04	NA	NA	NC	NA	NC	NA	NC
CYANIDE	1.63E+00	b	1.00E+00	1.63E+00	9.80E-01	1.67E+00	9.90E-01	1.65E+00
IRON	9.84E+03	NA	NA	NC	NA	NC	NA	NC
VANADIUM	2.65E+01	b	1.30E+01	2.04E+00	9.50E+00	2.79E+00	1.10E+01	2.41E+00
Organics (mg/kg)								
2-NITROPHENOL	3.00E-02	NA	NA	NC	NA	NC	NA	NC
METYL ACETATE	2.64E-03	NA	NA	NC	NA	NC	NA	NC
N-NITROSODIPROPYLAMINE	4.50E-01	NA	NA	NC	NA	NC	NA	NC
Radionuclides (pCi/g)								
ACTINIUM-228	4.18E+00	NA	NA	NC	NA	NC	NA	NC
LEAD 212	2.74E+00	NA	NA	NC	NA	NC	NA	NC
LEAD-214	1.61E+00	NA	NA	NC	NA	NC	NA	NC
POTASSIUM-40	5.64E+00	NA	NA	NC	NA	NC	NA	NC

Table D.4-5. Uncertainty Evaluation for LRP 131-4L Subunit (Soil 0-0.3 m [0-1 ft]) *(continued/end)*

Analyte[1]	EPC[2]	RSV Source[3]	Deer Mouse Avian Herbivore		Montane Shrew Avian Omnivore		Mountain Cottontail Avian Omnivore		Grey Fox Mammalian Top Carnivore	
			RSV	HQ	RSV	HQ	RSV	HQ	RSV	HQ
Inorganics (mg/kg)										
ALUMINUM	1.31E+04	NA	NA	NC	NA	NC	NA	NC	NA	NC
CYANIDE	1.63E+00	b	3.30E+03	4.95E-04	3.30E+03	4.95E-04	7.90E+03	2.07E-04	3.30E+04	4.95E-05
IRON	9.84E+03	NA	NA	NC	NA	NC	NA	NC	NA	NC
VANADIUM	2.65E+01	b	1.00E+03	2.65E-02	6.10E+02	4.34E-02	1.50E+03	1.77E-02	6.90E+03	3.84E-03
Organics (mg/kg)										
2-NITROPHENOL	3.00E-02	NA	NA	NC	NA	NC	NA	NC	NA	NC
METYL ACETATE	2.64E-03	NA	NA	NC	NA	NC	NA	NC	NA	NC
N-NITROSODIPROPYLAMINE	4.50E-01	NA	NA	NC	NA	NC	NA	NC	NA	NC
Radionuclides (pCi/g)										
ACTINIUM-228	4.18E+00	NA	NA	NC	NA	NC	NA	NC	NA	NC
LEAD 212	2.74E+00	NA	NA	NC	NA	NC	NA	NC	NA	NC
LEAD-214	1.61E+00	NA	NA	NC	NA	NC	NA	NC	NA	NC
POTASSIUM-40	5.64E+00	NA	NA	NC	NA	NC	NA	NC	NA	NC

Analyte[1]	EPC[2]	RSV Source[3]	Earthworm Soil-Dwelling Invertebrates	
			RSV	HQ
Inorganics (mg/kg)				
ALUMINUM	1.31E+04	NA	NA	NC
CYANIDE	1.63E+00	b	3.30E+03	4.95E-04
IRON	9.84E+03	NA	NA	NC
VANADIUM	2.65E+01	b	1.00E+03	2.65E-02
Organics (mg/kg)				
2-NITROPHENOL	3.00E-02	NA	NA	NC
METYL ACETATE	2.64E-03	NA	NA	NC
N-NITROSODIPROPYLAMINE	4.50E-01	NA	NA	NC
Radionuclides (pCi/g)				
ACTINIUM-228	4.18E+00	NA	NA	NC
LEAD 212	2.74E+00	NA	NA	NC
LEAD-214	1.61E+00	NA	NA	NC
POTASSIUM-40	5.64E+00	NA	NA	NC

1 - Analytes identified as COPCs from Table D-10
2 - EPC = reasonable maximum exposure (RME) exposure point concentration (EPC) is the lesser of the maximum detected concentration and the 95% upper confidence limit (UCL) on the mean concentration. RME from Appendix A Table A.3.1 LRP 131-4L Subunit Soil (0-1 ft)
3 – RSV Source
a = Table 3 in EPA Region 4 Ecological Risk Assessment Supplemental Guidance March Update (2018).
b = Los Alamos National Laboratory Low Effect ESL for soil media (2022)
Hazard Quotient (HQ) = EPC/RSV
Highlighted cells indicate analytes with a HQ greater than 1.
NA = Not available; NC = Not calculated

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Table D.4-6. Uncertainty Evaluation for LRP 131-4L Subunit (Soil 0.3-1.2 m [1-4 ft])

			American Kestrel			
			Avian Top Carnivore		Insectivore/Carnivore	
Analyte[1]	EPC[2]	RSV Source[3]	RSV	HQ	RSV	HQ
Inorganics (mg/kg)						
ALUMINUM	1.43E+04	NA	NA	NC	NA	NC
CYANIDE	1.10E+00	b	5.90E+00	1.87E-01	3.60E+00	3.06E-01
IRON	1.13E+04	NA	NA	NC	NA	NC
VANADIUM	2.86E+01	b	2.30E+02	1.24E-01	1.10E+02	2.60E-01
Organics (mg/kg)						
CYCLOHEXANE	5.00E-04	NA	NA	NC	NA	NC
METYL ACETATE	2.75E-03	NA	NA	NC	NA	NC
METHYLCYCLOHEXANE	3.87E-04	NA	NA	NC	NA	NC
Radionuclides (pCi/g)						
ACTINIUM-228	3.43E+00	NA	NA	NC	NA	NC
AMERICIUM-243	4.95E-02	NA	NA	NC	NA	NC
LEAD-212	2.21E+00	NA	NA	NC	NA	NC
LEAD-214	1.97E+00	NA	NA	NC	NA	NC

			American Robin					
			Avian Herbivore		Avian Omnivore		Avian Omnivore	
Analyte[1]	EPC[2]	RSV Source[3]	RSV	HQ	RSV	HQ	RSV	HQ
Inorganics (mg/kg)								
ALUMINUM	7.19E+03	NA	NA	NC	NA	NC	NA	NC
CYANIDE	1.22E+00	b	1.00E+00	1.10E+00	9.80E-01	1.13E+00	9.90E-01	1.11E+00
IRON	6.45E+03	NA	NA	NC	NA	NC	NA	NC
VANADIUM	2.14E+02	b	1.30E+01	2.20E+00	9.50E+00	3.01E+00	1.10E+01	2.60E+00
Organics (mg/kg)								
CYCLOHEXANE	5.00E-04	NA	NA	NC	NA	NC	NA	NC
METYL ACETATE	2.75E-03	NA	NA	NC	NA	NC	NA	NC
METHYLCYCLOHEXANE	3.87E-04	NA	NA	NC	NA	NC	NA	NC
Radionuclides (pCi/g)								
ACTINIUM-228	3.43E+00	NA	NA	NC	NA	NC	NA	NC
AMERICIUM-243	4.95E-02	NA	NA	NC	NA	NC	NA	NC
LEAD-212	2.21E+00	NA	NA	NC	NA	NC	NA	NC
LEAD-214	1.97E+00	NA	NA	NC	NA	NC	NA	NC

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Table D.4-6. Uncertainty Evaluation for LRP 131-4L Subunit (Soil 0.3-1.2 m [1-4 ft])

Analyte[1]	EPC[2]	RSV Source[3]	Deer Mouse Mammalian Omnivore RSV	Deer Mouse Mammalian Omnivore HQ	Montane Shrew Mammalian Insectivore RSV	Montane Shrew Mammalian Insectivore HQ	Mountain Cottontail Mammalian Herbivore RSV	Mountain Cottontail Mammalian Herbivore HQ	Gray Fox Mammalian Top Carnivore RSV	Gray Fox Mammalian Top Carnivore HQ
Inorganics (mg/kg)										
ALUMINUM	7.19E+03	NA	NA	NC	NA	NC	NA	NC	NA	NC
CYANIDE	1.22E+00	b	3.30E+03	3.34E-04	3.30E+03	3.34E-04	7.90E+03	1.40E-04	3.30E+04	3.34E-05
IRON	6.45E+03	NA	NA	NC	NA	NC	NA	NC	NA	NC
VANADIUM	2.14E+02	b	1.00E+03	2.86E-02	6.10E+02	4.68E-02	1.50E+03	1.90E-02	6.90E+03	4.14E-03
Organics (mg/kg)										
CYCLOHEXANE	5.00E-04	NA	NA	NC	NA	NC	NA	NC	NA	NC
METYL ACETATE	2.75E-03	NA	NA	NC	NA	NC	NA	NC	NA	NC
METHYLCYCLOHEXANE	3.87E-04	NA	NA	NC	NA	NC	NA	NC	NA	NC
Radionuclides (pCi/g)										
ACTINIUM-228	3.43E+00	NA	NA	NC	NA	NC	NA	NC	NA	NC
AMERICIUM-243	4.95E-02	NA	NA	NC	NA	NC	NA	NC	NA	NC
LEAD-212	2.21E+00	NA	NA	NC	NA	NC	NA	NC	NA	NC
LEAD-214	1.97E+00	NA	NA	NC	NA	NC	NA	NC	NA	NC

Analyte[1]	EPC[2]	RSV Source[3]	Earthworm Soil-Dwelling Invertebrate RSV	Earthworm Soil-Dwelling Invertebrate HQ
Inorganics (mg/kg)				
ALUMINUM	1.43E+04	NA	NA	NC
CYANIDE	1.10E+00	b	NA	NC
IRON	1.13E+04	NA	NA	NC
VANADIUM	2.86E+01	b	NA	NC
Organics (mg/kg)				
CYCLOHEXANE	5.00E-04	NA	NA	NC
METYL ACETATE	2.75E-03	NA	NA	NC
METHYLCYCLOHEXANE	3.87E-04	NA	NA	NC
Radionuclides (pCi/g)				
ACTINIUM-228	3.43E+00	NA	NA	NC
AMERICIUM-243	4.95E-02	NA	NA	NC
LEAD-212	2.21E+00	NA	NA	NC
LEAD-214	1.97E+00	NA	NA	NC

1 - Analytes identified as COPCs from Table D-12
2 - EPC = reasonable maximum exposure (RME) exposure point concentration (EPC) is the lesser of the maximum detected concentration and the 95% upper confidence limit (UCL) on the mean concentration. RME from Appendix A Table A.3.2 LRP 131-4L Subunit Soil (1-4 ft)
3 – RSV Source
a = Table 3 in EPA Region 4 Ecological Risk Assessment Supplemental Guidance March Update (2018).
b = Los Alamos National Laboratory Low Effect ESL for soil media (2022)
Hazard Quotient (HQ) = EPC/RSV
Highlighted cells indicate analytes with a HQ greater than 1.
NA = Not available
NC = Not calculated

Attachment D-5. RESRAD Biota Values

Argonne National Laboratory (2006) RESRAD BIOTA (v.1.8) [software]

(www.ead.anl.gov/resrad website accessed December 1, 2023)

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Table D.5-1. Soil RESRAD Values

Radionuclide	Tier 3 Terrestrial Animal Soil BCG (pCi/g)
Actinium-228	---
Americium-243	---
Barium-133	---
Bismuth-212	---
Bismuth-214	---
Californium-244	---
Carbon-14	4,760
Cobalt-58	1,790
Curium-244	4,060
Curium-245 and Curium-246	---
Europium-155	15,800
Lead-212	---
Lead-214	---
Manganese-54	---
Neptunium-239	---
Potassium-40	119
Promethium-146	---
Radium-224	---
Ruthenium-106	---
Thallium-208	---
Thorium-231	---
Thorium-234	2,160
Tin-113	---
Zinc-65	413
Zirconium-95	1,170

BCG: **Biota Concentration Guides**

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Attachment D-6. ECODS L-3, LRP 131-1L, and LRP 131-4L OU Area Use Factors

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Table D-6.1. Area Use Factors for the ECODS L-3, LRP 131-1L, and LRP 131-4L OU

Receptor	AUF (ha)[1]	AUF (acre)	PAUF (ha)[2]	PAUF (acre)	ECODS L-3 Specific AUF[3]	ECODS L-3 Specific PAUF[4]	LRP 131-1L Specific AUF[3]	LRP 131-1L Specific PAUF[4]	LRP 131-4L Specific AUF[3]	LRP 131-4L Specific PAUF[4]
Earthworm	NA	NA	NA	NA	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00
American kestrel	1.06E+02	2.62E+02	4.24E+03	1.05E+04	1.26E-03	3.16E-05	5.25E-04	1.31E-05	1.05E-03	2.63E-05
American robin	4.20E-01	1.04E+00	1.68E+01	4.15E+01	3.19E-01	7.98E-03	1.33E-01	3.32E-03	2.65E-01	6.64E-03
Deer Mouse	7.70E-02	1.90E-01	3.00E+00	7.41E+00	1.74E+00	4.47E-02	7.23E-01	1.86E-02	1.45E+00	3.72E-02
Montane shrew	3.90E-01	9.64E-01	1.56E+01	3.85E+01	3.44E-01	8.59E-03	1.43E-01	3.57E-03	2.86E-01	7.15E-03
Mountain cottontail	3.10E+00	7.66E+00	1.24E+02	3.06E+02	4.32E-02	1.08E-03	1.80E-02	4.49E-04	3.60E-02	8.99E-04
Gray fox	1.04E+03	2.56E+03	4.15E+04	1.03E+05	1.29E-04	3.23E-06	5.37E-05	1.34E-06	1.07E-04	2.69E-06

1 – Home range taken from Table 3.3-1 of LANL 2015 Screening Level Ecological Risk Assessment Methods, Revision 4
2 – Population area taken from Table 3.3-1 of LANL 2015 Screening Level Ecological Risk Assessment Methods, Revision 4
3 – Unit-specific Area Use Factor (AUF) = Site size (acres) / AUF (acres)
4 – Unit-specific Population Area Use Factor (PAUF) = Site size (ha) / PAUF (ha)
NA = Not available

Unit Size	Ha	Acre
ECODS L-3	1.34E-01	3.31E-01
LRP 131-1L	5.57E-02	1.38E-01
LRP 131-4L	1.11E-01	2.75E-01

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Attachment D-7. PAUF Adjusted Hazard Quotients

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Table D.7-1. PAUF-Adjusted HQs for ECODS L-3 Subunit (Soil 0 to 0.3 m [0 to 1 ft])

Analyte[1]	Mean Concentration[2]	RSV Source[3]	American Kestrel Top Avian Predator		American Kestrel Insectivore/Carnivore	
			RSV[4]	HQ[5]	RSV[4]	HQ[5]
Inorganics (mg/kg)						
ALUMINUM	5.98E+03	NA	NA	NC	NA	NC
CADMIUM	6.37E-01	b	2.30E+03	8.75E-09	7.70E+00	2.61E-06
CYANIDE	1.85E-01	b	5.90E+00	9.88E-07	3.60E+00	1.62E-06
IRON	5.26E+03	NA	NA	NC	NA	NC
LEAD	9.00E+01	b	1.00E+03	2.84E-06	1.60E+02	1.78E-05
ZINC	6.15E+01	b	7.00E+03	2.77E-07	5.90E+02	3.29E-06
Organics (mg/kg)						
AROCLOR 1254	6.17E-01	b	7.60E+01	2.57E-07	1.90E+00	1.03E-05
BIS(2-ETHEYLHEXYL)PHTHLATE (DEHP)	1.06E+00	b	9.30E+01	3.59E-07	9.60E-01	3.48E-05

Analyte[1]	Mean Concentration[2]	RSV Source[3]	American Robin (Avian Herbivore)		American Robin (Avian Omnivore)		American Robin (Avian Insectivore)	
			RSV[4]	HQ[5]	RSV[4]	HQ[5]	RSV[4]	HQ[5]
Inorganics (mg/kg)								
ALUMINUM	5.98E+03	NA	NA	NC	NA	NC	NA	NC
CADMIUM	6.37E-01	b	2.30E+01	2.21E-04	1.60E+00	3.18E-03	3.00E+00	1.69E-03
CYANIDE	1.85E-01	b	1.00E+00	1.47E-03	9.80E-01	1.50E-03	9.90E-01	1.49E-03
IRON	5.26E+03	NA	NA	NC	NA	NC	NA	NC
LEAD	9.00E+01	b	3.60E+01	1.99E-02	2.30E+01	3.12E-02	2.80E+01	2.56E-02
ZINC	6.15E+01	b	1.20E+02	4.08E-03	1.20E+02	4.08E-03	2.20E+02	2.23E-03
Organics (mg/kg)								
AROCLOR 1254	6.17E-01	b	1.10E+01	4.47E-04	4.10E-01	1.20E-02	7.90E-01	6.23E-03
BIS(2-ETHEYLHEXYL)PHTHLATE (DEHP)	1.06E+00	b	1.60E+02	5.27E-05	2.00E-01	4.22E-02	4.00E-01	2.11E-02

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Table D.7-1. PAUF-Adjusted HQs for ECODS L-3 Subunit (Soil 0 to 0.3 m [0 to 1 ft]) *(continued/end)*

Analyte[1]	Mean Concentration[2]	RSV Source[3]	Deer Mouse Mammalian Omnivore RSV	Deer Mouse Mammalian Omnivore HQ	Montane Shrew Mammalian Insectivore RSV	Montane Shrew Mammalian Insectivore HQ	Mountain Cottontail Mammalian Herbivore RSV	Mountain Cottontail Mammalian Herbivore HQ	Gray Fox Mammalian Top Carnivore RSV	Gray Fox Mammalian Top Carnivore HQ
Inorganics (mg/kg)										
ALUMINUM	5.98E+03	NA	NA	NC	NA	NC	NA	NC	NA	NC
CADMIUM	6.37E-01	b	6.80E+00	4.18E-03	3.60E+00	1.52E-03	1.40E+02	4.92E-06	7.40E+03	2.78E-10
CYANIDE	1.85E-01	b	3.30E+03	2.50E-06	3.30E+03	4.80E-07	7.90E+03	2.52E-08	3.30E+04	1.80E-11
IRON	5.26E+03	NA	NC	NC	NA	NC	NC	NC	NC	NC
LEAD	9.00E+01	b	2.30E+02	1.75E-02	1.70E+02	4.55E-03	6.00E+02	1.62E-04	7.00E+03	4.15E-08
ZINC	6.15E+01	b	1.70E+03	1.61E-03	9.80E+02	5.39E-04	1.80E+04	3.69E-06	9.40E+04	2.11E-09
Organics (mg/kg)										
AROCLOR 1254	6.17E-01	b	4.80E+00	5.74E-03	2.40E+00	2.21E-03	2.40E+02	2.78E-06	7.20E+01	2.77E-08
BIS(2-ETHEYLHEXYL) PHTHLATE (DEHP)	1.06E+00	b	1.10E+01	4.29E-03	6.00E+00	1.51E-03	1.90E+04	6.01E-08	5.00E+03	6.82E-10

Analyte[1]	Mean Concentration[2]	RSV Source[3]	Earthworm Soil-Dwelling Invertebrate RSV[4]	Earthworm Soil-Dwelling Invertebrate HQ[5]
Inorganics (mg/kg)				
ALUMINUM	5.98E+03	NA	NA	NC
CADMIUM	6.37E-01	b	7.60E+02	8.38E-04
CYANIDE	1.85E-01	b	NA	NC
IRON	5.26E+03	NA	NC	NC
LEAD	9.00E+01	b	8.40E+03	1.07E-02
ZINC	6.15E+01	b	9.30E+02	6.61E-02
Organics (mg/kg)				
AROCLOR 1254	6.17E-01	b	NA	NC
BIS(2-ETHEYLHEXYL) PHTHLATE (DEHP)	1.06E+00	b	NA	NC

1 – COPCs identified in Table D-2 with receptor-specific RSVs available.
2 – Mean concentration from Appendix A Table A.2.1 ECODS L-3 Subunit Soil (0 to 0.3 m [0 to 1 ft]).
3 – RSV Source
a = Table 3 in EPA Region 4 Ecological Risk Assessment Supplemental Guidance March Update (2018).
b = Los Alamos National Laboratory Low Effect ESL for soil media (2022).
4 – Species-specific RSV for receptor from Attachment D-6, Table D-6.1.
5 – PAUF-adjusted value: Hazard Quotient (HQ) = (Mean/RSV) x PAUF); PAUF = Size of Unit in ha/Population Size in ha.
NA = Not available
NC = Not calculated

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Table D.7-2. PAUF-Adjusted HQs for ECODS L-3 Subunit (Soil 0.3 to 1.2 m [1 to 4 ft])

Analyte[1]	Mean Concentration [2]	RSV Source[3]	American Kestrel			
			Avian Top Predator		Insectivore/Carnivore	
			RSV[4]	HQ[5]	RSV[4]	HQ[5]
Inorganics (mg/kg)						
ALUMINUM	9.40E+03	NA	NA	NC	NA	NC
CADMIUM	1.51E+00	b	2.30E+03	2.07E-08	7.70E+00	6.18E-06
COPPER	3.02E+02	b	3.50E+03	2.73E-06	2.40E+02	3.98E-05
IRON	1.36E+04	NA	NA	NC	NA	NC
LEAD	4.29E+01	b	1.00E+03	1.35E-06	1.60E+02	8.46E-06
VANADIUM	2.41E+01	b	2.30E+02	3.31E-06	1.10E+02	6.93E-06
ZINC	1.39E+02	b	7.00E+03	6.27E-07	5.90E+02	7.44E-06
Organics (mg/kg)						
1,1'-BIPHENYL	5.52E-02	b	NA	NC	NA	NC
AROCLOR 1254	2.40E-01	B	7.60E+01	9.98E-08	1.90E+00	3.99E-06
BIS(2-ETHYLHEXYL) PHTHALATE (DEHP)	2.40E+00	b	9.30E+01	8.16E-07	9.60E-01	7.90E-05

Analyte[1]	Mean Concentration [2]	RSV Source[3]	American Robin					
			Avian Herbivore		Avian Insectivore		Avian Omnivore	
			RSV[4]	HQ[5]	RSV[4]	HQ[5]	RSV[4]	HQ[5]
Inorganics (mg/kg)								
ALUMINUM	9.40E+03	NA	NA	NC	NA	NC	NA	NC
CADMIUM	1.51E+00	b	2.30E+01	5.22E-04	1.60E+00	7.50E-03	3.00E+00	4.00E-03
COPPER	3.02E+02	b	1.00E+02	2.41E-02	4.30E+01	5.61E-02	6.00E+01	4.02E-02
IRON	1.36E+04	NA	NA	NC	NA	NC	NA	NC
LEAD	4.29E+01	b	3.60E+01	9.49E-03	2.30E+01	1.49E-02	2.80E+01	1.22E-02
VANADIUM	2.41E+01	b	1.30E+01	1.48E-02	9.50E+00	2.03E-02	1.10E+01	1.75E-02
ZINC	1.39E+02	b	1.20E+02	9.23E-03	1.20E+02	9.23E-03	2.20E+02	5.04E-03
Organics (mg/kg)								
1,1'-BIPHENYL	5.52E-02	b	NA	NC	NA	NC	NA	NC
AROCLOR 1254	2.40E-01	b	1.10E+01	1.74E-04	4.10E-01	4.67E-03	7.90E-01	2.42E-03
BIS(2-ETHYLHEXYL) PHTHALATE (DEHP)	2.40E+00	b	1.60E+02	1.20E-04	2.00E-01	9.58E-02	4.00E-01	4.79E-02

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Table D.7-2. PAUF-Adjusted HQs for ECODS L-3 Subunit (Soil 0.3 to 1.2 m [1 to 4 ft]) *(continued/end)*

Analyte[1]	Mean Concentration[2]	RSV Source[3]	Deer Mouse Mammalian Omnivore		Montane Shrew Mammalian Insectivore		Mountain Cottontail Mammalian Herbivore		Grey Fox Mammalian Top Predator	
			RSV[4]	HQ[5]	RSV[4]	HQ[5]	RSV[4]	HQ[5]	RSV[4]	HQ[5]
Inorganics (mg/kg)										
ALUMINUM	9.40E+03	NA	NA	NC	NA	NC	NA	NC	NA	NC
CADMIUM	1.51E+00	b	6.80E+00	9.89E-03	3.60E+00	3.59E-03	1.40E+02	1.16E-05	7.40E+03	6.56E-10
COPPER	3.02E+02	b	1.00E+02	1.35E-01	7.00E+01	3.71E-02	4.30E+02	7.60E-04	6.70E+03	1.46E-07
IRON	1.36E+04	NA	NA	NC	NA	NC	NA	NC	NA	NC
LEAD	4.29E+01	b	2.30E+02	8.32E-03	1.70E+02	2.17E-03	6.00E+02	7.72E-05	7.00E+03	1.98E-08
VANADIUM	2.41E+01	b	1.00E+03	1.08E-03	6.10E+02	3.40E-04	1.50E+03	1.74E-05	6.90E+03	1.13E-08
ZINC	1.39E+02	b	1.70E+03	3.65E-03	9.80E+02	1.22E-03	1.80E+04	8.34E-06	9.40E+04	4.77E-09
Organics (mg/kg)										
1,1'-BIPHENYL	5.52E-02	b	NA	NC	NA	NC	NA	NC	NA	NC
AROCLOR 1254	2.40E-01	b	4.80E+00	2.23E-03	2.40E+00	8.59E-04	2.40E+02	1.08E-06	7.20E+01	1.08E-08
BIS(2-ETHYLHEXYL) PHTHALATE (DEHP)	2.40E+00	b	1.10E+01	9.75E-03	6.00E+00	3.44E-03	1.90E+04	1.37E-07	5.00E+03	1.55E-09

Analyte[1]	Mean Concentration[2]	RSV Source[3]	Earthworm Soil-dwelling Invertebrate	
			RSV[4]	HQ[5]
Inorganic (mg/kg)				
ALUMINUM	9.40E+03	NA	NA	NC
CADMIUM	1.51E+00	b	7.60E+02	1.98E-03
COPPER	3.02E+02	b	5.30E+02	5.70E-01
IRON	1.36E+04	NA	NA	NC
LEAD	4.29E+01	b	8.40E+03	5.10E-03
VANADIUM	2.41E+01	b	NA	NC
ZINC	1.39E+02	b	9.30E+02	1.49E-01
Organic (mg/kg)				
1,1'-BIPHENYL	5.52E-02	b	NA	NC
AROCLOR 1254	2.40E-01	b	NA	NC
BIS(2-ETHYLHEXYL) PHTHALATE (DEHP)	2.40E+00	b	NA	NC

1 – COPCs identified in Table D-4 with receptor-specific RSVs available.
2 – Mean concentration from Appendix A Table A.2.2 ECODS L-3 Subunit Soil (0.3 to 1.2 m [1 to 4 ft]).
3 – RSV Source
a = Table 3 in EPA Region 4 Ecological Risk Assessment Supplemental Guidance March Update (2018).
b = Los Alamos National Laboratory Low Effect ESL for soil media (2022).
4 – Species-specific RSV for receptor from Attachment D-6, Table D-6.1.
5 – PAUF-adjusted value: Hazard Quotient (HQ) = (Mean/RSV) x PAUF); PAUF = Size of Unit in ha/Population Size in ha.
NA = Not available; NC = Not calculated

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Table D.7-3. PAUF-Adjusted HQs for LRP 131-1L Subunit (Soil 0 to 0.3 m [0 to 1 ft])

Analyte[1]	Maximum Concentration[2]	RSV Source[3]	American Kestrel			
			Avian Top Carnivore		Insectivore/Carnivore	
			RSV[4]	HQ[5]	RSV[4]	HQ[5]
Inorganics (mg/kg)						
ALUMINUM	2.04E+04	NA	NA	NC	NA	NC
IRON	1.10E+04	NA	NA	NC	NA	NC
VANADIUM	3.31E+01	b	2.30E+02	1.89E-06	1.10E+02	3.95E-06
Radionuclides (pCi/g)						
CURIUM-245/246	2.76E-02	NA	NA	NC	NA	NC
LEAD-214	9.13E-01	NA	NA	NC	NA	NC

Analyte[1]	Maximum Concentration[2]	RSV Source[3]	American Robin		American Robin		American Robin	
			Avian Herbivore		Avian Omnivore		Avian Insectivore	
			RSV[4]	HQ[5]	RSV[4]	HQ[5]	RSV[4]	HQ[5]
Inorganics (mg/kg)								
ALUMINUM	2.04E+04	NA	NA	NC	NA	NC	NA	NC
IRON	1.10E+04	NA	NA	NC	NA	NC	NA	NC
VANADIUM	3.31E+01	b	1.30E+01	8.44E-03	9.50E+00	1.16E-02	1.10E+01	9.98E-03
Radionuclides (pCi/g)								
CURIUM-245/246	2.76E-02	NA	NA	NC	NA	NC	NA	NC
LEAD-214	9.13E-01	NA	NA	NC	NA	NC	NA	NC

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Table D.7-3. PAUF-Adjusted HQs for LRP 131-1L Subunit (Soil 0 to 0.3 m [0 to 1 ft]) *(continued/end)*

Analyte[1]	Maximum Concentration[2]	RSV Source[3]	Deer Mouse Mammalian Omnivore RSV[4]	Deer Mouse Mammalian Omnivore HQ[5]	Montane Shrew Mammalian Insectivore RSV[4]	Montane Shrew Mammalian Insectivore HQ[5]	Mountain Cottontail Mammalian Herbivore RSV[4]	Mountain Cottontail Mammalian Herbivore HQ[5]	Gray Fox Mammalian Top Carnivore RSV[4]	Gray Fox Mammalian Top Carnivore HQ[5]
Inorganic (mg/kg)										
ALUMINUM	2.04E+04	NA	NA	NC	NA	NC	NA	NC	NA	NC
IRON	1.10E+04	NA	NA	NC	NA	NC	NA	NC	NA	NC
VANADIUM	3.31E+01	b	1.00E+03	6.14E-04	6.10E+02	1.94E-04	1.50E+03	9.91E-06	6.90E+03	6.43E-09
Radionuclides (pCi/g)										
CURIUM-245/246	2.76E-02	NA	NA	NC	NA	NC	NA	NC	NA	NC
LEAD-214	9.13E-01	NA	NA	NC	NA	NC	NA	NC	NA	NC

Analyte[1]	Maximum Concentration[2]	RSV Source[3]	Earthworm Soil-Dwelling Invertebrate RSV[4]	Earthworm Soil-Dwelling Invertebrate HQ[5]
Inorganics (mg/kg)				
ALUMINUM	2.04E+04	NA	NA	NC
IRON	1.10E+04	NA	NA	NC
VANADIUM	3.31E+01	b	NA	NC
Radionuclides (pCi/g)				
CURIUM-245/246	2.76E-02	NA	NA	NC
LEAD-214	9.13E-01	NA	NA	NC

1 – COPCs identified in Table D-6 with receptor-specific RSVs available.
2 – Mean concentration from Appendix A Table A.3.1 LRP 131-1L Subunit Soil (0 to 0.3 m [0 to 1 ft]).
3 – RSV Source
a = Table 3 in EPA Region 4 Ecological Risk Assessment Supplemental Guidance March Update (2018).
B = Los Alamos National Laboratory Low Effect ESL for soil media (2022).
4 – Species-specific RSV for receptor from Attachment D-6, Table D-6.1
5 – PAUF-adjusted value: Hazard Quotient (HQ) = (Mean/RSV) x PAUF); PAUF = Size of Unit in ha/Population Size in ha.
NA = Not available
NC = Not calculated

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Table D.7-4. PAUF-Adjusted HQs for LRP 131-1L Subunit (Soil 0.3 to 1.2 m [1 to 4 ft])

Analyte[1]	Mean Concentration[2]	RSV Source[3]	American Kestrel: Avian Top Carnivore RSV[4]	American Kestrel: Avian Top Carnivore HQ[5]	American Kestrel: Insectivore/Carnivore RSV[4]	American Kestrel: Insectivore/Carnivore HQ[5]
Inorganics (mg/kg)						
ALUMINUM	1.65E+04	NA	NA	NC	NA	NC
IRON	9.09E+03	NA	NA	NC	NA	NC
VANADIUM	2.61E+01	3	2.30E+02	1.49E-06	1.10E+02	2.80E-01
Organics (pCi/g)						
FLUORANTHENE	2.61E+00	3	NA	NC	NA	NC
HEXACHLOROBUTADIENE	1.61E+00	NA	NA	NC	NA	NC
PHENANTHRENE	2.44E+00	3	NA	NC	NA	NC
Radionuclides (pCi/g)						
LEAD-214	7.03E-01	NA	NA	NC	NA	NC

Analyte[1]	Mean Concentration[2]	RSV Source[3]	American Robin: Avian Herbivore RSV[4]	American Robin: Avian Herbivore HQ[5]	American Robin: Avian Omnivore RSV[4]	American Robin: Avian Omnivore HQ[5]	American Robin: Avian Insectivore RSV[4]	American Robin: Avian Insectivore HQ[5]
Inorganic (mg/kg)								
ALUMINUM	1.65E+04	NA	NA	NC	NA	NC	NA	NC
IRON	9.09E+03	NA	NA	NC	NA	NC	NA	NC
VANADIUM	2.61E+01	3	1.30E+01	6.64E-03	9.50E+00	9.09E-03	1.10E+01	7.85E-03
Organics (mg/kg)								
FLUORANTHENE	2.61E+00	3	NA	NC	NA	NC	NA	NC
HEXACHLOROBUTADIENE	1.61E+00	NA	NA	NC	NA	NC	NA	NC
PHENANTHRENE	2.44E+00	3	NA	NC	NA	NC	NA	NC
Radionuclides (pCi/g)								
LEAD-214	7.03E-01	NA	NA	NC	NA	NC	NA	NC

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Table D.7-4. PAUF-Adjusted HQs for LRP 131-1L Subunit (Soil 0.3 to 1.2 m [1 to 4 ft]) *(continued/end)*

Analyte[1]	Mean Concentration [2]	RSV Source[3]	Deer Mouse Mammalian Omnivore		Montane Shrew Mammalian Insectivore		Mountain Cottontail Mammalian Herbivore		Gray Fox Mammalian Top Carnivore	
			RSV[4]	HQ[5]	RSV[4]	HQ[5]	RSV[4]	HQ[5]	RSV[4]	HQ[5]
Inorganics (mg/kg)										
ALUMINUM	1.65E+04	NA	NA	NC	NA	NC	NA	NC	NA	NC
IRON	9.09E+03	NA	NA	NC	NA	NC	NA	NC	NA	NC
VANADIUM	2.61E+01	b	1.00E+03	4.84E-04	6.10E+02	1.52E-04	1.50E+03	7.80E-06	6.90E+03	5.07E-09
Organics (mg/kg)										
FLUORANTHENE	2.61E+00	b	3.80E+02	1.28E-04	2.20E+02	4.24E-05	2.70E+03	4.34E-07	3.90E+04	8.98E-11
HEXACHLORONUTADIENE	1.61E+00	NA	NA	NC	NA	NC	NA	NC	NA	NC
PHENANTHRENE	2.44E+00	b	1.50E+02	3.02E-04	1.10E+02	7.92E-05	6.20E+02	1.77E-06	1.90E+04	1.72E-10
Radionuclides (pCi/g)										
LEAD-214	7.03E-01	NA	NA	NC	NA	NC	NA	NC	NA	NC

Analyte[1]	Mean Concentration[2]	RSV Source[3]	Earthworm Soil-dwelling Invertebrate	
			RSV[4]	HQ[5]
Inorganics (mg/kg)				
ALUMINUM	1.65E+04	NA	NA	NC
IRON	9.09E+03	NA	NA	NC
VANADIUM	2.61E+01	b	NA	NC
Organics (mg/kg)				
FLUORANTHENE	2.61E+00	b	2.30E+01	1.13E-01
HEXACHLOROBUTADIENE	1.61E+00	NA	NA	NC
PHENANTHRENE	2.44E+00	b	1.20E+01	2.03E-01
Radionuclides (pCi/g)				
LEAD-214	7.03E-01	NA	NA	NC

1 – COPCs identified in Table D-8 with receptor-specific RSVs available.
2 – Mean concentration from Appendix A Table A.3.2 LRP 131-1L Subunit Soil (0.3 to 1.2 m [1 to 4 ft]).
3 – RSV Source
a = Table 3 in EPA Region 4 Ecological Risk Assessment Supplemental Guidance March Update (2018).
b = Los Alamos National Laboratory Low Effect ESL for soil media (2022).
4 – Species-specific RSV for receptor from Attachment D-6 Table D-6.1.
5 – PAUF-adjusted value: Hazard Quotient (HQ) = (Mean/RSV) x PAUF); PAUF = Size of Unit in ha/Population Size in ha.
NA = Not available
NC = Not calculated

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Table D.7.5. PAUF-Adjusted HQs for LRP 131-4L Subunit (Soil 0 to 0.3 m [0 to 1 ft])

Analyte[1]	Mean Concentration[2]	RSV Source[3]	American Kestrel			
			Avian Top Carnivore		Insectivore/Carnivore	
			RSV[4]	HQ[5]	RSV[4]	HQ[5]
Inorganics (mg/kg)						
ALUMINUM	1.17E+04	NA	NA	NC	NA	NC
CYANIDE	6.77E-01	b	5.90E+00	3.02E-06	5.90E+00	4.94E-06
IRON	8.87E+03	NA	NA	NC	NA	NC
VANADIUM	2.37E+01	b	2.30E+02	2.71E-06	2.30E+02	1.24E-01
Organics (mg/kg)						
2-NITROPHENOL	2.17E-02	NA	NA	NC	NA	NC
METYL ACETATE	9.14E-04	NA	NA	NC	NA	NC
N-NITROSODIPROPYLAMINE	1.52E-01	NA	NA	NC	NA	NC
Radionuclides (pCi/g)						
ACTINIUM-228	4.18E+00	NA	NA	NC	NA	NC
LEAD 212	2.74E+00	NA	NA	NC	NA	NC
LEAD-214	1.61E+00	NA	NA	NC	NA	NC
POTASSIUM-40	5.64E+00	NA	NA	NC	NA	NC

Analyte[1]	Mean Concentration[2]	RSV Source[3]	American Robin					
			Avian Herbivore		Avian Omnivore		Avian Omnivore	
			RSV[4]	HQ[5]	RSV[4]	HQ[5]	RSV[4]	HQ[5]
Inorganics (mg/kg)								
ALUMINUM	1.17E+04	NA	NA	NC	NA	NC	NA	NC
CYANIDE	6.77E-01	b	1.00E+00	4.49E-03	9.80E-01	4.58E-03	9.90E-01	4.54E-03
IRON	8.87E+03	NA	NA	NC	NA	NC	NA	NC
VANADIUM	2.37E+01	b	1.30E+01	1.21E-02	9.50E+00	1.66E-02	1.10E+01	1.43E-02
Organics (mg/kg)								
2-NITROPHENOL	2.17E-02	NA	NA	NC	NA	NC	NA	NC
METYL ACETATE	9.14E-04	NA	NA	NC	NA	NC	NA	NC
N-NITROSODIPROPYLAMINE	1.52E-01	NA	NA	NC	NA	NC	NA	NC
Radionuclides (pCi/g)								
ACTINIUM-228	4.18E+00	NA	NA	NC	NA	NC	NA	NC
LEAD 212	2.74E+00	NA	NA	NC	NA	NC	NA	NC
LEAD-214	1.61E+00	NA	NA	NC	NA	NC	NA	NC
POTASSIUM-40	5.64E+00	NA	NA	NC	NA	NC	NA	NC

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Table D.7.5. PAUF-Adjusted HQs for LRP 131-4L Subunit (Soil 0 to 0.3 m [0 to 1 ft]) *(continued/end)*

Analyte[1]	Mean Concentration[2]	RSV Source[3]	Deer Mouse Mammalian Omnivore		Montane Shrew Mammalian Insectivore		Mountain Cottontail Mammalian Herbivore		Gray Fox Mammalian Top Carnivore	
			RSV[4]	HQ[5]	RSV[4]	HQ[5]	RSV[4]	HQ[5]	RSV[4]	HQ[5]
Inorganics (mg/kg)										
ALUMINUM	1.17E+04	NA	NA	NC	NA	NC	NA	NC	NA	NC
CYANIDE	6.77E-01	b	3.30E+03	7.62E-06	3.30E+03	1.47E-06	7.90E+03	7.70E-08	3.30E+04	5.51E-11
IRON	8.87E+03	NA	NA	NC	NA	NC	NA	NC	NA	NC
VANADIUM	2.37E+01	b	1.00E+03	8.83E-04	6.10E+02	2.78E-04	1.50E+03	1.42E-05	6.90E+03	9.24E-09
Organics (mg/kg)										
2-NITROPHENOL	2.17E-02	NA	NA	NC	NA	NC	NA	NC	NA	NC
METYL ACETATE	9.14E-04	NA	NA	NC	NA	NC	NA	NC	NA	NC
N-NITROSODIPROPYLAMINE	1.52E-01	NA	NA	NC	NA	NC	NA	NC	NA	NC
Radionuclides (pCi/g)										
ACTINIUM-228	4.18E+00	NA	NA	NC	NA	NC	NA	NC	NA	NC
LEAD 212	2.74E+00	NA	NA	NC	NA	NC	NA	NC	NA	NC
LEAD-214	1.61E+00	NA	NA	NC	NA	NC	NA	NC	NA	NC
POTASSIUM-40	5.64E+00	NA	NA	NC	NA	NC	NA	NC	NA	NC

Analyte[1]	Mean Concentration[2]	RSV Source[3]	Earthworm Soil-Dwelling Invertebrate	
			RSV[4]	HQ[5]
Inorganics (mg/kg)				
ALUMINUM	1.17E+04	NA	NA	NC
CYANIDE	6.77E-01	b	NA	NC
IRON	8.87E+03	NA	NA	NC
VANADIUM	2.37E+01	b	NA	NC
Organics (mg/kg)				
2-NITROPHENOL	2.17E-02	NA	NA	NC
METYL ACETATE	9.14E-04	NA	NA	NC
N-NITROSODIPROPYLAMINE	1.52E-01	NA	NA	NC
Radionuclides (pCi/g)				
ACTINIUM-228	4.18E+00	NA	NA	NC
LEAD 212	2.74E+00	NA	NA	NC
LEAD-214	1.61E+00	NA	NA	NC
POTASSIUM-40	5.64E+00	NA	NA	NC

1 – COPCs identified in Table D-17 with receptor-specific RSVs available.
2 – Mean concentration from Appendix A Table A.4.1 LRP 131-4L Subunit Soil (0 to 0.3 m [0 to 1 ft]).
3 – RSV Source
a = Table 3 in EPA Region 4 Ecological Risk Assessment Supplemental Guidance March Update (2018).
b = Los Alamos National Laboratory Low Effect ESL for soil media (2022).
4 – Species-specific RSV for receptor from Attachment D-6, Table D-6.1.
5 – PAUF-adjusted value: Hazard Quotient (HQ) = (Mean/RSV) x PAUF); PAUF = Size of Unit in ha/Population Size in ha.
NA = Not available
NC = Not calculated

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Table D.7.6. PAUF-Adjusted HQs for LRP 131-4L Subunit (Soil 0.3 to 1.2 m [1 to 4 ft])

Analyte[1]	Mean Concentration[2]	RSV Source[3]	American Kestrel: Avian Top Carnivore RSV[4]	American Kestrel: Avian Top Carnivore HQ[5]	American Kestrel: Insectivore/Carnivore RSV[4]	American Kestrel: Insectivore/Carnivore HQ[5]
Inorganics (mg/kg)						
ALUMINUM	1.43E+04	NA	NA	NC	NA	NC
CYANIDE	1.10E+00	b	5.90E+00	2.16E-06	5.90E+00	3.54E-06
IRON	1.13E+04	NA	NA	NC	NA	NC
VANADIUM	2.86E+01	b	2.30E+02	3.02E-06	2.30E+02	6.31E-06
Organics (mg/kg)						
CYCLOHEXANE	5.00E-04	NA	NA	NC	NA	NC
METYL ACETATE	2.75E-03	NA	NA	NC	NA	NC
METHYLCYCLOHEXANE	3.87E-04	NA	NA	NC	NA	NC
Radionuclides (pCi/g)						
ACTINIUM-228	3.43E+00	NA	NA	NC	NA	NC
AMERICIUM-243	4.95E-02	NA	NA	NC	NA	NC
LEAD-212	2.21E+00	NA	NA	NC	NA	NC
LEAD-214	1.97E+00	NA	NA	NC	NA	NC

Analyte[1]	Mean Concentration[2]	RSV Source[3]	American Robin: Avian Herbivore RSV[4]	American Robin: Avian Herbivore HQ[5]	American Robin: Avian Omnivore RSV[4]	American Robin: Avian Omnivore HQ[5]	American Robin: Avian Omnivore RSV[4]	American Robin: Avian Omnivore HQ[5]
Inorganics (mg/kg)								
ALUMINUM	1.43E+04	NA	NA	NC	NA	NC	NA	NC
CYANIDE	1.10E+00	b	1.00E+00	3.22E-03	9.80E-01	3.28E-03	9.90E-01	3.25E-03
IRON	1.13E+04	NA	NA	NC	NA	NC	NA	NC
VANADIUM	2.86E+01	b	1.30E+01	1.35E-02	9.50E+00	1.85E-02	1.10E+01	1.59E-02
Organics (mg/kg)								
CYCLOHEXANE	5.00E-04	NA	NA	NC	NA	NC	NA	NC
METYL ACETATE	2.75E-03	NA	NA	NC	NA	NC	NA	NC
METHYLCYCLOHEXANE	3.87E-04	NA	NA	NC	NA	NC	NA	NC
Radionuclides (pCi/g)								
ACTINIUM-228	3.43E+00	NA	NA	NC	NA	NC	NA	NC
AMERICIUM-243	4.95E-02	NA	NA	NC	NA	NC	NA	NC
LEAD-212	2.21E+00	NA	NA	NC	NA	NC	NA	NC
LEAD-214	1.97E+00	NA	NA	NC	NA	NC	NA	NC

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Table D.7-6. PAUF-Adjusted HQs for LRP 131-4L Subunit (Soil 0.3 to 1.2 m [1 to 4 ft]) *(continued/end)*

Analyte[1]	Mean Concentration[2]	RSV Source[3]	Deer Mouse Mammalian Omnivore		Montane Shrew Mammalian Insectivore		Mountain Cottontail Mammalian Herbivore		Gray Fox Mammalian Top Carnivore	
			RSV[4]	HQ[5]	RSV[4]	HQ[5]	RSV[4]	HQ[5]	RSV[4]	HQ[5]
Inorganics (mg/kg)										
ALUMINUM	1.43E+04	NA	NA	NC	NA	NC	NA	NC	NA	NC
CYANIDE	1.10E+00	b	3.30E+03	5.46E-06	3.30E+03	1.05E-06	7.90E+03	5.52E-08	3.30E+04	3.95E-11
IRON	1.13E+04	NA	NA	NC	NA	NC	NA	NC	NA	NC
VANADIUM	2.86E+01	b	1.00E+03	9.82E-04	6.10E+02	3.09E-04	1.50E+03	1.58E-05	6.90E+03	1.03E-08
Organics (mg/kg)										
CYCLOHEXANE	5.00E-04	NA	NA	NC	NA	NC	NA	NC	NA	NC
METYL ACETATE	2.75E-03	NA	NA	NC	NA	NC	NA	NC	NA	NC
METHYLCYCLOHEXANE	3.87E-04	NA	NA	NC	NA	NC	NA	NC	NA	NC
Radionuclides (pCi/g)										
ACTINIUM-228	3.43E+00	NA	NA	NC	NA	NC	NA	NC	NA	NC
AMERICIUM-243	4.95E-02	NA	NA	NC	NA	NC	NA	NC	NA	NC
LEAD-212	2.21E+00	NA	NA	NC	NA	NC	NA	NC	NA	NC
LEAD-214	1.97E+00	NA	NA	NC	NA	NC	NA	NC	NA	NC

Analyte[1]	Mean Concentration[2]	RSV Source[3]	Earthworm Soil-Dwelling Invertebrate	
			RSV[4]	HQ[5]
Inorganics (mg/kg)				
ALUMINUM	1.43E+04	NA	NA	NC
CYANIDE	1.10E+00	b	NA	NC
IRON	1.13E+04	NA	NA	NC
VANADIUM	2.86E+01	b	NA	NC
Organics (mg/kg)				
CYCLOHEXANE	5.00E-04	NA	NA	NC
METYL ACETATE	2.75E-03	NA	NA	NC
METHYLCYCLOHEXANE	3.87E-04	NA	NA	NC
Radionuclides (pCi/g)				
ACTINIUM-228	3.43E+00	NA	NA	NC
AMERICIUM-243	4.95E-02	NA	NA	NC
LEAD-212	2.21E+00	NA	NA	NC
LEAD-214	1.97E+00	NA	NA	NC

1 – COPCs identified in Table D-19 with receptor-specific RSVs available.
2 – Mean concentration from Appendix A Table A.4.2 LRP 131-4L Subunit Soil (0 to 1.2 m [1 to 4 ft]).
3 – RSV Source
a = Table 3 in EPA Region 4 Ecological Risk Assessment Supplemental Guidance March Update (2018).
b = Los Alamos National Laboratory Low Effect ESL for soil media (2022).
4 – Species-specific RSV for receptor from Attachment D-6 Table D-6.1.
5 – PAUF-adjusted value: Hazard Quotient (HQ) = (Mean/RSV) x PAUF); PAUF = Size of Unit in ha/Population Size in ha.
NA = Not available; NC = Not calculated

APPENDIX E

PRINCIPAL THREAT SOURCE MATERIAL EVALUATION

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LIST OF ABBREVIATIONS AND ACRONYMS

COC	constituent of concern
ECODS	Early Construction and Operation Disposal Site
EN	essential nutrient
EPC	exposure point concentration
ft	feet
g	grams
HI	hazard index
HQ	hazard quotient
kg	kilograms
LRP	L-Area Rubble Pit
m	meter
mg	milligrams
NA	not available
NBN	No Building Number
OU	Operable Unit
pCi	picocurie
PRG	preliminary remediation goal
PTSM	principal threat source material
RSL	regional screening level
SL	screening level
SRS	Savannah River Site
THI	target hazard index
THQ	target hazard quotient
USEPA	U.S. Environmental Protection Agency

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E-1. INTRODUCTION

The concept of principal threat waste and low-level threat waste as developed by the U.S. Environmental Protection Agency (USEPA) in the National Contingency Plan (40 *Code of Federal Regulations* 300.430(a)(1)(iii)) is to be applied on a site-specific basis when characterizing source material. Source materials are those materials that include or contain hazardous substances, pollutants, or contaminants that act as a reservoir for migration to surface water or air, or that act as a source for direct exposure (USEPA 1991).

The determination of whether the source materials present at a waste unit would be classified as principal threat source material (PTSM) is based mainly on the USEPA guidance document (USEPA 1991). In this guidance, the USEPA defines principal threat wastes as “those source materials considered to be highly toxic or mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur.” These include liquids and other highly mobile materials (e.g., materials that released from surface soil due to volatilization, leaching, or surface runoff) or materials having high concentrations of toxic compounds. No “threshold level” of toxicity/risk has been established to equate to “principal threat.” However, the guidance does state that treatment alternatives for source materials should generally be evaluated where the combined toxicity and mobility pose a potential risk of 1E-03 or greater. According to USEPA, the PTSM concept expectation was to “help streamline and focus the remedy selection process, not as a mandatory waste classification requirement.”

The USEPA, South Carolina Department of Health and Environmental Control, and U.S. Department of Energy evaluated the USEPA guidance with respect to toxicity and contaminant migration analysis performed at Savannah River Site (SRS). In practice, SRS risk assessment and contaminant migration evaluations identify constituents of concern (COCs) associated with source material or impacted media and determine the associated risk (i.e., adverse health impacts as measured by the hazard index [HI] and numerical estimate of risk) or potential impact to environmental media. If threshold risk levels are exceeded, problems are identified, and an evaluation of remedial alternatives is conducted in the Feasibility Study. Since the risk assessment does not evaluate human receptor exposure to subsurface soils, further reevaluation is needed to account for potentially highly toxic source material or contaminated soils at depth that would results in unacceptable risk should exposure occur. Therefore, a quantitative determination of whether contamination exists above PTSM levels at the Early Construction and Operational Disposal Site (ECODS) L-3, No Building Number (NBN), L-Area Rubble Pit (LRP) 131-1L, and LRP 131-4L [ECODS L-3, LRP 131-1L, and LRP 131-4L] Operable Unit (OU) in all soil depths was performed.

E-1.1 Background

E-1.1.1 ECODS L-3

The ECODS L-3 subunit was used to dispose of construction debris and other non-radioactive waste materials, such as rubble and concrete, associated with the construction and early operation of L Area. The ECODS L-3 subunit is estimated to have been in use from November 1953 to June 1954. The subunit is ~18 m (60 ft) wide by ~60 m (200 ft) long (Figure E-1). A detailed description is provided in Chapters 1 and 2.

E-1.1.2 LRP 131-1L

The LRP 131-1L subunit was used for various non-radioactive construction debris. Typical debris disposed of in similar units includes metal, lumber, poles, and concrete. The LRP 131-1L subunit delineated by orange ball waste unit markers is 12 m (40 ft) by 46 m (150 ft) (Figure E-2). A detailed description is provided in Chapters 1 and 2.

E-1.1.3 LRP 131-4L

The LRP 131-4L subunit received inert rubble from the L-Area Powerhouse Stack and Silo demolition. The rubble consisted primarily of concrete and asphalt material with some metal. The LRP 131-4L subunit is an unlined pit, reported to have operated from 1973 to 1983, before it was filled and seeded in 1983. The size of the subunit is considered to be ~36.6 m by 36.6 m (120 ft by 120 ft) (Figure E-3). A detailed description is provided in Chapters 1 and 2.

E-1.2 Data

Characterization activities for the ECODS L-3, LRP 131-1L, and LRP 131-4L OU are described in detail in Chapter 3.

Appendix A presents the maximum detected constituent concentrations and activity concentrations from the all-depths soil interval for the ECODS L-3 soil (Table A.2.3); LRP 131-1L soil (Table A.3.3), and LRP 131-4L soil (Table A.4.3) used in the PTSM evaluation.

E-1.3 Receptor

The USEPA default industrial worker scenario (termed composite worker) is the receptor scenario evaluated under this PTSM evaluation for ECODS L-3, LRP 131-1L, and LRP 131-4L OU. The principal exposure assumptions for the industrial worker are 25 years, 250 days per year, and 8 hours per day. Given the current and expected future land use of the area in which the ECODS L-3, LRP 131-1L, and LRP 131-4L OU is located, the industrial worker is the most likely receptor exposure scenario.

E-1.4 Sources of Risk-Based Threshold Values

The *USEPA Regional Screening Levels* website (USEPA 2023a) is the source of risk-based threshold values for nonradiological constituents used in this evaluation. The website was accessed in December 2023. The industrial worker reginal screening levels (RSLs) are provided in Attachment E-1.

The USEPA *Preliminary Remediation Goals for Radionuclides at Superfund Sites* website (USEPA 2023b) is the source of the radionuclide threshold values used in this evaluation. The website was accessed in December 2023. The industrial worker preliminary remediation goals (PRGs) are provided in Attachment E-2.

E-2. PTSM EVALUATION PROCESS

To determine whether contaminated source material/soils should be preliminarily considered PTSM, a simple quantitative assessment evaluating the toxicity of the source is used where the results are compared to a threshold for determining PTSM.

In determining whether the source should be considered PTSM, the evaluation considers the cumulative effects of both the potential risk from carcinogenic constituents and the adverse effects from noncarcinogens to an industrial worker receptor. The source material (i.e., soil) is preliminarily considered to be PTSM if the cumulative risk exceeds at least one of the following threshold screening criteria:

- Carcinogens – greater than 1E-03 industrial worker risk
- Noncarcinogens – industrial worker HI greater than 10

In the preliminary screen, the unit maximum concentration for every detected constituent for the soil media from the all-depths interval from each of the subunits in the ECODS L-3, LRP 131-1L, and LRP 131-4L OU is determined and used as the exposure point concentration (EPC).

For carcinogens, the individual risk associated with each constituent is calculated by multiplying the ratio of the EPC to the RSL or PRG by 1E-06. Each of these risks is summed to calculate the cumulative carcinogenic risk associated with the source. For noncarcinogens, a hazard quotient (HQ) associated with each constituent is calculated by dividing the EPC by the RSL. These HQs are summed to derive the cumulative HI. If neither threshold criteria for PTSM are exceeded based on the maximum detected concentrations and activity concentrations, then PTSM is not present, and it is not necessary to evaluate further. If the threshold criteria are exceeded, then an uncertainty analysis may be conducted to further evaluate the constituents and source(s) that exceed the PTSM toxicity criteria.

E-2.1 Screening Evaluation

For the screening evaluation for PTSM, maximum concentrations for nonradiological constituents and activity concentrations for radionuclides in soil (all depths), as appropriate, from each subunit were used to calculate HQs for noncarcinogens and numerical risk for carcinogens. The following equations are used to calculate HQs and risks for the PTSM evaluation:

$$noncarcinogen\ hazard\ quotient = \frac{[Maximum\ Concentration]}{[RSL]}$$

$$carcinogen\ risk\ estimate = \left(\frac{[Maximum\ Concentration]}{[RSL\ or\ PRG]}\right) \times 1E\text{-}06$$

E-2.2 Results

E-2.2.1 ECODS L-3 (Soil Media)

Table E-1 presents the results of the PTSM screening evaluation for soil at the ECODS L-3 subunit. Results of the PTSM evaluation for soil at the ECODS L-3 subunit indicate that the HI is 2.79E+00 and the cumulative risk is 3.99E-05. No PTSM refined COCs are identified for the ECODS L-3 soil media.

E-2.2.2 LRP 131-1L (Soil Media)

Table E-2 presents the results of the PTSM screening evaluation for soil at the LRP 131-1L subunit. Results of the PTSM evaluation for soil at the LRP 131-1L indicate that the HI is 1.74E-01 and the cumulative risk is 2.36E-04. No PTSM refined COCs are identified for the LRP 131-1L soil media.

E-2.2.3 LRP 131-4L (Soil Media)

Table E-3 presents the results of the PTSM screening evaluation for soil at the LRP 131-4L subunit. Results of the PTSM evaluation for soil at the LRP 131-4L indicate that the HI is 1.10E+00 and the cumulative risk is 5.08E-04. No PTSM refined COCs are identified for the LRP 131-4L soil media.

E-3. SUMMARY AND CONCLUSIONS

Based on the results of the PTSM evaluation, no PTSM refined COCs are identified for the ECODS L-3, LRP 131-1L and LRP 131-4 OU. The revised conceptual site model is presented in Chapter 3.

Summary of the ECODS L-3, LRP 131-1L and LRP 131-4L OU PTSM Assessment

Subunit	PTSM RCOCs
ECODS L-3	Soil (all depths) None
LRP 131-1L	Soil (all depths) None
LRP 131-4L	Soil (all depths) None

E-4. REFERENCES

SRNS, 2022. RFI/RI Work Plan for Early Construction and Operational Disposal Site L-3 (NBN), L-Area Rubble Pit 131-1L, and L-Area Rubble Pit 131-4L Operable Unit (U), SRNS-RP-2021-05602, Revision 1, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC

USEPA, 1991. *A Guide to Principal Threat and Low-Level Threat Wastes*, Superfund Publication 9380.3-06FS, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C.

