U.S. Army Material Command

U.S. Army Installation Management Command

Decision Document

Sears Creek Station
Petroleum Only and No Further Action Sites

Final

Prepared By

United States Army

U.S. ARMY GARRISON ALASKA

March 2025

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List of Acronyms and Abbreviations

°F	degrees Fahrenheit
AAC	Alaska Administrative Code
ACL	alternative cleanup level
ADEC	Alaska Department of Environmental Conservation
AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirement

AST	aboveground fuel tank
bbl	barrel
bgs	below ground surface
BHC	benzene hexachloride
BTEX	benzene, toluene, ethylbenzene, and total xylenes
BTV	background threshold value
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	contaminant of concern
COPC	chemical of potential concern
CSM	conceptual site model
DD	Decision Document
DERP	Defense Environmental Restoration Program
DRO	diesel range organics
ECO-SSLs	Ecological Soil Screening Levels
EDB	1,2-dibromoethane
EPA	U.S. Environmental Protection Agency
ERA	ecological risk assessment
FS	Feasibility Study
ft	foot/feet
GRO	gasoline range organic
HFP	Haines-Fairbanks Pipeline
HHERA	human health and ecological risk assessment
HHSRA	human health screening risk assessment
HI	Hazard Index
HQ	hazard quotient
ISCO	in-situ chemical oxidation
LOD	limit of detection
LOQ	Limit of Quantitation
LUC	land use control
MDC	maximum detected concentration
mg/kg	milligrams per kilogram
NCP	National Contingency Plan
OIT	Organic Incineration Technology
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PID	photoionization detector
ppmv	parts per million by volume
RAO	remedial action objective
RAPM	Risk Assessment Procedures Manual
RCRA	Resource Conservation and Recovery Act
RI	remedial investigation
RRO	residual range organic
RSL	Regional Screening Level
SARA	Superfund Amendments and Reauthorization Act

SCS	Sears Creek Station
SRI	Supplemental Remedial Investigation
SVOC	semi-volatile organic compound
TBC	to be considered
TCR	target cancer risk
TEQ	toxicity equivalent quotient
TMV	toxicity, mobility, and volume
THQ	target hazard quotient
USC	United States Code
UST	underground storage tank
UU/UE	unlimited use / unrestricted exposure
VOC	volatile organic compound
VMP	vapor monitoring point
WSW	Water Supply Well

PART I – DECLARATION

SITE NAME AND LOCATION

Facility Name:	Sears Creek Station (SCS), Alaska – U.S. Army Garrison Alaska
Site Location:	Milepost 1374 Alaska Highway, Alaska
SEMS ID Number:	Not Applicable
Sites:	Valve Manifold Building Area of Concern (AOC), Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower) AOC, Drum Storage Area AOC, Dewatering Tower AOC, Disposal Line AOC, Diesel Transfer Pump AOC, Aboveground Fuel Tanks (ASTs) AOC, Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOC, Underground Storage Tanks AOC, Composite Building AOC, Composite Building Sump AOC, Scraper Trap AOC, and Warehouse Building AOC

STATEMENT OF BASIS AND PURPOSE

This Decision Document (DD) presents the selected remedies for thirteen AOCs located at SCS, Alaska, which were chosen in accordance with 18 Alaska Administrative Code (AAC) 75. The U.S. Army has followed the general process outlined in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986 and, to the extent practicable, the National Contingency Plan (NCP). This decision is based on the Administrative Record for this site.

The U.S. Army is managing the SCS by following the Defense Environmental Restoration Program (DERP) Management Manual (USDoD, 2012) for remediation of contamination at the Valve Manifold Building AOC, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower) AOC, Drum Storage Area AOC, Dewatering Tower AOC, Disposal Line AOC, Diesel Transfer Pump AOC, ASTs AOC, Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOC, Underground Storage Tanks AOC, Composite Building AOC, Composite Building Sump AOC, Scraper Trap AOC, and Warehouse Building AOC.

The U.S. Army has selected the remedies for the above referenced AOCs. The Alaska Department of Environmental Conservation (ADEC) concurs with the selected remedies.

ASSESSMENT OF SITE

The SCS (**Figure 1-1**) is comprised of 17 AOCs (**Figure 1-2**), outlined in Section 1.1 of this DD. This DD addresses 13 of the 17 AOCs, three AOCs identified as containing petroleum pollutants or contaminants or a petroleum release related to waste management practices to be addressed under 18 AAC 75, and closure of 10 AOCs. Three AOCs were addressed in the Final Record of Decision (U.S. Army, 2024) and one AOC was previously closed under the Class V Underground Injection. **Figure 1-2** presents the location and outlines the decision document that is applicable to each AOC.

The U.S. Army response actions will integrate the Alaska State Regulations into the U.S. Army's response. Contaminants of concern (COCs), including the petroleum-only source areas from waste management activities, will be managed, and cleaned up under 18 AAC 75 response action. The off-site treatment and disposal of petroleum-only contaminated soil (non-CERCLA) is not subject to the U.S. Environmental Protection Agency (EPA) Off-Site Rule under 40 Code of Federal Regulation (CFR) 300.440.

The response actions selected in this DD are necessary to protect public health or welfare or the environment from actual or threatened releases of petroleum-only hazardous substances into the environment or pollutants or contaminants from the site which may present an imminent and substantial endangerment to public health or welfare. The three AOCs covered by this DD are located above the Site-Wide Groundwater AOC, which is documented in the Final Record of Decision (U.S. Army, 2024). The Site-Wide Groundwater AOC has hazardous substances and contaminants that are expected to remain in the groundwater above levels that would support unlimited use and unrestricted exposure (UU/UE), for an estimated 20 years. Land use controls (LUCs) will be imposed to restrict access and use and/or exposure to groundwater contaminated above cleanup levels.

DESCRIPTION OF SELECTED REMEDIES

Remedial alternatives for the SCS AOCs to be addressed under 18 AAC 75 were developed and evaluated through a Feasibility Study (FS) (U.S. Army, 2020). Based on the results of the FS, the U.S. Army selected the following remedies for the three AOCs requiring action in this DD:

- **Valve Manifold Building AOC.** LUCs and soil excavation with off-site treatment of petroleum contaminated soil exceeding cleanup levels. LUCs will be used to limit site access until the soil excavation remedy has been completed. Soils exceeding cleanup level will be transported to an offsite treatment facility. Soil confirmation samples will be collected from the base and sidewalls of the excavation footprint to confirm cleanup levels are achieved. Upon achievement of cleanup levels, the excavation will be backfilled with clean fill material and LUCs will no longer be necessary.

- **Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower) AOC.** LUCs and soil excavation with off-site treatment of petroleum contaminated soil exceeding cleanup levels. LUCs will be used to limit site access until the soil excavation remedy has been completed. Soils exceeding cleanup level will be transported to an offsite treatment facility. Soil confirmation samples will be collected from the base and sidewalls of the excavation footprint to confirm cleanup levels are achieved. Upon achievement of cleanup levels, the excavation will be backfilled with clean fill material and LUCs will no longer be necessary.

- **Drum Storage Area AOC.** LUCs and soil excavation with off-site treatment of petroleum contaminated soil exceeding cleanup levels. LUCs will be used to limit site access until the soil excavation remedy has been completed. Soils exceeding cleanup level will be transported to an offsite treatment facility. Soil confirmation samples will be collected from the base and sidewalls of the excavation footprint to confirm cleanup levels are achieved. Upon achievement of cleanup levels, the excavation will be backfilled with clean fill material and LUCs will no longer be necessary.

The remaining 10 AOCs addressed in this DD do not require further action and will be closed under this DD.

STATUTORY DETERMINATIONS

The selected remedies are protective of human health and the environment, comply with promulgated requirements that are applicable or relevant and appropriate to the remedial action, and are cost effective. The selected remedies also represent the maximum extent to which permanent solutions can be used in a practicable manner at a site and provide the best balance or trade-offs in terms of balancing criteria.

The NCP establishes the expectation that treatment will be used to address the principal threats posed by a site whenever practicable [40 CFR 300.430 (a)(1)(iii)(A)] to permanently and significantly reduce the toxicity, mobility, or volume of hazardous contaminants. The selected remedies for the Valve Manifold Building AOC, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower) AOC, and the Drum Storage Area AOC satisfy the statutory preference for treatment as a principal element of the remedy, because soil contamination will be removed and treated at an off-site facility.

It is important to note that a selected remedy may change somewhat as a result of the remedial design and construction processes. Changes, if they occur, to a remedy as described in this DD will be documented using a technical memorandum in the Administrative Record or a DD amendment.

The selected remedies for the Valve Manifold Building AOC, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower) AOC, and the Drum Storage Area AOC at the SCS will not result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for UU/UE and, as such, a Periodic Review will not be required for the remedial actions at these AOCs.

AUTHORIZING SIGNATURES

The following signature sheets document the U.S. Army's approval of the remedy selected in this DD for SCS, Alaska, and indicates ADEC agreement that the selected remedies, when properly implemented, comply with state law.

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Agency Selection
Petroleum Only and No Further Action Decision Document,
Sears Creek Station, Alaska

This signature sheet documents the U.S. Army selection of the remedies contained in the Decision Document for the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), Drum Storage Area, Dewatering Tower, Disposal Line, Diesel Transfer Pump, Aboveground Fuel Tanks, Fuel Lines (associated with the Aboveground Fuel Tanks and Diesel Transfer Pump), Underground Storage Tanks, Composite Building, Composite Building Sump, Scraper Trap, and Warehouse Building Areas of Concern at Sears Creek Station, Alaska.

Jason A. Cole
Colonel, U.S. Army
Commander, Fort Wainwright, Alaska

9 April 2025
Date

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ADEC Concurrence Page
Petroleum Only and No Further Action Decision Document,
Sears Creek Station, Alaska

The Alaska Department of Environmental Conservation concurs that proper implementation of the selected remedies will comply with state environmental laws. This decision will be reviewed and will be modified in the future if information becomes available that indicates the presence of contaminants or exposures that may cause unacceptable risk to human health, welfare, safety, or the environment.

Digitally signed by Dennis Shepard
Date: 2025.04.14 10:58:10 -08'00'

4/14/2025

Dennis Shepard
Environmental Program Manager
Contaminated Sites Program, Federal Facilities Section
Alaska Department of Environmental Conservation

Date

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PART II – DECISION SUMMARY

1.0 INTRODUCTION TO SEARS CREEK STATION

The Decision Summary identifies the selected remedies, explains how the remedies fulfill statutory and regulatory requirements, and provides a substantive summary of the Administrative Record file that supports the remedy selection decision.

1.1 SITE NAME, LOCATION, AND DESCRIPTION

The SCS site is located at Milepost 1374 on the Alaska Highway, approximately 50 miles southeast of Delta Junction, Alaska, and 60 miles northwest of Tok, Alaska (**Figure 1-1**). The SCS consists of the following 17 AOCs (**Figure 1-2**):

- Burn Pit (addressed in the Final Record of Decision [U.S. Army, 2024]).
- Dry Well (addressed in the Final Record of Decision [U.S. Army, 2024]).
- Site-Wide Groundwater (addressed in the Final Record of Decision [U.S. Army, 2024]).
- Valve Manifold Building (addressed in this DD).
- Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower) (addressed in this DD).
- Drum Storage Area (addressed in this DD).
- Dewatering Tower (closure documented in this DD).
- Disposal Line (closure documented in this DD).
- Diesel Transfer Pump (closure documented in this DD).
- Aboveground Fuel Tanks (ASTs) (closure documented in this DD).
- Fuel Lines (associated with the ASTs and diesel transfer pump) (closure documented in this DD).
- Underground Storage Tanks (USTs) (closure documented in this DD).
- Composite Building (closure documented in this DD).
- Composite Building Sump (closure documented in this DD).
- Scraper Trap (closure documented in this DD).
- Warehouse Building (closure documented in this DD).
- Septic Tank/Leach Wells (closure documented in the *Class V UIC Well Closure Report, Revision 1* [Bristol, 2016a]).

The SCS was a booster station for the Haines-Fairbanks Pipeline (HFP) and operated between 1961 and 1973. The SCS was one of six booster stations utilized to increase the pressure and flow through the pipeline, to a maximum flow of 27,500 barrels per day. The pipeline and pumping station were deactivated in 1973. The SCS is accessed from the Alaska Highway and the perimeter of the site is fenced and secured with a locked gate (a new perimeter chain link fence and gate were installed in 2007). The land surrounding the SCS is owned by the State of Alaska Department of Natural Resources. A gravel pit used by the State of the Alaska Department of Transportation and Public Facilities is located to the northwest of the SCS.

As the lead agency for remedial activities, the U.S. Army has conducted environmental restoration at SCS in accordance with CERCLA under DERP, which was established by Section 211 of SARA of 1986 and codified by 10 United States Code (USC) Sections 2701 et seq. ADEC provides oversight of the environmental restoration actions.

Funding for remedial activities is provided by the Defense Environmental Restoration Account; a funding source approved by Congress to clean up contaminated sites on U.S. Department of Defense installations.

1.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

The SCS boosted pressure and flow within the 8-inch HFP, which was located south of the SCS, which carried refined petroleum products such as JP-4 (jet fuel), two grades of aviation gasoline, DF-4 (Arctic diesel), and automotive gasoline. The products were introduced into the pipeline from fuel tankers at the Haines Terminal in Haines, Alaska.

The SCS included: a Composite Building (including engine, pump, generator, and mechanical rooms; an office; storage and refrigeration area; and a garage), a warehouse, trailer houses for personnel lodging, a septic tank and leaching wells, two ASTs, two USTs, fuel piping, a fuel dispenser, a diesel fuel transfer pump, a dry well, a valve manifold building, a day tank/dewatering tower, a scraper trap (pigging station), and a burn pit (Figure 1-2).

The SCS was deactivated in 1973, prior to the enactment of hazardous waste regulations under the Resource Conservation and Recovery Act (RCRA) in 1980. Since deactivation, the site has been visited by trespassers collecting scrap metal (North Wind, 2014).

The following summarizes previous investigations and removal actions at the SCS:

- 1994 – 13 surface soil samples were collected, between 1 and 2 feet (ft) below ground surface (bgs), identifying elevated total petroleum hydrocarbon concentrations near the valve manifold (USAPEHEA, 1994).

- 2007/2008 – 49 soil borings and eight monitoring wells were completed as part of a remedial investigation (RI) investigating the following AOCs: ASTs, Burn Pit, the All-Purpose Warehouse, Composite Building, UST area, Scraper Trap, Valve Manifold Building and Dewatering Tower, Diesel Fuel Transfer Pump, and the Septic System Leach Field. The Burn Pit was identified as the only source area with significant contamination (North Wind, 2010).

- 2014 – An Ultraviolet Optical Screening Tool investigation was attempted at the Burn Pit. The investigations could not be competed due to drilling refusal (North Wind, 2015).

- 2014 – A data gap analysis was conducted to determine site feature characterization (North Wind, 2014).
- 2015 – Two removal actions were initiated at the SCS. The first was a storage tank and petroleum pipeline removal action that included the: ASTs, USTs, fuel pipelines, scraper trap, valve manifold pit dewatering tower, diesel transfer pump, and disposal line to the burn pit. This activity also included removing petroleum liquid and contaminated soil that was encountered and collecting soil samples from the limits of the excavations. The second removal action included a Class V Underground Injection Control closure of the septic tank, leach wells, and dry well. The dry well, drain line to the dry well, septic tank, leach wells, and septic lines from the tank to the leach wells were removed. The septic system piping from the Composite Building to the septic tank was decommissioned in place. End-point samples were collected from the dry well and leach wells (Bristol, 2016a, 2016b; North Wind, 2016a).
- 2015 – A Supplemental RI (SRI) was completed of the following areas: Dry Well; Valve Manifold, Dewatering Tower, and Associated Fuel Lines; Drum Storage Area; Burn Pit; Disposal Line; and the Diesel AST, Diesel Transfer Pump, and Adjacent Fuel Lines. There were 28 soil borings completed, 63 soil samples collected, 10 monitoring wells installed, and 20 groundwater samples collected (U.S. Army, 2018).

Following 2015 decommissioning activities, the only remaining structure at the SCS is the Composite Building and remaining SCS features include the WSW and perimeter fencing.

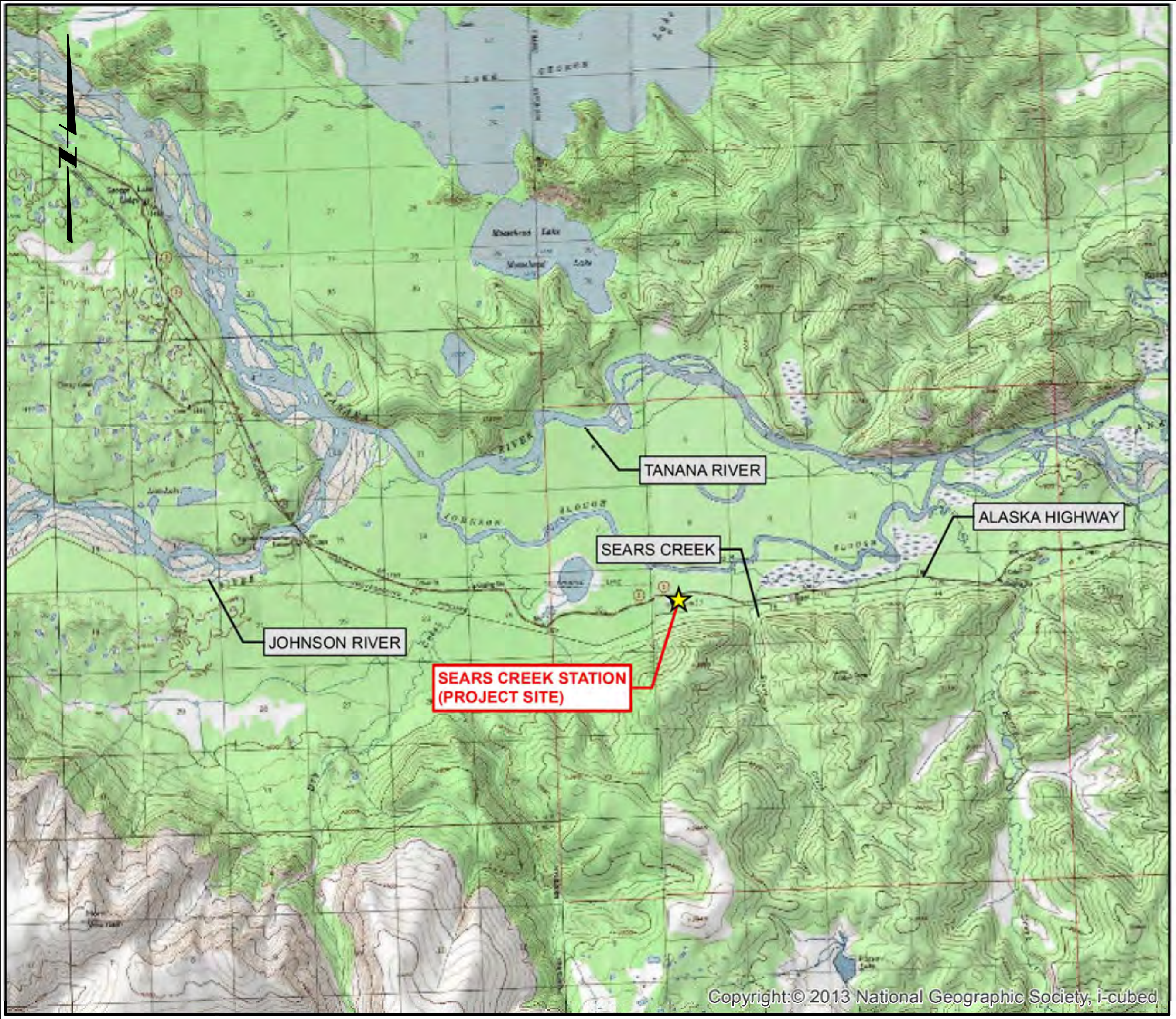
The current land use designation for the SCS is industrial. The SCS is currently out of operation and largely vacant. Future land use has not been determined, although it is possible the site could be used for residential purposes (U.S. Army, 2018), the reasonably anticipated future land use is associated with industrial applications, and future land use changes are not anticipated.

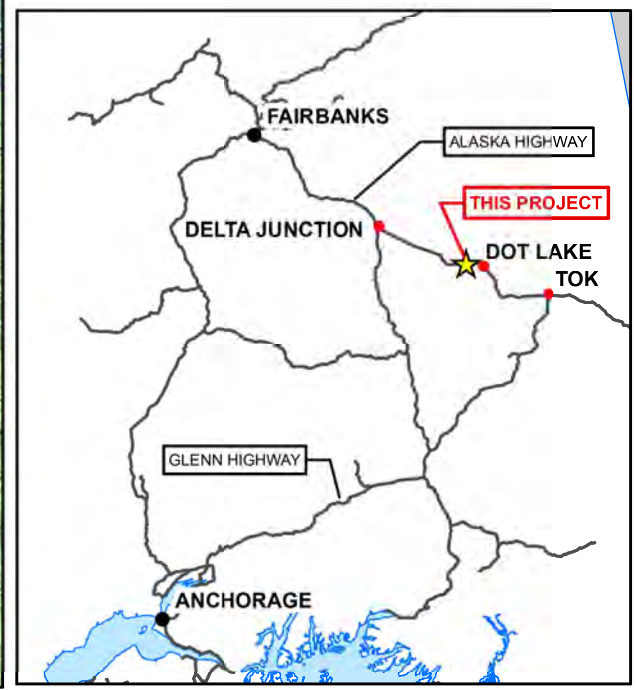
1.2.1 Identification of Activities Leading to the Current Contamination at SCS

Contamination present at SCS may have stemmed from fuel and solvent management and disposal practices associated with fuel pipeline operations.

1.2.2 Regulatory and Enforcement History

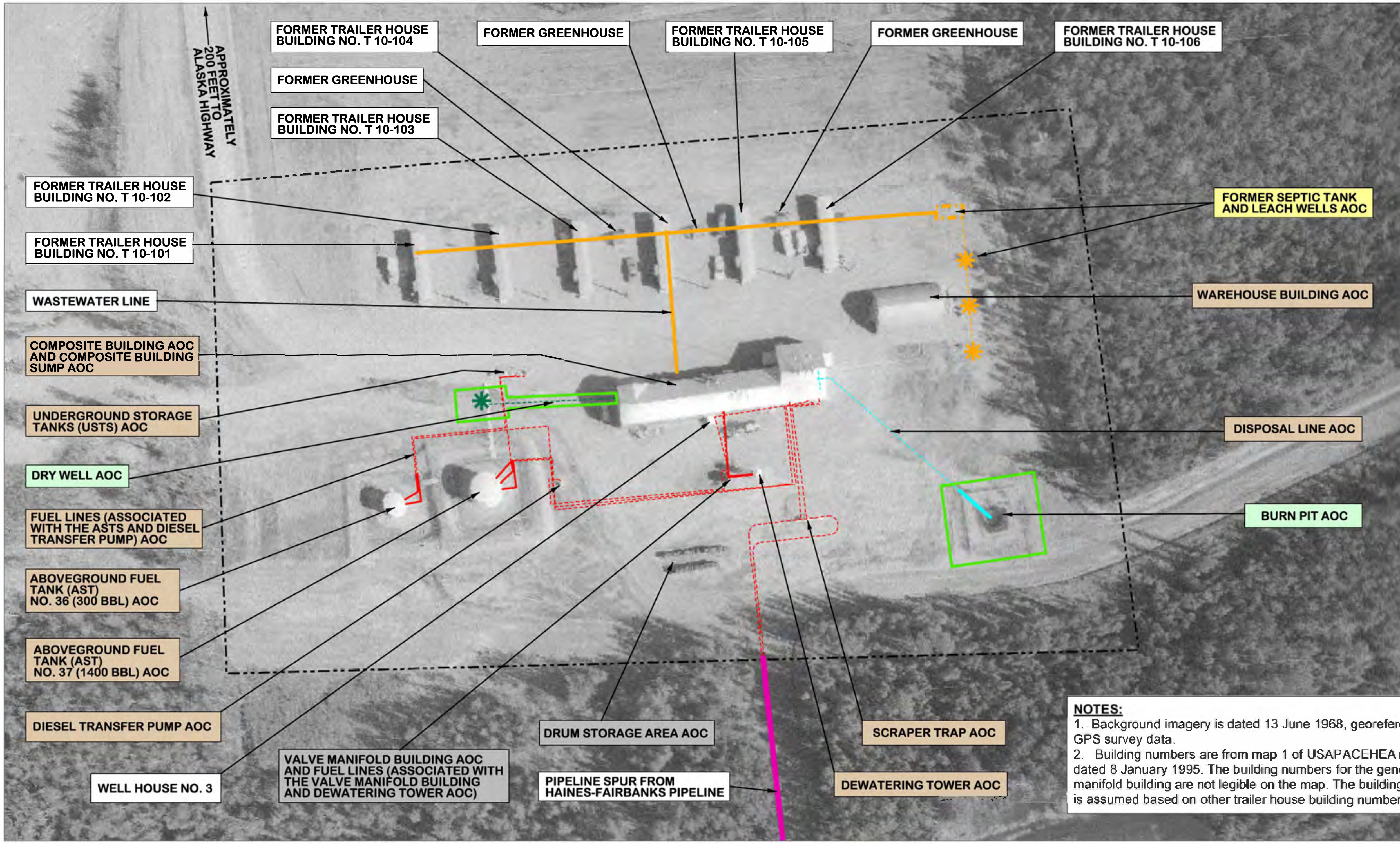
There are no records of enforcement actions at the SCS.





Source:
SCS CERCLA FS, final
Figure 1-1, Site Location, April 2020

SCALE IN MILES 0 1	Sears Creek Station, Alaska Petroleum Only and No Further Action Sites Decision Document	SITE LOCATION	FIGURE 1-1 185704695. 500.0502



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NOTES:

1. Background imagery is dated 13 June 1968, georeferenced to April 2015 and June 2015 GPS survey data.
2. Building numbers are from map 1 of USAPACEHEA report for Project No. 37-91-4102-94, dated 8 January 1995. The building numbers for the general purpose warehouse and valve manifold building are not legible on the map. The building number for Trailer House T 10-101 is assumed based on other trailer house building numbers.

LEGEND:

- FORMER DRY WELL (REMOVEDJUNE 2015)
- FORMER SEPTIC LEACHING WELL (REMOVED JUNE 2015)
- FORMER DRY WELL PIPING (REMOVED IN 2015)
- WASTEWATER LINE REMAINING IN PLACE
- WASTEWATER LINE (REMOVED IN 2015)
- CERCLA AOC
- FORMER SEPTIC TANK (REMOVED IN 2015)
- FENCE
- FUEL LINES REMAINING IN PLACE
- DISPOSAL LINE REMAINING IN PLACE
- FORMER DISPOSAL LINE (REMOVED IN 2015)
- FORMER ABOVEGROUND FUEL LINES (REMOVED IN 2015)
- FORMER UNDERGROUND FUEL LINES (REMOVED IN 2015)

AAC	ALASKA ADMINISTRATIVE CODE
AOC	AREA OF CONCERN
CERCLA	COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT
USAPACEHEA	U.S. ARMY PACIFIC ENVIRONMENTAL HEALTH ENGINEERING AGENCY
GPS	GLOBAL POSITIONING SYSTEM

FORMER SEPTIC LINE AND LEACHING WELLS	GREEN LABEL INDICATES CERCLA AOC
FORMER VALVE MANIFOLD BUILDING	GRAY LABEL INDICATES AOC IN DECISION DOCUMENT UNDER 18 AAC 75
DEWATERING TOWER AOC	BEIGE LABEL INDICATES AOC FOR SITE CLOSURE IN DECISION DOCUMENT
FORMER TRAILER HOUSE BUILDING NO. T 10-106	WHITE LABEL INDICATES BUILDING NOT IDENTIFIED AS AN AOC
FORMER SEPTIC TANK AND LEACH WELLS AOC	YELLOW LABEL INDICATES AOC ALREADY CLOSED

Source:
SCS CERCLA FS, final, Figure 1-3,
Sears Creek Station, Facility Map, April 2020

SCALE IN FEET
0 40

SEARS CREEK STATION, ALASKA
PETROLEUM ONLY AND NO FURTHER ACTION SITES
DECISION DOCUMENT

SEARS CREEK STATION
FACILITY MAP

FIGURE
1-2

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1.3 REGULATORY PARTICIPATION

Regulatory comments on this DD and the U.S. Army's responses are provided in **Appendix A**.

1.4 SCOPE AND ROLE OF RESPONSE ACTION

As with many sites, the environmental problems at the SCS are complex. As a result, the U.S. Army, with ADEC concurrence, has organized the environmental restoration work at SCS into 17 separate AOCs which are grouped into four categories, as presented below.

AOCs with hazardous substances regulated under the CERCLA Record of Decision (U.S. Army, 2024):

- Burn Pit
- Dry Well
- Site-Wide Groundwater

AOCs with only petroleum hydrocarbons regulated under 18 AAC 75:

- Valve Manifold Building
- Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower)
- Drum Storage Area

AOCs with no elevated contaminant concentrations and requiring closure:

- Dewatering Tower
- Disposal Line
- Diesel Transfer Pump
- Aboveground Fuel Tanks
- Fuel Lines (associated with the ASTs and diesel transfer pump)
- Underground Storage Tanks
- Composite Building
- Composite Building Sump
- Scraper Trap
- Warehouse Building

AOC closed under another regulatory program:

- Septic Tank/Leach Wells (closure documented in the *Draft Class V UIC Well Closure Report, Revision 1* [Bristol, 2016a], and approved by EPA [USEPA, 2017b]).

This DD addresses the three AOCs subject to regulation under 18 AAC 75 and the 10 AOCs requiring closure. The site work to implement the remedies selected in this DD is tentatively scheduled to begin in 2025.

