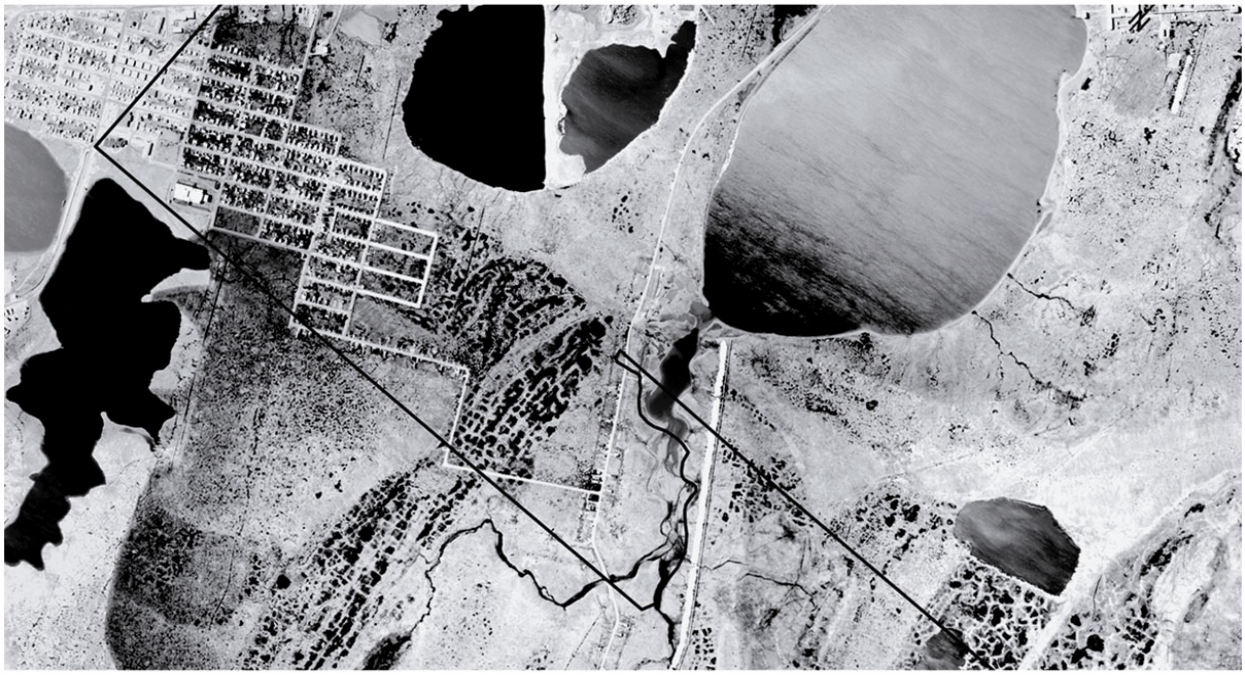
FINAL
NOVEMBER 2022

Explanation of Significant Differences – Revised Remedial Goal for Lead

Naval Arctic Research Laboratory Bulk Fuel Tank Farm (Site 13), Utqiaġvik, Alaska

United States Department of the Navy
Naval Facilities Engineering Systems Command
Engineering Field Activity, Northwest
1101 Tautog Circle
Silverdale, WA 98315-1101



Naval Facilities Engineering Systems Command Northwest
Silverdale, WA

Final

Explanation of Significant Differences – Revised Remedial Goal for Lead

Naval Arctic Research Laboratory Bulk Fuel Tank Farm (Site 13), Utqiaġvik, Alaska

November 2022

DCN: LBJV-5006-4063-0005

Prepared for:
United States Department of the Navy
Naval Facilities Engineering Systems Command Northwest
1101 Tautog Circle
Silverdale, WA 98315

Prepared by:
Liberty Joint Venture
4020 Lake Washington Boulevard NE, Suite 200
Kirkland, WA 98033
425-368-1000

Contract Number: N44255-20-D-5006; Task Order No. N4425521F4063

This page is intentionally blank.

FINAL
EXPLANATION OF SIGNIFICANT DIFFERENCES
REVISED REMEDIAL GOAL FOR LEAD
NAVAL ARCTIC RESEARCH LABORATORY BULK FUEL TANK FARM (SITE 13)
UTQIAĠVIK, ALASKA

Prepared for
United States Department of the Navy
Naval Facilities Engineering Systems Command Northwest

Silverdale, WA 98315

REVIEW AND APPROVAL

Approver: _____ 11/3/22

Captain Brent C. Paul
Commanding Officer, NAVFAC NW

Date

FINAL
EXPLANATION OF SIGNIFICANT DIFFERENCES
REVISED REMEDIAL GOAL FOR LEAD
NAVAL ARCTIC RESEARCH LABORATORY BULK FUEL TANK FARM (SITE 13)
UTQIAĠVIK, ALASKA

Prepared for
United States Department of the Navy
Naval Facilities Engineering Systems Command Northwest

Silverdale, WA 98315

REVIEW AND APPROVAL

Approver: Digitally signed by Cas Galasso Date: 2022.11.14 11:42:24 -09'00'

Cascade Galasso-Irish
Alaska Department of Environmental Conservation

11/14/2022
Date

FINAL
EXPLANATION OF SIGNIFICANT DIFFERENCES
REVISED REMEDIAL GOAL FOR LEAD
NAVAL ARCTIC RESEARCH LABORATORY BULK FUEL TANK FARM (SITE 13)
UTQIAĠVIK, ALASKA

Prepared for
United States Department of the Navy
Naval Facilities Engineering Systems Command Northwest

Silverdale, WA 98315

REVIEW AND APPROVAL

Approver: Thomas Leavitt 11/09/2022

Thomas Leavitt
Ukpeaġvik Iñupiat Corporation

Date

This page is intentionally blank.

Table of Contents

List of Appendices

List of Figures

List of Tables

This page is intentionally blank.

Acronyms and Abbreviations

AAC ..... Alaska Administrative Code
AOC ..... areas of concern
ADEC ..... Alaska Department of Environmental Conservation
ARAR ..... applicable or relevant and appropriate requirement
AST ..... above-ground storage tank

BFTF ..... bulk fuel tank farm
BTEX ..... benzene, toluene, ethylbenzene and xylene
bw ..... body weight

CERCLA ..... Comprehensive Environmental Response, Compensation, and Liability Act
CFR ..... Code of Federal Regulations
COC ..... contaminant of concern
COPEC ..... contaminants of potential ecological concern
CY ..... cubic yard

DD ..... Decision Document
DU ..... decision unit
DRO ..... diesel range organics

Eco-SSL ..... ecological soil screening levels
EPA ..... United States Environmental Protection Agency
ESD ..... Explanation of Significant Difference

GRO ..... gasoline range organics

HAVE ..... hot air vapor extraction
HL90 ..... Historical Location "90"

LOAEL ..... lowest observable adverse effects level

mg/kg ..... milligrams per kilogram

NARL ..... Naval Arctic Research Laboratory
NARL-CT ..... Naval Arctic Research Laboratory Cleanup Team
Navy ..... United States Department of the Navy
NCP ..... National Oil and Hazardous Substances Pollution Contingency Plan
NOAEL ..... no-observed-adverse-effect-level

Acronyms and Abbreviations (continued)

PRG ..... preliminary remediation goal

RBSL ..... risk-based screening level

TAA ..... Turnaround Area
TRV ..... toxicity reference value

UIC ..... Ukpeaġvik Iñupiat Corporation
US ..... United States
URS ..... URS Greiner, Inc.
USC ..... United States Code

USGS ..... United States Geological Service

VOC ..... volatile organic compound

1.0 Introduction

1.1 Purpose

This document presents an Explanation of Significant Differences (ESD) to the Decision Document (DD) for the Bulk Fuel Tank Farm (BFTF), Naval Arctic Research Laboratory (NARL), Utqiaġvik, Alaska (NARL Cleanup Team [NARL-CT], 2002). The DD was developed in accordance with State of Alaska regulations governing the protection of human health and the environment from hazardous substances (18 Alaska Administrative Code [AAC], Part 75, Article 3) and complies with procedures set forth by the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended in 1986 (42 United States Code [USC] 9601 *et seq.*). The DD was signed as final by the State of Alaska Department of Environmental Conservation (ADEC) and the Ukpeaġvik Iñupiat Corporation (UIC) on 12 December 2002, and by the United States Department of the Navy (Navy) on 7 March 2003.

As recommended in the Third Five-Year Review of the NARL (Navy, 2018), in 2019, soil samples were collected for lead analysis from the former BFTF (also designated Site 13). The results from this sampling event indicated the concentration of lead in soil exceeded the DD cleanup level for lead in surface soil of 40.5 milligrams per kilogram (mg/kg) in several locations. The DD soil lead cleanup level is based on a receptor that is inappropriate for the former BFTF, as discussed in Section 3, causing the level to be unnecessarily conservative. This ESD is intended to revise the lead cleanup level for soil using receptors appropriate for the Arctic Slope and the former BFTF while confirming that the new remediation goal is protective of human health and the environment based on current guidance.