USEPA, 2023a. *USEPA Regional Screening Levels*, U.S. Environmental Protection Agency, National Center for Environmental Assessment, Arlington, VA, (November 2023 update), accessed December 2023, https://www.epa.gov/risk/regional-screening-levels-rsls

USEPA, 2023b. *Preliminary Remediation Goals for Radionuclides at Superfund Sites*, U.S. Environmental Protection Agency, Office of Land and Emergency Management, Washington, DC, (February 2023 update), accessed December 2023, https://epa-prgs.ornl.gov/radionuclides

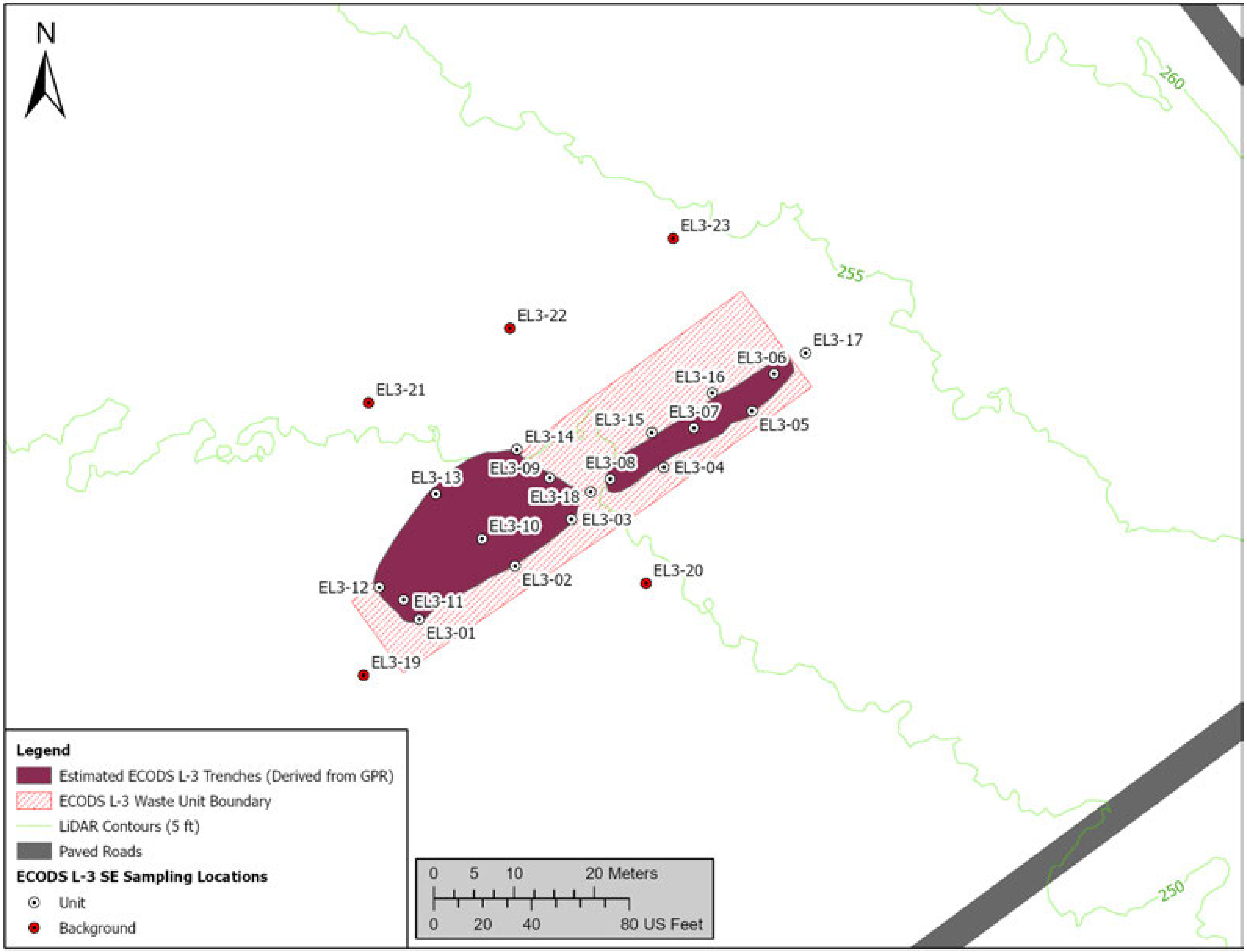

Figure E-1. ECODS L-3 Sample Location Map

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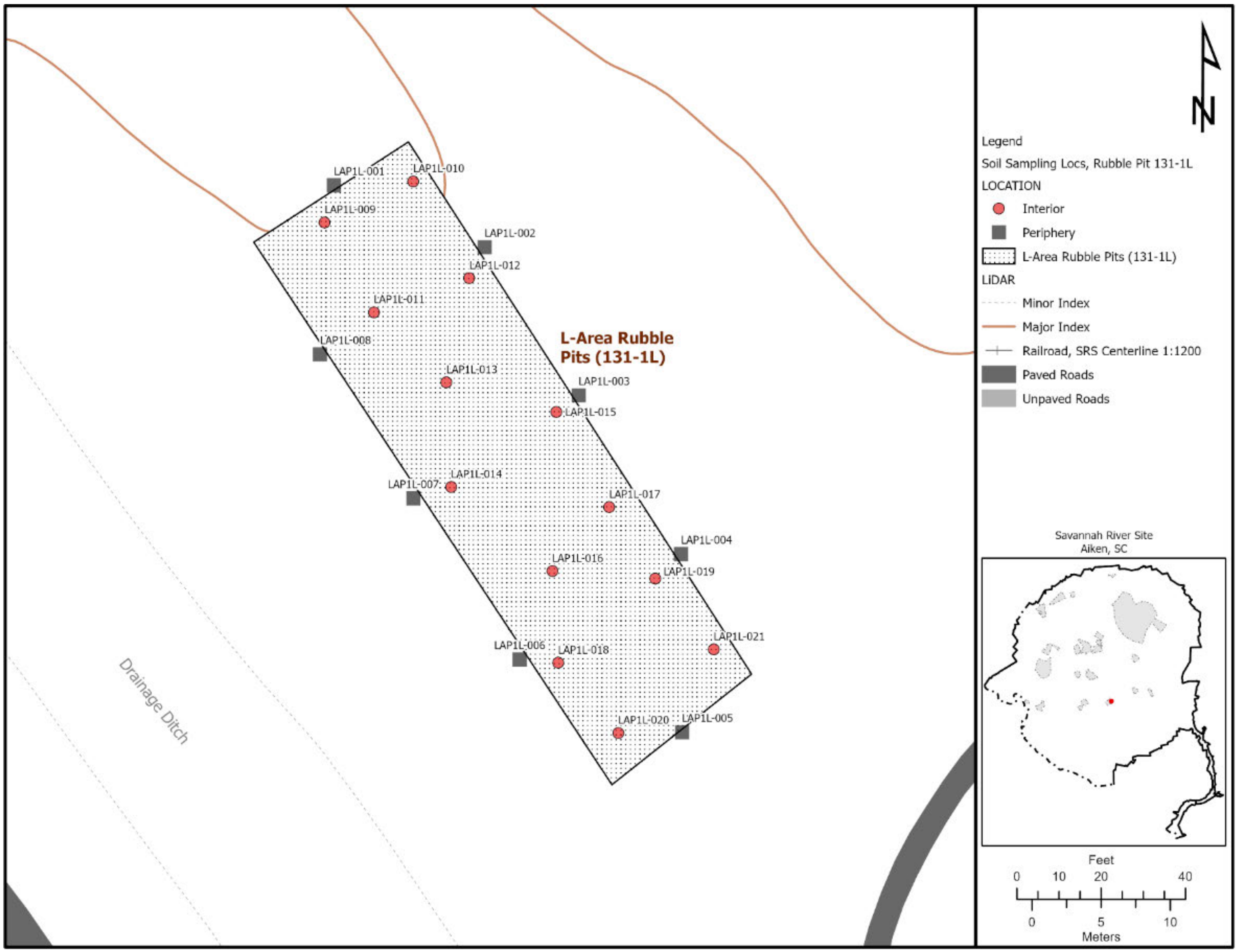

Figure E-2. LRP 131-1L Sample Location Map

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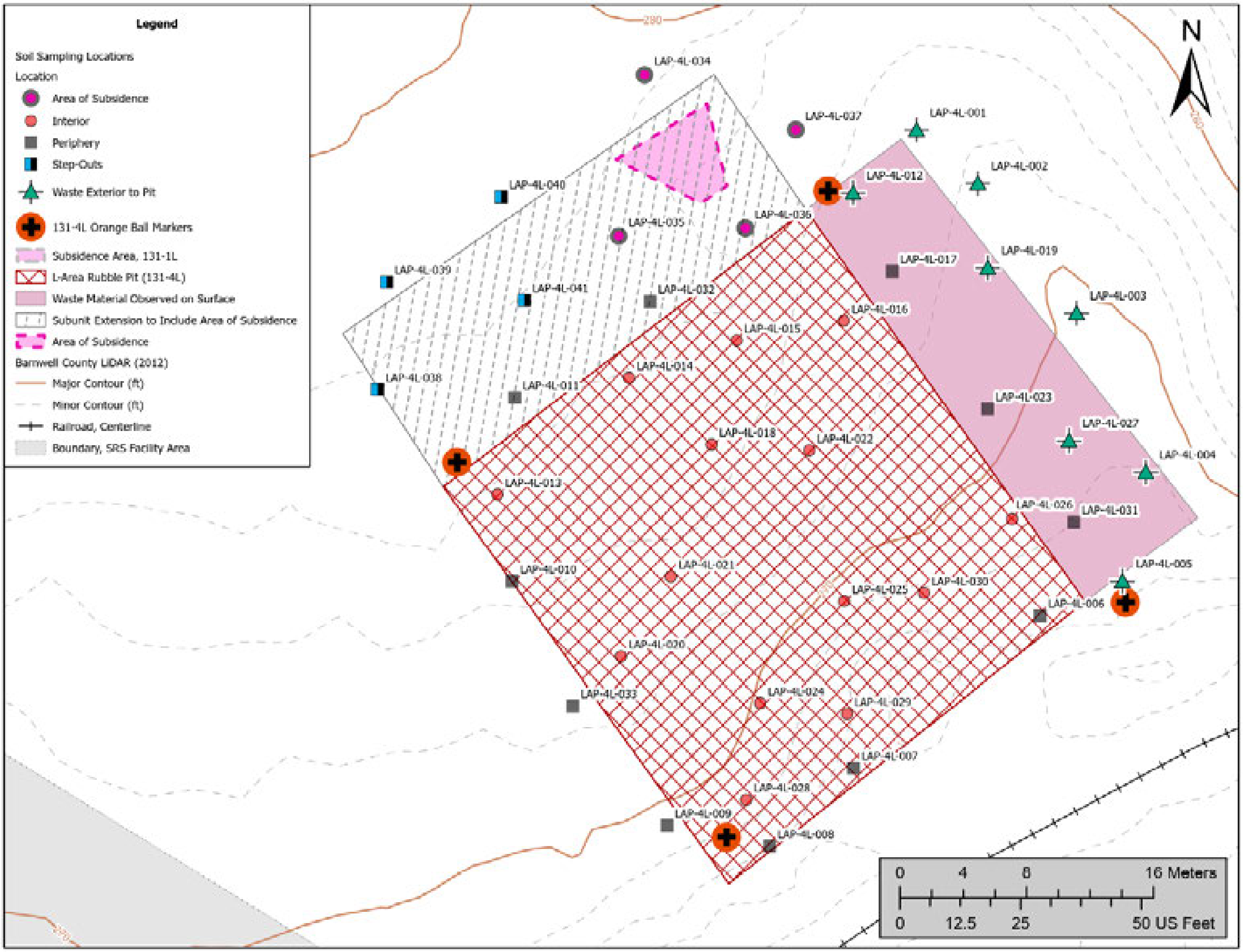

Figure E-3. LRP 131-4L Sample Location Map

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Table E-1. PTSM Screening Evaluation for ECODS L-3 (soil; all depths)

Analyte	Exposure Point Concentration[1]	Noncarcinogenic Hazard Estimate		Carcinogenic Risk Estimate	
		Industrial RSL[2,5]	Industrial HQ Estimate[3]	Industrial RSL[2,5]	Industrial Risk Estimate[4]
Inorganics *(mg/kg)*					
ALUMINUM	2.19E+04	1.12E+06	1.96E-02	NA	--
ANTIMONY	5.66E+01	4.67E+02	1.21E-01	NA	--
ARSENIC	1.31E+01	4.79E+02	2.73E-02	3.00E+00	4.37E-06
BARIUM	2.85E+02	2.17E+05	1.31E-03	NA	--
CADMIUM	1.19E+01	9.97E+01	1.19E-01	9.26E+03	1.29E-09
CALCIUM	5.28E+04	EN	--	EN	--
CHROMIUM	8.01E+01	3.48E+03	2.30E-02	6.33E+00	1.27E-05
COBALT	4.67E+00	3.47E+02	1.35E-02	1.85E+03	2.52E-09
COPPER	8.37E+03	4.67E+04	1.79E-01	NA	--
CYANIDE	1.22E+00	1.47E+02	8.30E-03	NA	--
IRON	3.17E+04	8.18E+05	3.88E-02	NA	--
LEAD	1.30E+03	8.00E+02	1.63E+00	NA	--
MAGNESIUM	2.52E+03	EN	--	EN	--
MANGANESE	4.47E+02	2.56E+04	1.75E-02	NA	--
MERCURY	3.79E+00	4.56E+01	8.31E-02	NA	--
NICKEL	4.24E+01	1.84E+04	2.33E-03	6.41E+04	6.61E-10
POTASSIUM	2.66E+02	EN	--	EN	--
SELENIUM	1.70E+00	5.84E+03	2.91E-04	NA	--
SODIUM	2.70E+02	EN	--	EN	--
VANADIUM	7.14E+01	5.83E+03	1.22E-02	NA	--
ZINC	1.12E+03	3.50E+05	3.20E-03	NA	--
Organics *(mg/kg)*					
1,1'-BIPHENYL	6.29E-01	2.00E+02	3.15E-03	4.09E+02	1.54E-09
1,1-DICHLOROETHYLENE	2.88E-03	9.95E+02	2.89E-06	NA	--
2-METHYLNAPHTHALENE	2.00E+00	3.01E+03	6.64E-04	NA	--
ACENAPHTHENE	9.27E+00	4.52E+04	2.05E-04	NA	--
ACETONE	2.86E-02	1.05E+06	2.72E-08	NA	--
ANTHRACENE	1.76E+01	2.26E+05	7.79E-05	NA	--
BENZALDEHYDE	2.22E-01	1.17E+05	1.90E-06	8.18E+02	2.71E-10
BENZENE	2.60E-03	4.23E+02	6.15E-06	5.08E+00	5.12E-10
BENZO(G,H,I)PERYLENE	9.67E+00	NA	--	NA	--
BENZO[A]ANTHRACENE	2.59E+01	NA	--	2.06E+01	1.26E-06
BENZO[A]PYRENE	2.06E+01	2.22E+02	9.28E-02	2.11E+00	9.76E-06
BENZO[B]FLUORANTHENE	2.69E+01	NA	--	2.11E+01	1.27E-06
BENZO[K]FLUORANTHENE	9.72E+00	NA	--	2.11E+02	4.61E-08
BIS(2-ETHYLHEXYL) PHTHALATE (DEHP)	3.71E+01	1.64E+04	2.26E-03	1.64E+02	2.26E-07
CARBAZOLE	1.38E+01	NA	--	NA	--
CARBON DISULFIDE	9.51E-04	3.47E+03	2.74E-07	NA	--
CHRYSENE	2.14E+01	NA	--	2.11E+03	1.01E-08
DIBENZ[AH]ANTHRACENE	2.70E+00	NA	--	2.11E+00	1.28E-06
DIBENZOFURAN	5.10E+00	1.17E+03	4.36E-03	NA	--

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Table E-1. PTSM Screening Evaluation for ECODS L-3 (soil; all depths) *(continued/end)*

Analyte	Exposure Point Concentration[1]	Noncarcinogenic Hazard Estimate: Industrial RSL[2,5]	Noncarcinogenic Hazard Estimate: Industrial HQ Estimate[3]	Carcinogenic Risk Estimate: Industrial RSL[2,5]	Carcinogenic Risk Estimate: Industrial Risk Estimate[4]
Organics** (mg/kg) **(continued)					
DICHLOROMETHANE (METHYLENE CHLORIDE)	6.96E-04	3.16E+03	2.20E-07	1.02E+03	6.82E-13
DI-N-BUTYL PHTHALATE	8.11E-02	8.21E+04	9.88E-07	NA	--
FLUORANTHENE	3.50E+01	3.01E+04	1.16E-03	NA	--
FLUORENE	1.05E+01	3.01E+04	3.49E-04	NA	--
INDENO[1,2,3-CD]PYRENE	8.91E+00	NA	--	2.11E+01	4.22E-07
METHYL ETHYL KETONE	1.57E-03	1.93E+05	8.13E-09	NA	--
METHYL TERTIARY BUTYL ETHER (MTBE)	4.30E-04	6.44E+04	6.68E-09	2.05E+02	2.10E-12
NAPHTHALENE	5.66E+00	5.85E+02	9.68E-03	8.57E+00	6.60E-07
PHENANTHRENE	3.39E+01	NA	--	NA	--
PYRENE	3.40E+01	2.26E+04	1.50E-03	NA	--
STYRENE	3.68E-04	3.48E+04	1.06E-08	NA	--
TOLUENE	2.37E-03	4.68E+04	5.06E-08	NA	--
XYLENES	7.12E-04	2.49E+03	2.86E-07	NA	--
***Pesticides/PCBs** (mg/kg)*					
AROCLOR 1254	5.63E+00	1.47E+01	3.83E-01	9.72E-01	5.79E-06
AROCLOR 1260	2.17E+00	NA	--	9.91E-01	2.19E-06
DDE	5.84E-04	5.84E+02	1.00E-06	9.28E+00	6.29E-11
DDT	1.07E-03	5.18E+02	2.07E-06	8.53E+00	1.25E-10
		Hazard Index	2.79E+00	**Cumulative Risk**	3.99E-05
		PTSM?[6]	no	**PTSM?[7]**	no

1 - Exposure Point Concentration (EPC) - maximum detected concentration from all depths, soil media from Table A.2.3 in Appendix A.
2 - Nonradiological Regional Screening Levels (RSLs) are industrial soil default values from the USEPA RSLs website, accessed December 2023 (see Attachment E-1).
3 - Industrial Hazard Estimate = EPC/RSL
4 - Industrial Risk Estimate = (EPC/RSL)*1E-06
5 - RSL for hexavalent chromium (most conservative) used.
6 - Waste unit potentially has principal threat source material (PTSM) if Hazard Index (HI) ≥ 10 for noncarcinogenic constituents.
7 - Waste unit potentially has PTSM if cumulative risk ≥ 1E-03 for carcinogenic constituents.
EN - essential nutrient; NA - not available

Table E-2. PTSM Screening Evaluation for LRP 131-1L (soil; all depths)

Analyte	Exposure Point Concentration[1]	Noncarcinogenic Hazard Estimate		Carcinogenic Risk Estimate	
		Industrial RSL[2,5]	Industrial HQ Estimate[3]	Industrial RSL/PRG[2,5,6]	Industrial Risk Estimate[4]
***Inorganics** (mg/kg)*					
ALUMINUM	4.00E+04	1.12E+06	3.57E-02	NA	--
ANTIMONY	3.20E-01	4.67E+02	6.85E-04	NA	--
ARSENIC	6.50E+00	4.79E+02	1.36E-02	3.00E+00	2.17E-06
BARIUM	5.80E+01	2.17E+05	2.67E-04	NA	--
BERYLLIUM	5.50E-01	2.29E+03	2.40E-04	6.95E+03	7.91E-11
CADMIUM	1.30E-01	9.97E+01	1.30E-03	9.26E+03	1.40E-11
CALCIUM	1.20E+03	EN	--	EN	--
CHROMIUM	3.00E+01	3.48E+03	8.62E-03	6.33E+00	4.74E-06
COBALT	2.10E+00	3.47E+02	6.05E-03	1.85E+03	1.14E-09
COPPER	3.10E+01	4.67E+04	6.64E-04	NA	--
CYANIDE	1.40E+00	1.47E+02	9.52E-03	NA	--
IRON	2.50E+04	8.18E+05	3.06E-02	NA	--
LEAD	1.30E+01	8.00E+02	1.63E-02	NA	--
MAGNESIUM	4.60E+02	EN	--	EN	--
MANGANESE	1.80E+02	2.56E+04	7.03E-03	NA	--
MERCURY	1.10E-01	4.56E+01	2.41E-03	NA	--
NICKEL	9.60E+00	1.82E+04	5.27E-04	6.41E+04	1.50E-10
POTASSIUM	4.00E+02	EN	--	EN	--
SELENIUM	5.80E-01	5.84E+03	9.93E-05	NA	--
SILVER	2.30E-02	5.84E+03	3.94E-06	NA	--
SODIUM	2.90E+01	EN	--	EN	--
THALLIUM	1.60E-01	1.17E+01	1.37E-02	NA	--
VANADIUM	6.90E+01	5.83E+03	1.18E-02	NA	--
ZINC	3.60E+01	3.50E+05	1.03E-04	NA	--
***Organics** (mg/kg)*					
2-HEXANONE	3.98E-03	1.34E+03	2.97E-06	NA	--
4-NITROPHENOL	1.20E-01	NA	--	NA	--
ACENAPHTHENE	2.40E+00	4.52E+04	5.31E-05	NA	--
ACETONE	3.97E-01	1.05E+06	3.78E-07	NA	--
BENZO(G,H,I)PERYLENE	8.60E-01	NA	--	NA	--
BENZO[A]ANTHRACENE	6.10E+00	NA	--	2.06E+01	2.96E-07
BENZO[A]PYRENE	2.30E+00	2.22E+02	1.04E-02	2.11E+00	1.09E-06
BENZO[B]FLUORANTHENE	4.90E+00	NA	--	2.11E+01	2.32E-07
BENZO[K]FLUORANTHENE	2.20E+00	NA	--	2.11E+02	1.04E-08
BIS(2-ETHYLHEXYL) PHTHALATE (DEHP)	2.10E-01	1.64E+04	1.28E-05	1.64E+02	1.28E-09
BUTYL BENZYL PHTHALATE	6.90E-02	1.64E+05	4.21E-07	1.21E+03	5.70E-11
CARBAZOLE	1.30E+00	NA	--	NA	--
CHRYSENE	6.70E+00	NA	--	2.11E+03	3.18E-09
CUMENE (ISOPROPYLBENZENE)	1.88E-03	9.95E+03	1.89E-07	NA	--
DIBENZ[AH]ANTHRACENE	1.60E+00	NA	--	2.11E+00	7.58E-07
DIBENZOFURAN	2.40E+00	1.17E+03	2.05E-03	NA	--
DI-N-BUTYL PHTHALATE	3.60E-02	8.21E+04	4.38E-07	NA	--
FLUORANTHENE	3.00E+01	3.01E+04	9.97E-04	NA	--
FLUORENE	2.20E+00	3.01E+04	7.31E-05	NA	--

Table E-2. PTSM Screening Evaluation for LRP 131-1L (soil; all depths) *(continued/end/)*

Analyte	Exposure Point Concentration[1]	Noncarcinogenic Hazard Estimate: Industrial RSL[2,5]	Noncarcinogenic Hazard Estimate: Industrial HQ Estimate[3]	Carcinogenic Risk Estimate: Industrial RSL/PRG[2,5,6]	Carcinogenic Risk Estimate: Industrial Risk Estimate[4]
Organics *(mg/kg)*					
HEXACHLOROBUTADIENE	2.90E-01	1.17E+03	2.48E-04	5.26E+00	5.51E-08
INDENO[1,2,3-CD]PYRENE	3.00E+00	NA	--	2.11E+01	1.42E-07
METHYL ACETATE	5.21E-03	1.17E+06	4.45E-09	NA	--
METHYL ETHYL KETONE	4.39E-02	1.93E+05	2.27E-07	NA	--
N-DIOCTYL PHTHALATE	1.10E-01	8.21E+03	1.34E-05	NA	--
N-NITROSODIPHENYLAMINE	2.20E-02	NA	--	4.69E+02	4.69E-11
PHENANTHRENE	2.40E+01	NA	--	NA	--
PYRENE	1.70E+01	2.26E+04	7.52E-04	NA	--
STYRENE	1.85E-03	3.48E+04	5.32E-08	NA	--
TOLUENE	1.05E-03	4.68E+04	2.24E-08	NA	--
Pesticides/PCBs *(mg/kg)*					
DDE	3.60E-03	5.84E+02	6.16E-06	9.28E+00	3.88E-10
Radionuclides *(pCi/g)*					
AMERICIUM-243	8.88E-02	NA	--	2.59E-01	3.43E-07
CESIUM-137	3.90E-01	NA	--	9.07E-02	4.30E-06
CURIUM-245/246	4.29E-02	NA	--	5.95E-01	7.20E-08
PLUTONIUM-238	1.06E-01	NA	--	1.41E+01	7.51E-09
PLUTONIUM-239/240	5.69E-02	NA	--	1.22E+01	4.66E-09
PLUTONIUM-242	2.08E-02	NA	--	1.26E+01	1.65E-09
POTASSIUM-40	1.06E+00	NA	--	2.19E-01	4.84E-06
PROMETHIUM-147	1.10E+00	NA	--	1.07E+04	1.03E-10
STRONTIUM-90	8.14E-01	NA	--	9.00E+00	9.04E-08
THORIUM-232	1.90E+00	NA	--	1.53E-02	--
RADIUM-228	2.53E+00	NA	--	1.53E-02	1.65E-04
ACTINIUM-228	1.42E+00	NA	--	1.53E-02	--
THORIUM-228	2.04E+00	NA	--	1.53E-02	--
LEAD-212	1.09E+00	NA	--	1.53E-02	--
URANIUM-238	9.00E-01	NA	--	2.00E-02	--
URANIUM-233/234	9.35E-01	NA	--	2.00E-02	--
THORIUM-230	1.01E+00	NA	--	2.00E-02	5.05E-05
RADIUM-226	1.00E+00	NA	--	2.00E-02	--
LEAD-214	9.13E-01	NA	--	2.00E-02	--
URANIUM-235	9.02E-02	NA	--	7.31E-02	1.23E-06
		Hazard Index	1.74E-01	**Cumulative Risk**	2.36E-04
		PTSM?[7]	no	**PTSM?[8]**	no

1 - Exposure Point Concentration (EPC) - maximum detected concentration from all depths, soil media from Table A.3.3 in Appendix A.
2 - Nonradiological Regional Screening Levels (RSLs) are industrial soil default values from the USEPA RSLs website, accessed December 2023 (see Attachment E-1). Radiological Preliminary Remediation Goals (PRGs) are industrial soil default values from the USEPA Radionuclide PRGs for Superfund website, accessed December 2023 (see Attachment E-2).
3 - Industrial Hazard Estimate = EPC/RSL
4 – Industrial Risk Estimate = (EPC/[RSL or PRG])*1E-06
5 - RSL for hexavalent chromium (most conservative) used.
6 - For radionuclides within a decay chain (i.e., thorium-232, uranium-235, uranium-238) the most conservative EPC (highest activity) within each series is used to estimate the risk. Risk is calculated using parent PRG.
7 - Waste unit potentially has principal threat source material (PTSM) if Hazard Index (HI) ≥ 10 for noncarcinogenic constituents.
8 - Waste unit potentially has PTSM if cumulative risk ≥ 1E-03 for carcinogenic constituents.
EN - essential nutrient; NA - not available

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Table E-3. PTSM Screening Evaluation for LRP 131-4L (soil; all depths)

Analyte	Exposure Point Concentration[1]	Noncarcinogenic Hazard Estimate		Carcinogenic Risk Estimate	
		Industrial RSL[2,5]	Industrial HQ Estimate[3]	Industrial RSL/ PRG[2,5,6]	Industrial Risk Estimate[4]
***Inorganics** (mg/kg)*					
ALUMINUM	2.90E+04	1.12E+06	2.59E-02	NA	--
ANTIMONY	1.20E+00	4.67E+02	2.57E-03	NA	--
ARSENIC	1.40E+01	4.79E+02	2.92E-02	3.00E+00	4.67E-06
BARIUM	1.60E+02	2.17E+05	7.37E-04	NA	--
BERYLLIUM	6.30E-01	2.29E+03	2.75E-04	6.95E+03	9.06E-11
CADMIUM	1.50E+01	9.97E+01	1.50E-01	9.26E+03	1.62E-09
CALCIUM	3.50E+04	EN	--	EN	--
CHROMIUM	5.50E+01	3.48E+03	1.58E-02	6.33E+00	8.69E-06
COBALT	3.50E+00	3.47E+02	1.01E-02	1.85E+03	1.89E-09
COPPER	4.80E+02	4.67E+04	1.03E-02	NA	--
CYANIDE	1.10E+01	1.47E+02	7.48E-02	NA	--
IRON	5.80E+04	8.18E+05	7.09E-02	NA	--
LEAD	2.60E+02	8.00E+02	3.25E-01	NA	--
MAGNESIUM	1.40E+03	EN	--	EN	--
MANGANESE	4.20E+02	2.56E+04	1.64E-02	NA	--
MERCURY	6.60E-01	4.56E+01	1.45E-02	NA	--
NICKEL	8.10E+00	1.82E+04	4.45E-04	6.41E+04	1.26E-10
POTASSIUM	3.20E+02	EN	--	EN	--
SELENIUM	1.80E+00	5.84E+03	3.08E-04	NA	--
SILVER	6.20E-02	5.84E+03	1.06E-05	NA	--
SODIUM	2.30E+03	EN	--	EN	--
THALLIUM	1.80E-01	1.17E+01	1.54E-02	NA	--
VANADIUM	3.10E+02	5.83E+03	5.32E-02	NA	--
ZINC	7.40E+01	3.50E+05	2.11E-04	NA	--
***Organics** (mg/kg)*					
2,4,6-TRICHLOROPHENOL	3.00E-02	8.21E+02	3.65E-05	2.09E+02	1.44E-10
2-METHYLNAPHTHALENE	1.40E-01	3.01E+03	4.65E-05	NA	--
2-NITROPHENOL	3.00E-02	NA	--	NA	--
ACENAPHTHENE	1.40E-01	4.52E+04	3.10E-06	NA	--
ACENAPHTHYLENE	1.20E-01	NA	--	NA	--
ACETONE	3.55E-01	1.05E+06	3.38E-07	NA	--
ANTHRACENE	3.20E-01	2.26E+05	1.42E-06	NA	--
BENZALDEHYDE	6.40E-02	1.17E+05	5.47E-07	8.18E+02	7.82E-11
BENZENE	5.45E-04	4.23E+02	1.29E-06	5.08E+00	1.07E-10
BENZO(G,H,I)PERYLENE	8.30E-01	NA	--	NA	--
BENZO[A]ANTHRACENE	1.80E+00	NA	--	2.06E+01	8.74E-08
BENZO[A]PYRENE	1.20E+00	2.22E+02	5.41E-03	2.11E+00	5.69E-07
BENZO[B]FLUORANTHENE	2.50E+00	NA	--	2.11E+01	1.18E-07
BENZO[K]FLUORANTHENE	9.20E-01	NA	--	2.11E+02	4.36E-09
BIS(2-ETHYLHEXYL) PHTHALATE (DEHP)	1.70E-01	1.64E+04	1.04E-05	1.64E+02	1.04E-09
CARBAZOLE	1.90E-01	NA	--	NA	--
CHRYSENE	2.20E+00	NA	--	2.11E+03	1.04E-09
CUMENE (ISOPROPYLBENZENE)	2.19E-03	9.95E+03	2.20E-07	NA	--
CYCLOHEXANE	1.84E-03	2.74E+04	6.72E-08	NA	--

Table E-3. PTSM Screening Evaluation for LRP 131-4L (soil; all depths) *(continued)*

Analyte	Exposure Point Concentration[1]	Noncarcinogenic Hazard Estimate: Industrial RSL[2,5]	Noncarcinogenic Hazard Estimate: Industrial HQ Estimate[3]	Carcinogenic Risk Estimate: Industrial RSL/ PRG[2,5,6]	Carcinogenic Risk Estimate: Industrial Risk Estimate[4]
***Organics** (mg/kg) continued*					
DIBENZ[AH]ANTHRACENE	2.30E-01	NA	--	2.11E+00	1.09E-07
DIBENZOFURAN	5.00E-02	1.17E+03	4.27E-05	NA	--
DICHLOROMETHANE (METHYLENE CHLORIDE)	2.17E-03	3.16E+03	6.87E-07	1.02E+03	2.13E-12
DIETHYL PHTHALATE	4.40E-01	6.57E+05	6.70E-07	NA	--
DI-N-BUTYL PHTHALATE	3.30E-01	8.21E+04	4.02E-06	NA	--
ENDOSULFAN II	1.50E-03	NA	--	NA	--
FLUORANTHENE	2.60E+00	3.01E+04	8.64E-05	NA	--
FLUORENE	6.20E-02	3.01E+04	2.06E-06	NA	--
INDENO[1,2,3-CD]PYRENE	8.90E-01	NA	--	2.11E+01	4.22E-08
M,P-XYLENE	1.33E-03	2.49E+03	5.34E-07	NA	--
METHYL ACETATE	4.25E-03	1.17E+06	3.63E-09	NA	--
METHYL ETHYL KETONE	2.40E-02	1.93E+05	1.24E-07	NA	--
METHYLCYCLOHEXANE	3.35E-03	4.12E+02	8.13E-06	NA	--
NAPHTHALENE	3.80E-02	5.85E+02	6.50E-05	8.57E+00	4.43E-09
N-DIOCTYL PHTHALATE	1.50E-01	8.21E+03	1.83E-05	NA	--
N-NITROSODIPROPYLAMINE	4.50E-01	NA	--	3.28E-01	1.37E-06
O-XYLENE	9.02E-04	2.79E+03	3.23E-07	NA	--
PHENANTHRENE	1.10E+00	NA	--	NA	--
PYRENE	2.30E+00	2.26E+04	1.02E-04	NA	--
STYRENE	1.11E-03	3.48E+04	3.19E-08	NA	--
TETRACHLOROETHYLENE (PCE)	2.40E-03	3.89E+02	6.17E-06	1.03E+02	2.33E-11
TOLUENE	1.98E-03	4.68E+04	4.23E-08	NA	--
***Pesticides/PCBs** (mg/kg)*					
AROCLOR 1254	4.10E+00	1.47E+01	2.79E-01	9.72E-01	4.22E-06
DDE	2.70E-03	5.84E+02	4.62E-06	9.28E+00	2.91E-10
DDT	1.50E-02	5.18E+02	2.90E-05	8.53E+00	1.76E-09
GAMMA-CHLORDANE	3.10E-03	4.51E+02	6.87E-06	7.66E+00	4.05E-10
METHOXYCHLOR	9.20E-03	4.10E+03	2.24E-06	NA	--
***Radionuclides** (pCi/g)*					
AMERICIUM-243	6.23E-02	NA	--	2.59E-01	2.41E-07
PLUTONIUM-238	6.99E-01	NA	--	1.41E+01	4.95E-08
PLUTONIUM-239/240	8.59E-02	NA	--	1.22E+01	7.03E-09
POTASSIUM-40	5.64E+00	NA	--	2.19E-01	2.58E-05
STRONTIUM-90	3.67E-01	NA	--	9.00E+00	4.08E-08

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Table E-3. PTSM Screening Evaluation for LRP 131-4L (soil; all depths) *(continued/end)*

Analyte	Exposure Point Concentration[1]	Noncarcinogenic Hazard Estimate: Industrial RSL[2,5]	Noncarcinogenic Hazard Estimate: Industrial HQ Estimate[3]	Carcinogenic Risk Estimate: Industrial RSL/ PRG[2,5,6]	Carcinogenic Risk Estimate: Industrial Risk Estimate[4]
Radionuclides *(pCi/g)*					
THORIUM-232	2.95E+00	NA	--	1.53E-02	--
RADIUM-228	1.94E+00	NA	--	1.53E-02	--
ACTINIUM-228	4.70E+00	NA	--	1.53E-02	3.07E-04
THORIUM-228	3.13E+00	NA	--	1.53E-02	--
LEAD-212	3.92E+00	NA	--	1.53E-02	--
URANIUM-238	1.57E+00	NA	--	2.00E-02	--
URANIUM-233/234	2.11E+00	NA	--	2.00E-02	--
THORIUM-230	2.71E+00	NA	--	2.00E-02	--
RADIUM-226	1.85E+00	NA	--	2.00E-02	--
LEAD-214	3.05E+00	NA	--	2.00E-02	1.53E-04
URANIUM-235	1.47E-01	NA	--	7.31E-02	2.01E-06
		Hazard Index	1.10E+00	**Cumulative Risk**	5.08E-04
		PTSM?[7]	no	**PTSM?[8]**	no

1 - Exposure Point Concentration (EPC) - maximum detected concentration from all depths, soil media from Table A.4.3 in Appendix A.
2 - Nonradiological Regional Screening Levels (RSLs) are industrial soil default values from the USEPA RSLs website, accessed December 2023 (see Attachment E-1). Radiological Preliminary Remediation Goals (PRGs) are industrial soil default values from the USEPA Radionuclide PRGs for Superfund website, accessed December 2023 (see Attachment E-2).
3 - Industrial Hazard Estimate = EPC/RSL
4 - Industrial Risk Estimate = (EPC/[RSL or PRG])*1E-06
5 - RSL for hexavalent chromium (most conservative) used.
6 - For radionuclides within a decay chain (i.e., thorium-232, uranium-235, uranium-238) the most conservative EPC (highest activity) within each series is used to estimate the risk. Risk is calculated using parent PRG.
7 - Waste unit potentially has principal threat source material (PTSM) if Hazard Index (HI) ≥ 10 for noncarcinogenic constituents.
8 - Waste unit potentially has PTSM if cumulative risk ≥ 1E-03 for carcinogenic constituents.
EN - essential nutrient; NA - not available

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Attachment E-1. USEPA Regional Screening Levels Website: Default Regional Screening Levels (RSLs) for Composite Worker (i.e., Industrial Worker) Scenario

(November 2023 update)
(Website accessed December 2023)

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Attachment E-1. Default Regional Screening Levels (RSLs) for Composite Worker (i.e., Industrial Worker) Scenario

Contaminant	Carcinogenic TR = 1E-06				Noncarcinogenic HI=1			
Analyte	Ingestion SL TR=1E-06 (mg/kg)	Dermal SL TR=1E-06 (mg/kg)	Inhalation SL TR=1E-06 (mg/kg)	Carcinogenic SL TR=1E-06 (mg/kg)	Ingestion SL THQ=1 (mg/kg)	Dermal SL THQ=1 (mg/kg)	Inhalation SL THQ=1 (mg/kg)	Noncarcinogenic THQ=1 (mg/kg)
Inorganics								
ALUMINUM	-	-	-	NA	1.17E+06	-	2.98E+07	1.12E+06
ANTIMONY	-	-	-	NA	4.67E+02	-	1.79E+06	4.67E+02
ARSENIC	3.63E+00	1.72E+01	3.88E+03	3.00E+00	5.84E+02	2.76E+03	8.93E+04	4.79E+02
BARIUM	-	-	-	NA	2.34E+05	-	2.98E+06	2.17E+05
BERYLLIUM	-	-	6.95E+03	6.95E+03	2.34E+03	-	1.19E+05	2.29E+03
CADMIUM	-	-	9.26E+03	9.26E+03	1.17E+02	6.90E+02	5.95E+04	9.97E+01
CALCIUM	-	-	-	NA	-	-	-	NA
CHROMIUM	6.54E+00	-	1.98E+02	6.33E+00	3.50E+03	-	5.95E+05	3.48E+03
COBALT	-	-	1.85E+03	1.85E+03	3.50E+02	-	3.57E+04	3.47E+02
COPPER	-	-	-	NA	4.67E+04	-	-	4.67E+04
CYANIDE	-	-	-	NA	7.01E+02	-	1.87E+02	1.47E+02
IRON	-	-	-	NA	8.18E+05	-	-	8.18E+05
LEAD	-	-	-	NA	-	-	-	NA
MAGNESIUM	-	-	-	NA	-	-	-	NA
MANGANESE	-	-	-	NA	2.80E+04	-	2.98E+05	2.56E+04
MERCURY	-	-	-	NA	-	-	4.56E+01	4.56E+01
NICKEL	-	-	6.41E+04	6.41E+04	2.34E+04	-	8.34E+04	1.82E+04
POTASSIUM	-	-	-	NA	-	-	-	NA
SELENIUM	-	-	-	NA	5.84E+03	-	1.19E+08	5.84E+03
SILVER	-	-	-	NA	5.84E+03	-	-	5.84E+03
SODIUM	-	-	-	NA	-	-	-	NA
THALLIUM	-	-	-	NA	1.17E+01	-	-	1.17E+01
VANADIUM	-	-	-	NA	5.89E+03	-	5.95E+05	5.83E+03
ZINC	-	-	-	NA	3.50E+05	-	-	3.50E+05

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Attachment E-1. Default Regional Screening Levels (RSLs) for Composite Worker (i.e., Industrial Worker) Scenario *(continued)*

Contaminant	Carcinogenic TR = 1E-06				Noncarcinogenic HI=1			
Analyte	Ingestion SL TR=1E-06 (mg/kg)	Dermal SL TR=1E-06 (mg/kg)	Inhalation SL TR=1E-06 (mg/kg)	Carcinogenic SL TR=1E-06 (mg/kg)	Ingestion SL THQ=1 (mg/kg)	Dermal SL THQ=1 (mg/kg)	Inhalation SL THQ=1 (mg/kg)	Noncarcinogenic THQ=1 (mg/kg)
Organics								
1,1'-BIPHENYL	4.09E+02	-	-	4.09E+02	5.84E+05	-	2.00E+02	2.00E+02
1,1-DICHLOROETHYLENE	-	-	-	NA	5.84E+04	-	1.01E+03	9.95E+02
2-METHYLNAPHTHALENE	-	-	-	NA	4.67E+03	8.49E+03	-	3.01E+03
2,4,6-TRICHLOROPHENOL	2.97E+02	7.02E+02	5.38E+06	2.09E+02	1.17E+03	2.76E+03	-	8.21E+02
2-HEXANONE	-	-	-	NA	5.84E+03	-	1.75E+03	1.34E+03
2-NITROPHENOL	-	-	-	NA	-	-	-	NA
4-NITROPHENOL	-	-	-	NA	-	-	-	NA
ACENAPHTHENE	-	-	-	NA	7.01E+04	1.27E+05	-	4.52E+04
ACENAPHTHYLENE	-	-	-	NA	-	-	-	NA
ACETONE	-	-	-	NA	1.05E+06	-	-	1.05E+06
ANTHRACENE	-	-	-	NA	3.50E+05	6.37E+05	-	2.26E+05
BENZALDEHYDE	8.18E+02	-	-	8.18E+02	1.17E+05	-	-	1.17E+05
BENZENE	5.95E+01	-	5.56E+00	5.08E+00	4.67E+03	-	4.65E+02	4.23E+02
BENZO(G,H,I)PERYLENE	-	-	-	NA	-	-	-	NA
BENZO[A]ANTHRACENE	3.27E+01	5.94E+01	8.99E+02	2.06E+01	-	-	-	NA
BENZO[A]PYRENE	3.27E+00	5.94E+00	2.78E+04	2.11E+00	3.50E+02	6.37E+02	1.19E+04	2.22E+02
BENZO[B]FLUORANTHENE	3.27E+01	5.94E+01	2.78E+05	2.11E+01	-	-	-	NA
BENZO[K]FLUORANTHENE	3.27E+02	5.94E+02	2.78E+06	2.11E+02	-	-	-	NA
BIS(2-ETHYLHEXYL)PHTHALATE (DEHP)	2.34E+02	5.52E+02	6.95E+06	1.64E+02	2.34E+04	5.52E+04	-	1.64E+04
BUTYL BENZYL PHTHALATE	1.72E+03	4.07E+03	-	1.21E+03	2.34E+05	5.52E+05	-	1.64E+05
CARBAZOLE	-	-	-	NA	-	-	-	NA
CARBON DISULFIDE	-	-	-	NA	1.17E+05	-	3.58E+03	3.47E+03
CHRYSENE	3.27E+03	5.94E+03	2.78E+07	2.11E+03	-	-	-	NA

Attachment E-1. Default Regional Screening Levels (RSLs) for Composite Worker (i.e., Industrial Worker) Scenario *(continued)*

Contaminant	Carcinogenic TR = 1E-06				Noncarcinogenic HI=1			
Analyte	Ingestion SL TR=1E-06 (mg/kg)	Dermal SL TR=1E-06 (mg/kg)	Inhalation SL TR=1E-06 (mg/kg)	Carcinogenic SL TR=1E-06 (mg/kg)	Ingestion SL THQ=1 (mg/kg)	Dermal SL THQ=1 (mg/kg)	Inhalation SL THQ=1 (mg/kg)	Noncarcinogenic THQ=1 (mg/kg)
Organics (continued)								
CUMENE (ISOPROPYLBENZENE)	-	-	-	NA	1.17E+05	-	1.09E+04	9.95E+03
CYCLOHEXANE	-	-	-	NA	-	-	2.74E+04	2.74E+04
DIBENZ[AH]ANTHRACENE	3.27E+00	5.94E+00	2.78E+04	2.11E+00	-	-	-	NA
DIBENZOFURAN	-	-	-	NA	1.17E+03	-	-	1.17E+03
DICHLOROMETHANE (METHYLENE CHLORIDE)	1.64E+03	-	2.69E+03	1.02E+03	7.01E+03	-	5.76E+03	3.16E+03
DIETHYL PHTHALATE	-	-	-	NA	9.34E+05	2.21E+06	-	6.57E+05
DI-N-BUTYL PHTHALATE	-	-	-	NA	1.17E+05	2.76E+05	-	8.21E+04
ENDOSULFAN II	-	-	-	NA	-	-	-	NA
FLUORANTHENE	-	-	-	NA	4.67E+04	8.49E+04	-	3.01E+04
FLUORENE	-	-	-	NA	4.67E+04	8.49E+04	-	3.01E+04
HEXACHLOROBUTADIENE	4.19E+01	-	6.01E+00	5.26E+00	1.17E+03	-	-	1.17E+03
INDENO[1,2,3-CD]PYRENE	3.27E+01	5.94E+01	2.78E+05	2.11E+01	-	-	-	NA
M,P-XYLENE	-	-	-	NA	2.34E+05	-	2.39E+03	2.37E+03
METHYL ACETATE	-	-	-	NA	1.17E+06	-	-	1.17E+06
METHYL ETHYL KETONE	-	-	-	NA	7.01E+05	-	2.67E+05	1.93E+05
METHYLCYCLOHEXANE	-	-	-	NA	-	4.12E+02	4.12E+02	NA
METHYL TERTIARY BUTYL ETHER (MTBE)	1.82E+03	-	2.31E+02	2.05E+02	-	-	6.44E+04	6.44E+04
NAPHTHALENE	2.73E+01	4.95E+01	1.67E+01	8.57E+00	2.34E+04	4.25E+04	6.09E+02	5.85E+02
N-DIOCTYL PHTHALATE	-	-	-	NA	1.17E+04	2.76E+04	-	8.21E+03
N-NITROSODIPHENYLAMINE	6.67E+02	1.58E+03	6.41E+06	4.69E+02	-	-	-	NA
N-NITROSODIPROPYLAMINE	4.67E-01	1.10E+00	8.34E+03	3.28E-01	-	-	-	NA
O-XYLENE	-	-	-	NA	2.34E+05	-	2.82E+03	2.79E+03
PHENANTHRENE	-	-	-	NA	-	-	-	NA

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Attachment E-1. Default Regional Screening Levels (RSLs) for Composite Worker (i.e., Industrial Worker) Scenario *(continued/end)*

Contaminant	Carcinogenic TR = 1E-06				Noncarcinogenic HI=1			
Analyte	Ingestion SL TR=1E-06 (mg/kg)	Dermal SL TR=1E-06 (mg/kg)	Inhalation SL TR=1E-06 (mg/kg)	Carcinogenic SL TR=1E-06 (mg/kg)	Ingestion SL THQ=1 (mg/kg)	Dermal SL THQ=1 (mg/kg)	Inhalation SL THQ=1 (mg/kg)	Noncarcinogenic THQ=1 (mg/kg)
Organics (continued)								
PYRENE	-	-	-	NA	3.50E+04	6.37E+04	-	2.26E+04
STYRENE	-	-	-	NA	2.34E+05	-	4.09E+04	3.48E+04
TETRACHLOROETHYLENE (PCE)	1.56E+03	-	1.11E+02	1.03E+02	7.01E+03	-	4.11E+02	3.89E+02
TOLUENE	-	-	-	NA	9.34E+04	-	9.39E+04	4.68E+04
XYLENES	-	-	-	NA	2.34E+05	-	2.51E+03	2.49E+03
Pesticides/PCBs								
AROCLOR 1254	1.64E+00	2.76E+00	1.81E+01	9.72E-01	2.34E+01	3.94E+01	-	1.47E+01
AROCLOR 1260	1.64E+00	2.76E+00	2.82E+01	9.91E-01	-	-	-	NA
DDE	9.62E+00	-	2.65E+02	9.28E+00	5.84E+02	-	-	5.84E+02
DDT	9.62E+00	7.58E+01	1.72E+05	8.53E+00	5.84E+02	4.60E+03	-	5.18E+02
GAMMA-CHLORDANE	-	-	-	NA	5.84E+02	3.45E+03	-	4.99E+02
METHOXYCHLOR	-	-	-	NA	5.84E+03	1.38E+04	-	4.10E+03

HI – hazard index
SL – screening level
THI – target hazard index THQ – target hazard quotient
TR – target risk

Attachment E-2. USEPA Radionuclide Preliminary Remediation Goals for Superfund Website: Default Preliminary Remediation Goals (PRGs) for Composite Worker (i.e., Industrial Worker) Scenario

(February 2023 update)
(Website accessed December 2023)

Attachment E-2. Default Preliminary Remediation Goals (PRGs) for Composite Worker (i.e., Industrial Worker) Scenario

Isotope	Composite Worker Soil Total PRG* (pCi/g)
AMERICIUM-243	2.59E-01
CESIUM-137	9.07E-02
CURIUM-245/246	5.95E-01
PLUTONIUM-238	1.41E+01
PLUTONIUM-239/240	1.22E+01
PLUTONIUM-242	1.26E+01
POTASSIUM-40	2.19E-01
PROMETHIUM-147	1.07E+04
STRONTIUM-90	9.00E+00
THORIUM-232	1.53E-02
URANIUM-235	2.00E-02
URANIUM-238	7.31E-02

PRG – preliminary remediation goals
*Output generated from EPA February 2023 PRG Summary Table

APPENDIX F

RISK-BASED CLEANUP LEVEL CALCULATIONS

Preliminary Remediation Goals

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LIST OF ABBREVIATIONS AND ACRONYMS

ARAR	applicable or relevant and appropriate requirement
CM	contaminant migration
ECO	ecological
ECODS	Early Construction and Operational Disposal Site
COC	constituent of concern
HH	human health
LRP	L-Area Rubble Pile
NBN	no building number
OU	operable unit
PRG	preliminary remediation goal
PTSM	principal threat source material
RCOC	refined constituent of concern

F-1. INTRODUCTION

Risk-based cleanup levels, i.e., preliminary remediation goals (PRGs) for the Early Construction and Operational Disposal Site (ECODS) L-3 no building number (NBN), L-Area Rubble Pile (131-1L) (LRP 131-1L), and L-Area Rubble Pile (131-4L) (LRP 131-4L) Operable Unit (OU) are presented in this appendix.

F-2. APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS PRGS

As presented in the Remedial Investigation (Chapter 3), polychlorinated biphenyls (PCBs) (Aroclor 1254 and Aroclor 1260) exceed the Toxic Substances Control Act (TSCA) applicable or relevant and appropriate requirement (ARAR) of 1 mg/kg for high occupancy (i.e., unrestricted land use) in surface soil at the ECODS L-3 subunit. The TSCA ARAR is provided in Table F-1 for comparison.

There are no applicable or relevant and appropriate requirements (ARAR) refined constituents of concern (RCOCs) identified in surface soil media within the LRP 131-1L and LRP 131-4L OU. Therefore, no ARAR PRGs are presented for these subunits.

F-3. CONTAMINANT MIGRATION PRGS

The contaminant migration (CM) analysis is presented in Appendix B of this document. No CM RCOCs were identified for any subunits within the ECODS L-3, LRP 131-1L, and LRP 131-4L OU. Therefore, CM PRGs are not developed in this appendix.

F-4. HUMAN HEALTH PRGS

The human health (HH) risk assessment is presented in Appendix C of this document. HH RCOCs were identified in surface soil media at the ECODS L-3 subunit for Aroclor 1254 and Aroclor 1260 (residential scenario). HH RCOCs were identified in surface soil at the LRP 131-4L for benzo(a)pyrene (residential scenario). No HH RCOCs were identified for the LRP 131-1L subunit surface soil.

Risk-based PRGs are based on the regional screening levels presented in Appendix C and are calculated for these two exposure scenarios at a hazard quotient (HQ) of 0.1, 1, and 3 for noncarcinogenic health effects and a various target risk levels (1E-06, 1E-05, 1E-04) for carcinogenic effects. The HH PRGs for the ECODS L-3 (surface soil) and the LRP 131-4L (surface soil) subunits are provided in Table F-1.

F-5. ECOLOGICAL PRGS

The ecological risk assessment is presented in Appendix D of this document. No ecological RCOCs were identified for soil media for ECODS L-3, LRP 131-1L and 131-4L OU. Therefore, ecological PRGs are not developed in this appendix.

F-6. PRINCIPAL THREAT SOURCE MATERIAL PRGS

The principal threat source material (PTSM) evaluation is presented in Appendix E of this document. No PTSM RCOCs were identified for ECODS L-3, LRP 131-1L, and LRP 131-4L OU. Therefore, no PTSM PRGs are presented.

Table F-1. Human Health Risk-Based PRGs for ECODS L-3, LRP 131-1L, and LRP 131-4L OU

HH RCOC	Resident (mg/kg)						TSCA ARAR (mg/kg)
	Risk=1E-06	Risk=1E-05	Risk=1E-04	HQ = 0.1	HQ = 1	HQ = 3	High Occupancy*
ECODS L-3 surface soil (0 to 0.3 m [0 to 1 ft])							
Aroclor 1254	0.24	2.4	24	0.117	1.17	3.51	1.0
Aroclor 1260	0.24	2.4	24	--	--	--	1.0
LRP 131-4L surface soil (0 to 0.3 m [0 to 1 ft])							
Benzo(a)pyrene	0.12	1.2	12	1.78	17.8	53.4	--

-- = Not applicable

* For comparison purposes the PCB TSCA ARAR threshold for high-occupancy is presented for Aroclor 1254 and Aroclor 1260 (see Section 3.10).

Note: Risk-based Preliminary Remediation Goals (PRGs) are based on the Regional Screening Levels (RSLs) (1E-06) from the USEPA RSLs website for nonradiological constituents and PRGs (1E-06) from the USEPA PRG website for radiological constituents that are provided in Appendix C.

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APPENDIX G

NATURAL RESOURCE INJURY EVALUATION CHECKLIST

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NATURAL RESOURCE INJURY EVALUATION CHECKLIST

This checklist is provided to assist project teams in determining the potential for natural resource injuries in the conduct and planning of remedial activities. For the most part, the questions only require a simple 'yes/no' or 'to be determined' response. Some require a short answer or explanation. However, it is in the best interest of the project team to be as complete as possible and add any relevant information.

Five main areas are being evaluated, as follows:

- Are there potential natural resource injuries and what do they consist of?
- What are the potential impacts from implementing the remedial alternatives?
- Are there potential residual injuries that will not be addressed by the alternative?
- Would implementation of the alternative cause additional injuries?
- What potential irreversible and irretrievable resources may be identified?

The checklist may be re-visited and revised as Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) activities continue and additional information from the Early Construction and Operational Disposal Site (ECODS) L-3 no building number (NBN), L-Area Rubble Pit 131-1L (LRP 131-1L), and L-Area Rubble Pit 131-4L (LRP 131-4L) Operable Unit (OU) (ECODS L-3, LRP 131-1L, and LRP 131-4L OU) becomes available.

1. Has a release of a hazardous substance occurred?

Yes. OU-related constituents of concern (COCs) were identified in soil media (polychlorinated biphenyls [PCBs], i.e., Aroclor 1254 and Aroclor 1260) associated with the ECODS L-3 subunit and benzo(a)pyrene for the LRP 131-4L subunit. Exposure to these constituents under a residential scenario may result in risk exceeding the upper bound of the CERCLA risk range. Additionally, asbestos-containing materials were identified as problems warranting action in soils at both of these subunits. There is no indication of any hazardous substances released that would cause a natural resource injury at the LRP 131-1L subunit.

2a. Have natural resources for which Federal or State agencies (or Indian Tribes) may assert trusteeship under CERCLA been or are likely to have been adversely affected by the release?

Yes. Natural resources are defined by Section 101(16) of CERCLA as "land, fish, wildlife, biota, air, water, groundwater, drinking water supplies, and other such resources." The National Oil and Hazardous Substances Pollution Contingency Plan Section 300.600(b) indicates that natural resources may include not only the environmental organisms and abiotic resources, but the "supporting ecosystems associated with the biotic resources" as well. Resources are categorized into five groups: 1) surface water resources, 2) groundwater resources, 3) air resources, 4) geologic resources, and 5) biological resources. Resources can also be classified as direct use (i.e., drinking water, hunting, etc.) or nonuse (i.e., aesthetic value or existence). Nonuse services do not require physical or visual contact between people and the resource. Nonuse resources include resources that provide well-being for people (or other flora/fauna) because they exist (e.g., nesting sites, threatened and endangered species, natural areas, etc.).

While COCs are associated with soil media, there is no indication that constituents present in these media have migrated to surrounding soil or to underlying groundwater.

2b. List the potentially affected resources (e.g., ground water, waterfowl, etc.).

Localized soil.

3. Is the amount of hazardous substance released sufficient to potentially cause a natural resource injury?

Yes. The COCs previously identified in checklist item #1 and asbestos-containing materials will likely prevent unrestricted use of the land at the ECODS L-3 and LRP 131-4L subunits. No COCs are identified for the LRP-1L subunit, and land use restrictions are not warranted.

4. Will the remedial alternatives being considered, or action already taken, sufficiently address the injuries to natural resources (including residual injuries)?

Remedial alternatives are identified and evaluated in the Corrective Measures Study/Feasibility Study (Section 5) to address soil media associated with the ECODS

L-3 and LRP 131-4L subunits. LRP 131-1L was determined not to require a remedial action. Each alternative will be evaluated as to whether it would be protective of human health and the environment.

5. Will the remedial alternatives being considered produce additional impacts to natural resources during remediation?

Each alternative for the ECODS L-3 and LRP 131-4L subunits is evaluated as to whether it would impact surrounding natural resources during and after implementation.

The potential costs for addressing resource injuries during remedial action implementation will be taken into consideration when selecting a remedial alternative. The liability (damage) associated with resource injuries could drive the cost of the intended best or lowest cost alternative.

6. Identify any irreversible and/or irretrievable resource losses in the appropriate documentation.

No irreversible and/or irretrievable resource losses are known to exist associated with the remedial action options developed for the ECODS L-3, LRP 131-1L, and LRP 131-4L OU.