1.5 SITE CHARACTERISTICS

The following provides an overview of the overall site characteristics associated with the SCS. The nature and extent of contamination for the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and Drum Storage Area AOCs is presented in Sections 2, 3, and 4, respectively.

1.5.1 Conceptual Site Model

Contaminant sources typically result from historical releases, spills, or leaks, and through site operations. Potential sources at the SCS include: a diesel fuel transfer pump and valve manifold, former ASTs, former USTs and pipes, a scraper trap (pigging station), a composite building, a septic system and leach wells, a burn pit, and a warehouse. The primary release mechanisms include spills, leaks, and weathering. Waste petroleum, oils, and lubricants were thought to be regularly disposed of in the Burn Pit and, therefore, could leach into site soils and groundwater. In addition, trailer housing and the septic system were also located on site to accommodate workers. Petroleum fuel components could have been released incidentally or accidentally from these facilities and equipment onto the surface soil or subsurface soil, and/or groundwater.

Exposure media on or near the site include:

- Soil − Release of contamination during SCS operations may have impacted both surface (0 to 2 ft bgs) and subsurface (greater than 2 ft bgs) soils. Surface soil may have been directly impacted by potential surface releases from SCS facilities and/or facility maintenance activities. Subsurface soil may have been directly impacted from leaking USTs and/or underground product lines. Subsurface soil has been indirectly impacted by contaminant migration or leaching transport mechanisms from surface to subsurface soil.

- Groundwater − Direct releases to groundwater have not occurred at these AOCs at the SCS, although potential groundwater impacts may have occurred by releases to soil and subsequent migration or leaching from surface and/or subsurface soil.

- Air − Impacts to air may result from emanation of volatile constituents from subsurface media into ambient air. In addition, potential release of non-volatile constituents to air via wind erosion and entrainment with particulates in ambient air is a potential secondary source.

1.5.2 Physical Description

1.5.2.1 SCS Size

The SCS covers approximately 11.24 acres.

1.5.2.2 Topography and Climate

The regional topography slopes west and north towards the Tanana River, which is approximately 2 miles north of the SCS. Topography where the SCS facilities are located is relatively flat; however, the topography rises sharply immediately to the south of the site as shown on Figure 1-1.

The climate near the SCS is typical of the subarctic region of interior Alaska and is characterized by large diurnal and seasonal temperature variation, low precipitation, and low humidity. Average temperatures from the community of Dot Lake range from a low of -22 degrees Fahrenheit (°F) in the winter (December-February) to a high of 65°F in the summer (June-August). The average annual precipitation is approximately 11.1 inches, and the average snowfall is 27 inches (U.S. Army, 2018).

1.5.2.3 Geology

SCS is located in the Tanana Lowland, where the geology generally consists of gravel, sand, and silt deposits along alluvial streams, outwash fans, and wind-deposited loess. Till deposits (a heterogeneous mixture of cobbles, gravel, sand, silt, and clay transported by glaciers) are also found in the Tanana Lowland (Holmes, 1965). The native soil material overlays bedrock, which was identified between 55 and 60 ft bgs (North Wind, 2010).

1.5.2.4 Hydrogeology and Groundwater Use

The hydrogeology of the Tanana Lowland includes unconfined and confined conditions. The unconfined groundwater is generally found in unconsolidated material in valleys and fractured bedrock underlying high slopes and ridges. Confined groundwater occurs as a result of permafrost or other impermeable sedimentary layers and is generally found under artesian conditions (HLA/Wilder, 2000). Groundwater at the SCS is unconfined (North Wind, 2010).

The depth to groundwater across the SCS ranged between approximately 32 and 52 ft bgs. The shallowest groundwater was observed on the south edge of the site near the Burn Pit and south of the ASTs. The depth to groundwater increased from the south to the north side of the site, with the deepest groundwater observed north of the Composite Building. The groundwater has a northwesterly flow direction on the east side of the site, and a northeast flow direction in the southwest corner of the site. Groundwater flow through the middle of the site appears to generally follow a northwest direction. This is generally consistent with the surrounding site topography (U.S. Army, 2018).

Groundwater underlying the SCS is not currently used for drinking or agricultural purposes. Other than the existing SCS water supply well (WSW) (adjacent to the Composite Building, location shown on Figure 1-2 as Well House No. 3), there are no other drinking water wells currently located in the immediate vicinity of the SCS.

1.5.2.5 Surface Water Hydrology

The closest surface water body is the Johnson Slough, which is 0.4 miles north of the site, and north of the Alaska Highway. The slough empties into the Tanana River near the confluence of the Johnson and Tanana Rivers 3 miles northwest of the SCS.

1.5.2.6 Ecological Setting

SCS vegetation is dominated by a young (relative to surrounding undisturbed areas) but developed understory (shrub/scrub) and overstory dominated by white spruce (*Picea glauca*), birch (*Betula papyrifera*), and aspen (*Populus tremuloides*), which is typical of the Tanana-Kuskokwim Lowlands subregion of Alaska. Undisturbed mature forest is present along the southeastern and eastern boundary along the fence line. Some formerly active areas of the SCS are predominately gravel and/or bare compacted ground (roads, area around the Composite Building, and the location of the former trailer houses). Plant coverage in these areas is sparse, limited, localized to a few areas, and dominated by early successional weedy plant species (U.S. Army, 2018).

Wildlife in the region includes the presence of large and small terrestrial mammals, and resident and migratory birds. No formal wildlife surveys (i.e., systematic bird and/or mammal identification and abundance surveys), other quantitative biological surveys, or sampling have been conducted at the SCS. Large terrestrial mammals expected in the area of the site may include American black bear (*Ursus americanus*) and moose (*Alces americanus*). Small terrestrial mammals expected to occur in the ecoregion include voles (e.g., meadow vole [*Microtus pennsylvanicus*]), shrews (e.g., common shrew [*Sorex araneus*]), mice (e.g., meadow jumping mouse [*Zapus hudsonius*]), squirrels (e.g., Arctic ground squirrel [*Spermophilus parryii*]), and weasels (e.g., ermine [*Mustela erminea*]) (U.S. Army, 2018).

Upland passerine/small bird species and non-passerine bird species are common and abundant in the region. Typical birds found in Interior Bottomland forests include various species of passerines/small bird species (e.g., jays, sparrows, thrushes), and upland species such as grouse (e.g., ruffled grouse [*Bonasa umbellus*]) and ptarmigan (e.g., willow ptarmigan [*Lagopus lagopus*]), especially in drier regions (U.S. Army, 2018).

1.6 CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USE

The SCS is currently controlled by the U.S. Department of Defense and is administered by the U.S. Army. There are no manned operations at the SCS, and the majority of the former facility infrastructure has been removed. The SCS is fenced around its entire perimeter and secured with a locked gate. Access to the site is controlled, but trespass onto the property is known to occur. The fencing is a deterrent to site access by some animals as well. Site groundwater is not currently used as a drinking water source.

The SCS is located in an unincorporated borough within the Dry-Creek census-designated place. The closest areas to the SCS of significant residency are the community of Dry Creek (approximately 3 miles to the west) and the community of Dot Lake (approximately 10 miles to the east). The land surrounding the SCS is owned by the State of Alaska Department of Natural Resources. A gravel pit used by the State of the Alaska Department of Transportation and Public Facilities is located to the northwest of the SCS.

The reasonably foreseeable future use of the SCS is expected to remain industrial while under U.S. Army ownership and, as the lead agency, the U.S. Army has the authority to determine the future anticipated land use of the SCS. The U.S. Army has not determined potential future uses and unrestricted use could be a possibility following property transfer.

1.7 SUMMARY OF SITE RISKS

The following provides an overview of the overall human health and ecological risk assessment (HHERA) approach at the SCS, which is documented in the SCS SRI (U.S. Army, 2018). The HHERA evaluated the following SCS AOCs:

- Burn Pit
- Dry Well
- Valve Manifold Building
- Dewatering Tower
- Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower)
- Drum Storage Area
- Disposal Line
- Diesel Transfer Pump
- Aboveground Fuel Tanks
- Fuel Lines (associated with the ASTs and diesel transfer pump)
- Site Groundwater

The HHERA evaluated the Valve Manifold, Dewatering Tower, and associated Fuel Line AOCs as a single unit and the Aboveground Fuel Tanks, Diesel Transfer Pump, and associated Fuel Line AOCs as a single unit. The Site-Wide Groundwater AOC was evaluated on a site-wide basis using data collected in 2015 as part of the SCS SRI (U.S. Army, 2018). The chemicals of potential concern (COPCs) and risk characterization for the Burn Pit, Dry Well and Site-Wide Groundwater AOCs is presented in the Final Record of Decision (U.S. Army, 2024). The COPCs and risk characterization for the Valve Manifold, Dewatering Tower, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), Aboveground Fuel Tanks, Diesel Transfer Pump, Fuel Lines (associated with the Aboveground Fuel Tanks and diesel transfer pump), Drum Storage Area, and Disposal Line AOCs are presented in subsequent AOC specific sections of this DD.

1.7.1 Natural or Anthropogenic Background Concentrations

The HHERA reviewed and statistically evaluated available data to determine site-specific soil background threshold values (BTVs) for metals as dedicated background values had not been established for the SCS. Groundwater data from upgradient Monitoring Well MW-8 were utilized as background conditions.

For soil, natural background concentrations were developed in accordance with:

- *Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites* (USEPA, 2002a).

- *Role of Background in the CERCLA Cleanup Program* (USEPA, 2002b).
- *Extracting A Site-Specific Background Dataset for a Constituent from a Broader Dataset Consisting of Onsite Constituent Concentrations & Estimating Background Level Constituent Concentrations* (Singh et al., 2014).

Evaluation of background conditions considered ADEC's *Arsenic In Soil. Technical Memorandum* (ADEC, 2009) that addresses evaluation and soil sampling criteria for arsenic and other naturally occurring inorganics. For some metals, sufficient data was not available to adequately calculate separate BTVs for surface soil (0 to 2 ft bgs) and subsurface soil (2 to 15 ft bgs); therefore, all metals data for surface soil and subsurface soil were compiled into a single dataset and statistically evaluated to determine the 0 to 15 ft bgs BTV. The statistical evaluation was conducted using the EPA's ProUCL version 5.0.00 (USEPA, 2013) and included: normality testing, quantile-quantile plot analysis, outlier evaluation, hypothesis testing (comparing the variability in surface soil versus subsurface soil datasets), and BTV estimation. **Table 1-1** outlines the established soil BTVs for metals.

Table 1-1 Soil Background Threshold Values for Metals

Analyte	Background Threshold Value (mg/kg)
Surface Soil: 0-2 ft bgs	
Chromium	42.4
Lead	22.3
Mercury	0.0523
Thallium	0.152
Vanadium	97.4
Zinc	86.3
Subsurface Soil: 2-15 ft bgs	
Chromium	23.5
Lead	14.9
Mercury	0.0368
Thallium	0.11
Vanadium	47.6
Zinc	47.4
Soil: 0-15 ft bgs	
Arsenic	4.8
Cadmium	0.243
Cobalt	10.2
Copper	30
Manganese	590
Selenium	0.665

Key:
bgs – below ground surface
ft – feet

mg/kg – milligrams per kilogram

Table 1-2 outlines the established groundwater background well concentration from Monitoring Well MW-08.

Table 1-2 Groundwater Background Threshold Values for Metals

Analyte	Background Threshold Value (mg/L)
Site-Wide Groundwater	
Antimony	0.0015
Arsenic	0.0156
Barium	0.102
Beryllium	0.0005
Cadmium	0.001
Chromium	0.00359
Cobalt	0.00246
Copper	0.00729
Lead	0.00231
Mercury	0.0001
Molybdenum	0.0235
Nickel	0.00556
Selenium	0.01
Silver	0.001
Thallium	0.001
Vanadium	0.01
Zinc	0.0125

Key:
mg/L – milligrams per liter

1.7.2 Summary of Human Health Risk Assessment

Human health was assessed through completion of a Human Health Screening Risk Assessment (HHSRA), completed in accordance with 18 AAC 75 and the ADEC *Risk Assessment Procedures Manual* (RAPM) (ADEC, 2015), and is consistent with EPA and U.S. Army Corps of Engineers (USACE) guidance documents including the: Risk Assessment Handbook, Volumes I and II (USACE, 1999, 2010); *Risk Assessment Guidance for Superfund* (USEPA, 1989, 2004, 2009); and *Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites* (USEPA, 2002a).

The risk assessment, as described in ADEC's Cumulative Risk Guidance (ADEC, 2008a), was conducted for the SCS in accordance with the RAPM (ADEC, 2015). Preliminary COPCs in soil and groundwater were selected by comparing: (1) the maximum detected concentrations (MDCs) to background values for inorganic chemicals; and (2) the MDC reported for each media to the applicable risk-based screening level. The HHSRA considered the resulting preliminary COPCs along with the following key elements to draw risk conclusions: 1) preliminary estimate of potential cumulative cancer risks and noncancer hazards; 2) contribution from natural background sources; 3) current and future exposure conditions; and 4) evaluation of uncertainties.

1.7.2.1 Exposure Assessment

Contaminants have been released to surface and subsurface soil at the SCS through historic spills, leaks, and disposal practices. Percolation and leaching of the soil releases can transport contaminants to groundwater. Volatile contaminants in soil and groundwater can result in direct release of volatile COPCs to ambient air through volatilization. A conceptual site model (CSM), presented in the HHERA (U.S. Army, 2018), was developed to aid in determining reasonable exposure scenarios and pathways of concern. The identified exposure media and exposure pathways include:

- Soil – incidental ingestion, dermal absorption, and inhalation of fugitive dust.
- Groundwater – ingestion, dermal absorption, and inhalation of volatile compounds in tap water.
- Air – inhalation of outdoor air, inhalation of indoor air, and inhalation of fugitive dust.

The receptors identified in the CSM included:

- Future residents – exposure to all media and pathways
- Future commercial or industrial workers – exposure to all media and pathways
- Current and future site visitors, trespassers, or recreational users – exposure to all soil pathways and the air inhalation pathways for outdoor air and fugitive dust
- Future construction worker – exposure to all soil pathways and the air inhalation pathways for outdoor air and fugitive dust
- Future farmers/subsistence harvesters – exposure to all soil pathways, groundwater ingestion and dermal absorption pathways, and the air inhalation pathways for outdoor air and fugitive dust
- Future subsistence consumers – exposure to all soil pathways and the air inhalation pathways for outdoor air and fugitive dust

The HHSRA considered potential future risks to residential receptors and potential risks to industrial receptors. As screening levels do not exist for the other identified receptors, they were not quantitatively evaluated in the HHSRA. However, the conservative assumptions used in the development of screening levels for residential and industrial receptors are considered protective of the potential receptors that could exist at the SCS but were not quantitatively evaluated. Specifically, the HHSRA assumes that the hypothetical residential receptor will spend 100 percent of their time at the evaluated AOC.

1.7.2.2 Identification of Chemicals of Potential Concern

Soil and groundwater screening levels, to determine COPCs, were obtained from the EPA Regional Screening Level (RSL) table (USEPA, 2016), except for: the carcinogenic polynuclear aromatic hydrocarbons (PAHs), diesel range organics (DRO), gasoline range organics (GRO), and residual range organics (RRO). The screening levels for the carcinogenic PAHs were calculated using the RSL calculator (USEPA, 2017a). To be consistent with ADEC guidance (ADEC, 2015), the RSL table published for noncarcinogens with a target hazard quotient (THQ) equal to 0.1 was used. Soil and groundwater screening levels for DRO, GRO, and RRO were obtained from Tables B2 (under 40-inch zone) and C of 18 AAC 75 (ADEC, 2016), respectively. COPCs were identified for both the residential and industrial exposure scenario. As described in the EPA's RSL user guide (USEPA, 2016), the composite worker land use scenario is used for developing the "industrial soil RSLs."

1.7.2.3 Toxicity Assessment

The carcinogenic and non-carcinogenic toxicity criteria used to calculate the potential risk were based on the values utilized to establish: the 2016 18 AAC 75, Tables B2 and C values for DRO, GRO, and RRO in soil and groundwater, respectively (ADEC, 2016); the 2017 EPA RSL calculator values for carcinogenic PAHs (USEPA, 2017a); and the 2016 EPA RSLs (USEPA, 2016) for all other constituents.

This toxicity assessment used human health cleanup levels from the 2016 version of 18 AAC 75 which were updated in 2018. The following COCs had the same human health cleanup levels in 2016 and 2018: benzene, ethylbenzene, 2-methylnaphthalene, and arsenic. The following COCs had higher human health cleanup levels in 2016 than in 2018: 1-methylnapthalene and naphthalene.

1.7.2.4 Risk Characterization

Cumulative cancer risks and noncancer hazards are conservatively based on a future residential exposure scenario. Soil screening levels are also based on receptors spending 100 percent of their time in the affected areas. To evaluate potential future residential risks, a preliminary estimate of the potential cancer risks and noncancer hazards were performed for the COPCs that exceeded residential screening levels.

The excess cancer risk of a COPC that exceeded screening levels was calculated as a ratio of the MDC and the COPC RSL multiplied by the target cancer risk (TCR) used in the derivation of the screening level (1×10^{-6}).

The noncarcinogenic hazard, hazard quotient (HQ), of a COPC that exceeded screening levels was calculated as a ratio of the MDC and the COPC RSL multiplied by the TQH used in the derivation of the screening level (0.1).

The excess cancer risk estimates are then evaluated in the context of EPA's risk management range of 10^{-4} to 10^{-6} (1 in 10,000 to 1 in 1,000,000), as well as ADEC's risk management criterion of 10^{-5} (1 in 100,000). The noncarcinogenic hazard estimates are then evaluated in the context of the EPA's and ADEC's acceptable noncancer hazard index (HI) of 1.

An excess lifetime cancer risk of 1×10^{-6} indicates that an individual experiencing the reasonable maximum exposure estimate has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure. This is referred to as an "excess lifetime cancer risk" because it would be in addition to the risks of cancer individuals face from other causes – such as smoking or exposure to too much sun. The chance of an individual's developing cancer from all other causes has been estimated to be as high as 1 in 3.

An HQ less than or equal to 1 indicates that toxic noncarcinogenic effects from that chemical are unlikely.

The HI is generated by adding the HQs for all COPCs. An HI less than or equal to 1 indicates that adverse effects are unlikely from additive exposure to site chemicals. An HI greater than 1 indicates that site-related exposures may present a risk to human health.

1.7.3 Summary of Ecological Risk Assessment

Ecological risk was assessed through completion of a Step 1 Ecological Scoping and, as applicable, a Step 2 Preliminary Ecological Screening in accordance with the RAPM (ADEC, 2015) and the Final Risk Assessment Work Plan (USACE, 2016), and is consistent with EPA Ecological Risk Assessment (ERA) guidance (USEPA, 1997a, 1998; 1997b).

The Step 1 Ecological Scoping evaluation is the preliminary set which considers all available site information, including: contaminant toxicity, quantity, and potential for bioaccumulation; quality and extent of habitat; receptor presence; and observations regarding potential impacts. Each of the components (scoping factors) of the ADEC Ecoscoping Guidance (ADEC, 2014) are addressed to determine inclusion or exclusion of a site for further evaluation in a screening level ecological risk assessment.

The Step 2 Preliminary Screening evaluation consists of comparing site data to metal BTV concentrations and conservative screening concentrations to determine preliminary ecological COPCs, and to determine the need for further evaluation in additional steps of the process.

An ERA is a qualitative and/or quantitative appraisal of the actual or potential effects of site releases on plants and animals. The SCS ERA concluded that exposure to residual chemicals in surface and shallow subsurface soil is potentially complete, but unlikely to result in significant exposure to ecological receptors. As a result, there is no need of further evaluation or remedial action based on potential ecological risk.

1.7.3.1 ADEC Step 1 Ecological Scoping Evaluation

The goal of ecological scoping is identification sites that are likely versus unlikely to pose a potential hazard to the environment. The scoping evaluation is based on observations and investigations completed at the SCS, including: the RI/FS (North Wind, 2010), Final Decision Document (North Wind, 2012), the Data Gap Report (North Wind, 2014), and the SRI (U.S. Army, 2018). The scoping process evaluates five scoping factors:

- Scoping Factor 1 – Visual Impacts
- Scoping Factor 2a – Terrestrial Exposure Routes
- Scoping Factor 2b – Aquatic Exposure Routes
- Scoping Factor 3 – Habitat for Valued Species
- Scoping Factor 4 – Contaminant Quantity

These scoping factors were used to develop the ecological CSM, presented in the HHERA (U.S. Army, 2018). The identified exposure media and exposure pathways included:

- Soil – ingestion and inhalation of fugitive dust.

- Groundwater – ingestion.

The receptors identified in the CSM included:

- Terrestrial Plant Community – exposure to ingestion of surface soil (0-2 ft bgs).
- Terrestrial Invertebrate Community – exposure to ingestion of surface soil (0-2 ft bgs).
- Mammals – exposure to ingestion of surface soil (0-2 ft bgs), ingestion of subsurface soil (greater than 2 ft bgs), and inhalation of fugitive dust from surface soil (0-2 ft bgs).
- Birds – exposure to ingestion of surface soil (0-2 ft bgs), inhalation of fugitive dust from surface soil (0-2 ft bgs), and ingestion of groundwater.

While the pathway for each receptor was complete, the exposure was determined to be insignificant.

Scoping Factor 1 – Visual Impacts

Physically disturbed areas remain in association with the SCS AOCs due to historical and/or RI activities, especially the Composite Building, former Trailer House areas, and along roads where gravel and compact soil is present. No overt signs of toxicity, such as stressed or dead vegetation or absence of biota, have been noted as part of the SCS investigations. Previously disturbed areas are recovering and characterized by the presence of successional vegetation – including weeds, grasses, shrubs, and trees.

Scoping Factor 2a – Terrestrial Exposure Routes

Chemical detections are present in surface and subsurface soil. The potential for direct contact with surface soil, defined as 0 to 2 ft bgs, per ADEC CSM guidance (ADEC, 2010), by terrestrial organisms (i.e., upland birds and mammals) in previously disturbed areas could result in complete exposure to residual chemicals, if present at concentrations of concern. Exposure to subsurface soil (exceeding 2 ft bgs, but less than or equal to 4 ft bgs) is also considered a potentially complete exposure pathway. The majority of biological exposures are likely to occur within the upper foot (0 to 1 ft bgs) or biologically relevant zone of soil (USEPA, 2015) where direct contact and/or integration and uptake into food resources are greatest.

While the potential uptake of contaminants by soil invertebrate and plant communities in contact with soil/soil moisture may be a potentially complete pathway, these communities currently are functional – as evident by recovered vegetation and a functional plant community.

Wildlife ingestion of surface water as a drinking water resource is an incomplete pathway for wildlife exposure, as perennial water sources (i.e., ponds, streams) are not present on or adjacent to the site.

Scoping Factor 2b – Aquatic Exposure Routes

There are no perennial (or temporary) water bodies or groundwater seepage areas present within the defined bounds of the investigation areas or in areas adjacent to the SCS.

Scoping Factor 3 – Habitat for Valued Species

The ecological habitat present at the SCS could support valued species. However, the area of potential impacts at the SCS is limited and localized based on available data and, therefore, potential for significant site presence or exposure to such species is unlikely.

State and/or federally listed (threatened or endangered) species regulated by Alaska Department of Fish and Game, National Marine Fisheries Service, and/or U.S. Fish and Wildlife Service do not occur at, or in association, with the SCS (USACE, 2016).

Scoping Factor 4 – Contaminant Quantity

Contaminant quantity refers to the spatial and/or volumetric quantity of contaminants. Contaminants have been released to surface and subsurface soil at the SCS through historic spills, leaks, and disposal practices. Based on investigations of the SCS, the spatial extent of petroleum impacts does not exceed the 0.5-acre *de minimis* criterion for petroleum-contaminated properties prescribed by ADEC (ADEC, 2014). The areal extent, considering all current AOCs, totals about 0.4 acres or 4 percent of the total acreage of the SCS. Non-petroleum constituents are considered further in the Step 2 Preliminary Screening evaluation.

1.7.3.2 ADEC Step 2 Preliminary Screening Evaluation

The Step 2 preliminary screening evaluation is the last step in the ADEC ecoscoping process, evaluation of Scoping Factor 5 – Toxicity Determination. Scoping Factor 5 is utilized to assess non-petroleum constituents at the SCS, as the petroleum constituents met the *de minimis* criterion in Scoping Factor 4.

Preliminary screening was conducted by comparing site concentrations detected in surface soil (0 to 2 ft bgs) and subsurface soil (greater than 2 to 4 ft bgs) to conservative soil screening concentrations protective of ecological endpoints. These conservative screening values are often based on no effect levels derived from laboratory studies conducted on sensitive endpoints (e.g., seedling growth and germination, and sensitive members of a given population or community), and/or individual species that may or may not be present under site-specific conditions.

Dataset

In accordance the *Final Risk Assessment Work Plan* (USACE, 2016) the analytical results considered includes those detections in surface soil (0 to 2 ft bgs) and shallow subsurface soil (greater than 2 to 4 ft bgs). The analytes considered included: organochlorine pesticide, metals, volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), poly- and perfluoroalkyl substances, and dioxins/furans.

Screening Levels

Screening levels were obtained from the Oak Ridge National Laboratory Risk Assessment Information System (RAIS) tool (http://rais.ornl.gov/) per ADEC guidance (ADEC, 2014, 2015). The following hierarchy of sources, based on those available in the RAIS, (in order of preference) was used:

- Ecological Soil Screening Levels (ECO-SSLs) (USEPA, 2005). Includes interim support documents through 2008.

- *Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Terrestrial Plants* (Efroymson et al., 1997a); and *Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Soil and litter Invertebrates and Heterotrophic Process* (Efroymson et al., 1997b).

- Region 5 RCRA Corrective Action Ecological Screening Levels (USEPA, 2003).

The lower of the EPA ECO-SSLs (for mammals, birds, invertebrates, and plants) was applied, where available, for screening. In the absence of ECO-SSLs, the lower of the screening benchmarks per Efroymson et al. (1997a and b) was applied, followed by EPA Region 5 ecological screening values for soil.

Chemical compounds present in multiple forms (i.e., isomers, congeners) were summed to provide environmental concentrations on a total basis (i.e., total PAHs, total PCBs, and total xylenes). This process of summing was conducted to accommodate those analyte groups for which medium-specific ecological screening levels (and/or toxicity data) are available on a total basis. For screening purposes, the calculated totals were based on the sum of detected constituent parameters for each individual sample and compared to applicable screening levels. If constituent parameters at a given location were never detected (e.g., 100 percent non-detect for all constituent PAHs at a given sample location), the total concentration was considered non-detected and represented by the maximum limit of detection (LOD) for the constituent parameters at that location.

Ecological Chemicals of Potential Concern Screening and Analysis

Ecological COPCs were established by comparing chemical MDCs to respective screening levels and metal background levels. The maximum LOD was utilized as the constituent MDC in the event that the constituent was non-detect.

Non-petroleum chemicals that exceeded respective screening levels included:

- Surface soil: Dioxin/furans (evaluated as dioxin toxicity equivalent quotient [TEQ]), cobalt, copper, lead, and zinc.

- Subsurface soil: Copper, lead, selenium, vanadium, and zinc.

The cobalt, copper, selenium, vanadium, and subsurface zinc detections exceeded screening levels; however, the detections were comparable to background concentrations and, as such, these constituents are attributed to background metal conditions and potential unacceptable exposure is not expected.

Ecological COPCs were identified as follows:

- Surface soil lead detections exceeded the BTV of 22.4 milligrams per kilogram (mg/kg) and ecological screening level of 11 mg/kg (USEPA, 2005) at the following areas of evaluation: Disposal Line; AST, Diesel Transfer Pump, and associated Fuel Lines; and Valve Manifold, Dewatering Tower, and associated Fuel Lines.

- Surface soil zinc detection exceeded the BTV of 86.3 mg/kg and ecological screening level of 46 mg/kg (USEPA, 2007) at the Drum Storage Area of evaluation.

- Subsurface soil lead detection exceeded the BTV of 14.9 mg/kg and ecological screening level of 11 mg/kg (USEPA, 2005) at the Dry Well area of evaluation.
- Dioxin TEQ exceeded the ecological screening level of 1.99 x 10^{-7} mg/kg (USEPA, 2003) at the Burn Pit evaluation area.

1.7.3.3 Ecological Risk Characterization

While exposure to ecological receptors at the Burn Pit; Disposal Line; AST, Diesel Transfer Pump and associated Fuel Lines; Valve Manifold, Dewatering Tower, and associated Fuel Lines; Drum Storage Area; and the Dry Well is possible, given the small size of the AOCs (together or singly) significant exposure to higher trophic level receptors (birds and mammals) is not expected, especially when considering wildlife home ranges, which exceed the area footprint even for wildlife with very small home ranges. Expected wildlife population densities at the AOC individually, or at the SCS as a whole, are low. In general, a “population” is the minimum viable population size for a given species in an area. For small mammals, the minimum viable population size is typically considered to be around 500 reproducing individuals to maintain population stability (Lehmkuhl, 1984; Thomas, 1990; Reed et al., 2003), but more may be needed to maintain genetic variability (Reed et al., 2003). The area needed for a minimum viable population, therefore, is considerably larger than the AOCs. Based on the limited exposure potential and localized nature of detections, significant exposure is not expected.

1.7.4 Risk Uncertainty

Uncertainty and limitation are inherent in the risk assessment process. The following are areas of uncertainty as they relate to the evaluation of the SCS.

Uncertainties In Data Assessment

Limitations may exist in relation to the type, quality, and quantity of available data as a function of the collection of the data and the ability to evaluate the data according to EPA guidelines. Differences in the limits of quantitation (LOQs) between similar data sets could also introduce uncertainty into the estimation of chemical risk with low concentrations.