1.2 Lead and Support Agencies

The Navy is the lead federal agency for this project, ADEC is the regulatory agency responsible for the cleanup of sites at the former NARL facility, and UIC is the current property owner.

1.3 Statutory Authority

This ESD complies with CERCLA, Section 117(c); the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), Title 40 Code of Federal Regulations (CFR) Section 300.435(c)(2)(i); and NCP 40 CFR Section 300.825(a)(2).

In accordance with the NCP 40 CFR Section 300.435(c)(2)(i)(A) and 300.825(a)(2), this ESD will become part of the former NARL Administrative Record and will also be made available for public inspection in the local information repositories. Pursuant to

NCP 40 CFR Section 300.435(c)(2)(i), the Navy will publish a notice in a major local newspaper briefly explaining the ESD.

2.0 Site History, Contamination, and Selected Remedy

2.1 Site Location and History

The former NARL facility is located about four miles northeast of the city of Utqiaġvik (known as Barrow from 1901 to 2016) and six miles southwest of Point Barrow on the coastal plain of Alaska's North Slope. Its geographic position is 71°20'29 “N latitude and 156°36'28 “W longitude (Figure 1). The NARL was established in 1947 as a logistic supply center for petroleum exploration in Naval Petroleum Reserve No. 4. The Navy managed the NARL facilities from 1947 to 1981, and the Office of Naval Research established research activities. In the latter capacity, the NARL provided facilities and services for basic and applied research on arctic oceanography, meteorology, hydro-acoustics, geophysics, atmospheric and ionospheric physics, biology, and cold weather physiology and engineering. Federal agencies, scientific organizations, educational institutions, and individuals conducted research intermittently at NARL for three decades (EA, 1999). Other support facilities at the site were operated by a succession of agencies:

- 1947–1953: US Geological Service (USGS)
- 1954–1972: US Air Force
- 1972–1981: Navy
- 1981–1984: USGS
- 1984–1986: UIC

The Navy began phasing out NARL activities in 1978, and laboratory operations ended in 1980. The USGS took over as site caretaker in 1981, and UIC assumed caretaker responsibilities in 1984, which continued until 1986. The Land Exchange Agreement between the US Government and the UIC in 1986 transferred former NARL BFTF land to UIC (NARL-CT, 2002).

The former BFTF covers about five acres and is located approximately 2 miles northeast of the main NARL complex near the northeast end of the airstrip (Figure 1). Elson Lagoon and a large freshwater melt pond are just east of the site, and North Salt Lagoon is directly west along the southwest boundary of the former BFTF. North Salt Lagoon is used for fishing and waterfowl hunting (NARL-CT, 2002). Currently, most of the site is covered with gravel to support vehicle traffic.

The BFTF consisted of six above-ground storage tanks (ASTs) used for bulk storage of gasoline, diesel, and jet fuel (URS, 2000). In 1970, an estimated 100,000 gallons of jet fuel (JP-5) was spilled onto the supporting Gravel Pad, which was approximately 5 feet

thick, between Tanks 2 and 3. In 1990, during tank removal, it was found that Tank 3 had leaked; there was no estimate of the quantity of fuel lost. Tank 3 had been previously used to store diesel grade DF-A fuel (NARL-CT, 2002).

In 1990, the ASTs and their associated piping were removed from the site.

In 1994 two cubic yards (CY) of surface soil with the highest contamination of petroleum compounds were removed from the site and treated at the former NARL complex by vapor extraction that reduced gasoline and diesel concentrations by 98 percent. Treated soil was returned to the former BFTF two years later (NARL-CT, 2002).

In 1997, a site investigation identified approximately 9,000 CY of soil contaminated with petroleum hydrocarbons and volatile organic compounds (VOCs) from the fuel leaks and spills, and the subsequent risk assessment completed in 1999 identified lead in surface soils as a contaminant of concern (COC) in addition to the petroleum hydrocarbons and VOCs (EA, 1999).

In 2003, clean soil from the top of the Gravel Pad was used as fill elsewhere at NARL, leaving the Gravel Pad an average of three to four feet thick (ICRC, 2004). The raised Gravel Pad and gravel surface are surrounded by tundra. Permafrost is approximately 5 feet below ground surface under the Gravel Pad and between 1and 5 feet below ground surface in the tundra areas. A 1.5-foot-thick layer of active zone water is found on top of the permafrost, except beneath the raised Gravel Pad where the elevated surface soil and corresponding elevated permafrost promote water drainage away from the pad.

2.2 Selected Remedy

The remedy selected in the 2002 DD was a combination of hot air vapor extraction (HAVE) and landfarming (NARL-CT, 2002). The selected cleanup remedy consists of the following elements as outlined in the DD:

- Excavate soil with the highest contamination concentrations, located at the turnaround area and the south bank of the Gravel Pad. Transport this soil to the NARL Airstrip site for thermal treatment using HAVE.
- Construct biological treatment cells at the south end of the NARL Airstrip and/or at the Gravel Pad itself. Contaminated soil from the Gravel Pad and surrounding tundra which is not HAVE treated will be placed in the biocells and treated by landfarming.
- If soil treatment endpoints from landfarming are not reached at the end of one treatment season, transport the remaining contaminated soil to the NARL Airstrip for thermal treatment using HAVE.

- Conduct a 5-year program monitoring the natural attenuation of active zone water along the shorelines of the nearby melt water pond and North Salt Lagoon.
- Conduct a 5-year monitoring program for natural attenuation of sediments in North Salt Lagoon to verify that contaminant transport has ceased following soil cleanup.
- After five years of operation, evaluate the need for continued monitoring.
- Evaluate the cumulative residual risk for the site after cleanup levels have been achieved at the former NARL facility.

The cleanup levels for soil in the DD were established to protect both people and wildlife at the site. Cleanup levels for surface soils were based on preventing risks to wildlife, and cleanup goals for subsurface soils were based on preventing harm to construction workers. The lead cleanup level for surface soil was 40.5 mg/kg, which is significantly lower than the ADEC soil cleanup level for lead (400 mg/kg) identified in 18 AAC 75.341, which is based on protecting human health. Therefore, the surface soil cleanup level for lead was protective of both human health and wildlife. There was no lead cleanup level for subsurface soil because none of the lead detections at the site exceeded risk criteria based on construction worker exposures. The cleanup levels established by the DD for soil at former BFTF are summarized in Table 2-1.

Table 2-1: Cleanup Levels for Soil at the Bulk Fuel Tank Farm Site

Cleanup Objective	Chemical of Concern	Surface Soil[1]	Subsurface Soil[2]	Treated Soil
Prevent exposures of wildlife to lead and diesel-range hydrocarbons in surface soil	***Metals***			
	Lead	40.5	--	400[3, 4]
	Total Petroleum Hydrocarbon Fractions			
	Diesel-Range Aliphatic	1,328	--	500[3]
	Diesel-Range Aromatic	300	--	
Prevent exposures of construction workers to volatile organic compounds in subsurface soil	***Total Petroleum Hydrocarbon Fractions***			
	Gasoline-Range Aliphatic	--	5.8	100[3, 5]
	Gasoline-Range Aromatic	--	79	
	Volatile Organic Compounds			
	Benzene	--	--	< 0.5[3]
	BTEX	--	--	< 15[3]
	1,2,4-trimethylbenzene	--	1.9[6]	1.9[6]
	1,3,5-trimethylbenzene	--	0.61[6]	0.61[6]

Table 2-1: Cleanup Levels for Soil at the Bulk Fuel Tank Farm Site (continued)

Notes:
Units are presented in milligrams per kilogram (mg/kg)
BTEX = benzene, toluene, ethylbenzene and xylene

Basis for cleanup levels:
[1] Risk-based cleanup level based on wildlife exposures to surface soils (0-18 inches below ground surface) from *Decision Document for the Navy Arctic Research Laboratory, Bulk Fuel Tank Farm, Barrow, Alaska* (NARL-CT, 2002).
[2] Risk-based cleanup level based on construction worker exposure to volatile organic compounds in subsurface soils from *Decision Document for the Navy Arctic Research Laboratory, Bulk Fuel Tank Farm, Barrow, Alaska* (NARL-CT, 2002).
[3]Alaska regulations pertaining to cleanup levels for hazardous substances in soil are found in Alaska Administrative Code (AAC) at 18 AAC 75.341. These cleanup levels can be applied to all sites located in the Arctic Zone to establish human health-based cleanup levels. The 18 AAC 75.341 Table B1 criteria include a residential soil cleanup level of 400 mg/kg for lead and compounds. 18 AAC 75.341, Method 1 was the source for diesel and gasoline range organics in treated soil referenced in the *Decision Document for the Navy Arctic Research Laboratory, Bulk Fuel Tank Farm, Barrow, Alaska.* (NARL-CT, 2002).
[4] Although 18 AAC 75.341 was identified as an Applicable or Relevant and Appropriate Requirement, this value based on residential soil was not explicitly identified in the *Decision Document for the Navy Arctic Research Laboratory, Bulk Fuel Tank Farm, Barrow, Alaska* (NARL-CT, 2002) as a soil cleanup level for lead. However, it was used as the basis for requiring offsite disposal of former BFTF soil treated in 2019 that exceeded 400 mg/kg.
[5] This value may not be protective for subsurface soil due to potential inhalation risk to construction workers. Therefore, default to subsurface criteria for soil deeper than 18 inches.
[6] The *Decision Document for the Navy Arctic Research Laboratory, Bulk Fuel Tank Farm, Barrow, Alaska* (NARL-CT, 2002) identified this risk-based value as the cleanup level for treated soil.