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APPENDIX H

DETAILED COST ESTIMATES

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Table H-1. ECODS L-3 – Alternative A-2: Land Use Controls

Institutional Controls Estimate
Alternative A-2
Land Use Controls Only - ECODS L-3

Item	Quantity	Units	Unit Cost	Total Cost
Direct Capital Costs				
ECODS L-3				
Institutional Controls				
Posting of Warning Signs	4	ea	$500	$2,000
Land Use Control Implementation Plan	1	ea	$5,000	$5,000
Deed Restrictions	1	ea	$5,000	$5,000
Subtotal - Direct Capital Cost				$12,000
Mobilization/Demobilization	9%	of subtotal direct capital		$1,080
Site Preparation/Site Restoration	9%	of subtotal direct capital		$1,080
Total Direct Capital Cost				**$14,160**
Indirect Capital Costs				
Engineering & Design	14%	of direct capital		$1,982
Project/Construction Management	25%	of direct capital		$3,540
Health & Safety	6%	of direct capital		$850
Overhead	30%	of direct capital + indirect capital		$6,160
Contingency	26%	of direct capital + indirect capital		$5,338
Total Indirect Capital Cost				**$17,870**
Total Estimated Capital Cost				**$32,030**
Direct O&M Costs	1.2%	3 Year Discount Rate [1]		
Annual Costs (Existing System during Post-ROD Design & Const)	2	years O&M		*Years 2027-2028*
Access Controls	1	ea	$500	$500
Maintenance	1	ea	$1,425	$1,425
Subtotal - Annual Costs				$1,925
Present Value Cost				**$3,782**
	2.0%	30 Year Discount Rate [1]		
Annual Costs	30	years O&M		*Years 2028-2057*
Access Controls	1	ea	$500	$500
Annual Inspection/Maintenance	1	ea	$1,425	$1,425
Subtotal - 30 Year Annual Costs				$1,925
Present Value Cost				**$43,118**
Five Year Costs	6			
Remedy Review	1	ea	$15,000	$15,000
Subtotal - Five Year O&M Costs				$15,000
Present Value Cost				**$64,555**
Total Present Value Direct O&M Cost				**$111,456**

Table H-1. ECODS L-3 – Alternative A-2: Land Use Controls *(continued/end)*

Institutional Controls Estimate
Alternative A-2
Land Use Controls Only - ECODS L-3

Indirect O&M Costs			
Project/Admin Management	146%	of direct O&M	$162,725
Health & Safety	19%	of direct O&M	$21,177
Overhead	30%	of direct O&M + indirect O&M	$33,437
Contingency	20%	of direct O&M + indirect O&M	$21,734
Total Present Worth Indirect O&M Cost			$239,072
Total Estimated Present Worth O&M Cost			**$350,528**
TOTAL ESTIMATED COST			**$382,557**

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Interest rates for costs with 3-year and 30-year durations are based on SRNS Technical Memorandum ERTEC-2017-00002.
Real Interest Rates for OMB Circular No. A-94
Treasury Notes and Bonds of Specified Maturities

Table H-2. ECODS L-3 – Alternative A-3: Soil Cover with Land Use Controls

ECODS L-3 Soil Cover Estimate
Alternative A-3
Class II Soil Cover with LUCs

Item	Quantity	Units	Unit Cost	Total Cost
Direct Capital Costs				
ECODS L-3				
Clearing and Grubbing				
Clear Vegetation and Debris, Stockpile at Site Perimeter	0.504	ac	$2,600	$1,310
Clear Trees and Grub Stumps, Stockpile at Site Perimeter	0.504	ac	$4,500	$2,267
Close In-Situ ECODS L-3 w/ SCDHEC Class II Cover system				
Access Road	2,640	lf	$12	$31,680
Construct SCDHEC Class II Cover system				
Design	1	ea	$233,000	$233,000
Site Layout and Surveys w/ As-Builts	0.504	ac	$3,000	$1,511
Eqipment mobilization	1	ea	$55,680	$55,680
Contour for slope	1,650	yd3	$3.59	$5,924
Common Backfill (20 Inches)	611.1	yd3	$13	$7,944
Topsoil (4 Inches)	122.2	yd3	$35	$4,278
Sod	1,100	yd2	$5	$5,500
Backfill Sampling / Analysis	2	ea	$1,200	$2,400
Stormwater Management	550.4	lf	$25	$13,759
Institutional Controls				
Posting of Warning Signs	4	ea	$500	$2,000
Land Use Control Implementation Plan	1	ea	$5,000	$5,000
Deed Restrictions	1	ea	$5,000	$5,000
Subtotal - Direct Capital Cost				$377,253
Mobilization/Demobilization	9%	of subtotal direct capital		$33,953
Site Preparation/Site Restoration	9%	of subtotal direct capital		$33,953
Total Direct Capital Cost				**$445,159**
Indirect Capital Costs				
Engineering & Design	14%	of direct capital		$62,322
Project/Construction Management	25%	of direct capital		$111,290
Health & Safety	6%	of direct capital		$26,710
Overhead	30%	of direct capital + indirect capital		$193,644
Contingency	26%	of direct capital + indirect capital		$167,825
Total Indirect Capital Cost				**$561,791**
Total Estimated Capital Cost				**$1,006,950**
Direct O&M Costs	1.2%	3 Year Discount Rate [1]		
Annual Costs (Existing System during Post-ROD Design & Const)	2	years O&M		*Years 2027-2028*
Access Controls	1	ea	$500	$500
Maintenance	1	ea	$1,425	$1,425
Subtotal - Annual Costs				$1,925
Present Value Cost				**$3,782**
	2.0%	30 Year Discount Rate [1]		
Annual Costs	30	years O&M		*Years 2028-2057*
Access Controls	1	ea	$500	$500
Annual Inspection/Maintenance	1	ea	$1,425	$1,425
Subtotal - 30 Year Annual Costs				$1,925
Present Value Cost				**$43,118**

Table H-2. ECODS L-3 – Alternative A-3: Soil Cover with Land Use Controls *(continued/end)*

ECODS L-3 Soil Cover Estimate
Alternative A-3
Class II Soil Cover with LUCs

Five Year Costs	6			
Remedy Review	1	ea	$15,000	$15,000
Subtotal - Five Year O&M Costs				$15,000
Present Value Cost				**$64,555**
Total Present Value Direct O&M Cost				**$111,456**
Indirect O&M Costs				
Project/Admin Management	146%	of direct O&M		$68,475
Health & Safety	19%	of direct O&M		$8,911
Overhead	30%	of direct O&M + indirect O&M		$19,952
Contingency	20%	of direct O&M + indirect O&M		$12,969
Total Present Worth Indirect O&M Cost				**$110,307**
Total Estimated Present Worth O&M Cost				**$221,762**
TOTAL ESTIMATED COST				**$1,228,712**

[1] Interest rates for costs with 3-year and 30-year durations are based on SRNS Technical Memorandum ERTEC-2017-00002.
Real Interest Rates for OMB Circular No. A-94
Treasury Notes and Bonds of Specified Maturities

Table H-3. ECODS L-3 – Alternative A-4: Excavate and Haul

ECODS L-3 Excavate & Haul
Alternative A-4
Excavate & Haul ECODS L-3 to 3 Rivers Landfill

Item	Quantity	Units	Unit Cost	Total Cost
Direct Capital Costs				
3RLF				
Landfill Disposal Fees				
ECODS L-3	7,333	yd^3	$65.00	$476,667
ECODS L-3				
Clearing and Grubbing				
Clear Vegetation and Debris, Stockpile at Site Perimeter	0.504	ac	$2,600	$1,310
Clear Trees and Grub Stumps, Stockpile at Site Perimeter	0.504	ac	$4,500	$2,267
Access Road	1,320	lf	$12	$15,840
Excavate, Truck Haul and Dump Soil For Off-Unit Disposal				
Excavate & Load Contaminated Soil for Hauling	7,333	yd3	$3.59	$26,327
Truck Haul Contaminated Soil to Disposal Site	8,800	yd3	$18.72	$164,736
Backfill / Compact Soil at Disposal Site	8,800	yd3	$2.50	$22,000
Confirmation Sampling / Analysis	2	ea	$1,000	$2,000
Stormwater Management	550	lf	$25	$13,759
Site Restoration				
Eqipment mobilization	1	ea	$55,680	$55,680
Contour Site After Contaminated Soil Removal	0.38	ac	$1,700	$644
Common Backfill (144 Inches)	8,800	yd3	$13	$114,400
Topsoil (4 Inches)	244	yd3	$35	$8,556
Fertilizer, Lime, Seed & Mulch	2,200	yd2	$0.75	$1,650
Backfill Sampling / Analysis	10	ea	$1,200	$12,000
Subtotal - Direct Capital Cost				$441,169
Mobilization/Demobilization	9%	of subtotal direct capital		$39,705
Site Preparation/Site Restoration	9%	of subtotal direct capital		$39,705
Total Direct Capital Cost				**$520,579**
Indirect Capital Costs				
Engineering & Design	14%	of direct capital		$72,881
Project/Construction Management	25%	of direct capital		$130,145
Health & Safety	6%	of direct capital		$31,235
Overhead	30%	of direct capital + indirect capital		$226,452
Contingency	26%	of direct capital + indirect capital		$196,258
Total Indirect Capital Cost				**$656,971**
Total Estimated Capital Cost				**$1,654,216**

Table H-3. ECODS L-3 – Alternative A-4: Excavate and Haul *(continued/end)*

ECODS L-3 Excavate & Haul
Alternative A-4
Excavate & Haul ECODS L-3 to 3 Rivers Landfill

Direct O&M Costs				
O&M Costs for Site Restoration	1.2%	3 Year Discount Rate [1]		
Annual Costs (Existing System during Post-ROD Design & Const)	2	years O&M		*Years 2027-2028*
Access Controls	0	ea	$500	$0
Maintenance	0	ea	$338	$0
Subtotal - Annual Costs				$0
Present Value Cost				**$0**
	2.0%	30 Year Discount Rate [1]		
Annual Costs	30	years O&M		*Years 2028-2057*
Access Controls	0	ea	$500	$0
Annual Inspection/Maintenance	0	ea	$338	$0
Subtotal - 30 Year Annual Costs				$0
Present Value Cost				**$0**
Five Year Costs	0			
Remedy Review	0	ea	$15,000	$0
Subtotal - Five Year O&M Costs				$0
Present Value Cost				**$0**
Total Present Value Direct O&M Cost				**$0**
Indirect O&M Costs				
Project/Admin Management	146%	of direct O&M		$0
Health & Safety	19%	of direct O&M		$0
Overhead	30%	of direct O&M + indirect O&M		$0
Contingency	20%	of direct O&M + indirect O&M		$0
Total Present Worth Indirect O&M Cost				$0
Total Estimated Present Worth O&M Cost				**$0**
TOTAL ESTIMATED COST				**$1,654,216**

[1] Interest rates for costs with 3-year and 30-year durations are based on SRNS Technical Memorandum ERTEC-2017-00002.
Real Interest Rates for OMB Circular No. A-94
Treasury Notes and Bonds of Specified Maturities

Table H-4. LRP 131-4L – Alternative B-2: Land Use Controls

Institutional Controls Estimate

Alternative B-2
Land Use Controls Only 131-4L

Item	Quantity	Units	Unit Cost	Total Cost
Direct Capital Costs				
131-4L				
Confirmatory Borings				
Drill/core 12 rotosonic soil borings to 16ft for waste verification	1	ea	$29,031	$29,031
Technical Oversight	1	ea	$24,238	$24,238
Institutional Controls				
Posting of Warning Signs	4	ea	$500	$2,000
Land Use Control Implementation Plan	1	ea	$5,000	$5,000
Deed Restrictions	1	ea	$5,000	$5,000
Subtotal - Direct Capital Cost				$65,269
Mobilization/Demobilization	9%	of subtotal direct capital		$5,874
Site Preparation/Site Restoration	9%	of subtotal direct capital		$5,874
Total Direct Capital Cost				**$77,017**
Indirect Capital Costs				
Engineering & Design	14%	of direct capital		$10,782
Project/Construction Management	25%	of direct capital		$19,254
Health & Safety	6%	of direct capital		$4,621
Overhead	30%	of direct capital + indirect capital		$33,502
Contingency	26%	of direct capital + indirect capital		$29,035
Total Indirect Capital Cost				**$97,196**
Total Estimated Capital Cost				**$174,213**
Direct O&M Costs	1.2%	3 Year Discount Rate [1]		
Annual Costs (Existing System during Post-ROD Design & Const)	2	years O&M		*Years 2027-2028*
Access Controls	1	ea	$500	$500
Maintenance	1	ea	$1,894	$1,894
Subtotal - Annual Costs				$2,394
Present Value Cost				**$4,702**
	2.0%	30 Year Discount Rate [1]		
Annual Costs	30	years O&M		*Years 2028-2057*
Access Controls	1	ea	$500	$500
Annual Inspection/Maintenance	1	ea	$1,894	$1,894
Subtotal - 30 Year Annual Costs				$2,394
Present Value Cost				**$53,606**
Five Year Costs	6			
Remedy Review	1	ea	$15,000	$15,000
Subtotal - Five Year O&M Costs				$15,000
Present Value Cost				**$64,555**
Total Present Value Direct O&M Cost				**$122,864**

Table H-4. LRP 131-4L – Alternative B-2: Land Use Controls *(continued/end)*

Institutional Controls Estimate
Alternative B-2
Land Use Controls Only 131-4L

Indirect O&M Costs			
Project/Admin Management	146%	of direct O&M	$179,381
Health & Safety	19%	of direct O&M	$23,344
Overhead	30%	of direct O&M + indirect O&M	$36,859
Contingency	20%	of direct O&M + indirect O&M	$23,958
Total Present Worth Indirect O&M Cost			$263,543
Total Estimated Present Worth O&M Cost			**$386,406**
TOTAL ESTIMATED COST			**$560,619**

[1] Interest rates for costs with 3-year and 30-year durations are based on SRNS Technical Memorandum ERTEC-2017-00002.
Real Interest Rates for OMB Circular No. A-94
Treasury Notes and Bonds of Specified Maturities

Table H-5. LRP 131-4L – Alternative B-3: Soil Cover with Land Use Controls

131-4L Soil Cover Estimate
Alternative B-3
Class II Soil Cover, LUCs

Item	Quantity	Units	Unit Cost	Total Cost
Direct Capital Costs				
131-4L				
Confirmatory Borings				
Drill/core 12 rotosonic soil borings to 16ft for waste verification	1	ea	$29,031	$29,031
Technical Oversight	1	ea	$24,238	$24,238
Clearing and Grubbing				
Clear Vegetation and Debris, Stockpile at Site Perimeter	1.16	ac	$2,600	$3,013
Clear Trees and Grub Stumps, Stockpile at Site Perimeter	1.16	ac	$4,500	$5,214
Close In-Situ 131-4L w/ SCDHEC Class II Cover system				
Access Road	2,640	lf	$12	$31,680
Construct SCDHEC Class II Cover system				
Design	1	ea	$233,000	$233,000
Site Layout and Surveys w/ As-Builts	1.16	ac	$3,000	$3,476
Eqipment mobilization	1	ea	$53,760	$53,760
Contour for slope	3,795	yd3	$3.59	$13,624
Common Backfill (20 Inches)	1,405.6	yd3	$13	$18,272
Topsoil (4 Inches)	281.1	yd3	$35	$9,839
Sod	2,530	yd2	$5	$12,650
Backfill Sampling / Analysis	3	ea	$1,200	$3,600
Stormwater Management	1,265.9	lf	$25	$31,647
Institutional Controls				
Posting of Warning Signs	4	ea	$500	$2,000
Land Use Control Implementation Plan	1	ea	$5,000	$5,000
Deed Restrictions	1	ea	$5,000	$5,000
Subtotal - Direct Capital Cost				$485,044
Mobilization/Demobilization	9%	of subtotal direct capital		$43,654
Site Preparation/Site Restoration	9%	of subtotal direct capital		$43,654
Total Direct Capital Cost				**$572,351**
Indirect Capital Costs				
Engineering & Design	14%	of direct capital		$80,129
Project/Construction Management	25%	of direct capital		$143,088
Health & Safety	6%	of direct capital		$34,341
Overhead	30%	of direct capital + indirect capital		$248,973
Contingency	26%	of direct capital + indirect capital		$215,777
Total Indirect Capital Cost				**$722,308**
Total Estimated Capital Cost				**$1,294,659**
Direct O&M Costs	1.2%	3 Year Discount Rate [1]		
Annual Costs (Existing System during Post-ROD Design & Const)	2	years O&M		*Years 2027-2028*
Access Controls	1	ea	$500	$500
Maintenance	1	ea	$1,894	$1,894
Subtotal - Annual Costs				$2,394
Present Value Cost				$4,702

Table H-5. LRP 131-4L – Alternative B-3: Soil Cover with Land Use Controls *(continued/end)*

131-4L Soil Cover Estimate
Alternative B-3
Class II Soil Cover, LUCs

	2.0%	30 Year Discount Rate [1]		
Annual Costs	30	years O&M		*Years 2028-2057*
Access Controls	1	ea	$500	$500
Annual Inspection/Maintenance	1	ea	$1,894	$1,894
Subtotal - 30 Year Annual Costs				$2,394
Present Value Cost				**$53,606**
Five Year Costs	6			
Remedy Review	1	ea	$15,000	$15,000
Subtotal - Five Year O&M Costs				$15,000
Present Value Cost				**$64,555**
Total Present Value Direct O&M Cost				**$122,864**
Indirect O&M Costs				
Project/Admin Management	146%	of direct O&M		$85,131
Health & Safety	19%	of direct O&M		$11,079
Overhead	30%	of direct O&M + indirect O&M		$17,943
Contingency	20%	of direct O&M + indirect O&M		$11,663
Total Present Worth Indirect O&M Cost				**$125,815**
Total Estimated Present Worth O&M Cost				**$248,679**
TOTAL ESTIMATED COST				**$1,543,338**

[1] Interest rates for costs with 3-year and 30-year durations are based on SRNS Technical Memorandum ERTEC-2017-00002.
Real Interest Rates for OMB Circular No. A-94
Treasury Notes and Bonds of Specified Maturities

Table H-6. LRP 131-4L – Alternative B-4: Excavate and Haul

LRP 131-4L Excavate & Haul
Alternative B-4
Excavate & Haul LRP 131-4L to 3 Rivers Landfill

Item	Quantity	Units	Unit Cost	Total Cost
Direct Capital Costs				
3RLF				
Landfill Disposal Fees				
131-4L	19,678	yd^3	$65.00	$1,279,056
131-4L				
Confirmatory Borings				
Drill/core 12 rotosonic soil borings to 16ft for waste verification	1	ea	$29,031	$29,031
Technical Oversight	1	ea	$24,238	$24,238
Clearing and Grubbing				
Clear Vegetation and Debris, Stockpile at Site Perimeter	1.16	ac	$2,600	$3,013
Clear Trees and Grub Stumps, Stockpile at Site Perimeter	1.16	ac	$4,500	$5,214
Access Road	1,320	lf	$12	$15,840
Excavate, Truck Haul and Dump Soil For Off-Unit Disposal				
Excavate & Load Contaminated Soil for Hauling	19,678	yd3	$3.59	$70,643
Truck Haul Contaminated Soil to Disposal Site	23,613	yd3	$18.24	$430,707
Backfill / Compact Soil at Disposal Site	23,613	yd3	$3.59	$84,772
Confirmation Sampling / Analysis	5	ea	$1,000	$5,000
Stormwater Management	1,266	lf	$25	$31,647
Site Restoration				
Eqipment mobilization	1	ea	$53,760	$53,760
Contour Site After Contaminated Soil Removal	0.87	ac	$1,700	$1,481
Common Backfill (168 Inches)	23,613	yd3	$13	$306,973
Topsoil (4 Inches)	562	yd3	$35	$19,678
Fertilizer, Lime, Seed & Mulch	5,060	yd2	$0.75	$3,795
Backfill Sampling / Analysis	25	ea	$1,200	$30,000
Subtotal - Direct Capital Cost				$2,394,847
Mobilization/Demobilization	9%	of subtotal direct capital		$215,536
Site Preparation/Site Restoration	9%	of subtotal direct capital		$215,536
Total Direct Capital Cost				**$2,825,920**
Indirect Capital Costs				
Engineering & Design	14%	of direct capital		$395,629
Project/Construction Management	25%	of direct capital		$706,480
Health & Safety	6%	of direct capital		$169,555
Overhead	30%	of direct capital + indirect capital		$1,229,275
Contingency	26%	of direct capital + indirect capital		$1,065,372
Total Indirect Capital Cost				**$3,566,311**
Total Estimated Capital Cost				**$7,671,286**

Table H-6. LRP 131-4L – Alternative B-4: Excavate and Haul *(continued/end)*

LRP 131-4L Excavate & Haul
Alternative B-4
Excavate & Haul LRP 131-4L to 3 Rivers Landfill

Direct O&M Costs				
O&M Costs at Ash Basins for Site Restoration	1.2%	3 Year Discount Rate [1]		
Annual Costs (Existing System during Post-ROD Design & Const)	2	years O&M		*Years 2027-2028*
Access Controls	0	ea	$500	$0
Maintenance	0	ea	$501	$0
	0			
Subtotal - Annual Costs				$0
Present Value Cost				**$0**
	2.0%	30 Year Discount Rate [1]		
Annual Costs	30	years O&M		*Years 2028-2057*
Access Controls	0	ea	$500	$0
Annual Inspection/Maintenance	0	ea	$501	$0
Subtotal - 30 Year Annual Costs				$0
Present Value Cost				**$0**
Five Year Costs	0			
Remedy Review	0	ea	$15,000	$0
Subtotal - Five Year O&M Costs				$0
Present Value Cost				**$0**
Total Present Value Direct O&M Cost				**$0**
Indirect O&M Costs				
Project/Admin Management	146%	of direct O&M		$0
Health & Safety	19%	of direct O&M		$0
Overhead	30%	of direct O&M + indirect O&M		$0
Contingency	20%	of direct O&M + indirect O&M		$0
Total Present Worth Indirect O&M Cost				$0
Total Estimated Present Worth O&M Cost				**$0**
TOTAL ESTIMATED COST				**$7,671,286**

[1] Interest rates for costs with 3-year and 30-year durations are based on SRNS Technical Memorandum ERTEC-2017-00002.
Real Interest Rates for OMB Circular No. A-94
Treasury Notes and Bonds of Specified Maturities

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APPENDIX I

DATA USABILITY REPORTS

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Appendix I.1. Data Usability Report for the L-Area Rubble Pit (131-1L)

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LIST OF ABBREVIATIONS AND ACRONYMS

ID	identification
FD	field duplicate
ft	feet
GEL	General Engineering Laboratories
LCS	laboratory control sample
LD	laboratory duplicate
LRP	L-Area Rubble Pit
MB	method blank
MCL	maximum contaminant limit
MDL	method detection limit
MSD	matrix spike duplicate
MS	matrix spike
NBN	No Building Number
NST	no sample taken
PRG	preliminary remediation goal
OU	Operable Unit
QAPP	Quality Assurance Project Plan
QC	quality control
RB	rinsate blank
RCRA	Resource Conservation and Recovery Act
REG	regular
RFI	RCRA Facility Investigation
RI	Remedial Investigation
RPD	relative percent difference
RSL	regional screening level
SPL	split
SRNS	Savannah River Nuclear Solutions, LLC
ssEQL	sample specific estimated quantification limit
TAL	Test America Labs
TB	trip blank

SRNS-RP-2023-01365

I.1 DATA USABILITY REPORT FOR THE L-AREA RUBBLE PIT (131-1L)

I.1.1 Project Summary

This report presents analytical data verification, validation, and usability assessment results for sampling at the L-Area Rubble Pit (131-1L) Operable Unit. In 2022, soil samples were collected in accordance with the *RFI/RI Work Plan for the Early Construction and Operational Disposal Site L-3 (NBN), L-Area Rubble Pit (131-1L), and L-Area Rubble Pit (131-4L) Operable Unit (U)* (SRNS 2022). The project generated one hundred thirteen (113) regular (REG) field samples, seven (7) field duplicate (FD) samples, seven (7) split (SPL) samples, twenty-one (21) trip blanks (TB) and four (4) rinsate blanks (RB). In addition, there were thirteen (13) no samples taken (NST). Due to contractual issues, samples collected for the REG samples and SPL samples were divided between two laboratories. For the REG samples, volatile organic analyses were sent to General Engineering Labs (GEL), with the remainder of the REG sample analyses going to Test America Labs (TAL). For the SPL samples, volatile organic analyses were sent to TAL, with the remainder of the SPL samples analyses going to GEL. The samples, along with the requested analytical analyses, are listed in Table I.1-1.

Table I.1-1. Sample Identification (ID) Summary

Station ID	Sample ID	Sample Type	Sample Date	Sample Time	Matrix	Interval *(ft)*	Analysis Requested
LAP-1L-001	*LRP-1L-WP-00313*	*REG*	*10/31/2022*	*9:30*	*Soil*	*0 – 1*	*1, 2, 3*
LAP-1L-001	*LRP-1L-WP-00314*	*REG*	*10/31/2022*	*10:00*	*Soil*	*1 – 4*	*1, 2, 3*
LAP-1L-001	*LRP-1L-WP-00315*	*REG*	*10/31/2022*	*10:45*	*Soil*	*4 – 8*	*1, 2, 3*
LAP-1L-001	*LRP-1L-WP-00316*	*REG*	*10/31/2022*	*11:20*	*Soil*	*8 – 12*	*1, 2, 3*
LAP-1L-001	*LRP-1L-WP-00317*	*REG*	*10/31/2022*	*11:45*	*Soil*	*12 – 16*	*1, 2, 3*
LAP-1L-001	*LRP-1L-WP-00318*	*REG*	*10/31/2022*	*12:20*	*Soil*	*16 – 20*	*1, 2, 3*
LAP-1L-001	*LRP-1L-WP-00319*	*FD*	*10/31/2022*	*09:30*	*Soil*	*0 – 1*	*1, 2, 3*
LAP-1L-002	*LRP-1L-WP-00320*	*REG*	*11/1/2022*	*12:45*	*Soil*	*0 – 1*	*1, 2, 3*
LAP-1L-002	*LRP-1L-WP-00321*	*REG*	*11/1/2022*	*13:10*	*Soil*	*1 – 4*	*1, 2, 3*
LAP-1L-002	*LRP-1L-WP-00322*	*REG*	*11/1/2022*	*13:35*	*Soil*	*4 – 8*	*1, 2, 3*
LAP-1L-002	*LRP-1L-WP-00323*	*REG*	*11/1/2022*	*14:00*	*Soil*	*8 – 12*	*1, 2, 3*
LAP-1L-002	*LRP-1L-WP-00324*	*REG*	*11/1/2022*	*14:40*	*Soil*	*12 – 16*	*1, 2, 3*
LAP-1L-002	*LRP-1L-WP-00325*	*REG*	*11/2/2022*	*08:25*	*Soil*	*16 – 20*	*1, 2, 3*

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Table I.1-1. Sample Identification (ID) Summary *(continued)*

Station ID	Sample ID	Sample Type	Sample Date	Sample Time	Matrix	Interval *(ft)*	Analysis Requested
LAP-1L-003	*LRP-1L-WP-00326*	*REG*	*11/8/2022*	*13:30*	*Soil*	*0 – 1*	*1, 2, 3, 6, 7, 8, 9, 10, 11*
LAP-1L-003	*LRP-1L-WP-00327*	*REG*	*11/9/2022*	*07:50*	*Soil*	*1 – 4*	*1, 2, 3*
LAP-1L-003	*LRP-1L-WP-00328*	*REG*	*11/9/2022*	*08:20*	*Soil*	*4 – 8*	*1, 2, 3*
LAP-1L-003	*LRP-1L-WP-00329*	*REG*	*11/9/2022*	*08:55*	*Soil*	*8 – 12*	*1, 2, 3*
LAP-1L-003	*LRP-1L-WP-00330*	*REG*	*11/9/2022*	*09:25*	*Soil*	*12 – 16*	*1, 2, 3*
LAP-1L-003	*LRP-1L-WP-00331*	*REG*	*11/9/2022*	*10:00*	*Soil*	*16 – 20*	*1, 2, 3*
LAP-1L-003	*LRP-1L-WP-00332*	*SPL*	*11/8/2022*	*13:30*	*Soil*	*0 – 1*	*1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18*
LAP-1L-004	*LRP-1L-WP-00333*	*REG*	*11/14/2022*	*10:00*	*Soil*	*0 – 1*	*1, 2, 3*
LAP-1L-004	*LRP-1L-WP-00334*	*FD*	*11/17/2022*	*11:00*	*Soil*	*1 – 4*	*1, 2, 3*
LAP-1L-004	*LRP-1L-WP-00335*	*REG*	*11/17/2022*	*11:00*	*Soil*	*1 – 4*	*1, 2, 3*
LAP-1L-004	*LRP-1L-WP-00336*	*REG*	*11/17/2022*	*12:15*	*Soil*	*4 – 8*	*1, 2, 3*
LAP-1L-004	*LRP-1L-WP-00337*	*REG*	*11/17/2022*	*12:45*	*Soil*	*8 – 12*	*1, 2, 3*
LAP-1L-004	*LRP-1L-WP-00338*	*REG*	*11/17/2022*	*13:15*	*Soil*	*12 – 16*	*1, 2, 3*
LAP-1L-004	*LRP-1L-WP-00339*	*REG*	*11/17/2022*	*13:45*	*Soil*	*16 – 20*	*1, 2, 3*
LAP-1L-005	*LRP-1L-WP-00340*	*REG*	*11/14/2022*	*11:30*	*Soil*	*0 – 1*	*1, 2, 3*
LAP-1L-005	*LRP-1L-WP-00341*	*REG*	*11/17/2022*	*08:20*	*Soil*	*1 – 4*	*1, 2, 3*
LAP-1L-005	*LRP-1L-WP-00342*	*REG*	*11/17/2022*	*08:50*	*Soil*	*4 – 8*	*1, 2, 3*
LAP-1L-005	*LRP-1L-WP-00343*	*REG*	*11/17/2022*	*09:30*	*Soil*	*8 – 12*	*1, 2, 3*
LAP-1L-005	*LRP-1L-WP-00344*	*REG*	*11/17/2022*	*10:00*	*Soil*	*12 – 16*	*1, 2, 3*
LAP-1L-005	*LRP-1L-WP-00345*	*REG*	*11/17/2022*	*10:25*	*Soil*	*16 – 20*	*1, 2, 3*
LAP-1L-006	*LRP-1L-WP-00346*	*REG*	*11/9/2022*	*10:35*	*Soil*	*0 – 1*	*1, 2, 3*
LAP-1L-006	*LRP-1L-WP-00347*	*REG*	*11/9/2022*	*11:10*	*Soil*	*1 – 4*	*1, 2, 3*
LAP-1L-006	*LRP-1L-WP-00348*	*REG*	*11/9/2022*	*12:30*	*Soil*	*4 – 8*	*1, 2, 3*
LAP-1L-006	*LRP-1L-WP-00349*	*REG*	*11/9/2022*	*13:00*	*Soil*	*8 – 12*	*1, 2, 3*
LAP-1L-006	*LRP-1L-WP-00350*	*REG*	*11/9/2022*	*13:30*	*Soil*	*12 – 16*	*1, 2, 3*
LAP-1L-006	*LRP-1L-WP-00351*	*REG*	*11/9/2022*	*14:00*	*Soil*	*16 – 20*	*1, 2, 3*
LAP-1L-006	*LRP-1L-WP-00352*	*SPL*	*11/9/2022*	*11:10*	*Soil*	*1 – 4*	*1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18*
LAP-1L-007	*LRP-1L-WP-00353*	*REG*	*11/7/2022*	*13:10*	*Soil*	*0 – 1*	*1, 2, 3*

Table I.1-1. Sample Identification (ID) Summary *(continued)*

Station ID	Sample ID	Sample Type	Sample Date	Sample Time	Matrix	Interval *(ft)*	Analysis Requested
LAP-1L-007	*LRP-1L-WP-00354*	*FD*	*11/7/2022*	*14:15*	*Soil*	*4 – 8*	*1, 2, 3*
LAP-1L-007	*LRP-1L-WP-00355*	*REG*	*11/7/2022*	*13:40*	*Soil*	*1 – 4*	*1, 2, 3, 6, 7, 8, 9, 10, 11*
LAP-1L-007	*LRP-1L-WP-00356*	*REG*	*11/7/2022*	*14:15*	*Soil*	*4 – 8*	*1, 2, 3*
LAP-1L-007	*LRP-1L-WP-00357*	*REG*	*11/8/2022*	*07:50*	*Soil*	*8 – 12*	*1, 2, 3*
LAP-1L-007	*LRP-1L-WP-00358*	*REG*	*11/8/2022*	*08:35*	*Soil*	*12 – 16*	*1, 2, 3*
LAP-1L-007	*LRP-1L-WP-00359*	*REG*	*11/8/2022*	*09:00*	*Soil*	*16 – 20*	*1, 2, 3*
LAP-1L-008	*LRP-1L-WP-00360*	*REG*	*11/3/2022*	*08:50*	*Soil*	*0 – 1*	*1, 2, 3, 6, 7, 8, 9, 10, 11*
LAP-1L-008	*LRP-1L-WP-00361*	*REG*	*11/3/2022*	*09:25*	*Soil*	*1 – 4*	*1, 2, 3*
LAP-1L-008	*LRP-1L-WP-00362*	*REG*	*11/3/2022*	*09:50*	*Soil*	*4 – 8*	*1, 2, 3*
LAP-1L-008	*LRP-1L-WP-00363*	*REG*	*11/3/2022*	*10:25*	*Soil*	*8 – 12*	*1, 2, 3*
LAP-1L-008	*LRP-1L-WP-00364*	*REG*	*11/3/2022*	*11:00*	*Soil*	*12 – 16*	*1, 2, 3*
LAP-1L-008	*LRP-1L-WP-00365*	*REG*	*11/3/2022*	*12:45*	*Soil*	*16 – 20*	*1, 2, 3*
LAP-1L-009	*LRP-1L-WP-00366*	*REG*	*10/31/2022*	*12:55*	*Soil*	*0 – 1*	*1, 2, 3, 6, 7, 8, 9, 10, 11*
LAP-1L-009	*LRP-1L-WP-00367*	*REG*	*10/31/2022*	*13:10*	*Soil*	*1 – 4*	*1, 2, 3*
LAP-1L-009	*LRP-1L-WP-00368*	*REG*	*10/31/2022*	*13:35*	*Soil*	*4 – 8*	*1, 2, 3*
LAP-1L-009	*LRP-1L-WP-00369*	*REG*	*11/1/2022*	*08:10*	*Soil*	*8 – 12*	*1, 2, 3*
LAP-1L-009	*LRP-1L-WP-00370*	*REG*	*11/1/2022*	*09:05*	*Soil*	*12 – 16*	*1, 2, 3*
LAP-1L-009	*LRP-1L-WP-00371*	*NST*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
LAP-1L-009	*LRP-1L-WP-00372*	*SPL*	*10/31/2022*	*13:35*	*Soil*	*4 – 8*	*1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18*
LAP-1L-010	*LRP-1L-WP-00373*	*REG*	*11/1/2022*	*09:35*	*Soil*	*0 – 1*	*1, 2, 3, 6, 7, 8, 9, 10, 11*
LAP-1L-010	*LRP-1L-WP-00374*	*FD*	*11/1/2022*	*11:20*	*Soil*	*8 – 12*	*1, 2, 3*
LAP-1L-010	LRP-1L-WP-00375	REG	11/1/2022	10:15	Soil	1 – 4	1, 2, 3
LAP-1L-010	*LRP-1L-WP-00376*	*REG*	*11/1/2022*	*10:30*	*Soil*	*4 – 8*	*1, 2, 3*
LAP-1L-010	*LRP-1L-WP-00377*	*REG*	*11/1/2022*	*11:20*	*Soil*	*8 – 12*	*1, 2, 3*
LAP-1L-010	*LRP-1L-WP-00378*	*REG*	*11/1/2022*	*12:15*	*Soil*	*12 – 16*	*1, 2, 3*
LAP-1L-010	*LRP-1L-WP-00379*	*NST*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
LAP-1L-011	*LRP-1L-WP-00380*	*REG*	*11/2/2022*	*12:45*	*Soil*	*0 – 1*	*1, 2, 3*
LAP-1L-011	*LRP-1L-WP-00381*	*REG*	*11/2/2022*	*13:15*	*Soil*	*1 – 4*	*1, 2, 3*
LAP-1L-011	*LRP-1L-WP-00382*	*REG*	*11/2/2022*	*13:40*	*Soil*	*4 – 8*	*1, 2, 3*

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Table I.1-1. Sample Identification (ID) Summary *(continued)*

Station ID	Sample ID	Sample Type	Sample Date	Sample Time	Matrix	Interval *(ft)*	Analysis Requested
LAP-1L-011	*LRP-1L-WP-00383*	*REG*	*11/2/2022*	*14:15*	*Soil*	*8 - 12*	*1, 2, 3*
LAP-1L-011	*LRP-1L-WP-00384*	*REG*	*11/3/2022*	*08:10*	*Soil*	*12 - 16*	*1, 2, 3*
LAP-1L-011	*LRP-1L-WP-00385*	*NST*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
LAP-1L-012	*LRP-1L-WP-00386*	*REG*	*11/2/2022*	*09:05*	*Soil*	*0 - 1*	*1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18*
LAP-1L-012	*LRP-1L-WP-00387*	*REG*	*11/2/2022*	*09:30*	*Soil*	*1 - 4*	*1, 2, 3, 6, 7, 8, 9, 10, 11*
LAP-1L-012	*LRP-1L-WP-00388*	*REG*	*11/2/2022*	*10:00*	*Soil*	*4 - 8*	*1, 2, 3*
LAP-1L-012	*LRP-1L-WP-00389*	*REG*	*11/2/2022*	*10:45*	*Soil*	*8 - 12*	*1, 2, 3*
LAP-1L-012	*LRP-1L-WP-00390*	*REG*	*11/2/2022*	*12:10*	*Soil*	*12 - 16*	*1, 2, 3*
LAP-1L-012	*LRP-1L-WP-00391*	*NST*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
LAP-1L-012	*LRP-1L-WP-00392*	*SPL*	*11/2/2022*	*10:45*	*Soil*	*8 - 12*	*1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18*
LAP-1L-013	*LRP-1L-WP-00393*	*REG*	*11/3/2022*	*13:30*	*Soil*	*0 - 1*	*1, 2, 3*
LAP-1L-013	*LRP-1L-WP-00394*	*FD*	*11/7/2022*	*09:20*	*Soil*	*12 - 16*	*1, 2, 3*
LAP-1L-013	*LRP-1L-WP-00395*	*REG*	*11/3/2022*	*14:00*	*Soil*	*1 - 4*	*1, 2, 3*
LAP-1L-013	*LRP-1L-WP-00396*	*REG*	*11/7/2022*	*08:20*	*Soil*	*4 - 8*	*1, 2, 3, 6, 7, 8, 9, 10, 11*
LAP-1L-013	*LRP-1L-WP-00397*	*REG*	*11/7/2022*	*08:45*	*Soil*	*8 - 12*	*1, 2, 3*
LAP-1L-013	*LRP-1L-WP-00398*	*REG*	*11/7/2022*	*09:20*	*Soil*	*12 - 16*	*1, 2, 3*
LAP-1L-013	*LRP-1L-WP-00399*	*NST*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
LAP-1L-014	*LRP-1L-WP-00400*	*REG*	*11/7/2022*	*10:15*	*Soil*	*0 - 1*	*1, 2, 3*
LAP-1L-014	*LRP-1L-WP-00401*	*REG*	*11/7/2022*	*10:35*	*Soil*	*1 - 4*	*1, 2, 3*
LAP-1L-014	*LRP-1L-WP-00402*	*REG*	*11/7/2022*	*11:30*	*Soil*	*4 - 8*	*1, 2, 3*
LAP-1L-014	*LRP-1L-WP-00403*	*REG*	*11/7/2022*	*11:55*	*Soil*	*8 - 12*	*1, 2, 3*
LAP-1L-014	*LRP-1L-WP-00404*	*REG*	*11/7/2022*	*12:30*	*Soil*	*12 - 16*	*1, 2, 3, 6, 7, 8, 9, 10, 11*
LAP-1L-014	*LRP-1L-WP-00405*	*NST*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
LAP-1L-015	*LRP-1L-WP-00406*	*REG*	*11/8/2022*	*09:50*	*Soil*	*0 - 1*	*1, 2, 3*
LAP-1L-015	*LRP-1L-WP-00407*	*REG*	*11/8/2022*	*10:15*	*Soil*	*1 - 4*	*1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18*
LAP-1L-015	*LRP-1L-WP-00408*	*REG*	*11/8/2022*	*10:40*	*Soil*	*4 - 8*	*1, 2, 3*

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Table I.1-1. Sample Identification (ID) Summary *(continued)*

Station ID	Sample ID	Sample Type	Sample Date	Sample Time	Matrix	Interval *(ft)*	Analysis Requested
LAP-1L-015	*LRP-1L-WP-00409*	*REG*	*11/8/2022*	*11:20*	*Soil*	*8 - 12*	*1, 2, 3, 6, 7, 8, 9, 10, 11*
LAP-1L-015	*LRP-1L-WP-00410*	*REG*	*11/8/2022*	*12:30*	*Soil*	*12 - 16*	*1, 2, 3*
LAP-1L-015	*LRP-1L-WP-00411*	*NST*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
LAP-1L-015	*LRP-1L-WP-00412*	*SPL*	*11/8/2022*	*12:30*	*Soil*	*12 - 16*	*1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18*
LAP-1L-016	*LRP-1L-WP-00413*	*REG*	*11/10/2022*	*09:55*	*Soil*	*0 - 1*	*1, 2, 3*
LAP-1L-016	*LRP-1L-WP-00414*	*FD*	*11/10/2022*	*09:55*	*Soil*	*0 - 1*	*1, 2, 3*
LAP-1L-016	*LRP-1L-WP-00415*	*REG*	*11/15/2022*	*08:10*	*Soil*	*1 - 4*	*1, 2, 3*
LAP-1L-016	*LRP-1L-WP-00416*	*REG*	*11/15/2022*	*08:40*	*Soil*	*4 - 8*	*1, 2, 3*
LAP-1L-016	*LRP-1L-WP-00417*	*REG*	*11/15/2022*	*09:10*	*Soil*	*8 - 12*	*1, 2, 3*
LAP-1L-016	*LRP-1L-WP-00418*	*REG*	*11/15/2022*	*09:10*	*Soil*	*12 - 16*	*1, 2, 3*
LAP-1L-016	*LRP-1L-WP-00419*	*NST*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
LAP-1L-017	*LRP-1L-WP-00420*	*REG*	*11/14/2022*	*08:20*	*Soil*	*0 - 1*	*1, 2, 3*
LAP-1L-017	*LRP-1L-WP-00421*	*REG*	*11/15/2022*	*10:15*	*Soil*	*1 - 4*	*1, 2, 3*
LAP-1L-017	*LRP-1L-WP-00422*	*REG*	*11/15/2022*	*10:40*	*Soil*	*4 - 8*	*1, 2, 3*
LAP-1L-017	*LRP-1L-WP-00423*	*REG*	*11/15/2022*	*11:15*	*Soil*	*8 - 12*	*1, 2, 3*
LAP-1L-017	*LRP-1L-WP-00424*	*REG*	*11/15/2022*	*11:40*	*Soil*	*12 - 16*	*1, 2, 3*
LAP-1L-017	*LRP-1L-WP-00425*	*NST*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
LAP-1L-018	*LRP-1L-WP-00426*	*REG*	*11/9/2022*	*14:40*	*Soil*	*0 - 1*	*1, 2, 3*
LAP-1L-018	*LRP-1L-WP-00427*	*REG*	*11/10/2022*	*07:50*	*Soil*	*1 - 4*	*1, 2, 3, 6, 7, 8, 9, 10, 11*
LAP-1L-018	*LRP-1L-WP-00428*	*REG*	*11/10/2022*	*08:15*	*Soil*	*4 - 8*	*1, 2, 3*
LAP-1L-018	*LRP-1L-WP-00429*	*REG*	*11/10/2022*	*08:50*	*Soil*	*8 - 12*	*1, 2, 3*
LAP-1L-018	*LRP-1L-WP-00430*	*REG*	*11/10/2022*	*09:15*	*Soil*	*12 - 16*	*1, 2, 3*
LAP-1L-018	*LRP-1L-WP-00431*	*NST*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
LAP-1L-018	*LRP-1L-WP-00432*	*SPL*	*11/9/2022*	*14:40*	*Soil*	*0 - 1*	*1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18*
LAP-1L-019	*LRP-1L-WP-00433*	*REG*	*11/14/2022*	*09:20*	*Soil*	*0 - 1*	*1, 2, 3*
LAP-1L-019	*LRP-1L-WP-00434*	*FD*	*11/16/2022*	*08:00*	*Soil*	*1 - 4*	*1, 2, 3*
LAP-1L-019	*LRP-1L-WP-00435*	*REG*	*11/16/2022*	*08:00*	*Soil*	*1 - 4*	*1, 2, 3*
LAP-1L-019	*LRP-1L-WP-00436*	*REG*	*11/16/2022*	*08:40*	*Soil*	*4 - 8*	*1, 2, 3*

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Table I.1-1. Sample Identification (ID) Summary *(continued)*

Station ID	Sample ID	Sample Type	Sample Date	Sample Time	Matrix	Interval *(ft)*	Analysis Requested
LAP-1L-019	*LRP-1L-WP-00437*	*REG*	*11/16/2022*	*09:15*	*Soil*	*8 - 12*	*1, 2, 3*
LAP-1L-019	*LRP-1L-WP-00438*	*REG*	*11/16/2022*	*09:45*	*Soil*	*12 - 16*	*1, 2, 3*
LAP-1L-019	*LRP-1L-WP-00439*	*NST*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
LAP-1L-020	*LRP-1L-WP-00440*	*REG*	*11/14/2022*	*11:00*	*Soil*	*0 - 1*	*1, 2, 3*
LAP-1L-020	*LRP-1L-WP-00441*	*REG*	*11/16/2022*	*13:10*	*Soil*	*1 - 4*	*1, 2, 3*
LAP-1L-020	*LRP-1L-WP-00442*	*REG*	*11/16/2022*	*14:10*	*Soil*	*4 - 8*	*1, 2, 3*
LAP-1L-020	*LRP-1L-WP-00443*	*REG*	*11/17/2022*	*07:20*	*Soil*	*8 - 12*	*1, 2, 3*
LAP-1L-020	*LRP-1L-WP-00444*	*REG*	*11/17/2022*	*07:55*	*Soil*	*12 - 16*	*1, 2, 3*
LAP-1L-020	*LRP-1L-WP-00445*	*NST*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
LAP-1L-021	*LRP-1L-WP-00446*	*REG*	*11/14/2022*	*10:35*	*Soil*	*0 - 1*	*1, 2, 3*
LAP-1L-021	*LRP-1L-WP-00447*	*REG*	*11/16/2022*	*10:40*	*Soil*	*1 - 4*	*1, 2, 3*
LAP-1L-021	*LRP-1L-WP-00448*	*REG*	*11/16/2022*	*11:20*	*Soil*	*4 - 8*	*1, 2, 3*
LAP-1L-021	*LRP-1L-WP-00449*	*REG*	*11/16/2022*	*11:55*	*Soil*	*8 - 12*	*1, 2, 3*
LAP-1L-021	*LRP-1L-WP-00450*	*REG*	*11/16/2022*	*12:25*	*Soil*	*12 - 16*	*1, 2, 3*
LAP-1L-021	*LRP-1L-WP-00451*	*NST*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
LAP-1L-021	*LRP-1L-WP-00452*	*SPL*	*11/16/2022*	*10:40*	*Soil*	*1 - 4*	*1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18*
RINSATE-BLANK	*LRP-1L-WP-00453*	*RB*	*11/2/2022*	*14:55*	*Water*		*1, 2, 3*
RINSATE-BLANK	*LRP-1L-WP-00454*	*RB*	*11/9/2022*	*15:20*	*Water*		*1, 2, 3*
RINSATE-BLANK	*LRP-1L-WP-00455*	*RB*	*11/11/2022*	*12:20*	*Water*		*1, 2, 3*
RINSATE-BLANK	*LRP-1L-WP-00456*	*RB*	*11/16/2022*	*14:50*	*Water*		*1, 2, 3*
TRIP-BLANK	*LRP-1L-WP-00457*	*TB*	*10/31/2022*	*13:00*	*Water*		*1*
TRIP-BLANK	*LRP-1L-WP-00458*	*TB*	*11/2/2022*	*10:20*	*Water*		*1*
TRIP-BLANK	*LRP-1L-WP-00459*	*TB*	*10/31/2022*	*09:00*	*Water*		*1*
TRIP-BLANK	*LRP-1L-WP-00460*	*TB*	*11/1/2022*	*08:00*	*Water*		*1*
TRIP-BLANK	*LRP-1L-WP-00461*	*TB*	*11/2/2022*	*08:00*	*Water*		*1*
TRIP-BLANK	*LRP-1L-WP-00462*	*TB*	*11/2/2022*	*14:30*	*Water*		*1*
TRIP-BLANK	*LRP-1L-WP-00463*	*TB*	*11/3/2022*	*08:00*	*Water*		*1*
TRIP-BLANK	*LRP-1L-WP-00464*	*TB*	*11/7/2022*	*08:00*	*Water*		*1*
TRIP-BLANK	*LRP-1L-WP-00465*	*TB*	*11/8/2022*	*07:30*	*Water*		*1*

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Table I.1-1. Sample Identification (ID) Summary *(continued/end)*

Station ID	Sample ID	Sample Type	Sample Date	Sample Time	Matrix	Interval *(ft)*	Analysis Requested
TRIP-BLANK	*LRP-1L-WP-00466*	*TB*	*11/9/2022*	*07:30*	*Water*		*1*
TRIP-BLANK	*LRP-1L-WP-00467*	*TB*	*11/9/2022*	*15:00*	*Water*		*1*
TRIP-BLANK	*LRP-1L-WP-00468*	*TB*	*11/10/2022*	*07:30*	*Water*		*1*
TRIP-BLANK	*LRP-1L-WP-00469*	*TB*	*11/14/2022*	*08:30*	*Water*		*1*
TRIP-BLANK	*LRP-1L-WP-00470*	*TB*	*11/14/2022*	*11:50*	*Water*		*1*
TRIP-BLANK	*LRP-1L-WP-00471*	*TB*	*11/15/2022*	*08:00*	*Water*		*1*
TRIP-BLANK	*LRP-1L-WP-00472*	*TB*	*11/16/2022*	*07:30*	*Water*		*1*
TRIP-BLANK	*LRP-1L-WP-00473*	*TB*	*11/16/2022*	*14:30*	*Water*		*1*
TRIP-BLANK	*LRP-1L-WP-00474*	*TB*	*11/17/2022*	*07:00*	*Water*		*1*
TRIP-BLANK	*LRP-1L-WP-00512*	*TB*	*11/8/2022*	*12:00*	*Water*		*1*
TRIP-BLANK	*LRP-1L-WP-00513*	*TB*	*11/9/2022*	*11:00*	*Water*		*1*
TRIP-BLANK	*LRP-1L-WP-00533*	*TB*	*11/16/2022*	*10:15*	*Water*		*1*

Analyses Requested
1. Target Compound List
2. Target Analyte List
3. Gross Alpha/Non-Volatile Beta
4. Tritium
5. Gamma Spectroscopy
6. Radium-226, Radium-228
7. Thorium Series
8. Uranium Series
9. Americium/Curium Series
10. Neptunium Series
11. Plutonium Series
12. Carbon-14
13. Iodine-129
14. Nickel-59
15. Nickel-63
16. Promethium-147
17. Strontium-90
18. Technetium-99

A total of 24,342 records were produced consisting of 19,908 REG records and 4,434 Quality Control (QC) records (Table I.1-2A). Table I.1-2B breaks down the number of records by matrix and sample type for the samples collected at the unit.

Table I.1-2A. Total Number of Records

Number of Records	Chemical	Radiochemical	Totals
Analytical	*19,436*	*472*	*19,908*
Field QC	*4,181*	*253*	*4,434*
Totals	*23,617*	*725*	*24,342*

Table I.1-2B. Total Records by Matrix and Sample Type

Matrix Code	Sample Type Code	Chemical	Radiochemical	Totals
Soil	*REG*	*19,436*	*472*	*19,908*
	SPL	*1,197*	*231*	*1,428*
	FD	*1,204*	*14*	*1,218*
Water	*RB*	*688*	*8*	*696*
	TB	*1,092*	*0*	*1,092*
Totals		*23,617*	*725*	*24,342*

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The verification process was conducted to review completeness of the sampling and analytical requirements. Validation has been performed to assess compliance with methods, procedures, and contracts, and to assess a comparison with measurement performance criteria in the *Analytical Data Qualification* (SRNS 2015). A usability assessment will provide the data user with an assessment of whether the process execution and resulting data meet project quality objectives in the Quality Assurance Project Plan (QAPP) (SRNS 2012) and the *RFI/RI Work Plan for the Early Construction and Operational Disposal Site L-3 (NBN), L-Area Rubble Pit (131-1L), and L-Area Rubble Pit (131-4L) Operable Unit (U)* (SRNS 2022). These processes involve examination of electronic data files, the field data, analytical data, and laboratory records. Computer programs are used to verify that samples were properly preserved and were analyzed within the required holding time, that QC results were within specified acceptable ranges, and that the appropriate detection limits were employed by the laboratories. Additionally, manual reviews of field data and laboratory records are conducted to ensure the quality of these items. Validation summaries for holding time, preservation, calibration, analyte identification, and analyte quantitation can be found in subsections 3.1, *Holding Times*; 3.2, *Preservation*; and 3.3, *Calibration, Identification, and Quantitation*.

The data were validated to determine if the records conform to the technical criteria associated with definitive data per ER-SOP-033 (SRNS 2015). Table I.1-3 provides a brief validation summary for the project. Review qualifiers are assigned by a data validator internal to Savannah River Nuclear Solutions, LLC (SRNS) and external to the analytical laboratory. Environmental records include REG, SPL and FD records for soil samples collected.

Table I.1-3. Environmental Record Review Qualifier Summary

	Detects		Non-detects		Rejected	
Method Code	**# NULL Qualifiers**	**# J Qualifiers**	**# U Qualifiers**	**# UJ Qualifiers**	**# R Qualifiers**	**Total**
A01R	*70*	*14*	*108*	*0*	*0*	*192*
EERFC-01	*0*	*0*	*2*	*0*	*0*	*2*
EPA6010D	*393*	*200*	*161*	*0*	*0*	*754*
EPA6020B	*1442*	*329*	*269*	*0*	*0*	*2040*
EPA7471B	*86*	*30*	*11*	*0*	*0*	*127*
EPA8081B	*0*	*6*	*2617*	*44*	*0*	*2667*
EPA8082A	*0*	*2*	*894*	*0*	*0*	*896*
EPA8260D	*91*	*59*	*6350*	*104*	*0*	*6604*

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Table I.1-3. Environmental Record Review Qualifier Summary (*continued/end*)

	Detects		Non-detects		Rejected	
Method Code	**# NULL Qualifiers**	**# J Qualifiers**	**# U Qualifiers**	**# UJ Qualifiers**	**# R Qualifiers**	**Total**
EPA8270E	*0*	*40*	*6430*	*2152*	*0*	*8622*
EPA9012B	*8*	*1*	*116*	*2*	*0*	*127*
EPA903.0	*9*	*3*	*0*	*0*	*0*	*12*
EPA904.0	*2*	*7*	*3*	*0*	*0*	*12*
EPA906.0	*0*	*0*	*2*	*0*	*0*	*2*
EPA9310	*121*	*108*	*11*	*0*	*0*	*240*
GA-01-RMOD	*7*	*2*	*7*	*0*	*0*	*16*
RADA-001	*5*	*8*	*1*	*0*	*0*	*14*
RADA-002	*0*	*0*	*7*	*0*	*0*	*7*
RADA-003	*0*	*0*	*7*	*0*	*0*	*7*
RADA-004	*0*	*0*	*7*	*0*	*0*	*7*
RADA-005	*0*	*0*	*7*	*0*	*0*	*7*
RADA-006	*0*	*0*	*6*	*0*	*1*	*7*
RADA-008	*3*	*4*	*0*	*0*	*0*	*7*
RADA-009	*0*	*4*	*3*	*0*	*0*	*7*
RADA-011	*0*	*11*	*66*	*0*	*0*	*77*
RADA-013	*17*	*6*	*18*	*0*	*1*	*42*
RADA-020	*0*	*0*	*7*	*0*	*0*	*7*
RADA-022	*0*	*0*	*14*	*0*	*0*	*14*
RADA-032	*0*	*0*	*7*	*0*	*0*	*7*
RADA-038	*2*	*16*	*3*	*0*	*0*	*21*
SR-03-RCMOD	*0*	*1*	*1*	*0*	*0*	*2*
ST-RC-0055	*0*	*0*	*4*	*0*	*0*	*4*
ST-RC-0247	*0*	*1*	*1*	*0*	*0*	*2*
TC-02-RCMOD	*0*	*0*	*2*	*0*	*0*	*2*
Total	*2256*	*852*	*17142*	*2302*	*2*	*22554*
% of Total	*10.00%*	*3.78%*	*76.00%*	*10.21%*	*0.01%*	*100.00%*

I.1.2 Assessment of Precision, Accuracy, Representativeness, Comparability, Completeness, and Sensitivity Data Quality Indicators and Measurement Performance Criteria

This section discusses the analytical data in terms of the following indicators of data quality: precision, accuracy, representativeness, comparability, completeness, and sensitivity. Precision is determined from the FD and laboratory duplicate (LD) analyses and indicates the consistency of field and laboratory techniques. Accuracy is determined from the laboratory control samples (LCS), matrix spikes (MS), and the results of the RBs, TBs, method blanks (MB), and field blanks and indicates the ability of the laboratory to generate correct results. Representativeness measures the degree to which data accurately represents a population characteristic or process or

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environmental condition. Comparability expresses the confidence with which data from different laboratories are considered to be equivalent. Completeness measures the amount of valid data resulting from the data collection activity. Sensitivity evaluates detection limits relative to risk-based screening criteria.

I.1.2.1 Precision

Precision is the degree to which a set of observations or measurements of the same property, obtained under similar conditions, conform to themselves. FDs measure the repeatability of the sampling and analytical techniques, and LDs measure the ability of the laboratory to reproduce a result. Low precision can be caused by poor instrument performance, poor operator technique, inconsistent application of method protocols, laboratory environment, time between analyses, or by a difficult, heterogeneous sample matrix. Precision is especially important when the action limit approaches the quantification limit. A total of 10 % of the samples were collected in duplicate for this project in accordance with the sampling and analysis plan. The laboratory performs LD analyses on at least 5% of the samples received.

Precision is expressed in terms of the relative percent differences (RPD) as follows:

$$\mathrm{RPD} = \frac{|x - y|}{\left(\frac{x + y}{2}\right)} \times 100$$

where x is the original sample result and y is the duplicate sample result. When one result of a duplicate pair is below the method detection limit (MDL), the sample specific estimated quantification limit (ssEQL) is used for that result in the calculation. When both results are below the MDL, the RPD is not calculated.

The RPD should be less than 20% for water samples and less than 35% for solid samples when results are greater than the ssEQL. In the case where results are between the ssEQL and the MDL, the RPD should be less than 100% for water samples and less than 200% for soil samples. In the event analytical precision goals are not met, a determination of the usability of that information is made through the environmental data assessment process.

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No records were rejected due to precision issues. Details for this project can be found in subsections I.1-3.6, *Laboratory Duplicate Relative Percent Difference*; and I.1-3.7, *Field Duplicate Relative Percent Difference*.

I.1.2.2 Accuracy

Accuracy is defined as the closeness of agreement between an observed value and an accepted reference value. Accuracy is especially important when the concentration of concern approaches the detection limit and/or the action limit. When the concentration is underestimated near the detection limit, the analyte may be present but reported as not detected. When the concentration is underestimated near the action limit, the analyte may be at a concentration that would require remediation, but the remediation would not be performed. When the concentration is overestimated near the detection limit, the analyte may not be present but reported as detected. When the concentration is overestimated near the action limit, the analyte may not be at a concentration that would require remediation, but the remediation would be performed. The sample types used to evaluate accuracy are performance evaluation studies, LCSs, surrogate spikes, MSs, MBs, TBs, and RBs.

LCSs monitor the performance of all steps in the analytical process, including sample preparation, and are used to identify problems with the analytical procedure. LCSs are deionized water that is spiked with the target analyte, digested, and analyzed with the REG samples. The LCS spiking solution is obtained from a third-party supplier or is prepared in the laboratory using chemicals from a different source than the calibration standards.

The LCS percent recovery is calculated as follows:

$$\%\ \text{Recovery} = \frac{\text{Blank spike concentration}}{\text{Spike concentration}} \times 100$$

One hundred percent recovery is equivalent to 100% accuracy. Values less than 100% or greater than 100% may indicate a sample matrix effect and a false reading. A periodic program of sample spiking is required (e.g., one MS and one MS duplicate per 20 samples). If analytical accuracy

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goals are not met, a determination is made through the environmental data assessment process relative to the usability of that information.

No records were rejected due to accuracy issues. Details for this project can be found in subsections I.1-3.4, *Trip Blanks and Rinsate Blanks*; I.1-3.5, *Method Blanks*; I.1-3.8, *Matrix Spike Recovery*; I.1-3.9, *Laboratory Control Samples Recovery*; and 3.10, *Surrogate/Tracer Recovery*.

I.1.2.3 Representativeness

The representativeness of samples collected is controlled by adhering to the detailed descriptions of sampling procedures. Representativeness expresses the relative degree to which the data depict the characteristics of a population, parameter, sampling point, process condition, or environmental condition. The objective of this study is to accurately represent the concentrations of target analytes or compounds. Representative samples for this investigation will be required by implementing approved sampling and analytical procedures that will generate data representative of the sampling point location and will be maintained. Analytical methods are selected that will most accurately represent the true concentration of the parameter of interest. The accumulation of QC procedures and information (i.e., RPD values, blank QC concentrations, MS percent recoveries, etc.) employed for a given analysis combine to exhibit the representativeness of the data generated.

The goal for representative sample data will therefore be met by properly documenting field and analytical protocols. In the event these procedures and methods are not able to be implemented, the appropriate corrective action documentation should encompass the impact on the representativeness of the information. When review of the data and documentation determines the data to be non-representative, the information is qualified in its use or is not used by the project.

All samples were collected and analyzed per established procedures.