Detection Limit/Limit of Detection Evaluations

Constituents may not have been detected as a result of not being present or because the LOD was not low enough to detect the presence of a constituent. The LODs were compared to available screening criteria to understand this uncertainty.

In soil, LODs exceeded screening levels for 28 non-detect human health chemicals in six chemical classes, including: 17 organochlorine pesticides, four VOCs, one PCB (Aroclor 1254), two PAHs, one metal (thallium), and three semi-volatile organic compounds (SVOCs). LODs exceeded screening levels for 25 non-detect ecological chemicals in four chemical classes, including: 19 organochlorine pesticides, three VOCs, total PCBs (evaluated as the sum of aroclors), and two metals. The following summarizes the LOD exceedances:

- 16 human health chemicals and 11 ecological chemicals had non-detect soil results, with LODs that exceeded respective screening levels by a magnitude of 1 to 2. There was little difference between the minimum and maximum LOD and nearly all minimum LODs also exceeded the screening level. Although there is some uncertainty as to whether these chemicals would actually be detected at concentrations above screening levels if LODs were lower, given the small magnitude of exceedance any detection up to the maximum LOD would be at a very low level and unlikely to result in unacceptable exposure. The potential for exposure and risk underestimation for these chemicals is low.

- Seven human health chemicals and five ecological chemicals had non-detect soil results with LODs that exceeded respective screening levels by a magnitude of 2 to 10. The human health chemicals included: 1,2,3 trichloropropane, 1,2-dibromo-3-chloropropane, 4-6-dinitro-2-methylphenol, beta-benzene hexachloride (BHC), delta-BHC, gamma-BHC, and endrin ketone. The ecological chemicals included: 1,2-dibromo-3-chloropropane, alpha- and gamma-chlordane, aldrin, and toxaphene.

- Nine human health chemicals and 18 ecological chemicals had non-detect soil results with LODs that exceeded respective screening levels by a magnitude of greater than 10. The human health chemicals included: 1,2-dibromo-3-chloropropane, 1,2,3-trichloropropane, aldrin, alpha-BHC, dieldrin, heptachlor, heptachlor epoxide, n-nitrosodimethylamine, and toxaphene. The ecological chemicals included: PCBs (total), 4,4'-dichlorodiphenyldichloroethane, 4,4'- dichlorodiphenyldichloroethylene, 4,4'-dichlorodiphenyltrichloroethane, aldrin, alpha-BHC, beta-BHC, dieldrin, endrin, endrin aldehyde, endosulfan I, endosulfan II, endosulfan sulfate, gamma-BHC, heptachlor, heptachlor epoxide, methoxychlor, and toxaphene.

With the exception of PCBs (ecological) where the minimum LOD was always higher than the ecological screening level, indicating that a lower level was not analytically achievable, the number of non-detect samples exceeding the screening level was typically limited to a fraction of the total sample number. The latter indicates that the LOD was adequate to meet applicable screening levels in at least some of the samples, which limits the level of uncertainty. In the extreme case where most or all of the analytical results are non-detected, yet elevated above screening levels, the uncertainty can become very high, especially when high LODs are elevated due to analytical or matrix interferences that can skew sample statistics and hide true exposure. Where screening levels are analytically unachievable to meet LODs due to method limitations, potential uncertainty can be moderate to high, especially where orders of magnitude exceedances exist. However, these chemicals have never been detected during any sampling event and, if present, at least some detection would be expected. There is no known source or documented use of many of these chemicals at the SCS, especially with regards to pesticides. Overall, the level of uncertainty that a chemical is not detected when in fact it is present, is low.

In groundwater, LODs exceeded screening levels for 29 non-detect chemicals in four chemical classes including: six organochlorine pesticides, 20 VOCs, two PAHs, and two metals. The following summarizes the LOD exceedances:

- Eleven chemicals had non-detect groundwater results with LODs that exceeded respective screening levels by a magnitude of 1 (comparable to the screening level). Although this may represent an area of uncertainty as to whether these chemicals would be detected above screening levels if LODs were lower, the low magnitude of exceedance indicates that detections would likely be at very low levels.

- Eight chemicals had non-detect soil results with LODs that exceeded respective screening levels by a magnitude of 2 to 10. The chemicals include: 1,1,2,2-tetrachloroethane, bromodichloromethane, bromomethane, chloroform, hexachlorobutadiene, alpha-BHC, trichloroethene, and dieldrin. The slightly higher magnitude of exceedances gives slightly less certainty that these chemicals would not be detected above screening levels with lower LODs.

- 10 chemicals had non-detect soil results with LODs that exceeded respective screening levels by a magnitude greater than 10. The chemicals include: 1,2-dibromo-3-chloropropane, 1,2-dibromomethane, 1,2,3-trichloropropane, 1,1,2-trichloroethane, aldrin, heptachlor, heptachlor epoxide, thallium, toxaphene, and vinyl chloride. Therefore, there is uncertainty that these chemicals would still be non-detect if LODs were lower.

Because the LODs for these non-detected chemicals exceed the screening levels, there is a possibility that they could be present in groundwater at above the screening levels and risks and hazards could potentially be underestimated. However, these chemicals have never been detected during any sampling event and there is no known source of these chemicals at the SCS. Therefore, the elevated LODs for these chemicals is unlikely to affect the conclusions of the risk assessment.

Precision of Analytical Measurements

The magnitude of analytical error is usually small compared to other sources of uncertainty, although the relative uncertainty increases for results that are near the LOD. For non-detected results at a given location, where no detections were measured, the LOD is considered in the dataset used for the risk assessment. Constituents detected below the sample LOQ but above the LOD (i.e., “J” and/or “QL” [low bias], “QN” [no directional bias], “QH” [high bias] flagged data) lack sufficient precision in the reported concentration and are, therefore, estimated concentrations. These data were included in the dataset for risk analysis as recommended by EPA guidance (USEPA, 1989). In general, inclusion of these data in the risk assessment provides additional robustness to the overall dataset. Except in instances where sample point and/or statistical estimates of exposure concentrations are based solely or in large part on these data, little overall effect on statistical estimates and, consequently, risk estimates or conclusions, is expected.

It is notable that the Burn Pit sample location with the highest detected concentration of dioxins/furans was “B” qualified, indicating blank contamination, resulting in a potential high bias.

Use of the Toxicity Equivalency Factors/Toxicity Equivalent Quotient Approach

Dioxins/furans were investigated at the Burn Pit AOC. For initial COPC screening, the maximum detected TEQ concentration was compared to applicable screening levels. The MDC was calculated for each location having at least one detection, where non-detects were conservatively included at the LOD for computing the TEQ. Based on the sensitivity of the high-resolution gas chromatography/high resolution mass spectrometry method used in the analysis of dioxins/furans, inclusion of the non-detect dioxin/furan congeners in the TEQ summation (either at or 1/2 the congener’s detection limit) is likely to overestimate dioxin/furan concentrations and potential exposure attributed to the dioxin/furan TEQs.

Use of Screening Levels to Identify COPCs and Potential Risk

The human health screening process eliminated chemicals that were below screening criteria that are based on a cancer risk of 10^{-6} or a noncancer target HI of 0.1. The RSLs did identify COPCs; therefore, additional risk evaluation could be performed to assess more accurately the site risk and hazards.

EPA RSLs are calculated using default upper-bound estimates for: intake rate, exposure frequency, exposure duration, an average value for body weight, and an averaging time (typically 70 years for carcinogens). These standard default factors are intended for calculation of reasonable maximum exposure estimates (the 95th percentile) of each applicable scenario at a site. In developing default exposure parameters, a determination of what is considered "reasonable" cannot be based solely on available quantitative information, but also requires the consideration and use of professional judgment, which could lead to either low or high bias of the assumptions. Based on anticipation of uncertainty when quantifying exposure, the reasonable maximum exposure (i.e., the highest exposure that is reasonably expected to occur at the site) is used so that health risks and hazards are more likely to indicate that chemicals are exceeding target risk goals, although actual health risks may be negligible. As such, the EPA RSLs are calculated using conservative assumptions that are more likely to overestimate exposure and risk than underestimate. Therefore, use of the EPA RSLs, combined with the MDC to estimate potential risks and hazards, is a conservative approach that is more likely to overestimate risk. This approach ensures that no COPC or AOC is prematurely eliminated from further consideration.

Screening criteria are not available for some chemicals and, as such, surrogate chemicals that may have similar physical and chemical properties may be utilized. Comparison to such screening levels would more accurately characterize the risk, as opposed to not screening the COPCs against any criteria at all. However, depending on the nature of the physical and chemical properties of the surrogate chemical, which may not match that of the COPC, inclusion of the surrogate could overestimate or underestimate the risk.

For total chromium, the RSLs for chromium III were used in the COPC screening process. According to ADEC (ADEC, 2017):

> *"…due to the prevalence of naturally occurring chromium III throughout the state, sample results reported for total chromium detected at a site will be considered background chromium III unless anthropogenic contribution of chromium III or VI from a source, activity, or mobilization by means of another introduced contaminant is known or suspected."*

Therefore, evaluation of total chromium as chromium III was considered more appropriate for the SCS and the screening levels for chromium III were used to evaluate total chromium, rather than the hexavalent form. The MDC for total chromium in both soil and groundwater was below chromium III RSLs. Thus, total chromium was not identified as a COPC in soil or groundwater, and no cancer risks or noncancer hazards were calculated for total chromium. However, if chromium VI screening levels were considered in the evaluation, chromium VI would be considered a COPC in soil at the Dry Well and Valve Manifold Building and Dewatering Tower AOCs, as well as in site-wide groundwater.

Use of On-Site Data to Develop Background Levels

BTVs were established for metals in soil to evaluate whether the measured site concentrations were indicative of site sources or related to natural or anthropogenic background conditions. As dedicated background values were not available for the SCS, current and historical soil samples were reviewed and statistically evaluated to determine a site-specific soil background concentration for metals. Use of onsite data to develop background levels is an effective method to identify multiple populations of metals concentrations (e.g., natural, anthropogenic, and/or site-related) and allow refinement of data to select a data population that is representative of background conditions on which a BTV can be developed. Operations at the SCS were primarily fuel related, with the exception of lead, which was a component of leaded gasoline, no other metals have documented site use.

It is acknowledged that use of site data to develop background concentrations may be a somewhat less conservative approach than use of a dedicated background dataset obtained from background reference locations. However, as evidenced by the wide-spread spatial distribution and consistent and relatively low magnitude of detected metals results across the SCS, it is likely that most metals are naturally occurring. Generally, concentrations of detected metals in soil were either below conservative risk-based screening levels or exceedances were noted in only single isolated occurrences. The overall uncertainty in the background dataset is low because the characteristics of metals results indicate that, with some isolated exceptions, the SCS has been relatively unimpacted by site activities and use of site data to calculate BTVs is a reasonable approach, in lieu of off-site data.

1.8 ADEC METHOD THREE CALCULATOR AND SITE-SPECIFIC APPROVED CLEANUP LEVELS

ADEC Method Three migration-to-groundwater cleanup levels were developed as part of the SRI (U.S. Army, 2018) to assess a contaminants ability to migrate to groundwater based on site-specific information and were developed for those contaminants that exceeded the 18 AAC 75.341 Method Two migration-to-groundwater values outlined in Tables B1 and B2 (ADEC, 2018a). The *Draft Cleanup Levels Guidance for Methods Two and Three* (ADEC, 2017) was followed to develop site-specific migration-to-groundwater alternative cleanup levels (ACLs) for SCS soils. Migration-to-groundwater ACLs for SCS soils under 18 AAC 75.340 Method Three were based on modification of the migration-to-groundwater cleanup level, using site-specific values (where available), the online ADEC Cleanup Levels Calculator, and the online ADEC Petroleum Cleanup Levels Calculator (ADEC, 2018b). Site-specific parameters used to develop the ADEC Method Three migration-to-groundwater ACLs include: fractional organic carbon, aquifer hydraulic conductivity, source length parallel to groundwater flow, hydraulic gradient, and infiltration rate, each of which are detailed in the SRI (U.S. Army, 2018).

The site-specific approved cleanup levels were then selected based on the most conservative of the human health cleanup level (18 AAC 75.341 Tables B1 and B2, under 40-inch zone), the maximum allowable concentration (for petroleum hydrocarbons only), and the ADEC Method Three migration-to-groundwater value. A comparison of these values is provided in Sections 2, 3, and 4 for the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and Drum Storage Area AOCs, respectively, based on the constituents detected above the ADEC Method Two migration-to-groundwater values.

1.9 REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives (RAOs) are specific goals for protecting human health and the environment from risks and hazards associated with site-related contamination. The RAOs must comply with the 18 AAC 75, Site Cleanup Rules. Applicable or Relevant and Appropriate Requirements (ARARs) identified for the site. RAOs may be achieved by reducing exposure to the contaminated media or through reduction of concentrations of COCs at exposure points to below protective concentrations. The RAOs for soil at the AOCs addressed in this DD are:

- RAO 1: Prevent the exposure of human receptors with contaminated media that pose a cumulative carcinogenic risk greater than 1 in 100,000 or a cumulative noncarcinogenic HI greater than 1 across all exposure pathways. Specifically:
    - Reduce concentrations of RRO in soil to below cleanup levels protective of human health.
- RAO 2: Prevent further degradation of groundwater by reducing the concentrations of COCs in soil to levels protective of groundwater quality. Specifically:
    - Reduce concentrations of DRO in soil to below ACLs for protection of migration to groundwater developed using ADEC Method Three.

The RAOs applicable to each AOC are outlined in subsequent AOC specific sections of this DD.

1.10 SUMMARY OF COMPARATIVE ANALYSIS OF REMDIAL TECHNOLOGIES

Eight remedial technologies were evaluated in the FS (U.S. Army, 2020) to achieve the RAOs at the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and Drum Storage Area AOCs. The eight technologies evaluated were:

Technology 1: No Action. The No Action alternative serves as a baseline against which other alternatives are compared. No remedial actions would be taken, monitoring would not be conducted, and LUCs would not be implemented to prevent exposures. Although natural attenuation would occur, contaminant reductions would not be verified without monitoring.

Technology 2: LUCs. LUCs are composed of 1) institutional controls that are enforceable administrative management techniques, and 2) engineering controls that are physical measures to prevent or limit access of receptors to potentially harmful concentrations of site COCs. LUCs could be implemented to limit human exposure to the contaminated soil. Institutional controls (e.g., restrictions on excavation) may be appropriate for areas with contaminated soil until cleanup levels are achieved. ECs could include site fencing encompassing the contaminated soil. Implementation of would require documentation of the LUCs, maintenance of administrative controls through review of work clearance permits, periodic inspections of the site, and corrective action for LUC violations. The U.S. Army would be responsible for documenting, monitoring, maintaining, and enforcing the LUCs.

Technology 3: *In Situ* Treatment – SVE. SVE involves extracting soil vapor from the vadose zone at moderate to high flow rates to remove volatile organic compounds. SVE is effective on volatile constituents (i.e., GRO, Benzene, etc.) though it not effective on non-volatile constituents (i.e., DRO, RRO, etc.). Implementation of this alternative would require installation of extraction wells, a blower system, buried air transmission lines connecting the blower to the extraction wells, and a connection to an electrical power source. As there is not an existing power source at SCS, a power line would have to be run from Dot Lake, located approximately 14 miles away or an alternative on-site power source could be established.

Exhaust treatment may be required, or flow rates could be controlled to keep emissions below threshold levels. Several vapor monitoring points (VMPs) also would be installed for monitoring soil vapor concentrations in the vadose zone.

Technology 4: *In Situ* Treatment – Bioventing. Bioventing involves injecting air into, or extracting soil vapor from, vent wells at a low flow rate from contaminated vadose zone soil to promote aerobic biodegradation of organic contaminants, most commonly petroleum hydrocarbons. This technology accelerates the natural *in situ* biodegradation of aerobically degradable compounds present in unsaturated soil by providing oxygen to indigenous soil microorganisms. In contrast to SVE, bioventing uses low air flow rates to provide enough atmospheric air to sustain soil oxygen concentrations of at least 5 percent. In addition to biodegradation of adsorbed petroleum residuals, volatile compounds (e.g., benzene) are also biodegraded as vapors move slowly through biologically active soil. In practice, some degree of dispersion and volatilization also occurs when bioventing is implemented.

Oxygen is most commonly supplied through direct air injection into residual contamination in soil. Implementation of this remedial alternative would require installation of vent wells, a small blower system, air transmission lines connecting the blower to the extraction wells, and a connection to an electrical power source. Because there is not an existing power source at the SCS, a power line would have to be run from Dot Lake, located approximately 14 miles away or an alternative on site power source could be established. Several VMPs also would be installed for monitoring oxygen and COC concentrations in soil vapor as an indicator of remedial progress.

Technology 5: *In Situ* Treatment – Chemical Oxidation. *In situ* chemical oxidation (ISCO) involves introducing chemical oxidants to the contaminated soil, so the contaminants react with the oxidant and are degraded, producing innocuous substances such as carbon dioxide, water, and inorganic chloride, where chlorinated compounds are present. Various process options for ISCO are available. Implementation of ISCO could be accomplished by mixing the oxidant with the contaminated soil to ensure contact between the ISCO reagents and contaminants.

ISCO is potentially applicable over a range of contaminant concentrations from source area mass reduction to dissolved phase plume treatment for a range of COCs (Interstate Technology & Regulatory Council, 2005). There are various oxidants available, and each has its own unique advantages and disadvantages. Soil mixing would be required to effectively implement ISCO in the vadose zone to ensure contact between the oxidant and contaminants.

Technology 6: *In Situ* Treatment – Thermal Enhancement. Thermal enhancement technologies include hot air or steam injection, electrical resistance heating, radio-frequency heating, and thermal conduction heating. The geology and subsurface features (e.g., utility lines) of the site are factors that would be considered in choosing the most appropriate thermal enhancement method. The relative effectiveness of thermal enhancement at the site is rated to be moderate; however, operation of this remedial alternative would be conducted concurrently with another in situ treatment technology (e.g., SVE). Implementation of this remedial alternative would require installation of the heating system and associated controls and power supply.

Because there is not an existing power source at the SCS, a power line would have to be run from Dot Lake, located approximately 14 miles away.

Technology 7: Excavation and Onsite Treatment. Contaminated soils would be excavated and treated at the SCS facility. The excavation would be backfilled with clean excavated soil or clean imported backfill material. Onsite treatment options include the following:

1. Petroleum contaminated soil could be treated through biological treatment in a temporary on site landfarm or biopile.
2. Petroleum contaminated soil could be treated using an ex-situ low temperature thermal desorption process such as Hot Air Vapor Extraction.
3. Petroleum contaminated soil could be treated using a portable thermal treatment unit.

Technology 8: Excavation and Offsite Treatment. Contaminated soils would be excavated and transported to an approved off-site facility for treatment. Offsite treatment options for petroleum-contaminated soil include high temperature thermal oxidation at Organic Incineration Technology (OIT) located in the town of Moose Creek, Alaska. OIT facility is located approximately 120 miles northeast of the SCS facility just off Alaska Highway 2.

These potential remedial technologies were evaluated based on effectiveness, reduction of toxicity, mobility, or volume (TMV), implementability, and relative cost. The remedial technologies passing the screening process were retained to become the remedial alternative. These criteria are discussed for the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and Drum Storage Area AOCs in Sections 2, 3, and 4, respectively, of this DD.

1.11 COMPLIANCE WITH ARARS

Section 121(d) of CERCLA and NCP Section 300.430(f)(1)(ii)(B) require that remedial actions at CERCLA sites must attain legally applicable or relevant and appropriate Federal and State requirements, standards, criteria, and limitations which are collectively referred to as "ARARs," unless such ARARs are waived under CERCLA Section 121(d)(4). Criteria to be considered (TBCs), are non-promulgated advisories or guidance issued by federal or state government that are not legally binding and do not have the status of potential ARARs. However, in many circumstances, TBCs are considered along with ARARs. While the AOCs covered by this DD are not covered by CERCLA, the U.S. Army has applied the standard to establish ARARs for these AOCs. As this is a petroleum decision document, the 18 AAC 75 Site Cleanup Rules are applicable and must be met.

Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental and State environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. State standards that are identified by a state in a timely manner and that are more stringent than Federal requirements may be applicable.

Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental and State environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site (relevant) that their use is well-suited (appropriate) to the particular site. Only those State standards that are identified in a timely manner and are more stringent than Federal requirements may be relevant and appropriate.

ARARs fall into three categories: chemical-specific, location-specific, and action-specific. *Chemical-specific* ARARs are health-based or risk-management-based numbers that provide concentration limits for the occurrence of a chemical in the environment at agreed-upon points of compliance. *Location-specific* ARARs restrict activities in certain sensitive environments. *Action-specific* ARARs are activity-based or technology-based, and typically control remedial activities that generate hazardous wastes (such as with those covered under RCRA). Offsite shipment, treatment, and disposal of excavated contaminated soil invoke action specific ARARs.

Table 1-3 summarizes the ARARs and TBCs for the selected remedies at the SCS and describes how the selected remedies address each one at agreed-upon points of compliance.

Table 1-3 Description of State Regulations Considered for Selected Remedies at the SCS

Source	Standard, Requirement, Criterion, Limitation	Description of Standard	Status	Comments
Chemical Specific				
ADEC, Oil and Other Hazardous Substances Pollution Control	18 AAC 75.325(g)	After completing site cleanup, the risk from hazardous substances will be evaluated to ensure it does not exceed a cumulative carcinogenic risk standard of 1 in 100,000 or a cumulative noncarcinogenic hazard index of 1 across all exposure pathways.	Applicable	Complete cumulative risk evaluation to determine the cumulative risks from constituents of interest present at the SCS.
	18 AAC 75.340(e)	Provides procedure for development and application of site-specific alternative soil cleanup levels under method three.	Applicable	Develop site-specific alternative cleanup levels for the migration-to-groundwater pathway for COCs in soil (DRO, arsenic, and lead).
	18 AAC 75.341(c) Tables B1 and B2	Provides tabulated soil cleanup levels for human health and migration-to-groundwater pathways that are not site-specific.	Applicable	Select soil cleanup levels for the human health pathway for COCs in soil (DRO, arsenic, and lead) from the cleanup levels on Tables B1 and B2.
	18 AAC 75.340(d)	Provides for how and when alternative cleanup levels can be applied rather than tabulated Method One or Two soil cleanup levels.	Applicable	Compare tabulated human health cleanup levels for COCs in soil (DRO, arsenic, and lead) to site-specific alternative cleanup levels calculated for migration-to-groundwater to select approved cleanup levels (ACLs). Lower of two is selected. Compare soil concentrations to ACLs.
	18 AAC 75.345	Groundwater must meet the cleanup levels listed in Table C of this Section.	Applicable	Compare concentrations of COCs in groundwater (arsenic, DRO, gasoline range organics, ethylbenzene, xylenes, 1,2,3-trimethylbenzene, 1,3,5-trimethylbenzene, 1-methylnaphthalene, 2-methylnaphthalene, naphthalene, and lead) to Table C values.

Table 1-3 Description of ARARs for Selected Remedies at the SCS (continued)

Source	Standard, Requirement, Criterion, Limitation	Description of Standard	Status	Comments
Location Specific				
CFR, Public Lands: Interior	43 CFR 7.4(a) and 7.5(b)(1) (Archaeological Resources Protection Act of 1979; 16 USC 470ii	May not excavate, remove, damage, or otherwise alter or deface archaeological resources unless by permit or exception. Must protect any such archaeological resources if discovered.	Applicable	No historic or archaeological resources have been identified at the SCS. In the event that buried historic or archaeological resources are discovered, notification and mitigation measures to protect the area will be implemented.
CFR, Public Lands: Interior	43 CFR 10.4(c) and (d) (Native American Graves Protection and Repatriation Regulations)	Must stop activities in the area of discovery and make a reasonable effort to secure and protect the objects discovered. Must consult with Native organization likely to be affiliated with the objects to determine further disposition per 43 CFR 10.5(b).	Applicable	No human remains, funerary objects, sacred objects, or objects of cultural patrimony have been identified at the SCS. In the event that these items are discovered, notification and mitigation measures to protect the area will be implemented.
Action Specific				
CFR, Protection of Environment	40 CFR 262.11(a)-(d)	Characteristics of Hazardous Waste	Applicable	Properly characterize, label, store, transport hazardous waste. Only dispose of hazardous waste in RCRA permitted treatment, storage, and disposal facilities.
	40 CFR 144.82	What must I do to protect underground sources of drinking water?	Applicable	Prohibits injections that allow movement of fluid into underground sources of drinking water that might cause endangerment and provides closure requirements.
ADEC, Oil and Other Hazardous Substances Pollution Control	18 AAC 75.370(a)	Soil storage and disposal.	Applicable	Prohibits blending contaminated soil with uncontaminated soil and provides requirements for storing of contaminated soil.
ADEC, Solid Waste Management	18 AAC 60.010(a)(4)	Accumulation, storage, and treatment.	Applicable	A person may not store accumulated solid waste in a manner that causes polluted run-off water.

Key:
AAC – Alaska Administrative Code
ADEC – Alaska Department of Environmental Conservation
ARAR – Applicable or Relevant and Appropriate Requirements
CFR – Code of Federal Regulation
COC – contaminant of concern
DRO – diesel range organics
RCRA – Resource Control and Recovery Act
SCS – Sears Creek Station
USC – United States Code

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2.0 VALVE MANIFOLD BUILDING AOC

The Valve Manifold Building AOC (labeled as the “fuel oil drain-pit” on the as-built drawings) was located approximately 50 ft south of the Composite Building (**Figure 1-2**). The valve manifold connected the 1,200-gallon Dewatering Tower to fuel pump engines, a generator, and a boiler located within the Composite Building. The floor of the Valve Manifold Building was approximately 10 feet bgs, and the as-built schematic showed that the floor was sloped to a sump approximately 1.5 ft square and 1.5 ft deep in the southwest corner of the building. A series of underground fuel pipelines connected the Valve Manifold, Dewatering Tower, and components in the Composite Building. Several underground pipelines were also located approximately 10 feet south of the Valve Manifold and Dewatering Tower and connected the ASTs to the pump engine room in the Composite Building.

The Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower AOCs had removal actions completed (Bristol, 2016a) and were evaluated in the SRI (U.S. Army, 2018) and the FS (U.S. Army, 2020) as a singular area due to proximity. As such this section provides the area wide evaluation of the three AOCs and Valve Manifold Building AOC specific remedy determination.

2.1 SITE CHARACTERISTICS

2.1.1 Topography and Climate

This is the same for the whole of the SCS (See Section 1.5.2.2).

2.1.2 Geology

This is the same for the whole of the SCS (See Section 1.5.2.3).

2.1.3 Hydrogeology and Groundwater Use

This is the same for the whole of the SCS (See Section 1.5.2.4).

2.1.4 Surface Water Hydrology

This is the same for the whole of the SCS (See Section 1.5.2.5).

2.1.5 Ecological Setting

This is the same for the whole of the SCS (See Section 1.5.2.6).

2.1.6 Site Characterization Activities

1994 Investigation. Two surface soil samples (S8 and S9) were collected in the vicinity of the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower AOCs during the 1994 investigation (**Figure 2-1**). The samples were analyzed for VOCs, basic/neutral/acid extractables, PCBs, pesticides, and toxic metals (USAPACEHEA, 1994). Results indicated contaminant concentrations were lower than applicable state and federal cleanup standards or consistent with the background sample concentrations, with the exception of DRO detected at 2,000 mg/kg at S8 (North Wind, 2012).

2007/2008 RI. Previous investigations were completed when the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower were intact. Four soil borings (SB3, SB4, SB6, and MW3) were drilled and sampled, and MW3 was completed as a groundwater monitoring well during the 2007 investigation (**Figure 2-2)**. Soil boring SB3 was placed northwest of the Valve Manifold Building and monitoring well MW3 was installed west of the Valve Manifold Building. Additional soil borings were placed east of the Dewatering Tower and in the vicinity of the buried pipelines (SB4 and SB6). SB3, SB4, and SB6 each had a total depth of 22 feet bgs and MW3 was completed at a total depth of 61 feet bgs. Soil samples were collected from the 5 to 7 feet bgs and 10 to 12 feet bgs intervals in SB4 and SB6, and from the 15 to 17 feet bgs and 20 to 22 feet bgs intervals in SB3 and MW3. Soil samples collected from the borings were analyzed for GRO; DRO; RRO; benzene, toluene, ethylbenzene, and total xylenes (BTEX); PAHs; lead; and TOC. None of the soil samples collected in the area of the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower had reported contaminant concentrations above the cleanup levels in 18 AAC 75.341, Tables B1 and B2 during the 2007/2008 investigation (North Wind, 2010).