AAC: Alaska Administrative Code; BFTF: Bulk Fuel Tank Farm; BTEX: benzene, toluene, ethylbenzene and xylene; mg/kg: milligrams per kilogram; NARL: Naval Arctic Research Laboratory

2.3 Remedy Implementation

From 2003 to 2019, multiple remedial actions and recommendations associated with soil cleanup were made at the former BFTF. In addition to soil remediation, the remedy included monitoring active zone water near surface water bodies adjacent to the former BFTF site and sediments in North Salt Lagoon. The DD anticipated a five-year monitoring period, but because soil remediation has not yet been completed and annual monitoring has detected increasing concentrations of COCs in groundwater adjacent to surface water, annual monitoring is ongoing. A summary of actions and reports that are relevant to former BFTF soil are listed below:

- June 2003 – Soil from the South Bank of the Gravel Pad area with the highest levels of gasoline range organics (GRO) and diesel range organics (DRO) contamination was excavated and moved to the treatment areas near the NARL Airstrip for treatment via HAVE. In total, 3,080 CY of petroleum-contaminated soil was excavated and treated with HAVE (Navy, 2004b). The treated soil was returned to the South Bank of the Gravel Pad area.

- July to September 2003 – Approximately 4,700 CY of petroleum-contaminated soil from the Gravel Pad and 900 CY from outlying areas were landfarmed to reduce DRO and GRO (Navy, 2004a). During soil remediation, seven rounds of operation and maintenance and confirmation sampling were conducted to assess remedial progress. After landfarming, ten additional samples were collected to evaluate the treatment of petroleum-related compounds. The landfarm sampling results showed that all other organic COCs had achieved their specified cleanup levels except DRO. Samples were not analyzed for lead (Navy, 2004a).
- October 2003 – Treatment, backfilling, and final grading were completed for the areas described above, and results were documented in a final closure report (Navy, 2004b).
- July 2006 – Following soil removal and treatment in 2003, concerns were raised that the number of post-landfarming soil samples was insufficient to verify that landfarming treatment had met the cleanup goals. Therefore, at the request of ADEC and UIC, 16 composite soil samples were collected by the Navy in the landfarmed area and analyzed for DRO only. Four of the composite samples exceeded the 500 mg/kg cleanup level for DRO in treated soil (Navy, 2006).
- September 2007 to September 2008 – The former BFTF landfarmed area was sampled for DRO using multi-incremental sampling techniques. Surface samples were compared to cleanup levels established for treated soil, while subsurface samples collected below 18 inches were compared with risk-based cleanup levels. Sample results indicated that DRO exceeded the 500 mg/kg cleanup level in one of the two surface soil decision units (DUs) at a reported level of 630 mg/kg. None of the four subsurface DUs exceeded the risk-based cleanup level established for DRO in surface soil (1,328 mg/kg). These samples were not analyzed for lead. Based on only one sample slightly exceeding the cleanup level in surface soil, and active zone groundwater and sediment monitoring data that suggested (at the time) that contaminants are not migrating offsite, the Navy recommended no further action for site soils at the former BFTF (Navy, 2009).
- June 2008 – The *Final First Five-Year Review Airstrip (Site 5), Powerhouse (Site12) and BFTF (Site 13) Naval Arctic Research Laboratory, Barrow, Alaska,* reported that the remedy at the former BFTF had been implemented, and the remedy was protective in the short term (Navy, 2008). However, it noted that treated soil had not been analyzed for lead to determine if cleanup goals had been met; consequently, the protectiveness of the remedy could not be demonstrated for wildlife potentially exposed to lead in surface soil. The First Five-Year Review recommended adding lead as a soil analyte to the next soil sampling event and noted that a 124 mg/kg cleanup level for lead calculated in

the 1999 risk assessment appeared to be more appropriate as a lead cleanup level than the cleanup level chosen in the DD (40.5 mg/kg) (Navy, 2008).

- 11 January 2010 – ADEC's (2010) review of the *2008 Bulk Fuel Tank Farm Confirmation Sampling Report, NARL Former Bulk Fuel Tank Farm* (Navy, 2009) concluded that soil at the former BFTF would require additional treatment to meet the DRO cleanup level of 500 mg/kg. Alternatively, ADEC recommended that the cleanup team members revise the DRO cleanup level through a cooperative agreement so that it is less conservative. Additional treatment of the soil would then not be necessary (ADEC, 2010). ADEC also concurred with the First Five-Year Review's recommendation to revise the cleanup level for lead in surface soil from 40.5 mg/kg (based on protection of the American Woodcock [*Scolopax minor*]) to 124 mg/kg, which was the risk-based screening level (RBSL) calculated in the 1999 site-specific risk assessment (EA, 1999). ADEC acknowledged that although 124 mg/kg represented a higher cleanup level for lead, it was still protective of human health and the environment (ADEC, 2010).
- April 2013 – The *Final Second Five-Year Review Airstrip (Site 5), Powerhouse (Site12) and BFTF (Site 13) Former NARL, Barrow, Alaska* (Navy, 2013) raised concerns that the remedy at the former BFTF may not be protective because of increasing detections of petroleum compounds in active groundwater. The technical assessment suggested that soils may be contributing to the increases in groundwater concentrations because soil concentrations exceeding the DD endpoint criteria were left in place in the South Bank of the Gravel Pad excavation area, and several areas were not excavated or treated as required by the DD. The Second Five-Year Review noted that the landfarming portion of the remedy did not achieve the treated soil cleanup level of 500 mg/kg for DRO in most of the treated soils. The report recommended additional soil treatment to meet the DRO cleanup level of 500 mg/kg for treated soils (Navy, 2013).
- November 2018 – The *Final Third Five-Year Review, Naval Arctic Research Laboratory, Barrow, Alaska* (Navy, 2018) concluded that the cleanup actions at the former BFTF did not appear to be functioning as anticipated based on the increasing concentrations of COCs in active groundwater adjacent to surface water. The report found that cleanup actions at the former BFTF were currently protective of human health and the environment with respect to petroleum contamination but recommended additional treatment of site soils. The report noted that treated soil had never been analyzed for lead and indicated that lead would be analyzed as part of a soil sampling program to be conducted in the 2019 field season.

- June to October 2019 – Former BFTF soils from the former Landfarmed Area (Gravel Pad), the South Bank Area, Turnaround Area (TAA), and Historical Location "90" (HL90) (collectively defined as Areas of Concern [AOCs]) were sampled and analyzed for site-related COCs to determine which soils required further treatment. The analyses included lead, but lead concentrations were not considered when determining which soil should be excavated for treatment. Lead concentrations in soil samples collected prior to excavation ranged from 3.0 to 460 mg/kg. Soils from the Gravel Pad and South Bank of the Gravel Pad area that exceeded petroleum-related cleanup levels from the 2002 DD were excavated from the BFTF site and placed in seven landfarm cells constructed near the airstrip for treatment (Figure 3). Confirmation samples from the sidewalls and bottom of the excavations indicated that soil remaining in place in several DUs exceeded cleanup levels for DRO in treated soil and lead in surface soil. However, the 2002 DD had not established DRO cleanup levels for subsurface soils left in place, and the need for further excavation and treatment has not yet been determined for soil remaining in the Gravel Pad and South Bank of the Gravel Pad areas. Due to elevated levels of water and the presence of plants indicative of wetlands in the HL90 and TAA AOCs, no soil from HL90 was excavated, and a limited amount was excavated from the TAA and placed into the landfarm cells. Approximately 4,550 CY of soil were excavated and remediated during the 2019 season. Lead concentrations in post-excavation soil samples ranged from not detected (below 0.15 mg/kg) to approximately 440 mg/kg. At the conclusion of treatment, approximately 400 CY of treated soil had lead concentrations above the ADEC Arctic Zone Human Health cleanup level of 400 mg/kg, and this soil was staged for offsite disposal. Additional treated soil was staged for further treatment because it did not meet the cleanup levels for DRO in treated soil. Soils that met the cleanup levels for petroleum compounds in treated soil were returned to the AOCs at the former BFTF. Some of the treated soil returned to the excavations had lead concentrations below the 400 mg/kg criterion, but that exceeded the 40.5 mg/kg cleanup level for lead in surface soil, so this soil was placed in subsurface locations. Additional site remediation is anticipated to address the soil that could not be excavated because of site conditions during the 2019 field season and stockpiled soil from one landfarm cell that did not meet the cleanup levels for DRO in treated soil (Navy, 2021).