I.1.2.4 Comparability

Comparability is the degree to which different methods, data sets, and decisions agree or can be represented as similar. The comparability of the data from the laboratories is based on the results of the split samples and on confirmation that the laboratories used the same standardized procedures for sample analysis, the same reporting unit, and obtained similar quantitation limits. Comparability of the data produced for this investigation may be obtained by implementing the identified protocols for sampling and analysis of samples. Implementation of traceable reference materials such as laboratory standards, expression of results in standard concentration units, and successful participation by the laboratories in external performance evaluation programs will enable the information produced through this investigation to be compared with future data sets, if required.

For this project, seven (7) SPL samples were collected from seven (7) locations and sent to a designated QC laboratory. Details for the split samples can be found in subsection *3.11, Split Samples Comparability*.

I.1.2.5 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared with the amount that was expected to be obtained under correct, normal circumstances. The Quality Assurance completeness objective for RFI/RI projects is to obtain valid field and laboratory analytical results for at least 90% of the samples collected during the project. This implies that completeness of sample collection (i.e., the number of samples collected compared to the number of samples planned) must be virtually 100% to allow for some loss of data during the laboratory analytical process. Accountability of samples collected, from field to final disposal, must be 100%.

Completeness is a measure of the amount of data obtained from a measurement process that achieves the project goals as compared to the amount of data planned to be obtained by the project. Completeness is affected by unexpected conditions during the data collection process that reduce the usable data achieved relative to the data planned.

When review of the data and documentation determines the data to be incomplete, the impact relative to the project objective will be assessed and documented.

The following are measures of completeness:

Sample Collection:

$$Completeness = \frac{Number\ of\ Sample\ Points\ Sampled}{Number\ of\ Sample\ Points\ Planned} \times 100$$

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Field Measurement:

$$Completeness = \frac{Number\ of\ Valid\ Measurements\ Made}{Number\ of\ Measurements\ Planned} \times 100$$

Laboratory Analysis:

$$Completeness = \frac{Number\ of\ Valid\ Data\ Points}{Number\ of\ Data\ Points\ Planned} \times 100$$

The completeness numbers for this project are listed below:

Sample Collection Completeness	90 %
Field Measurement Completeness	N/A
Laboratory Analysis Completeness	80%

The reason for not achieving 100% sample collection completeness is due to some samples not being collected from the bottom sampling interval for locations within the pit boundary. As described in the sampling and analysis plan in the *RFI/RI Work Plan for the Early Construction and Operational Disposal Site L-3 (NBN), L-Area Rubble Pit (131-1L), and L-Area Rubble Pit (131-4L) Operable Unit (U)* (SRNS 2022), the bottom sampling interval was contingent if the pit bottom was encountered and needed to be further defined. As a result, the tentative sampling depths were not sampled, resulting in not all laboratory analysis completed. For work that was completed in assessing the site, all required sampling depths and analyses were performed.

I.1.2.6 Sensitivity

Sensitivity is the ability of the method or instrument to detect the target analytes at the level of interest (e.g., Regional Screening Levels [RSL] or Primary Drinking Water Maximum Contaminant Levels [MCL]). The sample quantitation limit is the minimum concentration of an analyte that can be routinely identified and quantified above the MDL by a laboratory. Sensitivity can be determined by comparing the MDLs for each analyte and for each matrix (e.g., soil or groundwater). MDLs for each matrix and analyte are compared against the criteria of interest to ensure data usability.

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I.1.3 Validation Findings

I.1.3.1 Holding Times

This section discusses the holding times for the reported analyses and identifies whether the analyses were within the recommended limits and if qualification was required for REG samples, field duplicate samples and split samples.

EPA8081B, Pesticides

Forty-two (42) pesticide records were qualified as approximate because the sample was held beyond normal holding time prior to analysis, UJ/Q.

EPA8260D, Volatile Organics

One hundred four (104) volatile organic records were qualified as approximate because the sample was held beyond normal holding time prior to analysis, UJ/Q.

EPA8270E, Semivolatiles

One hundred twenty-eight (128) semi-volatile records were qualified as approximate because the sample was held beyond normal holding time prior to analysis, UJ/Q.

Four (4) semi-volatile records were qualified as estimated because the sample was held beyond normal holding time prior to analysis, J/Q.

EPA9012B, Cyanide

Two (2) cyanide records were qualified as approximate because the sample was held beyond normal holding time prior to analysis, UJ/Q.

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Table I.1-4. Holding Time Review Qualifier Summary

Method Code	Total # of Records	# of Records Qualified for Hold Times	Associated Samples Qualified
A01R	*192*	*0*	
EERFC-01	*2*	*0*	
EPA6010D	*774*	*0*	
EPA6020B	*2,108*	*0*	
EPA7470A	*4*	*0*	
EPA7471B	*127*	*0*	
EPA8081B	*2,751*	*42*	*LRP-1L-WP-00332, LRP-1L-WP-00412*
EPA8082A	*924*	*0*	
EPA8260D	*7,904*	*104*	*LRP-1L-WP-00361, LRP-1L-WP-00401*
EPA8270E	*8,894*	*132*	*LRP-1L-WP-00332, LRP-1L-WP-00412*
EPA900.0	*8*	*0*	
EPA9012B	*131*	*2*	*LRP-1L-WP-00332, LRP-1L-WP-00412*
EPA903.0	*12*	*0*	
EPA904.0	*12*	*0*	
EPA906.0	*2*	*0*	
EPA9310	*240*	*0*	
GA-01-RMOD	*16*	*0*	
RADA-001	*14*	*0*	
RADA-002	*7*	*0*	
RADA-003	*7*	*0*	
RADA-004	*7*	*0*	
RADA-005	*7*	*0*	
RADA-006	*7*	*0*	
RADA-008	*7*	*0*	
RADA-009	*7*	*0*	
RADA-011	*77*	*0*	
RADA-013	*42*	*0*	
RADA-020	*7*	*0*	
RADA-022	*14*	*0*	
RADA-032	*7*	*0*	
RADA-038	*21*	*0*	
SR-03-RCMOD	*2*	*0*	
ST-RC-0055	*4*	*0*	
ST-RC-0247	*2*	*0*	
TC-02-RCMOD	*2*	*0*	

I.1.3.2 Preservation

All chemical and physical preservation for the reported analyses were properly applied. No qualification was required.

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Table I.1-5. Preservation Review Qualifier Summary

Method Code	Total # of Records	# of Records Qualified for Preservation	Associated Samples Qualified
A01R	*192*	*0*	
EERFC-01	*2*	*0*	
EPA6010D	*774*	*0*	
EPA6020B	*2,108*	*0*	
EPA7470A	*4*	*0*	
EPA7471B	*127*	*0*	
EPA8081B	*2,751*	*0*	
EPA8082A	*924*	*0*	
EPA8260D	*7,904*	*0*	
EPA8270E	*8,894*	*0*	
EPA900.0	*8*	*0*	
EPA9012B	*131*	*0*	
EPA903.0	*12*	*0*	
EPA904.0	*12*	*0*	
EPA906.0	*2*	*0*	
EPA9310	*240*	*0*	
GA-01-RMOD	*16*	*0*	
RADA-001	*14*	*0*	
RADA-002	*7*	*0*	
RADA-003	*7*	*0*	
RADA-004	*7*	*0*	
RADA-005	*7*	*0*	
RADA-006	*7*	*0*	
RADA-008	*7*	*0*	
RADA-009	*7*	*0*	
RADA-011	*77*	*0*	
RADA-013	*42*	*0*	
RADA-020	*7*	*0*	
RADA-022	*14*	*0*	
RADA-032	*7*	*0*	
RADA-038	*21*	*0*	
SR-03-RCMOD	*2*	*0*	
ST-RC-0055	*4*	*0*	
ST-RC-0247	*2*	*0*	
TC-02-RCMOD	*2*	*0*	

I.1.3.3 Calibration, Identification, and Quantitation

This section discusses whether all calibration, identification, and quantitation criteria for the reported analyses were within the recommended limits and if qualification was required for REG samples, FD samples and SPL samples.

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RADA-006, Iodine-129

One (1) Iodine-129 record was rejected due to compound identification criteria was not met, R/1.

RADA-013, Gamma Spectroscopy

One (1) Cesium-137 record was rejected due to compound identification criteria was not met, R/1.

Table I.1-6. Calibration, Identification, and Quantitation Review Summary

Method Code	Total # of Records	# of Records Qualified for Calibration, Identification and Quantitation	Associated Samples Qualified
A01R	*192*	*0*	
EERFC-01	*2*	*0*	
EPA6010D	*774*	*0*	
EPA6020B	*2,108*	*0*	
EPA7470A	*4*	*0*	
EPA7471B	*127*	*0*	
EPA8081B	*2,751*	*0*	
EPA8082A	*924*	*0*	
EPA8260D	*7,904*	*0*	
EPA8270E	*8,894*	*0*	
EPA900.0	*8*	*0*	
EPA9012B	*131*	*0*	
EPA903.0	*12*	*0*	
EPA904.0	*12*	*0*	
EPA906.0	*2*	*0*	
EPA9310	*240*	*0*	
GA-01-RMOD	*16*	*0*	
RADA-001	*14*	*0*	
RADA-002	*7*	*0*	
RADA-003	*7*	*0*	
RADA-004	*7*	*0*	
RADA-005	*7*	*0*	
RADA-006	*7*	*1*	*LRP-1L-WP-00412*

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Table I.1-6. Calibration, Identification, and Quantitation Review Summary *(continued/end)*

Method Code	Total # of Records	# of Records Qualified for Calibration, Identification and Quantitation	Associated Samples Qualified
RADA-008	*7*	*0*	
RADA-009	*7*	*0*	
RADA-011	*77*	*0*	
RADA-013	*42*	*1*	*LRP-1L-WP-00412*
RADA-020	*7*	*0*	
RADA-022	*14*	*0*	
RADA-032	*7*	*0*	
RADA-038	*21*	*0*	
SR-03-RCMOD	*2*	*0*	
ST-RC-0055	*4*	*0*	
ST-RC-0247	*2*	*0*	
TC-02-RCMOD	*2*	*0*	

I.1.3.4 Trip Blanks and Rinsate Blanks

This section discusses whether the TB and RB results for the reported analyses were within the recommended limits and if qualification was required. No qualification was required.

Table I.1-7A. Trip Blank Review Qualifier Summary

Method Code	Total # of TB Records	# of TB Records Qualified	Associated Samples Qualified
EPA8260D	*1092*	*0*	

Table I.1-7B. Rinsate Blank Review Qualifier Summary

Method Code	Total # of TB Records	# of TB Records Qualified	Associated Samples Qualified
EPA6010D	*20*	*0*	
EPA6020B	*68*	*0*	
EPA7470A	*4*	*0*	
EPA8081B	*84*	*0*	
EPA8082A	*28*	*0*	
EPA8260D	*208*	*0*	
EPA8270E	*272*	*0*	
EPA900.0	*8*	*0*	
EPA9012B	*4*	*0*	

I.1.3.5 Method Blanks

This section discusses whether the MB results for the reported analyses were within the recommended limits and if qualification was required for REG samples, FD samples and SPL samples.

EPA6010D, ICP-ES Metals

Thirty (30) Calcium records were qualified as estimated due to the analyte was detected in the MB, J/V.

Twelve (12) Iron records were qualified as estimated due to the analyte was detected in the MB, J/V.

One (1) Nickel record was qualified as estimated due to the analyte was detected in the MB, J/V.

Seventeen (17) Potassium records were qualified as estimated due to the analyte was detected in the MB, J/V.

One (1) Selenium record was qualified as approximate due to the analyte was detected in the MB, UJ/V.

Three (3) Silver records were qualified as approximate due to the analyte was detected in the MB, UJ/V.

Two (2) Zinc records were qualified as approximate due to the analyte was detected in the MB, UJ/V.

EPA6020B, ICP-MS Metals

Eighty (80) Aluminum records were qualified as estimated due to the analyte was detected in the MB, J/V.

Eighty (80) Barium records were qualified as estimated due to the analyte was detected in the MB, J/V.

One hundred twenty (120) Chromium records were qualified as estimated due to the analyte was detected in the MB, J/V.

One hundred twenty (120) Copper records were qualified as estimated due to the analyte was detected in the MB, J/V.

Eighty (80) Lead records were qualified as estimated due to the analyte was detected in the MB, J/V.

Twenty (20) Manganese records were qualified as estimated due to the analyte was detected in the MB, J/V.

<u>EPA7471B, Mercury</u>

Sixteen (16) Mercury records were qualified as estimated due to the analyte was detected in the MB, J/V.

<u>EPA8260D, Volatile Organics</u>

Nine (9) Acetone records were qualified as approximate due to the analyte was detected in the MB, UJ/V.

<u>RADA-009, Radium-228</u>

Four (4) Radium-228 records were qualified as estimated due to the analyte was detected in the MB, J/V.

<u>RADA-011, Alpha Spectroscopy</u>

Seven (7) Americium-241 records were qualified as approximate due to the analyte was detected in the MB, UJ/V.

Seven (7) Americium-243 records were qualified as approximate due to the analyte was detected in the MB, UJ/V.

Five (5) Plutonium-238 records were qualified as approximate due to the analyte was detected in the MB, UJ/V.

Seven (7) Plutonium-239/240 records were qualified as approximate due to the analyte was detected in the MB, UJ/V.

Four (4) Plutonium-242 records were qualified as approximate due to the analyte was detected in the MB, UJ/V.

Three (3) Uranium-233/234 records were qualified as estimated due to the analyte was detected in the MB, J/V.

One (1) Uranium-233/234 record was qualified as approximate due to the analyte was detected in the MB, UJ/V.

Seven (7) Uranium-235/236 records were qualified as approximate due to the analyte was detected in the MB, UJ/V.

Two (2) Uranium-238 records were qualified as approximate due to the analyte was detected in the MB, UJ/V.

Five (5) Uranium-238 records were qualified as estimated due to the analyte was detected in the MB, J/V.

RADA-032, Neptunium Series

Five (5) Neptunium-237 records were qualified as approximate due to the analyte was detected in the MB, UJ/V.

RADA-038, Thorium Series

One (1) Thorium-228 record was qualified as approximate due to the analyte was detected in the MB, UJ/V.

Three (3) Thorium-228 records were qualified as estimated due to the analyte was detected in the MB, J/V.

Two (2) Thorium-230 records were qualified as approximate due to the analyte was detected in the MB, UJ/V.

Five (5) Thorium-230 records were qualified as estimated due to the analyte was detected in the MB, J/V.

Four (4) Thorium-232 records were qualified as estimated due to the analyte was detected in the MB, J/V.

Table I.1-8. Method Blank (MB) Review Qualifier Summary

Method Code	Total # of MB Records	# of MB Records Qualified	Associated Samples Qualified
A01R	*16*	*0*	
EERFC-01	*1*	*0*	
EPA6010D	*214*	*19*	*LRP-1L-WP-00313, LRP-1L-WP-00314, LRP-1L-WP-00315, LRP-1L-WP-00316, LRP-1L-WP-00317, LRP-1L-WP-00318, LRP-1L-WP-00319, LRP-1L-WP-00333, LRP-1L-WP-00340, LRP-1L-WP-00366, LRP-1L-WP-00367, LRP-1L-WP-00368, LRP-1L-WP-00381, LRP-1L-WP-00382, LRP-1L-WP-00383, LRP-1L-WP-00413, LRP-1L-WP-00414, LRP-1L-WP-00415, LRP-1L-WP-00416, LRP-1L-WP-00417, LRP-1L-WP-00418, LRP-1L-WP-00420, LRP-1L-WP-00421, LRP-1L-WP-00422, LRP-1L-WP-00423, LRP-1L-WP-00424, LRP-1L-WP-00427, LRP-1L-WP-00428, LRP-1L-WP-00429, LRP-1L-WP-00430, LRP-1L-WP-00433, LRP-1L-WP-00434, LRP-1L-WP-00436, LRP-1L-WP-00437, LRP-1L-WP-00440, LRP-1L-WP-00441, LRP-1L-WP-00442, LRP-1L-WP-00446, LRP-1L-WP-00447, LRP-1L-WP-00448, LRP-1L-WP-00449, LRP-1L-WP-00450*

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Table I.1-8. Method Blank (MB) Review Qualifier Summary *(continued)*

Method Code	Total # of MB Records	# of MB Records Qualified	Associated Samples Qualified
EPA6020B	*156*	*30*	*LRP-1L-WP-00313, LRP-1L-WP-00314, LRP-1L-WP-00315, LRP-1L-WP-00316, LRP-1L-WP-00317, LRP-1L-WP-00318, LRP-1L-WP-00319, LRP-1L-WP-00320, LRP-1L-WP-00321, LRP-1L-WP-00322, LRP-1L-WP-00323, LRP-1L-WP-00324, LRP-1L-WP-00325, LRP-1L-WP-00326, LRP-1L-WP-00327, LRP-1L-WP-00328, LRP-1L-WP-00329, LRP-1L-WP-00330, LRP-1L-WP-00331, LRP-1L-WP-00333, LRP-1L-WP-00334, LRP-1L-WP-00335, LRP-1L-WP-00336, LRP-1L-WP-00337, LRP-1L-WP-00338, LRP-1L-WP-00339, LRP-1L-WP-00340, LRP-1L-WP-00341, LRP-1L-WP-00342, LRP-1L-WP-00343, LRP-1L-WP-00344, LRP-1L-WP-00345, LRP-1L-WP-00346, LRP-1L-WP-00347, LRP-1L-WP-00348, LRP-1L-WP-00349, LRP-1L-WP-00350, LRP-1L-WP-00351, LRP-1L-WP-00353, LRP-1L-WP-00354, LRP-1L-WP-00355, LRP-1L-WP-00356, LRP-1L-WP-00357, LRP-1L-WP-00358, LRP-1L-WP-00359, LRP-1L-WP-00360, LRP-1L-WP-00361, LRP-1L-WP-00362, LRP-1L-WP-00363, LRP-1L-WP-00364, LRP-1L-WP-00365, LRP-1L-WP-00366, LRP-1L-WP-00367, LRP-1L-WP-00368, LRP-1L-WP-00369, LRP-1L-WP-00370, LRP-1L-WP-00373, LRP-1L-WP-00374, LRP-1L-WP-00375, LRP-1L-WP-00376, LRP-1L-WP-00377, LRP-1L-WP-00378, LRP-1L-WP-00380, LRP-1L-WP-00381, LRP-1L-WP-00382, LRP-1L-WP-00383, LRP-1L-WP-00384, LRP-1L-WP-00386, LRP-1L-WP-00387, LRP-1L-WP-00388, LRP-1L-WP-00389, LRP-1L-WP-00390, LRP-1L-WP-00393, LRP-1L-WP-00394, LRP-1L-WP-00395, LRP-1L-WP-00396, LRP-1L-WP-00397, LRP-1L-WP-00398, LRP-1L-WP-00400, LRP-1L-WP-00401, LRP-1L-WP-00402, LRP-1L-WP-00403, LRP-1L-WP-00404, LRP-1L-WP-00406, LRP-1L-WP-00407, LRP-1L-WP-00408, LRP-1L-WP-00409, LRP-1L-WP-00410, LRP-1L-WP-00413, LRP-1L-WP-00414, LRP-1L-WP-00415, LRP-1L-WP-00416, LRP-1L-WP-00417, LRP-1L-WP-00418, LRP-1L-WP-00420, LRP-1L-WP-00421, LRP-1L-WP-00422, LRP-1L-WP-00423, LRP-1L-WP-00424, LRP-1L-WP-00426, LRP-1L-WP-00427, LRP-1L-WP-00428, LRP-1L-WP-00429, LRP-1L-WP-00430, LRP-1L-WP-00433, LRP-1L-WP-00434, LRP-1L-WP-00435, LRP-1L-WP-00436, LRP-1L-WP-00437, LRP-1L-WP-00438, LRP-1L-WP-00440, LRP-1L-WP-00441, LRP-1L-WP-00442, LRP-1L-WP-00443, LRP-1L-WP-00444, LRP-1L-WP-00446, LRP-1L-WP-00447, LRP-1L-WP-00448, LRP-1L-WP-00449, LRP-1L-WP-00450*
EPA7470A	*4*	*0*	
EPA7471B	*14*	*1*	*LRP-1L-WP-00353, LRP-1L-WP-00354, LRP-1L-WP-00355, LRP-1L-WP-00357, LRP-1L-WP-00358, LRP-1L-WP-00360, LRP-1L-WP-00361, LRP-1L-WP-00362, LRP-1L-WP-00364, LRP-1L-WP-00402, LRP-1L-WP-00403, LRP-1L-WP-00404, LRP-1L-WP-00407, LRP-1L-WP-00408, LRP-1L-WP-00409, LRP-1L-WP-00410*

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Table I.1-8. Method Blank (MB) Review Qualifier Summary *(continued/end)*

Method Code	Total # of MB Records	# of MB Records Qualified	Associated Samples Qualified
EPA8081B	*421*	*0*	
EPA8082A	*139*	*0*	
EPA8260D	*1976*	*14*	*LRP-1L-WP-00314, LRP-1L-WP-00321, LRP-1L-WP-00322, LRP-1L-WP-00323, LRP-1L-WP-00324, LRP-1L-WP-00367, LRP-1L-WP-00368, LRP-1L-WP-00369, LRP-1L-WP-00370*
EPA8270E	*1278*	*0*	
EPA900.0	*2*	*0*	
EPA9012B	*23*	*0*	
EPA903.0	*2*	*0*	
EPA904.0	*2*	*0*	
EPA906.0	*1*	*0*	
EPA9310	*16*	*0*	
GA-01-RMOD	*9*	*0*	
HASL300	*111*	*61*	
LSC_I129	*3*	*0*	
LSC-A-001	*1*	*0*	
RADA-001	*16*	*0*	
RADA-002	*6*	*0*	
RADA-003	*6*	*0*	
RADA-004	*6*	*0*	
RADA-005	*6*	*0*	
RADA-006	*7*	*0*	
RADA-008	*6*	*0*	
RADA-009	*6*	*4*	*LRP-1L-WP-00326, LRP-1L-WP-00347, LRP-1L-WP-00426, LRP-1L-WP-00447*
RADA-011	*77*	*0*	*LRP-1L-WP-00332, LRP-1L-WP-00352, LRP-1L-WP-00372, LRP-1L-WP-00392, LRP-1L-WP-00412, LRP-1L-WP-00432, LRP-1L-WP-00452*
RADA-013	*42*	*0*	
RADA-020	*6*	*0*	
RADA-022	*12*	*0*	
RADA-032	*7*	*4*	*LRP-1L-WP-00332, LRP-1L-WP-00352, LRP-1L-WP-00372, LRP-1L-WP-00392, LRP-1L-WP-00432*
RADA-038	*21*	*0*	*LRP-1L-WP-00332, LRP-1L-WP-00352, LRP-1L-WP-00372, LRP-1L-WP-00392, LRP-1L-WP-00412, LRP-1L-WP-00432, LRP-1L-WP-00452*
SR-03-RCMOD	*1*	*0*	
STL-RC-0147	*1*	*0*	
ST-RC-0055	*2*	*0*	
ST-RC-0247	*1*	*0*	
TC-02-RCMOD	*1*	*0*	

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I.1.3.6 Laboratory Duplicate Relative Percent Difference

This section discusses whether the LD results for the reported analyses were within the recommended limits and if qualification was required.

EPA6010D, ICP-ES Metals

One (1) Iron record was qualified as estimated due to MS/MSD RPD was not within control limits, J/18.

EPA6020B, ICP-MS Metals

One (1) Arsenic record was qualified as estimated due to MS/MSD RPD was not within control limits, J/18.

Two (2) Vanadium records were qualified as estimated due to MS/MSD RPD was not within control limits, J/18.

EPA8081B, Pesticides

One (1) Heptachlor record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

Two (2) Toxaphene records were qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

EPA8270E, Semivolatiles

One (1) 2,4-Dimethylphenol record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

Five (5) 4-Chloroaniline records were qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

One (1) 4-Nitrophenol record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

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One (1) Caprolactam record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

One (1) Carbazole record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

One (1) Fluoranthene record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

One (1) M-Nitroaniline record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

One (1) P-Nitroaniline record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

<u>EPA9012B, Cyanide</u>

One (1) Cyanide record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

Table I.1-9. Laboratory Duplicate Qualifier Summary

Method Code	Total # of LD Records	# of LD Records Qualified	Associated Samples Qualified
A01R	*16*	*0*	
EERFC-01	*1*	*0*	
EPA6010D	*143*	*1*	*LRP-1L-WP-00421*
EPA6020B	*136*	*3*	*LRP-1L-WP-00394, LRP-1L-WP-00450*
EPA7470A	*1*	*0*	
EPA7471B	*13*	*0*	
EPA8081B	*268*	*2*	*LRP-1L-WP-00359, LRP-1L-WP-00365*
EPA8082A	*24*	*0*	
EPA8270E	*739*	*11*	*LRP-1L-WP-00330, LRP-1L-WP-00336, LRP-1L-WP-00366, LRP-1L-WP-00401, LRP-1L-WP-00435*
EPA9012B	*23*	*1*	*LRP-1L-WP-00396*
EPA903.0	*2*	*0*	
EPA904.0	*2*	*0*	
EPA906.0	*1*	*0*	
EPA9310	*16*	*0*	
GA-01-RMOD	*9*	*0*	

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Table I.1-9. Laboratory Duplicate Qualifier Summary *(continued/end)*

Method Code	Total # of LD Records	# of LD Records Qualified	Associated Samples Qualified
RADA-001	*6*	*0*	
RADA-002	*2*	*0*	
RADA-003	*2*	*0*	
RADA-004	*2*	*0*	
RADA-005	*2*	*0*	
RADA-006	*2*	*0*	
RADA-008	*2*	*0*	
RADA-009	*2*	*0*	
RADA-011	*22*	*0*	
RADA-013	*30*	*0*	
RADA-020	*1*	*0*	
RADA-022	*6*	*0*	
RADA-032	*2*	*0*	
RADA-038	*6*	*0*	
SR-03-RCMOD	*1*	*0*	
ST-RC-0055	*2*	*0*	
ST-RC-0247	*1*	*0*	
TC-02-RCMOD	*1*	*0*	

I.1.3.7 Field Duplicate Relative Percent Difference

This section discusses whether the FD results for the reported analyses were within the recommended limits and if qualification was required. No qualification was required.

Table I.1-10. Field Duplicate Qualifier Summary

Method Code	Total # of FD Records	# of FD Records Qualified	Associated Samples Qualified
EPA6010D	*35*	*0*	
EPA6020B	*119*	*0*	
EPA7471B	*7*	*0*	
EPA8081B	*147*	*0*	
EPA8082A	*49*	*0*	
EPA8260D	*364*	*0*	
EPA8270E	*476*	*0*	
EPA9012B	*7*	*0*	
EPA9310	*14*	*0*	

I.1.3.8 Matrix Spike Recovery

This section discusses whether the MS and MSD recoveries for the reported analyses were within the recommended limits and if qualification was required.

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<u>EPA6010D, ICP-ES Metals</u>

Six (6) Iron records were qualified as estimated due to the MS/MSD recovery was outside the established control limits, J/11.

<u>EPA6020B, ICP-MS Metals</u>

Four (4) Arsenic records were qualified as estimated due to the MS/MSD recovery was outside the established control limits, J/11.

Six (6) Barium records were qualified as estimated due to the MS/MSD recovery was outside the established control limits, J/11.

Four (4) Chromium records were qualified as estimated due to the MS/MSD recovery was outside the established control limits, J/11.

Three (3) Lead records were qualified as estimated due to the MS/MSD recovery was outside the established control limits, J/11.

One (1) Manganese record was qualified as estimated due to the MS/MSD recovery was outside the established control limits, J/11.

Five (5) Nickel records were qualified as estimated due to the MS/MSD recovery was outside the established control limits, J/11.

One (1) Selenium record was qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Six (6) Vanadium records were qualified as estimated due to the MS/MSD recovery was outside the established control limits, J/11.

Two (2) Zinc records were qualified as estimated due to the MS/MSD recovery was outside the established control limits, J/11.

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EPA8081B, Pesticides

One (1) Beta-Benzene Hexachloride record was qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

One (1) DDT record was qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

One (1) Endrin Aldehyde record was qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

One (1) Methoxychlor record was qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

One (1) Toxaphene record was qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

EPA8082A, PCBs

One (1) Aroclor 1016 record was qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

One (1) Aroclor 1260 record was qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

EPA8270E, Semivolatiles

Thirty (30) 1,1-Biphenyl records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) 1,2,4,5-Tetrachlorobenzene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) 2,3,4,6-Tetrachlorophenol records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) 2,4,5-Trichlorophenol records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) 2,4,6-Trichlorophenol records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) 2,4-Dichlorophenol records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) 2,4-Dimethylphenol records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) 2,4-Dinitrophenol records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) 2,4-Dinitrotoluene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) 2,6-Dinitrotoluene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) 2-Chloronaphthalene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) 2-Chlorophenol records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) 2-Methylnaphthalene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) 2-Nitroaniline records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

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Thirty (30) 2-Nitrophenol records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) 3,3-Dichlorobenzidine records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) 4-Bromophenyl Phenyl Ether records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) 4-Chloroaniline records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) 4-Chlorophenyl Phenyl Ether records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty-one (31) 4-Nitrophenol records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Twenty-nine (29) Acenaphthene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) Acenaphthylene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) Acetophenone records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) Anthracene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) Atrazine records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

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Thirty (30) Benzaldehyde records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Twenty-nine (29) Benzo(G,H,I)perylene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Twenty-nine (29) Benzo[A]anthracene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Twenty-nine (29) Benzo[A]pyrene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Twenty-nine (29) Benzo[B]fluoranthene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Twenty-nine (29) Benzo[K]fluoranthene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) Bis(2-Chloro-1-Methylethyl)Ether records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) Bis(2-Chloroethoxy)Methane records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) Bis(2-Chloroethyl)Ether records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) Bis(2-Ethylhexyl)Phthalate records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) Butyl Benzyl Phthalate records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

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Thirty (30) Caprolactam records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Twenty-nine (29) Carbazole records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Twenty-nine (29) Chrysene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

One (1) Chrysene record was qualified as estimated due to the MS/MSD recovery was outside the established control limits, J/11.

Twenty-nine (29) Dibenz[AH]anthracene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Twenty-nine (29) Dibenzofuran records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) Diethyl Phthalate records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) Dimethyl Phthalate records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) Di-N-Butyl Phthalate records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) Dinitro-O-Cresol records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Twenty-nine (29) Fluoranthene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

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One (1) Fluoranthene record was qualified as estimated due to the MS/MSD recovery was outside the established control limits, J/11.

Twenty-nine (29) Fluorene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) Hexachlorobenzene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) Hexachlorobutadiene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) Hexachlorocyclopentadiene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) Hexachloroethane records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Twenty-nine (29) Indeno[1,2,3-CD]pyrene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) Isophorone records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) M/P-Cresol records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) M-Nitroaniline records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) Naphthalene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

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Thirty (30) N-Dioctyl Phthalate records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) Nitrobenzene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) N-Nitrosodiphenylamine records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) N-Nitrosodipropylamine records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) O-Cresol records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) P-Chloro-M-Cresol records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) P-Cresol records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty (30) Pentachlorophenol records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Twenty-nine (29) Phenanthrene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

One (1) Phenanthrene record was qualified as estimated due to the MS/MSD recovery was outside the established control limits, J/11.

Thirty-one (31) Phenol records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

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Thirty (30) P-Nitroaniline records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Twenty-nine (29) Pyrene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

One (1) Pyrene record was qualified as estimated due to the MS/MSD recovery was outside the established control limits, J/11.

EPA9012B, Cyanide

One (1) Cyanide record was qualified as estimated due to the MS/MSD recovery was outside the established control limits, J/11.

One (1) Cyanide record was qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Table I.1-11. MS and MSD Recovery Qualifier Summary

Method Code	Total # of MS/MSD Records	# of MS/MSD Records Qualified	Associated Samples Qualified
EERFC-01	*1*	*0*	
EPA6010D	*293*	*12*	*LRP-1L-WP-00331, LRP-1L-WP-00338, LRP-1L-WP-00363, LRP-1L-WP-00369, LRP-1L-WP-00370, LRP-1L-WP-00438*
EPA6020B	*272*	*50*	*LRP-1L-WP-00356, LRP-1L-WP-00366, LRP-1L-WP-00373, LRP-1L-WP-00394, LRP-1L-WP-00430, LRP-1L-WP-00450*
EPA7470A	*2*	*0*	
EPA7471B	*26*	*0*	
EPA8081B	*536*	*4*	*LRP-1L-WP-00383*
EPA8082A	*48*	*4*	*LRP-1L-WP-00383*

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Table I.1-11. MS and MSD Recovery Qualifier Summary (*continued/end)*

Method Code	Total # of MS/MSD Records	# of MS/MSD Records Qualified	Associated Samples Qualified
EPA8270E	*1478*	*13*	*LRP-1L-WP-00313, LRP-1L-WP-00314, LRP-1L-WP-00319, LRP-1L-WP-00320, LRP-1L-WP-00326, LRP-1L-WP-00333, LRP-1L-WP-00340, LRP-1L-WP-00346, LRP-1L-WP-00353, LRP-1L-WP-00360, LRP-1L-WP-00361, LRP-1L-WP-00366, LRP-1L-WP-00367, LRP-1L-WP-00373, LRP-1L-WP-00375, LRP-1L-WP-00380, LRP-1L-WP-00386, LRP-1L-WP-00387, LRP-1L-WP-00389, LRP-1L-WP-00393, LRP-1L-WP-00395, LRP-1L-WP-00400, LRP-1L-WP-00407, LRP-1L-WP-00413, LRP-1L-WP-00414, LRP-1L-WP-00420, LRP-1L-WP-00426, LRP-1L-WP-00433, LRP-1L-WP-00440, LRP-1L-WP-00446*
EPA9012B	*41*	*2*	*LRP-1L-WP-00366, LRP-1L-WP-00396*
EPA906.0	*1*	*0*	
RADA-002	*2*	*0*	
RADA-003	*2*	*0*	
RADA-006	*2*	*0*	
RADA-008	*2*	*0*	

I.1.3.9 Laboratory Control Samples Recovery

This section discusses whether the LCS recovery for the reported analyses were within the recommended limits and if qualification was required.

EPA8081B, Pesticides

One (1) Endosulfan II record was qualified as non-detect because the LCS recovery was outside the established control limits, U/2.

Nineteen (19) Toxaphene records were qualified as non-detect because the LCS recovery was outside the established control limits, U/2.

One (1) Toxaphene record was qualified as approximate because the LCS recovery was outside the established control limits, UJ/2.

EPA8082A, PCBs

Nineteen (19) Aroclor 1016 records were qualified as non-detect because the LCS recovery was outside the established control limits, U/2.

One (1) Aroclor 1016 record was qualified as approximate because the LCS recovery was outside the established control limits, UJ/2.

Nineteen (19) Aroclor 1260 records were qualified as non-detect because the LCS recovery was outside the established control limits, U/2.

One (1) Aroclor 1260 record was qualified as approximate because the LCS recovery was outside the established control limits, UJ/2.

EPA8260D, Volatile Organics

One (1) 1,2,3-Trichlorobenzene record was qualified as approximate because the LCS recovery was outside the established control limits, UJ/2.

One (1) Trichlorofluoromethane record was qualified as non-detect because the LCS recovery was outside the established control limits, U/2.

EPA8270E, Semivolatiles

One (1) 4-Nitrophenol record was qualified as approximate because the LCS recovery was outside the established control limits, UJ/2.

Two (2) 4-Nitrophenol records were qualified as non-detect because the LCS recovery was outside the established control limits, U/2.

One (1) Caprolactam record was qualified as approximate because the LCS recovery was outside the established control limits, UJ/2.

Seven (7) Caprolactam records were qualified as non-detect because the LCS recovery was outside the established control limits, U/2.

Three (3) Phenol records were qualified as non-detect because the LCS recovery was outside the established control limits, U/2.

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Table I.1-12. LCS Qualifier Summary

Method Code	Total # of LCS Records	# of LCS Records Qualified	Associated Samples Qualified
A01R	*7*	*0*	
EERFC-01	*1*	*0*	
EPA6010D	*229*	*0*	
EPA6020B	*156*	*0*	
EPA7470A	*4*	*0*	
EPA7471B	*16*	*0*	
EPA8081B	*556*	*2*	*LRP-1L-WP-00320, LRP-1L-WP-00321, LRP-1L-WP-00322, LRP-1L-WP-00323, LRP-1L-WP-00325, LRP-1L-WP-00373, LRP-1L-WP-00374, LRP-1L-WP-00375, LRP-1L-WP-00376, LRP-1L-WP-00377, LRP-1L-WP-00378, LRP-1L-WP-00380, LRP-1L-WP-00381, LRP-1L-WP-00382, LRP-1L-WP-00383, LRP-1L-WP-00386, LRP-1L-WP-00387, LRP-1L-WP-00388, LRP-1L-WP-00389, LRP-1L-WP-00390*
EPA8082A	*48*	*2*	*LRP-1L-WP-00320, LRP-1L-WP-00321, LRP-1L-WP-00322, LRP-1L-WP-00323, LRP-1L-WP-00325, LRP-1L-WP-00373, LRP-1L-WP-00374, LRP-1L-WP-00375, LRP-1L-WP-00376, LRP-1L-WP-00377, LRP-1L-WP-00378, LRP-1L-WP-00380, LRP-1L-WP-00381, LRP-1L-WP-00382, LRP-1L-WP-00383, LRP-1L-WP-00386, LRP-1L-WP-00387, LRP-1L-WP-00388, LRP-1L-WP-00389, LRP-1L-WP-00390*
EPA8260D	*3178*	*1*	*LRP-1L-WP-00352*
EPA8270E	*1551*	*19*	*LRP-1L-WP-00394, LRP-1L-WP-00397, LRP-1L-WP-00398, LRP-1L-WP-00400, LRP-1L-WP-00401*
EPA900.0	*2*	*0*	
EPA9012B	*57*	*0*	
EPA903.0	*2*	*0*	
EPA904.0	*2*	*0*	
EPA906.0	*1*	*0*	
EPA9310	*16*	*0*	
GA-01-RMOD	*4*	*0*	
HASL300	*111*	*0*	
LSC_I129	*1*	*0*	
LSC-A-001	*2*	*0*	
LSC-A-006	*1*	*0*	
RADA-001	*16*	*0*	
RADA-002	*6*	*0*	
RADA-003	*6*	*0*	
RADA-004	*6*	*0*	
RADA-005	*6*	*0*	
RADA-006	*7*	*0*	
RADA-008	*6*	*0*	
RADA-009	*6*	*0*	
RADA-011	*77*	*0*	
RADA-013	*49*	*0*	
RADA-020	*6*	*0*	
RADA-022	*12*	*0*	

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Table I.1-12. LCS Qualifier Summary *(continued/end)*

Method Code	Total # of LCS Records	# of LCS Records Qualified	Associated Samples Qualified
RADA-032	*7*	*0*	
RADA-038	*21*	*0*	
SR-03-RCMOD	*1*	*0*	
STL-RC-0147	*1*	*0*	
ST-RC-0055	*2*	*0*	
ST-RC-0247	*1*	*0*	
TC-02-RCMOD	*1*	*0*	

I.1.3.10 Surrogate/Tracer Recovery

This section discusses whether the surrogate/tracer recovery for the reported analyses were within the recommended limits and if qualification was required.

EPA8081B, Pesticides

Four (4) Aldrin records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Four (4) Alpha-Benzene Hexachloride records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Four (4) Alpha-Chlordane records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Four (4) Beta-Benzene Hexachloride records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Four (4) DDD records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Four (4) DDE records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

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Ten (10) DDT records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Four (4) Delta-Benzene Hexachloride records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Four (4) Dieldrin records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Four (4) Endosulfan I records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Four (4) Endosulfan II records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Four (4) Endosulfan Sulfate records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Four (4) Endrin records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Four (4) Endrin Aldehyde records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Four (4) Endrin Ketone records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Four (4) Gamma-Chlordane records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Six (6) Heptachlor records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

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Four (4) Heptachlor Epoxide records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Four (4) Lindane records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Seven (7) Methoxychlor records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Four (4) Toxaphene records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

EPA8082A, PCBs

Three (3) Aroclor 1016 records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Three (3) Aroclor 1221 records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Three (3) Aroclor 1232 records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Three (3) Aroclor 1242 records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Three (3) Aroclor 1248 records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Three (3) Aroclor 1254 records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Three (3) Aroclor 1260 records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

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EPA8260D, Volatile Organics

One (1) 1,1,2,2-Tetrachloroethane record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) 1,2,3-Trichlorobenzene record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) 1,2,4-Trichlorobenzene record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) 1,2-Dibromo-3-Chloropropane record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) 1,2-Dichlorobenze record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) 1,3-Dichlorobenze record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) 1,4-Dichlorobenze record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Bromoform record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Cumene record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Toluene record was qualified as estimated because surrogate recovery was outside of specifications, J/14.

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EPA8270E, Semivolatiles

One (1) 1,1’-Biphenyl record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) 1,2,4,5-Tetrachlorobenzene record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) 2,3,4,6-Tetrachlorophenol record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) 2,4,5-Trichlorophenol record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) 2,4,6-Trichlorophenol record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) 2,4-Dichlorophenol record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) 2,4-Dimethylphenol record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) 2,4-Dinitrophenol record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) 2,4-Dinitrotoluene record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) 2,6-Dinitrotoluene record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) 2-Chloronaphthalene record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

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One (1) 2-Chlorophenol record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) 2-Methylnaphthalene record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) 2-Nitroaniline record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) 2-Nitrophenol record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) 3,3-Dichlorobenzidine record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) 4-Bromophenyl Phenyl Ether record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) 4-Chloroaniline record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) 4-Chlorophenyl Phenyl Ether record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) 4-Nitrophenol record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Acenaphthene record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Acenaphthylene record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Acetophenone record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Anthracene record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Atrazine record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Benzaldehyde record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Benzo(G,H,I)perylene record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Benzo[A]anthracene record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Benzo[A]pyrene record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Benzo[B]fluoranthene record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Benzo[K]fluoranthene record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Bis(2-Chloro-1-Methylethyl)Ether record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Bis(2-Chloroethoxy)Methane record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Bis(2-Chloroethyl)Ether record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Bis(2-Ethylhexyl)Phthalate record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Butyl Benzyl Phthalate record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Caprolactam record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Carbazole record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Chrysene record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Dibenz[AH]anthracene record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Dibenzofuran record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Diethyl Phthalate record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Dimethyl Phthalate record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Di-N-Butyl Phthalate record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

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One (1) Dinitro-O-Cresol record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Fluoranthene record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Fluorene record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Hexachlorobenzene record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Hexachlorobutadiene record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Hexachlorocyclopentadiene record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Hexachloroethane record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Indeno[1,2,3-CD]pyrene record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Isophorone record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) M/P-Cresol record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) M-Nitroaniline record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

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One (1) Naphthalene record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) N-Dioctyl Phthalate record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Nitrobenzene record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) N-Nitrosodiphenylamine record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) N-Nitrosodipropylamine record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) O-Cresol record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) P-Chloro-M-Cresol record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) P-Cresol record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Pentachlorophenol record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Phenanthrene record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Phenol record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) P-Nitroaniline record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Pyrene record was qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Table I.1-13. Surrogate/Tracer Recovery Qualifier Summary

Method Code	Total # of Surrogate/ Tracer Records	# of Surrogate/Tracer Records Qualified	Associated Samples Qualified
EPA8081B	*254*	*6*	*LRP-1L-WP-00315, LRP-1L-WP-00318, LRP-1L-WP-00319, LRP-1L-WP-00348, LRP-1L-WP-00349, LRP-1L-WP-00355, LRP-1L-WP-00369, LRP-1L-WP-00398, LRP-1L-WP-00422*
EPA8082A	*254*	*1*	*LRP-1L-WP-00355, LRP-1L-WP-00398, LRP-1L-WP-00421*
EPA8260D	*388*	*1*	*LRP-1L-WP-00408, LRP-1L-WP-00452*
EPA8270E	*762*	*1*	*LRP-1L-WP-00401*
HASL300	*42*	*0*	
RADA-005	*7*	*0*	
RADA-009	*7*	*0*	
RADA-011	*28*	*0*	
RADA-032	*7*	*0*	
RADA-038	*7*	*0*	

I.1.3.11 Split Samples Comparability

This section discusses samples taken from the same locations and analyzed by similar methods at different laboratories.

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Table I.1-14. Split Samples

Station ID	Sample ID	Sample Interval	Date/Time Collected	Sample Type	Media	Lab
LAP-1L-003	*LRP-1L-WP-00326*	*0 - 1 ft*	*11/8/22 13:30*	*REG*	*SOIL*	*GEL*
LAP-1L-003	*LRP-1L-WP-00326*	*0 - 1 ft*	*11/8/22 13:30*	*REG*	*SOIL*	*TAL*
LAP-1L-003	*LRP-1L-WP-00332*	*0 - 1 ft*	*11/8/22 13:30*	*SPL*	*SOIL*	*GEL*
LAP-1L-003	*LRP-1L-WP-00332*	*0 - 1 ft*	*11/8/22 13:30*	*SPL*	*SOIL*	*TAL*
LAP-1L-006	*LRP-1L-WP-00347*	*1 - 4 ft*	*11/9/22 11:10*	*REG*	*SOIL*	*GEL*
LAP-1L-006	*LRP-1L-WP-00347*	*1 - 4 ft*	*11/9/22 11:10*	*REG*	*SOIL*	*TAL*
LAP-1L-006	*LRP-1L-WP-00352*	*1 - 4 ft*	*11/9/22 11:10*	*SPL*	*SOIL*	*GEL*
LAP-1L-006	*LRP-1L-WP-00352*	*1 - 4 ft*	*11/9/22 11:10*	*SPL*	*SOIL*	*TAL*
LAP-1L-009	*LRP-1L-WP-00368*	*4 - 8 ft*	*10/31/22 13:35*	*REG*	*SOIL*	*GEL*
LAP-1L-009	*LRP-1L-WP-00368*	*4 - 8 ft*	*10/31/22 13:35*	*REG*	*SOIL*	*TAL*
LAP-1L-009	*LRP-1L-WP-00372*	*4 - 8 ft*	*10/31/22 13:35*	*SPL*	*SOIL*	*GEL*
LAP-1L-009	*LRP-1L-WP-00372*	*4 - 8 ft*	*10/31/22 13:35*	*SPL*	*SOIL*	*TAL*
LAP-1L-012	*LRP-1L-WP-00389*	*8 - 12 ft*	*11/2/22 9:45*	*REG*	*SOIL*	*GEL*
LAP-1L-012	*LRP-1L-WP-00389*	*8 - 12 ft*	*11/2/22 9:45*	*REG*	*SOIL*	*TAL*
LAP-1L-012	*LRP-1L-WP-00392*	*8 - 12 ft*	*11/2/22 9:45*	*SPL*	*SOIL*	*GEL*
LAP-1L-012	*LRP-1L-WP-00392*	*8 - 12 ft*	*11/2/22 9:45*	*SPL*	*SOIL*	*TAL*
LAP-1L-015	*LRP-1L-WP-00410*	*12 - 16 ft*	*11/8/22 12:30*	*REG*	*SOIL*	*GEL*
LAP-1L-015	*LRP-1L-WP-00410*	*12 - 16 ft*	*11/8/22 12:30*	*REG*	*SOIL*	*TAL*
LAP-1L-015	*LRP-1L-WP-00412*	*12 - 16 ft*	*11/8/22 12:30*	*SPL*	*SOIL*	*GEL*
LAP-1L-015	*LRP-1L-WP-00412*	*12 - 16 ft*	*11/8/22 12:30*	*SPL*	*SOIL*	*TAL*
LAP-1L-018	*LRP-1L-WP-00426*	*0 - 1 ft*	*11/9/22 14:40*	*REG*	*SOIL*	*GEL*
LAP-1L-018	*LRP-1L-WP-00426*	*0 - 1 ft*	*11/9/22 14:40*	*REG*	*SOIL*	*TAL*
LAP-1L-018	*LRP-1L-WP-00432*	*0 - 1 ft*	*11/9/22 14:40*	*SPL*	*SOIL*	*GEL*
LAP-1L-018	*LRP-1L-WP-00432*	*0 - 1 ft*	*11/9/22 14:40*	*SPL*	*SOIL*	*TAL*
LAP-1L-021	*LRP-1L-WP-00447*	*1 - 4 ft*	*11/16/22 10:40*	*REG*	*SOIL*	*GEL*
LAP-1L-021	*LRP-1L-WP-00447*	*1 - 4 ft*	*11/16/22 10:40*	*REG*	*SOIL*	*TAL*
LAP-1L-021	*LRP-1L-WP-00452*	*1 - 4 ft*	*11/16/22 10:40*	*SPL*	*SOIL*	*GEL*
LAP-1L-021	*LRP-1L-WP-00452*	*1 - 4 ft*	*11/16/22 10:40*	*SPL*	*SOIL*	*TAL*

Split soil samples were taken from seven (7) locations and were analyzed by similar methods at different laboratories (General Engineering Labs (GEL) and Test America Labs (TAL)).

A comparison of analytical methods by each laboratory is provided below. None of the RPDs were > 200%.

GEL	TAL
EPA6010D	EPA6010D
	EPA6020B
EPA7471B	EPA7470A, EPA7471B
EPA8081B	EPA8081B
EPA8082A	EPA8082A
EPA8260B	EPA8260D
EPA8270E	EPA8270E

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EPA9012B	EPA9012B
HASL300	
RADA-001	EPA900.0, EPA9310
RADA-002	EPA906.0
RADA-003	EERFC-01
RADA-004	SR-03-RCMOD
RADA-005	TC-02-RCMOD
RADA-006	GA-01-RMOD
RADA-008	EPA903.0
RADA-009	EPA904.0
RADA-011	A01R
RADA-013	GA-01-RMOD
RADA-020	ST-RC-0247
RADA-022	ST-RC-0055
RADA-032	A01R
RADA-038	A01R

I.1.3.12 Summary of Data Sensitivity Evaluation

This section summarizes the results of the data sensitivity evaluation. It applies to constituents that have a high percentage of non-detects (i.e., greater than 95% non-detect) to identify if the MDL exceeds the threshold screening criteria. The review of MDLs by matrix, method, and analyte relative to the human health risk-based thresholds (RSLs for nonradiological constituents and preliminary remediation goals [PRGs] for radiological constituents) in the 0 to 1 foot soil interval is presented in tabular format in Appendix A. Non-detected results that have MDLs greater than the RSL or PRG are identified below.

Table I.1-15. Data Sensitivity Summary

Method Code	Analyte	Total # of Non-Detects	Total # of Records	Total # of Records with MDL > RSL or PRG
EPA8270E	*2,6-DINITROTOLUENE*	*21*	*21*	*1*
EPA8270E	*3,3-DICHLOROBENZIDINE*	*21*	*21*	*1*
EPA8270E	*BENZO[A]PYRENE*	*21*	*21*	*1*
EPA8270E	*BIS(2-CHLOROETHYL)ETHER*	*21*	*21*	*1*
EPA8270E	*DIBENZ[AH]ANTHRACENE*	*21*	*21*	*1*
EPA8270E	*DINITRO-O-CRESOL*	*21*	*21*	*1*
EPA8270E	*HEXACHLOROBENZENE*	*21*	*21*	*1*
EPA8270E	*HEXACHLOROCYCLOPENTADIENE*	*21*	*21*	*1*
EPA8270E	*N-NITROSODIPROPYLAMINE*	*21*	*21*	*2*
EPA8270E	*PENTACHLOROPHENOL*	*21*	*21*	*2*
EPA8260D	*1,2-DIBROMO-3-CHLOROPROPANE*	*21*	*21*	*1*
EPA8260D	*1,2-DIBROMOETHANE*	*21*	*21*	*1*
A01R	*URANIUM-235*	*4*	*5*	*3*
EPA906.0	*TRITIUM*	*1*	*1*	*1*
GA-01-RMOD	*COBALT-60*	*1*	*1*	*1*
GA-01-RMOD	*EUROPIUM-154*	*1*	*1*	*1*

I.1.4 Data Usability

The analytical data collected from L-Area Rubble Pit (131-1L) are considered useable for purposes outlined in the RFI/RI Work Plan for the Early Construction and Operational Disposal Site L-3 (NBN), L-Area Rubble Pit (131-1L), and L-Area Rubble Pit (131-4L) Operable Unit (U) (SRNS 2022). Overall, two (2) environmental sample records (0.01% of total) were rejected. The rejected data were not used. Although some sample results were J-qualified (estimated results) based on poor surrogate recoveries and/or method detection blanks, the data is considered useable in the quantitative analysis for the purposes of decision making in the RI/Baseline Risk Assessment. Differences in sample results may also be attributed to sample matrix heterogeneity between sample aliquots, possible due to samples not being adequately homogenized rather than analytical uncertainty. Qualification details are found in Section 3.0, Validation Findings.

I.1.5 References

SRNS, 2012. *Area Completion Projects Programmatic Quality Assurance Project Plan for Environmental Data Collection and Management*, ERD-AG-2005-00001, Revision 5, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC.

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SRNS 2015. *Analytical Data Qualification, ER-SOP-033, Revision 6, Environmental Compliance and Area Completion Projects (EC&ACP) Geochemical Monitoring Procedure Manual;* C-3, Volume 10, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken SC

SRNS 2022. *RFI/RI Work Plan for the Early Construction and Operational Disposal Site L-3 (NBN), L-Area Rubble Pit (131-1L), and L-Area Rubble Pit (131-4L) Operable Unit (U),* SRNS-RP-2021-05602, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC

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Table I.1-16. Comparison of MDLs for Non-Detects to Risk-Based Screening Criteria

Table of MDL > RSL or PRG at L-Area Rubble Pit (131-1L)

INTERPRETED QUALIFIERS: U or UJ Qualifiers
MATRIX CODE: Soil only
LAB GROUP COMBO: ALL
SAMPLE TYPE CODE: REG Samples ONLY
START DEPTH: 0 ft
END DEPTH: 1 ft

RECORD GROUPS	ANALYTE GROUP	CHEMICAL NAME	ANALYTICAL METHOD	RSL or PRG	UNITS	MDL Min	MDL Max	# of Non-Detects	# of Results	# of MDL> RSL or PRG
Chemical	SVOCs	2,6-DINITROTOLUENE	EPA8270E	3.60E-01	mg/kg	2.70E-02	5.50E-01	21	21	6
Chemical	SVOCs	3,3-DICHLOROBENZIDINE	EPA8270E	1.20E+00	mg/kg	8.70E-02	1.80E+00	21	21	6
Chemical	SVOCs	BENZO[A]PYRENE	EPA8270E	1.10E-01	mg/kg	1.90E-02	3.90E-01	21	21	17
Chemical	SVOCs	BIS(2-CHLOROETHYL)ETHER	EPA8270E	2.30E-01	mg/kg	1.60E-02	3.30E-01	21	21	6
Chemical	SVOCs	DIBENZ[AH]ANTHRACENE	EPA8270E	1.10E-01	mg/kg	1.80E-02	3.70E-01	21	21	17
Chemical	SVOCs	DINITRO-O-CRESOL	EPA8270E	5.10E+00	mg/kg	3.20E-01	6.50E+00	21	21	6
Chemical	SVOCs	HEXACHLOROBENZENE	EPA8270E	2.10E-01	mg/kg	2.80E-02	5.70E-01	21	21	17
Chemical	SVOCs	HEXACHLOROCYCLOPENTADIENE	EPA8270E	1.80E+00	mg/kg	1.10E-01	2.20E+00	21	21	6
Chemical	SVOCs	N-NITROSODIPROPYLAMINE	EPA8270E	7.80E-02	mg/kg	6.50E-02	1.30E+00	21	21	20
Chemical	SVOCs	PENTACHLOROPHENOL	EPA8270E	1.00E+00	mg/kg	3.20E-01	6.50E+00	21	21	20
Chemical	VOCs	1,2-DIBROMO-3-CHLOROPROPANE	EPA8260D	5.30E-03	mg/kg	4.99E-04	6.24E-02	21	21	2
Chemical	VOCs	1,2-DIBROMOETHANE	EPA8260D	3.60E-02	mg/kg	3.32E-04	4.16E-02	21	21	2
Radiochemical	ALPHA SPEC	URANIUM-235	A01R	4.58E-02	pCi/g	4.55E-02	8.70E-02	4	5	3
Radiochemical	BETA SPEC	TRITIUM	EPA906.0	2.37E-01	pCi/g	4.32E-01	4.32E-01	1	1	1
Radiochemical	GAMMA SPEC	COBALT-60	GA-01-RMOD	3.30E-02	pCi/g	9.76E-02	9.76E-02	1	1	1
Radiochemical	GAMMA SPEC	EUROPIUM-154	GA-01-RMOD	4.73E-02	pCi/g	1.75E-01	1.75E-01	1	1	1

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Appendix I.2. Data Usability Report for the L-Area Rubble Pit (131-4L)

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LIST OF ABBREVIATIONS AND ACRONYMS

ID	identification
FD	field duplicate
ft	feet
GEL	General Engineering Laboratories
LCS	laboratory control sample
LD	laboratory duplicate
LRP	L-Area Rubble Pit
MB	method blank
MCL	maximum contaminant limit
MDL	method detection limit
MSD	matrix spike duplicate
MS	matrix spike
NBN	No Building Number
NST	no sample taken
PRG	preliminary remediation goal
OU	Operable Unit
QAPP	Quality Assurance Project Plan
QC	quality control
RB	rinsate blank
REG	regular
RPD	relative percent difference
RSL	regional screening level
SPL	split
SRNS	Savannah River Nuclear Solutions, LLC
ssEQL	sample specific estimated quantification limit
TAL	Test America Labs
TB	trip blank

I.2 DATA USABILITY REPORT FOR THE L-AREA RUBBLE PIT (131-4L)

I.2.1 Project Summary

This report presents analytical data verification, validation, and usability assessment results for sampling at the L-Area Rubble Pit 131-4L Operable Unit. In 2022 soil samples were collected for the RCRA Facility Investigation/Remedial Investigation (RFI/RI) in accordance with the *RFI/RI Work Plan for the Early Construction and Operational Disposal Site L-3 (NBN), L-Area Rubble Pit (131-1L), and L-Area Rubble Pit (131-4L) Operable Unit (U)* (SRNS 2022). The project generated one hundred ninety-two (192) regular (REG) field samples, eleven (11) field duplicate (FD) samples, six (6) rinsate blank (RB) samples, eleven (11) split (SPL) samples and thirty-seven (37) trip blank (TB) samples. In addition, there were thirteen (13) no samples taken (NST). Due to contractual cost issues, samples collected for the REG samples and SPL samples were divided between two laboratories. For the REG samples, volatile organic analyses were sent to General Engineering Labs (GEL), with the remainder of the REG sample analyses going to Test America Labs (TAL). For the SPL samples, volatile organic analyses were sent to TAL, with the remainder of the SPL sample analyses going to GEL. The samples, along with the requested analytical analyses, are listed in Table I.2-1.