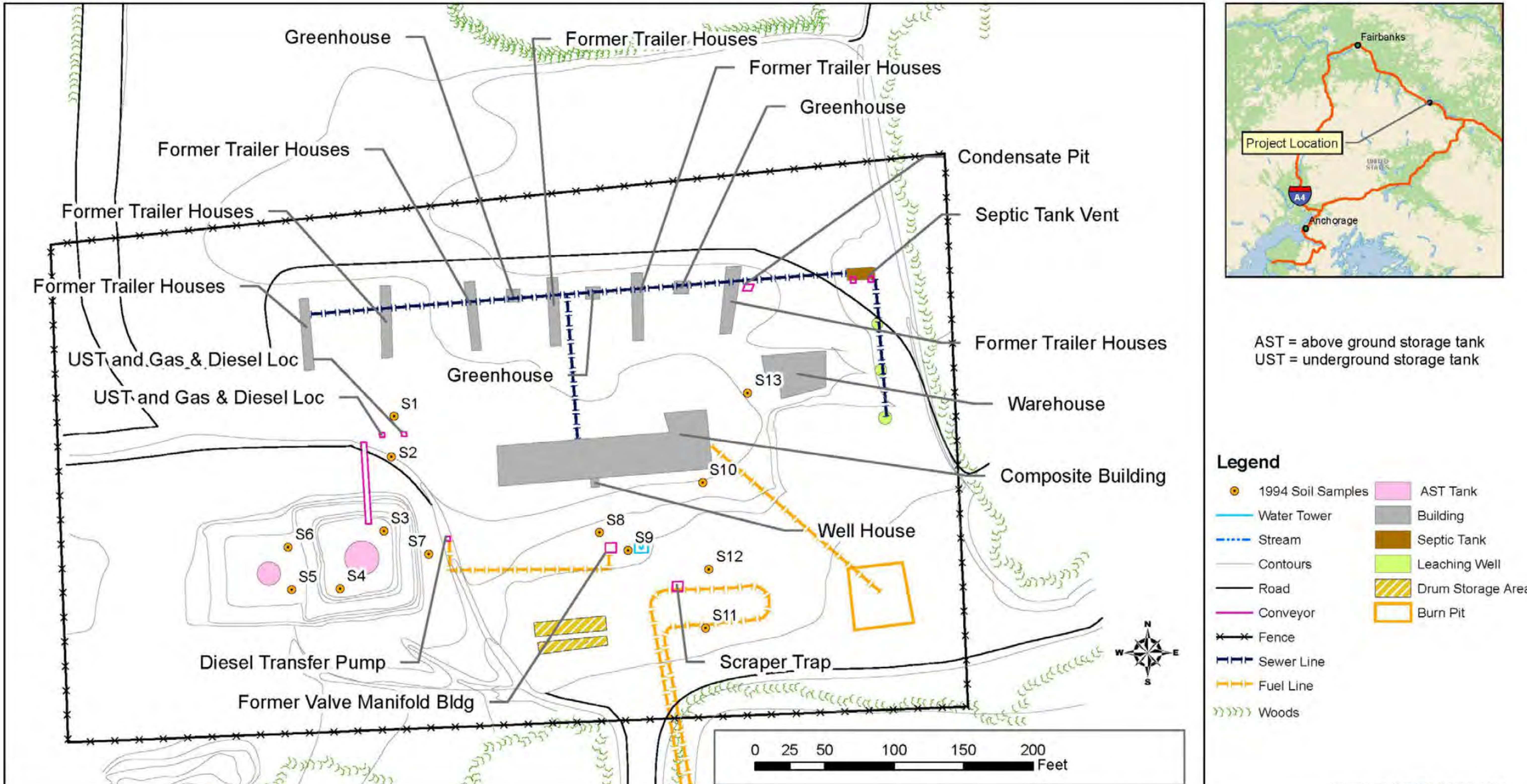
2014 Data Gap Analysis. The 2014 Data Gap Analysis reviewed site features and determined if a site feature had sufficient data to verify that a release had not occurred and that a site feature had sufficient data to determine the nature and extent of any contamination.

It was noted that a previously unknown sump was connected to the valve manifold. The valve manifold cover was opened during the Fall 2013 site visit and a strong fuel odor was noted, as well as a small amount of liquid in the bottom of the pit; however, the sump was not visible from above. The valve manifold pit was recommended for further investigation (North Wind, 2014).

No documentation was found as to whether the fuel lines were flushed and cleaned during the deactivation of the pump station. It was recommended to determine whether any fuel was still remaining in the lines and investigate the possibility that leakage has occurred through valves and joints over time (North Wind, 2014).

The Dewatering Tower AOC was not identified as having a data gap.

2015 Removal Action and Sampling. Decommissioning of the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower was conducted during the 2015 removal action (Bristol, 2016a). Approximately 80 cubic yards of potentially contaminated soil was excavated in this area based on field screening results. Field readings and sample locations during this action are presented on **Figure 2-3**.



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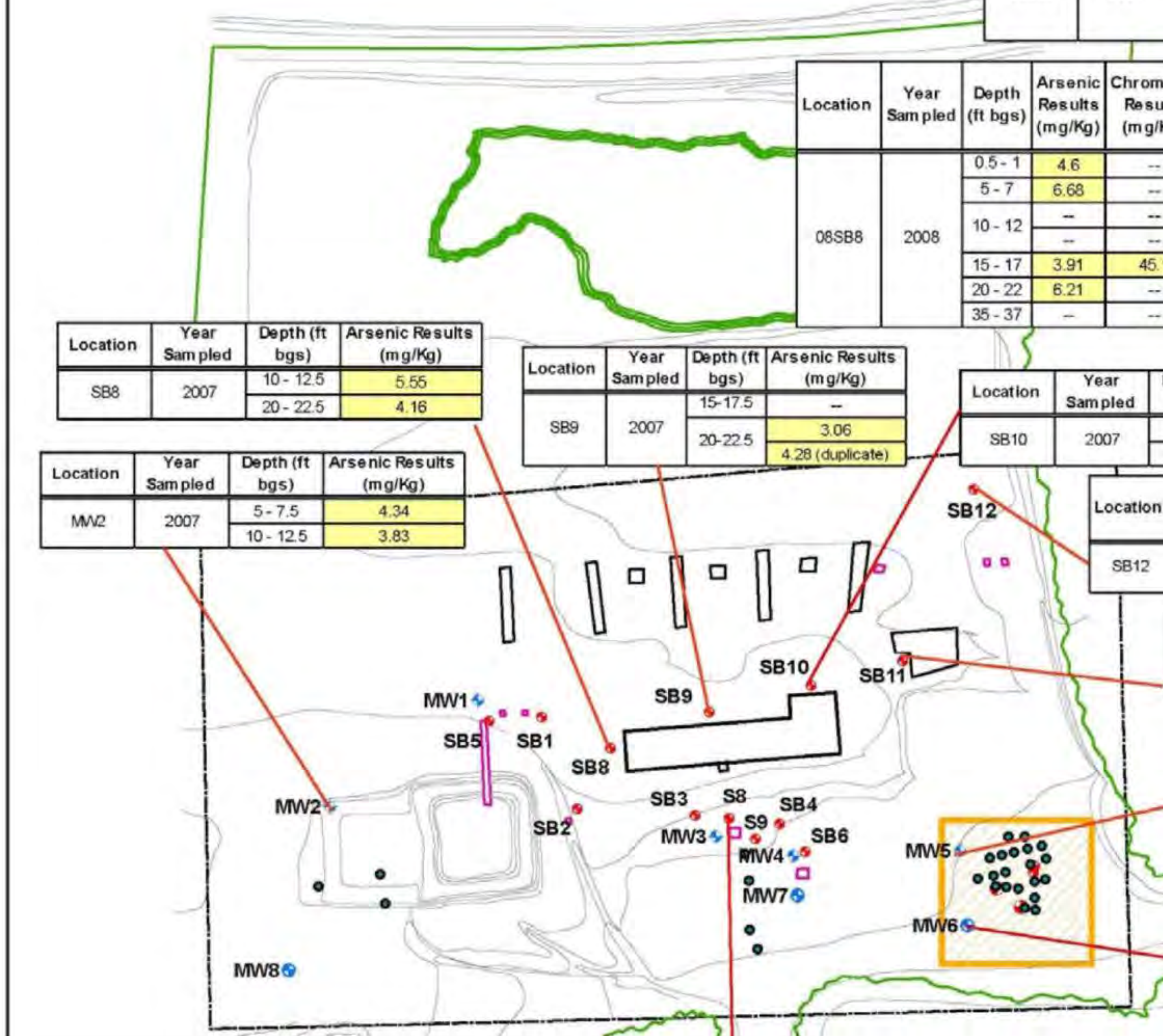
1994 Soil Boring Location Map

Sears Creek Station, Alaska
Petroleum Only and No Further Action Sites
Decision Document

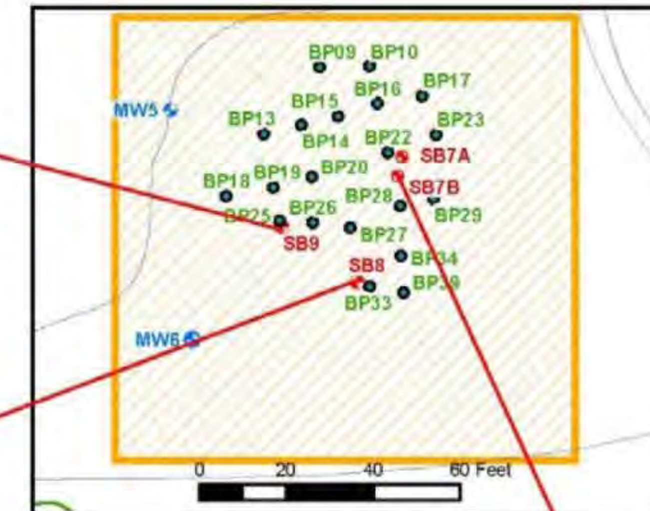
Figure 2-1

Produced for the US Army



Location	Year Sampled	Depth (ft bgs)	Arsenic Results (mg/Kg)	Chromium Results (mg/Kg)	GRO Results (mg/Kg)	DRO Results (mg/Kg)	Methylene Chloride Results (mg/Kg)
08SB9	2008	0.5 - 1	20.4	27.7	--	--	0.384
		5 - 7	3.94	--	--	--	0.1
		10 - 12	6.29	--	--	--	0.139
		20 - 22	--	--	350	263	--

Location	Year Sampled	Depth (ft bgs)	Arsenic Results (mg/Kg)	Chromium Results (mg/Kg)	DRO Results (mg/Kg)	1,2,4-Trimethylbenzene Results (mg/Kg)	2-Methylnaphthalene	Methylene Chloride Results (mg/Kg)
08SB8	2008	0.5 - 1	4.6	--	--	--	--	0.486
		5 - 7	6.68	--	--	--	--	0.0445
		10 - 12	--	--	--	--	--	0.211
			--	--	--	--	--	0.228 (duplicate)
		15 - 17	3.91	45.1	2,620	--	--	0.0732
		20 - 22	6.21	--	2,960	24	8.54	0.148
		35 - 37	--	--	883	--	--	--



Burn Pit Inset Map

Location	Year Sampled	Depth (ft bgs)	Arsenic Results (mg/Kg)
SB8	2007	10 - 12.5	5.55
		20 - 22.5	4.16

Location	Year Sampled	Depth (ft bgs)	Arsenic Results (mg/Kg)
SB9	2007	15-17.5	--
		20-22.5	3.06
			4.28 (duplicate)

Location	Year Sampled	Depth (ft bgs)	Arsenic Results (mg/Kg)
SB10	2007	10 - 12.5	2.65
		15 - 17.5	--

Location	Year Sampled	Depth (ft bgs)	Arsenic Results (mg/Kg)	GRO Results (mg/Kg)	DRO Results (mg/Kg)	1,1,2-Tricholoroethane Results (mg/Kg)	Methylene Chloride Results (mg/Kg)
SB7B	2007	5 - 7.5	6.22	653	1,080	--	0.56
		15 - 17.5	4.75	--	1,370	0.141	--
			3.21 (duplicate)	637 (duplicate)	1,540 (duplicate)	--	--

Location	Year Sampled	Depth (ft bgs)	Arsenic Results (mg/Kg)
MW2	2007	5 - 7.5	4.34
		10 - 12.5	3.83

Location	Year Sampled	Depth (ft bgs)	Arsenic Results (mg/Kg)
SB12	2007	10 - 12.5	2.31
		20 - 22.5	2.93

Location	Year Sampled	Depth (ft bgs)	Arsenic Results (mg/Kg)
SB11	2007	15 - 17.5	2.76
		20 - 22.5	3.96

Location	Year Sampled	Depth (ft bgs)	Arsenic Results (mg/Kg)
MW5	2007	5 - 7.5	3.08
		15 - 17.5	3.92

Location	Year Sampled	Depth (ft bgs)	Arsenic Results (mg/Kg)	Chromium Results (mg/Kg)	Methylene Chloride Results (mg/Kg)
MW6	2008	5 - 7	6.71	--	0.181
		10 - 12	--	--	0.089
			--	--	0.466 (duplicate)
		15 - 17	--	28.4	0.0398
		20 - 22	4.5	--	0.164

Location	Year Sampled	Depth (ft bgs)	DRO Results (mg/Kg)
S8	1994	1 - 2	2,000 (estimated)

Note:

--	Indicates compound did not exceed cleanup levels
ft	feet
bgs	below ground surface
ADEC	Alaska Dept of Environmental Conservation
mg/Kg	milligram per kilogram
GRO	gasoline range organics
DRO	diesel range organics
Cleanup Levels	Based on ADEC Method 2, Tables B1 and B2

ADEC Cleanup Levels:

Arsenic =	3.9 mg/Kg
GRO =	300 mg/Kg
DRO =	250 mg/Kg
1,1,2- Tricholoroethane =	0.018 mg/Kg
Total Chromium =	25 mg/Kg
1,2,4- Trimethylbenzene =	23 mg/Kg
2-Methylnaphthalene =	6.1 mg/Kg
Methylene Chloride =	0.016 mg/Kg

Legend

- Sample Locations
- Borings
- MonitoringWells
- Buildings
- Contours
- Woods
- Fence
- Burn Pit Detail Area

Note: Adapted from ENSR figure 1240000131B.dwg

0 25 50 100 150 Feet

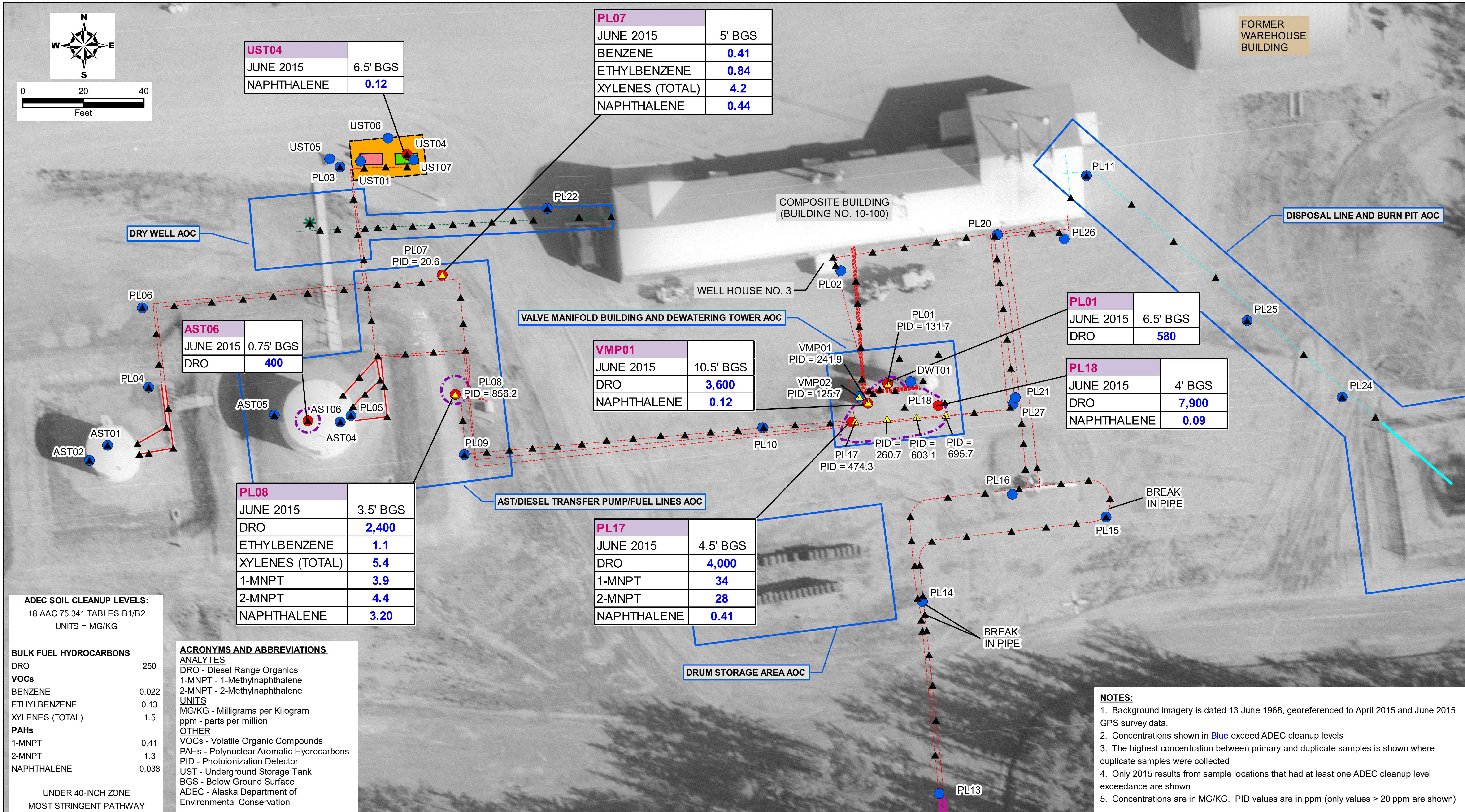
Alaska SPCS, Zone 3, NAD27

Figure 2-2	2007/2008 Investigation Exceedances	Sears Creek Station, Alaska Petroleum Only and No Further Action Sites Decision Document

NORTHWIND
7910 King St.
Anchorage, AK 99518
WEB: www.northwindgrp.com
Phone: (907) 277-5488

DATE: 4-10-2009		SCALE: On Map
DESIGNED BY:	TF/EP	DESIGN PHASE: Draft
DRAWN BY:	TF/EP	
CHECKED BY:	KI	NWI FILE NAME: SpiderDiagram.mxd
APPROVED BY:	KI	

Prepared for US Army Garrison Alaska



UST04	
JUNE 2015	6.5' BGS
NAPHTHALENE	0.12

PL07	
JUNE 2015	5' BGS
BENZENE	0.41
ETHYLBENZENE	0.84
XYLENES (TOTAL)	4.2
NAPHTHALENE	0.44

AST06	
JUNE 2015	0.75' BGS
DRO	400

PL01	
JUNE 2015	6.5' BGS
DRO	580

VMP01	
JUNE 2015	10.5' BGS
DRO	3,600
NAPHTHALENE	0.12

PL18	
JUNE 2015	4' BGS
DRO	7,900
NAPHTHALENE	0.09

PL08	
JUNE 2015	3.5' BGS
DRO	2,400
ETHYLBENZENE	1.1
XYLENES (TOTAL)	5.4
1-MNPT	3.9
2-MNPT	4.4
NAPHTHALENE	3.20

PL17	
JUNE 2015	4.5' BGS
DRO	4,000
1-MNPT	34
2-MNPT	28
NAPHTHALENE	0.41

ADEC SOIL CLEANUP LEVELS:
18 AAC 75.341 TABLES B1/B2
UNITS = MG/KG

BULK FUEL HYDROCARBONS	
DRO	250
VOCs	
BENZENE	0.022
ETHYLBENZENE	0.13
XYLENES (TOTAL)	1.5
PAHs	
1-MNPT	0.41
2-MNPT	1.3
NAPHTHALENE	0.038

UNDER 40-INCH ZONE
MOST STRINGENT PATHWAY

ACRONYMS AND ABBREVIATIONS
ANALYTES
DRO - Diesel Range Organics
1-MNPT - 1-Methylnaphthalene
2-MNPT - 2-Methylnaphthalene
UNITS
MG/KG - Milligrams per Kilogram
ppm - parts per million
OTHER
VOCs - Volatile Organic Compounds
PAHs - Polynuclear Aromatic Hydrocarbons
PID - Photoionization Detector
UST - Underground Storage Tank
BGS - Below Ground Surface
ADEC - Alaska Department of Environmental Conservation

NOTES:
1. Background imagery is dated 13 June 1968, georeferenced to April 2015 and June 2015 GPS survey data.
2. Concentrations shown in Blue exceed ADEC cleanup levels
3. The highest concentration between primary and duplicate samples is shown where duplicate samples were collected
4. Only 2015 results from sample locations that had at least one ADEC cleanup level exceedance are shown
5. Concentrations are in MG/KG. PID values are in ppm (only values > 20 ppm are shown)

LEGEND:
- REMOVAL ACTION SOIL SAMPLE - BRISTOL
- REMOVAL ACTION SOIL SAMPLE (NO ADEC EXCEEDANCES) - BRISTOL
- APPROXIMATE FIELD SCREENING LOCATION WITH PID RESULT GREATER THAN 20 PPM
- APPROXIMATE FIELD SCREENING LOCATION WITH PID RESULT LESS THAN 20 PPM
- FORMER DRY WELL (REMOVED IN 2015)
- FORMER DRY WELL PIPING (REMOVED IN 2015)
- DISPOSAL LINE REMAINING IN PLACE
- FORMER DISPOSAL LINE (REMOVED IN 2015)
- FORMER ABOVEGROUND FUEL LINES (REMOVED IN 2015)
- FORMER UNDERGROUND FUEL LINES (REMOVED IN 2015)
- FUEL LINES REMAINING IN PLACE
- SOIL SAMPLE FROM THE 2015 REMOVAL ACTION INVESTIGATION - BRISTOL
- FORMER GASOLINE UST (REMOVED IN 2015)
- FORMER DIESEL UST (REMOVED IN 2015)
- UST EXCAVATION - BRISTOL
- REMAINING SOIL CONTAMINATION WITH DRO CONCENTRATION ABOVE ADEC SOIL CLEANUP LEVEL
- SRI AREA OF CONCERN

Figure 2-3
2015 Storage Tank, Pipelines, and Associated Features Removal Action
Elevated Field Screening Locations and
ADEC Cleanup Level Exceedances in Soil
Sears Creek Station, Alaska
Petroleum Only and No Further Action Sites Decision Document

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3538 International Street
Fairbanks, AK 99701
Bristol
ENVIRONMENTAL REMEDIATION SERVICES, LLC
Phone (907)563-0013
Fax (907)563-6713

DATUM: WGS84
SYSTEM: UTM ZONE 6 N
Project No. 34150037
DATE NOV 2018
DWN. CB
SCALE AS SHOWN
APPRVD. CM

FINAL

Prior to decommissioning of the Valve Manifold Building, the fuel lines were exposed, and any residual fluid was drained back into the Valve Manifold Pit. The liquid in the Valve Manifold Pit was then pumped out. A total of seven 55-gallon drums of a liquid with fuel odor was pumped out of the pit and later disposed (Bristol, 2016a). The Valve Manifold Pit was then cleaned, decommissioned by punching holes in the base of the pit and collapsing the upper four feet of concrete walls into the pit, and finally backfilled (Bristol, 2016a). Bristol collected two soil samples from the base of the Valve Manifold Pit: one on the south side of the pit (VMP01) and one on the west side of the pit (VMP02). Elevated photoionization detector (PID) values were observed in VMP01 and VMP02, but laboratory results showed an exceedance of the cleanup levels in 18 AAC 75.341, Tables B1 and B2 for VMP01 only. The only contaminants that exceeded the cleanup level in this sample were DRO and naphthalene (Bristol, 2016a).

No fluids were present in the Dewatering Tower, which was a 1,200-gallon diesel fuel tank. The tower was decommissioned by loosening the bolts of the base and tipping it over in a controlled manner (Bristol, 2016a). The tank was then cut into pieces and metal pieces were recycled. One sample was collected from the Dewatering Tower (DWT01) footprint for field screening and laboratory analysis. The PID screening results were below 20 parts per million by volume (ppmv), and laboratory results showed there were no exceedances of cleanup levels in 18 AAC 75.341, Tables B1 and B2 (Bristol, 2016a).

The fuel lines between the Valve Manifold and the Composite Building, the lines between the Valve Manifold and the Dewatering Tower, and the fuel lines south of the Valve Manifold were tapped to remove any residual fluid. After residual fluid was removed and containerized, the pipelines were removed. They were then cut into appropriate length sections for transport, and sent to be recycled (Bristol, 2016a). Excavated soil associated with the underground piping was screened with a PID. Soil with PID results greater than 20 ppmv was identified in the pipe trench south of the Valve Manifold Pit, and in the pipe trench between the Valve Manifold Pit and the Dewatering Tower. The excavated soil was placed in a lined contaminated soil stockpile and later disposed in accordance with ADEC regulations (Bristol, 2016a).

Potential soil contamination was observed underlying the south and west sides of the Valve Manifold Building, along piping between the Valve Manifold and the Dewatering Tower, and in the piping trench south of the Valve Manifold Pit.

Soil sampling results are presented on **Figure 2-4**, and showed exceedances of the 18 AAC 75.341, Table B2 cleanup level for DRO (250 mg/kg) at 10.5 feet bgs on the south side of the Manifold Building (3,600 mg/kg), in the piping trench between the Valve Manifold and the Dewatering Tower at 6.5 feet bgs (580 mg/kg), and in the piping trench south of the Valve Manifold Pit at approximately 4 feet bgs (4,000 mg/kg and 7,900 mg/kg). Naphthalene was identified above the cleanup level in 18 AAC 75.341, Table B2 in the same two pipeline trench samples (PL17 and PL18) and in the sample on the south side of the Valve Manifold (VMP01), and two additional fuel-related PAHs (1-methylnaphthalene and 2- methylnaphthalene) were identified above the 18 AAC 75.341, Table B2 cleanup levels in the piping trench south of the Valve Manifold Pit (PL17). These areas of contamination were further investigated in the SRI.

2015 SRI. Six soil borings were drilled as part of the SRI in the former Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower area to characterize and delineate the extent of soil contamination identified during the removal actions. Four of the soil borings were drilled to 20 feet bgs (VM-

BH1, BH2, BH3, and BH6) since there was no evidence of significant soil contamination based on field screening PID results at the time of drilling. Soil boring VM-BH4 was completed to the groundwater table to delineate the vertical extent of potential contamination, since PID screening indicated potential shallow contamination. Soil Boring VM-BH5 was also completed to the groundwater table to delineate the extent of potential deep contamination at the site. Groundwater was encountered at approximately 49 feet bgs, but no evidence of soil contamination at the groundwater table was identified in the field screening results from VM-BH4 or VM-BH5.

Twelve soil samples were collected from the six borings, and the samples were analyzed for GRO, DRO, RRO, VOCs, SVOCs, pesticides, and metals. At select locations where field screening identified potential contamination, samples were also collected for 1,2-dibromoethane (EDB) analysis.

Exceedances of cleanup levels in 18 AAC 75.341, Tables B1 and B2 for DRO were observed in one soil boring adjacent to the former fuel lines south of the Valve Manifold Pit and Dewatering Tower (VM-BH4). The DRO exceedances were observed between 2-3 feet bgs (493 mg/kg) and 7-8 feet bgs (1,050 mg/kg). Two additional samples were collected from deeper intervals in this boring and no exceedances were observed, including in the sample collected from the water table.

Two monitoring wells were installed during the SRI to evaluate potential groundwater contamination in the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower AOC. Monitoring well MW13 was installed adjacent to VM-BH1 and east of the former Dewatering Tower. Monitoring well MW14 was installed downgradient of the Valve Manifold Pit and adjacent to the Composite Building, as shown in **Figure 2-4**. Groundwater samples were collected from newly installed wells MW13 and MW14, along with previously installed wells MW3, MW4, and the WSW between September 14 and 18, 2015 to evaluate potential groundwater contamination. Groundwater samples were analyzed for GRO, DRO, RRO, VOCs, PAHs, EDB, pesticides, and metals.

The groundwater sampling results show that the only exceedance of the groundwater cleanup levels in 18 AAC 75.345 Table C was for lead in the WSW. However, the lead detection in this well is likely associated with the components of the water distribution system (e.g., lead well screen, lead piping, or other lead water supply system components) rather than contaminant migration since lead above the cleanup level was not detected in any soil sample in the area. Moreover, since the screen length was unknown, the submersible pump was placed at the bottom of the well to collect a fresh formation water sample. In doing so, it is possible that lead particulates from the bottom of the well were introduced into the sample container (the sample was unfiltered), which were subsequently dissolved by acid.