This page is intentionally blank.

3.0 Basis for the ESD

The DD for the former BFTF identified lead in soil as a COC and included a cleanup level for lead in surface soil to protect wildlife. However, the original characterization of the site suggested that lead exceedances were limited and possibly associated with lead ammunition used by hunters frequenting the nearby North Salt Lagoon. Therefore, the remedy selected to treat the petroleum-contaminated soil was not specifically developed to reduce lead concentrations in soil. Recent sampling post-treatment has determined that the lead contamination was more widespread than anticipated. Lead concentrations in the soil from several locations at the former BFTF exceeded 40.5 mg/kg (Navy, 2021), which limited the reuse and placement options for the treated soil. However, as described below, the current soil cleanup level is lower than necessary to protect human health and ecological receptors found at NARL.

The DD established a soil cleanup level for lead of 40.5 mg/kg (NARL-CT, 2002). This level was introduced as the ecological soil screening benchmark in the conservative Tier I evaluation included as part of the ecological risk assessment for the former BFTF (EA, 1999). The Tier I process incorporates published, readily available, chemical-specific screening benchmarks for soil. The soil screening benchmark for lead used in the Tier 1 risk assessment was developed by Efroymson et al. (1997) to be used as a conservative preliminary remediation goal (PRG) for a wide variety of CERCLA sites. The soil PRGs are based on the most sensitive terrestrial receptor. For lead, the most sensitive receptor was an invertivorous bird, the American woodcock. Efroymson chose the American woodcock to develop the conservative PRGs because of the large quantity of soil ingested by this avian receptor and the relatively high chemical uptake rates for its food (i.e., earthworms). However, the American woodcock is not known to occur in Alaska (Audubon, 2021a). Because of this, and because the wildlife PRGs are intended to be used as generic screening criteria rather than as cleanup level, the 40.5 mg/kg cleanup criterion, while still protective of the environment, is overly conservative for bird and mammal species that may occur at the former BFTF.

The ecological risk assessment presented in the Site Inspection report (EA, 1999) included a refined Tier I evaluation wherein more realistic and site-specific information on exposure concentrations and receptor behavior, such as the frequency and duration of exposure of wildlife to site chemicals, was incorporated into the overall assessment. As a part of the refined Tier I approach, site-specific RBSLs were calculated for ecological indicator species appropriate for NARL. The benchmark screening, RBSL comparison, and risk estimation constituted a comprehensive suite of habitats, trophic levels, exposure routes, and feeding habits for ecological receptors.

Table 3-1 includes the indicator species used in the 1999 site-specific ecological risk assessment and their associated RBSLs. For lead at the former BFTF, the most sensitive receptor was an avian invertivore receptor, the Lapland longspur (*Calcarius lapponicus*). As documented in the *User's Guide for Selection and Application of Default Assessment Endpoints and Indicator Species in Alaskan Ecoregions* (Ecoregions Working Group, 1999), the Lapland longspur is an appropriate terrestrial indicator species for the Arctic Slope ecoregion, which encompasses the former NARL. The Lapland longspur was chosen as a measurement species at the former BFTF to represent the invertivorous bird functional group. It was selected for the following reasons:

- The Lapland longspur represents an avian secondary consumer. This means that they eat prey (mostly soil macroinvertebrates) rather than vegetation.
- The exposure of Lapland longspurs to contaminants of potential ecological concern (COPECs) is potentially high because they consume large numbers of soil macroinvertebrates that may bioaccumulate or biomagnify the COPECs to a greater extent than vegetation.
- Lapland longspurs are also highly exposed to COPECs through the incidental ingestion of soil.
- Lapland longspur exposure data were available.

Table 3-1: Soil RBSLs for Terrestrial Food Web Receptors[1]

Analyte	Tundra Vole		Arctic Shrew		Arctic Fox		Snowy Owl		Lapland Longspur	
	Tier 1 RBSL	Refined RBSL	Tier 1 RBSL	Refined RBSL	Tier 1 RBSL	Refined RBSL	Tier 1 RBSL	Refined RBSL	Tier 1 RBSL	Refined RBSL
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Lead	1,750	7,000	651	2,604	920	46,000	1,260	126,000	16	124

Notes:

1. EA Engineering, Science, and Technology. 1999. Site Investigation and Risk Assessment Report for the Dry Cleaning Facility and Bulk Fuel Tank Farm at NARL, Point Barrow, Alaska, July.

Soil RBSL: Tier 1 risk-based screening level, equal to COPEC concentration in soil corresponding to a hazard quotient of 1.0, given receptor's intake from soil-related pathways (i.e., soil and diet) using generic exposure factors.

Refined RBSL: RBSLs are adjusted for exposure duration (3 months/year for longspurs) and site use factor (the area of contamination divided by the area of home range to a maximum of 1.0).

RBSL = risk based screening level; mg/kg = milligrams per kilogram; NARL = Naval Arctic Research Laboratory; COPEC = contaminants of potential ecological concern

The Tier 1 RBSLs shown in Table 3-1 used exposure parameters consistent with the conservative ecological exposure assumptions in ADEC guidance for screening-level ecological risk assessments (ADEC, 2018). However, ADEC guidance also allows replacing the conservative assumptions with site-specific information to develop cleanup

levels based on ecological risk. The refined RBSLs shown in Table 3-1 are based on site-specific exposure assumptions for each receptor.

The refined site-specific risk assessment based on the Lapland longspur resulted in an RBSL of 124 mg/kg for lead in surface soil that was protective of all receptors (EA, 1999). The assumptions and exposure factors used to develop the refined RBSL for the Lapland longspur were reviewed to ensure they were appropriate for the former NARL. The ingestion rate of food used in 1999 is appropriate as it agrees with the ingestion rate predicted by Nagy (2001) for a 31.3-gram passerine bird, which is within the reported body weight range of the Lapland longspur. While the home range of the Lapland longspur has changed with the increasing warming of the arctic region, its predicted distribution along the coastline near Utqiaġvik, Alaska, with increasing temperatures, is not expected to change (Audubon, 2021b). Thus, this species remains an appropriate receptor for evaluating ecological risk from lead exposure, and the assumptions regarding site exposure used in 1999 are still valid. The following criteria were used to develop the refined RBSL:

- To represent the Lapland longspur, a no-observed-adverse-effect level (NOAEL) obtained with quail was used (1.13 mg/kg body weight [bw]/day; Sample et al., 1996). This study encompassed the reproductive life stage, and as such, no uncertainty factor was applied to the Toxicity Reference Value (TRV).
- Terrestrial measurement groups (e.g., vegetation, invertebrates) were assumed to be directly exposed to onsite contaminants in soil, as in the Tier I assessment.

Site-specific receptor behavior, site use factors, and exposure duration are shown in Table 3-2. The exposure factors presented in Table 3-2 are consistent with the exposure factors in the approved 1999 risk assessment (EA Engineering, Science, and Technology, 1999).

Table 3-2: Refined Lead Exposure Factors for The Lapland Longspur Used to Calculate Soil Cleanup Level of 124 mg/kg for NARL[1]

Measurement Species Assessment/ Functional Group Habitat/Food Web	Lapland Longspur Invertivorous Small Bird Terrestrial	References/Assumptions
Exposure Factors	**Values**	
Bodyweight	27.3 g	Dunning (1993). Mean body weight
Home range	1 acre	
Site use factor	0.5	
Exposure duration	0.25	Fraction of year exposed to site
Insect ingestion rate	6.62 E-03 kg/day	50:50 herbivorous:carnivorous insects
Incidental soil ingestion rate	1.98 E-04 kg/day	
Percent of diet as insects	100	

Table 3-2: Refined Lead Exposure Factors for The Lapland Longspur Used to Calculate Soil Cleanup Level of 124 mg/kg for NARL[1] (continued)

Measurement Species Assessment/ Functional Group Habitat/Food Web	Lapland Longspur Invertivorous Small Bird Terrestrial	References/Assumptions
Exposure Factors	**Values**	
Percent of diet as soil	3	Soil ingestion rate/Insect ingestion rate
Soil-Insect uptake factor	0.271	Sample et al. (1999)
Toxicity Reference Value (TRV)	1.13 mg/kg/day	Sample et al. (1996)
Hazard Quotient Used as Basis for Soil Cleanup Level	1	EPA (1997)

Notes:
1. EA Engineering, Science, and Technology. 1999. Site Investigation and Risk Assessment Report for the Dry Cleaning Facility and Bulk Fuel Tank Farm at NARL, Point Barrow, Alaska, July.
Lapland Longspur range: Migratory species, in summer, lives over vast expanses of tundra north of tree line.
Lapland Longspur feeding: In summer, beetles, weevils, crane flies, mosquitoes, caterpillars, bugs, spiders, seeds of grasses, sedges; in winter, mostly weed seeds.
TRV = toxicity reference value; mg/kg = milligrams per kilograms; kg/day = kilograms per day; g = grams; NARL = Naval Arctic Research Laboratory; EPA = Environmental Protection Agency

In 2005, a collaborative effort of a multi-stakeholder workgroup consisting of federal, state, consulting, industry, and academic participants led by the United States Environmental Protection Agency (EPA) Office of Emergency and Remedial Response established ecological soil screening levels (Eco-SSLs) for a variety of substances. As part of this Eco-SSL effort, EPA issued *Screening Levels for Lead* (EPA, 2005), which included an updated avian TRV of 1.63 milligrams of lead per kilogram of body weight per day (mg lead/kg bw/day) and an updated mammalian TRV of 4.70 mg lead/kg bw/day. These TRVs are based on many toxicity studies, and they represent NOAEL based on growth and reproduction and were conservatively derived to avoid underestimating risk. The lead Eco-SSL for plants is 120 mg/kg, and the lead Eco-SSL for soil invertebrates is 1,700 mg/kg (EPA, 2005). The Eco-SSL document makes it clear that requiring a cleanup level based solely on Eco-SSL values would not be technically defensible.