Table I.2-1. Sample Identification (ID) Summary

Station ID	Sample ID	Sample Type	Sample Date	Sample Time	Matrix	Interval	Analysis Requested
LAP-4L-001	*LRP-4L-WP-00049*	*REG*	*1/12/2023*	*14:30*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-001	*LRP-4L-WP-00050*	*REG*	*1/17/2023*	*09:45*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-001	*LRP-4L-WP-00051*	*REG*	*1/17/2023*	*10:20*	*SOIL*	*4 - 8 ft*	*1,2,3*
LAP-4L-001	*LRP-4L-WP-00052*	*REG*	*1/17/2023*	*10:45*	*SOIL*	*8 - 12 ft*	*1,2,3*
LAP-4L-001	*LRP-4L-WP-00053*	*REG*	*1/17/2023*	*11:10*	*SOIL*	*12 - 16 ft*	*1,2,3*
LAP-4L-001	*LRP-4L-WP-00054*	*FD*	*1/17/2023*	*09:45*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-002	*LRP-4L-WP-00055*	*REG*	*12/14/2022*	*10:40*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-002	*LRP-4L-WP-00056*	*REG*	*12/14/2022*	*11:20*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-002	*LRP-4L-WP-00057*	*REG*	*12/14/2022*	*12:20*	*SOIL*	*4 - 8 ft*	*1,2,3*
LAP-4L-002	*LRP-4L-WP-00058*	*REG*	*12/14/2022*	*12:40*	*SOIL*	*8 - 12 ft*	*1,2,3*
LAP-4L-002	*LRP-4L-WP-00059*	*REG*	*12/14/2022*	*13:10*	*SOIL*	*12 - 16 ft*	*1,2,3*
LAP-4L-002	*LRP-4L-WP-00060*	*SPL*	*12/14/2022*	*10:40*	*SOIL*	*0 - 1 ft*	*1,2,3,4,5,6,7,8,9, 10,11,12,13,14, 15,16, 17,18*

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Table I.2-1. Sample Identification (ID) Summary *(continued)*

Station ID	Sample ID	Sample Type	Sample Date	Sample Time	Matrix	Interval	Analysis Requested
LAP-4L-003	*LRP-4L-WP-00061*	*REG*	*1/12/2023*	*09:30*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-003	*LRP-4L-WP-00062*	*REG*	*1/12/2023*	*09:50*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-003	*LRP-4L-WP-00063*	*FD*	*1/12/2023*	*10:20*	*SOIL*	*4 - 8 ft*	*1,2,3*
LAP-4L-003	*LRP-4L-WP-00064*	*REG*	*1/12/2023*	*10:20*	*SOIL*	*4 - 8 ft*	*1,2,3*
LAP-4L-003	*LRP-4L-WP-00065*	*REG*	*1/12/2023*	*10:50*	*SOIL*	*8 - 12 ft*	*1,2,3*
LAP-4L-003	*LRP-4L-WP-00066*	*REG*	*1/12/2023*	*11:20*	*SOIL*	*12 - 16 ft*	*1,2,3,6,7,8,9,10, 11*
LAP-4L-004	*LRP-4L-WP-00067*	*REG*	*12/7/2022*	*08:15*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-004	*LRP-4L-WP-00068*	*REG*	*12/7/2022*	*08:45*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-004	*LRP-4L-WP-00069*	*REG*	*12/7/2022*	*09:15*	*SOIL*	*4 - 8 ft*	*1,2,3*
LAP-4L-004	*LRP-4L-WP-00070*	*REG*	*12/7/2022*	*09:45*	*SOIL*	*8 - 12 ft*	*1,2,3*
LAP-4L-004	*LRP-4L-WP-00071*	*REG*	*12/7/2022*	*10:20*	*SOIL*	*12 - 16 ft*	*1,2,3*
LAP-4L-004	*LRP-4L-WP-00072*	*SPL*	*12/7/2022*	*08:45*	*SOIL*	*1 - 4 ft*	*1,2,3,4,5,6,7,8,9, 10,11,12,13,14, 15,16, 17,18*
LAP-4L-005	*LRP-4L-WP-00073*	*REG*	*12/6/2022*	*13:20*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-005	*LRP-4L-WP-00074*	*REG*	*12/6/2022*	*13:40*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-005	*LRP-4L-WP-00075*	*FD*	*12/6/2022*	*14:30*	*SOIL*	*8 - 12 ft*	*1,2,3*
LAP-4L-005	*LRP-4L-WP-00076*	*REG*	*12/6/2022*	*14:10*	*SOIL*	*4 - 8 ft*	*1,2,3*
LAP-4L-005	*LRP-4L-WP-00077*	*REG*	*12/6/2022*	*14:30*	*SOIL*	*8 - 12 ft*	*1,2,3*
LAP-4L-005	*LRP-4L-WP-00078*	*REG*	*12/6/2022*	*14:50*	*SOIL*	*12 - 16 ft*	*1,2,3,6,7,8,9,10, 11*
LAP-4L-006	*LRP-4L-WP-00079*	*REG*	*12/6/2022*	*10:20*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-006	*LRP-4L-WP-00080*	*REG*	*12/6/2022*	*10:45*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-006	*LRP-4L-WP-00081*	*REG*	*12/6/2022*	*11:20*	*SOIL*	*4 - 8 ft*	*1,2,3*
LAP-4L-006	*LRP-4L-WP-00082*	*REG*	*12/6/2022*	*12:30*	*SOIL*	*8 - 12 ft*	*1,2,3*
LAP-4L-006	*LRP-4L-WP-00083*	*REG*	*12/6/2022*	*12:50*	*SOIL*	*12 - 16 ft*	*1,2,3*
LAP-4L-006	*LRP-4L-WP-00084*	*SPL*	*12/6/2022*	*11:20*	*SOIL*	*4 - 8 ft*	*1,2,3,4,5,6,7,8,9, 10,11,12,13,14, 15,16, 17,18*
LAP-4L-007	*LRP-4L-WP-00085*	*REG*	*12/5/2022*	*11:15*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-007	*LRP-4L-WP-00086*	*REG*	*12/5/2022*	*12:00*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-007	*LRP-4L-WP-00087*	*FD*	*12/5/2022*	*11:15*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-007	*LRP-4L-WP-00088*	*REG*	*12/5/2022*	*12:30*	*SOIL*	*4 - 8 ft*	*1,2,3*
LAP-4L-007	*LRP-4L-WP-00089*	*REG*	*12/5/2022*	*12:55*	*SOIL*	*8 - 12 ft*	*1,2,3*
LAP-4L-007	*LRP-4L-WP-00090*	*REG*	*12/5/2022*	*13:30*	*SOIL*	*12 - 16 ft*	*1,2,3*
LAP-4L-008	*LRP-4L-WP-00091*	*REG*	*12/5/2022*	*08:20*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-008	*LRP-4L-WP-00092*	*REG*	*12/5/2022*	*08:45*	*SOIL*	*1 - 4 ft*	*1,2,3*

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Table I.2-1. Sample Identification (ID) Summary *(continued)*

Station ID	Sample ID	Sample Type	Sample Date	Sample Time	Matrix	Interval	Analysis Requested
LAP-4L-008	*LRP-4L-WP-00093*	*REG*	*12/5/2022*	*09:10*	*SOIL*	*4 - 8 ft*	*1,2,3*
LAP-4L-008	*LRP-4L-WP-00094*	*REG*	*12/5/2022*	*09:50*	*SOIL*	*8 - 12 ft*	*1,2,3*
LAP-4L-008	*LRP-4L-WP-00095*	*REG*	*12/5/2022*	*10:30*	*SOIL*	*12 - 16 ft*	*1,2,3*
LAP-4L-008	*LRP-4L-WP-00096*	*SPL*	*12/5/2022*	*09:50*	*SOIL*	*8 - 12 ft*	*1,2,3,4,5,6,7,8,9, 10,11,12,13,14, 15,16, 17,18*
LAP-4L-009	*LRP-4L-WP-00097*	*REG*	*11/21/2022*	*08:45*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-009	*LRP-4L-WP-00098*	*REG*	*11/21/2022*	*09:20*	*SOIL*	*1 - 4 ft*	*1,2,3,6,7,8,9,10, 11*
LAP-4L-009	*LRP-4L-WP-00099*	*FD*	*11/21/2022*	*09:20*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-009	*LRP-4L-WP-00100*	*REG*	*11/21/2022*	*10:10*	*SOIL*	*4 - 8 ft*	*1,2,3*
LAP-4L-009	*LRP-4L-WP-00101*	*REG*	*11/21/2022*	*10:40*	*SOIL*	*8 - 12 ft*	*1,2,3*
LAP-4L-009	*LRP-4L-WP-00102*	*REG*	*11/21/2022*	*11:10*	*SOIL*	*12 - 16 ft*	*1,2,3*
LAP-4L-010	*LRP-4L-WP-00103*	*REG*	*1/10/2023*	*11:00*	*SOIL*	*0 - 1 ft*	*1,2,3,6,7,8,9,10, 11*
LAP-4L-010	*LRP-4L-WP-00104*	*REG*	*1/10/2023*	*11:40*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-010	*LRP-4L-WP-00105*	*REG*	*1/10/2023*	*13:10*	*SOIL*	*4 - 8 ft*	*1,2,3*
LAP-4L-010	*LRP-4L-WP-00106*	*REG*	*1/10/2023*	*13:30*	*SOIL*	*8 - 12 ft*	*1,2,3,6,7,8,9,10, 11*
LAP-4L-010	*LRP-4L-WP-00107*	*REG*	*1/10/2023*	*14:00*	*SOIL*	*12 - 16 ft*	*1,2,3*
LAP-4L-010	*LRP-4L-WP-00108*	*SPL*	*1/10/2023*	*11:00*	*SOIL*	*0 - 1 ft*	*1,2,3,4,5,6,7,8,9, 10,11,12,13,14, 15,16, 17,18*
LAP-4L-011	*LRP-4L-WP-00109*	*REG*	*12/19/2022*	*08:30*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-011	*LRP-4L-WP-00110*	*REG*	*12/19/2022*	*09:10*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-011	*LRP-4L-WP-00111*	*FD*	*12/19/2022*	*11:30*	*SOIL*	*4 - 8 ft*	*1,2,3*
LAP-4L-011	*LRP-4L-WP-00112*	*REG*	*12/19/2022*	*11:30*	*SOIL*	*4 - 8 ft*	*1,2,3*
LAP-4L-011	*LRP-4L-WP-00113*	*REG*	*12/19/2022*	*10:20*	*SOIL*	*8 - 12 ft*	*1,2,3*
LAP-4L-011	*LRP-4L-WP-00114*	*REG*	*12/19/2022*	*10:45*	*SOIL*	*12 - 16 ft*	*1,2,3*
LAP-4L-012	*LRP-4L-WP-00115*	*REG*	*12/14/2022*	*13:50*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-012	*LRP-4L-WP-00116*	*REG*	*12/15/2022*	*11:30*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-012	*LRP-4L-WP-00117*	*REG*	*12/15/2022*	*12:10*	*SOIL*	*4 - 8 ft*	*1,2,3*
LAP-4L-012	*LRP-4L-WP-00118*	*REG*	*12/15/2022*	*12:25*	*SOIL*	*8 - 12 ft*	*1,2,3*
LAP-4L-012	*LRP-4L-WP-00119*	*REG*	*12/15/2022*	*12:50*	*SOIL*	*12 - 16 ft*	*1,2,3*
LAP-4L-012	*LRP-4L-WP-00120*	*SPL*	*12/14/2022*	*13:50*	*SOIL*	*0 - 1 ft*	*1,2,3,4,5,6,7,8,9, 10,11,12,13,14, 15,16, 17,18*
LAP-4L-013	*LRP-4L-WP-00121*	*REG*	*1/9/2023*	*14:00*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-013	*LRP-4L-WP-00122*	*REG*	*1/9/2023*	*14:20*	*SOIL*	*1 - 4 ft*	*1,2,3*

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Table I.2-1. Sample Identification (ID) Summary *(continued)*

Station ID	Sample ID	Sample Type	Sample Date	Sample Time	Matrix	Interval	Analysis Requested
LAP-4L-013	*LRP-4L-WP-00123*	*FD*	*1/10/2023*	*09:00*	*SOIL*	*8 - 12 ft*	*1,2,3*
LAP-4L-013	*LRP-4L-WP-00124*	*REG*	*1/10/2023*	*08:30*	*SOIL*	*4 - 8 ft*	*1,2,3*
LAP-4L-013	*LRP-4L-WP-00125*	*REG*	*1/10/2023*	*09:00*	*SOIL*	*8 - 12 ft*	*1,2,3,6,7,8,9,10, 11*
LAP-4L-013	*LRP-4L-WP-00126*	*REG*	*1/10/2023*	*10:00*	*SOIL*	*12 - 16 ft*	*1,2,3*
LAP-4L-014	*LRP-4L-WP-00127*	*REG*	*12/13/2022*	*13:30*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-014	*LRP-4L-WP-00128*	*REG*	*12/13/2022*	*14:00*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-014	*LRP-4L-WP-00129*	*NST*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
LAP-4L-014	*LRP-4L-WP-00130*	*NST*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
LAP-4L-014	*LRP-4L-WP-00131*	*REG*	*12/14/2022*	*09:30*	*SOIL*	*12 - 16 ft*	*1,2,3*
LAP-4L-014	*LRP-4L-WP-00132*	*SPL*	*12/13/2022*	*14:00*	*SOIL*	*1 - 4 ft*	*1,2,3,4,5,6,7,8,9, 10,11,12,13,14, 15,16, 17,18*
LAP-4L-015	*LRP-4L-WP-00133*	*REG*	*12/8/2022*	*11:10*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-015	*LRP-4L-WP-00134*	*REG*	*12/8/2022*	*11:50*	*SOIL*	*1 - 4 ft*	*1,2,3,6,7,8,9,10, 11*
LAP-4L-015	*LRP-4L-WP-00135*	*FD*	*12/8/2022*	*11:10*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-015	*LRP-4L-WP-00136*	*NST*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
LAP-4L-015	*LRP-4L-WP-00137*	*NST*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
LAP-4L-015	*LRP-4L-WP-00138*	*REG*	*12/8/2022*	*13:25*	*SOIL*	*12 - 16 ft*	*1,2,3,6,7,8,9,10, 11*
LAP-4L-016	*LRP-4L-WP-00139*	*REG*	*12/12/2022*	*13:00*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-016	*LRP-4L-WP-00140*	*REG*	*12/12/2022*	*13:30*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-016	*LRP-4L-WP-00141*	*REG*	*12/12/2022*	*13:55*	*SOIL*	*4 - 8 ft*	*1,2,3,6,7,8,9,10, 11*
LAP-4L-016	*LRP-4L-WP-00142*	*REG*	*12/12/2022*	*14:25*	*SOIL*	*8 - 12 ft*	*1,2,3*
LAP-4L-016	*LRP-4L-WP-00143*	*NST*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
LAP-4L-016	*LRP-4L-WP-00144*	*SPL*	*12/12/2022*	*13:55*	*SOIL*	*4 - 8 ft*	*1,2,3,4,5,6,7,8,9, 10,11,12,13,14, 15,16, 17,18*
LAP-4L-017	*LRP-4L-WP-00145*	*REG*	*1/17/2023*	*11:50*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-017	*LRP-4L-WP-00146*	*REG*	*1/17/2023*	*12:10*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-017	*LRP-4L-WP-00147*	*FD*	*1/17/2023*	*12:10*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-017	*LRP-4L-WP-00148*	*REG*	*1/17/2023*	*12:40*	*SOIL*	*4 - 8 ft*	*1,2,3*
LAP-4L-017	*LRP-4L-WP-00149*	*REG*	*1/17/2023*	*13:10*	*SOIL*	*8 - 12 ft*	*1,2,3*
LAP-4L-017	*LRP-4L-WP-00150*	*REG*	*1/17/2023*	*13:30*	*SOIL*	*12 - 16 ft*	*1,2,3*
LAP-4L-018	*LRP-4L-WP-00151*	*REG*	*12/13/2022*	*08:20*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-018	*LRP-4L-WP-00152*	*REG*	*12/13/2022*	*08:50*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-018	*LRP-4L-WP-00153*	*REG*	*12/13/2022*	*09:20*	*SOIL*	*4 - 8 ft*	*1,2,3*

Table I.2-1. Sample Identification (ID) Summary *(continued)*

Station ID	Sample ID	Sample Type	Sample Date	Sample Time	Matrix	Interval	Analysis Requested
LAP-4L-018	*LRP-4L-WP-00154*	*NST*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
LAP-4L-018	*LRP-4L-WP-00155*	*REG*	*12/13/2022*	*11:00*	*SOIL*	*12 - 16 ft*	*1,2,3*
LAP-4L-025	*LRP-4L-WP-00156*	*SPL*	*1/11/2023*	*13:00*	*SOIL*	*12 - 16 ft*	*1,2,3,4,5,6,7,8,9, 10,11,12,13,14, 15,16, 17,18*
LAP-4L-019	*LRP-4L-WP-00157*	*REG*	*1/12/2023*	*12:10*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-019	*LRP-4L-WP-00158*	*REG*	*1/12/2023*	*12:30*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-019	*LRP-4L-WP-00159*	*FD*	*1/12/2023*	*13:00*	*SOIL*	*4 - 8 ft*	*1,2,3*
LAP-4L-019	*LRP-4L-WP-00160*	*REG*	*1/12/2023*	*13:00*	*SOIL*	*4 - 8 ft*	*1,2,3*
LAP-4L-019	*LRP-4L-WP-00161*	*REG*	*1/12/2023*	*13:40*	*SOIL*	*8 - 12 ft*	*1,2,3*
LAP-4L-019	*LRP-4L-WP-00162*	*REG*	*1/12/2023*	*14:00*	*SOIL*	*12 - 16 ft*	*1,2,3*
LAP-4L-020	*LRP-4L-WP-00163*	*REG*	*11/28/2022*	*12:45*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-020	*LRP-4L-WP-00164*	*REG*	*11/28/2022*	*13:15*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-020	*LRP-4L-WP-00165*	*REG*	*11/28/2022*	*13:50*	*SOIL*	*4 - 8 ft*	*1,2,3*
LAP-4L-020	*LRP-4L-WP-00166*	*REG*	*11/28/2022*	*14:25*	*SOIL*	*8 - 12 ft*	*1,2,3*
LAP-4L-020	*LRP-4L-WP-00167*	*NST*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
LAP-4L-020	*LRP-4L-WP-00168*	*SPL*	*11/28/2022*	*13:50*	*SOIL*	*4 - 8 ft*	*1,2,3,4,5,6,7,8,9, 10,11,12,13,14, 15,16, 17,18*
LAP-4L-021	*LRP-4L-WP-00169*	*REG*	*11/29/2022*	*08:10*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-021	*LRP-4L-WP-00170*	*REG*	*11/29/2022*	*08:45*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-021	*LRP-4L-WP-00171*	*FD*	*11/29/2022*	*09:50*	*SOIL*	*8 - 12 ft*	*1,2,3*
LAP-4L-021	*LRP-4L-WP-00172*	*NST*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
LAP-4L-021	*LRP-4L-WP-00173*	*REG*	*11/29/2022*	*09:50*	*SOIL*	*8 - 12 ft*	*1,2,3*
LAP-4L-021	*LRP-4L-WP-00174*	*REG*	*11/29/2022*	*10:25*	*SOIL*	*12 - 16 ft*	*1,2,3*
LAP-4L-022	*LRP-4L-WP-00175*	*REG*	*12/12/2022*	*08:20*	*SOIL*	*0 - 1 ft*	*1,2,3,4,5,6,7,8,9, 10,11,12,13,14, 15,16, 17,18*
LAP-4L-022	*LRP-4L-WP-00176*	*REG*	*12/12/2022*	*09:15*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-022	*LRP-4L-WP-00177*	*REG*	*12/12/2022*	*09:40*	*SOIL*	*4 - 8 ft*	*1,2,3*
LAP-4L-022	*LRP-4L-WP-00178*	*REG*	*12/12/2022*	*11:50*	*SOIL*	*8 - 12 ft*	*1,2,3*
LAP-4L-022	*LRP-4L-WP-00179*	*REG*	*12/12/2022*	*10:45*	*SOIL*	*12 - 16 ft*	*1,2,3*
LAP-4L-022	*LRP-4L-WP-00180*	*SPL*	*12/12/2022*	*08:20*	*SOIL*	*0 - 1 ft*	*1,2,3,4,5,6,7,8,9, 10,11,12,13,14, 15,16, 17,18*
LAP-4L-023	*LRP-4L-WP-00181*	*REG*	*12/1/2022*	*11:00*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-023	*LRP-4L-WP-00182*	*REG*	*12/1/2022*	*11:20*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-023	*LRP-4L-WP-00183*	*REG*	*12/1/2022*	*11:45*	*SOIL*	*4 - 8 ft*	*1,2,3*

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Table I.2-1. Sample Identification (ID) Summary *(continued)*

Station ID	Sample ID	Sample Type	Sample Date	Sample Time	Matrix	Interval	Analysis Requested
LAP-4L-023	*LRP-4L-WP-00184*	*REG*	*12/1/2022*	*12:10*	*SOIL*	*8 - 12 ft*	*1,2,3*
LAP-4L-023	*LRP-4L-WP-00185*	*REG*	*12/1/2022*	*12:40*	*SOIL*	*12 - 16 ft*	*1,2,3*
LAP-4L-024	*LRP-4L-WP-00186*	*REG*	*11/29/2022*	*13:00*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-024	*LRP-4L-WP-00187*	*REG*	*11/29/2022*	*13:25*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-024	*LRP-4L-WP-00188*	*REG*	*11/29/2022*	*13:50*	*SOIL*	*4 - 8 ft*	*1,2,3*
LAP-4L-024	*LRP-4L-WP-00189*	*REG*	*11/29/2022*	*14:15*	*SOIL*	*8 - 12 ft*	*1,2,3*
LAP-4L-024	*LRP-4L-WP-00190*	*REG*	*11/29/2022*	*14:40*	*SOIL*	*12 - 16 ft*	*1,2,3*
LAP-4L-025	*LRP-4L-WP-00191*	*REG*	*1/11/2023*	*11:00*	*SOIL*	*0 - 1 ft*	*1,2,3,6,7,8,9,10, 11*
LAP-4L-025	*LRP-4L-WP-00192*	*REG*	*1/11/2023*	*11:30*	*SOIL*	*1 - 4 ft*	*1,2,3,4,5,6,7,8,9, 10,11,12,13,14, 15,16, 17,18*
LAP-4L-025	*LRP-4L-WP-00193*	*REG*	*1/11/2023*	*11:50*	*SOIL*	*4 - 8 ft*	*1,2,3,6,7,8,9,10, 11*
LAP-4L-025	*LRP-4L-WP-00194*	*REG*	*1/11/2023*	*12:10*	*SOIL*	*8 - 12 ft*	*1,2,3,6,7,8,9,10, 11*
LAP-4L-025	*LRP-4L-WP-00195*	*REG*	*1/11/2023*	*13:00*	*SOIL*	*12 - 16 ft*	*1,2,3*
LAP-4L-026	*LRP-4L-WP-00196*	*REG*	*12/12/2022*	*10:55*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-026	*LRP-4L-WP-00197*	*REG*	*12/7/2022*	*11:30*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-026	*LRP-4L-WP-00198*	*REG*	*12/7/2022*	*12:45*	*SOIL*	*4 - 8 ft*	*1,2,3*
LAP-4L-026	*LRP-4L-WP-00199*	*REG*	*12/7/2022*	*13:15*	*SOIL*	*8 - 12 ft*	*1,2,3*
LAP-4L-027	*LRP-4L-WP-00200*	*NST*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
LAP-4L-027	*LRP-4L-WP-00201*	*REG*	*12/8/2022*	*08:25*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-027	*LRP-4L-WP-00202*	*REG*	*12/8/2022*	*08:55*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-027	*LRP-4L-WP-00203*	*REG*	*12/8/2022*	*09:25*	*SOIL*	*4 - 8 ft*	*1,2,3*
LAP-4L-027	*LRP-4L-WP-00204*	*REG*	*12/8/2022*	*09:50*	*SOIL*	*8 - 12 ft*	*1,2,3*
LAP-4L-027	*LRP-4L-WP-00205*	*REG*	*12/8/2022*	*10:20*	*SOIL*	*12 - 16 ft*	*1,2,3,4,5,6,7,8,9, 10,11,12,13,14, 15,16, 17,18*
LAP-4L-028	*LRP-4L-WP-00206*	*REG*	*11/21/2022*	*12:30*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-028	*LRP-4L-WP-00207*	*REG*	*11/21/2022*	*12:50*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-028	*LRP-4L-WP-00208*	*REG*	*11/21/2022*	*13:15*	*SOIL*	*4 - 8 ft*	*1,2,3*
LAP-4L-028	*LRP-4L-WP-00209*	*REG*	*11/21/2022*	*13:45*	*SOIL*	*8 - 12 ft*	*1,2,3*
LAP-4L-028	*LRP-4L-WP-00210*	*REG*	*11/21/2022*	*14:15*	*SOIL*	*12 - 16 ft*	*1,2,3*
LAP-4L-029	*LRP-4L-WP-00211*	*REG*	*1/11/2023*	*08:00*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-029	*LRP-4L-WP-00212*	*REG*	*1/11/2023*	*08:20*	*SOIL*	*1 - 4 ft*	*1,2,3,6,7,8,9,10, 11*
LAP-4L-029	*LRP-4L-WP-00213*	*REG*	*1/11/2023*	*08:50*	*SOIL*	*4 - 8 ft*	*1,2,3*
LAP-4L-029	*LRP-4L-WP-00214*	*REG*	*1/11/2023*	*09:50*	*SOIL*	*8 - 12 ft*	*1,2,3*

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Table I.2-1. Sample Identification (ID) Summary *(continued)*

Station ID	Sample ID	Sample Type	Sample Date	Sample Time	Matrix	Interval	Analysis Requested
LAP-4L-029	*LRP-4L-WP-00215*	*REG*	*1/11/2023*	*10:00*	*SOIL*	*12 - 16 ft*	*1,2,3,6,7,8,9,10, 11*
LAP-4L-030	*LRP-4L-WP-00216*	*REG*	*1/11/2023*	*13:30*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-030	*LRP-4L-WP-00217*	*REG*	*1/11/2023*	*13:50*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-030	*LRP-4L-WP-00218*	*REG*	*1/11/2023*	*14:10*	*SOIL*	*4 - 8 ft*	*1,2,3*
LAP-4L-030	*LRP-4L-WP-00219*	*NST*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
LAP-4L-030	*LRP-4L-WP-00220*	*REG*	*1/12/2023*	*09:00*	*SOIL*	*20 - 24 ft*	*1,2,3,6,7,8,9,10, 11*
LAP-4L-031	*LRP-4L-WP-00221*	*REG*	*12/1/2022*	*08:10*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-031	*LRP-4L-WP-00222*	*REG*	*12/1/2022*	*08:40*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-031	*LRP-4L-WP-00223*	*REG*	*12/1/2022*	*09:15*	*SOIL*	*4 - 8 ft*	*1,2,3*
LAP-4L-031	*LRP-4L-WP-00224*	*REG*	*12/1/2022*	*09:50*	*SOIL*	*8 - 12 ft*	*1,2,3*
LAP-4L-031	*LRP-4L-WP-00225*	*REG*	*12/1/2022*	*10:20*	*SOIL*	*12 - 16 ft*	*1,2,3*
LAP-4L-032	*LRP-4L-WP-00226*	*REG*	*12/19/2022*	*12:55*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-032	*LRP-4L-WP-00227*	*REG*	*12/19/2022*	*13:01*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-032	*LRP-4L-WP-00228*	*REG*	*12/19/2022*	*14:50*	*SOIL*	*16 - 20 ft*	*1,2,3,6,7,8,9,10, 11*
LAP-4L-032	*LRP-4L-WP-00229*	*NST*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
LAP-4L-032	*LRP-4L-WP-00230*	*REG*	*12/19/2022*	*14:15*	*SOIL*	*12 - 16 ft*	*1,2,3*
LAP-4L-033	*LRP-4L-WP-00231*	*REG*	*11/28/2022*	*09:45*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-033	*LRP-4L-WP-00232*	*REG*	*11/28/2022*	*10:10*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-033	*LRP-4L-WP-00233*	*REG*	*11/28/2022*	*10:40*	*SOIL*	*4 - 8 ft*	*1,2,3*
LAP-4L-033	*LRP-4L-WP-00234*	*REG*	*11/28/2022*	*11:10*	*SOIL*	*8 - 12 ft*	*1,2,3*
LAP-4L-033	*LRP-4L-WP-00235*	*REG*	*11/28/2022*	*11:40*	*SOIL*	*12 - 16 ft*	*1,2,3*
LAP-4L-034	*LRP-4L-WP-00236*	*REG*	*1/4/2023*	*08:05*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-034	*LRP-4L-WP-00237*	*REG*	*1/4/2023*	*08:20*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-034	*LRP-4L-WP-00238*	*REG*	*1/4/2023*	*08:40*	*SOIL*	*4 - 8 ft*	*1,2,3*
LAP-4L-034	*LRP-4L-WP-00239*	*REG*	*1/4/2023*	*09:10*	*SOIL*	*8 - 12 ft*	*1,2,3*
LAP-4L-034	*LRP-4L-WP-00240*	*REG*	*1/4/2023*	*09:30*	*SOIL*	*12 - 16 ft*	*1,2,3*
LAP-4L-035	*LRP-4L-WP-00241*	*REG*	*12/20/2022*	*08:15*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-035	*LRP-4L-WP-00242*	*REG*	*12/20/2022*	*08:40*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-035	*LRP-4L-WP-00243*	*REG*	*12/20/2022*	*09:20*	*SOIL*	*4 - 8 ft*	*1,2,3*
LAP-4L-035	*LRP-4L-WP-00244*	*REG*	*12/20/2022*	*11:40*	*SOIL*	*16 - 20 ft*	*1,2,3*
LAP-4L-035	*LRP-4L-WP-00245*	*REG*	*12/20/2022*	*10:30*	*SOIL*	*12 - 16 ft*	*1,2,3*
LAP-4L-036	*LRP-4L-WP-00246*	*REG*	*1/3/2023*	*11:50*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-036	*LRP-4L-WP-00247*	*REG*	*1/3/2023*	*12:50*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-036	*LRP-4L-WP-00248*	*REG*	*1/3/2023*	*14:50*	*SOIL*	*4 - 8 ft*	*1,2,3*

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Table I.2-1. Sample Identification (ID) Summary *(continued)*

Station ID	Sample ID	Sample Type	Sample Date	Sample Time	Matrix	Interval	Analysis Requested
LAP-4L-036	*LRP-4L-WP-00249*	*REG*	*1/3/2023*	*13:40*	*SOIL*	*8 - 12 ft*	*1,2,3,6,7,8,9,10, 11*
LAP-4L-036	*LRP-4L-WP-00250*	*REG*	*1/3/2023*	*14:20*	*SOIL*	*12 - 16 ft*	*1,2,3*
LAP-4L-037	*LRP-4L-WP-00251*	*REG*	*1/3/2023*	*09:00*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-037	*LRP-4L-WP-00252*	*REG*	*1/3/2023*	*09:40*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-037	*LRP-4L-WP-00253*	*REG*	*1/3/2023*	*10:10*	*SOIL*	*4 - 8 ft*	*1,2,3*
LAP-4L-037	*LRP-4L-WP-00254*	*REG*	*1/3/2023*	*10:40*	*SOIL*	*8 - 12 ft*	*1,2,3*
LAP-4L-037	*LRP-4L-WP-00255*	*REG*	*1/3/2023*	*11:10*	*SOIL*	*12 - 16 ft*	*1,2,3*
LAP-4L-038	*LRP-4L-WP-00256*	*REG*	*1/9/2023*	*07:10*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-038	*LRP-4L-WP-00257*	*REG*	*1/9/2023*	*09:30*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-038	*LRP-4L-WP-00258*	*REG*	*1/9/2023*	*09:50*	*SOIL*	*4 - 8 ft*	*1,2,3,6,7,8,9,10, 11*
LAP-4L-038	*LRP-4L-WP-00259*	*REG*	*1/9/2023*	*10:10*	*SOIL*	*8 - 12 ft*	*1,2,3*
LAP-4L-038	*LRP-4L-WP-00260*	*REG*	*1/9/2023*	*10:35*	*SOIL*	*12 - 16 ft*	*1,2,3*
LAP-4L-039	*LRP-4L-WP-00261*	*REG*	*1/5/2023*	*12:40*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-039	*LRP-4L-WP-00262*	*REG*	*1/5/2023*	*13:00*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-039	*LRP-4L-WP-00263*	*REG*	*1/5/2023*	*13:20*	*SOIL*	*4 - 8 ft*	*1,2,3*
LAP-4L-039	*LRP-4L-WP-00264*	*REG*	*1/5/2023*	*13:50*	*SOIL*	*8 - 12 ft*	*1,2,3*
LAP-4L-039	*LRP-4L-WP-00265*	*REG*	*1/5/2023*	*14:20*	*SOIL*	*12 - 16 ft*	*1,2,3*
LAP-4L-040	*LRP-4L-WP-00266*	*REG*	*1/5/2023*	*08:30*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-040	*LRP-4L-WP-00267*	*REG*	*1/5/2023*	*08:50*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-040	*LRP-4L-WP-00268*	*REG*	*1/5/2023*	*09:20*	*SOIL*	*4 - 8 ft*	*1,2,3*
LAP-4L-040	*LRP-4L-WP-00269*	*REG*	*1/5/2023*	*11:10*	*SOIL*	*16 - 20 ft*	*1,2,3*
LAP-4L-040	*LRP-4L-WP-00270*	*REG*	*1/5/2023*	*10:50*	*SOIL*	*12 - 16 ft*	*1,2,3*
LAP-4L-041	*LRP-4L-WP-00271*	*REG*	*1/9/2023*	*11:00*	*SOIL*	*0 - 1 ft*	*1,2,3*
LAP-4L-041	*LRP-4L-WP-00272*	*REG*	*1/9/2023*	*11:20*	*SOIL*	*1 - 4 ft*	*1,2,3*
LAP-4L-041	*LRP-4L-WP-00273*	*NST*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
LAP-4L-041	*LRP-4L-WP-00274*	*NST*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
LAP-4L-041	*LRP-4L-WP-00275*	*REG*	*1/9/2023*	*13:30*	*SOIL*	*16 - 20 ft*	*1,2,3*
RINSATE-BLANK	*LRP-4L-WP-00276*	*RB*	*11/30/2022*	*07:30*	*WATER*		*1,2,3*
RINSATE-BLANK	*LRP-4L-WP-00277*	*RB*	*12/7/2022*	*14:10*	*WATER*		*1,2,3*
RINSATE-BLANK	*LRP-4L-WP-00278*	*RB*	*12/14/2022*	*14:20*	*WATER*		*1,2,3*
RINSATE-BLANK	*LRP-4L-WP-00279*	*RB*	*1/4/2023*	*13:40*	*WATER*		*1,2,3*
RINSATE-BLANK	*LRP-4L-WP-00280*	*RB*	*1/11/2023*	*14:35*	*WATER*		*1,2,3*

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Table I.2-1. Sample Identification (ID) Summary *(continued)*

Station ID	Sample ID	Sample Type	Sample Date	Sample Time	Matrix	Interval	Analysis Requested
RINSATE-BLANK	*LRP-4L-WP-00281*	*RB*	*1/17/2023*	*14:30*	*WATER*		*1,2,3*
TRIP-BLANK	*LRP-4L-WP-00282*	*TB*	*11/28/2022*	*13:00*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00283*	*TB*	*12/5/2022*	*08:00*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00284*	*TB*	*12/6/2022*	*11:00*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00285*	*TB*	*11/21/2022*	*08:30*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00286*	*TB*	*11/28/2022*	*09:00*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00287*	*TB*	*11/29/2022*	*08:00*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00288*	*TB*	*11/30/2022*	*07:15*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00289*	*TB*	*12/1/2022*	*06:30*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00290*	*TB*	*12/5/2022*	*08:00*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00291*	*TB*	*12/6/2022*	*09:30*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00292*	*TB*	*12/7/2022*	*07:30*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00293*	*TB*	*12/7/2022*	*14:00*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00294*	*TB*	*12/8/2022*	*08:00*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00295*	*TB*	*12/12/2022*	*08:20*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00296*	*TB*	*12/13/2022*	*08:00*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00297*	*TB*	*12/14/2022*	*08:15*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00298*	*TB*	*12/14/2022*	*14:00*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00299*	*TB*	*12/15/2022*	*10:30*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00300*	*TB*	*12/19/2022*	*08:10*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00301*	*TB*	*12/20/2022*	*07:50*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00302*	*TB*	*1/3/2023*	*08:30*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00303*	*TB*	*1/4/2023*	*07:45*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00304*	*TB*	*1/4/2023*	*13:30*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00305*	*TB*	*1/5/2023*	*08:10*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00306*	*TB*	*1/9/2023*	*08:50*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00307*	*TB*	*1/10/2023*	*08:00*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00308*	*TB*	*1/11/2023*	*07:45*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00309*	*TB*	*1/11/2023*	*14:25*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00310*	*TB*	*1/12/2023*	*07:45*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00311*	*TB*	*1/17/2023*	*09:30*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00312*	*TB*	*1/17/2023*	*13:50*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00478*	*TB*	*12/7/2022*	*08:00*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00479*	*TB*	*12/12/2022*	*08:20*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00480*	*TB*	*12/13/2022*	*08:00*	*WATER*		*1*

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Table I.2-1. Sample Identification (ID) Summary *(continued/end)*

Station ID	Sample ID	Sample Type	Sample Date	Sample Time	Matrix	Interval	Analysis Requested
TRIP-BLANK	*LRP-4L-WP-00509*	*TB*	*12/14/2022*	*10:20*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00510*	*TB*	*1/10/2023*	*10:35*	*WATER*		*1*
TRIP-BLANK	*LRP-4L-WP-00511*	*TB*	*1/11/2023*	*12:45*	*WATER*		*1*

Analyses Requested

1. Target Compound List
2. Target Analyte List
3. Gross Alpha/Non-Volatile Beta
4. Tritium
5. Gamma Spectroscopy
6. Radium-226, Radium-228
7. Thorium Series
8. Uranium Series
9. Americium/Curium Series
10. Neptunium Series
11. Plutonium Series
12. Carbon-14
13. Iodine-129
14. Nickel-59
15. Nickel-63
16. Promethium-147
17. Strontium-90
18. Technetium-99

A total of 40,861 analytical records were produced consisting of 33,831 REG records and 7,030 Quality Control (QC) records (Table I.2- 2). Table I.2-2A breaks down the number of records by matrix and sample type for the samples collected at the unit.

Table I.2-2A. Total Number of Records

Number of Records	Chemical	Radiochemical	Totals
Analytical	*33,024*	*807*	*33,831*
Field QC	*6,633*	*397*	*7,030*
Totals	*39,657*	*1,204*	*40,861*

Table I.2-2B. Total Records by Matrix and Sample Type

Matrix Code	Sample Type Code	Chemical	Radiochemical	Totals
Soil	*REG*	*33,024*	*807*	*33,831*
	SPL	*1,881*	*363*	*2,244*
	FD	*1,892*	*22*	*1,914*
Water	*RB*	*936*	*12*	*948*
	TB	*1,924*	*0*	*1,924*
Totals		*39,657*	*1,204*	*40,861*

The verification process was conducted to review completeness of the sampling and analytical requirements. Validation has been performed to assess compliance with methods, procedures, and contracts, and to assess a comparison with measurement performance criteria in the ER-SOP-033, *Analytical Data Qualification* (SRNS 2015). A usability assessment will provide the data user with an assessment of whether the process execution and resulting data meet project quality objectives in the Quality Assurance Project Plan (SRNS 2012) and the *RFI/RI Work Plan for the Early Construction and Operational Disposal Site L-3 (NBN), L-Area Rubble Pit (131-1L),*

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and L-Area Rubble Pit (131-4L) Operable Unit (U) (SRNS 2022). These processes involve examination of electronic data files, the field data, analytical data, and laboratory records. Computer programs are used to verify that samples were properly preserved and were analyzed within the required holding time, that QC results were within specified acceptable ranges, and that the appropriate detection limits were employed by the laboratories. Additionally, manual reviews of field data and laboratory records are conducted to ensure the quality of these items. Validation summaries for holding time, preservation, calibration, analyte identification, and analyte quantitation can be found in the following subsections of this appendix: 3.1, *Holding Times*; 3.2, *Preservation*; and 3.3, *Calibration, Identification, and Quantitation*.

The data were validated to determine if the records conform to the technical criteria associated with definitive data per ER-SOP-033 (SRNS 2015). Table 3 provides a brief validation summary for the project. Review qualifiers are assigned by a data validator internal to Savannah River Nuclear Solutions and external to the analytical laboratory. Environmental records include REG, SPL and FD records for soil samples collected.

Table I.2-3. Environmental Record Review Qualifier Summary

	Detects		Non-detects		Rejected	
Method Code	**# NULL Qualifiers**	**# J Qualifiers**	**# U Qualifiers**	**# UJ Qualifiers**	**# R Qualifiers**	**Total**
A01R	*121*	*29*	*186*	*0*	*0*	*336*
EERFC-01	*0*	*0*	*3*	*0*	*0*	*3*
EPA6010D	*549*	*494*	*239*	*5*	*0*	*1,287*
EPA6020B	*1,851*	*1,319*	*383*	*0*	*0*	*3,553*
EPA7470A	*0*	*0*	*6*	*0*	*0*	*6*
EPA7471B	*101*	*85*	*28*	*0*	*0*	*214*
EPA8081B	*4*	*53*	*4,043*	*486*	*13*	*4,599*
EPA8082A	*9*	*10*	*1,509*	*16*	*0*	*1,544*
EPA8260D	*159*	*125*	*12,431*	*649*	*0*	*13,364*
EPA8270E	*69*	*385*	*11,521*	*2,895*	*0*	*14,870*
EPA900.0	*0*	*0*	*12*	*0*	*0*	*12*
EPA9012B	*8*	*6*	*201*	*5*	*0*	*220*
EPA903.0	*19*	*2*	*0*	*0*	*0*	*21*
EPA904.0	*2*	*15*	*4*	*0*	*0*	*21*
EPA906.0	*0*	*0*	*3*	*0*	*0*	*3*
EPA9310	*162*	*222*	*22*	*0*	*0*	*406*
GA-01-RMOD	*9*	*1*	*11*	*3*	*0*	*24*
HASL300	*0*	*19*	*61*	*0*	*0*	*80*
RADA-001	*1*	*17*	*4*	*0*	*0*	*22*
RADA-002	*0*	*0*	*11*	*0*	*0*	*11*

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Table I.2-3. Environmental Record Review Qualifier Summary *(continued/end)*

RADA-003	*0*	*0*	*11*	*0*	*0*	*11*
RADA-004	*0*	*0*	*11*	*0*	*0*	*11*
RADA-005	*0*	*0*	*6*	*0*	*0*	*6*
RADA-006	*0*	*0*	*6*	*0*	*0*	*6*
RADA-008	*1*	*9*	*1*	*0*	*0*	*11*
RADA-009	*0*	*3*	*8*	*0*	*0*	*11*
RADA-011	*2*	*9*	*55*	*0*	*0*	*66*
RADA-013	*25*	*7*	*33*	*0*	*1*	*66*
RADA-020	*0*	*0*	*11*	*0*	*0*	*11*
RADA-022	*0*	*0*	*20*	*0*	*2*	*22*
RADA-032	*0*	*0*	*4*	*7*	*0*	*11*
RADA-038	*1*	*14*	*3*	*0*	*0*	*18*
SR-03-RCMOD	*0*	*1*	*2*	*0*	*0*	*3*
ST-RC-0055	*0*	*0*	*6*	*0*	*0*	*6*
ST-RC-0247	*0*	*0*	*3*	*0*	*0*	*3*
TC-02-RCMOD	*0*	*0*	*3*	*0*	*0*	*3*
Total	***3,093***	***2,825***	***30,861***	***4,066***	***16***	***40,861***
% of Total	***7.57%***	***6.91%***	***75.53%***	***9.95%***	***0.04%***	***100%***

I.2.2 Assessment of Precision, Accuracy, Representativeness, Comparability, Completeness, and Sensitivity Data Quality Indicators and Measurement Performance Criteria

This section discusses the analytical data in terms of the following indicators of data quality: precision, accuracy, representativeness, comparability, completeness, and sensitivity. Precision is determined from the FD and laboratory duplicate (LD) analyses and indicates the consistency of field and laboratory techniques. Accuracy is determined from the laboratory control samples (LCS), matrix spikes (MS), and the results of the RBs, TBs, method blanks (MB), and field blanks and indicates the ability of the laboratory to generate correct results. Representativeness measures the degree to which data accurately represents a population characteristic or process or environmental condition. Comparability expresses the confidence with which data from different laboratories are considered to be equivalent. Completeness measures the amount of valid data resulting from the data collection activity. Sensitivity evaluates detection limits relative to risk-based screening criteria.

I.2.2.1 Precision

Precision is the degree to which a set of observations or measurements of the same property, obtained under similar conditions, conform to themselves. Field duplicates measure the repeatability of the sampling and analytical techniques, and laboratory duplicates measure the ability of the laboratory to reproduce a result. Low precision can be caused by poor instrument performance, poor operator technique, inconsistent application of method protocols, laboratory environment, time between analyses, or by a difficult, heterogeneous sample matrix. Precision is especially important when the action limit approaches the quantification limit. A total of 10 % of the samples were collected in duplicate for this project in accordance with the sampling and analysis plan. The laboratory performs duplicate analyses on at least 5% of the samples received.

Precision is expressed in terms of the relative percent differences (RPD) as follows:

$$\mathrm{RPD} = \frac{|x - y|}{\left(\frac{x + y}{2}\right)} \times 100$$

where x is the original sample result and y is the duplicate sample result. When one result of a duplicate pair is below the method detection limit (MDL), the sample specific estimated quantification limit (ssEQL) is used for that result in the calculation. When both results are below the MDL, the RPD is not calculated.

The RPD should be less than 20% for water samples and less than 35% for solid samples when results are greater than the ssEQL. In the case where results are between the ssEQL and the MDL, the RPD should be less than 100% for water samples and less than 200% for soil samples. In the event analytical precision goals are not met, a determination of the usability of that information is made through the environmental data assessment process.

No records were rejected due to precision issues. Details for this project can be found in subsections 3.6, *Laboratory Duplicate RPD*; and 3.7, *Field Duplicate RPD*.

I.2.2.2 Accuracy

Accuracy is defined as the closeness of agreement between an observed value and an accepted reference value. Accuracy is especially important when the concentration of concern approaches the detection limit and/or the action limit. When the concentration is underestimated near the detection limit, the analyte may be present but reported as not detected. When the concentration is underestimated near the action limit, the analyte may be at a concentration that would require remediation, but the remediation would not be performed. When the concentration is overestimated near the detection limit, the analyte may not be present but reported as detected.

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When the concentration is overestimated near the action limit, the analyte may not be at a concentration that would require remediation, but the remediation would be performed. The sample types used to evaluate accuracy are performance evaluation studies LCSs, surrogate spikes, MSs, MBs, TBs, and RBs.

LCSs monitor the performance of all steps in the analytical process, including sample preparation, and are used to identify problems with the analytical procedure. LCSs are deionized water that is spiked with the target analyte, digested, and analyzed with the regular samples. The LCS spiking solution is obtained from a third-party supplier or is prepared in the laboratory using chemicals from a different source than the calibration standards.

The LCS percent recovery is calculated as follows:

$$\%\ \text{Recovery} = \frac{\text{Blank spike concentration}}{\text{Spike concentration}} \times 100$$

One hundred percent recovery is equivalent to 100% accuracy. Values less than 100% or greater than 100% may indicate a sample matrix effect and a false reading. A periodic program of sample spiking is required (e.g., one MS and one MS duplicate per 20 samples). If analytical accuracy goals are not met, a determination is made through the environmental data assessment process relative to the usability of that information.

Twelve (12) Endrin Aldehyde records were rejected due to the matrix spike duplicate was outside of limits. Details for this project can be found in subsections 3.4, *Trip Blanks*; 3.5, *Method Blanks*; 3.8, *Matrix Spike Recovery*; 3.9, *LCS Recovery*; and 3.10, *Surrogate/Tracer Recovery*.

I.2.2.3 Representativeness

The representativeness of samples collected is controlled by adhering to the detailed descriptions of sampling procedures. Representativeness expresses the relative degree to which the data depict the characteristics of a population, parameter, sampling point, process condition, or environmental condition. The objective of this study is to accurately represent the concentrations of target analytes or compounds. Representative samples for this investigation will be required by implementing approved sampling and analytical procedures that will generate data representative of the sampling point location and will be maintained. Analytical methods are selected that will most accurately

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represent the true concentration of the parameter of interest. The accumulation of QC procedures and information (i.e., RPD values, blank QC concentrations, MS percent recoveries, etc.) employed for a given analysis combine to exhibit the representativeness of the data generated.

The goal for representative sample data will therefore be met by properly documenting field and analytical protocols. In the event these procedures and methods are not able to be implemented, the appropriate corrective action documentation should encompass the impact on the representativeness of the information. When review of the data and documentation determines the data to be non-representative, the information is qualified in its use or is not used by the project.

All samples were collected and analyzed per established procedures.

I.2.2.4 Comparability

Comparability is the degree to which different methods, data sets, and decisions agree or can be represented as similar. The comparability of the data from the laboratories is based on the results of the split samples and on confirmation that the laboratories used the same standardized procedures for sample analysis, the same reporting unit, and obtained similar quantitation limits. Comparability of the data produced for this investigation may be obtained by implementing the identified protocols for sampling and analysis of samples. Implementation of traceable reference materials such as laboratory standards, expression of results in standard concentration units, and successful participation by the laboratories in external performance evaluation programs will enable the information produced through this investigation to be compared with future data sets, if required.

For this project, eleven (11) SPL samples were collected from eleven (11) locations and sent to a designated QC laboratory. Details for the split samples can be found in subsection *3.11, Split Samples Comparability*.

I.2.2.5 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared with the amount that was expected to be obtained under correct, normal circumstances. The Quality Assurance completeness objective for RFI/RI projects is to obtain valid field and laboratory analytical results for at least 90% of the samples collected during the project. This implies that completeness of sample collection (i.e., the number of samples collected compared to the number of samples planned) must be virtually 100% to allow for some loss of data during the laboratory analytical process. Accountability of samples collected, from field to final disposal, must be 100%.

Completeness is a measure of the amount of data obtained from a measurement process that achieves the project goals as compared to the amount of data planned to be obtained by the project. Completeness is affected by unexpected conditions during the data collection process that reduce the usable data achieved relative to the data planned.

When review of the data and documentation determines the data to be incomplete, the impact relative to the project objective will be assessed and documented.

The following are measures of completeness:

Sample Collection:

$$\text{Completeness} = \frac{\text{Number of Sample Points Sampled}}{\text{Number of Sample Points Planned}} \text{ X 100}$$

Field Measurement:

$$\text{Completeness} = \frac{\text{Number of Valid Measurements Made}}{\text{Number of Measurements Planned}} \text{ X 100}$$

Laboratory Analysis:

$$\text{Completeness} = \frac{\text{Number of Valid Data Points}}{\text{Number of Data Points Planned}} \text{ X 100}$$

The completeness numbers for this project are listed below:

Sample Collection Completeness 100 %
Field Measurement Completeness N/A
Laboratory Analysis Completeness 85%

I.2.2.6 Sensitivity

Sensitivity is the ability of the method or instrument to detect the target analytes at the level of interest (e.g., Regional Screening Levels [RSL] or Primary Drinking Water Maximum Contaminant Levels). The sample quantitation limit is the minimum concentration of an analyte

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that can be routinely identified and quantified above the MDL by a laboratory. Sensitivity can be determined by comparing the MDLs for each analyte and for each matrix (e.g., soil or groundwater). MDLs for each matrix and analyte are compared against the criteria of interest to ensure data usability.

I.2.3 Validation Findings

I.2.3.1 Holding Times

This section discusses the holding times for the reported analyses and identifies whether the analyses were within the recommended limits and if qualification was required for regular samples, field duplicate samples and split samples.

<u>EPA8260D, Volatile Organics</u>

Six hundred fourteen (614) volatile organic records were qualified as approximate because the sample was held beyond normal holding time prior to analysis, UJ/Q.

Ten (10) volatile organic records were qualified as estimated because the sample was held beyond normal holding time prior to analysis, J/Q.

<u>EPA9012B, Cyanide</u>

Five (5) cyanide records were qualified as approximate because the sample was held beyond normal holding time prior to analysis, UJ/Q.

<u>GA-01-RMOD, Iodione-129</u>

Three (3) Iodine-129 records were qualified as approximate because the sample was held beyond normal holding time prior to analysis, UJ/Q.

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Table I.2-4. Holding Time Review Qualifier Summary

Method Code	Total # of Records	# of Records Qualified for Hold Times	Associated Samples Qualified
A01R	*336*	*0*	
EERFC-01	*3*	*0*	
EPA6010D	*1,287*	*0*	
EPA6020B	*3,553*	*0*	
EPA7470A	*6*	*0*	
EPA7471B	*214*	*0*	
EPA8081B	*4,599*	*0*	
EPA8082A	*1,544*	*0*	
EPA8260D	*13,364*	*624*	*LRP-4L-WP-00073, LRP-4L-WP-00074, LRP-4L-WP-00075, LRP-4L-WP-00076, LRP-4L-WP-00077, LRP-4L-WP-00078, LRP-4L-WP-00079, LRP-4L-WP-00080, LRP-4L-WP-00081, LRP-4L-WP-00082, LRP-4L-WP-00083, LRP-4L-WP-00284*
EPA8270E	*14,870*	*0*	
EPA900.0	*12*	*0*	
EPA9012B	*220*	*5*	*LRP-4L-WP-00067, LRP-4L-WP-00068, LRP-4L-WP-00069, LRP-4L-WP-00070, LRP-4L-WP-00071*
EPA903.0	*21*	*0*	
EPA904.0	*21*	*0*	
EPA906.0	*3*	*0*	
EPA9310	*406*	*0*	
GA-01-RMOD	*24*	*3*	*LRP-4L-WP-00175, LRP-4L-WP-00192, LRP-4L-WP-00205*
HASL300	*80*	*0*	
RADA-001	*22*	*0*	
RADA-002	*11*	*0*	
RADA-003	*11*	*0*	
RADA-004	*11*	*0*	
RADA-005	*6*	*0*	
RADA-006	*6*	*0*	
RADA-008	*11*	*0*	
RADA-009	*11*	*0*	
RADA-011	*66*	*0*	
RADA-013	*66*	*0*	
RADA-020	*11*	*0*	
RADA-022	*22*	*0*	
RADA-032	*11*	*0*	
RADA-038	*18*	*0*	
SR-03-RCMOD	*3*	*0*	
ST-RC-0055	*6*	*0*	
ST-RC-0247	*3*	*0*	
TC-02-RCMOD	*3*	*0*	

I.2.3.2 Preservation

All chemical and physical preservation for the reported analyses were properly applied. No qualification was required.

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Table I.2-5. Preservation Review Qualifier Summary

Method Code	Total # of Records	# of Records Qualified for Preservation	Associated Samples Qualified
A01R	*336*	*0*	
EERFC-01	*3*	*0*	
EPA6010D	*1,287*	*0*	
EPA6020B	*3,553*	*0*	
EPA7470A	*6*	*0*	
EPA7471B	*214*	*0*	
EPA8081B	*4,599*	*0*	
EPA8082A	*1,544*	*0*	
EPA8260D	*13,364*	*0*	
EPA8270E	*14,870*	*0*	
EPA900.0	*12*	*0*	
EPA9012B	*220*	*0*	
EPA903.0	*21*	*0*	
EPA904.0	*21*	*0*	
EPA906.0	*3*	*0*	
EPA9310	*406*	*0*	
GA-01-RMOD	*24*	*0*	
HASL300	*80*	*0*	
RADA-001	*22*	*0*	
RADA-002	*11*	*0*	
RADA-003	*11*	*0*	
RADA-004	*11*	*0*	
RADA-005	*6*	*0*	
RADA-006	*6*	*0*	
RADA-008	*11*	*0*	
RADA-009	*11*	*0*	
RADA-011	*66*	*0*	
RADA-013	*66*	*0*	
RADA-020	*11*	*0*	
RADA-022	*22*	*0*	
RADA-032	*11*	*0*	
RADA-038	*18*	*0*	
SR-03-RCMOD	*3*	*0*	
ST-RC-0055	*6*	*0*	
ST-RC-0247	*3*	*0*	
TC-02-RCMOD	*3*	*0*	

I.2.3.3 Calibration, Identification, and Quantitation

This section discusses whether all calibration, identification, and quantitation criteria for the reported analyses were within the recommended limits and if qualification was required for REG samples, FD samples and SPL samples.

EPA8081B, Pesticides

One (1) DDE record was qualified as estimated because of interference present in the matrix, J/4.

Five (5) DDT records were qualified as estimated because of interference present in the matrix, J/4.

RADA-013, Gamma Spectroscopy

One (1) Actinium-228 record was rejected due to compound identification criteria was not met, R/1.

RADA-022, Gamma Spectroscopy

Two (2) Nickel-59 records were rejected due to compound identification criteria was not met, R/1.

Table I.2-6. Calibration, Identification, and Quantitation Review Summary

Method Code	Total # of Records	# of Records Qualified for Calibration, Identification and Quantitation	Associated Samples Qualified
A01R	*336*	*0*	
EERFC-01	*3*	*0*	
EPA6010D	*1,287*	*0*	
EPA6020B	*3,553*	*0*	
EPA7470A	*6*	*0*	
EPA7471B	*214*	*0*	
EPA8081B	*4,599*	*6*	*LRP-4L-WP-00127, LRP-4L-WP-00151, LRP-4L-WP-00248, LRP-4L-WP-00250, LRP-4L-WP-00251, LRP-4L-WP-00278*
EPA8082A	*1,544*	*0*	
EPA8260D	*13,364*	*0*	
EPA8270E	*14,870*	*0*	
EPA900.0	*12*	*0*	
EPA9012B	*220*	*0*	
EPA903.0	*21*	*0*	
EPA904.0	*21*	*0*	
EPA906.0	*3*	*0*	
EPA9310	*406*	*0*	
GA-01-RMOD	*24*	*0*	
HASL300	*80*	*0*	

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Table I.2-6. Calibration, Identification, and Quantitation Review Summary *(continued/end)*

Method Code	Total # of Records	# of Records Qualified for Calibration, Identification and Quantitation	Associated Samples Qualified
RADA-001	*22*	*0*	
RADA-002	*11*	*0*	
RADA-003	*11*	*0*	
RADA-004	*11*	*0*	
RADA-005	*6*	*0*	
RADA-006	*6*	*0*	
RADA-008	*11*	*0*	
RADA-009	*11*	*0*	
RADA-011	*66*	*0*	
RADA-013	*66*	*1*	*LRP-4L-WP-00156*
RADA-020	*11*	*0*	
RADA-022	*22*	*2*	*LRP-4L-WP-00084, LRP-4L-WP-00168*
RADA-032	*11*	*0*	
RADA-038	*18*	*0*	
SR-03-RCMOD	*3*	*0*	
ST-RC-0055	*6*	*0*	
ST-RC-0247	*3*	*0*	
TC-02-RCMOD	*3*	*0*	

I.2.3.4 Trip Blanks and Rinsate Blanks

This section discusses whether the TB and RB results for the reported analyses were within the recommended limits and if qualification was required.

Table I.2-7A. Trip Blank Review Qualifier Summary

Method Code	Total # of TB Records	# of TB Records Qualified	Associated Samples Qualified
EPA8260D	*1924*	*0*	

Table I.2-7B. Rinsate Blank Review Qualifier Summary

Method Code	Total # of TB Records	# of TB Records Qualified	Associated Samples Qualified
EPA6010D	*30*	*0*	
EPA6020B	*102*	*0*	
EPA7470A	*6*	*0*	
EPA8081B	*105*	*0*	
EPA8082A	*35*	*0*	
EPA8260D	*312*	*0*	
EPA8270E	*340*	*0*	
EPA900.0	*12*	*0*	
EPA9012B	*6*	*0*	

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I.2.3.5 Method Blanks

This section discusses whether the MB results for the reported analyses were within the recommended limits and if qualification was required for REG samples, FD samples and SPL samples.

<u>EPA6010D, ICP-ES Metals</u>

One hundred eleven (111) Calcium records were qualified as estimated due to the analyte was detected in the method blank, J/V.

One (1) Cobalt record was qualified as approximate due to the analyte was detected in the method blank, UJ/V.

Thirty-two (32) Iron records were qualified as estimated due to the analyte was detected in the method blank, J/V.

Two (2) Magnesium records were qualified as estimated due to the analyte was detected in the method blank, J/V.

One (1) Nickel record was qualified as approximate due to the analyte was detected in the method blank, UJ/V.

One (1) Nickel record was qualified as estimated due to the analyte was detected in the method blank, J/V.

One (1) Potassium record was qualified as estimated due to the analyte was detected in the method blank, J/V.

Two (2) Selenium records were qualified as approximate due to the analyte was detected in the method blank, UJ/V.

Twenty-four (24) Sodium records were qualified as estimated due to the analyte was detected in the method blank, J/V.

One (1) Zinc record was qualified as approximate due to the analyte was detected in the method blank, UJ/V.

Two (2) Zinc records were qualified as estimated due to the analyte was detected in the method blank, J/V.

EPA6020B, ICP-MS Metals

Seventy-five (75) Aluminum records were qualified as estimated due to the analyte was detected in the method blank, J/V.

Sixteen (16) Antimony records were qualified as estimated due to the analyte was detected in the method blank, J/V.

Thirty (30) Barium records were qualified as estimated due to the analyte was detected in the method blank, J/V.

Two hundred three (203) Chromium records were qualified as estimated due to the analyte was detected in the method blank, J/V.

Sixteen (16) Cobalt records were qualified as estimated due to the analyte was detected in the method blank, J/V.

One hundred twenty-one (121) Copper records were qualified as estimated due to the analyte was detected in the method blank, J/V.

Sixty-five (65) Lead records were qualified as estimated due to the analyte was detected in the method blank, J/V.

One hundred twelve (112) Manganese records were qualified as estimated due to the analyte was detected in the method blank, J/V.