PREVIOUS SOIL INVESTIGATION RESULTS

Year	Boring/Sample #	Previous Analyses	Previous Detections	Previous Exceedance
2007	SB3, SB4, SB6, MW3	GRO, DRO, RRO, BTEX,	DRO	None

ADEC SOIL CLEANUP LEVELS:
18 AAC 75.341 TABLES B1/B2
UNITS = MG/KG

BULK FUEL HYDROCARBONS	
DRO	250
PAHs	
1-MNPT	0.41
2-MNPT	1.3
NAPHTHALENE	0.038
METALS	
ARSENIC	0.2

UNDER 40-INCH ZONE
MOST STRINGENT PATHWAY

ADEC GROUNDWATER CLEANUP LEVELS:
18 AAC 75.345 TABLE C
UNITS = MG/L

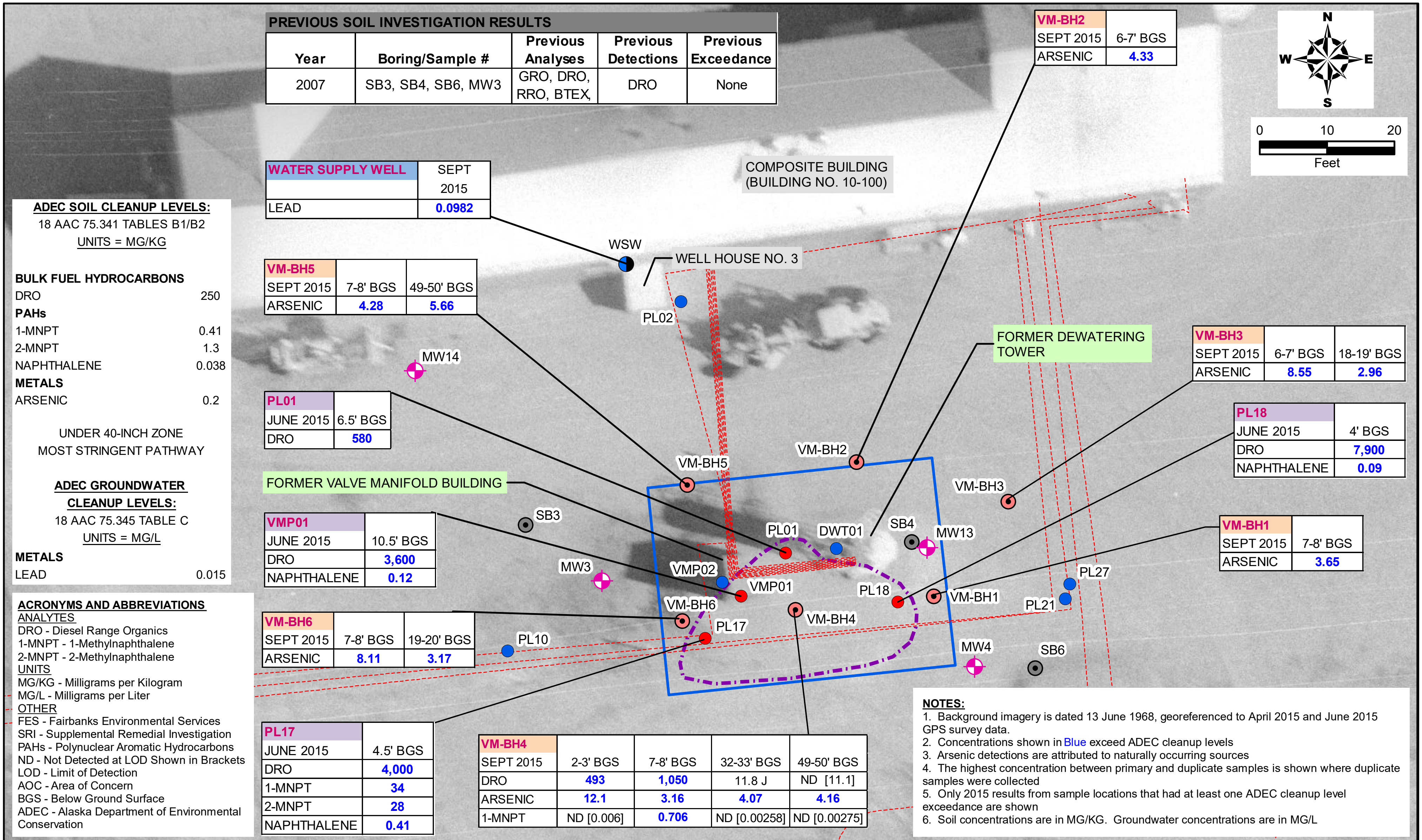
METALS	
LEAD	0.015

ACRONYMS AND ABBREVIATIONS

ANALYTES
DRO - Diesel Range Organics
1-MNPT - 1-Methylnaphthalene
2-MNPT - 2-Methylnaphthalene

UNITS
MG/KG - Milligrams per Kilogram
MG/L - Milligrams per Liter

OTHER
FES - Fairbanks Environmental Services
SRI - Supplemental Remedial Investigation
PAHs - Polynuclear Aromatic Hydrocarbons
ND - Not Detected at LOD Shown in Brackets
LOD - Limit of Detection
AOC - Area of Concern
BGS - Below Ground Surface
ADEC - Alaska Department of Environmental Conservation



WATER SUPPLY WELL	SEPT 2015
LEAD	0.0982

VM-BH5		
SEPT 2015	7-8' BGS	49-50' BGS
ARSENIC	4.28	5.66

PL01	
JUNE 2015	6.5' BGS
DRO	580

VMP01	
JUNE 2015	10.5' BGS
DRO	3,600
NAPHTHALENE	0.12

VM-BH6		
SEPT 2015	7-8' BGS	19-20' BGS
ARSENIC	8.11	3.17

PL17	
JUNE 2015	4.5' BGS
DRO	4,000
1-MNPT	34
2-MNPT	28
NAPHTHALENE	0.41

VM-BH4				
SEPT 2015	2-3' BGS	7-8' BGS	32-33' BGS	49-50' BGS
DRO	493	1,050	11.8 J	ND [11.1]
ARSENIC	12.1	3.16	4.07	4.16
1-MNPT	ND [0.006]	0.706	ND [0.00258]	ND [0.00275]

VM-BH2	
SEPT 2015	6-7' BGS
ARSENIC	4.33

VM-BH3		
SEPT 2015	6-7' BGS	18-19' BGS
ARSENIC	8.55	2.96

PL18	
JUNE 2015	4' BGS
DRO	7,900
NAPHTHALENE	0.09

VM-BH1	
SEPT 2015	7-8' BGS
ARSENIC	3.65

NOTES:
1. Background imagery is dated 13 June 1968, georeferenced to April 2015 and June 2015 GPS survey data.
2. Concentrations shown in Blue exceed ADEC cleanup levels
3. Arsenic detections are attributed to naturally occurring sources
4. The highest concentration between primary and duplicate samples is shown where duplicate samples were collected
5. Only 2015 results from sample locations that had at least one ADEC cleanup level exceedance are shown
6. Soil concentrations are in MG/KG. Groundwater concentrations are in MG/L

LEGEND:
- GROUNDWATER MONITORING WELL
- WATER SUPPLY WELL
- REMOVAL ACTION SOIL SAMPLE - BRISTOL
- REMOVAL ACTION SOIL BORING (NO ADEC EXCEEDANCES) - BRISTOL
- 2015 SRI SOIL BORING - FES
- PRE-2015 SOIL BORING
- FORMER ABOVEGROUND FUEL LINES (REMOVED IN 2015)
- FORMER UNDERGROUND FUEL LINES (REMOVED IN 2015)
- REMAINING SOIL CONTAMINATION WITH DRO CONCENTRATION ABOVE ADEC SOIL CLEANUP LEVEL
- DATA GAP AREA OF CONCERN
- GROUNDWATER SAMPLE FROM THE 2015 SUPPLEMENTAL REMEDIAL INVESTIGATION
- SOIL BORING SAMPLE FROM THE 2015 SUPPLEMENTAL REMEDIAL INVESTIGATION
- SOIL SAMPLE FROM THE 2015 REMOVAL ACTION INVESTIGATION - BRISTOL

Figure **2-4**
Valve Manifold, Dewatering Tower, and Associated Fuel Lines
AOC Soil and Groundwater Sampling Results
Exceeding ADEC Cleanup Levels
Sears Creek Station, Alaska
Petroleum Only and No Further Action Sites Decision Document

FES
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DATUM: WGS84
SYSTEM: UTM ZONE 6 N
Project No. 34150037
DATE NOV 2018
DWN. CB
SCALE AS SHOWN
APPRVD. CM

FINAL

Soil samples collected as part of the 2015 decommissioning, showed exceedances of the site-specific ADEC Method Three ACL for DRO in soils on the south side of the Valve Manifold Pit and in the pipeline trench south of the Valve Manifold Pit (Bristol, 2016a). Follow-up sampling in the SRI showed the areal extent of soil contamination was limited and did not extend significantly outside of the pipeline trench.

2.1.7 Nature and Extent of Contamination

The nature and extent of contamination at the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower was evaluated using results from previous investigations, the 2015 removal action, and the 2015 SRI. Soil samples collected as part of the 2015 removal action showed exceedances of cleanup levels in 18 AAC 75.341, Tables B1 and B2 for DRO and fuel-related PAHs in shallow soils (10 feet bgs or less) on the south side of the Valve Manifold Pit, in the pipeline trench between the Valve Manifold Pit and Dewatering Tower, and in the pipeline trench south of the Valve Manifold Pit (Bristol, 2016a). Follow-up sampling in the SRI showed the areal extent of fuel related soil contamination was limited and did not extend significantly outside of the pipeline trench. Arsenic was also detected in all samples above ADEC cleanup levels in 18 AAC 75.341, Table B1. The vertical extent of contamination was also limited. Soil concentrations exceeding the cleanup levels extended from approximately 2 feet bgs to a maximum depth of 10.5 feet bgs. No detections of DRO or fuel-related compounds above the cleanup level were identified at the water table. The approximate areal extent of soil with fuel-related contamination above the cleanup level is presented on **Figure 2-4**.

Groundwater sampling results showed no evidence of groundwater contamination from contaminant releases at the site. As previously discussed, the elevated lead concentration in the WSW was suspected to be associated with a lead screen, piping, or other leaded water distribution system components. Groundwater is addressed as part of the Site-Wide Groundwater AOC which is covered by the Final Record of Decision (U.S. Army, 2024).

2.1.8 Conceptual Site Model

The CSM is the same as presented for the whole of the SCS (See Section 1.5.1) and the exposure assessment presented in Section 1.7.2.1.

2.2 CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USE

2.2.1 Land Use

This is the same for the whole of the SCS (See Section 1.6).

2.2.2 Ground and Surface Water Uses

There are no current groundwater uses at the SCS. The reasonably foreseeable future use of the SCS is expected to remain industrial while under U.S. Army ownership and, as the lead agency, the U.S. Army has the authority to determine the future anticipated land use of the SCS. The U.S. Army has not determined potential future uses and unrestricted use could be a possibility following property transfer.

Surface water is not present at the SCS.

2.3 SUMMARY OF SITE RISKS

A HHERA evaluated the human health and ecological risks associated with the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower AOC. The HHERA process and approach is presented in Section 1.7 and subsequent sub-sections. The following discussion is focused on the COPCs and risks that the HHERA identified for the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower AOCs.

2.3.1 Summary of Human Health Risk Assessment

This is the same for the whole of the SCS (See Section 1.7.2).

2.3.1.1 Exposure Assessment

This is the same for the whole of the SCS (See Section 1.7.2.1).

2.3.1.2 Identification of Chemicals of Potential Concern

This is the same for the whole of the SCS (See Section 1.7.2.2), apart from the site-specific details described below.

Residential Screening: COPCs, chemicals with MDCs exceeding residential soil RSLs and cleanup levels for GRO, DRO and RRO in 18 AAC 75.341 Table B2, under 40-inch zone, were identified in subsurface soil at the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower AOCs:

- Subsurface soil: 1-methylnaphthalene, 2-methylnaphthalene, and vanadium.

Industrial Screening: COPCs, chemicals with MDCs exceeding industrial soil RSLs, and cleanup levels for GRO, DRO and RRO in 18 AAC 75.341 (Table B2, under 40-inch zone) were not identified at the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower AOCs.

The data used in the risk assessment was deemed to be of sufficient quality and quantity for its intended use. The detection frequency (number of samples in which the chemical was detected divided by the total number of samples analyzed), the MDCs, and residential and industrial screening levels are presented in **Table 2-1**.

Table 2-1 Summary of Cumulative Risk Estimates for Human Receptors – Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower AOCs

Medium/Risk Driver[1]	Number of Samples	Number of detections	MDC (mg/kg)	Residential Soil RSL[2] THQ=0.1 or TCR=1 x 10^{-6}	Industrial Soil RSL[2] THQ=0.1 or TCR=1 x 10^{-6}	Hypothetical Future Resident	
						Estimated Cancer Risk[3]	Estimated Noncancer Hazard[3]
Subsurface Soil							
1-methylnaphthalene	15	4	34	18	NA	1.9 x 10^{-6}	NA
2-methylnaphthalene	15	3	28	24	NA	NA	0.117
Vanadium	8	8	51.6	39	580	NA	0.132
Cumulative Media Cancer Risk/Noncancer Hazard:						1.9 x 10^{-6}	0.249
ADEC Risk Criteria:						10^{-5}	1
EPA Risk Range:						10^{-6} – 10^{-4}	1

Notes:
1 – Summary of risk estimates for COPCs are presented if the COPC is a risk driver for at least one receptor. Risk estimates for all COPCs are presented in the Human Health and Ecological Risk Assessment which is Appendix H of the Supplemental Remedial Investigation (U.S. Army, 2018).
2 – Human Health Screening levels are the May 2016 EPA Regional Screening Levels for Residential Soil, except for the carcinogenic PAHs. The screening levels for the carcinogenic PAHs were calculated using the RSL calculator in May 2017.
3 – Estimated Cancer Risk = (MDC/RSL) *10^{-6}; Estimated Noncancer Hazard = (MDC/RSL)*0.1
Key:
ADEC = Alaska Department of Environmental Conservation
AOC = Area of Concern
COPC = contaminant of potential concern
EPA = U.S. Environmental Protection Agency
mg/kg = milligrams per kilogram
MDC = maximum detected concentration
NA = not applicable
PAH = polynuclear aromatic hydrocarbon
RSL = regional screening level
TCR = target cancer risk
THQ = target hazard quotient

2.3.1.3 Toxicity Assessment

This is the same for the whole of the SCS (See Section 1.7.2.3).

2.3.1.4 Risk Characterization

This is the same for the whole of the SCS (See Section 1.7.2.4), apart from the site-specific details described below.

Preliminary estimated cancer risks are at the low end of the EPA's risk management range of 10^{-6} to 10^{-4} and below the ADEC excess cancer risk threshold of 1×10^{-5}. Preliminary non-cancer hazards are below the EPA's target hazard index of 1. No exceedances of ADEC soil cleanup levels were noted. Therefore, based on the various lines of evidence, it is unlikely that chemicals are present at concentrations that would potentially pose risks or hazards to human health of residential or industrial receptors.

2.3.2 Summary of Ecological Risk Assessment

This is the same for the whole of the SCS (See Section 1.7.3).

2.3.2.1 ADEC Step 1 Ecological Scoping Evaluation

This is the same for the whole of the SCS (See Section 1.7.3.1).

2.3.2.2 ADEC Step 2 Preliminary Screening Evaluation

This is the same for the whole of the SCS (See Section 1.7.3.2), apart from the site-specific details described below.

Ecological COPCs, chemicals with MDCs exceeding screening levels at the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower AOCs included:

- Surface soil: Lead.
- Subsurface soil: Copper, selenium, vanadium, and zinc.

In all cases, inorganic concentrations were relatively low, and exceedances were within about one-order of magnitude of the conservative screening levels applied. The ecological evaluation concludes that exposure to residual chemicals in surface and shallow subsurface soil is potentially complete but unlikely to result in significant exposure to ecological receptors. Per ADEC decision criteria, available information are considered adequate to conclude that reported exposure (and potential risk) is negligible and there is no need of further evaluation or remedial action based on potential ecological risk (U.S. Army, 2018).

2.3.3 Basis for Action

Based on the results of the HHERA, as summarized above, the Valve Manifold Building AOC does not contain COC's that are risks to human or ecological receptors. However, as noted in Section 2.1.7, there are COPCs that exceed ADEC Method Two migration-to-groundwater cleanup levels.

As discussed in Section 1.8, ADEC Method Three migration-to-groundwater levels were calculated to further refine the constituents that are a migration to groundwater threat and should be established as COCs. **Table 2-2** presents the COPCs identified, along with the:

- ADEC Method Two migration-to-groundwater cleanup value.
- Maximum allowable concentration (for petroleum hydrocarbons only).
- Most conservative ADEC Method Two human health, under 40-inch zone, cleanup value.
- ADEC Method Three migration-to-groundwater cleanup value.
- Selection of the Site-Specific ACL, which is based on the most conservative of the ADEC Method Two maximum allowable concentration (for petroleum hydrocarbons only), the ADEC Method Two human health soil cleanup level (18 AAC 75.341 Tables B1 and B2, under 40-inch zone), , and the ADEC Method Three migration-to-groundwater value.

Table 2-2 Cleanup Levels for Soil Contaminants of Potential Concern

Compound	ADEC Method Two Migration-to-Groundwater Cleanup Level[1] (mg/kg)	ADEC Method Two Maximum Allowable Concentration[2] (mg/kg)	ADEC Method Two Human Health Level[3] (mg/kg)	ADEC Method Three Calculator Value – Migration-to-Groundwater[4] (mg/kg)	Site-Specific Alternative Cleanup Level[5] (mg/kg)	Maximum Detected Concentration (mg/kg)
Diesel Range Organics	250	12,500	10,250	3,300	3,300	**7,900**
Naphthalene	0.038	NA	29	13	13	0.41
1-Methylnaphthalene	0.41	NA	68	130	68	34
2-Methylnaphthalene	1.3	NA	310	410	310	28
Arsenic	0.2	NA	8.8	210	8.8	**12.1**

Notes:
1 – Tables B1 and B2, 18 AAC 75.341 (ADEC. 2023).
2 – Table B2, 18 AAC 75.341 (ADEC. 2023).
3 – Human Health value based on the Under 40-inch zone in Table B1 and most conservative of the ingestion and inhalation value for the under 40-inch zone in Table B2 (for diesel range organics and gasoline range organics) (ADEC. 2023).
4 – Value determined for the migration-to-groundwater scenario using the ADEC Cleanup Levels Calculator and the Petroleum Cleanup Levels Calculator (U.S. Army, 2018).
5 – Site-specific alternative cleanup level for soil is the lowest value between: 1) ADEC Maximum Allowable Concentration, 2) ADEC Human Health Level, and 3) ADEC Method Three Calculator Value – Migration-to-Groundwater.
Bold values exceed the site-specific cleanup level.
Key:
AAC – Alaska Administrative Code
ADEC – Alaska Department of Environmental Conservation
mg/kg – milligrams per kilogram
NA – not applicable

Although the maximum detected arsenic concentration exceeded its respective BTV (Section 1.7.1) and the site-specific ACL, all other arsenic detections are consistent with naturally occurring concentrations and there were no other arsenic exceedances of the site-specific ACL.

Arsenic concentrations are considered to be not statistically different from site wide concentrations based on a two-sample t-test of the Burn Pit AOC arsenic concentrations documented in the SRI (U.S. Army, 2018).

DRO was the only constituent to exceed the site-specific ACL and is the only soil COC at the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower AOCs. DRO contamination exceeding the approved cleanup levels is present in the western portion near the Valve Manifold Building and Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower) AOCs (VMP01 and PL17) and in the eastern portion near the Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower) AOC (PL18). No exceedances of DRO are noted near the Dewatering Tower AOC.

Table 2-3 summarizes the COC and cleanup goal (the site-specific ACL) for the Valve Manifold Building and Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower) AOCs. **Figure 2-4** presents the location of the DRO detection that exceeds the cleanup goal and presents the estimated lateral extent of exceedance.

Table 2-3 Soil Contaminant of Concern and Cleanup Goal for the Valve Manifold Building and Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower) AOCs

Contaminant of Concern	Site-Specific Alternative Cleanup Level (mg/kg)	Basis for Cleanup
Diesel Range Organics	3,300	Migration-to-Groundwater

Key:
AOC – Area of Concern
mg/kg – milligrams per kilogram

2.4 REMEDIAL ACTION OBJECTIVES

The general RAOs are outlined in Section 1.9. Only RAO 2 is applicable to the Valve Manifold Building AOC:

- RAO 2: Prevent further degradation of groundwater by reducing the concentrations of COCs in soil to levels protective of groundwater quality. Specifically:
  - Reduce concentrations of DRO in soil to below ACLs for protection of migration to groundwater developed using ADEC Method Three.

2.5 DESCRIPTION OF TECHNOLOGIES

The remedial technologies and the selected alternative for the Valve Manifold Building AOC was presented in the FS (U.S. Army, 2020) and is summarized below.

2.5.1 Description of Potential Remedy Technologies

This is the same for the whole of the SCS (See Section 1.10).

2.5.2 Expected Outcome of Each Technology

Technology 1: No Action. There are no site changes expected from selecting this remedial alternative. This technology would not achieve RAO 2.

Technology 2: LUCs. While LUCs would control access there is no provision for monitoring degradation of DRO and therefore RAO 2 would not be achieved.

Technology 3: *In Situ* Treatment – SVE. As the COC at the Valve Manifold Building AOC is DRO, a non-volatile petroleum hydrocarbon, SVE is unlikely to substantially reduce the DRO concentrations and therefore RAO 2 would not be achieved.

Technology 4: *In Situ* Treatment – Bioventing. Bioventing could take several years to achieve RAO 2.

Technology 5: *In Situ* Treatment – Chemical Oxidation. ISCO could require multiple injections to achieve RAO 2.

Technology 6: *In Situ* Treatment – Thermal Enhancement. Thermal enhancement would be implemented in conjunction with another in situ technology to achieve RAO 2.

Technology 7: Excavation – Onsite Treatment. Contaminated soil would be excavated and treated, achieving RAO 2.

Technology 8: Excavation – Offsite Treatment. Contaminated soil would be excavated and treated, achieving RAO 2.

2.6 SUMMARY OF COMPARATIVE ANALYSIS OF TECHNOLOGIES

Technologies were evaluated using the six criteria which includes effectiveness and permanence; reduction TMV through treatment; implementability; advantages; limitations; and cost (relative).

This section summarizes how well each alternative satisfies each evaluation criterion and indicates how it compares to the other alternatives under consideration for the Valve Manifold Building AOC.

2.6.1 Effectiveness and Permanence

Effectiveness and permanence refer to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time once clean-up levels have been met. This criterion includes the consideration of residual risk that will remain onsite following remediation and the adequacy and reliability of controls.

Technology 1: No Action. Would not achieve the RAO’s and therefore is not effective.

Technology 2: LUCs. Is effective in preventing exposure pathways but is not effective at remediating contaminated soils.

Technology 3: *In Situ* Treatment – SVE. The relative effectiveness is low because SVE is not effective for the removal of non-volatile contaminants (i.e., DRO).

Technology 4: *In Situ* Treatment – Bioventing. Effective for non-volatile petroleum contamination (i.e., DRO). Could take several years to achieve alternative cleanup levels.

Technology 5: *In Situ* Treatment – Chemical Oxidation. Effectiveness is dependent on the design, chemical distribution, and could require multiple injections to be effective and permanent.

Technology 6: *In Situ* Treatment – Thermal Enhancement. The relative effectiveness is low because thermal treatment is less effective for the removal of less volatile contaminants (i.e., DRO).

Technology 7: Excavation – Onsite Treatment. Effective and permanent.

Technology 8: Excavation – Offsite Treatment. Effective and permanent.

2.6.2 Reduction of Toxicity, Mobility, or Volume Through Treatment

Reduction of TMV through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy.

Technology 1: No Action. Does not reduce TMV through treatment.

Technology 2: LUCs. Does not reduce TMV through treatment.

Technology 3: *In Situ* Treatment – SVE. Unlikely to reduce TMV of DRO through treatment.

Technology 4: *In Situ* Treatment – Bioventing. Would reduce TMV through treatment.

Technology 5: *In Situ* Treatment – Chemical Oxidation. Would reduce TMV through active treatment.

Technology 6: *In Situ* Treatment – Thermal Enhancement. Would reduce TMV through active treatment.

Technology 7: Excavation – Onsite Treatment. Would reduce TMV through active treatment.

Technology 8: Excavation – Offsite Treatment. Would reduce TMV through active treatment.

2.6.3 Implementability

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered.

Technology 1: No Action. Readily implementable.

Technology 2: LUCs. Readily implementable.

Technology 3: *In Situ* Treatment – SVE. Requires installation of extraction wells, a blower system, air transmission lines, and a connection to an electrical power source. Vapor monitoring points would be installed to sample soil gas to monitor the progress of remediation. Installation of power source also required.

Technology 4: *In Situ* Treatment – Bioventing. Requires installation of injection wells, a blower system, air transmission lines connecting the blower to appropriate wells, and a connection to an electrical power source. Vapor monitoring points would be installed to sample soil gas to monitor the progress of remediation. Installation of power source also required.

Technology 5: *In Situ* Treatment – Chemical Oxidation. Requires mixing and placing chemical oxidants could be placed into target zone and mixed using heavy equipment (excavator, mixing auger).

Technology 6: *In Situ* Treatment – Thermal Enhancement. Requires a thermal or electrical heating system to be installed and would also need a connection to a power source.

Technology 7: Excavation – Onsite Treatment. Requires mobilization of excavation equipment for the removal of impacted material. Clean backfill would be delivered to backfill the site. On-Site treatment would require the establishment of treatment system, operation and maintenance, a power source may be required. For landfarming soil nutrient applications may be required to support biodegradation.

Technology 8: Excavation – Offsite Treatment. Requires mobilization of excavation equipment for the removal of impacted material. Requires hauling soil off site to treatment facility. Clean backfill would be delivered to backfill the site.

2.6.4 Advantages

The following provides a general assessment of the advantages of each technology.

Technology 1: No Action. Has no advantages.

Technology 2: LUCs. Low cost and highly effective.

Technology 3: *In Situ* Treatment – SVE. Relatively low annual operating cost for in situ treatment.

Technology 4: *In Situ* Treatment – Bioventing. Relatively low annual operating cost for in situ treatment.

Technology 5: *In Situ* Treatment – Chemical Oxidation. Effective for DRO and treatment may be completed quickly.

Technology 6: *In Situ* Treatment – Thermal Enhancement. Could speed up contaminant removal.

Technology 7: Excavation – Onsite Treatment. Eliminates off-site transport of contaminated soils.

Technology 8: Excavation – Offsite Treatment. Achieves cleanup level as soon as soil is removed. Does not require set up, operation, and maintenance of an on-site treatment system.

2.6.5 Limitations

The following provides a general assessment of the limitations of each technology.

Technology 1: No Action. Does not achieve RAO.

Technology 2: LUCs. Does not achieve RAO.

Technology 3: *In Situ* Treatment – SVE. Unlikely to address DRO. There is no on-site power source.

Technology 4: *In Situ* Treatment – Bioventing. There is no on-site power source.

Technology 5: *In Situ* Treatment – Chemical Oxidation. Oxidants require special handling due to safety hazards.

Technology 6: *In Situ* Treatment – Thermal Enhancement. Has a very high cost and it is energy intensive. It is also not highly effective for primary site COC.

Technology 7: Excavation – Onsite Treatment. High costs for system setup for volume of material to be treated by an on-site treatment option. Land farm treatment can take one or more years to achieve cleanup levels.

Technology 8: Excavation – Offsite Treatment. No limitations.

2.6.6 Cost

The following provides a relative assessment of cost for each technology.

Technology 1: No Action. No cost.

Technology 2: LUCs. Low initial cost, with a moderate long-term cost if used as the sole remedy.

Technology 3: *In Situ* Treatment – SVE. High cost due to establishment of an on-site power supply.

Technology 4: *In Situ* Treatment – Bioventing. High cost due to establishment of an on-site power supply.

Technology 5: *In Situ* Treatment – Chemical Oxidation. High cost due to ISCO products, injection equipment, specialized personnel, and implementation difficulties.

Technology 6: *In Situ* Treatment – Thermal Enhancement. High cost due to establishment of an on-site power supply and operation of a thermal heating system.

Technology 7: Excavation – Onsite Treatment. High costs for the construction and operation of an on-site treatment system for a small volume of contaminated soil.

Technology 8: Excavation – Offsite Treatment. Moderate cost, as compared to on-site treatment.

2.7 SELECTED REMEDY

The selected remedies for the Valve Manifold Building AOC involves LUCs and excavation and off-site treatment of DRO-contaminated soil exceeding the site-specific ACLs. These remedial actions were selected based upon the ability to protect the environment by addressing potential contaminant migration to groundwater and compliance with applicable requirements. The U.S. Army has determined that the selected remedy provides the best balance of trade-offs among the technologies with respect to the six criteria set out in Section 2.6.

Remedy selections are based on the detailed evaluation of remedial alternatives presented in the FS (U.S. Army, 2020). The U.S. Army is responsible for implementing and monitoring the remedial actions identified herein for the duration of the remedies selected in this DD.

2.7.1 Summary of the Rationale for the Selected Remedy

Based on the technical and cost evaluations presented in the FS (U.S. Army, 2020) and summarized in the prior subsections this alternative is highly effective and permanent, reduces TMV through removal and treatment, is relatively easy to implement, will rapidly achieve RAOs, and is the most cost-effective remedy.

2.7.2 Description of the Selected Remedy

LUCs would be required prior to and during the excavation of the contaminated soil to eliminate potential contact with contaminated media. LUCs could include maintaining existing site fencing and signage to limit site access to authorized personnel and prohibiting disturbing soil in the AOC except by qualified personnel working under an ADEC-approved work plan. Once excavation and backfill are complete and the sites have been approved for unlimited use/unlimited exposure, LUCs would no longer be required as the RAO would be achieved following the removal of the soil exceeding approved cleanup levels. Excavated soil exceeding approved cleanup levels would be transported to OIT in Moose Creek, Alaska, for offsite treatment.

At the Valve Manifold Building and Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower) AOCs contamination exceeding the approved cleanup levels is present in the western portion of the AOC (VMP01 and PL17) and in the eastern portion of the AOC (PL18), as shown on **Figure 2-4**. In the western portion of AOC, clean soil between 0 and 4.5 feet bgs would be segregated, sampled in accordance with ADEC's Field Sampling Guidance (ADEC, 2024) to confirm it is not contaminated, and reused as backfill. In the eastern portion of the AOC (PL18), soil contamination was detected at 4 feet bgs, the lower vertical extent of contamination in this area has not been determined. Approximately 150 cubic yards of soil between the two areas of excavation would be excavated and hauled to OIT for offsite treatment.

2.7.3 Expected Outcomes of Selected Remedy

Upon completion of the selected remedy, the Valve Manifold Building AOC will be in compliance with State of Alaska environmental statutes. No known contamination above site-specific cleanup goals will remain within soil at the Valve Manifold Building AOC after the selected remedy (excavation) has been completed. Refer to **Table 2-3** for COCs, cleanup levels, and the basis for the cleanup level.

2.7.4 Protection of Human Health and the Environment

Excavation of the COC at the Valve Manifold Building AOC would protect the environment by removing the contaminant mass that poses a soil migration to groundwater risk from the site and transporting the material to an off-site, permitted, treatment facility.

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3.0 FUEL LINES (ASSOCIATED WITH THE VALVE MANIFOLD BUILDING AND DEWATERING TOWER) AOC

The Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower) AOC was a series of underground fuel pipelines connected the Valve Manifold, Dewatering Tower, and components in the Composite Building. Several underground pipelines were also located approximately 10 feet south of the Valve Manifold and Dewatering Tower and connected the ASTs to the pump engine room in the Composite Building (**Figure 1-2**).

The Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), Valve Manifold Building, and the Dewatering Tower AOCs had removal actions completed (Bristol, 2016a) and were evaluated in the SRI (U.S. Army, 2018) and the FS (U.S. Army, 2020) as a singular area due to proximity. As such this section provides the area wide evaluation of the three AOCs and Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower) AOC specific remedy determination.

3.1 SITE CHARACTERISTICS

3.1.1 Topography and Climate

This is the same for the whole of the SCS (See Section 1.5.2.2).

3.1.2 Geology

This is the same for the whole of the SCS (See Section 1.5.2.3).

3.1.3 Hydrogeology

This is the same for the whole of the SCS (See Section 1.5.2.4).

3.1.4 Surface Water Hydrology

This is the same for the whole of the SCS (See Section 1.5.2.5).

3.1.5 Ecological Setting

This is the same for the whole of the SCS (See Section 1.5.2.6).

3.1.6 Site Characterization Activities

1994 Investigation. Two surface soil samples (S8 and S9) were collected in the vicinity of the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower AOCs during the 1994 investigation (**Figure 2-1**). The samples were analyzed for VOCs, basic/neutral/acid extractables, PCBs, pesticides, and toxic metals (USAPACEHEA, 1994). Results indicated contaminant concentrations were lower than applicable state and federal cleanup standards or consistent with the background sample concentrations, with the exception of DRO detected at 2,000 mg/kg at S8 (North Wind, 2012).

2007/2008 RI. Previous investigations were completed when the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower were intact. Four soil borings (SB3, SB4, SB6, and MW3) were drilled and sampled, and MW3 was completed as a groundwater monitoring well during the 2007 investigation (**Figure 2-**

2). Soil boring SB3 was placed northwest of the Valve Manifold Building and monitoring well MW3 was installed west of the Valve Manifold Building. Additional soil borings were placed east of the Dewatering Tower and in the vicinity of the buried pipelines (SB4 and SB6). SB3, SB4, and SB6 each had a total depth of 22 feet bgs and MW3 was completed at a total depth of 61 feet bgs. Soil samples were collected from the 5 to 7 feet bgs and 10 to 12 feet bgs intervals in SB4 and SB6, and from the 15 to 17 feet bgs and 20 to 22 feet bgs intervals in SB3 and MW3. Soil samples collected from the borings were analyzed for GRO; DRO; RRO; BTEX; PAHs; lead; and TOC. None of the soil samples collected in the area of the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower had reported contaminant concentrations above the cleanup levels in 18 AAC 75.341, Tables B1 and B2 during the 2007/2008 investigation (North Wind, 2010).

2014 Data Gap Analysis. The 2014 Data Gap Analysis reviewed site features and determined if a site feature had sufficient data to verify that a release had not occurred and that a site feature had sufficient data to determine the nature and extent of any contamination.

It was noted that a previously unknown sump was connected to the valve manifold. The valve manifold cover was opened during the Fall 2013 site visit and a strong fuel odor was noted, as well as a small amount of liquid in the bottom of the pit; however, the sump was not visible from above. The valve manifold pit was recommended for further investigation (North Wind, 2014).

No documentation was found as to whether the fuel lines were flushed and cleaned during the deactivation of the pump station. It was recommended to determine whether any fuel was still remaining in the lines and investigate the possibility that leakage has occurred through valves and joints over time (North Wind, 2014).

The Dewatering Tower AOC was not identified as having a data gap.

2015 Removal Action and Sampling. Decommissioning of the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower was conducted during the 2015 removal action (Bristol, 2016a). Approximately 80 cubic yards of potentially contaminated soil was excavated in this area based on field screening results. Field readings and sample locations during this action are presented on **Figure 2-3**.

Prior to decommissioning of the Valve Manifold Building, the fuel lines were exposed, and any residual fluid was drained back into the Valve Manifold Pit. The liquid in the Valve Manifold Pit was then pumped out. A total of seven 55-gallon drums of a liquid with fuel odor was pumped out of the pit and later disposed (Bristol, 2016a). The Valve Manifold Pit was then cleaned, decommissioned by punching holes in the base of the pit and collapsing the upper four feet of concrete walls into the pit, and finally backfilled (Bristol, 2016a). Bristol collected two soil samples from the base of the Valve Manifold Pit: one on the south side of the pit (VMP01) and one on the west side of the pit (VMP02). Elevated PID values were observed in VMP01 and VMP02, but laboratory results showed an exceedance of the cleanup levels in 18 AAC 75.341, Tables B1 and B2 for VMP01 only. The only contaminants that exceeded the cleanup level in this sample were DRO and naphthalene (Bristol, 2016a).

No fluids were present in the Dewatering Tower which was a 1,200-gallon diesel fuel tank. The tower was decommissioned by loosening the bolts of the base and tipping it over in a controlled manner (Bristol, 2016a). The tank was then cut into pieces and metal pieces were recycled. One sample was collected from the Dewatering Tower (DWT01) footprint for field screening and laboratory analysis. The PID screening results were below 20 ppmv, and laboratory results showed there were no exceedances of cleanup levels in 18 AAC 75.341, Tables B1 and B2 (Bristol, 2016a).

The fuel lines between the Valve Manifold and the Composite Building, the lines between the Valve Manifold and the Dewatering Tower, and the fuel lines south of the Valve Manifold were tapped to remove any residual fluid. After residual fluid was removed and containerized, the pipelines were removed. They were then cut into appropriate length sections for transport, and sent to be recycled (Bristol, 2016a). Excavated soil associated with the underground piping was screened with a PID. Soil with PID results greater than 20 ppmv was identified in the pipe trench south of the Valve Manifold Pit, and in the pipe trench between the Valve Manifold Pit and the Dewatering Tower. The excavated soil was placed in a lined contaminated soil stockpile and later disposed in accordance with ADEC regulations (Bristol, 2016a).

Potential soil contamination was observed underlying the south and west sides of the Valve Manifold Building, along piping between the Valve Manifold and the Dewatering Tower, and in the piping trench south of the Valve Manifold Pit.

Soil sampling results are presented on **Figure 2-4**, and showed exceedances of the 18 AAC 75.341, Table B2 cleanup level for DRO (250 mg/kg) at 10.5 feet bgs on the south side of the Manifold Building (3,600 mg/kg), in the piping trench between the Valve Manifold and the Dewatering Tower at 6.5 feet bgs (580 mg/kg), and in the piping trench south of the Valve Manifold Pit at approximately 4 feet bgs (4,000 mg/kg and 7,900 mg/kg). Naphthalene was identified above the cleanup level in 18 AAC 75.341, Table B2 in the same two pipeline trench samples (PL17 and PL18) and in the sample on the south side of the Valve Manifold (VMP01), and two additional fuel-related PAHs (1-methylnaphthalene and 2- methylnaphthalene) were identified above the 18 AAC 75.341, Table B2 cleanup levels in the piping trench south of the Valve Manifold Pit (PL17). These areas of contamination were further investigated in the SRI.

2015 SRI. Six soil borings were drilled as part of the SRI in the former Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower area to characterize and delineate the extent of soil contamination identified during the removal actions. Four of the soil borings were drilled to 20 feet bgs (VM-BH1, BH2, BH3, and BH6) since there was no evidence of significant soil contamination based on field screening PID results at the time of drilling. Soil boring VM-BH4 was completed to the groundwater table to delineate the vertical extent of potential contamination, since PID screening indicated potential shallow contamination. Soil Boring VM-BH5 was also completed to the groundwater table to delineate the extent of potential deep contamination at the site. Groundwater was encountered at approximately 49 feet bgs, but no evidence of soil contamination at the groundwater table was identified in the field screening results from VM-BH4 or VM-BH5.

Twelve soil samples were collected from the six borings, and the samples were analyzed for GRO, DRO, RRO, VOCs, SVOCs, pesticides, and metals. At select locations where field screening identified potential contamination, samples were also collected for EDB analysis.

Exceedances of cleanup levels in 18 AAC 75.341, Tables B1 and B2 for DRO were observed in one soil boring adjacent to the former fuel lines south of the Valve Manifold Pit and Dewatering Tower (VM-BH4). The DRO exceedances were observed between 2-3 feet bgs (493 mg/kg) and 7-8 feet bgs (1,050 mg/kg). Two additional samples were collected from deeper intervals in this boring and no exceedances were observed, including in the sample collected from the water table.

Two monitoring wells were installed during the SRI to evaluate potential groundwater contamination in the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower AOC. Monitoring well MW13 was installed adjacent to VM-BH1 and east of the former Dewatering Tower. Monitoring well MW14 was installed downgradient of the Valve Manifold Pit and adjacent to the Composite Building, as shown in **Figure 2-4**. Groundwater samples were collected from newly installed wells MW13 and MW14, along with previously installed wells MW3, MW4, and the WSW between September 14 and 18, 2015 to evaluate potential groundwater contamination. Groundwater samples were analyzed for GRO, DRO, RRO, VOCs, PAHs, EDB, pesticides, and metals.

The groundwater sampling results show that the only exceedance of the groundwater cleanup levels in 18 AAC 75.345 Table C was for lead in the WSW. However, the lead detection in this well is likely associated with the components of the water distribution system (e.g., lead well screen, lead piping, or other lead water supply system components) rather than contaminant migration since lead above the cleanup level was not detected in any soil sample in the area. Moreover, since the screen length was unknown, the submersible pump was placed at the bottom of the well to collect a fresh formation water sample. In doing so, it is possible that lead particulates from the bottom of the well were introduced into the sample container (the sample was unfiltered), which were subsequently dissolved by acid.

Soil samples collected as part of the 2015 decommissioning, showed exceedances of the site-specific ADEC Method Three ACL for DRO in soils on the south side of the Valve Manifold Pit and in the pipeline trench south of the Valve Manifold Pit (Bristol, 2016a). Follow-up sampling in the SRI showed the areal extent of soil contamination was limited and did not extend significantly outside of the pipeline trench.

3.1.7 Nature and Extent of Contamination

The nature and extent of contamination at the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower was evaluated using results from previous investigations, the 2015 removal action, and the 2015 SRI. Soil samples collected as part of the 2015 removal action showed exceedances of cleanup levels in 18 AAC 75.341, Tables B1 and B2 for DRO and fuel-related PAHs in shallow soils (10 feet bgs or less) on the south side of the Valve Manifold Pit, in the pipeline trench between the Valve Manifold Pit and Dewatering Tower, and in the pipeline trench south of the Valve Manifold Pit (Bristol, 2016a). Follow-up sampling in the SRI showed the areal extent of fuel related soil contamination was limited and did not extend significantly outside of the pipeline trench. Arsenic was also detected in all samples above ADEC cleanup levels in 18 AAC 75.341, Table B1. The vertical extent of contamination was also limited. Soil concentrations exceeding the cleanup levels extended from approximately 2 feet bgs to a maximum depth of 10.5 feet bgs. No detections of DRO or fuel-related compounds above the cleanup level were identified at the water table. The approximate areal extent of soil with fuel-related contamination above the cleanup level is presented on **Figure 2-4**.

Groundwater sampling results showed no evidence of groundwater contamination from contaminant releases at the site. As previously discussed, the elevated lead concentration in the

WSW was suspected to be associated with a lead screen, piping, or other leaded water distribution system components. Groundwater is addressed as part of the Site-Wide Groundwater AOC which is covered by the Final Record of Decision (U.S. Army, 2024).

3.1.8 Conceptual Site Model

The CSM is the same as presented for the whole of the SCS (See Section 1.5.1) and the exposure assessment presented in Section 1.7.2.1.

3.2 CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USE

3.2.1 Land Use

This is the same for the whole of the SCS (See Section 1.6).

3.2.2 Ground and Surface Water Uses

There are no current groundwater uses at the SCS. The reasonably foreseeable future use of the SCS is expected to remain industrial while under U.S. Army ownership and, as the lead agency, the U.S. Army has the authority to determine the future anticipated land use of the SCS. The U.S. Army has not determined potential future uses and unrestricted use could be a possibility following property transfer.

Surface water is not present at the SCS.

3.3 SUMMARY OF SITE RISKS

A HHERA evaluated the human health and ecological risks associated with the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower AOC. The HHERA process and approach is presented in Section 1.7 and subsequent sub-sections. The following discussion is focused on the COPCs and risks that the HHERA identified for the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower AOCs.

3.3.1 Summary of Human Health Risk Assessment

This is the same for the whole of the SCS (See Section 1.7.2).

3.3.1.1 Exposure Assessment

This is the same for the whole of the SCS (See Section 1.7.2.1).

3.3.1.2 Identification of Chemicals of Potential Concern

This is the same for the whole of the SCS (See Section 1.7.2.2), apart from the site-specific details described below.

Residential Screening: COPCs, chemicals with MDCs exceeding residential soil RSLs and cleanup levels for GRO, DRO and RRO in 18 AAC 75.341 Table B2, under 40-inch zone, were identified in subsurface soil at the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower AOCs:

- Subsurface soil: 1-methylnaphthalene, 2-methylnaphthalene, and vanadium.

Industrial Screening: COPCs, chemicals with MDCs exceeding industrial soil RSLs, and cleanup levels for GRO, DRO and RRO in 18 AAC 75.341 (Table B2, under 40-inch zone) were not identified at the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower AOCs.

The data used in the risk assessment was deemed to be of sufficient quality and quantity for its intended use. The detection frequency (number of samples in which the chemical was detected divided by the total number of samples analyzed), the MDCs, and residential and industrial screening levels are presented in **Table 3-1**.

3.3.1.3 Toxicity Assessment

This is the same for the whole of the SCS (See Sections 1.7.2.3).

Table 3-1 Summary of Cumulative Risk Estimates for Human Receptors – Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower AOCs

Medium/Risk Driver[1]	Number of Samples	Number of detections	MDC (mg/kg)	Residential Soil RSL[2] THQ=0.1 or TCR=1 x 10^{-6}	Industrial Soil RSL[2] THQ=0.1 or TCR=1 x 10^{-6}	Hypothetical Future Resident	
						Estimated Cancer Risk[3]	Estimated Noncancer Hazard[3]
Subsurface Soil							
1-methylnaphthalene	15	4	34	18	NA	1.9 x 10^{-6}	NA
2-methylnaphthalene	15	3	28	24	NA	NA	0.117
Vanadium	8	8	51.6	39	580	NA	0.132
Cumulative Media Cancer Risk/Noncancer Hazard:						1.9 x 10^{-6}	0.249
ADEC Risk Criteria:						10^{-5}	1
EPA Risk Range:						10^{-6} – 10^{-4}	1

Notes:
1 – Summary of risk estimates for COPCs are presented if the COPC is a risk driver for at least one receptor. Risk estimates for all COPCs are presented in the Human Health and Ecological Risk Assessment which is Appendix H of the Supplemental Remedial Investigation (U.S. Army, 2018).
2 – Human Health Screening levels are the May 2016 EPA Regional Screening Levels for Residential Soil, except for the carcinogenic PAHs. The screening levels for the carcinogenic PAHs were calculated using the RSL calculator in May 2017.
3 – Estimated Cancer Risk = (MDC/RSL) *10^{-6}; Estimated Noncancer Hazard = (MDC/RSL)*0.1
Key:
ADEC – Alaska Department of Environmental Conservation
AOC – Area of Concern
COPC – contaminant of potential concern
EPA – U.S. Environmental Protection Agency
mg/kg – milligrams per kilogram
MDC – maximum detected concentration
NA – not applicable
PAH – polynuclear aromatic hydrocarbon
RSL – regional screening level
TCR – target cancer risk
THQ – target hazard quotient

3.3.1.4 Risk Characterization

This is the same for the whole of the SCS (See Section 1.7.2.4), apart from the site-specific details described below.

Preliminary estimated cancer risks are at the low end of the EPA's risk management range of 10^{-6} to 10^{-4} and below the ADEC excess cancer risk threshold of 1×10^{-5}. Preliminary non-cancer hazards are below the EPA's target hazard index of 1. No exceedances of ADEC soil cleanup levels were noted. Therefore, based on the various lines of evidence, it is unlikely that chemicals are present at concentrations that would potentially pose risks or hazards to human health of residential or industrial receptors.

3.3.2 Summary of Ecological Risk Assessment

This is the same for the whole of the SCS (See Section 1.7.3).

3.3.2.1 ADEC Step 1 Ecological Scoping Evaluation

This is the same for the whole of the SCS (See Section 1.7.3.1)**.**

3.3.2.2 ADEC Step 2 Preliminary Screening Evaluation

This is the same for the whole of the SCS (See Section 1.7.3.2), apart from the site-specific details described below.

Ecological COPCs, chemicals with MDCs exceeding screening levels at the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower AOCs included:

- Surface soil: Lead.
- Subsurface soil: Copper, selenium, vanadium, and zinc.

In all cases, inorganic concentrations were relatively low, and exceedances were within about one-order of magnitude of the conservative screening levels applied. The ecological evaluation concludes that exposure to residual chemicals in surface and shallow subsurface soil is potentially complete but unlikely to result in significant exposure to ecological receptors. Per ADEC decision criteria, available information are considered adequate to conclude that reported exposure (and potential risk) is negligible and there is no need of further evaluation or remedial action based on potential ecological risk (U.S. Army, 2018).

3.3.3 Basis for Action

Based on the results of the HHERA, as summarized above, the Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower) AOC does not contain COC's that are risks to human or ecological receptors. However, as noted in Section 2.1.7, there are COPCs that exceed ADEC Method Two migration-to-groundwater cleanup levels.

As discussed in Section 1.8, ADEC Method Three migration-to-groundwater levels were calculated to further refine the constituents that are a migration to groundwater threat and should be established as COCs. **Table 3-2** presents the COPCs identified, along with the:

- ADEC Method Two migration-to-groundwater cleanup value.
- Maximum allowable concentration (for petroleum hydrocarbons only).
- Most conservative ADEC Method Two human health, under 40-inch zone, cleanup value.
- ADEC Method Three migration-to-groundwater cleanup value.
- Selection of the Site-Specific ACL, which is based on the most conservative of the ADEC Method Two human health cleanup level (18 AAC 75.341 Tables B1 and B2, under 40-inch zone), the maximum allowable concentration (for petroleum hydrocarbons only), and the ADEC Method Three migration-to-groundwater value.

Table 3-2 Cleanup Levels for Soil Contaminants of Potential Concern

Compound	ADEC Method Two Migration-to-Groundwater Cleanup Level[1] (mg/kg)	ADEC Maximum Allowable Concentration[2] (mg/kg)	ADEC Human Health Level[3] (mg/kg)	ADEC Method Three Calculator Value – Migration-to-Groundwater[4] (mg/kg)	Site-Specific Alternative Cleanup Level[5] (mg/kg)	Maximum Detected Concentration (mg/kg)
Diesel Range Organics	250	12,500	10,250	3,300	3,300	**7,900**
Naphthalene	0.038	NA	29	13	13	0.41
1-Methylnaphthalene	0.41	NA	68	130	68	34
2-Methylnaphthalene	1.3	NA	310	410	310	28
Arsenic	0.2	NA	8.8	210	8.8	**12.1**

Notes:
1 – Tables B1 and B2, 18 AAC 75.341 (ADEC. 2023).
2 – Table B2, 18 AAC 75.341 (ADEC. 2023).
3 – Human Health value based on the Under 40-inch zone in Table B1 and most conservative of the ingestion and inhalation value for the under 40-inch zone in Table B2 (for diesel range organics and gasoline range organics) (ADEC. 2023).
4 – Value determined for the migration-to-groundwater scenario using the ADEC Cleanup Levels Calculator and the Petroleum Cleanup Levels Calculator (U.S. Army, 2018).
5 – Site-specific alternative cleanup level for soil is the lowest value between: 1) ADEC Maximum Allowable Concentration, 2) ADEC Human Health Level, and 3) ADEC Method Three Calculator Value – Migration-to-Groundwater.
Bold values exceed the cleanup level.
Key:
AAC – Alaska Administrative Code
ADEC – Alaska Department of Environmental Conservation
mg/kg – milligrams per kilogram
NA – not applicable

Although the maximum detected arsenic concentration exceeded its respective BTV (Section 1.7.1) and the site-specific ACL, all other arsenic detections are consistent with naturally occurring concentrations and there were no other arsenic exceedances of the site-specific ACL. Arsenic concentrations are considered to be not statistically different from site wide concentrations based on a two-sample t-test of the Burn Pit AOC arsenic concentrations documented in the SRI (U.S. Army, 2018).

DRO was the only constituent to exceed the site-specific ACL and is the only soil COC at the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower AOCs. DRO contamination exceeding the approved cleanup levels is present in the western portion near the Valve Manifold Building and Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower) AOCs (VMP01 and PL17) and in the eastern portion near the Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower) AOC (PL18). No exceedances of DRO are noted near the Dewatering Tower AOC.

Table 3-3 summarizes the COC and cleanup goal (the site-specific ACL) for the Valve Manifold Building and Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower) AOCs. **Figure 2-4** presents the location of the DRO detection that exceeds the cleanup goal and presents the estimated lateral extent of exceedance.

Table 3-3 Soil Contaminant of Concern and Cleanup Goal for the Valve Manifold Building and Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower) AOCs

Contaminant of Concern	Site-Specific Alternative Cleanup Level (mg/kg)	Basis for Cleanup
Diesel Range Organics	3,300	Migration-to-Groundwater

Key:
AOC – Area of Concern
mg/kg – milligrams per kilogram

3.4 REMEDIAL ACTION OBJECTIVES

The general RAOs are outlined in Section 1.9. Only RAO 2 is applicable to the Valve Manifold Building AOC:

- RAO 2: Prevent further degradation of groundwater by reducing the concentrations of COCs in soil to levels protective of groundwater quality. Specifically:
  - Reduce concentrations of DRO in soil to below ACLs for protection of migration to groundwater developed using ADEC Method Three.

3.5 DESCRIPTION OF ALTERNATIVES

The remedial technologies and the selected alternative for the Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower) was presented in the FS (U.S. Army, 2020) and is summarized below.

3.5.1 Description of Potential Remedy Technologies

This is the same for the whole of the SCS (See Section 1.10).

3.5.2 Expected Outcome of Each Technology

Technology 1: No Action. There are no site changes expected from selecting this remedial alternative. This technology would not achieve RAO 2.

Technology 2: LUCs. While LUCs would control access there is no provision for monitoring degradation of DRO and therefore RAO 2 would not be achieved.

Technology 3: *In Situ* Treatment – SVE. As the COC at the Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower) AOC is DRO, a non-volatile petroleum hydrocarbon, SVE is unlikely to substantially reduce the DRO concentrations and therefore RAO 2 would not be achieved.

Technology 4: *In Situ* Treatment – Bioventing. Bioventing could take several years to achieve RAO 2.

Technology 5: *In Situ* Treatment – Chemical Oxidation. ISCO could require multiple injections to achieve RAO 2.

Technology 6: *In Situ* Treatment – Thermal Enhancement. Thermal enhancement would be implemented in conjunction with another in situ technology to achieve RAO 2.

Technology 7: Excavation – Onsite Treatment. Contaminated soil would be excavated and treated, achieving RAO 2.

Technology 8: Excavation – Offsite Treatment. Contaminated soil would be excavated and treated, achieving RAO 2.

3.6 SUMMARY OF COMPARATIVE ANALYSIS OF TECHNOLOGIES

Technologies were evaluated using the six criteria which includes effectiveness and permanence; reduction TMV through treatment; implementability; advantages; limitations; and cost (relative).

This section summarizes how well each alternative satisfies each evaluation criterion and indicates how it compares to the other alternatives under consideration for the Valve Manifold Building AOC.

3.6.1 Effectiveness and Permanence

Effectiveness and permanence refer to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time once clean-up levels have been met. This criterion includes the consideration of residual risk that will remain onsite following remediation and the adequacy and reliability of controls.

Technology 1: No Action. Would not achieve the RAO's and therefore is not effective.

Technology 2: LUCs. Is effective in preventing exposure pathways but is not effective at remediating contaminated soils.

Technology 3: *In Situ* Treatment – SVE. The relative effectiveness is low because SVE is not effective for the removal of non-volatile contaminants (i.e., DRO).

Technology 4: *In Situ* Treatment – Bioventing. Effective for non-volatile petroleum contamination (i.e., DRO). Could take several years to achieve alternative cleanup levels.

Technology 5: *In Situ* Treatment – Chemical Oxidation. Effectiveness is dependent on the design, chemical distribution, and could require multiple injections to be effective and permanent.

Technology 6: *In Situ* Treatment – Thermal Enhancement. The relative effectiveness is low because thermal treatment is less effective for the removal of less volatile contaminants (i.e., DRO).

Technology 7: Excavation – Onsite Treatment. Effective and permanent.

Technology 8: Excavation – Offsite Treatment. Effective and permanent.

3.6.2 Reduction of Toxicity, Mobility, or Volume Through Treatment

Reduction of TMV through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy.

Technology 1: No Action. Does not reduce TMV through treatment.

Technology 2: LUCs. Does not reduce TMV through treatment.

Technology 3: *In Situ* Treatment – SVE. Unlikely to reduce TMV of DRO through treatment.

Technology 4: *In Situ* Treatment – Bioventing. Would reduce TMV through treatment.

Technology 5: *In Situ* Treatment – Chemical Oxidation. Would reduce TMV through active treatment.

Technology 6: *In Situ* Treatment – Thermal Enhancement. Would reduce TMV through active treatment.

Technology 7: Excavation – Onsite Treatment. Would reduce TMV through active treatment.

Technology 8: Excavation – Offsite Treatment. Would reduce TMV through active treatment.

3.6.3 Implementability

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered.

Technology 1: No Action. Readily implementable.

Technology 2: LUCs. Readily implementable.

Technology 3: *In Situ* Treatment – SVE. Requires installation of extraction wells, a blower system, air transmission lines, and a connection to an electrical power source. Vapor monitoring points would be installed to sample soil gas to monitor the progress of remediation. Installation of power source also required.

Technology 4: *In Situ* Treatment – Bioventing. Requires installation of injection wells, a blower system, air transmission lines connecting the blower to appropriate wells, and a connection to an electrical power source. Vapor monitoring points would be installed to sample soil gas to monitor the progress of remediation. Installation of power source also required.

Technology 5: *In Situ* Treatment – Chemical Oxidation. Requires mixing and placing chemical oxidants could be placed into target zone and mixed using heavy equipment (excavator, mixing auger).

Technology 6: *In Situ* Treatment – Thermal Enhancement. Requires a thermal or electrical heating system to be installed and would also need a connection to a power source.

Technology 7: Excavation – Onsite Treatment. Requires mobilization of excavation equipment for the removal of impacted material. Clean backfill would be delivered to backfill the site. On-Site treatment would require the establishment of treatment system, operation and maintenance, a power source may be required. For landfarming soil nutrient applications may be required to support biodegradation.

Technology 8: Excavation – Offsite Treatment. Requires mobilization of excavation equipment for the removal of impacted material. Requires hauling soil off site to treatment facility. Clean backfill would be delivered to backfill the site.

3.6.4 Advantages

The following provides a general assessment of the advantages of each technology.

Technology 1: No Action. Has no advantages.

Technology 2: LUCs. Low cost and highly effective.

Technology 3: *In Situ* Treatment – SVE. Relatively low annual operating cost for in situ treatment.

Technology 4: *In Situ* Treatment – Bioventing. Relatively low annual operating cost for in situ treatment.

Technology 5: *In Situ* Treatment – Chemical Oxidation. Effective for DRO and treatment may be completed quickly.

Technology 6: *In Situ* Treatment – Thermal Enhancement. Could speed up contaminant removal.

Technology 7: Excavation – Onsite Treatment. Eliminates off-site transport of contaminated soils.

Technology 8: Excavation – Offsite Treatment. Achieves cleanup level as soon as soil is removed. Does not require set up, operation, and maintenance of an on-site treatment system.

3.6.5 Limitations

The following provides a general assessment of the limitations of each technology.

Technology 1: No Action. Does not achieve RAO.

Technology 2: LUCs. Does not achieve RAO.

Technology 3: *In Situ* Treatment – SVE. Unlikely to address DRO. There is no on-site power source.

Technology 4: *In Situ* Treatment – Bioventing. There is no on-site power source.

Technology 5: *In Situ* Treatment – Chemical Oxidation. Oxidants require special handling due to safety hazards.

Technology 6: *In Situ* Treatment – Thermal Enhancement. Has a very high cost and it is energy intensive. It is also not highly effective for primary site COC.

Technology 7: Excavation – Onsite Treatment. High costs for system setup for volume of material to be treated by an on-site treatment option. Land farm treatment can take one or more years to achieve cleanup levels.

Technology 8: Excavation – Offsite Treatment. No limitations.

3.6.6 Cost

The following provides a relative assessment of cost for each technology.

Technology 1: No Action. No cost.

Technology 2: LUCs. Low initial cost, with a moderate long-term cost if used as the sole remedy.

Technology 3: *In Situ* Treatment – SVE. High cost due to establishment of an on-site power supply.

Technology 4: *In Situ* Treatment – Bioventing. High cost due to establishment of an on-site power supply.

Technology 5: *In Situ* Treatment – Chemical Oxidation. High cost due to ISCO products, injection equipment, specialized personnel, and implementation difficulties.

Technology 6: *In Situ* Treatment – Thermal Enhancement. High cost due to establishment of an on-site power supply and operation of a thermal heating system.

Technology 7: Excavation – Onsite Treatment. High costs for the construction and operation of an on-site treatment system for a small volume of contaminated soil.

Technology 8: Excavation – Offsite Treatment. Moderate cost, as compared to on-site treatment.

3.7 SELECTED REMEDY

The selected remedies for the Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower) AOC involves LUCs and excavation and off-site treatment of DRO-contaminated soil exceeding the site-specific ACLs. These remedial actions were selected based upon the ability to protect the environment by addressing potential contaminant migration to groundwater and compliance with applicable requirements. The U.S. Army has determined that the selected remedy provides the best balance of trade-offs among the technologies with respect to the six criteria set out in Section 3.6.