The new avian TRV of 1.63 mg lead/kg bw/day (EPA, 2005) was calculated as the highest NOAEL, below the lowest-observable-adverse-effects level (LOAEL), of 54 toxicity studies with growth and reproduction endpoints that met EPA's quality assurance criteria. In contrast, the TRV of 1.13 mg lead/kg bw/day used to derive the 124 mg/kg RBSL for lead in surface soil was based on a single study (Sample et al., 1996). The 1.63 mg lead/kg bw/day avian TRV for lead is widely accepted and has been used as the basis for ecological risk assessments for more than 15 years.

Higher TRV values correlate with less risk, and recalculating the lead cleanup level with the newer TRV and the exposure parameters for the Lapland longspur shown in Table 3-2 would result in a lead soil cleanup level of 179 mg/kg. Thus, the 124 mg/kg cleanup

level is more conservative than the cleanup level calculated with the updated avian TRV.

Although 179 mg/kg would be a protective cleanup level for lead in surface soil, the Navy has conservatively chosen to use the 124 mg/kg RBSL calculated in 1999 as the revised remediation goal for lead in surface soil. The rationale for using the older calculation rather than updating the RBSL based on current toxicity criteria includes:

- The Navy and ADEC previously discussed using 124 mg/kg as the revised cleanup level, and this site-specific cleanup level was acceptable to both.
- The ecological risk assessment that underlies the 124 mg/kg RBSL for lead in surface soil was based on sound science and the best available toxicity criteria at the time.
- The 1999 ecological risk assessment was reviewed and accepted by all parties, and thus it is part of the existing administrative record for the former NARL.
- The Lapland longspur is still the most sensitive of the potential ecological receptors at the site, and the avian TRV used to calculate the RBSL for lead in 1999 is more conservative than the current TRV for this type of receptor and thus is protective of both human and ecological receptors.

The DD established cleanup criteria for the former BFTF based on risk-based criteria and regulatory criteria. The regulatory criteria identified by the DD constitute the applicable or relevant and appropriate requirements (ARARs) identified for the remedy. This ESD does not identify any new ARARs.

Soil remediation is not yet complete at the former BFTF, and this ESD is needed to update the soil cleanup level for lead so that the Navy will have more options for managing and reusing treated soil. An ESD is the appropriate means to document revisions to the lead cleanup level established for former BFTF soil in the DD (NARL-CT, 2002). The revised cleanup level for lead is a significant change but does not fundamentally alter the remedy's scope, performance, or cost. The method of treatment and remedial goals for COCs other than lead in the soil remains the same as those in the DD (NARL-CT, 2002). The remedy will continue to comply with the previously identified remedial action objectives for petroleum compounds. The new cleanup level for lead in soil is protective of human health and the environment, and it satisfies ARARs.

This page is intentionally blank.

4.0 Description of Significant Difference

The DD soil cleanup level for lead of 40.5 mg/kg was overly conservative and is significantly below the risk-based cleanup level that would be calculated using current scientific literature (see Section 3 for a discussion of the basis for the new cleanup level). The site-specific ecological risk assessment (EA, 1999) developed a more appropriate cleanup level for lead of 124 mg/kg based on the Lapland longspur. This cleanup level is more conservative than the 179 mg/kg cleanup level, resulting from recalculating the RBSL for the Lapland longspur using the more current and less conservative avian TRV from *Ecological Screening Levels for Lead* (EPA, 2005).

The new cleanup level for lead in surface soil is a risk-based goal intended to protect wildlife, but it also satisfied ARARs, including regulatory criteria established by ADEC to protect human health. Alaska regulations pertaining to cleanup levels for hazardous substances in soil are found in AAC at 18 AAC 75.341. These cleanup levels can be applied to all sites located in the Arctic Zone to establish human health-based cleanup levels. The 18 AAC 75.341 Table B2 criteria include a residential soil cleanup level of 400 mg/kg for lead and compounds. ADEC's Technical Memorandum *Establishing Arctic Zone Cleanup Levels* (ADEC, 2019) clarifies that the cleanup levels established for human health in 18 AAC 75.341 do not address the potential risk to ecological receptors or migration of contamination to surface water or sediment. Migration of surface soil was not identified as a pathway of concern for the former BFTF, and the new cleanup level for lead in surface soil is protective of both human health and wildlife.

The new cleanup level has the following benefits:

- The new cleanup level is protective of all current and potential human and ecological receptors that occur at the former NARL.
- The new cleanup level is based on a site-specific ecological risk assessment that used low TRVs based on NOAELs and indicator species recommended by ADEC for use in the Arctic Slope ecoregion. The cleanup level is protective of the most sensitive indicator species, the Lapland longspur.
- Because the lead cleanup level is based on NOAELs, the new lead cleanup level would be protective of even special status species if they were to occur at the site.
- The new cleanup level of 124 mg/kg complies with site ARARs, including the ADEC cleanup standard for lead in soil (400 mg/kg). The ADEC cleanup standard is based on residential use, which is generally considered protective of all human receptors, including the recreational visitors most likely to access the former BFTF. Thus, the new cleanup level supports unrestricted land use.

- The higher cleanup level will allow more flexibility in how the soil treated for hydrocarbons can be used and where it can be placed at the site.
- The new cleanup level will minimize the quantity of soil that must be buried or disposed of offsite.
- The new cleanup level will result in less treated soil exceeding the cleanup level for lead, thereby reducing the quantity of soil that requires special handling and disposal. This has the potential to reduce remedial costs and expedite site closure.

Based on the above rationale and benefits, this ESD revises the lead cleanup level for surface soil from 40.5 mg/kg to 124 mg/kg.

5.0 Agency Comments

ADEC comments and the Navy's response to comments and ADEC's letter of final approval are provided in Appendix A

This page is intentionally blank.

6.0 Statutory Determinations

The remedy for the former NARL BFTF, as modified by this ESD, continues to satisfy the statutory requirements of CERCLA Section 121 (42 USC 9621) for protection of human health and the environment and complies with federal and state requirements in the DD that are ARARs as required by the NCP Sections 300.430(f)(1)(ii)(B)(1) and (2).

This page is intentionally blank.

7.0 Public Participation Compliance

The preparation and public notice of this ESD are pursuant to Section 117(c) of CERCLA, as amended by the Superfund Amendment and Reauthorization Act of 1986, and pursuant to 40 CFR Section 300.435(c)(2)(i). In accordance with the NCP (CFR Section 300.825(a)(2)), this ESD will become part of the former NARL Administrative Record and will be available at the following locations:

OFFICIAL ADMINISTRATIVE RECORD LOCATION
Naval Facilities Engineering Command Systems Northwest
1101 Tautog Circle, Silverdale, WA 98315

REPOSITORY LOCATION
Iḷisaġvik College
Tuzzy Consortium Library
5421 North Star Street, Utqiaġvik, AK 99723

Hours are subject to change but are generally as follows:
Thursday and Friday: 1400–1800; Saturday: 1200–1600
Phone: (907) 852-4050

NARL ADMINISTRATIVE RECORDS WEBSITE
https://www.navfac.navy.mil/products_and_services/ev/products_and_services/env_restoration/administrative_records.html?p_instln_id=NARL

Following regulatory agency review, a notice of availability and a brief description of the ESD will be published in *The Arctic Sounder*, which is a major local newspaper of general circulation, as required by the NCP (CFR Section 300.435(c)(2)(i)(B)).

This page is intentionally blank.

8.0 References

Alaska Department of Environmental Conservation (ADEC). 2019. Technical Memorandum: Establishing Arctic Zone Cleanup Levels. April 4.

_____. 2018. *Risk Assessment Procedures Manual*. February 1.

_____. 2010. Approval of *Final 2008 Bulk Fuel Tank Farm Confirmation Sampling Report, NARL*. January 11.

Dunning, J. B. 1993. *Body Weights of 686 Species of North American Birds. Monograph No. 1.*, Western Bird Banding Association, May 1984, International Wildlife Rehabilitation Council, Reprint, Suisun, California.