Twenty-one (21) Nickel records were qualified as estimated due to the analyte was detected in the method blank, J/V.

Thirty-six (36) Thallium records were qualified as estimated due to the analyte was detected in the method blank, J/V.

Twenty-two (22) Zinc records were qualified as estimated due to the analyte was detected in the method blank, J/V.

EPA7471B, Mercury

Fifteen (15) Mercury records were qualified as estimated due to the analyte was detected in the method blank, J/V.

EPA8081B, Pesticides

One (1) Aldrin record was qualified as approximate due to the analyte was detected in the method blank, UJ/V.

One (1) Alpha-Benzene Hexachloride record was qualified as approximate due to the analyte was detected in the method blank, UJ/V.

One (1) Alpha-Chlordane record was qualified as approximate due to the analyte was detected in the method blank, UJ/V.

One (1) Beta-Benzene Hexachloride record was qualified as approximate due to the analyte was detected in the method blank, UJ/V.

One (1) DDD record was qualified as approximate due to the analyte was detected in the method blank, UJ/V.

One (1) DDE record was qualified as approximate due to the analyte was detected in the method blank, UJ/V.

One (1) DDT record was qualified as approximate due to the analyte was detected in the method blank, UJ/V.

One (1) Delta-Benzene Hexachloride record was qualified as approximate due to the analyte was detected in the method blank, UJ/V.

One (1) Dieldrin record was qualified as approximate due to the analyte was detected in the method blank, UJ/V.

One (1) Endosulfan I record was qualified as approximate due to the analyte was detected in the method blank, UJ/V.

One (1) Endosulfan II record was qualified as approximate due to the analyte was detected in the method blank, UJ/V.

One (1) Endosulfan Sulfate record was qualified as approximate due to the analyte was detected in the method blank, UJ/V.

One (1) Endrin record was qualified as approximate due to the analyte was detected in the method blank, UJ/V.

One (1) Endrin Aldehyde record was qualified as approximate due to the analyte was detected in the method blank, UJ/V.

One (1) Endrin Ketone record was qualified as approximate due to the analyte was detected in the method blank, UJ/V.

One (1) Gamma-Chlordane record was qualified as approximate due to the analyte was detected in the method blank, UJ/V.

One (1) Heptachlor record was qualified as approximate due to the analyte was detected in the method blank, UJ/V.

One (1) Heptachlor Epoxide record was qualified as approximate due to the analyte was detected in the method blank, UJ/V.

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One (1) Lindane record was qualified as approximate due to the analyte was detected in the method blank, UJ/V.

One (1) Methoxychlor record was qualified as approximate due to the analyte was detected in the method blank, UJ/V.

EPA8082A, PCBs

One (1) Aroclor 1260 record was qualified as approximate due to the analyte was detected in the method blank, UJ/V.

One (1) Aroclor-Total record was qualified as approximate due to the analyte was detected in the method blank, UJ/V.

EPA8260D, Volatile Organics

Sixteen (16) Acetone records were qualified as approximate due to the analyte was detected in the method blank, UJ/V.

Nine (9) Dichloromethane records were qualified as approximate due to the analyte was detected in the method blank, UJ/V.

Four (4) Toluene records were qualified as approximate due to the analyte was detected in the method blank, UJ/V.

EPA8270E, Semi-Volatiles

One (1) Di-N-Butyl Phthalate record was qualified as approximate due to the analyte was detected in the method blank, UJ/V.

Seventeen (17) Di-N-Butyl Phthalate records were qualified as estimated due to the analyte was detected in the method blank, J/V.

HASL300, Rad Analyses

Two (2) Thorium-230 records were qualified as estimated due to the analyte was detected in the method blank, J/V.

Two (2) Thorium-232 records were qualified as estimated due to the analyte was detected in the method blank, J/V.

Three (3) Uranium-238 records were qualified as estimated due to the analyte was detected in the method blank, J/V.

RADA-022, Nickel-59

One (1) Nickel-59 record was rejected due to the analyte was detected in the method blank, R/V.

RADA-032, Neptunium Series

Seven (7) Neptunium-237 were qualified as approximate due to the analyte was detected in the method blank, UJ/V.

Table I.2-8. Method Blank (MB) Review Qualifier Summary

Method Code	Total # of MB Records	# of MB Records Qualified	Associated Samples Qualified
A01R	*37*	*0*	
EERFC-01	*1*	*0*	
EPA6010D	*234*	*15*	*LRP-4L-WP-00049, LRP-4L-WP-00050, LRP-4L-WP-00051, LRP-4L-WP-00052, LRP-4L-WP-00053, LRP-4L-WP-00054, LRP-4L-WP-00055, LRP-4L-WP-00056, LRP-4L-WP-00057, LRP-4L-WP-00058, LRP-4L-WP-00059, LRP-4L-WP-00061, LRP-4L-WP-00062, LRP-4L-WP-00063, LRP-4L-WP-00064, LRP-4L-WP-00065, LRP-4L-WP-00066, LRP-4L-WP-00082, LRP-4L-WP-00085, LRP-4L-WP-00086, LRP-4L-WP-00087, LRP-4L-WP-00088, LRP-4L-WP-00089, LRP-4L-WP-00090, LRP-4L-WP-00091, LRP-4L-WP-00093, LRP-4L-WP-00094, LRP-4L-WP-00095, LRP-4L-WP-00097, LRP-4L-WP-00103, LRP-4L-WP-00104, LRP-4L-WP-00105, LRP-4L-WP-00106, LRP-4L-WP-00107, LRP-4L-WP-00109, LRP-4L-WP-00110, LRP-4L-WP-00111, LRP-4L-WP-00112, LRP-4L-WP-00113, LRP-4L-WP-00114, LRP-4L-WP-00115, LRP-4L-WP-00116, LRP-4L-WP-00117, LRP-4L-WP-00118, LRP-4L-WP-00119, LRP-4L-WP-00121, LRP-4L-WP-00122, LRP-4L-WP-00123, LRP-4L-WP-00124, LRP-4L-WP-00125, LRP-4L-WP-00126, LRP-4L-WP-00127, LRP-4L-WP-00128, LRP-4L-WP-00131, LRP-4L-WP-00138, LRP-4L-WP-00141, LRP-4L-WP-00145, LRP-4L-WP-00146, LRP-4L-WP-00147, LRP-4L-WP-00148, LRP-4L-WP-00149, LRP-4L-WP-00150, LRP-4L-WP-00151, LRP-4L-WP-00152, LRP-4L-WP-00153, LRP-4L-WP-00155, LRP-4L-WP-00157, LRP-4L-WP-00158, LRP-4L-WP-00159, LRP-4L-WP-00160, LRP-4L-WP-00161, LRP-4L-WP-00162, LRP-4L-WP-00163, LRP-4L-WP-00166, LRP-4L-WP-00170, LRP-4L-WP-00173, LRP-4L-WP-00174, LRP-4L-WP-00178, LRP-4L-WP-00185, LRP-4L-WP-00187, LRP-4L-WP-00188, LRP-4L-WP-00189, LRP-4L-WP-00190, LRP-4L-WP-00191, LRP-4L-WP-00192, LRP-4L-WP-00193, LRP-4L-WP-00194, LRP-4L-WP-00195, LRP-4L-WP-00196, LRP-4L-WP-00197, LRP-4L-WP-00198, LRP-4L-WP-00201, LRP-4L-WP-00202, LRP-4L-WP-00203, LRP-4L-WP-00211, LRP-4L-WP-00212, LRP-4L-WP-00213, LRP-4L-WP-00214, LRP-4L-WP-00215, LRP-4L-WP-00216, LRP-4L-WP-00217, LRP-4L-WP-00218, LRP-4L-WP-00220, LRP-4L-WP-00221, LRP-4L-WP-00222, LRP-4L-WP-00223, LRP-4L-WP-00224, LRP-4L-WP-00225, LRP-4L-WP-00226, LRP-4L-WP-00227, LRP-4L-WP-00228, LRP-4L-WP-00230, LRP-4L-WP-00241, LRP-4L-WP-00242, LRP-4L-WP-00243, LRP-4L-WP-00244, LRP-4L-WP-00245, LRP-4L-WP-00246, LRP-4L-WP-00247, LRP-4L-WP-00248, LRP-4L-WP-00249, LRP-4L-WP-00250, LRP-4L-WP-00251, LRP-4L-WP-00252, LRP-4L-WP-00253, LRP-4L-WP-00254, LRP-4L-WP-00255, LRP-4L-WP-00256, LRP-4L-WP-00257, LRP-4L-WP-00258, LRP-4L-WP-00259, LRP-4L-WP-00260, LRP-4L-WP-00264, LRP-4L-WP-00265, LRP-4L-WP-00271, LRP-4L-WP-00272, LRP-4L-WP-00275*

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Table I.2-8. Method Blank (MB) Review Qualifier Summary *(continued)*

Method Code	Total # of MB Records	# of MB Records Qualified	Associated Samples Qualified
EPA6020B	*375*	*63*	*LRP-4L-WP-00049, LRP-4L-WP-00050, LRP-4L-WP-00051, LRP-4L-WP-00052, LRP-4L-WP-00053, LRP-4L-WP-00054, LRP-4L-WP-00055, LRP-4L-WP-00056, LRP-4L-WP-00057, LRP-4L-WP-00058, LRP-4L-WP-00059, LRP-4L-WP-00061, LRP-4L-WP-00062, LRP-4L-WP-00063, LRP-4L-WP-00064, LRP-4L-WP-00065, LRP-4L-WP-00066, LRP-4L-WP-00067, LRP-4L-WP-00068, LRP-4L-WP-00069, LRP-4L-WP-00070, LRP-4L-WP-00071, LRP-4L-WP-00073, LRP-4L-WP-00074, LRP-4L-WP-00075, LRP-4L-WP-00076, LRP-4L-WP-00077, LRP-4L-WP-00078, LRP-4L-WP-00079, LRP-4L-WP-00080, LRP-4L-WP-00081, LRP-4L-WP-00082, LRP-4L-WP-00083, LRP-4L-WP-00085, LRP-4L-WP-00086, LRP-4L-WP-00087, LRP-4L-WP-00088, LRP-4L-WP-00089, LRP-4L-WP-00090, LRP-4L-WP-00091, LRP-4L-WP-00092, LRP-4L-WP-00093, LRP-4L-WP-00094, LRP-4L-WP-00095, LRP-4L-WP-00097, LRP-4L-WP-00098, LRP-4L-WP-00099, LRP-4L-WP-00100, LRP-4L-WP-00101, LRP-4L-WP-00102, LRP-4L-WP-00103, LRP-4L-WP-00104, LRP-4L-WP-00105, LRP-4L-WP-00106, LRP-4L-WP-00107, LRP-4L-WP-00109, LRP-4L-WP-00110, LRP-4L-WP-00111, LRP-4L-WP-00112, LRP-4L-WP-00113, LRP-4L-WP-00114, LRP-4L-WP-00115, LRP-4L-WP-00116, LRP-4L-WP-00117, LRP-4L-WP-00118, LRP-4L-WP-00119, LRP-4L-WP-00121, LRP-4L-WP-00122, LRP-4L-WP-00123, LRP-4L-WP-00124, LRP-4L-WP-00125, LRP-4L-WP-00126, LRP-4L-WP-00127, LRP-4L-WP-00128, LRP-4L-WP-00131, LRP-4L-WP-00133, LRP-4L-WP-00134, LRP-4L-WP-00135, LRP-4L-WP-00138, LRP-4L-WP-00139, LRP-4L-WP-00140*

Table I.2-8. Method Blank (MB) Review Qualifier Summary *(continued)*

Method Code	Total # of MB Records	# of MB Records Qualified	Associated Samples Qualified
EPA6020B (Cont.)	*375*	*63*	*LRP-4L-WP-00141, LRP-4L-WP-00142, LRP-4L-WP-00145, LRP-4L-WP-00146, LRP-4L-WP-00147, LRP-4L-WP-00148, LRP-4L-WP-00149, LRP-4L-WP-00150, LRP-4L-WP-00151, LRP-4L-WP-00152, LRP-4L-WP-00153, LRP-4L-WP-00155, LRP-4L-WP-00157, LRP-4L-WP-00158, LRP-4L-WP-00159, LRP-4L-WP-00160, LRP-4L-WP-00161, LRP-4L-WP-00162, LRP-4L-WP-00163, LRP-4L-WP-00164, LRP-4L-WP-00165, LRP-4L-WP-00166, LRP-4L-WP-00169, LRP-4L-WP-00170, LRP-4L-WP-00171, LRP-4L-WP-00173, LRP-4L-WP-00174, LRP-4L-WP-00175, LRP-4L-WP-00176, LRP-4L-WP-00177, LRP-4L-WP-00178, LRP-4L-WP-00179, LRP-4L-WP-00181, LRP-4L-WP-00182, LRP-4L-WP-00183, LRP-4L-WP-00184, LRP-4L-WP-00185, LRP-4L-WP-00186, LRP-4L-WP-00187, LRP-4L-WP-00188, LRP-4L-WP-00189, LRP-4L-WP-00190, LRP-4L-WP-00191, LRP-4L-WP-00192, LRP-4L-WP-00193, LRP-4L-WP-00194, LRP-4L-WP-00195, LRP-4L-WP-00196, LRP-4L-WP-00197, LRP-4L-WP-00198, LRP-4L-WP-00199, LRP-4L-WP-00201, LRP-4L-WP-00202, LRP-4L-WP-00203, LRP-4L-WP-00204, LRP-4L-WP-00205, LRP-4L-WP-00206, LRP-4L-WP-00207, LRP-4L-WP-00208, LRP-4L-WP-00209, LRP-4L-WP-00210, LRP-4L-WP-00211, LRP-4L-WP-00212, LRP-4L-WP-00213, LRP-4L-WP-00214, LRP-4L-WP-00215, LRP-4L-WP-00216, LRP-4L-WP-00217, LRP-4L-WP-00218, LRP-4L-WP-00220, LRP-4L-WP-00221, LRP-4L-WP-00222, LRP-4L-WP-00223, LRP-4L-WP-00224, LRP-4L-WP-00225, LRP-4L-WP-00226, LRP-4L-WP-00227, LRP-4L-WP-00228, LRP-4L-WP-00230, LRP-4L-WP-00231, LRP-4L-WP-00232, LRP-4L-WP-00233, LRP-4L-WP-00234, LRP-4L-WP-00235, LRP-4L-WP-00236, LRP-4L-WP-00237, LRP-4L-WP-00238, LRP-4L-WP-00239, LRP-4L-WP-00240, LRP-4L-WP-00241, LRP-4L-WP-00242, LRP-4L-WP-00243, LRP-4L-WP-00244, LRP-4L-WP-00245, LRP-4L-WP-00246, LRP-4L-WP-00247, LRP-4L-WP-00248, LRP-4L-WP-00249, LRP-4L-WP-00250, LRP-4L-WP-00251, LRP-4L-WP-00252, LRP-4L-WP-00253, LRP-4L-WP-00254, LRP-4L-WP-00255, LRP-4L-WP-00256, LRP-4L-WP-00257, LRP-4L-WP-00258, LRP-4L-WP-00259, LRP-4L-WP-00260, LRP-4L-WP-00261, LRP-4L-WP-00262, LRP-4L-WP-00263, LRP-4L-WP-00264, LRP-4L-WP-00265, LRP-4L-WP-00266, LRP-4L-WP-00267, LRP-4L-WP-00268, LRP-4L-WP-00269, LRP-4L-WP-00270, LRP-4L-WP-00271, LRP-4L-WP-00272, LRP-4L-WP-00275*
EPA7470A	*6*	*0*	
EPA7471B	*23*	*2*	*LRP-4L-WP-00109, LRP-4L-WP-00110, LRP-4L-WP-00111, LRP-4L-WP-00112, LRP-4L-WP-00113, LRP-4L-WP-00114, LRP-4L-WP-00226, LRP-4L-WP-00227, LRP-4L-WP-00228, LRP-4L-WP-00230, LRP-4L-WP-00241, LRP-4L-WP-00242, LRP-4L-WP-00243, LRP-4L-WP-00244, LRP-4L-WP-00245*
EPA8081B	*525*	*20*	*LRP-4L-WP-00168*

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Table I.2-8. Method Blank (MB) Review Qualifier Summary (*continued/end*)

Method Code	Total # of MB Records	# of MB Records Qualified	Associated Samples Qualified
EPA8082A	*167*	*2*	*LRP-4L-WP-00072*
EPA8260D	*2912*	*12*	*LRP-4L-WP-00098, LRP-4L-WP-00099, LRP-4L-WP-00100, LRP-4L-WP-00101, LRP-4L-WP-00102, LRP-4L-WP-00208, LRP-4L-WP-00209, LRP-4L-WP-00210, LRP-4L-WP-00242, LRP-4L-WP-00243, LRP-4L-WP-00244, LRP-4L-WP-00245*
EPA8270E	*1822*	*3*	*LRP-4L-WP-00049, LRP-4L-WP-00061, LRP-4L-WP-00062, LRP-4L-WP-00063, LRP-4L-WP-00064, LRP-4L-WP-00065, LRP-4L-WP-00066, LRP-4L-WP-00125, LRP-4L-WP-00126, LRP-4L-WP-00158, LRP-4L-WP-00159, LRP-4L-WP-00160, LRP-4L-WP-00161, LRP-4L-WP-00162, LRP-4L-WP-00195, LRP-4L-WP-00214, LRP-4L-WP-00220*
EPA900.0	*10*	*0*	
EPA9012B	*34*	*0*	
EPA903.0	*2*	*0*	
EPA904.0	*2*	*0*	
EPA906.0	*1*	*0*	
EPA9310	*26*	*0*	
GA-01-RMOD	*9*	*0*	
HASL300	*96*	*50*	*LRP-4L-WP-00060, LRP-4L-WP-00108, LRP-4L-WP-00120, LRP-4L-WP-00156*
RADA-001	*12*	*0*	
RADA-002	*6*	*0*	
RADA-003	*6*	*0*	
RADA-004	*6*	*0*	
RADA-005	*4*	*0*	
RADA-006	*4*	*0*	
RADA-008	*6*	*0*	
RADA-009	*6*	*0*	
RADA-011	*44*	*0*	
RADA-013	*36*	*0*	
RADA-020	*6*	*0*	
RADA-022	*12*	*3*	*LRP-4L-WP-00084*
RADA-032	*6*	*3*	*LRP-4L-WP-00060, LRP-4L-WP-00108, LRP-4L-WP-00120, LRP-4L-WP-00132, LRP-4L-WP-00144, LRP-4L-WP-00156, LRP-4L-WP-00180*
RADA-038	*12*	*0*	
SR-03-RCMOD	*4*	*0*	
STL-RC-0055	*2*	*0*	
STL-RC-0147	*2*	*0*	
STL-RC-0245	*1*	*0*	
ST-RC-0055	*2*	*0*	
ST-RC-0247	*1*	*0*	
TC-02-RCMOD	*1*	*0*	

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I.2.3.6 Laboratory Duplicate Relative Percent Difference

This section discusses whether the LD results for the reported analyses were within the recommended limits and if qualification was required.

<u>EPA6010D, ICP-ES Metals</u>

Three (3) Iron records were qualified as estimated due to MS/MSD RPD was not within control limits, J/18.

<u>EPA6020B, ICP-MS Metals</u>

One (1) Cadmium record was qualified as estimated due to MS/MSD RPD was not within control limits, J/18.

One (1) Vanadium record was qualified as estimated due to MS/MSD RPD was not within control limits, J/18.

<u>EPA7470A, Mercury</u>

One (1) Mercury record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

<u>EPA7471B, Mercury</u>

Two (2) Mercury records were qualified as estimated due to MS/MSD RPD was not within control limits, J/18.

<u>EPA8081B, Pesticides</u>

One (1) DDT record was qualified as estimated due to MS/MSD RPD was not within control limits, J/18.

Three (3) Endosulfan Sulfate records were qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

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One (1) Endrin Aldehyde record was rejected due to MS/MSD RPD was not within control limits, R/18.

Two (2) Endrin Aldehyde records were qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

One (1) Methoxychlor record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

EPA8260D, Volatile Organics

One (1) 1,1,2-Trichloro-1,2,2-Trifluoroethane record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

One (1) 1,1-Dichloroethylene record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

One (1) 1,2-Dibromo-3-Chloropropane record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

One (1) Bromomethane record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

One (1) Carbon Disulfide record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

One (1) Chloroethane record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

One (1) Chloroethene record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

One (1) Chloromethane record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

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One (1) Cumene record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

One (1) Cyclohexane record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

One (1) Dichlorodifluoromethane record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

One (1) Trichlorofluoromethane record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

<u>EPA8270E, Semi-Volatiles</u>

One (1) 2,3,4,6-Tetrachlorophenol record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

One (1) 2,4,5-Trichlorophenol record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

Three (3) 2,4-Dinitrophenol records were qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

One (1) 2,4-Dinitrotoluene record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

Two (2) 4-Chloroaniline records were qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

One (1) 4-Chlorophenyl Phenyl Ether record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

One (1) 4-Nitrophenol record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

One (1) Acetophenone record was qualified as estimated due to MS/MSD RPD was not within control limits, J/18.

One (1) Bis(2-Chloro-1-Methylethyl)Ether record was qualified as estimated due to MS/MSD RPD was not within control limits, J/18.

Three (3) Caprolactam records were qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

One (1) Dibenz[AH]anthracene record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

One (1) Dibenzofuran record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

One (1) Diethyl Phthalate record was qualified as estimated due to MS/MSD RPD was not within control limits, J/18.

One (1) Fluorene record was qualified as estimated due to MS/MSD RPD was not within control limits, J/18.

Two (2) Hexachlorocyclopentadiene records were qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

One (1) Hexachloroethane record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

One (1) Indeno[1,2,3-CD]pyrene record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

One (1) Nitrobenzene record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

One (1) N-Nitrosodipropylamine record was qualified as estimated due to MS/MSD RPD was not within control limits, J/18.

One (1) O-Cresol record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

One (1) P-Cresol record was qualified as estimated due to MS/MSD RPD was not within control limits, J/18.

One (1) Pentachlorophenol record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

One (1) P-Nitroaniline record was qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

EPA9012B, Cyanide

One (1) Cyanide record was qualified as estimated due to MS/MSD RPD was not within control limits, J/18.

Four (4) Cyanide records were qualified as approximate due to MS/MSD RPD was not within control limits, UJ/18.

Table I.2-9. Laboratory Duplicate Qualifier Summary

Method Code	Total # of LD Records	# of LD Records Qualified	Associated Samples Qualified
A01R	*37*	*0*	
EERFC-01	*1*	*0*	
EPA6010D	*232*	*3*	*LRP-4L-WP-00160, LRP-4L-WP-00185, LRP-4L-WP-00264*
EPA6020B	*358*	*2*	*LRP-4L-WP-00178, LRP-4L-WP-00206*
EPA7470A	*6*	*1*	*LRP-4L-WP-00277*
EPA7471B	*22*	*2*	*LRP-4L-WP-00067, LRP-4L-WP-00235*
EPA8081B	*414*	*8*	*LRP-4L-WP-00165, LRP-4L-WP-00169, LRP-4L-WP-00221, LRP-4L-WP-00238*
EPA8082A	*38*	*0*	
EPA8260D	*150*	*0*	
EPA8270E	*1137*	*9*	*LRP-4L-WP-00092, LRP-4L-WP-00097, LRP-4L-WP-00169, LRP-4L-WP-00201, LRP-4L-WP-00216, LRP-4L-WP-00251*

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Table I.2-9. Laboratory Duplicate Qualifier Summary *(continued/end)*

Method Code	Total # of LD Records	# of LD Records Qualified	Associated Samples Qualified
EPA900.0	*10*	*0*	
EPA9012B	*39*	*4*	*LRP-4L-WP-00106, LRP-4L-WP-00178, LRP-4L-WP-00214, LRP-4L-WP-00266*
EPA903.0	*2*	*0*	
EPA904.0	*2*	*0*	
EPA906.0	*1*	*0*	
EPA9310	*26*	*0*	
GA-01-RMOD	*9*	*0*	
HASL300	*17*	*0*	
RADA-001	*6*	*0*	
RADA-002	*3*	*0*	
RADA-003	*3*	*0*	
RADA-004	*4*	*0*	
RADA-005	*2*	*0*	
RADA-006	*1*	*0*	
RADA-008	*5*	*0*	
RADA-009	*5*	*0*	
RADA-011	*22*	*0*	
RADA-013	*36*	*0*	
RADA-020	*3*	*0*	
RADA-022	*6*	*0*	
RADA-032	*3*	*0*	
RADA-038	*6*	*0*	
SR-03-RCMOD	*1*	*0*	
ST-RC-0055	*2*	*0*	
ST-RC-0247	*1*	*0*	
TC-02-RCMOD	*1*	*0*	

I.2.3.7 Field Duplicate Relative Percent Difference

This section discusses whether the FD results for the reported analyses were within the recommended limits and if qualification was required.

Table I.2-10. Field Duplicate Qualifier Summary

Method Code	Total # of FD Records	# of FD Records Qualified	Associated Samples Qualified
EPA6010D	*55*	*0*	
EPA6020B	*187*	*0*	
EPA7471B	*11*	*0*	
EPA8081B	*231*	*0*	
EPA8082A	*77*	*0*	
EPA8260D	*572*	*0*	
EPA8270E	*748*	*0*	
EPA9012B	*11*	*0*	
EPA9310	*22*	*0*	

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I.2.3.8 Matrix Spike Recovery

This section discusses whether the MS and MSD recoveries for the reported analyses were within the recommended limits and if qualification was required.

EPA6010D, ICP-ES Metals

One (1) Calcium record was qualified as estimated due to the MS/MSD recovery was outside the established control limits, J/11.

One (1) Magnesium record was qualified as estimated due to the MS/MSD recovery was outside the established control limits, J/11.

EPA6020B, ICP-MS Metals

Two (2) Antimony records were qualified as estimated due to the MS/MSD recovery was outside the established control limits, J/11.

One (1) Arsenic record was qualified as estimated due to the MS/MSD recovery was outside the established control limits, J/11.

Eight (8) Barium records were qualified as estimated due to the MS/MSD recovery was outside the established control limits, J/11.

One (1) Cadmium record was qualified as estimated due to the MS/MSD recovery was outside the established control limits, J/11.

Five (5) Chromium records were qualified as estimated due to the MS/MSD recovery was outside the established control limits, J/11.

One (1) Lead record was qualified as estimated due to the MS/MSD recovery was outside the established control limits, J/11.

Nine (9) Manganese records were qualified as estimated due to the MS/MSD recovery was outside the established control limits, J/11.

One (1) Nickel record was qualified as estimated due to the MS/MSD recovery was outside the established control limits, J/11.

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Eleven (11) Vanadium records were qualified as estimated due to the MS/MSD recovery was outside the established control limits, J/11.

Three (3) Zinc records were qualified as estimated due to the MS/MSD recovery was outside the established control limits, J/11.

EPA7470A, Mercury

One (1) Mercury record was qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

EPA7471B, Mercury

One (1) Mercury record was qualified as estimated due to the MS/MSD recovery was outside the established control limits, J/11.

EPA8081B, Pesticides

One (1) Alpha-Benzene Hexachloride record was qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Seven (7) Beta-Benzene Hexachloride records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Two (2) DDD records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

One (1) DDE record was qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

One (1) DDT record was qualified as estimated due to the MS/MSD recovery was outside the established control limits, J/11.

One (1) Delta-Benzene Hexachloride record was qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Two (2) Endosulfan I records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Three (3) Endosulfan II records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Four (4) Endosulfan Sulfate records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Two (2) Endrin Aldehyde records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Two (2) Endrin Ketone records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

One (1) Lindane record was qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Two (2) Methoxychlor records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Two (2) Toxaphene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

EPA8082A, PCBs

One (1) Aroclor 1016 record was qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

EPA8270E, Semi-Volatiles

Forty-four (44) 1,1`-Biphenyl records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) 1,2,4,5-Tetrachlorobenzene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) 2,3,4,6-Tetrachlorophenol records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

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Forty-four (44) 2,4,5-Trichlorophenol records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) 2,4,6-Trichlorophenol records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) 2,4-Dichlorophenol records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) 2,4-Dimethylphenol records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) 2,4-Dinitrophenol records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) 2,4-Dinitrotoluene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) 2,6-Dinitrotoluene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) 2-Chloronaphthalene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) 2-Chlorophenol records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-three (43) 2-Methylnaphthalene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) 2-Nitroaniline records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) 2-Nitrophenol records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) 3,3-Dichlorobenzidine records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) 4-Bromophenyl Phenyl Ether records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) 4-Chloroaniline records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) 4-Chlorophenyl Phenyl Ether records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) 4-Nitrophenol records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-two (42) Acenaphthene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) Acenaphthylene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) Acetophenone records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty-nine (39) Anthracene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) Atrazine records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Twenty-seven (27) Benzaldehyde records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty-nine (39) Benzo(G,H,I)perylene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty-one (31) Benzo[A]anthracene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty-four (34) Benzo[A]pyrene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty-two (32) Benzo[B]fluoranthene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

One (1) Benzo[B]fluoranthene record was qualified as estimated due to the MS/MSD recovery was outside the established control limits, J/11.

Thirty-seven (37) Benzo[K]fluoranthene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) Bis(2-Chloro-1-Methylethyl)Ether records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) Bis(2-Chloroethoxy)Methane records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) Bis(2-Chloroethyl)Ether records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) Bis(2-Ethylhexyl)Phthalate records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) Butyl Benzyl Phthalate records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty (40) Caprolactam records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) Carbazole records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty-four (34) Chrysene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

One (1) Chrysene record was qualified as estimated due to the MS/MSD recovery was outside the established control limits, J/11.

Forty-three (43) Dibenz[AH]anthracene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) Dibenzofuran records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) Diethyl Phthalate records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) Dimethyl Phthalate records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-two (42) Di-N-Butyl Phthalate records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) Dinitro-O-Cresol records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty-two (32) Fluoranthene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) Fluorene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) Hexachlorobenzene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) Hexachlorobutadiene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty-nine (39) Hexachlorocyclopentadiene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) Hexachloroethane records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty-nine (39) Indeno[1,2,3-CD]pyrene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) Isophorone records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

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Forty-four (44) M/P-Cresol records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) M-Nitroaniline records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) Naphthalene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-five (45) N-Dioctyl Phthalate records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) Nitrobenzene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) N-Nitrosodiphenylamine records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-three (43) N-Nitrosodipropylamine records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) O-Cresol records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) P-Chloro-M-Cresol records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) P-Cresol records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-five (45) Pentachlorophenol records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Thirty-four (34) Phenanthrene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Forty-four (44) Phenol records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

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Forty (40) P-Nitroaniline records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

Twenty-seven (27) Pyrene records were qualified as approximate due to the MS/MSD recovery was outside the established control limits, UJ/11.

EPA9012B, Cyanide

One (1) Cyanide record was qualified as estimated due to the MS/MSD recovery was outside the established control limits, J/11.

Table I.2-11. MS and MSD Recovery Qualifier Summary

Method Code	Total # of MS/MSD Records	# of MS/MSD Records Qualified	Associated Samples Qualified
EERFC-01	*1*	*0*	
EPA6010D	*475*	*5*	*LRP-4L-WP-00110, LRP-4L-WP-00276*
EPA6020B	*715*	*55*	*LRP-4L-WP-00055, LRP-4L-WP-00063, LRP-4L-WP-00067, LRP-4L-WP-00116, LRP-4L-WP-00122, LRP-4L-WP-00126, LRP-4L-WP-00147, LRP-4L-WP-00166, LRP-4L-WP-00178, LRP-4L-WP-00179, LRP-4L-WP-00206, LRP-4L-WP-00225, LRP-4L-WP-00238, LRP-4L-WP-00266*
EPA7470A	*12*	*1*	*LRP-4L-WP-00277*
EPA7471B	*44*	*2*	*LRP-4L-WP-00067*
EPA8081B	*827*	*59*	*LRP-4L-WP-00063, LRP-4L-WP-00103, LRP-4L-WP-00115, LRP-4L-WP-00169, LRP-4L-WP-00178, LRP-4L-WP-00216, LRP-4L-WP-00221, LRP-4L-WP-00238, LRP-4L-WP-00252*
EPA8082A	*76*	*2*	*LRP-4L-WP-00221*
EPA8260D	*300*	*0*	
EPA8270E	*2273*	*29*	*LRP-4L-WP-00061, LRP-4L-WP-00091, LRP-4L-WP-00092, LRP-4L-WP-00097, LRP-4L-WP-00098, LRP-4L-WP-00099, LRP-4L-WP-00109, LRP-4L-WP-00110, LRP-4L-WP-00127, LRP-4L-WP-00128, LRP-4L-WP-00133, LRP-4L-WP-00134, LRP-4L-WP-00135, LRP-4L-WP-00138, LRP-4L-WP-00139, LRP-4L-WP-00140, LRP-4L-WP-00141, LRP-4L-WP-00142, LRP-4L-WP-00145, LRP-4L-WP-00152, LRP-4L-WP-00153, LRP-4L-WP-00157, LRP-4L-WP-00158, LRP-4L-WP-00175, LRP-4L-WP-00176, LRP-4L-WP-00177, LRP-4L-WP-00178, LRP-4L-WP-00179, LRP-4L-WP-00181, LRP-4L-WP-00182, LRP-4L-WP-00183, LRP-4L-WP-00186, LRP-4L-WP-00187, LRP-4L-WP-00188, LRP-4L-WP-00201, LRP-4L-WP-00202, LRP-4L-WP-00203, LRP-4L-WP-00204, LRP-4L-WP-00213, LRP-4L-WP-00226, LRP-4L-WP-00227, LRP-4L-WP-00241, LRP-4L-WP-00242, LRP-4L-WP-00243, LRP-4L-WP-00251, LRP-4L-WP-00266*
EPA9012B	*72*	*5*	*LRP-4L-WP-00214*

Table I.2-11. MS and MSD Recovery Qualifier Summary *(continued/end)*

EPA906.0	*1*	*0*	
HASL300	*1*	*0*	
RADA-002	*3*	*0*	
RADA-003	*3*	*0*	
RADA-006	*1*	*0*	
RADA-008	*5*	*0*	

I.2.3.9 Laboratory Control Samples Recovery

This section discusses whether the LCS recovery for the reported analyses were within the recommended limits and if qualification was required.

<u>EPA8081B, Pesticides</u>

Forty-eight (48) Beta-Benzene Hexachloride records were qualified as non-detect because the LCS recovery was outside the established control limits, U/2.

Three (3) Beta-Benzene Hexachloride records were qualified as approximate because the LCS recovery was outside the established control limits, UJ/2.

Thirteen (13) DDE records were qualified as non-detect because the LCS recovery was outside the established control limits, U/2.

Sixteen (16) DDT records were qualified as non-detect because the LCS recovery was outside the established control limits, U/2.

One (1) DDT record was qualified as estimated because the LCS recovery was outside the established control limits, J/2.

One (1) Endosulfan I record was qualified as non-detect because the LCS recovery was outside the established control limits, U/2.

Two (2) Endosulfan II records were qualified as non-detect because the LCS recovery was outside the established control limits, U/2.

One (1) Endosulfan Sulfate record was qualified as non-detect because the LCS recovery was outside the established control limits, U/2.

One (1) Endrin record was qualified as non-detect because the LCS recovery was outside the established control limits, U/2.

Twenty (20) Endrin Aldehyde records were qualified as non-detect because the LCS recovery was outside the established control limits, U/2.

Thirteen (13) Endrin Aldehyde records were rejected because the LCS recovery was outside the established control limits, R/2.

One (1) Endrin Ketone record was qualified as non-detect because the LCS recovery was outside the established control limits, U/2.

Two (2) Methoxychlor records were qualified as non-detect because the LCS recovery was outside the established control limits, U/2.

EPA8082A, PCBs

One (1) Aroclor 1016 record was qualified as non-detect because the LCS recovery was outside the established control limits, U/2.

One (1) Aroclor 1260 record was qualified as non-detect because the LCS recovery was outside the established control limits, U/2.

EPA8270E, Semi-Volatiles

One (1) 2,4,5-Trichlorophenol record was qualified as approximate because the LCS recovery was outside the established control limits, UJ/2.

One (1) 2,4-Dinitrotoluene record was qualified as approximate because the LCS recovery was outside the established control limits, UJ/2.

One (1) 4-Chlorophenyl Phenyl Ether record was qualified as approximate because the LCS recovery was outside the established control limits, UJ/2.

Two (2) 4-Nitrophenol records were qualified as approximate because the LCS recovery was outside the established control limits, UJ/2.

Three (3) 4-Nitrophenol records were qualified as non-detect because the LCS recovery was outside the established control limits, U/2.

Twenty-one (21) Benzaldehyde records were qualified as approximate because the LCS recovery was outside the established control limits, UJ/2.

Sixteen (16) Benzaldehyde records were qualified as non-detect because the LCS recovery was outside the established control limits, U/2.

Four (4) Bis(2-Ethylhexyl)Phthalate records were qualified as approximate because the LCS recovery was outside the established control limits, UJ/2.

Seventeen (17) Bis(2-Ethylhexyl)Phthalate records were qualified as non-detect because the LCS recovery was outside the established control limits, U/2.

Four (4) Butyl Benzyl Phthalate records were qualified as approximate because the LCS recovery was outside the established control limits, UJ/2.

Seventeen (17) Butyl Benzyl Phthalate records were qualified as non-detect because the LCS recovery was outside the established control limits, U/2.

Six (6) Caprolactam records were qualified as approximate because the LCS recovery was outside the established control limits, UJ/2.

Twelve (12) Caprolactam records were qualified as non-detect because the LCS recovery was outside the established control limits, U/2.

One (1) Dibenzofuran record was qualified as approximate because the LCS recovery was outside the established control limits, UJ/2.

One (1) Diethyl Phthalate record was qualified as non-detect because the LCS recovery was outside the established control limits, U/2.

One (1) Fluorene record was qualified as non-detect because the LCS recovery was outside the established control limits, U/2.

Eleven (11) Hexachlorocyclopentadiene records were qualified as approximate because the LCS recovery was outside the established control limits, UJ/2.

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Four (4) Hexachlorocyclopentadiene records were qualified as non-detect because the LCS recovery was outside the established control limits, U/2.

One (1) Indeno[1,2,3-CD]pyrene record was qualified as approximate because the LCS recovery was outside the established control limits, UJ/2.

One (1) Phenol record was qualified as approximate because the LCS recovery was outside the established control limits, UJ/2.

Four (4) Phenol records were qualified as non-detect because the LCS recovery was outside the established control limits, U/2.

Four (4) P-Nitroaniline records were qualified as approximate because the LCS recovery was outside the established control limits, UJ/2.

Ten (10) P-Nitroaniline records were qualified as non-detect because the LCS recovery was outside the established control limits, U/2.

EPA9012B, Cyanide

Ten (10) Cyanide records were qualified as non-detect because the LCS recovery was outside the established control limits, U/2.

Table I.2-12. LCS Qualifier Summary

Method Code	Total # of LCS Records	# of LCS Records Qualified	Associated Samples Qualified
A01R	*16*	*0*	
EERFC-01	*1*	*0*	
EPA6010D	*238*	*0*	
EPA6020B	*376*	*0*	
EPA7470A	*6*	*0*	
EPA7471B	*22*	*0*	

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Table I.2-12. LCS Qualifier Summary*(continued)*

Method Code	Total # of LCS Records	# of LCS Records Qualified	Associated Samples Qualified
EPA8081B	*663*	*23*	*LRP-4L-WP-00049, LRP-4L-WP-00050, LRP-4L-WP-00051, LRP-4L-WP-00052, LRP-4L-WP-00053, LRP-4L-WP-00054, LRP-4L-WP-00055, LRP-4L-WP-00056, LRP-4L-WP-00057, LRP-4L-WP-00058, LRP-4L-WP-00059, LRP-4L-WP-00061, LRP-4L-WP-00062, LRP-4L-WP-00063, LRP-4L-WP-00064, LRP-4L-WP-00066, LRP-4L-WP-00097, LRP-4L-WP-00098, LRP-4L-WP-00099, LRP-4L-WP-00100, LRP-4L-WP-00115, LRP-4L-WP-00127, LRP-4L-WP-00128, LRP-4L-WP-00131, LRP-4L-WP-00133, LRP-4L-WP-00134, LRP-4L-WP-00135, LRP-4L-WP-00138, LRP-4L-WP-00139, LRP-4L-WP-00140, LRP-4L-WP-00141, LRP-4L-WP-00142, LRP-4L-WP-00146, LRP-4L-WP-00147, LRP-4L-WP-00148, LRP-4L-WP-00149, LRP-4L-WP-00150, LRP-4L-WP-00151, LRP-4L-WP-00152, LRP-4L-WP-00153, LRP-4L-WP-00155, LRP-4L-WP-00163, LRP-4L-WP-00164, LRP-4L-WP-00165, LRP-4L-WP-00166, LRP-4L-WP-00175, LRP-4L-WP-00176, LRP-4L-WP-00177, LRP-4L-WP-00178, LRP-4L-WP-00179, LRP-4L-WP-00201, LRP-4L-WP-00202, LRP-4L-WP-00203, LRP-4L-WP-00204, LRP-4L-WP-00205, LRP-4L-WP-00231, LRP-4L-WP-00232, LRP-4L-WP-00233, LRP-4L-WP-00234, LRP-4L-WP-00235, LRP-4L-WP-00246, LRP-4L-WP-00247, LRP-4L-WP-00248, LRP-4L-WP-00249, LRP-4L-WP-00250, LRP-4L-WP-00251, LRP-4L-WP-00252, LRP-4L-WP-00253, LRP-4L-WP-00254, LRP-4L-WP-00255, LRP-4L-WP-00261, LRP-4L-WP-00262, LRP-4L-WP-00263, LRP-4L-WP-00264, LRP-4L-WP-00265, LRP-4L-WP-00266, LRP-4L-WP-00267, LRP-4L-WP-00268, LRP-4L-WP-00269, LRP-4L-WP-00270*
EPA8082A	*54*	*4*	*LRP-4L-WP-00277*
EPA8260D	*4408*	*0*	

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Table I.2-12. LCS Qualifier Summary*(continued)*

Method Code	Total # of LCS Records	# of LCS Records Qualified	Associated Samples Qualified
EPA8270E	*2164*	*47*	*LRP-4L-WP-00055, LRP-4L-WP-00056, LRP-4L-WP-00057, LRP-4L-WP-00058, LRP-4L-WP-00059, LRP-4L-WP-00109, LRP-4L-WP-00110, LRP-4L-WP-00111, LRP-4L-WP-00112, LRP-4L-WP-00113, LRP-4L-WP-00114, LRP-4L-WP-00115, LRP-4L-WP-00121, LRP-4L-WP-00122, LRP-4L-WP-00127, LRP-4L-WP-00128, LRP-4L-WP-00131, LRP-4L-WP-00133, LRP-4L-WP-00134, LRP-4L-WP-00135, LRP-4L-WP-00138, LRP-4L-WP-00139, LRP-4L-WP-00140, LRP-4L-WP-00141, LRP-4L-WP-00142, LRP-4L-WP-00151, LRP-4L-WP-00152, LRP-4L-WP-00153, LRP-4L-WP-00155, LRP-4L-WP-00175, LRP-4L-WP-00176, LRP-4L-WP-00177, LRP-4L-WP-00178, LRP-4L-WP-00179, LRP-4L-WP-00201, LRP-4L-WP-00202, LRP-4L-WP-00203, LRP-4L-WP-00204, LRP-4L-WP-00226, LRP-4L-WP-00227, LRP-4L-WP-00228, LRP-4L-WP-00230, LRP-4L-WP-00241, LRP-4L-WP-00242, LRP-4L-WP-00243, LRP-4L-WP-00244, LRP-4L-WP-00245, LRP-4L-WP-00256, LRP-4L-WP-00257, LRP-4L-WP-00258, LRP-4L-WP-00259, LRP-4L-WP-00260, LRP-4L-WP-00261, LRP-4L-WP-00262, LRP-4L-WP-00263, LRP-4L-WP-00264, LRP-4L-WP-00265, LRP-4L-WP-00266, LRP-4L-WP-00267, LRP-4L-WP-00268, LRP-4L-WP-00269, LRP-4L-WP-00270, LRP-4L-WP-00271, LRP-4L-WP-00272, LRP-4L-WP-00275*
EPA900.0	*10*	*0*	
EPA9012B	*89*	*1*	*LRP-4L-WP-00246, LRP-4L-WP-00247, LRP-4L-WP-00248, LRP-4L-WP-00249, LRP-4L-WP-00250, LRP-4L-WP-00251, LRP-4L-WP-00252, LRP-4L-WP-00253, LRP-4L-WP-00254, LRP-4L-WP-00255*
EPA903.0	*2*	*0*	
EPA904.0	*2*	*0*	
EPA906.0	*1*	*0*	
EPA9310	*26*	*0*	
GA-01-RMOD	*4*	*0*	
HASL-300	*96*	*0*	
RADA-001	*12*	*0*	
RADA-002	*6*	*0*	
RADA-003	*6*	*0*	
RADA-004	*6*	*0*	
RADA-005	*4*	*0*	
RADA-006	*4*	*0*	
RADA-008	*6*	*0*	
RADA-009	*6*	*0*	
RADA-011	*44*	*0*	
RADA-013	*42*	*0*	
RADA-020	*6*	*0*	
RADA-022	*12*	*0*	
RADA-032	*6*	*0*	
RADA-038	*12*	*0*	

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Table I.2-12. LCS Qualifier Summary*(continued/end)*

Method Code	Total # of LCS Records	# of LCS Records Qualified	Associated Samples Qualified
SR-03-RCMOD	*4*	*0*	
STL-RC-0055	*2*	*0*	
STL-RC-0147	*1*	*0*	
STL-RC-0245	*1*	*0*	
ST-RC-0055	*2*	*0*	
ST-RC-0247	*1*	*0*	
TC-02-RCMOD	*1*	*0*	

I.2.3.10 Surrogate/Tracer Recovery

This section discusses whether the surrogate/tracer recovery for the reported analyses were within the recommended limits and if qualification was required.

EPA8081B, Pesticides

Twenty-three (23) Aldrin records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty-three (23) Alpha-Benzene Hexachloride records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty-three (23) Alpha-Chlordane records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty-two (22) Beta-Benzene Hexachloride records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty-three (23) DDD records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty-two (22) DDE records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) DDE record was qualified as estimated because surrogate recovery was outside of specifications, J/14.

Sixteen (16) DDT records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

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Seven (7) DDT records were qualified as estimated because surrogate recovery was outside of specifications, J/14.

Twenty-three (23) Delta-Benzene Hexachloride records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty-three (23) Dieldrin records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty-three (23) Endosulfan I records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty-three (23) Endosulfan II records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty-three (23) Endosulfan Sulfate records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Nineteen (19) Endrin records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty-three (23) Endrin Aldehyde records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty-four (24) Endrin Ketone records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty-two (22) Gamma-Chlordane records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Gamma-Chlordane record was qualified as estimated because surrogate recovery was outside of specifications, J/14.

Twenty-three (23) Heptachlor records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty-three (23) Heptachlor Epoxide records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

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Twenty-three (23) Lindane records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Nineteen (19) Methoxychlor records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Two (2) Methoxychlor record was qualified as estimated because surrogate recovery was outside of specifications, J/14.

Twenty-three (23) Toxaphene records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

EPA8082A, PCBs

Two (2) Aroclor 1016 records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Two (2) Aroclor 1221 records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Two (2) Aroclor 1232 records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Two (2) Aroclor 1242 records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Two (2) Aroclor 1248 records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Two (2) Aroclor 1254 records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Two (2) Aroclor 1260 records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

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EPA8270E, Semi-Volatiles

Twenty (20) 1,1`-Biphenyl records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) 1,2,4,5-Tetrachlorobenzene records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) 2,3,4,6-Tetrachlorophenol records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) 2,4,5-Trichlorophenol records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) 2,4,6-Trichlorophenol records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) 2,4-Dichlorophenol records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) 2,4-Dimethylphenol records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) 2,4-Dinitrophenol records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) 2,4-Dinitrotoluene records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) 2,6-Dinitrotoluene records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) 2-Chloronaphthalene records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) 2-Chlorophenol records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) 2-Methylnaphthalene records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) 2-Nitroaniline records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) 2-Nitrophenol records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) 3,3-Dichlorobenzidine records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) 4-Bromophenyl Phenyl Ether records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) 4-Chloroaniline records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) 4-Chlorophenyl Phenyl Ether records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) 4-Nitrophenol records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Sixteen (16) Acenaphthene records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Four (4) Acenaphthene records were qualified as estimated because surrogate recovery was outside of specifications, J/14.

Twenty (20) Acenaphthylene records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) Acetophenone records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Fifteen (15) Anthracene records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Five (5) Anthracene records were qualified as estimated because surrogate recovery was outside of specifications, J/14.

Twenty (20) Atrazine records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) Benzaldehyde records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Sixteen (16) Benzo(G,H,I)perylene records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Four (4) Benzo(G,H,I)perylene records were qualified as estimated because surrogate recovery was outside of specifications, J/14.

Fourteen (14) Benzo[A]anthracene records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Six (6) Benzo[A]anthracene records were qualified as estimated because surrogate recovery was outside of specifications, J/14.

Fourteen (14) Benzo[A]pyrene records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Six (6) Benzo[A]pyrene records were qualified as estimated because surrogate recovery was outside of specifications, J/14.

Fourteen (14) Benzo[B]fluoranthene records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Six (6) Benzo[B]fluoranthene records were qualified as estimated because surrogate recovery was outside of specifications, J/14.

Fifteen (15) Benzo[K]fluoranthene records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Five (5) Benzo[K]fluoranthene records were qualified as estimated because surrogate recovery was outside of specifications, J/14.

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Twenty (20) Bis(2-Chloro-1-Methylethyl)Ether records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) Bis(2-Chloroethoxy)Methane records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) Bis(2-Chloroethyl)Ether records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) Bis(2-Ethylhexyl)Phthalate records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) Butyl Benzyl Phthalate records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) Caprolactam records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Nineteen (19) Carbazole records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Carbazole record was qualified as estimated because surrogate recovery was outside of specifications, J/14.

Fourteen (14) Chrysene records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Six (6) Chrysene records were qualified as estimated because surrogate recovery was outside of specifications, J/14.

Seventeen (17) Dibenz[AH]anthracene records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Three (3) Dibenz[AH]anthracene records were qualified as estimated because surrogate recovery was outside of specifications, J/14.

Nineteen (19) Dibenzofuran records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

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One (1) Dibenzofuran record was qualified as estimated because surrogate recovery was outside of specifications, J/14.

Nineteen (19) Diethyl Phthalate records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Diethyl Phthalate record was qualified as estimated because surrogate recovery was outside of specifications, J/14.

Twenty (20) Dimethyl Phthalate records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Nineteen (19) Di-N-Butyl Phthalate records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Di-N-Butyl Phthalate record was qualified as estimated because surrogate recovery was outside of specifications, J/14.

Twenty (20) Dinitro-O-Cresol records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Fourteen (14) Fluoranthene records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Six (6) Fluoranthene records were qualified as estimated because surrogate recovery was outside of specifications, J/14.

Nineteen (19) Fluorene records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) Fluorene record was qualified as estimated because surrogate recovery was outside of specifications, J/14.

Twenty (20) Hexachlorobenzene records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) Hexachlorobutadiene records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

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Twenty (20) Hexachlorocyclopentadiene records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) Hexachloroethane records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Seventeen (17) Indeno[1,2,3-CD]pyrene records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Three (3) Indeno[1,2,3-CD]pyrene records were qualified as estimated because surrogate recovery was outside of specifications, J/14.

Twenty (20) Isophorone records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) M/P-Cresol records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) M-Nitroaniline records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) Naphthalene records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Nineteen (19) N-Dioctyl Phthalate records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

One (1) N-Dioctyl Phthalate record was qualified as estimated because surrogate recovery was outside of specifications, J/14.

Twenty (20) Nitrobenzene records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) N-Nitrosodiphenylamine records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) N-Nitrosodipropylamine records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

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Twenty (20) O-Cresol records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) P-Chloro-M-Cresol records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) P-Cresol records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) Pentachlorophenol records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Fourteen (14) Phenanthrene records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Six (6) Phenanthrene records were qualified as estimated because surrogate recovery was outside of specifications, J/14.

Twenty (20) Phenol records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Twenty (20) P-Nitroaniline records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Fourteen (14) Pyrene records were qualified as approximate because surrogate recovery was outside of specifications, UJ/14.

Six (6) Pyrene records were qualified as estimated because surrogate recovery was outside of specifications, J/14.

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Table I.2-13. Surrogate/Tracer Recovery Qualifier Summary

Method Code	Total # of Surrogate/ Tracer Records	# of Surrogate/Tracer Records Qualified	Associated Samples Qualified
EPA8081B	*698*	*26*	*LRP-4L-WP-00070, LRP-4L-WP-00071, LRP-4L-WP-00073, LRP-4L-WP-00080, LRP-4L-WP-00083, LRP-4L-WP-00085, LRP-4L-WP-00090, LRP-4L-WP-00097, LRP-4L-WP-00102, LRP-4L-WP-00119, LRP-4L-WP-00128, LRP-4L-WP-00134, LRP-4L-WP-00142, LRP-4L-WP-00152, LRP-4L-WP-00153, LRP-4L-WP-00170, LRP-4L-WP-00175, LRP-4L-WP-00176, LRP-4L-WP-00186, LRP-4L-WP-00188, LRP-4L-WP-00196, LRP-4L-WP-00199, LRP-4L-WP-00201, LRP-4L-WP-00205, LRP-4L-WP-00212, LRP-4L-WP-00222, LRP-4L-WP-00226, LRP-4L-WP-00236*
EPA8082A	*576*	*7*	*LRP-4L-WP-00238, LRP-4L-WP-00277*
EPA8260D	*970*	*0*	
EPA8270E	*1740*	*40*	*LRP-4L-WP-00055, LRP-4L-WP-00056, LRP-4L-WP-00100, LRP-4L-WP-00105, LRP-4L-WP-00115, LRP-4L-WP-00122, LRP-4L-WP-00170, LRP-4L-WP-00182, LRP-4L-WP-00183, LRP-4L-WP-00189, LRP-4L-WP-00194, LRP-4L-WP-00208, LRP-4L-WP-00210, LRP-4L-WP-00218, LRP-4L-WP-00238, LRP-4L-WP-00243, LRP-4L-WP-00252, LRP-4L-WP-00258, LRP-4L-WP-00265, LRP-4L-WP-00268*
HASL300	*66*	*0*	
RADA-004	*11*	*0*	
RADA-005	*6*	*0*	
RADA-009	*11*	*0*	
RADA-011	*24*	*0*	
RADA-020	*11*	*0*	
RADA-022	*22*	*0*	
RADA-032	*11*	*0*	
RADA-038	*6*	*0*	

I.2.3.11 Split Samples Comparability

This section discusses samples taken from the same locations and analyzed by similar methods at different laboratories.

Table I.2-14. Split Samples

Station ID	Sample ID	Sample Interval	Date/Time Collected	Sample Type	Media	Lab
LAP-4L-002	*LRP-4L-WP-00055*	*0 - 1 ft*	*12/14/22 10:40*	*REG*	*SOIL*	*GEL*
LAP-4L-002	*LRP-4L-WP-00055*	*0 - 1 ft*	*12/14/22 10:40*	*REG*	*SOIL*	*TAL*
LAP-4L-002	*LRP-4L-WP-00060*	*0 - 1 ft*	*12/14/22 10:40*	*SPL*	*SOIL*	*GEL*
LAP-4L-002	*LRP-4L-WP-00060*	*0 - 1 ft*	*12/14/22 10:40*	*SPL*	*SOIL*	*TAL*
LAP-4L-004	*LRP-4L-WP-00068*	*1 - 4 ft*	*12/7/22 8:45*	*REG*	*SOIL*	*GEL*
LAP-4L-004	*LRP-4L-WP-00068*	*1 - 4 ft*	*12/7/22 8:45*	*REG*	*SOIL*	*TAL*

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Table I.2-14. Split Samples *(continued/end)*

LAP-4L-004	*LRP-4L-WP-00072*	*1 - 4 ft*	*12/7/22 8:45*	*SPL*	*SOIL*	*GEL*
LAP-4L-004	*LRP-4L-WP-00072*	*1 - 4 ft*	*12/7/22 8:45*	*SPL*	*SOIL*	*TAL*
LAP-4L-006	*LRP-4L-WP-00081*	*4 - 8 ft*	*12/6/22 11:20*	*REG*	*SOIL*	*GEL*
LAP-4L-006	*LRP-4L-WP-00081*	*4 - 8 ft*	*12/6/22 11:20*	*REG*	*SOIL*	*TAL*
LAP-4L-006	*LRP-4L-WP-00084*	*4 - 8 ft*	*12/6/22 11:20*	*SPL*	*SOIL*	*GEL*
LAP-4L-006	*LRP-4L-WP-00084*	*4 - 8 ft*	*12/6/22 11:20*	*SPL*	*SOIL*	*TAL*
LAP-4L-008	*LRP-4L-WP-00094*	*8 - 12 ft*	*12/5/22 9:50*	*REG*	*SOIL*	*GEL*
LAP-4L-008	*LRP-4L-WP-00094*	*8 - 12 ft*	*12/5/22 9:50*	*REG*	*SOIL*	*TAL*
LAP-4L-008	*LRP-4L-WP-00096*	*8 - 12 ft*	*12/5/22 9:50*	*SPL*	*SOIL*	*GEL*
LAP-4L-008	*LRP-4L-WP-00096*	*8 - 12 ft*	*12/5/22 9:50*	*SPL*	*SOIL*	*TAL*
LAP-4L-010	*LRP-4L-WP-00103*	*0 - 1 ft*	*1/10/23 11:00*	*REG*	*SOIL*	*GEL*
LAP-4L-010	*LRP-4L-WP-00103*	*0 - 1 ft*	*1/10/23 11:00*	*REG*	*SOIL*	*TAL*
LAP-4L-010	*LRP-4L-WP-00108*	*0 - 1 ft*	*1/10/23 11:00*	*SPL*	*SOIL*	*GEL*
LAP-4L-010	*LRP-4L-WP-00108*	*0 - 1 ft*	*1/10/23 11:00*	*SPL*	*SOIL*	*TAL*
LAP-4L-012	*LRP-4L-WP-00115*	*0 - 1 ft*	*12/14/22 13:50*	*REG*	*SOIL*	*GEL*
LAP-4L-012	*LRP-4L-WP-00115*	*0 - 1 ft*	*12/14/22 13:50*	*REG*	*SOIL*	*TAL*
LAP-4L-012	*LRP-4L-WP-00120*	*0 - 1 ft*	*12/14/22 13:50*	*SPL*	*SOIL*	*GEL*
LAP-4L-012	*LRP-4L-WP-00120*	*0 - 1 ft*	*12/14/22 13:50*	*SPL*	*SOIL*	*TAL*
LAP-4L-014	*LRP-4L-WP-00128*	*1 - 4 ft*	*12/13/22 14:00*	*REG*	*SOIL*	*GEL*
LAP-4L-014	*LRP-4L-WP-00128*	*1 - 4 ft*	*12/13/22 14:00*	*REG*	*SOIL*	*TAL*
LAP-4L-014	*LRP-4L-WP-00132*	*1 - 4 ft*	*12/13/22 14:00*	*SPL*	*SOIL*	*GEL*
LAP-4L-014	*LRP-4L-WP-00132*	*1 - 4 ft*	*12/13/22 14:00*	*SPL*	*SOIL*	*TAL*
LAP-4L-016	*LRP-4L-WP-00141*	*4 - 8 ft*	*12/12/22 13:55*	*REG*	*SOIL*	*GEL*
LAP-4L-016	*LRP-4L-WP-00141*	*4 - 8 ft*	*12/12/22 13:55*	*REG*	*SOIL*	*TAL*
LAP-4L-016	*LRP-4L-WP-00144*	*4 - 8 ft*	*12/12/22 13:55*	*SPL*	*SOIL*	*GEL*
LAP-4L-016	*LRP-4L-WP-00144*	*4 - 8 ft*	*12/12/22 13:55*	*SPL*	*SOIL*	*TAL*
LAP-4L-018	*LRP-4L-WP-00155*	*12 - 16 ft*	*12/13/22 11:00*	*REG*	*SOIL*	*GEL*
LAP-4L-018	*LRP-4L-WP-00155*	*12 - 16 ft*	*12/13/22 11:00*	*REG*	*SOIL*	*TAL*
LAP-4L-025	*LRP-4L-WP-00156*	*12 - 16 ft*	*1/11/23 13:00*	*SPL*	*SOIL*	*GEL*
LAP-4L-025	*LRP-4L-WP-00156*	*12 - 16 ft*	*1/11/23 13:00*	*SPL*	*SOIL*	*TAL*
LAP-4L-020	*LRP-4L-WP-00165*	*4 - 8 ft*	*11/28/22 13:50*	*REG*	*SOIL*	*GEL*
LAP-4L-020	*LRP-4L-WP-00165*	*4 - 8 ft*	*11/28/22 13:50*	*REG*	*SOIL*	*TAL*
LAP-4L-020	*LRP-4L-WP-00168*	*4 - 8 ft*	*11/28/22 13:50*	*SPL*	*SOIL*	*GEL*
LAP-4L-020	*LRP-4L-WP-00168*	*4 - 8 ft*	*11/28/22 13:50*	*SPL*	*SOIL*	*TAL*
LAP-4L-022	*LRP-4L-WP-00175*	*0 - 1 ft*	*12/12/22 8:20*	*REG*	*SOIL*	*GEL*
LAP-4L-022	*LRP-4L-WP-00175*	*0 - 1 ft*	*12/12/22 8:20*	*REG*	*SOIL*	*TAL*
LAP-4L-022	*LRP-4L-WP-00180*	*0 - 1 ft*	*12/12/22 8:20*	*SPL*	*SOIL*	*GEL*
LAP-4L-022	*LRP-4L-WP-00180*	*0 - 1 ft*	*12/12/22 8:20*	*SPL*	*SOIL*	*TAL*

Split soil samples were taken from eleven (11) locations and were analyzed by similar methods at different laboratories (General Engineering Labs (GEL) and Test America Labs (TAL)).