Remedy selections are based on the detailed evaluation of remedial alternatives presented in the FS (U.S. Army, 2020). The U.S. Army is responsible for implementing and monitoring the remedial actions identified herein for the duration of the remedies selected in this DD.

3.7.1 Summary of the Rationale for the Selected Remedy

Based on the technical and cost evaluations presented in the FS (U.S. Army, 2020) and summarized in the prior subsections this alternative is highly effective and permanent, reduces TMV through removal and treatment, is relatively easy to implement, will rapidly achieve RAOs, and is the most cost-effective remedy.

3.7.2 Description of the Selected Remedy

LUCs would be required prior to and during the excavation of the contaminated soil to eliminate potential contact with contaminated media. LUCs could include maintaining existing site fencing and signage to limit site access to authorized personnel and prohibiting disturbing soil in the AOC except by qualified personnel working under an ADEC-approved work plan. Once excavation and backfill are complete and the sites have been approved for unlimited use/unlimited exposure, LUCs would no longer be required as the RAO would be achieved following the removal of the soil exceeding approved cleanup levels. Excavated soil exceeding approved cleanup levels would be transported to OIT in Moose Creek, Alaska, for offsite treatment.

At the Valve Manifold Building and Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower) AOCs contamination exceeding the approved cleanup levels is present in the western portion of the AOC (VMP01 and PL17) and in the eastern portion of the AOC (PL18), as shown on **Figure 2-4**. In the western portion of AOC, clean soil between 0 and 4.5 feet bgs would be segregated, sampled in accordance with ADEC’s Field Sampling Guidance (ADEC, 2024) to confirm it is not contaminated, and reused as backfill. In the eastern portion of the AOC (PL18), soil contamination was detected at 4 feet bgs, the lower vertical extent of contamination in this area has not been determined. Approximately 150 cubic yards of soil between the two areas of excavation would be excavated and hauled to OIT for offsite treatment.

3.7.3 Expected Outcomes of Selected Remedy

Upon completion of the selected remedy, the Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower) AOC will be in compliance with State of Alaska environmental statutes. No known contamination above site-specific cleanup goals will remain within soil at the Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower) AOC after the selected remedy (excavation) has been completed. Refer to **Table 3-3** for COCs, cleanup levels, and the basis for the cleanup level.

3.7.4 Protection of Human Health and the Environment

Excavation of the COC at the Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower) AOC would protect the environment by removing the contaminant mass that poses a soil migration to groundwater risk from the site and transporting the material to an off-site, permitted, treatment facility.

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4.0 DRUM STORAGE AREA AOC

The Drum Storage AOC was an area about 100 ft south of the Composite Building that contained two rows of drums approximately 40 to 60 feet long (**Figure 1-2**). The contents of the drums are unknown.

4.1 SITE CHARACTERISTICS

4.1.1 Topography and Climate

This is the same for the whole of the SCS (See Section 1.5.2.2).

4.1.2 Geology

This is the same for the whole of the SCS (See Section 1.5.2.3).

4.1.3 Hydrogeology

This is the same for the whole of the SCS (See Section 1.5.2.4).

4.1.4 Surface Water Hydrology

This is the same for the whole of the SCS (See Section 1.5.2.5).

4.1.5 Ecological Setting

This is the same for the whole of the SCS (See Section 1.5.2.6).

4.1.6 Site Characterization Activities

2014 Data Gap Analysis. The 2014 Data Gap Analysis reviewed site features and determined if a site feature had sufficient data to verify that a release had not occurred and that a site feature had sufficient data to determine the nature and extent of any contamination. During this effort, the Drum Storage Area AOC was identified from a June 13, 1968 aerial photograph (North Wind, 2014).

2015 SRI – Potential contamination in the Drum Storage Area was investigated by completing five soil borings and collecting subsurface soil samples, collecting surface soil samples from three locations under the remaining drum rack, and installing one monitoring well (MW15). All subsurface and surface soils were analyzed for GRO, DRO, RRO, VOCs, PAHs, PCBs, pesticides, and metals. Groundwater samples were analyzed for GRO, DRO, RRO, VOCs, PAHs, EDB, pesticides, and metals. Soil and groundwater sample locations and results are summarized on **Figure 4-1**.

Five soil borings were drilled and sampled in the Drum Storage Area (DS-BH1 through DS-BH5). Elevated PID measurements or any other evidence of contamination were not identified in any of the soil samples from the Drum Storage AOC borings. As a result, the borings were completed to 20 feet bgs. Two soil samples were collected from each boring, with one sample collected between 0-5 feet bgs, and one sample collected between 15-20 feet bgs. Three surface soil samples were also collected. No evidence of soil contamination, including elevated PID measurements, was identified in the surface soils at the time of sampling.

The soil sampling results showed DRO and RRO concentrations exceeded the cleanup levels in 18 AAC 75.341, Table B2, in one surface soil sample (and associated field duplicate sample) collected on the west side of the drum rack (DSA-SS3). In addition, the RRO concentration was above the maximum allowable concentration presented in Table B2 of 18 AAC 75.341 (ADEC, 2018a). However, no evidence of contamination was observed at the time of sampling, and no elevated PID results or cleanup level exceedances of fuel related compounds were observed in any other Drum Storage Area samples.

A groundwater sample from monitoring well MW15 had no exceedances of the 18 AAC 75.345 Table C groundwater cleanup levels.

4.1.7 Nature and Extent of Contamination

Based on the 2015 SRI soil sampling results, DRO and RRO concentrations exceeded the cleanup levels in 18 AAC 75.341, Table B2, in one surface soil sample (and associated field duplicate sample) collected on the west side of the drum rack (DSA-SS3). In addition, the RRO concentration was above the maximum allowable concentration presented in Table B2 of 18 AAC 75.341 (ADEC, 2018a). Arsenic was also detected in all samples above ADEC cleanup levels in 18 AAC 75.341, Table B1. The DRO/RRO chromatograms for the primary and field duplicate surface soil samples at DSA-SS3 were evaluated and the spectral patterns are consistent with that of a heavy oil, such as hydraulic oil. A minor hydraulic oil leak on surface soils at this location may explain the lack of soil staining, odor, and detections of more volatile analytes. No fuel-related exceedances were observed in any other samples collected from the Drum Storage AOC. Groundwater sampling results also showed no cleanup level exceedances. These results suggest that a limited spill of an oil-type material may have occurred in the Drum Storage AOC.

4.1.8 Conceptual Site Model

The CSM is the same as presented for the whole of the SCS (See Section 1.5.1) and the exposure assessment presented in Section 1.7.2.1.

4.2 CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USE

4.2.1 Land Use

This is the same for the whole of the SCS (See Section 1.6).

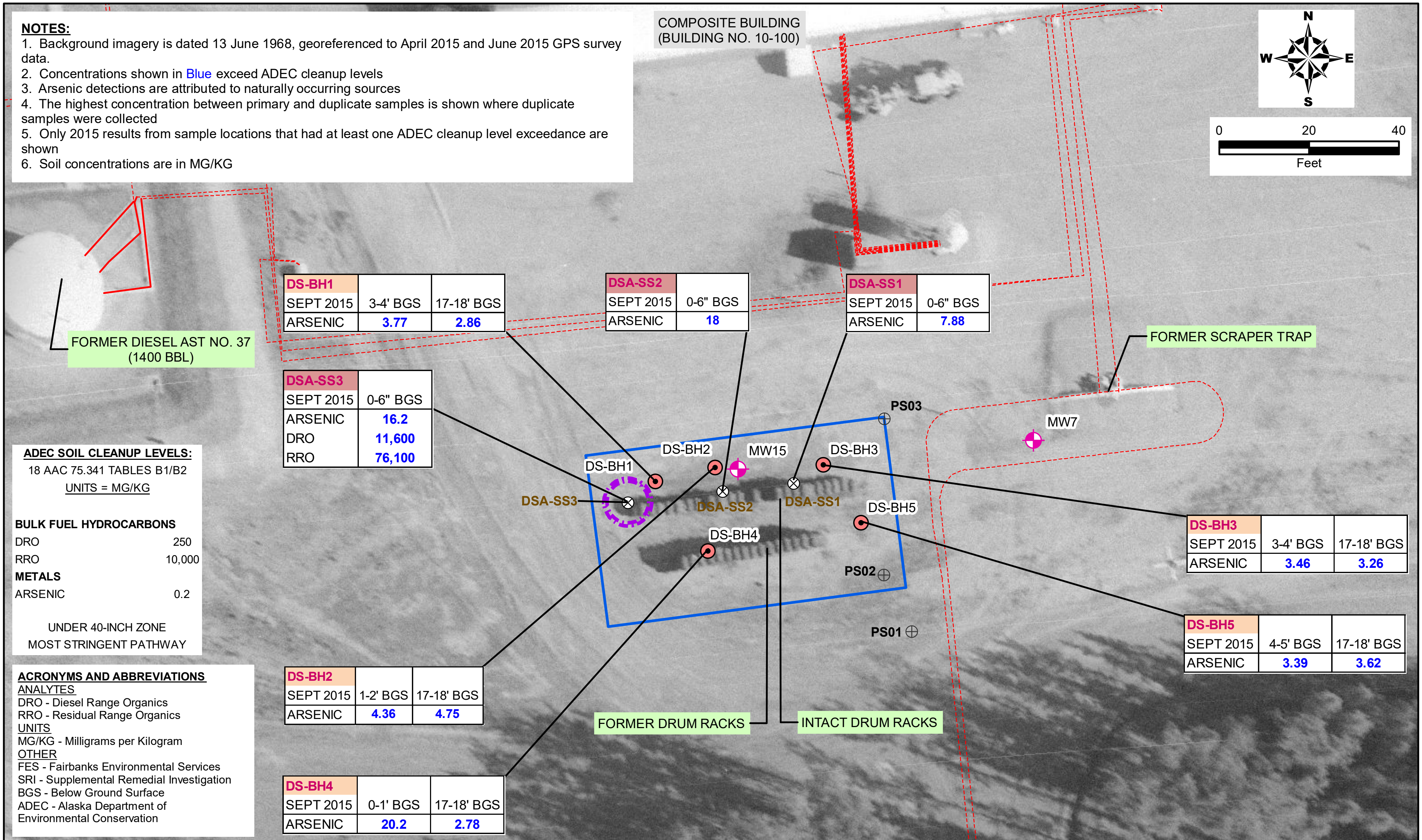
4.2.2 Ground and Surface Water Uses

There are no current groundwater uses at the SCS. The reasonably foreseeable future use of the SCS is expected to remain industrial while under U.S. Army ownership and, as the lead agency, the U.S. Army has the authority to determine the future anticipated land use of the SCS. The U.S. Army has not determined potential future uses and unrestricted use could be a possibility following property transfer.

Surface water is not present at the SCS.

NOTES:

1. Background imagery is dated 13 June 1968, georeferenced to April 2015 and June 2015 GPS survey data.
2. Concentrations shown in Blue exceed ADEC cleanup levels
3. Arsenic detections are attributed to naturally occurring sources
4. The highest concentration between primary and duplicate samples is shown where duplicate samples were collected
5. Only 2015 results from sample locations that had at least one ADEC cleanup level exceedance are shown
6. Soil concentrations are in MG/KG



DS-BH1		
SEPT 2015	3-4' BGS	17-18' BGS
ARSENIC	3.77	2.86

DSA-SS2	
SEPT 2015	0-6" BGS
ARSENIC	18

DSA-SS1	
SEPT 2015	0-6" BGS
ARSENIC	7.88

DSA-SS3	
SEPT 2015	0-6" BGS
ARSENIC	16.2
DRO	11,600
RRO	76,100

DS-BH3		
SEPT 2015	3-4' BGS	17-18' BGS
ARSENIC	3.46	3.26

DS-BH5		
SEPT 2015	4-5' BGS	17-18' BGS
ARSENIC	3.39	3.62

DS-BH2		
SEPT 2015	1-2' BGS	17-18' BGS
ARSENIC	4.36	4.75

DS-BH4		
SEPT 2015	0-1' BGS	17-18' BGS
ARSENIC	20.2	2.78

ADEC SOIL CLEANUP LEVELS:

18 AAC 75.341 TABLES B1/B2

UNITS = MG/KG

BULK FUEL HYDROCARBONS	
DRO	250
RRO	10,000
METALS	
ARSENIC	0.2

UNDER 40-INCH ZONE

MOST STRINGENT PATHWAY

ACRONYMS AND ABBREVIATIONS

ANALYTES
DRO - Diesel Range Organics
RRO - Residual Range Organics
UNITS
MG/KG - Milligrams per Kilogram
OTHER
FES - Fairbanks Environmental Services
SRI - Supplemental Remedial Investigation
BGS - Below Ground Surface
ADEC - Alaska Department of Environmental Conservation

LEGEND:

- GROUNDWATER MONITORING WELL
- 2015 SRI SOIL BORING - FES
- 2015 SRI SURFACE SOIL SAMPLE
- 2007-2008 NEAR SURFACE SOIL SAMPLE LOCATION
- FORMER ABOVEGROUND FUEL LINES (REMOVED IN 2015)
- FORMER UNDERGROUND FUEL LINES (REMOVED IN 2015)
- SOIL CONTAMINATION WITH DRO CONCENTRATION ABOVE ADEC SOIL CLEANUP LEVEL
- DATA GAP AREA OF CONCERN
- SOIL BORING SAMPLE FROM THE 2015 SUPPLEMENTAL REMEDIAL INVESTIGATION
- SURFACE SOIL SAMPLE FROM THE 2015 SUPPLEMENTAL REMEDIAL INVESTIGATION

Figure **4-1**

Drum Storage AOC Soil Sampling Results Exceeding ADEC Cleanup Levels

Sears Creek Station, Alaska

Petroleum Only and No Further Action Sites Decision Document

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Fairbanks Environmental Services
3538 International Street
Fairbanks, AK 99701

Bristol ENVIRONMENTAL REMEDIATION SERVICES LLC
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DATUM: WGS84		DATE	AUG 2018
SYSTEM: UTM ZONE 6 N		DWN.	CB
Project No.	34150037	SCALE	AS SHOWN
		APPRVD.	CM

FINAL

4.3 SUMMARY OF SITE RISKS

A HHERA evaluated the human health and ecological risks associated with the Drum Storage AOC. The HHERA process and approach is presented in Section 1.7 and subsequent sub-sections. The following discussion is focused on the COPCs and risks that the HHERA identified for the Drum Storage AOC.

4.3.1 Summary of Human Health Risk Assessment

This is the same for the whole of the SCS (See Section 1.7.2).

4.3.1.1 Exposure Assessment

This is the same for the whole of the SCS (See Section 1.7.2.1).

4.3.1.2 Identification of Chemicals of Potential Concern

This is the same for the whole of the SCS (See Section 1.7.2.2), apart from the site-specific details described below.

Residential Screening: COPCs, chemicals with MDCs exceeding residential soil RSLs and cleanup levels for GRO, DRO and RRO in 18 AAC 75.341 Table B2, under 40-inch zone, were only identified in surface soil at the Drum Storage Area AOC:

- Surface soil: DRO, RRO, and cobalt.

Industrial Screening: COPCs, chemicals with MDCs exceeding industrial soil RSLs, and cleanup levels for GRO, DRO and RRO in 18 AAC 75.341 (Table B2, under 40-inch zone) were only identified in surface soil at the Drum Storage Area AOC:

- Surface soil: DRO and RRO.

The data used in the risk assessment was deemed to be of sufficient quality and quantity for its intended use. The detection frequency (number of samples in which the chemical was detected divided by the total number of samples analyzed), the MDCs, and residential and industrial screening levels are presented in **Table 4-1**.

Table 4-1 Summary of Cumulative Risk Estimates for Human Receptors – Drum Storage Area AOC

Medium/Risk Driver[1]	Number of Samples	Number of detections	MDC (mg/kg)	Residential Soil RSL[2] THQ=0.1 or TCR=1 x 10^{-6}	Industrial Soil RSL[2] THQ=0.1 or TCR=1 x 10^{-6}	Hypothetical Future Resident	
						Estimated Cancer Risk[3]	Estimated Noncancer Hazard[3]
Surface Soil							
Cobalt	6	6	15.1	2.3	35	NA	0.657
Diesel Range Organics (C10-C25)[4]	5	4	11,600	10,250	10,250	>CUL[5]	NA
Residual Range Organics (C25-C36)[4]	5	4	76,100	10,000	10,000	>CUL[5]	NA
Cumulative Media Cancer Risk/Noncancer Hazard:						NA	0.657
ADEC Risk Criteria:						10^{-5}	1
EPA Risk Range:						10^{-6} – 10^{-4}	1

Key:

1 – Summary of risk estimates for COPCs are presented if the COPC is a risk driver for at least one receptor. Risk estimates for all COPCs are presented in the Human Health and Ecological Risk Assessment which is Appendix H of the Supplemental Remedial Investigation (U.S. Army, 2018).

2 – Human Health Screening levels are the May 2016 EPA Regional Screening Levels for Residential Soil, except for the carcinogenic PAHs. The screening levels for the carcinogenic PAHs were calculated using the RSL calculator in May 2017.

3 – Estimated Cancer Risk = (MDC/RSL) *10^{-6}; Estimated Noncancer Hazard = (MDC/RSL)*0.1

4 – Source: ADEC 2016. 18 AAC 75. Oil and Other Hazardous Substances Pollution Control. Tables B1 and B2. Method Two - Human Health Soil Cleanup Levels for the "under 40-inch

5 – Cleanup levels for TPH are based on the toxicity of several indicator compounds representing the aliphatic and aromatic fraction of the TPH carbon fraction ranges. Hazards cannot be calculated for TPH using the screening-level ratio approach. Thus, hazards for TPH are evaluated based on the exceedance of the TPH cleanup levels.

ADEC – Alaska Department of Environmental Conservation

AOC – Area of Concern

COPC – contaminant of potential concern

EPA – U.S. Environmental Protection Agency

mg/kg – milligrams per kilogram

MDC – maximum detected concentration

NA – not applicable

PAH – polynuclear aromatic hydrocarbon

RSL – regional screening level

TCR – target cancer risk

THQ – target hazard quotient

TPH – total petroleum hydrocarbon

4.3.1.3 Toxicity Assessment

This is the same for the whole of the SCS (See Section 1.7.2.3).

4.3.1.4 Risk Characterization

This is the same for the whole of the SCS (See Section 1.7.2.4), apart from the site-specific details described below.

As shown on **Table 4-1**, the surface soil cobalt MDC (the only non-TPH COPC identified in soil at the Drum Storage AOC) resulted in an estimated total HI of 0.7 and is below the target HI of 1. In addition, there is no known source of cobalt at the SCS site and the MDC of 15.1 mg/kg could be associated with variability in naturally occurring metals concentrations. No COPCs associated with carcinogenic effects were identified in soil at the Drum Storage AOC. Therefore, it is unlikely that non-TPH compounds are present at concentrations that would potentially pose risks or hazards to human health of future residential receptors.

RSLs are not available for DRO and RRO; therefore, the 18 AAC 75.340 Method 2 soil cleanup levels were used as screening criteria based on the most conservative value available (i.e., ingestion of soil pathway). DRO was detected in four of six surface soil samples collected from this AOC and exceed screening criteria in only one location's primary and duplicate sample (DSA-SS3 and DSA-SS4, respectively). Similarly, RRO was detected in five of six surface soil samples and exceeded screening criteria at the same sample location as DRO. All other concentrations of DRO and RRO at the Drum Storage AOC were below the screening criteria. While the MDC of DRO exceeds the minimum 18 AAC 75.340 Method 2 soil cleanup level, it does not exceed the maximum allowable concentration. Conversely, both the maximum and average concentrations of RRO exceed the maximum allowable concentration allowed by ADEC.

4.3.2 Summary of Ecological Risk Assessment

This is the same for the whole of the SCS (See Section 1.7.3).

4.3.2.1 ADEC Step 1 Ecological Scoping Evaluation

This is the same for the whole of the SCS (See Section 1.7.3.1).

4.3.2.2 ADEC Step 2 Preliminary Screening Evaluation

This is the same for the whole of the SCS (See Section 1.7.3.2), apart from the site-specific details described below.

Ecological COPCs, chemicals with MDCs exceeding screening levels at the Drum Storage Area AOC included:

- Surface soil: Cobalt, copper, and zinc.

In all cases, inorganic concentrations were relatively low and exceedances were within about one-order of magnitude of the conservative screening levels applied. The ecological evaluation concludes that exposure to residual chemicals in surface and shallow subsurface soil is potentially complete but unlikely to result in significant exposure to ecological receptors. Per ADEC decision criteria, available information are considered adequate to conclude that reported exposure (and potential risk) is negligible and there is no need of further evaluation or remedial action based on potential ecological risk (U.S. Army, 2018).

4.3.3 Basis for Action

Based on the results of the HHERA, as summarized above, the Drum Storage AOC does contain RRO that is a potential risk to human receptors as it exceeds the maximum allowable concentration presented in Table B2 of 18 AAC 75.341 (ADEC, 2018a). As noted in Section 4.1.7, there are COPCs that exceed ADEC Method Two migration-to-groundwater cleanup levels. **Table 4-2** summarizes the COCs and cleanup goals for the Drum Storage AOC. **Figure 4-1** presents the locations were COCs were identified.

As discussed in Section 1.8, ADEC Method Three migration-to-groundwater levels were calculated to further refine the constituents that are a migration to groundwater threat and should be established as COCs. **Table 4-2** presents the COPCs identified, along with the:

- ADEC Method Two migration-to-groundwater cleanup value.
- Maximum allowable concentration (for petroleum hydrocarbons only).
- Most conservative ADEC Method Two human health, under 40-inch zone, cleanup value.
- ADEC Method Three migration-to-groundwater cleanup value.
- Selection of the Site-Specific ACL, which is based on the most conservative of the ADEC Method Two human health cleanup level (18 AAC 75.341 Tables B1 and B2, under 40-inch zone), the maximum allowable concentration (for petroleum hydrocarbons only), and the ADEC Method Three migration-to-groundwater value.

Table 4-2 Cleanup Levels for Soil Contaminants of Potential Concern

Compound	ADEC Method Two Migration-to-Groundwater Cleanup Level[1] (mg/kg)	ADEC Maximum Allowable Concentration[2] (mg/kg)	ADEC Human Health Level[3] (mg/kg)	ADEC Method Three Calculator Value – Migration-to-Groundwater[4] (mg/kg)	Site-Specific Alternative Cleanup Level[5] (mg/kg)	Maximum Detected Concentration (mg/kg)
Diesel Range Organics	250	12,500	10,250	3,300	3,300	**11,600**
Residual Range Organics	11,000	22,000	10,000	130,000	10,000	**76,100**
Arsenic	0.2	NA	8.8	210	8.8	**20.2**

Notes:
1 – Tables B1 and B2, 18 AAC 75.341 (ADEC. 2023).
2 – Table B2, 18 AAC 75.341 (ADEC. 2023).
3 – Human Health value based on the Under 40-inch zone in Table B1 and most conservative of the ingestion and inhalation value for the under 40-inch zone in Table B2 (for diesel range organics and gasoline range organics) (ADEC. 2023).
4 – Value determined for the migration-to-groundwater scenario using the ADEC Cleanup Levels Calculator and the Petroleum Cleanup Levels Calculator (U.S. Army, 2018).
5 – Site-specific alternative cleanup level for soil is the lowest value between: 1) ADEC Maximum Allowable Concentration, 2) ADEC Human Health Level, and 3) ADEC Method Three Calculator Value – Migration-to-Groundwater.
Bold values exceed the cleanup level.
Key:
AAC – Alaska Administrative Code
ADEC – Alaska Department of Environmental Conservation
J – Result is considered an estimate because it was reported below the limit of quantitation.
mg/kg – milligrams per kilogram
NA – not applicable
Q – Result is considered an estimate (biased H-high; N-unknown) due to quality control failure.

Although the maximum detected arsenic concentration exceeded its respective BTV (Section 1.7.1) and the site-specific ACL, all other arsenic detections are consistent with naturally occurring concentrations and there were no other arsenic exceedances of the site-specific ACL. Arsenic concentrations are considered to be not statistically different from site wide concentrations based on a two-sample t-test of the Burn Pit AOC arsenic concentrations documented in the SRI (U.S. Army, 2018).

DRO and RRO exceed the site-specific ACLs at the Drum Storage Area AOC. DRO and RRO contamination exceeding the approved cleanup levels is present in the western of the AOC (DSA-SS3).

Table 4-3 summarizes the COC and cleanup goal (the site-specific ACL) for the Drum Storage Area AOC. **Figure 4-1** presents the location of the DRO and RRO detections that exceeds the cleanup goals and presents the estimated lateral extent of exceedance.

Table 4-3 Soil Contaminant of Concern and Cleanup Goal for the Drum Storage Area AOC

Contaminants of Concern	Site-Specific Approved Cleanup Goals (mg/kg)	Basis
Residual Range Organics	10,000	18 AAC 75.340 – Migration to Groundwater
Diesel Range Organics	3,300	18 AAC 75.340 – Soil Ingestion

Key:
AAC – Alaska Administrative Code
AOC – Area of Concern
mg/kg – milligrams per kilogram

4.4 REMEDIAL ACTION OBJECTIVES

The general RAOs are outlined in Section 1.9. Both RAO 1 and RAO 2 are applicable to the Drum Storage AOC:

- RAO 1: Prevent the exposure of human receptors with contaminated media that pose a cumulative carcinogenic risk greater than 1 in 100,000 or a cumulative noncarcinogenic HI greater than 1 across all exposure pathways. Specifically:
    - Reduce concentrations of RRO in soil to below cleanup levels protective of human health.
- RAO 2: Prevent further degradation of groundwater by reducing the concentrations of COCs in soil to levels protective of groundwater quality. Specifically:
    - Reduce concentrations of DRO in soil to below ACLs for protection of migration to groundwater developed using ADEC Method Three.

4.5 DESCRIPTION OF ALTERNATIVES

The remedial technologies and the selected alternative for the Valve Manifold Building AOC was presented in the FS (U.S. Army, 2020) and is summarized below.

4.5.1 Description of Potential Remedy Technologies

This is the same for the whole of the SCS (See Section 1.10).

4.5.2 Expected Outcome of Each Technology

Technology 1: No Action. There are no site changes expected from selecting this remedial alternative. This technology would not achieve RAO 1 or RAO 2.

Technology 2: LUCs. While LUCs would control access there is no provision for monitoring degradation of DRO or RRO and therefore RAO 2 would not be achieved.

Technology 3: *In Situ* Treatment – SVE. As the COCs at the Drum Storage Area AOC are DRO and RRO, both non-volatile petroleum hydrocarbons, SVE is unlikely to substantially reduce the DRO or RRO concentrations and therefore neither RAO 1 nor RAO 2 would be achieved.

Technology 4: *In Situ* Treatment – Bioventing. Bioventing could take several years to achieve both RAO 1 and RAO 2.

Technology 5: *In Situ* Treatment – Chemical Oxidation. ISCO could require multiple injections to achieve both RAO 1 and RAO 2.

Technology 6: *In Situ* Treatment – Thermal Enhancement. Thermal enhancement would be implemented in conjunction with another in situ technology to achieve both RAO 1 and RAO 2.

Technology 7: Excavation – Onsite Treatment. Contaminated soil would be excavated and treated, achieving both RAO 1 and RAO 2.

Technology 8: Excavation – Offsite Treatment. Contaminated soil would be excavated and treated, achieving both RAO 1 and RAO 2.

4.6 SUMMARY OF COMPARATIVE ANALYSIS OF TECHNOLOGIES

Technologies were evaluated using the six criteria which includes effectiveness and permanence; reduction TMV through treatment; implementability; advantages; limitations; and cost (relative).

This section summarizes how well each alternative satisfies each evaluation criterion and indicates how it compares to the other alternatives under consideration for the Drum Storage Area AOC.

4.6.1 Effectiveness and Permanence

Effectiveness and permanence refer to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time once clean-up levels have been met. This criterion includes the consideration of residual risk that will remain onsite following remediation and the adequacy and reliability of controls.

Technology 1: No Action. Would not achieve the RAO's and therefore is not effective.

Technology 2: LUCs. Is effective in preventing exposure pathways but is not effective at remediating contaminated soils.

Technology 3: *In Situ* Treatment – SVE. The relative effectiveness is low because SVE is not effective for the removal of non-volatile contaminants (i.e., DRO and RRO).

Technology 4: *In Situ* Treatment – Bioventing. Effective for non-volatile petroleum contamination (i.e., DRO and RRO). Could take several years to achieve alternative cleanup levels.

Technology 5: *In Situ* Treatment – Chemical Oxidation. Effectiveness is dependent on the design, chemical distribution, and could require multiple injections to be effective and permanent.

Technology 6: *In Situ* Treatment – Thermal Enhancement. The relative effectiveness is low because thermal treatment is less effective for the removal of less volatile contaminants (i.e., DRO and RRO).

Technology 7: Excavation – Onsite Treatment. Effective and permanent.

Technology 8: Excavation – Offsite Treatment. Effective and permanent.

4.6.2 Reduction of Toxicity, Mobility, or Volume Through Treatment

Reduction of TMV through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy.

Technology 1: No Action. Does not reduce TMV through treatment.

Technology 2: LUCs. Does not reduce TMV through treatment.

Technology 3: *In Situ* Treatment – SVE. Unlikely to reduce TMV of DRO and RRO through treatment.

Technology 4: *In Situ* Treatment – Bioventing. Would reduce TMV through treatment.

Technology 5: *In Situ* Treatment – Chemical Oxidation. Would reduce TMV through active treatment.

Technology 6: *In Situ* Treatment – Thermal Enhancement. Would reduce TMV through active treatment.

Technology 7: Excavation – Onsite Treatment. Would reduce TMV through active treatment.