EA Engineering, Science, and Technology. 1999. *Site Investigation and Risk Assessment Report for the Dry Cleaning Facility and Bulk Fuel Tank Farm at NARL, Point Barrow, Alaska*, July.

Ecoregions Working Group. 1999. *User's Guide for Selection and Application of Default Assessment Endpoints and Indicator Species in Alaskan Ecoregions*. June.

Efroymson, R.A., G.W. Suter, II, BE Sample, and DS. Jones. 1997. *Preliminary Remediation Goals for Ecological Endpoints*. Prepared for the US Department of Energy, Office of Environmental Management. August.

ICRC. 2004. *Final FY2004 Monitoring Project Plans - Former NARL Sites 5, 12 & 13, Barrow, Alaska*. June.

Nagy, K.A., 2001. Food requirements of wild animals: Predictive equations for free-living mammals, reptiles, and birds. Nutrition Abstracts and Reviews. Series B: Livestock Feeds and Feeding. Vol. 71(10):21-32.

NARL Cleanup Team (NARL-CT). 2002. *Decision Document for the Navy Arctic Research Laboratory, Bulk Fuel Tank Farm, Barrow, Alaska*. December.

National Audubon Society (Audubon). 2021a. Available at: https://www.audubon.org/field-guide/bird/american-woodcock. July.

_____. 2021b. Available at: https://www.audubon.org/field-guide/bird/lapland-longspur. July.

Sample, B.E., D. M. Opresko and G.W. Suter. 1996. *Toxicological Benchmarks for Wildlife: 1996 Revision*. Prepared for the US Department of Energy, Office of Environmental Management. Oak Ridge, Tennessee.

Sample, B.E., Beauchamp, J.J., Efroymson, R.A., Suter II, GW 1999. *Literature-derived Bioaccumulation Models for Earthworms: Development and Validation*. Environmental Toxicology and Chemistry, vol. 18: 2110-2120. 1999.

United States Environmental Protection Agency (EPA). 2005. *Ecological Screening Levels for Lead*. March.

_____. 1997. Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments. June.

United States Department of the Navy (Navy). 2021. *Former Barrow Bulk Fuel Tank Farm (Site 13) Remedial Action - Former Naval Arctic Research Laboratory, Utqiaġvik, Alaska* (draft). April.

_____. 2018. *Third Five-Year Review, Naval Arctic Research Laboratory, Barrow, Alaska*. Prepared by Naval Facilities Engineering Command Northwest. Silverdale, Washington. November.

_____. 2013. *Final Second Five-Year Review Airstrip (Site 5), Powerhouse (Site12), and BTFT (Site 13) Former NARL, Barrow, Alaska. April 16.*

_____. 2009. *2008 Bulk Fuel Tank Farm Confirmation Sampling Report, NARL Former Bulk Fuel Tank Farm*. Prepared by SES-TECH for Naval Facilities Engineering Command Northwest. June.

_____. 2008. *First Five-Year Review Airstrip (Site 5), Powerhouse (Site 12), and Bulk Fuel Tank Farm (Site 13), Naval Arctic Research Laboratory, Barrow, Alaska*. June 3.

_____. 2006. *2006 Bulk fuel Tank Farm, Landfarm Confirmation Sampling Report, Naval Arctic Research Laboratory, Barrow, Alaska*. Prepared by ICRC/Clarus Environmental Services for Naval Facilities Engineering Command Northwest. October 2006.

_____. 2004a. *Closure Report for Environmental cleanup, Site 13/12, NARL Facility, Barrow, Alaska*. Prepared by AGVIQ Environmental Services for EFA NW. April.

_____. 2004b. *Summary Report, Landfarming Project, Hot Air Vapor Extraction Project, Site 13, Bulk Fuel Tank Farm, Former Barrow NARL, Barrow, Alaska*. Prepared by EFA NW. Undated, presumed 2004. NIRIS No. 65226.000542.

URS Greiner, Inc (URS). 2000. *Final NARL Environmental Site Status Report, Former NARL, Barrow, Alaska*. July

Figures

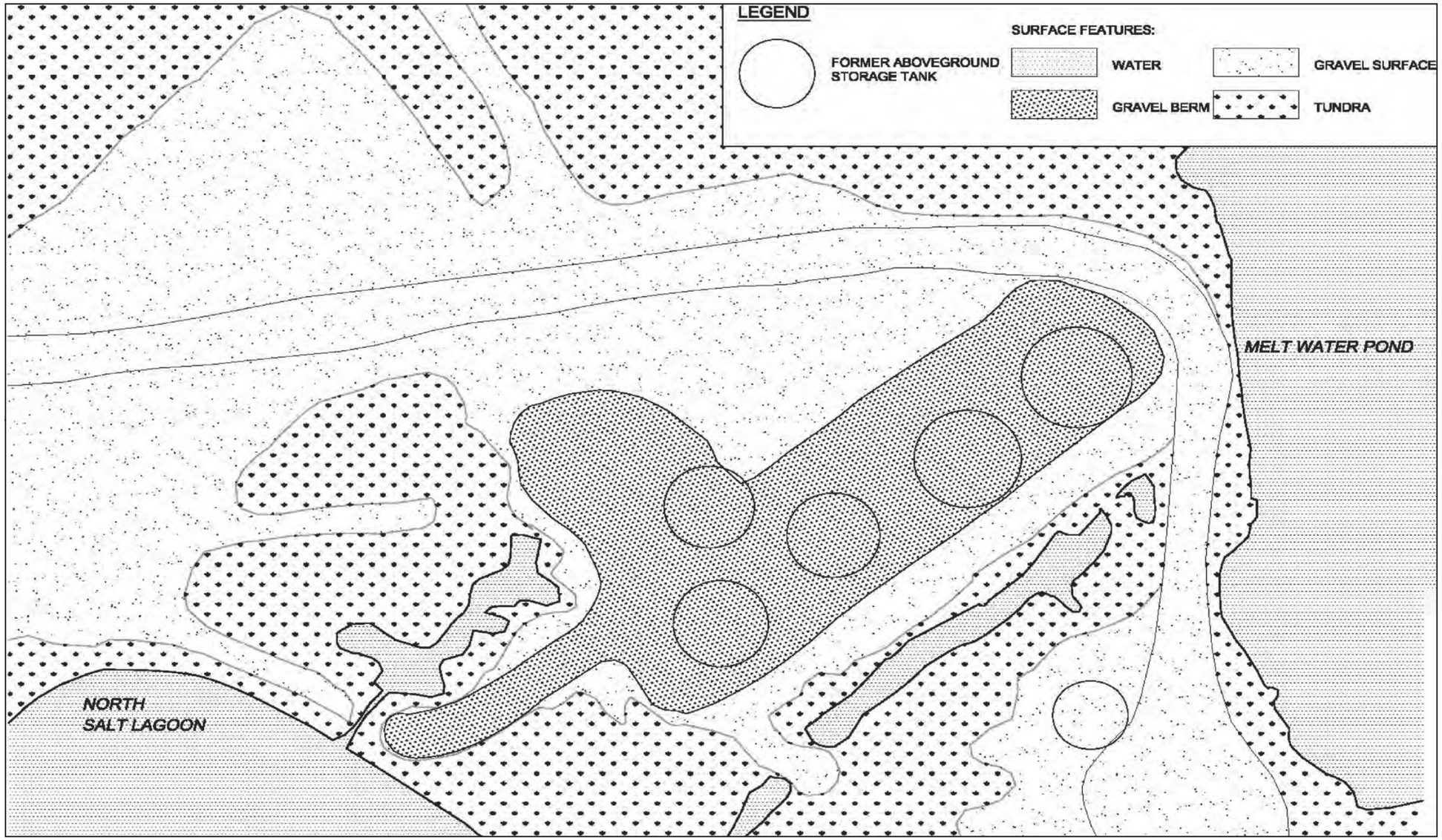
This page is intentionally blank.

Aerial image: DCRA Community Mapping 2014	NAVFAC		EXPLANATION OF SIGNIFICANT DIFFERENCES REVISED REMEDIAL GOAL FOR LEAD FORMER NARL, UTQIAĠVIK, ALASKA	DATE: NOVEMBER 2022 SCALE: 1 " = 3,000 ' PROJECT NO.: N4425521F4063 FIGURE: 1
	Wood Environment & Infrastructure Solutions, Inc. 15862 SW 72nd Ave., Suite 150 Portland, OR 97224		FORMER NARL VICINITY MAP	

DRAWN BY: SD CHECKED BY: TW

K:\13000\13600\13636\136361 - Barrow\13.0 GIS\Figure 1 - Former NARL Vicinity Map.mxd - stephane.descombes - 8/23/2022 - 1:42:16 PM

This page is intentionally blank.