A comparison of analytical methods by each laboratory is provided below. None of the RPDs were > 200%.

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GEL	TAL
EPA6010D	EPA6010D
	EPA6020B
EPA7471B	EPA7470A, EPA7471B
EPA8081B	EPA8081B
EPA8082A	EPA8082A
EPA8260B	EPA8260D
EPA8270E	EPA8270E
EPA9012B	EPA9012B
HASL300	
RADA-001	EPA900.0, EPA9310
RADA-002	EPA906.0
RADA-003	EERFC-01
RADA-004	SR-03-RCMOD
RADA-005	TC-02-RCMOD
RADA-006	GA-01-RMOD
RADA-008	EPA903.0
RADA-009	EPA904.0
RADA-011	A01R
RADA-013	GA-01-RMOD
RADA-020	ST-RC-0247
RADA-022	ST-RC-0055
RADA-032	A01R
RADA-038	A01R

I.2.3.12 Summary of Data Sensitivity Evaluation

This section summarizes the results of the data sensitivity evaluation. It applies to constituents that have a high percentage of non-detects (i.e., greater than 95% non-detect) to identify if the MDL exceeds the threshold screening criteria. The review of MDLs by matrix, method, and analyte relative to the human health risk-based thresholds (RSLs for nonradiological constituents and preliminary remediation goals [PRGs] for radiological constituents) in the 0 to 1 foot soil interval is presented in tabular format in Appendix A. Non-detected results that have MDLs greater than the RSL or PRG are identified below.

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Table I.2-15. Data Sensitivity Summary

Method Code	Analyte	Total # of Non-Detects	Total # of Records	Total # of Records with MDL > RSL or PRG
EPA8081B	*TOXAPHENE*	*41*	*41*	*2*
EPA8270E	*2,6-DINITROTOLUENE*	*41*	*41*	*2*
EPA8270E	*3,3-DICHLOROBENZIDINE*	*41*	*41*	*2*
EPA8270E	*BENZO[A]PYRENE*	*33*	*41*	*8*
EPA8270E	*BIS(2-CHLOROETHYL)ETHER*	*41*	*41*	*2*
EPA8270E	*DIBENZ[AH]ANTHRACENE*	*39*	*41*	*9*
EPA8270E	*DINITRO-O-CRESOL*	*41*	*41*	*2*
EPA8270E	*HEXACHLOROBENZENE*	*41*	*41*	*9*
EPA8270E	*HEXACHLOROCYCLOPENTADIENE*	*41*	*41*	*2*
EPA8270E	*N-NITROSODIPROPYLAMINE*	*40*	*41*	*22*
EPA8270E	*PENTACHLOROPHENOL*	*41*	*41*	*20*
A01R	*NEPTUNIUM-237*	*3*	*3*	*3*
A01R	*URANIUM-235*	*3*	*3*	*3*
EPA904.0	*RADIUM-228*	*1*	*3*	*1*
APA906.0	*TRITIUM*	*1*	*1*	*1*
GA-01-RMOD	*CESIUM-137*	*1*	*1*	*1*
GA-01-RMOD	*COBALT-60*	*1*	*1*	*1*
GA-01-RMOD	*EUROPIUM-154*	*1*	*1*	*1*

I.2.4 Data Usability

The analytical data collected from L-Area Rubble Pit (131-4L) are considered useable for purposes outlined in the RFI/RI Work Plan for the Early Construction and Operational Disposal Site L-3 (NBN), L-Area Rubble Pit (131-1L), and L-Area Rubble Pit (131-4L) Operable Unit (U) (SRNS 2022). Overall, sixteen (16) environmental sample records (0.04% of total) were rejected. The rejected data were not used. Although some samples results were J-qualified (estimated results) based on poor surrogate recoveries and/or method detection blanks, the data is considered useable in the quantitative analysis for the purposes of decision making in the RI/Baseline Risk Assessment. Differences in sample results may also be attributed to sample matrix heterogeneity between sample aliquots, possible due to samples not being adequately homogenized rather than analytical uncertainty. Qualification details are found in Section 3.0, Validation Findings.

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I.2.5 References

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SRNS 2015. *Analytical Data Qualification, ER-SOP-033, Revision 6, Environmental Compliance and Area Completion Projects (EC&ACP) Geochemical Monitoring Procedure Manual;* C-3, Volume 10, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken SC

SRNS 2022. *RFI/RI Work Plan for the Early Construction and Operational Disposal Site L-3 (NBN), L-Area Rubble Pit (131-1L), and L-Area Rubble Pit (131-4L) Operable Unit (U), SRNS-RP-2021-05602,* Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC

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Table I.2-16. Comparison of MDLs for Non-Detects to Risk-Based Screening Criteria

Table of MDL > RSL or PRG at L-Area Rubble Pit (131-4L)

INTERPRETED QUALIFIERS: U or UJ Qualifiers
MATRIX CODE: Soil only
LAB GROUP COMBO: ALL
SAMPLE TYPE CODE: REG Samples ONLY
START DEPTH: 0 ft
END DEPTH: 1 ft

RECORD GROUPS	ANALYTE GROUP	CHEMICAL NAME	ANALYTICAL METHOD	RSL or PRG[1]	UNITS	MDL Min	MDL Max	# of Non-Detects	# of Results	# of MDL> RSL or PRG
Chemical	PESTICIDES	TOXAPHENE	EPA 8081B	4.90E-01	mg/kg	3.00E-02	6.30E-01	41	41	2
Chemical	SVOCs	2,6-DINITROTOLUENE	EPA 8270E	3.60E-01	mg/kg	2.60E-02	5.60E-01	41	41	2
Chemical	SVOCs	3,3-DICHLOROBENZIDINE	EPA 8270E	1.20E+00	mg/kg	8.50E-02	1.80E+00	41	41	2
Chemical	SVOCs	BENZO[A]PYRENE	EPA 8270E	1.10E-01	mg/kg	1.90E-02	4.00E-01	33	41	8
Chemical	SVOCs	BIS(2-CHLOROETHYL)ETHER	EPA 8270E	2.30E-01	mg/kg	1.60E-02	3.30E-01	41	41	2
Chemical	SVOCs	DIBENZ[AH]ANTHRACENE	EPA 8270E	1.10E-01	mg/kg	1.80E-02	3.80E-01	39	41	9
Chemical	SVOCs	DINITRO-O-CRESOL	EPA 8270E	5.10E+00	mg/kg	3.10E-01	6.60E+00	41	41	2
Chemical	SVOCs	HEXACHLOROBENZENE	EPA 8270E	2.10E-01	mg/kg	2.70E-02	5.80E-01	41	41	9
Chemical	SVOCs	HEXACHLOROCYCLOPENTADIENE	EPA 8270E	1.80E+00	mg/kg	1.10E-01	2.20E+00	41	41	2
Chemical	SVOCs	N-NITROSODIPROPYLAMINE	EPA 8270E	7.80E-02	mg/kg	6.40E-02	1.40E+00	40	41	22
Chemical	SVOCs	PENTACHLOROPHENOL	EPA 8270E	1.00E+00	mg/kg	3.10E-01	6.60E+00	41	41	20
Radiochemical	ALPHA SPEC	NEPTUNIUM-237	A01R	6.50E-02	pCi/g	7.50E-02	1.54E-01	3	3	3
Radiochemical	ALPHA SPEC	URANIUM-235	A01R	4.58E-02	pCi/g	6.01E-02	6.61E-02	3	3	3
Radiochemical	BETA SPEC	RADIUM-228	EPA904.0	3.28E-02	pCi/g	5.89E-01	5.89E-01	1	3	1
Radiochemical	BETA SPEC	TRITIUM	EPA906.0	2.37E-01	pCi/g	5.21E-01	5.21E-01	1	1	1
Radiochemical	GAMMA SPEC	CESIUM-137	GA-01-RMOD	6.05E-02	pCi/g	4.72E-01	4.72E-01	1	1	1
Radiochemical	GAMMA SPEC	COBALT-60	GA-01-RMOD	3.30E-02	pCi/g	3.74E-01	3.74E-01	1	1	1
Radiochemical	GAMMA SPEC	EUROPIUM-154	GA-01-RMOD	4.73E-02	pCi/g	4.68E-01	4.68E-01	1	1	1

1 - RSL or PRG = residential regional screening level or preliminary remediation goal

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APPENDIX J

RFI/RI BORING LOGS FROM LRP 131-1L AND 131-4L

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Appendix J.1. L-Area Rubble Pit (131-1L) Boring Logs

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OSR 30-27# (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings	Start Date: 10/31/22 · Sheet 1 of 1
Well Number: LAP-1L-001 · Location: L-Area 131-1L	Drilling Subcontractor: Cascade
Logs Prepared By: Seth Dray	Driller: Brandon Griffis
Company: North Wind	Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–5		100	0-1' Sandy SILT (ML) silt w/ fine sand, some clay, moist, abundant organics, 7.5YR 3/4 1-2' same as above 2-2.5' Sandy SILT (ML) silt w/ fine sand + clay, Dry, 2.5YR 4/4 - 4/6 (red) 2.5-5' Transition to silty SAND (SM) fine-med. sand w/ silt, crumbly, 10YR 5/2	8.1ppm at 3.5' (Collect VOC's at 3.5') 3.6ppm at 5'
2	5–8		100	5-8' same as above w/ some med.-coarse sand, some clay 8-10' same as above	5.9ppm at 6.5' (Collect VOC's at 6.5')
3	8–12		100	10-12' Transition to Hard CLAY (CL) Hard dry clay w/ some V. fine sand (Kaolin) mottled color, 2.5 8/1 - 6/2 - 7/4	7.7ppm at 9.5' (Collect VOC's at 9.5')
4	12–16		100	12-16' Sandy CLAY (CL) clay w/ v. fine - fine sand, some med. sand, few pebble sized sub-rounded quartz, 7.5YR 8/1 - 7/3 16-18' same as above w/ more silt	3.4ppm at 14' (Collect VOC's at 14')
5	16–20		100	18-20' sandy silty CLAY (CL) stiff clay w/ silt + v. fine sand, mottled color 2.5YR 8/1 - 7/3 - 6/6	Collect VOC's at 17.5'

OSR 30-27# (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings	Start Date: 11/1/2022	Sheet 1 of 1
Well Number: LAP-1L-002	Location: L-Area 131-1L	Drilling Subcontractor: Cascade
Logs Prepared By: Seth Dray		Driller: Brandon Griffis
Company: North Wind		Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–4		100	0-1' Sandy SILT (ML) silt w/ fine sand some clay, organics, 7.5YR 3/4 1-2' same as above w/ less organics 2-4' Transition to silty SAND (SM) fine sand w/ silt, some med-coarse sand moist, 10YR 5/2	1.8ppm at 3.0' (collect VOC's at 3.0')
2	4–8		100	4-6' same as above w/ more med. coarse sand + some clay, crumbly 5YR 6/2-6/8 6-8' Sandy CLAY (CL) clay w/ fine-med. sand + silt, 5YR 6/2-8/1	10.4ppm at 7.0 (Collect VOC's at 7.0') 4.4ppm at 8.0'
3	8–12		100	8-12' Sandy CLAY (CL) Hard clay w/ silt + fine-med. sand, some coarse sand, few pebble sized subrounded quartz, at 11-11.5' more sand content, 2.5YR 8/1-8/2	9.1ppm at 11.5' (Collect VOC's at 11.5')
4	12–16		100	12-16' Sandy silty CLAY (CL) v. fine-fine sand in clay/silt matrix, some med-coarse sand, mottled color 2.5YR 8/1-7/6	Collect VOC's at 13.5'
5	16–20		100	16-20' Sandy silty CLAY (CL) stiff clay w/ silt + v. fine sand, mottled color 7.5YR 8/1-8/6 to 5YR 7/6	Collect VOC's at 18.5'

OSR 30-27# (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings		Start Date: 11/8/22	Sheet 1 of 1
Well Number: LAP-1L-003	Location: L-Area 131-1L	Drilling Subcontractor: Cascade	
Logs Prepared By: Seth Dray		Driller: Brandon Griffis	
Company: North Wind		Drilling Method: Roto-Sonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–4		100	0-1' Sandy clayey SILT(ML) silt w/ some clay + fine sand, organics, 7.5YR 5/4 1-4' silty SAND(SM) fine sand + silt, some clay, loose, crumbly 5YR 5/4-3/1	7.1ppm at 3.0'bgs Collect voc's at 3.5'
2	4–8		100	4-6' silty SAND(SM) fine + coarse sand w/ silt, crumbly, 5YR 6/1-6/2-6/6 6-8' silty sandy CLAY(CL) stiff clay w/ fine + coarse sand + silt, some sub rounded pebble sized quartz 5YR 6/1-6/2-6/6	25ppm at 5.0' Collect voc's at 5.0' 2.0ppm at 7.0'
3	8–12		100	8-12 clayey sandy SILT(ML) fine ~~[illegible]~~ sand in silt matrix, some clay throughout, crumbly, soft, some coarse sand + few pebble sized quartz, white 2.5Y 8/1	Collect voc's at 9.5'
4	12–16		100	12-13 same as above 13-16' sandy silty Clay(CL) Clay + silt w/ v. fine sand, at 14.5-16' mottled color 2.5YR 8/1-4/8 to 10YR 6/8	Collect voc's at 12.5'
5	16–20		100	16-20' same as above sandy silty CLAY(CL) Clay + silt w/ v. fine sand, ~~w/~~ somewhat laminated at 18-20' w/ sandy clay + sandy silt, 2.5YR 8/1-4/8 to 2.5YR 6/6 to 10YR 7/6	Collect voc's at 17.0

OSR 30-278 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings	Start Date: 11/14/22 — Sheet 1 of 1
Well Number: LAP-1L-004 — Location: L-Area 131-1L	Drilling Subcontractor: Cascade
Logs Prepared By: Seth Dray	Driller: Brandon Griffis
Company: North Wind	Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–4		100	0-1' Sandy SILT (ML) silt + fine sand, some clay, organics, 7.5YR 5/4 1-3.5' Sandy clayey SILT (ML) silt + clay w/ fine-med sand, some gravel, 5YR 5/6 3.5-4' silty SAND (SM) fine sand + silt, loose, Black 5YR 2.5/1	Collect VOC's at 3.5'
2	4–8		100	4-6' Sandy CLAY (CL) mostly stiff clay w/ some fine sand, some silt, some coarse sand 6-7' silty SAND (SM) loose fine sand + silt, some clay 5YR 5/1 7-8' Sandy CLAY (CL) stiff clay w/ fine sand + silt, some coarse sand, 5YR 5/1-5/6	Collect VOC's at 6.5'
3	8–12		100	8-12' silty clayey sand - sandy clay (SC-CL) fine + coarse sand in clay silt matrix, dense but crumbles, pockets of loose sand at 10.5', 7.5YR 6/1-5/1-6/6	Collect VOC's at 10.5'
4	12–16		106	12-14' silty CLAY (CL) soft crumbly clay w/ silt, some v. fine sand, mottle color 7.5YR 8/1-6/1-7/6 to 5YR 5/8 14-16' silty CLAY (CL) stiff clay w/ ~~fine~~ v. fine sand + lenses of silt throughout,	Collect VOC's at 14.0'
5	16–20		100	16-20' sandy silty CLAY (CL) clay + silt w/ v. fine sand, 5YR 8/1-7/4-6/1	Collect VOC's at 17.0'

OSR 30-278 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings	Start Date: 11/14/22	Sheet 1 of 1
Well Number: LAP-1L-005 / Location: L-Area 131-1L	Drilling Subcontractor: Cascade	
Logs Prepared By: Seth Dray	Driller: Brandon Griffis	
Company: North Wind	Drilling Method: Roto-Sonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–4		100	0-1' Sandy SILT (ML) mostly silt w/ fine + coarse sand, organics, 7.5YR 4/6 - 5/4 some gravel 1-3' Gravely Sands (SP) fine - med - coarse sand w/ rounded gravel + silt, loose 5YR 5/6 3-4' Sandy Clayey SILT (ML) mostly silt w/ clay + fine sand, crumbly, 7.5YR 5/6 to 2.5YR 4/6 to 2.5YR 2.5/1	Collect VOC's at 3.0
2	4–8		100	4-5 Same as above 5-8' Clayey silty SAND (SM) mostly fine sand + silt, some clay, loose but crumbly 5YR 7/1 - 6/1	Collect VOC's at 5.5'
3	8–12		100	8-12' Silty SAND (SM) mostly v. fine - fine sand, some silt, some coarse sand, loose 5YR 6/1 - 6/2 12-13' Same as above	Collect VOC's at 10.0'
4	12–16		100	13-16' Clayey SAND (SC) v. fine - fine sand in clay matrix, some silt, some coarse sand, few pebble sized quartz 5YR 5/1	Collect VOC's at 14.5'
	16–20		100	16-18.5' Same as above, v. fine to fine sand, loose sand at 17-18' 18.5-20' Sandy CLAY (CL) Clay w/ v. fine sand, some silt stringers, some fine sand lenses, 5YR 8/1 - 7/1 - 7/4	Collect VOC's at 18.5'

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Field Geologic Log

Project: L-Area Soil Borings		Start Date: 11/9/22	Sheet 1 of 1
Well Number: LAP-1L-006	Location: L-Area 131-1L	Drilling Subcontractor: Cascade	
Logs Prepared By: Seth Dray		Driller: Brandon Griffis	
Company: North Wind		Drilling Method: Roto-Sonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–4		100	0-1' Sandy Clayey SILT(ML) silt w/ some clay + some fine sand, organics, 7.5YR 5/4 1-3.5' Sandy Clayey SILT(ML) silt w/ clay + fine sand, some coarse sand 5YR 4/6 3.5-4.0' Silty SAND(SM) fine sand + silt, loose, some organics, Black 5YR 2.5/1	Collect VOC's at 3.5'
2	4–8		100	4-8' Sandy CLAY(CL) stiff clay w/ fine sand + silt, 5YR 6/1-6/2-6/6	Collect VOC's at 7.0'
3	8–12		100	8-12' silty SAND(SM) v. fine-fine sand and silt, some clay, Dense + crumbly 5YR 6/1-6/2-6/6 12-13' same as above w/ more clay content few pebble sized quartz	Collect VOC's at 13.0'
4	12–16		100	13-16' Sandy silty CLAY(CL) stiff clay w/ silt + v. fine sand, few coarse sand, somewhat laminated w/ sandy silt + silty clay GLEY 7/1-8/1 to 7.5YR 7/6	
5	16–20		100	16-20 Sandy silty Clay(CL) stiff clay w/ silt + v. fine sand, pockets of more sand content at 17.0 + 19.0', mostly 5YR 8/1 w/ streaks of 5YR 8/3	Collect VOC's at 17.0'

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Field Geologic Log

Project: L-Area Soil Borings		Start Date: 11/7/22	Sheet 1 of 1
Well Number: LAP-1L-007	Location: L-Area 131-1L	Drilling Subcontractor: Cascade	
Logs Prepared By: Seth Dray		Driller: Brandon Griffis	
Company: North Wind		Drilling Method: Roto-Sonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–4		75	0-1' Sandy SILT (ML) silt w/ fine sand some clay, organics 7.5YR 5/4 2-4' Sandy clayey SILT(ML) silt w/ clay + fine-med. sand 5YR 4/6	Collect VOC's at 3.0'
2	4–8			4-7.5' silty SAND (SM) fine sand w/ silt, some coarse sand, crumbly, 10YR 6/1-6/2 to 5YR 4/6 7.5-8.0' silty sandy CLAY (CL) stiff clay w/ fine sand + silt, some coarse sand, some subrounded pebble sized quartz 10YR 6/1-6/2 to 5YR 4/6	Collect VOC's at 5.5'
3	8–12			8-10' clayey silty sand (SM) fine sand w/ silt + some clay, some coarse sand, crumbly 10-12' silty sandy CLAY (CL) stiff clay w/ fine + coarse sand + silt 10YR 6/1-6/2 to 5YR 6/6	Collect VOC's at 9.5'
4	12–16			12-16 sandy silty CLAY (CL) stiff clay w/ silt + v. fine sand, some lenses of v. fine sand + silt, 7.5YR 8/1-7/6	Collect VOC's at 13.5'
	16–20			16-20 Clayey SILT (ML) clay + silt mix w/ v. fine sand, light + dense but crumbles, 7.5YR 8/1-6/8	Collect VOCs at 17.0'

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Field Geologic Log

Project: L-Area Soil Borings		Start Date: 11/3/2022 — Sheet 1 of 1
Well Number: LAP-1L-008	Location: L-Area 131-1L	Drilling Subcontractor: Cascade
Logs Prepared By: Seth Dray		Driller: Brandon Griffis
Company: North Wind		Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–4		100	0-1' Sandy SILT(ML) silt w/ fine sand, some clay, organics, 5YR 4/4 1-2' silty SAND(SM) fine-med. sand w/silt loose, 7.5YR 5/8 2-3.0' silty SAND(SM) fine sand w/silt, some organics, Black 5YR 2.5/1 3-4' silty SAND(SM) fine sand + silt, 10YR 3/2	collect VOC's at 3.0'
2	4–8		100	4-8' silty SAND(SM) v. fine-fine sand + silt, some coarse sand, crumbly 5YR 7/1 to 2.5YR 6/1-6/8 8-9' same as above	3.5ppm at 5.0' collect VOC's at 6.0' 7.5ppm at 7.0'
3	8–12		100	9-12' transition to silty sandy CLAY(CL) stiff clay w/ v. fine sand + silt, some coarse sand, at 11-12 crumbly silty sand zone, 5YR 8/1-7/1-7/6	collect VOC's at 9.5'
4	12–16		100	12-16' Sandy CLAY(CL) clay w/ v. fine sand + some silt, more silt content at 15.5-16', 10YR 8/1-8/2-7/1 to 2.5YR 4/8	collect VOC's at 12.5'
5	16–20		100	16-20' silty sandy CLAY(CL) clay w/ laminations of silt + v. fine sand 7.5YR 8/1-8/4 to 10YR 8/6 to 2.5YR 5/6	collect VOC's at 17.0'

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Field Geologic Log

Project: L-Area Soil Borings		Start Date: 10/31/22 Sheet 1 of 1
Well Number: LAP-1L-009	Location: L-Area 131-1L	Drilling Subcontractor: Cascade
Logs Prepared By: Seth Dray		Driller: Brandon Griffis
Company: North Wind		Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–4		100	0-1' Sandy SILT (ML) silt w/ fine sand, some clay, moist, abundant organics 7.5YR 3/4 1-2' Same as above 2-3' Sandy Clayey SILT (ML) silt w/ clay + fine sand 2.5YR 4/4	4.1 ppm at 3.0' (Collect VOC's at 3.0')
2	4–8		100	3-4' Transition to silty SAND (SM) fine to med. sand w/ silt, crumbly 10YR 5/2 4-8' Same as above w/ some coarse sand + clay 8-9' Same as above	10.1 ppm at 7.0' (Collect VOC's at 7.0')
3	8–12		100	9-12' Transition to Sandy CLAY (CL) Clay w/ fine sand, some med + coarse sand, few pebble sized subrounded quartz (Kaolin) 2.5YR 8/1 - 8/2 -	2.3 ppm at 9.0' (Collect VOC's at 9.0') 1.5 ppm at 12.0'
4	12–16		100	12-16' Sandy CLAY (CL) v. fine - fine sand in Clay matrix, some silt, some med - coarse sand, few pebble sized subrounded quartz, 2.5YR 8/1 - 7/6	2.6 ppm at 13.0' (Collect VOC's at 13.0')
	17–20				

OSR 30-27# (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings	Start Date: 11/1/2022 — Sheet 1 of 1
Well Number: LAP-1L-010 — Location: L-Area 131-1L	Drilling Subcontractor: Cascade
Logs Prepared By: Seth Dray	Driller: Brandon Griffis
Company: North Wind	Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–4	100	0-1' Sandy silt (ML) silt w/ fine sand moist, organics, 7.5YR 3/4 1-3' Clayey sand SILT (ML) silt w/ fine sand + some clay 5YR 4/4 3-4' Transition to silty SAND (SM) v. fine-fine sand + silt, some med.-coarse sand crumbly, 10YR 5/2	collect VOC's at 3.0'
2	4–8	100	4-8' Same as above 8-9' Same as above w/ more clay content some pebble sized sub-rounded quartz 9-12' Transition to sandy CLAY (CL) Hard clay w/ fine sand, some silt, some med.-coarse sand, 2.5YR 8/1-8/2	3.0ppm at 6.0' 4.2ppm at 7.0' (collect VOC's at 7.0')
3	8–12	100		5.2ppm at 9.0' (collect VOC's at 9.5') 5.5ppm at 10.0'
4	12–16	100	12-16' Silty sandy CLAY (CL) v. fine-fine sand in clay/silt matrix, some med. sand, few pebble sized sub rounded quartz 2.5YR 8/1-7/6	4.2ppm at 12.5' (collect VOC's at 12.5')

OSR 30-27# (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings	Start Date: 11/2/2022 — Sheet 1 of 1
Well Number: LAP-1L-011 — Location: L-Area 131-L	Drilling Subcontractor: Cascade
Logs Prepared By: Seth Dray	Driller: Brandon Griffis
Company: North Wind	Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–4		100	0-1' Sandy SILT(ML) silt w/ fine sand + some clay, organics 7.5YR 5/2 1-3' Sandy Clayey SILT(ML) silt w/ clay + fine sand, some course sand 5YR 5/4 3-3.5' silty SAND(SM) fine - med. sand w/ silt, loose - crumbly, Black 5YR 2.5/1	Sample VOC's at 3.5'
2	4–8		100	3.5-4' Transition to silty SAND(SM) fine-med. sand w/ silt, loose, 10YR 5/2 4-8' same as above, some course sand, some pebble sized subrounded quartz	2.6ppm at 5.0' 3.0ppm at 6.0' (collect VOC's at 6.0')
3	8–12		100	8-12' silty sandy CLAY(CL) clay w/ v. fine - fine sand + silt, some course sand, crumbly zone w/ sand at 11-11.5' GLEY1 7/1	Collect VOC's at 11.5'
4	12–16		100	12-16' silty sandy CLAY(CL) clay w/ v. fine sand + silt, v. stiff, more silt content at 15.5-16', mottled color 10YR 8/1 - 8/2 - 7/1 to 2.5YR 4/4	Collect VOC's at 12.5'
	16–20				

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Field Geologic Log

Project: L-Area Soil Borings		Start Date: 11/2/2022 — Sheet 1 of 1
Well Number: LAP-1L-012	Location: L-Area 131-1L	Drilling Subcontractor: Cascade
Logs Prepared By: Seth Dray		Driller: Brandon Griffis
Company: North Wind		Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–4		100	0-1' Sandy SILT (ML) silt w/ fine sand, wet, organics, 7.5YR 5/2 1-3.5' silty SAND (SM) fine-med. sand + silt, wet, some organics 3.5-5' silty SAND (SM) fine-med. sand w/ silt, some clay, moist, 10YR 5/2	Collect VOC's at 3.5'
2	4–8		100	5-8' Transition to sandy CLAY (CL) Stiff clay w/ fine sand, some silt, some coarse sand, few pebble sized rounded quartz 2.5 8/1 - 4/8	1.9ppm at 6.0' (Collect VOC's at 6.0')
3	8–12		100	8-10' Same as above 10-12' Sandy silty CLAY (CL) Clay w/ silt + v. fine sand, mottled color 10YR 8/2 - 7/1 - 8/3 to 2.5YR 4/8	Collect VOC's at 10.5'
4	12–16		100	12-14.5' silty CLAY (CL) clay + silt w/ v. fine sand, mottled color 2.5YR 8/1 - 5/8 to 7.5YR 7/6 14.5-16' Sandy CLAY (CL) clay w/ v. fine sand, some clay stringers, 2.5YR 8/1	Collect VOC's at 14.5'
	16–20				

OSR 30-278 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings	Start Date: 11/3/2022 — Sheet 1 of 1
Well Number: LAP-4L-013 — Location: L-Area 131-1L	Drilling Subcontractor: **Cascade**
Logs Prepared By: Seth Dray	Driller: Brandon Griffis
Company: **North Wind**	Drilling Method: **Roto-Sonic**

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
	0			0-1' Sandy silt(ML) silty w/ fine sand moist, organics, 7.5YR 5/3	
	1				
	2		75	2.0-3.5' Sandy SILT(ML) silt w/ fine-med. sand, some clay 5YR 4/6	
	3			3.5-4.0' silty SAND(SM) fine sand w/ silt loose, moist, organics, Black 5YR 2.5/1	Collect VOC's at 3.5'
	4			4.0-8.0' silty SAND(SM) fine - med. sand w/ silt, some coarse sand, some clay at 7-8', crumbly, 10YR 6/3	
	5				
	6				Collect VOC's at 7.0'
	7			8-9.5' same as above	
	8			9.5-12' sandy CLAY(CL) stiff clay w/ fine sand, some silt, some coarse sand throughout (sub rounded) 7.5YR 6/1 - 6/3 to 2.5YR 5/6	
	9				Collect VOC's at 9.5'
	10				
	1				
	12			12-16 Sandy silty CLAY(CL) Hard clay w/ v. fine sand + silt, some coarse sand, at 14-16' laminations of silt + clay w/ v. fine - fine sand, 7.5YR 7/1 - 7/3 - 8/1 to 2.5YR 5/6	
	3				Collect VOC's at 15.0'
	4				
	5				
	16				
	7				
	8				
	9				
	0				

OSR 30-278 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings		Start Date: 11/7/22	Sheet 1 of 1
Well Number: LAP-1L-014	Location: L-Area 131-1L	Drilling Subcontractor: Cascade	
Logs Prepared By: Seth Dray		Driller: Brandon Griffis	
Company: North Wind		Drilling Method: Roto-Sonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0, 1, 2, 3		100	0-1 Sandy Clayey SILT (ML) silt w/ some clay + fine-med sand, moist, organics 7.5YR 5/4 1-2.5' Sandy Clayey SILT (ML) silt w/ clay + fine-med sand 5YR 4/6 2.5-3.0' silty SAND (SM) fine-med. sand w/ silt, organics, Black 5YR 2.5/1	Collect VOC's at 2.5'
2	4, 5, 6, 7		100	3-3.5' silty SAND (SM) 7.5YR 5/2 3.5-4.0' Transition to sandy CLAY (CL) stiff clay w/ fine-med sand, some silt 7.5YR 6/2-6/3 to 5YR 4/6	Collect VOC's at 6.5'
3	8, 9, 10, 1		100	4-8' Silty SAND (SM) w/ pockets of Sandy CLAY (CL) at 4-4.5', 5-5.5' + 7.5-8.0' mostly fine sand, some coarse (subrounded) 10YR 6/1-6/3 to 5YR 5/6 8-10' Same as above silty SAND (SM) fine sand + silt, some clay, some coarse sand crumbly	Collect VOC's at 9.5'
4	12, 3, 4, 5		100	10-12' Silty Sandy CLAY (CL) stiff clay w/ fine sand, some coarse sand 5YR 7/1-7/3	Collect VOC's at 13.5'
	16, 7, 8, 9, 0			12-16' Sandy silty CLAY (CL) stiff clay w/ laminations of silty clay + sandy clay 5YR 8/1-7/1-7/8	

OSR 30-278 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings		Start Date: 11/4/22	Sheet 1 of 1
Well Number: LAP-1L-015	Location: L-Area 131-1L	Drilling Subcontractor: Cascade	
Logs Prepared By: Seth Dray		Driller: Branden Griffis	
Company: North Wind		Drilling Method: Roto-Sonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–4		100	0-1' Sandy Clayey SILT (ML) Silt w/ some clay + fine sand, organics, 7.5YR 5/4 1-3' silty SAND (SM) fine sand + silt, some coarse sand, crumbly, at 3.5-4.0' wood material w/creosote like odor	Collect voc's at 2.5' 2.5ppm at 3.5
2	4–8		100	4-8' clayey silty SAND (SM) fine sand w/ silt, some clay + some coarse sand, at 4' some wood material + creosote odor 7.5YR 6/1-6/2 to 5YR 6/6 8-9' same as above	Collect voc's at 4.5'
3	8–12		100	9-12' silty sandy CLAY (CL) stiff clay w/ fine + coarse sand + silt 5YR 8/1-7/1-6/8	Collect voc's at 10.0'
4	12–16		100	12-16' Sandy silty CLAY (CL) Hard/stiff clay + silt, v. fine sand, mottled color, 5YR 8/1-7/6 to 2.5YR 4/6	Collect voc's at 13.0'
	17–20				

OSR 30-278 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings		Start Date: 11/10/22 — Sheet 1 of 1
Well Number: LAP-1L-016	Location: L-Area 131-1L	Drilling Subcontractor: Cascade
Logs Prepared By: Seth Dray		Driller: Brandon Griffis
Company: North Wind		Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–4		100	0-1' silty sandy SILT(ML) silt w/ fine sand + organics 7.5YR 5/4 1-4' Sandy Silty CLAY(CL) clay + silt w/ fine - med sand, organics, 5YR 4/6	Collect VOC's at 3.5'
2	4–8		100	4-6' Clayey silty SAND(SM) fine + coarse sand w/ silt + clay, crumbly 6-7' Sandy CLAY(CL) stiff clay w/ fine + coarse sand, 5YR 6/2 - 6/6 7-8' Silty SAND(SM) fine sand + silt, crumbly, some coarse sand, few pebble sized quartz, 5YR 5/2	Collect VOC's at 7.5'
3	8–12		100	8-12' Same as above, some clay content at 11-12'	Collect VOC's at 10.0'
4	12–16		100	12-16' Sandy silty CLAY(CL) mostly clay + silt w/ v. fine sand, Hard + Dense, laminated sandy clay + silt 5YR 8/1 - 7/1 - 7/5 - 6/5	Collect VOC's at 14.0'
	16–20				

OSR 30-278 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings		Start Date: 11/14/22 — Sheet 1 of 1
Well Number: LAP-1L-017	Location: L-Area 131-1L	Drilling Subcontractor: Cascade
Logs Prepared By: Seth Dray		Driller: Braden Griffis
Company: North Wind		Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0, 1, 2, 3, 4		100	0-1' Sandy SILT(ML) Silt w/ fine Sand, some clay, organics, 7.5YR 5/4 1-3.5' Clayey Sandy SILT(ML) fine-med Sand w/ silt + some Clay, 5YR 4/6 3.5-4' silty SAND(SM) fine Sand + Silt, organics, Black 5YR 2.5/1	Collect VOC's at 5.5'
2	5, 6, 7, 8		100	4-5' Same as above 5-8' silty SAND(SM) fine Sand + Silt, crumbly, some med-coarse Sand, 5YR5/2-5/4	Collect VOC's at 6.5'
3	9, 10, 1, 12		100	8-10' Same as above 10-12' silty Sandy CLAY(CL) Clay w/ fine + coarse Sand + Silt, few pebble sized quartz 5YR 5/2 - 6/6	Collect VOC's at 11.0'
4	3, 4, 5, 16		100	12-13.5 Same as above, more silt content at 13.0-13.5', crumbly 13.5-16.0' sandy silty CLAY(CL) stiff Clay + silt w/ v. fine Sand, Dense, Stringers of Clay throughout, ~~$~~ 2.5YR 8/1-8/3 to 5YR 7/4	Collect VOC's at 13.5'
	7, 8, 9, 0				

OSR 30-278 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings		Start Date: 11/9/22	Sheet 1 of 1
Well Number: LAP-1L-018	Location: L-Area 131-1L	Drilling Subcontractor: Cascade	
Logs Prepared By: Seth Dray		Driller: Brandon Griffis	
Company: North Wind		Drilling Method: Roto-Sonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–4		100	0-1' Sandy SILT(ML) silt w/ fine sand + organics 7.5YR 5/4 1-3.5' Sandy silty CLAY(CL) clay + silt w/ fine sand, some cobbles 5YR 4/6 3.5-4.0' Silty SAND(SM) fine sand w/ silt some organics, crumbly 5YR 4/2 - 2.5/1	Collect VOC's at 3.5'
2	4–8		100	4-6' Same as above 6-7' sandy CLAY(CL) stiff clay w/ fine + coarse sand, some silt, 5YR 6/2 - 6/6 7-8' silty SAND(SM) fine sand + silt, loose + crumbly, some clay, some coarse sand 5YR 6/2 - 10YR 5/3	Collect VOC's at 7.5'
3	8–12		100	8-9.5' Same as above 9.5-12' Interbedded sandy silt + sandy clay, alternating bands of fine sand + silt, w/ clay, some coarse sand, few pebble sized quartz, dense + crumbly in silty zones 5YR 6/1	Collect VOC's at 9.5'
4	12–16		100	12-13' Same as above 13-16' Sandy silty CLAY(CL) mostly clay + silt w/ v. fine sand. Hard, laminated clay + silt at 15-16' 5YR 6/1 - 7/1 - 4/6 - 6/6	Collect VOC's at 13.0'
	17–20				

OSR 30-27# (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings		Start Date: 11/14/22	Sheet 1 of 1
Well Number: LAP-1L-019	Location: L-Area 131-1L	Drilling Subcontractor: Cascade	
Logs Prepared By: Seth Dray		Driller: Brandon Griffis	
Company: North Wind		Drilling Method: Roto-Sonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–4		100	0-1' Sandy SILT (ML) mostly silt w/ fine sand; some clay + organics, 7.5YR 5/4 1-3.5' clayey sandy SILT (ML) silt w/ fine-med. sand + some clay 5YR 4/6 3.5'-4.0' Silty SAND (SM) fine sand + silt, organics, Black 5YR 2.5/1	Collect VOC's at 3.5'
2	4–8		100	4-8' Silty SAND (SM) fine sand + silt some clay, some coarse sand, crumbly 5YR 5/2 - 5/4 8-9.5 Same as above	Collect VOC's at 6.0'
3	8–12		100	9.5-12' Silty sandy CLAY (CL) stiff clay w/ fine + coarse sand + silt, laminated at 11-12' w/ sandy clay + silt 5YR 6/1 - 5/2 - 7/6	Collect VOC's at 9.5'
4	12–16		100	12-16' Sandy silty CLAY (CL) stiff clay w/ silt + v. fine sand, laminated w/ clay, v. fine sand w/ clay + silt, 2.5YR 8/1 - 8/3 - 7/6 to 5YR 7/4	Collect VOC's at 13.0'
	16–20				

OSR 30-278 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings		Start Date: 11/14/22	Sheet 1 of 1
Well Number: LAP-1L-020	Location: L-Area 131-1L	Drilling Subcontractor: Cascade	
Logs Prepared By: Seth Dray		Driller: Brandon Griffis	
Company: North Wind		Drilling Method: Roto-Sonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–4		100	0-1' Sandy SILT(ML) mostly silt w/ fine sand, organics 7.5YR 5/4 1-2' silty SAND (SM) fine-med-coarse sand + silt, loose 5YR 4/6 2-4' silty sand (SM) fine sand + silt, some clay, 10YR 4/4 - 2/1	Collect VOC's at 3.0'
2	4–8		100	4-4.5 same as above 4.5-7' silty sand (SM) v.fine - fine sand and silt, some clay, crumbly 7-8' sandy CLAY (CL) clay w/ fine + coarse sand, + silt 2.5YR 4/1 - 7.5YR 6/1	collect VOC's at 6.0
3	8–12		100	8-9' Same as above 9-11' Silty SAND(SM) mostly fine sand + silt, loose, some pebble sized quartz 7.5YR 6/1 11-12' sandy silty CLAY(CL) stiff clay w/ silt + fine sand, some coarse sand 7.5YR 6/1	Collect VOC's at 10.0'
4	12–16		100	12-13.5' clayey silty SAND(SM) fine sand w/ silt, some clay, crumbly, some coarse sand 7.5YR 6/1 - 5/1 13.5-16' sandy silty CLAY(CL) mostly clay + silt w/ fine + coarse sand, ~~some~~ few pebble size quartz, 7.5YR 5/1 - 4/2	Collect VOC's at 13.5
	17–20				

OSR 30-278 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings	Location:	Start Date: 11/14/22	Sheet 1 of 1
Well Number: LAP-1L-021	L-Area 131-1L	Drilling Subcontractor: Cascade	
Logs Prepared By: Seth Dray		Driller: Brandon Griffis	
Company: North Wind		Drilling Method: Roto-Sonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–4		100	0-1' Sandy SILT(ML) mostly silt w/ fine-med sand, organics, at .5-1' some rounded gravel 1-3.5' silty SAND(SM) fine sand + silt, some pebble + gravel sized quartz, little clay 5YR 4/6 3.5-4' silty SAND(SM) fine sand + silt organics, crumbly Black 5YR 2.5/1	collect VOC's at 3.5'
2	4–8		100	4-5' sandy clay(CL) clay w/ fine sand 5-7' silty SAND(SM) v.fine - fine sand w/ silt, crumbly 2.5YR 4/1 7-8' sandy CLAY (CL) stiff clay w/ fine + coarse sand, 2.5YR 4/1	collect VOC's at 6.5'
3	8–12		100	8-8.5' same as above 8.5-11' silty SAND(SM) mostly fine sand + silt, some coarse sand, crumbly 2.5YR 4/1	collect VOC's at 10.0'
4	12–16		100	11-12' Sandy CLAY(CL) stiff clay w/ fine sand, some coarse sand + silt 2.5YR 4/1 12-14' same as above, more silt, crumbly 14-16' silty CLAY(CL) stiff clay w/ silt, some v.fine sand, laminated 2.5YR 8/1 - 8/3 - 7/6 to 5YR 7/4	Collect VOC's at 14.5'
	17–20				

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Appendix J.2. L-Area Rubble Pit (131-4L) Boring Logs

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OSR 30-278 (3-12-97)

Field Geologic Log

Project: L-Area Soil Borings	Start Date: 1-12-23 — Sheet 1 of 1
Well Number: LAP-4L-001 — Location: L-Area 131-4L	Drilling Subcontractor: Cascade
Logs Prepared By: ~~Seth Gray~~ Matt Malin (1/12/23 MM)	Driller: Branden Griffis
Company: North Wind	Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1		100	0.0-1.0 5YR 5/8 (yellowish red) f.gr sandy SILT (ML)	
2	1–4		100	1.0-4.0 5YR 6/6 (reddish yellow) f gr tr m gr silty SAND (SM)	VOC @ 3.0 PID: 0.1
3	4–8		100	4.0-6.5 7.5YR 7/3 (pink) f/m gr silty SAND (SM) 6.5-7.0 5YR 6/6 (reddish yellow) f/m gr clayey sandy SILT (~~SM~~ ML) 7.0-8.0 2.5YR 7/2 (pale red) f gr. sandy SILT (ML)	VOC @ 6.5.0 PID = 0.0
4	8–12		100	8.0-11.0 2.5YR 7/2 (pale red) f/m gr sandy clayey SILT (ML) micaceous 11.0-12.0 10YR 6/6 (yellowish brown) f/m gr, tr c gr sandy silty CLAY (CL) w/occ subrnd gravel to 1".	VOC @ 11.0 PID = 0.1
5	12–16		100	12.0-12.5 10YR 7/4 (v. pale brown) f. gr. sandy clayey SILT (ML) 12.5-13.0 10R 5/2-5/3 (weak red) vf. gr. sandy CLAY (CL) dense 13.0-14.0 2.5YR 6/6 (light red) f. gr. sandy clayey SILT (ML) micaceous	VOC ~ 0.0 PID ~ 0.0
	16–20			14.0-15.5 10R 5/6 (red) v. stiff dense CLAY (CL) 15.5-16.0 10YR 7/2 (lt. gray) v. stiff dense CLAY (CL)	

OSR 30-278 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings		Start Date: 12/14/22	Sheet 1 of 1
Well Number: LAP-4L-002	Location: L-Area 131-4L	Drilling Subcontractor: Cascade	
Logs Prepared By: ~~Seth Dray~~ Matt Malin		Driller: Branden Griffis	
Company: North Wind		Drilling Method: Roto-Sonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1		100	0.0-1.0 5YR 5/6 (yellowish red) f. gr. silty SAND (SM)	
2	1–4		100	1.0-4.0 5YR 5/8 (yellowish red) f.-m. gr. tr. c-gr. silty SAND (SM)	VOC @ 3.0' PID = 0.0
3	4–8		100	4.0-8.0 5YR 6/6 (reddish yellow) vf-f gr. sandy SILT w/ mica throughout (ML)	VOC @ 7.0 PID = 0.0
4	8–12		100	8.0-10.0 7.5YR 6/4 (light brown) vf-f. gr. sandy SILT (ML)/silty SAND (SM) w/mica 10.0-12.0 7.5YR 5/6 (strong brown) f-m gr. sandy clayey SILT w/subang-subrnd qtz gravel to 2"	VOC @ 10.0 PID = 0.0
5	12–16		100	12.0-13.0 7.5YR 5/6 (strong brown) f. gr. sandy clayey SILT (ML) 13.0-15.0 5YR 5/8 (yellowish red) dense CLAY 15.0-16.0 5YR 7/2 (pinkish gray) silty CLAY - dense, dry.	VOC @ 13.0' PID = 0.0

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Field Geologic Log

Project: L-Area Soil Borings	Start Date: 1-12-23 Sheet 1 of 1
Well Number: LAP-4L-003 Location: L-Area 131-4L	Drilling Subcontractor: Cascade
Logs Prepared By: ~~Seth Bray~~ 1/16/25 Matt Malin	Driller: Branden Griffis
Company: North Wind	Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1		100	0.0-1.0 5YR 6/4 (lt. reddish brown) f/m gr. silty SAND (SM)	
2	1–4		100	1.0-2.0 10YR 7/6 (yellow) f/m gr. silty SAND (SM) w/ occ subrnd pebbles 2.0-3.5 5YR 6/6-6/8 reddish yellow f/m gr. sandy clayey SILT w/ tr. c gr. sand, tr. subrnd cobble to 2" (ML) 3.5-4.0 10YR 8/1 (white) silty CLAY (CL)	VOC @ 3.0 PID = 0.1
3	4–8		100	4.0-5.5 10YR 7/4 (v. pale brown) vf-f gr. sandy SILT (ML) micaceous 5.5-8.0 5YR 7/2 (pinkish gray) vf. gr. sandy SILT (ML) micaceous	VOC @ 6.0 PID = 0.1
4	8–12		100	8.0-8.5 5YR 5/8 (yellowish red) vf. gr. sandy SILT (ML) micaceous 8.5-11.5 10YR 6/6 (brownish yellow) f-m gr. sandy clayey SILT (ML) w/ occ subrnd cobble to 1.5" root zone @ 10.5' 11.5-12.0 2.5YR 5/8 (red) f. gr. sandy CLAY (CL) dense	VOC @ 11.0 PID = 0.1
5	12–16		100	12.0-13.0 2.5YR 5/8 (red) f. gr. sandy CLAY (CL) dense, micaceous 13.0-14.0 2.5YR 5/8, 8/1 (red-white) f. gr. sandy CLAY (CL) dense, micaceous 14.0-16.0 10YR 7/3-7/4 (v. pale brown) vf-f gr. silty sandy CLAY (CL)	VOC = 14.5 PID = 0.1
	17–20				

OSR 30-27# (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings		Start Date: 12/7/22	Sheet 1 of 1
Well Number: LAP-4L-004	Location: L-Area 131-4L	Drilling Subcontractor: Cascade	
Logs Prepared By: Seth Dray		Driller: Jimmy Hill	
Company: North Wind		Drilling Method: Roto-Sonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1		100	0.0-1.0 5YR 6/6 (reddish yellow) f. gr. sandy SILT (ML) w/ pods of Kaolin clay.	
2	1–4		100	1.0-3.0 2.5YR 6/6 (light red) f. gr. sandy SILT (ML) w/ subrnd. pebbles-trace 3.0-4.0 7.5YR 7/6 (reddish yellow) f. gr. sandy clayey SILT (ML)	VOC @ 3.0'
3	4–8		100	4.0-5.0 10YR 7/3 (v. pale brown) vf-f gr. sandy SILT (ML) 5.0-8.0 7.5YR 7/3 (pink) vf-f gr. sandy tr. clay SILT (ML), micaceous 6.5-8.0	VOC @ 6.0'
4	8–12		100	8.0-8.5 7.5YR 7/3 (pink) vf-f gr. sandy tr. clay SILT (ML) tr. mica 8.5-11.0 10YR 7/4-7/6 (v. pale brown-yellow) f. gr. sandy tr. clay SILT w/ rounded pebbles at base to 2" (ML) 11.0-12.0 5YR 7/3 (pink) f. gr. sandy silty (CL) CLAY - moderately dense	VOC @ 10.5'
5	12–16		100	12.0-16.0 5YR 7/3 v.f-f gr. sandy SILT, (ML) tr. clay, tr. mica. more clay content in bottom 1.0' (15.0-16.0).	VOC @ 14.0'
	16–20				

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Field Geologic Log

Project: L-Area Soil Borings		Start Date: 12/6/22	Sheet 1 of 1
Well Number: LAP-4L-005	Location: L-Area 131-4L	Drilling Subcontractor: Cascade	
Logs Prepared By: Seth Dray		Driller: Jimmy Hall	
Company: North Wind		Drilling Method: Roto-Sonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1		100	0.0-1.0 10YR 6/4 lt. yellowish brown f. gr. silty SAND (SM)	
2	1–4		100	1.0-3.0 2.5YR 4/6 red. f-med. gr. sandy SILT (ML) w/tr. clay. 3.0-4.0 10YR 7/6 (yellow) f-med. gr. sandy SILT (ML) w/tr. clay.	VOC @ 3.0'
3	4–8		100	4.0-5.5 2.5YR 6/4 (lt. reddish brown) f. gr. sandy SILT (ML) 5.5-8.0 2.5YR 7/3 (lt. reddish brown) f. gr. sandy clayey SILT (ML) w/tr. of mica	VOC @ 6.0'
4	8–12		100	8.0-9.5 2.5YR 6/6 (light red) f. gr. silty clayey SAND (SM) SM 9.5-11.0 10YR 6/6 (yellowish brn) f. gr. silty clayey SAND (SM) 11.0-12.0 5YR 7/3 (pink) silty CLAY (CL) w/tr. micas	VOC @ 10.0'
5	12–16		100	12.0-13.0 5YR 7/3 (pink) silty CLAY w/tr. mica (CL) 13.0-15.0 2.5YR 6/3-6/4 (light reddish brown) f-med. gr. silty sandy CLAY (CL) w/trace mica 15.0-16.0 2.5YR 7/1 and 7/3 lt. reddish gray-lt. reddish red silty CLAY (CL)	VOC's at 14.0'
	17–20				

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Field Geologic Log

Project: L-Area Soil Borings		Start Date: 12/6/22	Sheet 1 of 1
Well Number: LAP-4L-006	Location: L-Area 131-4L	Drilling Subcontractor: Cascade	
Logs Prepared By: Seth Dray		Driller: Jimmy Hall	
Company: North Wind		Drilling Method: Roto-Sonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1		100	0.0-1.0 5YR 6/6 (reddish yellow), f. gr. sandy, clayey SILT (ML) w/trace rounded pebbles.	
2	1–4		100	1.0-4.0 2.5YR 5/6 (red) f.gr. sandy clayey SILT (ML)	VOC @ 3.0'
3	4–8		100	4.0-5.0 2.5YR 6/6 (light red) f.gr. clayey sandy SILT (ML)/f.gr. sandy silty CLAY (CL) 5.0-8.0 10YR 6/6 (brownish yellow) f.-med-coarse gr. sandy silty CLAY (subangular) with subrnd. gravel to cobble to 2"+	VOC @ 5.0
4	8–12		100	8.0-10.0 10YR 7/6 (yellow) f.gr. silty sandy CLAY (CL) w/micaceous layers 10.0-10.5 10R 5/6 (red) silty CLAY (CL) micaceous 10.5-11.5 10R 5/6 (red) f.gr. sandy clayey SILT (ML) 11.5-12.0 10R 4/2 (weak red) dense CLAY (CL)	VOC @ 11.0'
5	12–16		100	12.0-13.0 10R 6/2 (pale red) dense silty CLAY (CL) 12.0-13.0 10R 8/2-7/2 (pinkish white to pale red) dense silty CLAY (CL) 13.0-15.0 10R 6/2-6/3 (weak red) dense silty CLAY (CL) 15.0-16.0 10R 5/2 (weak red) dense CLAY (CL)	VOC @ 14.0
	16–20				

OSR 30-278 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings	Start Date: 12-5-22 / Sheet 1 of 3
Well Number: LAP-4L-007 / Location: L-Area 131-4L	Drilling Subcontractor: Cascade
Logs Prepared By: Seth Dray	Driller: Jimmy Hall
Company: North Wind	Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1		100	0.0-0.1 f.gr. sandy clayey SILT (ML) w/ trace rounded pebbles. 5YR 5/6 (yellowish red).	
2	1–4		100	1.0-3.0 f.gr. clayey sandy SILT (ML) 5YR 5/6 (reddish yellow 3.0-4.0 dense clay (CL) 5YR 5/6 (reddish yellow) and 2.5YR 3/4 (dark reddish brown)	VOC at 3.0' PID - 0.0
3	4–8		100	4.0-5.0 dense silty CLAY (CL) 10YR 6/6 5.0-8.0 dense silty CLAY (CL) 5YR 5/4 and 5YR 8/1 (reddish brown & white) layered "tiger stripe"	VOC @ 6.5' PID = 0.0
4	8–12		100	8.0-9.0 dense silty CLAY (CL) 10YR 6/6 (yellowish brown) 9.0-12.0 dense silty CLAY (CL) 5Y 3/1 (very dark gray)	VOC @ 11.0' PID = 0.0
5	12–16		100	12.0-15.0 dense clay (CL) 10R 3/1 + 10R 8/1 (dark reddish gray + white) 15.0-16.0 dense f.gr. sandy CLAY (CL) 10R 3/1 + 10R 8/1 (dark reddish gray + white).	VOC @ 13.0' PID = 0.0
6	16–20		100	16.0-18.0 10R 8/1 (white) soft, silty CLAY (CL) 18.0-19.0 dense CLAY (CL) 10R 8/1 (white) 19.0-20.0 silty CLAY - soft-med. 10R 3/1 dark reddish gray	

OSR 30-27# (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings		Start Date: 12-5-22	Sheet 2 of 3
Well Number: LAP-4L-007	Location: L-Area 131-4L	Drilling Subcontractor: Cascade	
Logs Prepared By: Seth Dray		Driller: Jimmy Hall	
Company: North Wind		Drilling Method: Roto-Sonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
	20			20.0-21.5 f.gr. sandy CLAY w/ some coarse grain 10R 3/1 (dk reddish gray)	
	1			21.5-24.0 f.gr. sandy CLAY 10R 5/1-5/2 (reddish gray - weak red)	
	2				
	3				
7	4			24.0-25.0 f.gr. silty clayey SAND (SA) 10R 5/2 weak red	
	25		100	25.0-30.0 f.gr. silty clayey SAND (SA) 10R 6/4 (pale red) w/ some 10YR 6/6 (brownish yellow, silty, clayey SAND	
	6				
	7				
	8				
	9				
	30			30.0-31.0 f. gr. silty clayey SAND (SA) 10R 6/4 (pale red)	
	1			31.0-33.0 f. gr. sand. CLAY (CL) 10R 6/1 (reddish gray)	
	2				
	3			33.0-36.0 dense CLAY (OL) 10R 4/1 (reddish gray)	
8	4				
	35		100		
	6			36.0-40' dense CLAY (CL) 7.5R 8/1-8/2 (white to light pink) tr f.gr. sand tr mica.	
	7				
	8				
	9				
	40				

OSR 30-27# (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings	Start Date: 12/5/22 — Sheet 3 of 3
Well Number: LAF-4L-607 — Location: L-Area 131-4L	Drilling Subcontractor: Cascade
Logs Prepared By: Seth Dray	Driller: J. Hall Jr.
Company: North Wind	Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
	4 0			40.0-43.5 7.5YR 8/1-8/2 f. gr. sandy CLAY (CC) white-pinkish white	
	1				
	2				
9	3			43.5-46.0 2.5Y 8/1 f-m gr. clayey SAND (SC) w/ tr. mica white to pale brown (2.5Y 8/1-8/2)	
	4				
	4 5		100		
	6			46.0-50.0 2.5Y 8/3-8/1 (pale brown to white) f. gr. silty clayey SAND	
	7				
	8				
	9				
	5 0				
	1				
	2				
	3				
	4				
	5				
	6				
	7				
	8				
	9				
	0				

OSR 30-278 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings		Start Date: 12/5/22	Sheet 1 of 1
Well Number: LAP-4L-008	Location: L-Area 131-4L	Drilling Subcontractor: Cascade	
Logs Prepared By: Seth Dray		Driller: Jimmy Hall	
Company: North Wind		Drilling Method: Roto-Sonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1		100	0-1' Sandy SILT (ML), trace clay 2.5YR 4/8-5/8 - red	PID ~ 0.1
2	1–4		100	1-4 f.gr. sandy SILT (ML) to clayey f.gr. sandy SILT (ML) w/tr. rounded pebble to cobble to 2" 2.5YR 4/8 (red)	Collect VOCs @ 3.0' PID = 0.0
3	4–8		100	4-8' f.gr. sandy SILT (ML) to f.gr. silty SAND (SM) w/occasional rounded pebble to cobbles. (4.0-5.0) 2.5Y 4/8 - red. 5.0-8.0 dense CLAY (CL) 2.5 YR 5/8 (red) and 2.5 YR 8/1 (white), v. stiff	collect VOC @ 5.0' PID = 0.0
4	8–12		100	8.0-10.0 f.gr. silty sandy CLAY (CL), med. dense, and friable/crumbly. 2.5 YR 5/8 (red) 10.0-12.0 dense clay (CL) 2.5 YR 3/1 and 2.5 YR 8/1 (dark reddish gray & white), v. stiff	collect VOC @ 9.5' PID: 0.0
5	12–16		100	12.0-14.0 dense CLAY (CL) / silty clay w/trace mica 10R 3/1 & 10R 8/1 (dark reddish gray & white). 14.0-16.0 dense CLAY (CL) v. stiff 10R 4/6-4/8 (red) and 10R 8/1 (white)	collect VOC at 14.0' PID ~ 0.0
	16–20				

OSR 30-27# (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings		Start Date: 11/21/22 / Sheet 1 of 1
Well Number: LAP-4L-009	Location: L-Area 131-4L	Drilling Subcontractor: Cascade
Logs Prepared By: Seth Dray		Driller: Brandon Griffis
Company: North Wind		Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–4			0-1' Sandy SILT (ML) silt, w/ fine-med -coarse sand, some gravel 2.5YR 6/8-5/8 1-4' Silty Gravel (GM) to silty CLAY (CL) mostly silt + clay w/ gravel + med. sand, 3.5-4 silty clay, 2.5YR 4/8 to 5YR 4/4	Collect VOC's at 3.5'
2	4–8			4-8' Clayey sandy SILT (ML) mostly silt w/ fine-med sand, some lenses of clay w/ fine + coarse sand, crumbly, few rounded gravel, 2.5YR 5/8 to 7.5YR 7/6	2.1 ppm at 6.5' Collect VOC's at 6.0'
3	8–12			8-11' Same as above 11-12' CLAY (CH) stiff clay, high plasticity, little silt, ~~laminated~~ mottled color 7.5R 4/6 - 4/2 - 8/1 - 5/8	Collect VOC's at 11.0'
4	12–16			12-16' Same as above, some silt lenses w/ small amount of v. fine sand, mottled color of 7.5R 8/1 - 4/6 - 4/2 - 5/8 - 3/2 silt lenses are 5YR 5/4 to 7.5R 3/2	Collect VOC's at 14.0'
	17–20				