Source: Decision Document for the Navy Arctic Research Laboratory, Bulk Fuel Tank Farm, Barrow, Alaska. (NARL Cleanup Team, 2002)

NAVFAC

Wood Environment & Infrastructure Solutions, Inc.
15862 SW 72nd Ave., Suite 150
Portland, OR 97224

EXPLANATION OF SIGNIFICANT DIFFERENCES
REVISED REMEDIAL GOAL FOR LEAD
FORMER NARL, UTQIAĠVIK, ALASKA

BULK FUEL TANK FARM - SITE 13

DATE: NOVEMBER 2022
SCALE: 1 " = 75 '
PROJECT NO.: N4425521F4063
FIGURE: 2

DRAWN BY: SD CHECKED BY: TW

K:\13000\13600\13636\136361 - Barrow\13.0 GIS\Figure 2 - Bulk Fuel Tank Farm.mxd - stephane.descombes - 8/23/2022 - 1:43:05 PM

This page is intentionally blank.

Aerial image:
DCRA Community Mapping 2014
Source: United States Department of the Navy (Navy). 2021. *Former Barrow Bulk Fuel Tank Farm (Site 13) Remedial Action - Former Naval Arctic Research Laboratory, Utqiaġvik, Alaska* (draft). April.

NAVFAC

Wood Environment & Infrastructure Solutions, Inc.
15862 SW 72nd Ave., Suite 150
Portland, OR 97224

EXPLANATION OF SIGNIFICANT DIFFERENCES
REVISED REMEDIAL GOAL FOR LEAD
FORMER NARL, UTQIAĠVIK, ALASKA

PROJECT SITE MAP & AREAS OF CONCERN

DATE: NOVEMBER 2022
SCALE: 1 " = 250 '
PROJECT NO.: N4425521F4063
FIGURE: 3

DRAWN BY: SD CHECKED BY: TW

\\woodplc.net\Wood\US\POR\ClientData\13000\13600\136361\136361 - Barrow\13.0 GIS\Figure 3 - Project Site Map.mxd - patrick.mccarthy - 6/14/2022 - 2:21:40 PM

This page is intentionally blank.

Appendix A:
Response to Regulatory Comments

This page is intentionally blank.

THE STATE of ALASKA
GOVERNOR MIKE DUNLEAVY

Department of Environmental Conservation
SPILL PREVENTION & RESPONSE
Contaminated Sites Program
610 University Avenue
Fairbanks, Alaska 99709
Main: 907.451.2143
Fax: 907.451.2155
www.dec.alaska.gov

File: 310.38.016

December 22, 2021

Electronic Delivery Only
Annette Sackman-Franzen, Remedial Project Manager
NAVFAC NW
1101 Tautog Circle, Suite 203
Silverdale, WA 98315-1101

RE: DEC Comments for the *Explanation of Significant Differences – Revised Remedial Goal for Lead*, *NARL former Bulk Fuel Tank Farm (BFTF),* dated September 2021

Dear Ms. Sackman-Franzen:

The Alaska Department of Environmental Conservation (ADEC) has completed review of the responses to comments for the above-referenced document. This document presents the revised lead cleanup level for soils using an ecological receptor more appropriate for the Alaskan Arctic region and the former BFTF.

ADEC is supportive of the proposed lead value of 124 mg/kg as the risk-based screening level (RBSL) for the Lapland Longspur, as it is within the range of the no-observed-adverse-effect-level (NOAEL) and the lowest-observable-adverse-effects-level (LOAEL). However, ADEC disagrees with the framework for selecting the cleanup value. See comment #6 in the attached table.

The comments to #6 - #8 are provided to document ADEC's position but require no further response or resolution. Please incorporate the changes from other comments into the text, include the comment/response matrix as an appendix, finalize the document, and provide ADEC with a copy for formal approval. If there are any comments or questions, please contact cascade.galasso-irish@alaska.gov or (907) 451-2181.

Sincerely,

Cascade Galasso
Environmental Program Specialist

Enclosures: DEC Comment Table

cc (via email): Dennis Shepard, ADEC
Melinda Brunner, ADEC

ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION CONTAMINATED SITES PROGRAM

Document: Explanation of Significant Differences – Revised Remedial Goal for Lead, NARL BFTF Site 13, Utqiagvik, AK
File No: 310.38.016

Comment No.	Page/ Section	DEC Comment/Recommendation 10/15/2021	Response 12/07/2021
1.	Page 1-1, 1.1	*"…and ~~is generally consistent~~ complies with procedures set forth by the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)…"* 1. This statement suggests the document is only consistent with CERCLA procedures, not complying with CERCLA. Please clarify if the ESD complies with CERCLA. 2. Please revise the above statement with the suggested edits, if appropriate.	The document complies with CERCLA. The requested revision has been made to the document text. ***Agree 12/21/2021***
2.	Page 1-1, 1.3	*"This ESD ~~is consistent~~ complies with CERCLA…"* 1. This statement suggests the document is only consistent with CERCLA procedures, not complying with CERCLA. Please clarify if the ESD complies with CERCLA. 2. Please revise the above statement with the suggested edits, if appropriate.	The document complies with CERCLA. The requested revision has been made in the report text. ***Agree 12/21/2021***
3.	Page 2-2, 2.1	Please include additional details regarding lead contaminated soils at the former BFTF site.	The following information regarding lead concentrations in soil has been added to the last bullet in Section 2.3 of the report, where the results of the 2019 sampling and remedial action are summarized: "Lead concentrations in soil samples collected prior to excavation ranged from 3.0 to 460 mg/kg," and "Lead concentrations in post-excavation soil samples ranged from not detected (below 0.15) to approximately 440 mg/kg." ***Agree 12/21/2021***
4.	Page 2-4, Table 2-1, note 1	*"The 18 AAC 75.341 Table ~~B2~~ B1 criteria include a residential soil cleanup level…"* Please revise the above statement with the suggested edits.	The requested revision has been made to the document text. ***Agree 12/21/2021***

ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION CONTAMINATED SITES PROGRAM

Agree 12/21/2021

5.	Page 2-5, 2.3	*"...sampled for DRO using multi-incremental techniques ~~developed by ADEC~~."* Please revise the above statement with the suggested edits.	The requested revision has been made to the document text. ***Agree 12/21/2021***
6.	Page 3-2, Table 3-1	The following footnote was provided in the cited 1999 site specific risk assessment: "Refined RBSL: RBSLs are adjusted for exposure duration (3 mo/yr for small mammals and longspur) and site use factor (see Appendix C)." The refinement of the area use factor (0.5) and exposure duration (ED) (1/4) are the two most sensitive exposure parameters in the site-specific alternative cleanup level (ACL) development for the Lapland Longspur as it raised the risk-based screening level (RBSL) from 16 to 124 mg/kg lead. Please document how these values, area use factor (AUF) and ED were determined and any potential uncertainties associated with them. This information should be discussed within the text of the ESD. In addition, please document the ED (from the dose response study) that was used with the cited toxicity reference value (TRV) of 1.13 mg/kg/day (Sample et al., 1996)[1] for comparison with the refinement in reducing the ED to 0.25. Please see the excerpt from the 1996 Sample et al. report at the bottom of this comment table. Since the study exposure duration was 12 weeks (3 months), at a critical stage for the effect, the site-specific ED of 0.25 reduction in exposure doesn't seem appropriate for the reproductive effect, since it effectively takes what was a 12 week exposure used in the dose response study and reduces it by 0.75. The RBSL of 16 mg/kg lead developed for longspur with the AUF refinement would be 32 mg/kg lead for the no-observed-adverse-effect-level (NOAEL) TRV. Using the TRV information in the table below (from Sample et al) with the lowest observable adverse effects level (LOAEL), the RBSL would be refined to 320 mg/kg for lead. RBSL with area use factor of 0.5 and the 1999 risk assessment exposure parameters for longspur would be: NOAEL = 32 mg/kg LOAEL= 320 mg/kg Due to the nature of dose-response relationships, a selective RBSL ranging from 32-320 mg/kg lead would be appropriate. EPA Greenberg and Charters provides a framework for selecting a cleanup value within a risk range at http://proceedings.ndia.org/jsem2007/4039_Greenberg.pdf	The AUF included in the ESD is consistent with the AUF used in the approved 1999 site-specific risk assessment. The ED of 0.25 is appropriate as a fraction of each year the Lapland longspur spends at the site. This equates to 3 months on site. The 12-week study of the Japanese quail was the basis for calculation of the LOAEL and NOAEL, and is not related to determination of the ED. ***ADEC Response**:* *The TRV from the respective study had an exposure duration (ED) of 12 weeks or approximately 3 months for the threshold reproductive effect. The proposed 3 month ED at the site for longspur because of migration off site for the remaining 9 months reduced the exposure (1/4) is not sound due to the fact the 3 month period falls within the threshold level effect to occurred during the breeding season.* *Plus, the remaining 9 months also assume there is no lead exposure during the migration period. The uncertainty with the assumption would need to be considered.* *Without application of the additional dilution of the ED with the migration the NOAEL would be = 32 mg/kg and additional refinement to the LOAEL = 320 mg/kg with the LOAEL TRV. Since 124 mg/kg falls within the range ADEC would be supportive of the ACL but not concur on using the migration to dilute the exposure.* *The Greenberg information was to provide guidance and transparency on selecting a value in the respective range of the 32-320 mg/kg noted. Please also beware that the preliminary remediation goal for the woodcock did not dilute*

[1] Sample, B.E., Opresko, D.M. & Suter, G.W., 1996. *Toxicological Benchmarks for Wildlife: 1996 Revision*, Risk Assessment Program, Health Sciences Research Division, Oak Ridge, Tennessee.

ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION CONTAMINATED SITES PROGRAM

6. (continued)	Page 3-2, Table 3-1 (continued)	ADEC is supportive of the proposed lead value of 124 mg/kg for longspur; however, the process of reducing the ED by 0.25 may not be the most sound based on: 1) TRV duration suggested sufficient time for body burden of lead to develop that would be associated with reproductive effects 2) ED of 0.25 seem to be based off migration but doesn't account for return of the species back to the site and body burden level obtain from remaining sites visited 0.75 (assume 0 lead exposure). Breeding season also occur during the summer months. Recommend revising the text in the ESD to select the 124 mg/kg RBSL based on the framework for selecting a cleanup value cited above, and in consideration of the Navy's previous risk assessment.	*the exposure to lead with area use factor and migration off site for the woodcock in the 40.5 mg/kg NOAEL that was selected. The longspur NOEAL without the dilutions would be 16 mg/kg for an apple to apple comparison of the receptors.* It is not clear what advantage would be gained by using the Greenberg and Charters framework for selecting a cleanup value. The soil cleanup value for lead of 124 mg/kg was based on a site-specific risk assessment approved by ADEC. The purpose of this ESD is to gain regulator approval to use the 124 mg/kg cleanup value (as opposed to the 40.5 mg/kg Preliminary Remediation Goal in the Record of Decision [ROD], which was based on an inappropriate receptor and unnecessarily conservative), and to verify that the 124 mg/kg cleanup value remains protective when compared to current toxicity values. The new cleanup level for lead in soil is protective of human health and the environment, as stated and technically supported in the Draft ESD. The Navy greatly appreciates the effort that the reviewer has taken for this response. Given that the proposed value falls within the risk range used by the "Rule of Five" recommended approach further verifies its protectiveness. ***ADEC agrees with the proposed lead value of 124 mg/kg for the RBSL, 12/21/2021.***
7	Page 3-3, Table 3-2	Please indicate if these exposure factor values are based on average, upper/lower confidence limit, or minimum/maximum.	The exposure factor values are consistent with the approved 1999 risk assessment. A statement to this effect has been added to the report Section 3.0, just prior to Table 3-2: "The exposure factors presented in Table 3-2 are consistent with the exposure factors in the approved 1999 risk assessment (EA Engineering, Science, and Technology, 1999)." ***ADEC Response:*** *the information is relevant to the proposed ACL and should be included in the text.*

ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION CONTAMINATED SITES PROGRAM

8	Page 3-3, Table 3-2	Please see Table H-5 at the bottom of this comment table, excerpted from the 1999 *Final Site Investigation and Risk Assessment Report for the Dry Cleaning Facility and Bulk Fuel Tank Farm at NARL, Point Barrow, Alaska* The table includes a water ingestion rate. It is not clear if the 124 mg/kg value in the 1999 Risk Assessment incorporated the water pathway. Table 3-2 of the submitted *Explanation of Significant Differences* (ESD) includes 3% of diet as soil for the Lapland longspur, but this value is not included in Table H-5 of the 1999 Risk Assessment. Please discuss the difference between the tables and clarify what is included in the current RBSL of 124 mg/kg.	A water ingestion rate was provided in the 1999 risk assessment but it was not used in the exposure calculations. There is no surface water on site. The 1999 risk assessment did not provide the percentage of diet as soil, although insect and soil ingestion rates were provided in Appendix H, Table H-5. The 3% value for soil in diet in the ESD was calculated by dividing the incidental soil ingestion rate by the insect ingestion rate and included for completeness. However, this value was not used in calculation of the cleanup level. ***ADEC Response:*** *Please document the information in the report.*

ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION CONTAMINATED SITES PROGRAM

9	Page 4-1, 4.0	*"Migration of surface soil was not identified as a pathway of concern for the former BFTF, and the new cleanup level for lead in surface soil is protective of both human health and wildlife."* 1. Please clarify what is meant by "migration of surface soil." 2. Considering the proximity of this site to nearby surface waters, what is the likelihood of lead in surface soils migrating to surface water and sediments through runoff?	This ESD is not intended to re-evaluate fate and transport processes, and it relies upon previous documentation regarding such issues. Migration of surface soil typically occurs via entrainment in site runoff or aerial transport. Particle transport is a potential migration pathway for lead in surface soil, but site conditions impact the importance of these processes. Previous risk assessments and protectiveness evaluations for the BFTF did not identify surface water runoff or aerial transport as migration pathways of concern that pose unacceptable risk to human health or the environment. The remedial goal for lead is based on protecting ecological receptors, and the ecological risk assessment in the *Site Investigation and Risk Assessment Report* (EA, 1999) indicated that the primary transport mechanism of ecological significance at the BFTF site is transport of onsite active-zone water to offsite locations. The 1999 report identified off-site transport of surface soil via surface water runoff was a potentially complete pathway for terrestrial receptors exposed to off-site soil but indicated that exposures associated with this pathway would be minor compared with on-site soil exposures. None of the Five-Year Reviews, which take current conditions into consideration, have identified surface runoff from the BFTF as an exposure pathway of concern. Thus, the statement accurately reflects previous characterizations of site risk. Lead concentrations in sediment have been monitored annually in North Salt Lagoon since 2008. Data from the most recent Five-Year Review (Battelle, 2018) indicate that although low levels of lead are detected at all three sediment sampling locations, sediment concentrations have never exceeded the current ecological risk-based soil cleanup level of 40.5 mg/kg or the lead threshold effect level of 30.2 mg/kg, and lead concentrations in sediment are generally considered stable. ***Agree 12/21/2021***

ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION CONTAMINATED SITES PROGRAM

Information referenced in Comment No. 7
From Sample et. al
Toxicological Benchmarks for Wildlife: 1996 Revision

Compound: Lead
Form: Acetate
Reference: Edens et al. 1976
Test Species: Japanese Quail
Body weight: 0.15 kg (from Vos et al. 1971)
Food Consumption: 0.0169 kg/d (calculated using allometric equation from Nagy 1987)
Study Duration: 12 weeks
(>10 weeks and during a critical lifestage = chronic)
Endpoint: reproduction
Exposure Route: oral in diet
Dosage: four dose levels:
1, 10, 100, and 1000 ppm Pb; NOAEL = 10 ppm Pb
Calculations:

$$\text{NOAEL: } \left(\frac{10\,\text{mg Pb}}{\text{kg food}} \times \frac{16.9\,\text{g food}}{\text{day}} \times \frac{1\,\text{kg}}{1000\,\text{g}} \right) / 0.15 \text{ kg BW} = 1.13 \text{ mg/kg/d}$$

$$\text{LOAEL: } \left(\frac{100\,\text{mg Pb}}{\text{kg food}} \times \frac{16.9\,\text{g food}}{\text{day}} \times \frac{1\,\text{kg}}{1000\,\text{g}} \right) / 0.15 \text{ kg BW} = 11.3 \text{ mg/kg/d}$$

Comments: While egg hatching success was reduced among birds consuming the 100 ppm Pb dose, reproduction was not impaired by the 10 ppm Pb dose. Because the study considered exposure over 12 weeks and throughout a critical lifestage (reproduction), these values were considered to be chronic LOAELs and NOAELs.
Final NOAEL: 1.13 mg/kg/d
Final LOAEL: 11.3 mg/kg/d

ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION CONTAMINATED SITES PROGRAM

Table referenced in Comment No. 9

Table H-5 from the 1999 *Final Site Investigation and Risk Assessment Report for the Dry Cleaning Facility and Bulk Fuel Tank Farm at NARL, Point Barrow, Alaska*

TABLE H-5 - EXPOSURE FACTORS FOR THE LAPLAND LONGSPUR, NARL TIER 1 ASSESSMENT

Measurement species	**Lapland longspur**
Assessment/Functional group	**Insectivorous small bird**
Habitat/Food web	**Terrestrial**

Exposure Factors	Values	References/Assumptions
Body weight	27.3 g	Williamson in Bent et al. 1968 in Terres 1991
Home range	1 acre	
Site use factor (default Tier 1)	1	
Refined site use factor	0.5	Fraction of home range exposed
Exposure duration	1	
Adjusted exposure duration	0.25	Fraction of year of exposure
Water ingestion rate	5.29 E-03 L/day	
Insect ingestion rate	6.62 E-03 kg/day	50:50 herbivorous:carnivorous insects
Incidental soil ingestion rate	1.98 E-04 kg/day	
Percent of diet as insects	100	
Percent of diet as soil		
Insect-soil bioaccumulation factor	chemical-specific	
Concentration in water	chemical-specific	
Concentration in soil	chemical-specific	

This page is intentionally blank.