OSR 30-278 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings	Start Date: 1-10-23 — Sheet 1 of 1
Well Number: LAP-4L-010 — Location: 131-4L-L-Area	Drilling Subcontractor: Cascade
Logs Prepared By: ~~Seth Dray~~ 1/10/23 Matt Malin	Driller: Branden Griffis
Company: North Wind	Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1		100	0.0-1.0 5YR 6/8 (reddish yellow) f. gr. sandy clayey SILT (ML)	VOC @ 2.5' PID=0.0
2	1–4		100	1.0-3.0 5YR 6/6 (reddish yellow) f gr. tr. m gr. sandy clayey SILT (ML) w/occ rounded gravel 3.0-4.0 7.5YR 6/6 (reddish yellow) f gr. tr. m gr. sandy clayey SILT (ML) w/occ rnd gravel micaceous	
3	4–8		100	4.0-7.0 5YR 5/6 (yellowish red) f. gr. sandy clayey SILT (ML) w/occ sub rnd. gravel, micaceous 7.0-8.0 5YR 5/3 (reddish brown) f. gr. sandy SILT (ML) tr. clay, micaceous	VOC @ 7.0 PID=0.0
4	8–12		100	8.0-10.0 5YR 5/8 (yellowish red) f/m/c gr. sandy clayey SILT (ML) w/occ sub.rnd gravel 10.0-12.0 5YR 5/6 (yellowish red) f gr. tr m gr. sandy SILT (ML) tr. clay.	VOC @ 10.5 PID=0.0
5	12–16		100	12.0-15.0 5YR 5/8 (yellowish red) f/m gr. sandy clayey SILT (ML) trc gravel. 15.0-16.0 5YR 5/8 (yellowish red) f/m gr. clayey sandy SILT (ML)	
	16–20				

OSR 30-27# (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings		Start Date: 12/19/22 — Sheet 1 of 1
Well Number: LAP-4L-011	Location: 131-4L, L-Area	Drilling Subcontractor: Cascade
Logs Prepared By: ~~Seth Dray~~ 12/19/22 Matt Martin		Driller: Branden Griffis
Company: North Wind		Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1		100	0.0-1.0 7.5YR 5/6 (strong brown) f. gr. sandy SILT (ML) w/occ. rounded gravel to 2", and organic material	
2	1–4		100	1.0-3.0 7.5YR 5/6 (strong brown) f. gr. sandy clayey SILT (ML) w/subround-round gravel 3.0-3.5 7.5YR 5/1 (gray) f. gr. silty sand (SM) ~~w/~~ pulverized concrete to 3" cobbles	VOC @ 2.5 PID = 0.0
3	4–8		100	3.5-4.0 GLEY 1 8/1 (white) pulverized concrete w/concrete rubble 4.0-6.5 GLEY 1 8/1 (white) f. gr. silty SAND (SM) pulverized concrete & concrete rubble to 3.5" 6.5-7.0 7.5YR 5/1 (gray) f. gr. silty SAND (SM) w/brick frags. 7.0-8.0 2.5YR 5/6 (red) f-m-coarse gr. sandy, clayey SILT (ML) poorly sorted, subang-subrnd.	VOC @ 7.0 PID = 0.0
4	8–12		100	8.0-11.0 2.5YR 5/6 (red) f-m gr. clayey sandy SILT (ML) w/some mica 11.0-12.0 2.5YR 5/6 (red) f-m-coarse gr. clayey-sandy SILT (ML) w/occ subrnd-gravel to 1.5"	VOC @ 11.0 PID = 0.0
5	12–16		100	12.0-16.0 2.5YR 6/6 f. gr. sandy clayey SILT (ML), micaceous	VOC @ 15.0 PID = 0.0
	16–20				

OSR 30-279 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings		Start Date: 12/14/22	Sheet 1 of 1
Well Number: LAP-4L-012	Location: L-Area 131-4L	Drilling Subcontractor: Cascade	
Logs Prepared By: ~~Seth Dray~~ Matt Malin (MM 12/14/22)		Driller: Branden Griffis	
Company: North Wind		Drilling Method: Roto-Sonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1		100	0.0-1.0 5YR 5/6 (yellowish red) f.gr. sandy SILT	
2	1–4		100	1.0-4.0 5YR 5/6 (yellowish red) f.gr. sandy SILT	VOC @ 3.0' PID=0.0
3	4–8		100	4.0-5.0 5YR 5/6 (yellowish red) f.gr. sandy SILT (ML), tr. clay. 5.0-8.0 5YR 6/6 (reddish yellow) f-m gr. silty SAND (SM).	VOC @ 7.0 PID=0.0
4	8–12		100	8.0-10.0 5YR 7/6 (reddish yellow) f. gr. sandy clayey SILT (ML) w/mica 10.0-12.0 5YR 7/6 (reddish yellow) f.gr. sandy SILT (ML) w/occ rounded gravel to 2", micaceous 11.0-12.0 10YR 7/6 (yellow) - 6/8 (brownish-yellow f-m gr. sandy SILT (ML) w/tr. coarse gr. sand, subang-subrd.	VOC @ 10.0 PID=0.0
5	12–16		100	12.0-13.0 10YR 7/6 (yellow) f-m gr. silty SAND (SM) w/occ qtz gravel, subrnd to 2" 13.0-14.0 10R 6/3 (pale red), v.f. gr. sandy CLAY (CL) dense, micaceous 14.0-15.0 5YR 6/6 (reddish yellow) f. gr. sandy clayey SILT (ML) tr. mica 15.0-16.0 10R 5/4 (weak red) dense CLAY (CL)	VOC @ 15.00' PID=0.0

OSR 30-278 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings	Start Date: 1-9-23 — Sheet 1 of 1
Well Number: LAF-4L-013 — Location: L-Area, 131-4L	Drilling Subcontractor: Cascade
Logs Prepared By: ~~Seth Bray~~ Matt Malin	Driller: Brendan Ellis
Company: North Wind	Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1		100	0.0-1.0 5YR 5/8 (yellowish red) f gr. tr. m gr. sandy clayey SILT (ML)	
2	1–4		100	1.0-2.5 5YR 5/6 (yellowish red) f/m gr. sandy clayey SILT (ML) 2.5-3.5 5YR 5/3 (reddish brown) f gr. tr. m gr. sandy SILT, tr. clay (ML) 3.5-4.0 5YR 5/6 (yellowish red) f gr. tr. m gr. sandy SILT, tr. clay (ML)	VOC @ 3.0' PID = 0.0
3	4–8		100	4.0-8.0 5YR 6/6 (reddish yellow) f/m gr. sandy clayey SILT (ML) w/occ subang. subrnd. gravel	VOC @ 6.5 PID = 0.0
4	8–12		100	8.0-~~10.0~~ 9.5 7.5YR 6/4 (lt brown) f gr. tr. m gr. sandy SILT (ML) tr. clay) 9.5-10.0 7.5YR 6/4 (lt brown) f gr tr m gr silty SAND (SM) 10.0-12.0 5YR 6/6 (reddish yellow) f/m gr, tr. c gr. sandy clayey SILT (SM)	VOC @ 10.0 PID = 0.0
5	12–16		100	12.0-16.0 5YR 4/4 (reddish brown) f/m, tr. c gr. sandy clayey SILT w/ streaks/of clay from 14-16' (unconnected continuous layer)	VOC @ 14.0 PID = 0.0
	16–20				

OSR 30-278 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings	Start Date: 12/13/22 — Sheet 1 of 1
Well Number: LAP-4L-014 — Location: L-Area 131-4L	Drilling Subcontractor: Cascade
Logs Prepared By: ~~Seth Dray~~ Matt Malin	Driller: Brandon Griffis
Company: North Wind	Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1		100	0.0-1.0 5YR 5/6 (yellowish red) f. gr. sandy clayey SILT (ML).	
2	1–4		100	1.0-3.0 5YR 5/6 (yellowish red) f. gr. sandy clayey SILT w/ ~~ang.~~ sub- gravel 3.0-4.0 5YR 4/3 (~~yellowish~~ reddish brown) f. gr. sandy clayey SILT (ML) w/ concrete cobbles	VOC @ 2.5' PID = 0.0
3	4–8		100	4.0-8.0 5YR 4/1 (dark gray) f. gr. silty SAND (SM) w/ concrete & brick rubble/pulverized subrounded pebbles/gravel to 2".	
4	8–12		100	8.0-10.0 5YR 4/1 (dark gray) f. gr. silty SAND (SM), & sandy SILT (ML) w/ metal debris & concrete rubble 10.0-12.0 5YR 8/1 (white) RECOVERED MATERIAL - pulverized concrete rubble w/ gravel ~~to~~ chunks to 2"+	
5	12–16		100	12.0-13.0 5YR 8/1 (white) f. gr. silty SAND (SM) concrete rubble & pulverized concrete 13.0-14.0 5YR 6/6 (reddish yellow) f. gr. silty SAND (SM) damp 14.0-16.0 5YR 6/6 (reddish yellow) f-m gr. clayey-silty SAND	VOC @ 13.5' PID = 0.0
	17–20				

OSR 30-27# (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings		Start Date: 12/8/22 / Sheet 1 of 1
Well Number: LAP-4L-15	Location: L-Area 131-4L	Drilling Subcontractor: Cascade
Logs Prepared By: Seth Dray		Driller: J. Hall Jr.
Company: North Wind		Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0		100	0.0-1.0 5YR 5/2 (reddish gray) f. gr. sandy SILT (ML)	
2	1–3		100	1.0-3.75 2.5YR 4/4 (reddish brown) dense silty CLAY (CL) w/ subangular pebbles (occ occasionally) 3.75-4.0 concrete debris - cobbles	VOC @ 3.0 PID = 0.0
3	4–7		100	4.0-8.0 - main + step out - concrete cobble, and, steel plate, rebar, metal wire debris NOT sampled	No Sample 4.0-8.0'
4	8–11		100	8.0-12.0 main + step out: concrete rubble and cobble + metal wire, debris/ waste. NOT sampled	No sample 8.0-12.0'
5	12–16		100	12.0-14.0 2.5YR 2.5/1 (reddish black/black) brick + concrete rubble, wire waste 14.0-16.0 2.5YR 5/4-6/4 (lt. reddish brown - reddish brown) f.-med-crse. gr. sandy silty CLAY subang-subrnd grains, damp 14.0-15.0, drier 15.0-16.0	VOC @ 14.0' PID = 0.0
	17				
	18				
	19				
	20				

OSR 30-27# (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings		Start Date: 12/12/22	Sheet 1 of 1
Well Number: LAP-4L-016	Location: L-Area 131-4L	Drilling Subcontractor: Cascade	
Logs Prepared By: ~~Seth Dray~~ Matt Malin (12/12/22 mm)		Driller: Branden Griffis	
Company: North Wind		Drilling Method: Roto-Sonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0, 1		70%	0.0-1.0 5YR 5/8 (yellowish red) f. gr. sandy SILT (ML) trace clay	
2	1, 2, 3, 4	[illegible]	100	1.0-2.0 5YR 5/3-5/4 (reddish brown) f.gr. sandy clayey SILT (ML) w/Crush & run stone to 3"; 2.0-2.5 2.5YR 5/6 (red) f. gr. silty SAND, tr clay (SM) 2.5-4.0 2.5YR 5/6 (red) f.gr. clayey sandy SILT (ML) w/ subang.-subrnd gravel to 2"	VOC @ 2.5 PID=0.0
3	4, 5, 6, 7, 8		100	4.0-8.0 2.5YR 5/4-5/5 (reddish brown to red) f.gr. sandy clayey SILT (ML) to sandy silty CLAY (CL), tr. mica throughout	VOC @ 6.0' PID=0.0
4	8, 9, 0, 1, 2		100	8.0-9.0 2.5YR 5/3-5/4 (reddish brown) f.gr. clayey sandy SILT (ML) 9.0-12.0 5YR 6/6 and 10YR 7/6 (reddish yellow - yellow f.gr. sandy clayey SILT and clayey sandy SILT (ML) w/tr. micas	VOC @ 10.0'
	3, 4, 5, 6, 7, 8, 9, 0				

OSR 30-274 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings	Start Date: 1-17-23 — Sheet 1 of 1
Well Number: LAP-4L-017 — Location: L-Area 131-4L	Drilling Subcontractor: Cascade
Logs Prepared By: ~~Seth Dray~~ MM 1/16/23 MATT MALIN	Driller: Brandon Griffis
Company: North Wind	Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1		100	0.0-1.0 5YR 6/4 (lt. reddish brown) f. gr. sandy clayey SILT (ML)	
2	1–4		100	1.0-3.0 5YR 6/4 (lt. reddish brown) f/m gr. sandy clayey SILT (ML) 3.0-4.0 10YR 7/4 (very pale brown) f gr. silty SAND (SM)	VOC@2.5 PID=0.0
3	4–8		100	4.0-6.0 7.5YR 6/8 (reddish yellow) f.gr. silty SAND (SM) tr. clay. 6.0-7.5 5YR 6/8 (reddish yellow) f gr. tr. m gr. clayey sandy SILT (ML) micaceous 7.5-8.0 5YR 7/4 (pink) vf/f gr. sandy SILT (ML) micaceous	VOC@6.0 PID=0.0
4	8–12		100	8.0-8.5 5YR 7/4 (pink) vf/f gr. sandy SILT (ML) micaceous 8.5-9.5 10YR 7/6 (yellow) f/m gr. some c gr. sandy clayey SILT, poorly sorted (ML) 9.5-10.0 5YR 7/4 (pink) f/m/c gr clayey sandy SILT (ML) poorly sorted 10.0-11.5 10YR 7/6-6/6 (yellow-brownish yellow) f/m/c gr. clayey sandy SILT (ML) poorly sorted w/occ subrnd gravel (2mm) 11.5-12.0 2.5YR 6/6 (light red) vf. gr. silty sandy CLAY (CL)	VOC@11.5 PID=0.0
5	12–16		100	12.0-12.5 10R 5/3 (weak red) vf gr. sandy CLAY (CL) dense 12.5-13.0 10YR 7/4 (v. pale brown) f gr. clayey silty SAND (SM) 13.0-15.5 2.5YR 4/6 + 8/1 (red + white) vf. gr sandy CLAY (CL) dense 15.5-16.0 10YR 7/6 + 8/1 (yellow + white) f gr. sandy silty CLAY (CL)	VOC@13.0 PID=0.0

OSR 30-27# (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings		Start Date: 12/13/22	Sheet: 1 of
Well Number: LAP-4L-018	Location: L-Area 131-4L	Drilling Subcontractor: Cascade	
Logs Prepared By: ~~Seth Dray~~ Matt Malin		Driller: Brandon Griffis	
Company: North Wind		Drilling Method: Roto-Sonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1		100	0.0-1.0 10YR 6/3 (pale brown) f. gr. silty SAND (SM)	
2	1–4		100	1.0-3.5 5YR 5/6 (yellowish red) f. gr. sandy clayey SILT (ML) w/org. subang. gravel, burnt/black and debris below 3.0' 3.5-4.0 5YR 2.5 (black) black and debris (concrete)	PID=0.0 VOC@2.5' waste from 3.0-4.0' bgs suspect asbestos pipe at ~3.2 (black)
3	4–8		100	4.0-5.5 2.5YR 3/4 (dk. reddish brown) pulverized concrete w/suspect asbestos pipe (4" long) 5.5-6.5 5YR 4/6 (yellowish red) f. gr. sandy SILT, (ML) w/trace clay. (reworked?) 6.5-7.0 5YR 8/1 (white) concrete rubble, pulverized concrete 7.0-8.0 10YR 4/3 (brown) f. gr. sandy SILT (ML) w/ burnt/charred debris	All waste 4.0-8.0 No sample collected.
4	8–12		62.5	8.0-9.5 10YR 3/1 (v.dk gray) f-m gr. sandy silt (ML) w/ concrete rubble and rebar. VOID - rods dropped 11.0-12.0 10YR 3/1 (v.dark gray) f-m gr. sandy SILT (ML) w/ concrete and brick rubble/cobbles	Waste - No SAMPLE COLLECTED 8-12 FT
5	12–16		100	12.0-15.0 5YR 3/1 (v.dark gray) f-m gr. silty SAND (SM) w/concrete rubble, pulverized concrete, rebar. 15.0-16.0 5YR 6/6 f-m gr. silty SAND (SM) w/10YR 6/6 clay pods/layers. damp.	VOC@15.5' PID=0.0
	17				
	18				
	19				
	20				

OSR 30-278 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings	Start Date: 1/12/23 — Sheet 1 of 1
Well Number: LAP-4L-019 — Location:	Drilling Subcontractor: Cascade
Logs Prepared By: Seth Dray	Driller:
Company: North Wind	Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1		100	0.0-1.0 5YR 6/6 (reddish yellow) f gr, tr c g sandy clayey SILT (ML)	
2	1–4		100	1.0-4.0 5YR 6/6 (reddish yellow) f/m tr. c. gr. silty SAND, (SM) tr. clay.	VOC @ 3.0 PID = 0.1
3	4–8		100	4.0-7.0 5YR 6/6 (reddish yellow) f/m gr. sandy clayey SILT (ML) micaceous 7.0-8.0 2.5YR 6/3-6/4 (lt. reddish brown) vf gr. Sandy SILT (ML) micaceous	VOC @ 7.0 PID = 0.1
4	8–12		100	8.0-8.75 2.5YR 6/4 (lt. reddish brown) f gr. sandy clayey SILT (ML) micaceous 8.75-10.5 10YR 6/6 (yellowish brown) f gr. silty (SM) SAND / sandy clayey SILT (ML) 10.5-12.0 5YR 7/4 (pink) f/m tr c gr. Sandy clayey SILT (ML) w/ lkg layers of gravel (sub rnd to 1.5") @ 11, 11.5' bgs	VOC @ 9.5 PID = 0.1
5	12–16		100	12.0-14.5 10R 5/4 (weak red) vf. gr. sandy silty CLAY (CL) micaceous, dense 14.5-16.0 10YR 7/3-7/4 (v. pale brown) vf. gr. silty sandy CLAY (CL), crumbly then dense	VOC @ 15.0 PID = 0.1
	16–20				

OSR 30-278 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings	Start Date: 11/28/22 — Sheet 1 of 1
Well Number: LAP-4L-020 — Location: L-Area 131-4L	Drilling Subcontractor: Cascade
Logs Prepared By: Seth Dray	Driller: Brandon Griffis
Company: North Wind	Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1		100	0-1' Sandy SILT (ML) silt w/ fine-med sand some coarse & pebble, crumbly 2.5YR 5/8	
2	1–4		100	1-4' Sandy SILT (ML) silt w/ fine-med sand, crumbly, some laminated silts & clay at 4-5', 10R 5/8 - 8/1 - 7.5YR 7/8	Collect VOC's at 3.0'
3	4–8		100	4-8' Silty SAND (SM) to Sandy SILT (ML) fine-med-coarse sand in silt matrix, some pebble sized rounded quartz, some mica throughout, some clay lenses 2.5YR 5/8 - 7.5YR 7/8	Collect VOC's at 7.0'
4	8–12		100	8-11' Same as above w/ clay lenses at 9 & 10.5' 11-12' Sandy SILT (ML) silt w/ v. fine sand, loose & soft but crumbly, 10R 6/8	Collect VOC's at 10.0'

OSR 30-278 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings	Start Date: 11/29/22	Sheet 1 of 1
Well Number: LAP-4L-021	Location: L-Area	Drilling Subcontractor: Cascade
Logs Prepared By: Seth Dray		Driller: Brandon Griffis
Company: North Wind		Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1		100	0-1' Sandy SILT (ML) silt w/ fine sand, some clay, organics, some pebble 2.5YR 5/8 – 7.5YR 4/3	
2	1–4		100	1-2' Gravely CLAY (CL) clay w/ pebble to cobble sized rounded to sub angular 2-2.5 Sandy SILT (ML) 2.5-3.5 crushed concrete material w/ gravel 3.5'-4.0' silt w/ gravel + some fine sand, gravel is pebble to cobble subrounded to sub angular, matrix is 7.5YR 2.5/3	Collect VOC's at 4.0'
3	4–8		100	4-8' Concrete + crush + run debris w/ rebar + brick at ~ 7.5-8'	
4	8–12		100	8-12' Silty Sandy Gravel, silt + fine-med-coarse sand w/ gravel, gravel is pebble - cobble sized crush + run, some debris (rebar + other metal)	Collect VOC's at 10.0'
5	12–16		100	12-12.5 same as above 12.5 Transition to native material (Pit bottom) Sandy silt (ML) to silty SAND (SM) fine-med-coarse sand w/ silt clay matrix, crumbly, some mica throughout, some pebble to cobble sized rounded quartz 2.5YR 5/8 – 7.5YR 7/8	Collect VOC's at 12.5'
	16–20				

OSR 30-27# (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings	Start Date: 12/12/22 — Sheet 1 of 1
Well Number: LAP-4L-022 — Location: L-Area 131-4L	Drilling Subcontractor: Cascade
Logs Prepared By: ~~Seth Dray~~ MM 12/12/22 Matt Malin	Driller: Branden Griffis
Company: North Wind	Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1		100	0.0-1.0 Organic layer 0.0-0.25, then 10R 5/6 (red) f.gr. sandy clayey SILT (ML)	
2	1–4		100	1.0-3.0 2.5YR 5/4 (reddish brown) f.gr. sandy clayey SILT (ML) / silty clayey SAND (SM) w/ occ. subangular gravel/cobble to 2". 3.0-4.0 2.5YR 5/8 (red) f.gr. clayey sandy SILT (ML)	VOC @ 3.0 PID = 0.1
3	4–8		100	4.0-6.0 2.5YR 5/4 (reddish brown) f.gr. sandy clayey SILT (ML) 6.0-7.0 2.5YR 5/6 (red) f.gr. clayey/sandy SILT (ML) w/ concrete rubble to 4" and wire (waste) 7.0-8.0 GLEY 1 8/1 (white) concrete rubble to 3" and pulverized concrete -	VOC @ 5.0' PID = 0.0
4	8–12		100	8.0-10.0 5YR 8/1 - concrete debris + cobbles to 4" + 5YR 7/2 sand w/ mottle yellow brittle in stepout 10.0-11.0 5YR 5/4 (reddish brown) f.gr. clayey sandy SILT (ML) w/ subrnd-subang gravel to 1.5" - avec mulch 11.0-12.0 5YR 3/1-3/2 (dark reddish brown) charcoal(?) ~ gravel/pebbles.	VOC @ 10.5' PID = 0.0
5	12–16		100	12.0-13.5 5YR 5/6 (yellowish red) f.gr. Sandy SILT (ML) wet/damp w/ subangular ~~pebble~~ gravel and concrete cobble to 4" 13.5-14.5 5YR 3/2 dark reddish brown f.gr. silty SAND (SM) 14.5-15 7.5YR 5/6 + 8/1 (strong brown + white) silty CLAY, w/mica 15.0-15.5 2.5YR 5/6 (red) f-F gr sandy SILT (ML) 15.5-16.0 7.5YR 6/6 (yellowish red), 5YR 6/6 (reddish yellow) dense CLAY	VOC @ 15.0 PID = 0.0
	16–20				

OSR 30-278 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings		Start Date: 12-1-22	Sheet 1 of 1
Well Number: LAP-4L-023	Location: L AREA 131-4L	Drilling Subcontractor: Cascade	
Logs Prepared By: ~~Seth Drey~~ M. PARDUE		Driller: J. HALL	
Company: North Wind		Drilling Method: Roto-Sonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1		100	0-1', Sandy SILT (ML), some clay present 5YR 5/8, yellowish red	PID= 0.3 PPM
2	1–4		100	1-4', Sandy SILT (ML), clay present, fine-grained sand grains, 5YR 5/8 yellowish red	@3' collect VOCs PID = 0.0 PPM
3	4–8		100	4-8', @ 4' transition to silty SAND (SM), sand is fine to medium grained, medium dense, 7.5YR 5/8 strong brown to 2.5 YR 5/8 red, @ 7' bgs tight sand lense	@6.5' collect VOCs, PID: 0.0 PPM
4	8–12		100	@8' Silty SAND (SM), fine to medium sand grains, clay present, medium dense, 7.5YR 5/8 strong brown, thin clay lense @ 9-9.5' @11' transition to very stiff clay (CL), low to medium plasticity, mottling present, very stiff, 2.5YR 8/3 pink to 2.5YR 5/8 red	@10.5' collect VOCs, PID=0.0 PPM
5	12–16		100	@12' transition back to Silty SAND (SM), fine to medium sand grains, clay present, medium dense, 7.5 YR 6/8 reddish yellow, slightly moist @14.0' transition back to very stiff CLAY (CL), low to medium plasticity, very stiff, 2.5 YR 8/3 pink to 2.5 YR 5/8 red	@13.5' collect VOCs, PID= 0.0 PPM

OSR 30-278 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings		Start Date: 11/28/22	Sheet 1 of 1
Well Number: LAP-4L-024	Location: L-Area 131-4L	Drilling Subcontractor: Cascade	
Logs Prepared By: Seth Dray		Driller: Brandon Griffis	
Company: North Wind		Drilling Method: Roto-Sonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1		100	0-1' Sandy SILT (ML) silt w/ fine sand, some clay, organics, some pebbles 2.5YR 5/4	
2	1–4		100	1-4' Gravely sandy SILT (ML), some clay, concrete rubble present, 5YR 4/4 reddish brown	4.6ppm at 3.5' bgs Collect VOC's at 3.5'
3	4–8		100	4-8' Gravely sandy SILT (ML), some clay, concrete rubbles present, 5YR 4/4 reddish brown	collect VOCs @ 7'
4	8–12		100	8-9.5 Same as above 9.5-11.5 Transition to silty SAND (SM) fine-med.-coarse sand in silt matrix, some clay lenses, some pebble to cobble sized rounded quartz, some mica 2.5YR 6/8 - 10YR 7/6 - 8/1	Collect VOC's at 9.5'
5	12–16		100	11.5-12.0' silty CLAY (CL) mostly stiff clay w/ some silt, some v. fine sand, mottled color, 10YR 6/8 - 7.5R 3/6 - 8/1 12-16 transition to CLAY (CL), very stiff, low to medium plasticity, dry, some silt present, 10YR 6/8 - 7.5R 3/6 - 8/1	Collect VOCs @ 14'
	16–20				

OSR 30-278 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings	Start Date: 1-11-23 / Sheet 1 of 1
Well Number: LAP-4L-25 / Location: 131-4L - L-Area	Drilling Subcontractor: Cascade
Logs Prepared By: ~~Seth Dray~~ 1/11/23 MM	Driller: Branden Griffis
Company: North Wind	Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1			0.0-1.0 5YR 5/8 (yellowish red) f. gr. sandy ~~silty~~ clayey SILT (ML)	
2	1–4		100	1.0-2.0 5YR 5/8 (yellowish red) f. gr. sandy silty CLAY w/ black ash/clinker; 2.0-4.0 5YR 4/6 (yellowish red) f. gr. sandy clayey SILT (ML) w/occ. subrnd gravel to 1"	VOC @ 3.0 PID = 0.0
3	4–8		100	4.0-6.0 5YR 5/6 (yellowish red) f. gr. silty sandy CLAY (CL) / f. gr. clayey sandy SILT (ML) w/occ subang rock frags; 6.0-8.0 5Y 8/1 (white) concrete rubble, pulverized concrete, rebar	VOC @ 5.5 PID = 0.0
4	8–12		100	8.0-9.0 5YR 5/6 (yellowish red) f. gr. sandy clayey SILT (ML) w/concrete rubble, damp; 9.0-10.0 5YR 5/6 (yellowish red) f/m gr. silty SAND (SM) w/occ subrnd gravel 1"-occ; 10.0-10.5 5YR 4/4 (reddish brown) f gr. sandy SILT (ML) wet, above clay below	VOC @ 10 PID = 0.0
5	12–16		100	10.5-12.0 10R 5/3 (weak red) mottled to weak red vf. gr. silty sandy CLAY (CL) dense; 12.0-15.0 10R 5/3 (weak red) vf. gr. silty sandy CLAY (CL) dense; 15.0-16.0 7.5YR 8/1 + 6/6 (white + reddish yellow) vf. gr. silty sandy CLAY (CL) dense	VOC @ 15.0 PID = 0.0
	17–20				

OSR 30-278 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings	Start Date: 12/7/22 — Sheet 1 of 1
Well Number: LAP-4L-026 — Location: L-Area, 131-4L	Drilling Subcontractor: Cascade
Logs Prepared By: Seth Dray	Driller: J. Hall Jr.
Company: North Wind	Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1		100	5YR 6/4 (lt. reddish brown) f. gr. sandy clayey SILT w/ rounded pebbles and roots + wire debris 0.0-1.0	
2	1–4		100	1.0-2.0 5YR 4/3 reddish br., f. gr. sandy SILT w/ const. debris - concrete rubble + steel pipe. 2.0-2.5 5YR 7/3 f-m gr. sandy silt (ML) 2.5-4.0 GLEY 1 8/1 (white) + 2.5YR 5/6 (red) f-m gr. sandy CLAY (CL) - kaolinic clay	VOC @ 2.0'
3	4–8		100	4.0-5.5 10YR 7/3 (v. pale brown) f. gr. sandy silty CLAY (CL) 5.5-8.0 5YR 6/3-6/4 (lt. reddish brown) f. gr. sandy SILT w/ micaceous layers	VOC @ 6.5'
4	8–12		100	8.0-9.0 5YR 5/4 (reddish brown) f-med. gr. clayey, silty SAND (SM) 9.0-11.0 7.5YR 6/4 (light brown) f. gr. silty sandy CLAY, (CL) micaceous - greasy feel. 11.0-12.0 2.5YR 5/6 (red) f. gr. silty sandy CLAY (CL), micaceous - greasy feel.	VOC @ 9.0'
	13–20				

OSR 30-278 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings	Start Date: 12/8/22	Sheet 1 of 1
Well Number: LAP-4L-027	Location: L-Area 131-4L	Drilling Subcontractor: Cascade
Logs Prepared By: Seth Dray / M. Malin		Driller: J. Hall Jr.
Company: North Wind		Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0		100	0.0-1.0 2.5 YR 5/4 (reddish brown) f. gr. sandy SILT (ML) w/ roots + organic material	
2	1, 2, 3		100	1.0-2.0 Concrete debris in upper 0.5' (1.0-1.5) then 2.5 YR 5/4 (reddish brown) f. gr. sandy SILT (ML) 2.0-3.5 2.5YR 5/6 (red) f.gr. silty, sandy CLAY (CL) v. dense, dry 3.5-4.0 2.5YR 8/1 (white) v.f. gr. silty, sandy CLAY (CL) / clayey SILT (ML) crumbly	VOC @ 2.0' PID = 0.0
3	5, 6, 7		100	4.0-7.0 2.5 YR 5/6 (red) f. gr. sandy SILT (ML) dry 7.0-8.0 2.5 YR 5/4 (reddish brown) vf-f gr. sandy SILT (ML) tr. clay, tr. mica	VOC @ 7.0' PID = 0.0
4	8, 9, 10, 1		100	8.0-9.0 10YR 6/6 (brownish yellow) f. gr. sandy clayey SILT (ML) w/occ rounded cobbles to 2.5" 9.0-9.5 10YR 8/1 (white) f. gr. clayey sandy SILT (ML) w/ kaolin 9.5-10.5 5YR 5/6 (yellowish red) f. gr. sandy SILT (ML) w/occ rounded cobbles to 2.5" @ base 10.5-11.5 10YR 8/1 (white) + 5YR 6/4 (lt. reddish brown) f. gr. silty sandy CLAY (CL) w/ mica, kaolin 11.5-12.0 10YR 6/6 (yellowish brown) v.f. gr. silty sandy CLAY (CL) micaceous	VOC @ 10.0' PID - 0.0
5	2, 3, 4, 5, 6		100	12.0-13.5 10 YR 6/6 (yellowish brown) + silty clayey f. gr. SAND (SM) / sandy SILT (ML) - soft, high moisture 13.5-14.5 Large mottled blocks 10YR 4/2 (dk grayish brn) + 10YR 8/1 dense, micaceous silty CLAY (CL) 14.5-16.0 5YR 6/3-6/4 (lt. reddish brown) thin laminated dense CLAY / silty CLAY (CL)	VOC = 13.0' PID = 0.0
	7, 8, 9, 0				

OSR 30-278 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings		Start Date: 11/21/22	Sheet 1 of 1
Well Number: LAP-4L-028	Location: L-Area 131-4L	Drilling Subcontractor: Cascade	
Logs Prepared By: Seth Dray		Driller: Brandon Griffis	
Company: North Wind		Drilling Method: Roto-Sonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–4		100	0-1' Sandy SILT (ML) silt w/ fine-med sand, loose + crumbly, some pebble + gravel 2.5YR 5/8 1-4' sandy gravely SILT (ML) silt w/ fine-med sand, some clay + gravel, some asphault + concrete chunks at 3-4'	3.2ppm at 2.0' Collect VOC's at 2.0'
2	4–8		100	4-5' Same as above w/ chunks of concrete 5-8 silty SAND (SM) to sandy SILT (ML) mostly fine-med-course sand in silt matrix, some gravel + cobble sized rounded, some lenses of clayey sand, 2.5YR 5/8 to 7.5YR 7/6	2.1ppm at 5.0' Collect VOC's at 5.0'
3	8–12		100	8-9.0' Same as above 9-12' CLAY (CH) med. soft-stiff clay, high plasticity, little silt ~12', mottled color- 7.5R 8/1-4/6-4/2-5/8 to 5YR 5/4	Collect VOC's at 9.0'
4	12–16		100	12-16' silty CLAY (CL) soft crumbly clay w/ silt, very small amount of v. fine sand, mottled color 7.5R 8/1-4/6-4/2-5/8-3/2 to 5YR 5/4 ~~7.5YR~~	Collect VOC's at 14.5'
	16–20				

OSR 30-278 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings	Start Date: 1-11-23 / Sheet 1 of 1
Well Number: LAP-4L-029 / Location:	Drilling Subcontractor: Cascade
Logs Prepared By: ~~Seth Bray~~ MM 1/11/23 Matt Malin	Driller: Brandon Griffis
Company: North Wind	Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1		100	0.0-1.0 5YR 5/8 (yellowish red) f. gr. sandy clayey SILT (ML)	
2	1–4		100	1.0-3.0 5YR 5/6 (yellowish red) f. gr. silty sandy CLAY (CL) w/occ subround rubble to 2" 3.0-4.0 5YR 5/6 (yellowish red) f. gr. clayey sandy SILT (ML) w/ some black f.g. sandy waste (clinker?) ash?).	PID @ 2.0 PID = 0,1
3	4–8		100	4.0-5.0 5YR 5/6 (yellowish red) f. gr. clayey sandy SILT (ML) w/ some black f. gr sandy waste (clinker/ash) 5.0-6.0 5YR 6/3 (lt. reddish brown) f/m gr. tr. c gr. silty clayey SAND (SM), damp 6.0-7.0 5YR 5/3 (reddish brown) f/m gr. silty clayey SAND w/concrete cobbles rounded gravel to 2" - wet	PID @ 5.5 P.I.D. 0.1 waste ~~4~~.5-~~5~~.0 ~ 6.0-7.0'
4	8–12		100	7.0-8.0 5YR 8/1 ~ 6/4 (white ~ lt. reddish brown) f. gr. silty sandy CLAY (CL) dense, dry 8.0-11.5 5YR 8/1 ~ 6/4 (white ~ lt. reddish brown) dense silty CLAY, w/vf. gr. sand (CL) 11.5-12.0 5YR 6/4 (lt. reddish brown) vf. gr. silty sandy CLAY (CL)	
5	12–16		100	12.0-14.5 5YR 8/1 (white) to ~~4/4~~ 2.5YR 4/4 (reddish brown) vf. gr. sandy CLAY - dense 14.5-16.0 ~~2.5YR 8/1 ~ 4/4~~ 2.5YR 3/4-4/4 ~ (dk reddish brown/reddish brown) vf. gr. silty sandy CLAY (CL) dense.	
	17–20				

OSR 30-278 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings	Start Date: 1-11-23 / Sheet: 1 of 2
Well Number: LAP-4L-030 / Location: L-Area 131-4L	Drilling Subcontractor: Cascade
Logs Prepared By: ~~Seth Dray~~ mm 1/11/23 Matt Malin	Driller: Brandon Griffis
Company: North Wind	Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1		100	0.0-1.0 5YR 5/8 (yellowish red) f.gr. sandy SILT (ML) tr. clay	
2	1–4		100	1.0-3.5 5YR 5/8 (yellowish red) f.gr. sandy silty CLAY (CL) w/ subrnd/strong pebbles to 1" 3.5-4.0 5YR 5/8 (reddish yellow) f.gr sandy silty CLAY w/ concrete rubble	VOC @ 3.0 PID - 0.0
3	4–8		50	4.0-6.0 5YR 5/6 (reddish yellow) f.gr. to m.gr. silty SAND (SM), some clay 5.0-5.5	VOC @ 5.0 PID = 0.0 Dropped rods 6.0-8.0
4	8–12		0		
5	12–16		0		
6	16–20		0		

OSR 30-279 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings	Start Date: 1-11-23 Sheet 2 of 2
Well Number: LAP-4L-030 Location: L-Area 131-4L	Drilling Subcontractor: Cascade
Logs Prepared By: ~~Seth Dray~~ 1/11/23 Matt Malin	Driller: Branden Griffis
Company: North Wind	Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
7	20		50	unrecovered from 8-22 assumed to be a saturated silty f/m gr. sand based on what was above clay that came out of core barrel	
	1				
	2			22.0-24.0 7.5R 5/4 (weak red) CLAY (CL), plastic, dense	
	3				
	24				
	5				
	6				
	7				
	8				
	9				
	0				
	1				
	2				
	3				
	4				
	5				
	6				
	7				
	8				
	9				
	0				

OSR 30-278 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings		Start Date: 12/1/22	Sheet 1 of 1
Well Number: ~~4~~ LAP-4L-031	Location: L-AREA 131-4L	Drilling Subcontractor: Cascade	
Logs Prepared By: ~~Seth Bray~~ M. PARDUE		Driller: J. HALL	
Company: North Wind		Drilling Method: Roto-Sonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1			0-1', sandy SILT (ML), some clay present, 5YR 5/8 yellowish red	PID 1.4 ppm
2	1–4			1-4', silty sand (SM), fine to medium sand grains, medium dense, some clay & pebbles, 5YR 6/8 reddish yellow	Collect VOCs @ 2.5', PID=0.0 ppm
3	4–8			4-5.5' same as above @5.5' transition to sandy clay (CL), low plasticity, stiff, mottling present, 2.5YR 4/6 red to 7.5YR 6/8 reddish yellow @6' transition to silty sand (SM), fine to medium sand grains, medium dense, some clay, 5YR 6/4 light reddish brown	Collect VOCs @ 6', PID=0.0 ppm
4	8–12			8-9.5', same as above, moist @9.5'-10', medium grain sand lense (SP) 10YR 5/8 yellowish brown, some pebbles @10' transition back to clayey sand (SC), fine-grained sand, intense mottling, 2.5YR 4/6 red to 7.5YR 5/6 strong brown, moist	Collect VOCs @ 10', PID=0.0 ppm
5	12–16			@12' same as above, some course sand @ 13' bgs @14' transition to v. stiff clay (CL), very stiff, low to med. plasticity, dry, 2.5YR 5/4 reddish brown	Collect VOCs @ 14', PID=0.0 ppm

OSR 30-278 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings		Start Date: 12/19/22 — Sheet 1 of 1
Well Number: LAP-4L-032	Location: L-Area 131-4L	Drilling Subcontractor: Cascade
Logs Prepared By: ~~Seth Dray~~ Matt Malin (MM 12/19/22)		Driller: Branden Griffis
Company: North Wind		Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1		100	0.0-1.0 5YR 5/2 (reddish gray) f.gr. silty sand (SM) w/organic material, + 5YR 5/6 (yellowish red) f.gr. sandy SILT, w/tr. clay (ML) stiff	
2	1–4		100	1.0-3.5 7.5YR 5/6 (strong brown) f.gr. sandy clayey SILT (ML) w/ subangular gravel to 2". 3.5-4.0 7.5YR 5/1 (gray) f.gr. silty SAND (SM) - pulverized concrete + concrete rubble to 2" diameter.	VOC @ 2.0 PID=0.0
3	4–8		100	4.0-6.0 GLEY 1 8/1 (white) pulverized concrete + concrete rubble to 3". 6.0-8.0 7.5YR 4/2 (brown) f/m/c gr. sandy silt w/ concrete rubble to 2" diameter	No Sample Waste
4	8–12		100	8.0-9.0 7.5YR 3/1 (v. dark gray) f.gr. silty sand w/ concrete brick rubble. 9.0-10.5 GLEY 1 8/1 (white) pulverized concrete w/concrete rubble to 3". 10.5-12.0 7.5 YR 4/1 f.gr. silty sand - pulv. concrete + concrete rubble - to 4".	No Sample Waste
5	12–16		100	12.0-14.0 7.5YR 4/1 (dark gray) f/m/c gr. silty SAND - pulverized concrete + concrete rubble. 14.0-14.5 7.5YR 7/3 (pink) f.gr. silty SAND, wet w/ rounded gravel (SM). 14.5-16.0 7.5YR 6/6 (reddish yellow) f/m gr. sandy clayey SILT w/ rounded gravel to 1.5"	VOC @ 15.0 PID= 0.0
6	16–20		100	16.0-17.0 5YR 6/6 (reddish yellow) f/m/c gr. sandy ~~clayey~~ ~~sandy~~ SILTY CLAY (CL) subang-sbrnd. 17.0-18.5 10YR 6/6 (brownish yellow) f/m/c gr. sandy silty CLAY (CL) subang-sbrnd w/ rare rounded gravel to 2". 18.5-20.0 10YR 6/6 + 2.5YR 5/4 (brownish yellow/red) f.gr. sandy CLAY (CL) Dense	VOC @ 18.0 PID=0

OSR 30-278 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings	Start Date: 11/28/22 — Sheet 1 of 1
Well Number: LAP-4L-033 — Location: L-Area 131-4L	Drilling Subcontractor: Cascade
Logs Prepared By: Seth Dray	Driller: Brandon Griffis
Company: North Wind	Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1		100	0-1' Sandy SILT (ML) silt w/fine-med sand, crumbly, some coarse sand 2.5YR 5/8	
2	1–4		100	1-4' Sandy SILT (ML) mostly silt + fine-med. sand. Some clay + some coarse sand, few pebble to cobble sized rounded quartz, 2.5YR 5/8 - 8/1	Collect VOC's at 2.0'
3	4–8		100	4-8' ~~Same as above~~ Silty SAND (SM) to Sandy SILT (ML) mostly fine-med.-coarse sand in silt matrix, some pebble-cobble sized rounded quartz, lense of clay at ~ 7.5', 2.5YR 5/8	Collect VOC's at 7.0'
4	8–12		100	8-9 Same as above 9-12' Sandy SILT (ML) silt w/ v.fine-fine sand, soft + crumbly, some mica throughout 10R 6/8 - 10YR 7/8	Collect VOC's at 10.0
5	12–16		100	12-13' Same as above 13-16' Silty SAND (SM) to Sandy SILT (ML) fine-med-coarse sand in silt matrix, some clay lenses, some pebble-cobble sized rounded quartz, 10R 5/8 - 10YR 7/8 - 8/1	Collect VOC's at 14.0'
	17				
	18				
	19				
	20				

OSR 30-278 (2-12-97)

Field Geologic Log

Project D-Area Soil Borings and Monitoring well Installation	Start Date 1-4-23	Sheet 1 of 1
Well Number LAP-4L-034	Location	Drilling Subcontractor Cascade
Logs Prepared By ~~Seth Dray~~ Matt Malin		Driller Branden Griffis
Company North Wind		Drilling Method Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0 1		100	0.0-1.0 2.5YR 4/4 (reddish brown) f.gr. sandy clayey SILT (ML)	
2	2 3 4		100	1.0-2.0 2.5YR 4/4 (reddish brown) f.gr. sandy clayey SILT (ML) 2.0-3.0 2.5YR 5/1 (reddish gray) f.gr. silty SAND (SM) 3.0-4.0 2.5YR 5/4 (reddish brown) f.gr. sandy clayey SILT (ML)	VOC @ 3.0 PID = 0.1
3	5 6 7 8		100	4.0-5.0 2.5YR 5/4 (reddish brn) f.gr. sandy clayey SILT (ML) 5.0-~~6.0~~ 7.0 2.5YR 7/2 f.gr. w/ tr. m/c.gr. silty SAND (cemented) (light reddish red) (SM) ~~6.0~~ 7.0-8.0 2.5YR 7/4 (lt. reddish brown) f.gr. sandy clayey SILT (ML)	VOC @ 5.0 PID = 0.1
4	9 10 1 12		100	8.0-10.0 2.5YR 6/6 (light red) f.gr. tr. m.gr. sandy clayey SILT w/ Kaolin (ML) 10.0-12.0 2.5YR 5/6 (red) f.gr. clayey sandy SILT, dry, stiff, micaceous (ML)	VOC @ 10.0 PID = 0.0
5	3 4 15 16		100	12.0-15.0 2.5YR 6/6 (light red) f.gr. sandy SILT, tr. clay, occ. gravel, sub rnd. (ML) 15.0-16.0 2.5YR 5/3 (reddish brn) f.gr. silty sandy CLAY / clayey sandy SILT (CL/ML) w/ occ. sub ind. gravel to 1.5"	
	7 8 9 0				

OSR 30-278 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings	Start Date: 12/20/22	Sheet 1 of 1
Well Number: LAP-4L-035	Location: L-Area-131-4L	Drilling Subcontractor: Cascade
Logs Prepared By: ~~Seth Dray~~ Matt Malin (MM 12/20/22)		Driller: Branden Griffis
Company: North Wind		Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1		100	0.0-1.0 2.5YR 5/6 (red) f.gr. silty sandy CLAY (CL) stiff.	
2	1–4		100	1.0-3.0 2.5YR 5/6 (red) f.gr. sandy silty CLAY (CL) stiff 3.0-3.5 2.5YR 5/6 (red) f/m/c gr. silty sandy CLAY (CL) - mon gr. size sand. 3.5-4.0 5YR 5/4 (reddish brown) f.gr. silty SAND (SM) w/ concrete debris/cobble to 2"	VOC @ 2.5' PID = 0.0
3	4–8		100	4.0-7.0 5YR 5/4 (reddish brown) f/m-gr. silty clayey SAND (SM) / sandy clayey SILT (ML) w/ subang.-subrnd. gravel to 1.5" 7.0-7.5 5YR 5/4 (reddish brown) f.gr. silt-sandy silt (ML) / silty sand (SM) w/ concrete rubble to 3", metal rebar + 3/8" metal debris	VOC @ 6.0 PID = 0.0
4	8–12		25	7.5-8.0 10R 7/3 pale red brick + pulverized brick, pipe ~3" long 8.0-9.0 10R 7/3 (pale red) brick + pulverized brick	
5	12–16		100	12.0-13.0 10YR 8/1 (white) concrete cobbles to 3" and pulverized concrete - f gr. silty sand/ sandy silt (ML/SM) 13.0-14.75 10YR 3/1 (v. dark gray) f/m gr. silty SAND w/ concrete + brick debris/rubble to 2" 14.75-16.00 10YR 7/6 (yellow) f/m/c gr. clayey sandy SILT (ML) subang-subrnd, w/ occ. subang-subrnd. pebbles to 1"	VOC @ 15.0 PID = 0.0
6	16–20		100	16.0-18.5 10YR 6/4 (lt yellowish brown) f/m gr. sandy CLAY (CL) w/ occ rounded cobble to 2" 18.5-19.0 2.5YR 7/6 (light red) f/m/c gr. sandy CLAY (CL) 19.0-19.5 10YR 6/6 (yellowish brown) f/m/c gr. sandy clay (CL) w/ gravel to 1" - subrnd/subang. 19.5-20 10YR 6/6 (yellowish brown) f.gr. sandy CLAY (CL) denser + stiff	

OSR 30-278 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings	Start Date: 1/3/23	Sheet 1 of 1
Well Number: LAP-4L-036	Location: L-Area 131-4L	Drilling Subcontractor: Cascade
Logs Prepared By: ~~Seth Dray~~ 1/3/23 MM Matt Malin	Driller: Brenden Griffis	
Company: North Wind	Drilling Method: Roto-Sonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1		100	0.0-1.0 2.5YR 6/4 (lt. reddish brown) f.gr. sandy SILT, tr. clay	
2	1–4		100	1.0-3.0 2.5YR 5/6 (red) f.gr. sandy clayey silt (ML) w/occ subang. gravel to 1" 3.0-4.0 2.5YR 6/2 (pale red) f.gr. sandy clayey SILT (ML) w/roots (½ dia) and subang. gravel to 1".	VOC @ PID=0.0
3	4–8		50	5.0-7.0 2.5Y 8/2 (pale red) f. gr. sandy SILT w/ Metal Plate ½" thick (2 pieces) step out: 4.0-5.5 2.5YR 5/4 (reddish brown) f.gr. sandy SILT (ML) st. ST.	Drill rods dropped 4-5 VOC @ 5.0 (step out) PID= 0.0
4	8–12		100	8.0-11.0 2.5Y 6/2 (pale red) f.-m. gr. clayey sandy SILT (ML) w/ trace subang. gravel to ½" 11.0-12 2.5Y 8/1 (white) pulverized concrete + concrete rubble	drill rods dropped 7-8 VOC @ 10.0 PID=0.0
5	12–16		100	12.0-13.0 5YR 8/1 (white) pulverized concrete + concrete rubble, wire 13.0-14.0 10YR 6/6 (brownish yellow) f/m/some coar. gr. sandy clayey SILT (ML)/clayey silty SAND (SM) w/pebble layer (sub rnd) @ 13.5' 14.0-16.0 2.5YR 5/6 (red) ct. gr. sandy CLAY - dense	
	17				
	18				
	19				
	20				

OSR 30-278 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings	Start Date: 1/3/23	Sheet 1 of 1
Well Number: LAP-4L-037	Location: L-Area 131-4L	Drilling Subcontractor: Cascade
Logs Prepared By: ~~Seth Dray~~ 1/3/23 Matt Malin	Driller: Brendan Griffis	
Company: North Wind	Drilling Method: Roto-Sonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1		100	0.0-1.0 5YR 5/6 (yellowish red) f. gr. sandy, clayey SILT (ML) w/occ concrete rubble	
2	1–4		100	1.0-3.0 5YR 6/6 (reddish yellow) f. gr. sandy clayey SILT (ML) 3.0-4.0 5YR 6/6 (reddish yellow) f. gr. sandy clayey SILT (ML) w/occ subrnd pebbles to 1"	VOC @ 2.5 PID = 0.0
3	4–8		100	4.0-6.0 5YR 6/6 (reddish yellow) f. gr. clayey sandy SILT (ML) 6.0-7.0 5YR 6/6 (reddish yellow) f. gr. silty SAND (SM) 7.0-8.0 5YR 6/6 (reddish yellow) f. gr. sandy, clayey SILT w/ 1/4" diameter wood/root (PID detect around root @ 7.5')	VOC @ 7.5 = 2.1 ppm
4	8–12		100	8.0-9.0 5YR 4/4 (lt reddish brown) f. gr. sandy silty CLAY (CL) 9.0-11.0 10YR 7/4 (v. pale brown) f. gr. sandy clayey SILT (ML), micaceous 11.0-12.0 10YR 6/6 (brownish yellow) f. gr. sandy SILT w/ occ. pebbles.	VOC @ 9.0 PID = 0.0
5	12–16		100	12.0-13.0 5YR 6/6 (reddish yellow) f. gr. clayey silty SAND to silty SAND (SM) 13.0-16.0 2.5YR 4/6 (red) and 2.5YR 8/1 (white) vf-f gr. sandy dense CLAY (CL)	VOC @ 12.5 PID = 0.3
	16–20				

OSR 30-27# (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings		Start Date: 1-9-23 / Sheet 1 of 1
Well Number: LAP-4L-038	Location: L-Area 131-4L	Drilling Subcontractor: Cascade
Logs Prepared By: ~~Seth Dray~~ Matt Malin (1/9/23 mm)		Driller: Brandon Griffis
Company: North Wind		Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1		100	0.0-1.0 5YR 5/6 (yellowish red) f.gr. sandy clayey SILT (ML)	
2	1–4		100	1.0-4.0 5YR 5/6 (yellowish red) f.gr. sandy clayey SILT (ML) w/quartz	VOC@ 3.0 PID = 0.1
3	4–8		100	4.0-8.0 5YR 46 (reddish yellow) f.gr. sandy clayey SILT, micaceous (ML	VOC @ 6.0' PID = 0.0
4	8–12		100	8.0-10.0 5YR 5/6 (yellowish red) f.gr./tr. m.gr. sandy clayey SILT (ML), micaceous 10.0-11.0 5YR 5/3-5/4 (reddish brown) f.gr. tr. m.gr. sandy clayey SILT (ML), micaceous 11.0-11.5 5YR 7/2 (pinkish gray) f.gr. sandy clayey SILT (ML) micaceous stiff 11.5-12.0 5YR 6/6 (reddish yellow) f.gr. tr. m/c gr. sandy SILT (ML) tr. clay	VOC @ 10.5 PID = 0.0
5	12–16		100	12.0-13.0 10YR 7/4 (yellow) f/m/c gr. sandy SILT/silty SAND (ML/SM) subang-subrnd tr. clay. 13.0-16.0 5YR 5/6 (yellowish red) f/m/c gr. sandy SILT (ML) poorly sorted, subang-subrnd. tr. clay.	VOC @ 15.0 PID = 0.0
	17–20				

OSR 30-278 (2-12-97)

Field Geologic Log

Project L-Area Soil Borings		Start Date 1-5-23	Sheet 1 of 1
Well Number LAP-4L-039	Location L-Area 131-4L	Drilling Subcontractor Cascade	
Logs Prepared By ~~Seth Dray~~ Matt Melin		Driller Branden Griffis	
Company North Wind		Drilling Method Roto-Sonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1		100	0.0-1.0 5YR 6/4 (lt. reddish brown) f/m gr. clayey sandy SILT (ML) w/occ. subang. gravel → concrete cobble to 2".	
2	1–4	SM	100	1.0-2.0 7.5YR 7/6 (reddish yellow) f. gr. clayey sandy SILT (ML) micaceous 2.0-3.0 5YR 6/6 f.gr. clayey sandy SILT (ML) (reddish yellow) w/occ subrd. gravel (1"). 3.0-~~3.5~~ 5YR 5/2 (reddish gray) f.gr. silty SAND (SM) 3.5-4.0 5YR 6/6 f.gr. clayey sandy silt (ML)	VOC @ 3.0 PID = 0.0
3	4–8		100	4.0-6.0 2.5YR 4/6 (red) f/m gr. sandy clayey SILT (ML) 6.0-7.0 10YR 7/6 → 2.5YR 4/6 (yellow-red) f/m gr. sandy clayey SILT (ML) w/occ sub rd. cobble. 7.0-8.0 2.5YR 4/8 (red) vf. gr. sandy SILT (ML)	VOC @ 6.5 PID = 0.0
4	8–12		100	8.0-12.0 2.5YR 5/6 (red) f.gr. occ m gr. sandy SILT (ML) trace clay	VOC @ 10.0' PID = 0.0
5	12–16	SM / CL	100	12.0-12.5 2.5YR 5/6 (red) f. gr. ~~silty~~ sandy SILT (ML) 12.5-13.0 5YR 4/1 (dark gray) f. gr. silty SAND (SM) 13.0-16.0 5YR 8/1 (white) vf/f gr. tr. m gr. sandy silty CLAY (CL) dense micaceous	VOC @ 13.0 PID = 0.0
	16–20				

OSR 30-278 (2-12-97)

Field Geologic Log

Project: D-Area Soil Borings and Monitoring well Installation		Start Date: 1/5/23	Sheet 1 of 1
Well Number: LAP-4L-040	Location: L-Area 131-4L	Drilling Subcontractor: Cascade	
Logs Prepared By: ~~Seth Gray~~ Matt Malin		Driller: Brenden Griffis	
Company: North Wind		Drilling Method: Roto-Sonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1		100	0.0-1.0 2.5Y 6/4 (lt. reddish brown) f. gr. clayey sandy SILT (ML)	
2	1–4		100	1.0-3.0 2.5YR 6/2 (pale red) f. gr. clayey sandy SILT (ML) w/ gravel to 2" sub ang-subrnd & occ. concrete chunks 3.0-4.0 5YR 5/2 (reddish gray) f. gr. sandy SILT (ML) tr. clay w/ gravel/concrete to 2" subangular	VOC PID @ 2.5' PID = 0.0
3	4–8		100	4.0-5.0 5YR 4/3 (reddish brown) f/m/c gr. silty SAND (SM) trace clay w/ rock frags to 1" subang-s 5.0-7.0 7.5YR 6/1 & 8/1 (gray-white) f/m/c gr. silty SAND (SM) w/ concrete debris, rubble, wire & pulverized concrete	VOC: 4.5' PID: 0.1
4	8–12		100	7.0-8.0 2.5YR 4/8 (red) Brick debris 8.0-10.0 Brick & concrete debris 10.0-12.0 Concrete debris & pulverized concrete.	No sample collected in borehole or stepout.
5	12–16		100	12.0-13.0 Brick & concrete debris 13.0-15.3' Concrete, rubble + concrete dust (pulverized) 15.3-16.0 5YR 6/6 (reddish yellow) f/m gr. clayey sandy SILT (ML) micaceous	VOC @ 14.0' in stepout PID=0.0 Sample collected 13.75-16.0 in stepout from native material.
6	16–20		100	16.0-17.0 5YR 6/6 (reddish yellow) f/m gr. sandy clayey SILT (ML) micaceous, w/ occ subrounded gravel to 1" 17.0-18.5 7.5YR 6/8 (reddish yellow) f/m gr. sandy clayey SILT (ML) w/ occ sub rnd. gravel	Short recovery 16.0-18.5 due to brick/concrete sloughing on top

OSR 30-278 (2-12-97)

Field Geologic Log

Project: L-Area Soil Borings	Start Date: 1-9-23 / Sheet 1 of 1
Well Number: LAP-4L-041 / Location: L-Area 131-4L	Drilling Subcontractor: Cascade
Logs Prepared By: ~~Seth Dray~~ 1/9/23 Matt Malin	Driller: Brandon Griffis
Company: North Wind	Drilling Method: Roto-Sonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
1	0–1		100	0.0-1.0 5YR 5/8 (yellowish red) f/m gr. sandy SILT, tr. clay (ML) w/occ pebbles to ½", subang.-subrnd.	
2	1–4		100	1.0-2.0 2.5YR 5/3-5/4 (reddish brown) f. gr. sandy silty CLAY w/occ. rnd pebbles to ½" (CL) 2.0-2.5 5YR 5/3 (reddish brown) f/m, trc gr. silty sandy CLAY (CL) w/occ gravel to 1.5" 2.5-4.0 5YR 5/2 (reddish gray) f/m gr. sandy silt (ML) mixed w/concrete rubble/waste	VOC @ 2.0 PID = 0.0
3	4–8		100	4.0-8.0 10YR 8/1 & 2/1 (white & black and dark gray) 3/1 f. gr. ~~silty~~ sandy SILT / Concrete debris and pulverized concrete in 0.15' intervals (alternating)	
4	8–12		100	8.0-10.0 2.5YR 7/1 (lt. reddish gray) f/m gr. sandy SILT (ML) = concrete rubble & pulv. concrete 10.0-12.0 2.5YR 5/1 reddish gray f/m gr. sandy silt = concrete rubble & pulv. concrete	
5	12–16		100	12.0-13.5 2.5YR 3/1 (dk reddish gray) f. gr. sandy SILT / concrete debris 13.5-15.3 2.5YR 8/1 (white) Concrete rubble & pulverized concrete 15.3-16.0 5YR 7/8 (reddish yellow) f. gr. clayey sandy SILT (ML)	
6	16–20		100	16.0-17.5 2.5YR 4/1 (dk reddish gray) f/m gr. sandy SILT/(ML) Concrete & brick waste 17.5-20.0 2.5YR 6/3 f/m gr sandy clayey SILT (ML) micaceous	Stepout #1 16-20' VOC @ 18.0 PID = 0.0