Technology 8: Excavation – Offsite Treatment. Would reduce TMV through active treatment.

4.6.3 Implementability

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered.

Technology 1: No Action. Readily implementable.

Technology 2: LUCs. Readily implementable.

Technology 3: *In Situ* Treatment – SVE. Requires installation of extraction wells, a blower system, air transmission lines, and a connection to an electrical power source. Vapor monitoring points would be installed to sample soil gas to monitor the progress of remediation. Installation of power source also required.

Technology 4: *In Situ* Treatment – Bioventing. Requires installation of injection wells, a blower system, air transmission lines connecting the blower to appropriate wells, and a connection to an electrical power source. Vapor monitoring points would be installed to sample soil gas to monitor the progress of remediation. Installation of power source also required.

Technology 5: *In Situ* Treatment – Chemical Oxidation. Requires mixing and placing chemical oxidants could be placed into target zone and mixed using heavy equipment (excavator, mixing auger).

Technology 6: *In Situ* Treatment – Thermal Enhancement. Requires a thermal or electrical heating system to be installed and would also need a connection to a power source.

Technology 7: Excavation – Onsite Treatment. Requires mobilization of excavation equipment for the removal of impacted material. Clean backfill would be delivered to backfill the site. On-Site treatment would require the establishment of treatment system, operation and maintenance, a power source may be required. For landfarming soil nutrient applications may be required to support biodegradation.

Technology 8: Excavation – Offsite Treatment. Requires mobilization of excavation equipment for the removal of impacted material. Requires hauling soil off site to treatment facility. Clean backfill would be delivered to backfill the site.

4.6.4 Advantages

The following provides a general assessment of the advantages of each technology.

Technology 1: No Action. Has no advantages.

Technology 2: LUCs. Low cost and highly effective.

Technology 3: *In Situ* Treatment – SVE. Relatively low annual operating cost for in situ treatment.

Technology 4: *In Situ* Treatment – Bioventing. Relatively low annual operating cost for in situ treatment.

Technology 5: *In Situ* Treatment – Chemical Oxidation. Effective for DRO and RRO and treatment may be completed quickly.

Technology 6: *In Situ* Treatment – Thermal Enhancement. Could speed up contaminant removal.

Technology 7: Excavation – Onsite Treatment. Eliminates off-site transport of contaminated soils.

Technology 8: Excavation – Offsite Treatment. Achieves cleanup level as soon as soil is removed. Does not require set up, operation, and maintenance of an on-site treatment system.

4.6.5 Limitations

The following provides a general assessment of the limitations of each technology.

Technology 1: No Action. Does not achieve RAOs.

Technology 2: LUCs. Does not achieve RAOs.

Technology 3: *In Situ* Treatment – SVE. Unlikely to address DRO or RRO. There is no on-site power source.

Technology 4: *In Situ* Treatment – Bioventing. There is no on-site power source.

Technology 5: *In Situ* Treatment – Chemical Oxidation. Oxidants require special handling due to safety hazards.

Technology 6: *In Situ* Treatment – Thermal Enhancement. Has a very high cost and it is energy intensive. It is also not highly effective for primary site COC.

Technology 7: Excavation – Onsite Treatment. High costs for system setup for volume of material to be treated by an on-site treatment option. Land farm treatment can take one or more years to achieve cleanup levels.

Technology 8: Excavation – Offsite Treatment. No limitations.

4.6.6 Cost

The following provides a relative assessment of cost for each technology.

Technology 1: No Action. No cost.

Technology 2: LUCs. Low initial cost, with a moderate long-term cost if used as the sole remedy.

Technology 3: *In Situ* Treatment – SVE. High cost due to establishment of an on-site power supply.

Technology 4: *In Situ* Treatment – Bioventing. High cost due to establishment of an on-site power supply.

Technology 5: *In Situ* Treatment – Chemical Oxidation. High cost due to ISCO products, injection equipment, specialized personnel, and implementation difficulties.

Technology 6: *In Situ* Treatment – Thermal Enhancement. High cost due to establishment of an on-site power supply and operation of a thermal heating system.

Technology 7: Excavation – Onsite Treatment. High costs for the construction and operation of an on-site treatment system for a small volume of contaminated soil.

Technology 8: Excavation – Offsite Treatment. Moderate cost, as compared to on-site treatment.

4.7 SELECTED REMEDY

The selected remedies for the Drum Storage AOC involves LUCs and excavation and off-site treatment of DRO and RRO contaminated soil exceeding the site-specific ACLs. These remedial actions were selected based upon the ability to protect the environment by addressing potential contaminant migration to groundwater and compliance with applicable requirements. The U.S. Army has determined that the selected remedy provides the best balance of trade-offs among the technologies with respect to the six criteria set out in Section 4.6.

Remedy selections are based on the detailed evaluation of remedial alternatives presented in the FS (U.S. Army, 2020). The U.S. Army is responsible for implementing and monitoring the remedial actions identified herein for the duration of the remedies selected in this DD.

4.7.1 Summary of the Rationale for the Selected Remedy

Based on the technical and cost evaluations presented in the FS (U.S. Army, 2020) and summarized in the prior subsections this alternative is highly effective and permanent, reduces TMV through removal and treatment, is relatively easy to implement, will rapidly achieve RAOs, and is the most cost-effective remedy.

4.7.2 Description of the Selected Remedy

LUCs would be required prior to and during the excavation of the contaminated soil to eliminate potential contact with contaminated media. LUCs could include maintaining existing site fencing and signage to limit site access to authorized personnel and prohibiting disturbing soil in the AOC except by qualified personnel working under an ADEC-approved work plan. Once excavation and backfill are complete and the sites have been approved for unlimited use/unlimited exposure, LUCs would no longer be required as the RAO would be achieved following the removal of the soil exceeding approved cleanup levels. Excavated soil exceeding approved cleanup levels would be transported to the Republic Services facility in Moose Creek, Alaska, for offsite treatment.

At the Drum Storage AOC, one soil sample (DSA-SS3) had approved cleanup level exceedances between 0 and 6 inches bgs, as shown on **Figure 4-1**. The lower vertical extent of contamination in this area has not been determined. No fuel-related exceedances were observed in any other samples collected from the AOC, and it is believed that the approved cleanup level exceedances are an isolated occurrence limited to shallow soils. Approximately 10 cubic yards of soil would be excavated and hauled to OIT for offsite treatment.

4.7.3 Expected Outcomes of Selected Remedy

Upon completion of the selected remedy, the Drum Storage Area AOC will be in compliance with State of Alaska environmental statutes. No known contamination above site-specific cleanup goals will remain within soil at the Drum Storage Area AOC after the selected remedy (excavation) has been completed. Refer to **Table 4-3** for COCs, cleanup levels, and the basis for the cleanup level.

4.7.4 Protection of Human Health and the Environment

Excavation of the COCs at the Drum Storage Area AOC would protect the environment by removing the contaminant mass that poses a soil migration to groundwater risk from the site and transporting the material to an off-site, permitted, treatment facility.

5.0 DEWATERING TOWER AOC

The Dewatering Tower AOC was a 1,200-gallon diesel dewatering tower (also referred to as a "day tank") located approximately 50 feet south of the Composite Building (**Figure 1-2**). The Dewatering Tower was connected to fuel pump engines, a generator, and a boiler located within the Composite Building via underground pipelines to and from the Valve Manifold.

The Dewatering Tower, Valve Manifold Building, and Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower) AOCs had removal actions completed (Bristol, 2016a) and were evaluated in the SRI (U.S. Army, 2018) and the FS (U.S. Army, 2020) as a singular area due to proximity. As such this section provides the area wide evaluation of the three AOCs and Dewatering Tower AOC specific remedy determination.

5.1 SITE CHARACTERISTICS

5.1.1 Topography and Climate

This is the same for the whole of the SCS (See Section 1.5.2.2).

5.1.2 Geology

This is the same for the whole of the SCS (See Section 1.5.2.3).

5.1.3 Hydrogeology and Groundwater Use

This is the same for the whole of the SCS (See Section 1.5.2.4).

5.1.4 Surface Water Hydrology

This is the same for the whole of the SCS (See Section 1.5.2.5).

5.1.5 Ecological Setting

This is the same for the whole of the SCS (See Section 1.5.2.6).

5.1.6 Site Characterization Activities

1994 Investigation. Two surface soil samples (S8 and S9) were collected in the vicinity of the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower AOCs during the 1994 investigation (**Figure 2-1**). The sample was analyzed for VOCs, basic/neutral/acid extractables, PCBs, pesticides, and toxic metals (USAPACEHEA, 1994). Results indicated contaminant concentrations were lower than applicable state and federal cleanup standards or consistent with the background sample concentrations, with the exception of DRO detected at 2,000 mg/kg at S8 (North Wind, 2012).

2007/2008 RI. Previous investigations were completed when the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower were intact. Four soil borings (SB3, SB4, SB6, and MW3) were drilled and sampled, and MW3 was completed as a groundwater monitoring well during the 2007 investigation (**Figure 2-2)**. Soil boring SB3 was placed northwest of the Valve Manifold Building and monitoring well MW3 was installed west of the Valve Manifold Building. Additional soil borings were placed east of the Dewatering Tower and in the vicinity of the buried pipelines (SB4 and SB6). SB3, SB4, and SB6 each had a total depth of 22 feet bgs and MW3 was completed at a total depth of 61 feet bgs. Soil samples were collected from the 5 to 7 feet bgs and 10 to 12 feet bgs intervals in SB4 and SB6, and from the 15 to 17 feet bgs and 20 to 22 feet bgs intervals in SB3 and MW3. Soil samples collected from the borings were analyzed for GRO; DRO; RRO; BTEX; PAHs; lead; and TOC. None of the soil samples collected in the area of the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower had reported contaminant concentrations above the cleanup levels in 18 AAC 75.341, Tables B1 and B2 during the 2007/2008 investigation (North Wind, 2010).

2014 Data Gap Analysis. The 2014 Data Gap Analysis reviewed site features and determined if a site feature had sufficient data to verify that a release had not occurred and that a site feature had sufficient data to determine the nature and extent of any contamination.

It was noted that a previously unknown sump was connected to the valve manifold. The valve manifold cover was opened during the Fall 2013 site visit and a strong fuel odor was noted, as well as a small amount of liquid in the bottom of the pit; however, the sump was not visible from above. The valve manifold pit was recommended for further investigation (North Wind, 2014).

No documentation was found as to whether the fuel lines were flushed and cleaned during the deactivation of the pump station. It was recommended to determine whether any fuel was still remaining in the lines and investigate the possibility that leakage has occurred through valves and joints over time (North Wind, 2014).

The Dewatering Tower AOC was not identified as having a data gap.

2015 Removal Action and Sampling. Decommissioning of the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower was conducted during the 2015 removal action (Bristol, 2016a). Approximately 80 cubic yards of potentially contaminated soil was excavated in this area based on field screening results. Field readings and sample locations during this action are presented on **Figure 2-3**.

Prior to decommissioning of the Valve Manifold Building, the fuel lines were exposed, and any residual fluid was drained back into the Valve Manifold Pit. The liquid in the Valve Manifold Pit was then pumped out. A total of seven 55-gallon drums of a liquid with fuel odor was pumped out of the pit and later disposed (Bristol, 2016a). The Valve Manifold Pit was then cleaned, decommissioned by punching holes in the base of the pit and collapsing the upper four feet of concrete walls into the pit, and finally backfilled (Bristol, 2016a). Bristol collected two soil samples from the base of the Valve Manifold Pit: one on the south side of the pit (VMP01) and one on the west side of the pit (VMP02). Elevated PID values were observed in VMP01 and VMP02, but laboratory results showed an exceedance of the cleanup levels in 18 AAC 75.341, Tables B1 and B2 for VMP01 only. The only contaminants that exceeded the cleanup level in this sample were DRO and naphthalene (Bristol, 2016a).

No fluids were present in the Dewatering Tower; a 1,200-gallon diesel fuel tank. The tower was decommissioned by loosening the bolts of the base and tipping it over in a controlled manner (Bristol, 2016a). The tank was then cut into pieces and metal pieces were recycled. One sample was collected from the Dewatering Tower (DWT01) footprint for field screening and laboratory analysis. The PID screening results were below 20 ppmv, and laboratory results showed there were no exceedances of cleanup levels in 18 AAC 75.341, Tables B1 and B2 (Bristol, 2016a).

The fuel lines between the Valve Manifold and the Composite Building, the lines between the Valve Manifold and the Dewatering Tower, and the fuel lines south of the Valve Manifold were tapped to remove any residual fluid. After residual fluid was removed and containerized, the pipelines were removed. They were then cut into appropriate length sections for transport, and sent to be recycled (Bristol, 2016a). Excavated soil associated with the underground piping was screened with a PID. Soil with PID results greater than 20 ppmv was identified in the pipe trench south of the Valve Manifold Pit, and in the pipe trench between the Valve Manifold Pit and the Dewatering Tower. The excavated soil was placed in a lined contaminated soil stockpile and later disposed in accordance with ADEC regulations (Bristol, 2016a).

Potential soil contamination was observed underlying the south and west sides of the Valve Manifold Building, along piping between the Valve Manifold and the Dewatering Tower, and in the piping trench south of the Valve Manifold Pit.

Soil sampling results are presented on **Figure 2-4**, and showed exceedances of the 18 AAC 75.341, Table B2 cleanup level for DRO (250 milligrams per kilogram [mg/kg]) at 10.5 feet bgs on the south side of the Manifold Building (3,600 mg/kg), in the piping trench between the Valve Manifold and the Dewatering Tower at 6.5 feet bgs (580 mg/kg), and in the piping trench south of the Valve Manifold Pit at approximately 4 feet bgs (4,000 mg/kg and 7,900 mg/kg). Naphthalene was identified above the cleanup level in 18 AAC 75.341, Table B2 in the same two pipeline trench samples (PL17 and PL18) and in the sample on the south side of the Valve Manifold (VMP01), and two additional fuel-related PAHs (1-methylnaphthalene and 2-methylnaphthalene) were identified above the 18 AAC 75.341, Table B2 cleanup levels in the piping trench south of the Valve Manifold Pit (PL17). These areas of contamination were further investigated in the SRI.

2015 SRI. Six soil borings were drilled as part of the SRI in the former Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower area to characterize and delineate the extent of soil contamination identified during the removal actions. Four of the soil borings were drilled to 20 feet bgs (VM-BH1, BH2, BH3, and BH6) since there was no evidence of significant soil contamination based on field screening PID results at the time of drilling. Soil boring VM-BH4 was completed to the groundwater table to delineate the vertical extent of potential contamination, since PID screening indicated potential shallow contamination. Soil Boring VM-BH5 was also completed to the groundwater table to delineate the extent of potential deep contamination at the site. Groundwater was encountered at approximately 49 feet bgs, but no evidence of soil contamination at the groundwater table was identified in the field screening results from VM-BH4 or VM-BH5.

Twelve soil samples were collected from the six borings, and the samples were analyzed for GRO, DRO, RRO, VOCs, SVOCs, pesticides, and metals. At select locations where field screening identified potential contamination, samples were also collected for EDB analysis.

Exceedances of cleanup levels cleanup levels in 18 AAC 75.341, Tables B1 and B2 for DRO were observed in one soil boring adjacent to the former fuel lines south of the Valve Manifold Pit and Dewatering Tower (VM-BH4). The DRO exceedances were observed between 2-3 feet bgs (493 mg/kg) and 7-8 feet bgs (1,050 mg/kg). Two additional samples were collected from deeper intervals in this boring and no exceedances were observed, including in the sample collected from the water table.

Two monitoring wells were installed during the SRI to evaluate potential groundwater contamination in the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower AOC. Monitoring well MW13 was installed adjacent to VM-BH1 and east of the former Dewatering Tower. Monitoring well MW14 was installed downgradient of the Valve Manifold Pit and adjacent to the Composite Building, as shown in **Figure 2-4**. Groundwater samples were collected from newly installed wells MW13 and MW14, along with previously installed wells MW3, MW4, and the WSW between September 14 and 18, 2015 to evaluate potential groundwater contamination. Groundwater samples were analyzed for GRO, DRO, RRO, VOCs, PAHs, EDB, pesticides, and metals.

The groundwater sampling results show that the only exceedance of the groundwater cleanup levels in 18 AAC 75.345 Table C was for lead in the WSW. However, the lead detection in this well is likely associated with the components of the water distribution system (e.g., lead well screen, lead piping, or other lead water supply system components) rather than contaminant migration since lead above the cleanup level was not detected in any soil sample in the area. Moreover, since the screen length was unknown, the submersible pump was placed at the bottom of the well to collect a fresh formation water sample. In doing so, it is possible that lead particulates from the bottom of the well were introduced into the sample container (the sample was unfiltered), which were subsequently dissolved by acid.

Soil samples collected as part of the 2015 decommissioning, showed exceedances of the site-specific ADEC Method Three ACL for DRO in soils on the south side of the Valve Manifold Pit and in the pipeline trench south of the Valve Manifold Pit (Bristol, 2016a). Follow-up sampling in the SRI showed the areal extent of soil contamination was limited and did not extend significantly outside of the pipeline trench.

5.1.7 Nature and Extent of Contamination

The nature and extent of contamination at the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower was evaluated using results from previous investigations, the 2015 removal action, and the 2015 SRI. Soil samples collected as part of the 2015 removal action showed exceedances of cleanup levels in 18 AAC 75.341, Tables B1 and B2 for DRO and fuel-related PAHs in shallow soils (10 feet bgs or less) on the south side of the Valve Manifold Pit, in the pipeline trench between the Valve Manifold Pit and Dewatering Tower, and in the pipeline trench south of the Valve Manifold Pit (Bristol, 2016a). Follow-up sampling in the SRI showed the areal extent of fuel related soil contamination was limited and did not extend significantly outside of the pipeline trench. Arsenic was also detected in all samples above ADEC cleanup levels in 18 AAC 75.341, Table B1. The vertical extent of contamination was also limited. Soil concentrations exceeding the cleanup levels extended from approximately 2 feet bgs to a maximum depth of 10.5 feet bgs. No detections of DRO or fuel-related compounds above the cleanup level were identified at the water table. The approximate areal extent of soil with fuel-related contamination above the cleanup level is presented on **Figure 2-4**.

Groundwater sampling results showed no evidence of groundwater contamination from contaminant releases at the site. As previously discussed, the elevated lead concentration in the WSW was suspected to be associated with a lead screen, piping, or other leaded water distribution system components. Groundwater is addressed as part of the Site-Wide Groundwater AOC which is covered by the Final Record of Decision (U.S. Army, 2024).

5.1.8 Conceptual Site Model

The CSM is the same as presented for the whole of the SCS (See Section 1.5.1) and the exposure assessment presented in Section 1.7.2.1.

5.2 CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USE

5.2.1 Land Use

This is the same for the whole of the SCS (See Section 1.6).

5.2.2 Ground and Surface Water Uses

There are no current groundwater uses at the SCS. The reasonably foreseeable future use of the SCS is expected to remain industrial while under U.S. Army ownership and, as the lead agency, the U.S. Army has the authority to determine the future anticipated land use of the SCS. The U.S. Army has not determined potential future uses and unrestricted use could be a possibility following property transfer.

Surface water is not present at the SCS.

5.3 SUMMARY OF SITE RISKS

A HHERA evaluated the human health and ecological risks associated with the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower AOC. The HHERA process and approach is presented in Section 1.7 and subsequent sub-sections. The following discussion is focused on the COPCs and risks that the HHERA identified for the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower AOCs.

5.3.1 Summary of Human Health Risk Assessment

This is the same for the whole of the SCS (See Section 1.7.2).

5.3.1.1 Exposure Assessment

This is the same for the whole of the SCS (See Section 1.7.2.1).

5.3.1.2 Identification of Chemicals of Potential Concern

This is the same for the whole of the SCS (See Section 1.7.2.2), apart from the site-specific details described below.

Residential Screening: COPCs, chemicals with MDCs exceeding residential soil RSLs and cleanup levels for GRO, DRO and RRO in 18 AAC 75.341 Table B2, under 40-inch zone, were identified in subsurface soil at the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower AOCs:

- Subsurface soil: 1-methylnaphthalene, 2-methylnaphthalene, and vanadium.

Industrial Screening: COPCs, chemicals with MDCs exceeding industrial soil RSLs, and cleanup levels for GRO, DRO and RRO in 18 AAC 75.341 (Table B2, under 40-inch zone) were not identified at the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower AOCs.

The data used in the risk assessment was deemed to be of sufficient quality and quantity for its intended use. The detection frequency (number of samples in which the chemical was detected divided by the total number of samples analyzed), the MDCs, and residential and industrial screening levels are presented in **Table 5-1**.

5.3.1.3 Toxicity Assessment

This is the same for the whole of the SCS (See Section 1.7.2.3).

Table 5-1 Summary of Cumulative Risk Estimates for Human Receptors – Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower AOCs

Medium/Risk Driver[1]	Number of Samples	Number of detections	MDC (mg/kg)	Residential Soil RSL[2] THQ=0.1 or TCR=1 x 10^{-6}	Industrial Soil RSL[2] THQ=0.1 or TCR=1 x 10^{-6}	Hypothetical Future Resident	
						Estimated Cancer Risk[3]	Estimated Noncancer Hazard[3]
Subsurface Soil							
1-methylnaphthalene	15	4	34	18	NA	1.9 x 10^{-6}	NA
2-methylnaphthalene	15	3	28	24	NA	NA	0.117
Vanadium	8	8	51.6	39	580	NA	0.132
Cumulative Media Cancer Risk/Noncancer Hazard:						1.9 x 10^{-6}	0.249
ADEC Risk Criteria:						10^{-5}	1
EPA Risk Range:						10^{-6} – 10^{-4}	1

Notes:
1 – Summary of risk estimates for COPCs are presented if the COPC is a risk driver for at least one receptor. Risk estimates for all COPCs are presented in the Human Health and Ecological Risk Assessment which is Appendix H of the Supplemental Remedial Investigation (U.S. Army, 2018).
2 – Human Health Screening levels are the May 2016 EPA Regional Screening Levels for Residential Soil, except for the carcinogenic PAHs. The screening levels for the carcinogenic PAHs were calculated using the RSL calculator in May 2017.
3 – Estimated Cancer Risk = (MDC/RSL) *10^{-6}; Estimated Noncancer Hazard = (MDC/RSL)*0.1
Key:
ADEC – Alaska Department of Environmental Conservation
AOC – Area of Concern
COPC – contaminant of potential concern
EPA – U.S. Environmental Protection Agency
mg/kg – milligrams per kilogram
MDC – maximum detected concentration
NA – not applicable
PAH – polynuclear aromatic hydrocarbon
RSL – regional screening level
TCR – target cancer risk
THQ – target hazard quotient

5.3.1.4 Risk Characterization

This is the same for the whole of the SCS (See Section 1.7.2.4), apart from the site-specific details described below.

Preliminary estimated cancer risks are at the low end of the EPA's risk management range of 10^{-6} to 10^{-4} and below the ADEC excess cancer risk threshold of 1×10^{-5}. Preliminary non-cancer hazards are below the EPA's target hazard index of 1. No exceedances of ADEC soil cleanup levels were noted. Therefore, based on the various lines of evidence, it is unlikely that chemicals are present at concentrations that would potentially pose risks or hazards to human health of residential or industrial receptors.

5.3.2 Summary of Ecological Risk Assessment

This is the same for the whole of the SCS (See Section 1.7.3).

5.3.2.1 ADEC Step 1 Ecological Scoping Evaluation

This is the same for the whole of the SCS (See Section 1.7.3.1).

5.3.2.2 ADEC Step 2 Preliminary Screening Evaluation

This is the same for the whole of the SCS (See Section 1.7.3.2), apart from the site-specific details described below.

Ecological COPCs, chemicals with MDCs exceeding screening levels at the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower AOCs included:

- Surface soil: Lead.
- Subsurface soil: Copper, selenium, vanadium, and zinc.

In all cases, inorganic concentrations were relatively low and exceedances were within about one-order of magnitude of the conservative screening levels applied. The ecological evaluation concludes that exposure to residual chemicals in surface and shallow subsurface soil is potentially complete but unlikely to result in significant exposure to ecological receptors. Per ADEC decision criteria, available information are considered adequate to conclude that reported exposure (and potential risk) is negligible and there is no need of further evaluation or remedial action based on potential ecological risk (U.S. Army, 2018).

5.3.3 Basis for Action

Based on the results of the HHERA, as summarized above, the Dewatering Tower AOC does not contain COC's that are risks to human or ecological receptors. However, as noted in Section 2.1.7, there are COPCs that exceed ADEC Method Two migration-to-groundwater cleanup levels.

As discussed in Section 1.8, ADEC Method Three migration-to-groundwater levels were calculated to further refine the constituents that are a migration to groundwater threat and should be established as COCs. **Table 5-2** presents the COPCs identified, along with the:

- ADEC Method Two migration-to-groundwater cleanup value.
- Maximum allowable concentration (for petroleum hydrocarbons only).
- Most conservative ADEC Method Two human health, under 40-inch zone, cleanup value.
- ADEC Method Three migration-to-groundwater cleanup value.
- Selection of the Site-Specific ACL, which is based on the most conservative of the ADEC Method Two human health cleanup level (18 AAC 75.341 Tables B1 and B2, under 40-inch zone), the maximum allowable concentration (for petroleum hydrocarbons only), and the ADEC Method Three migration-to-groundwater value.

Table 5-2 Cleanup Levels for Soil Contaminants of Potential Concern

Compound	ADEC Method Two Migration-to-Groundwater Cleanup Level[1] (mg/kg)	ADEC Maximum Allowable Concentration[2] (mg/kg)	ADEC Human Health Level[3] (mg/kg)	ADEC Method Three Calculator Value – Migration-to-Groundwater[4] (mg/kg)	Site-Specific Alternative Cleanup Level[5] (mg/kg)	Maximum Detected Concentration (mg/kg)
Diesel Range Organics	250	12,500	10,250	3,300	3,300	**7,900**
Naphthalene	0.038	NA	29	13	13	0.41
1-Methylnaphthalene	0.41	NA	68	130	68	34
2-Methylnaphthalene	1.3	NA	310	410	310	28
Arsenic	0.2	NA	8.8	210	8.8	**12.1**

Notes:
1 – Tables B1 and B2, 18 AAC 75.341 (ADEC. 2023).
2 – Table B2, 18 AAC 75.341 (ADEC. 2023).
3 – Human Health value based on the Under 40-inch zone in Table B1 and most conservative of the ingestion and inhalation value for the under 40-inch zone in Table B2 (for diesel range organics and gasoline range organics) (ADEC. 2023).
4 – Value determined for the migration-to-groundwater scenario using the ADEC Cleanup Levels Calculator and the Petroleum Cleanup Levels Calculator (U.S. Army, 2018).
5 – Site-specific alternative cleanup level for soil is the lowest value between: 1) ADEC Maximum Allowable Concentration, 2) ADEC Human Health Level, and 3) ADEC Method Three Calculator Value – Migration-to-Groundwater.
Bold values exceed the cleanup level.
Key:
AAC – Alaska Administrative Code
ADEC – Alaska Department of Environmental Conservation
NA – not applicable

Although the maximum detected arsenic concentration exceeded its respective BTV (Section 1.7.1) and the site-specific ACL, all other arsenic detections at the Burn Pit AOC are consistent with naturally occurring concentrations and there were no other arsenic exceedances of the site-specific ACL.

DRO was the only constituent to exceed the site-specific ACL and is the only soil COC at the Valve Manifold Building, Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower), and the Dewatering Tower AOCs. DRO contamination exceeding the approved cleanup levels is present in the western portion near the Valve Manifold Building and Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower) AOCs

(VMP01 and PL17) and in the eastern portion near the Fuel Lines (associated with the Valve Manifold Building and Dewatering Tower) AOC (PL18). No exceedances of DRO are noted near the Dewatering Tower AOC.

Based on the absence of human and ecological risks and chemical constituents are less than associated site-specific alternative cleanup level at the Dewatering Tower AOC, the Dewatering Tower AOC requires no further evaluation and site closure.

6.0 DISPOSAL LINE AOC

The Disposal Line AOC is a 2-inch underground pipeline ("Disposal Line") that connected the sump in the pump room of the Composite Building to the Burn Pit (**Figure 1-2**). The disposal line exited the Composite Building along the east wall and ran underground approximately 170 feet to the southeast where it emptied into the Burn Pit. Waste fuels and other waste substances were transported from the Composite Building to the Burn Pit via the Disposal Line.

6.1 SITE CHARACTERISTICS

6.1.1 Topography and Climate

This is the same for the whole of the SCS (See Section 1.5.2.2).

6.1.2 Geology

This is the same for the whole of the SCS (See Section 1.5.2.3).

6.1.3 Hydrogeology

This is the same for the whole of the SCS (See Section 1.5.2.4).

6.1.4 Surface Water Hydrology

This is the same for the whole of the SCS (See Section 1.5.2.5).

6.1.5 Ecological Setting

This is the same for the whole of the SCS (See Section 1.5.2.6).

6.1.6 Site Characterization Activities

2014 Data Gap Analysis. The 2014 Data Gap Analysis reviewed site features and determined if a site feature had sufficient data to verify that a release had not occurred and that a site feature had sufficient data to determine the nature and extent of any contamination. The analysis outlined that an investigation of the area surrounding the disposal line had not occurred and that a limited investigation was necessary to definitively determine if any release of contaminants had occurred and if waste remains in the line (North Wind, 2014).

2015 Removal Action and Sampling. The 2015 removal action included excavation of the disposal line from the connection at the Composite Building to within 20 feet of the Burn Pit. Approximately 20 feet of the 2-inch steel line was left in place due to known contamination in the Burn Pit area (Bristol, 2016a). The portion of the line remaining in place is shown on **Figure 6-1**. Field screening samples collected along the piping trench associated with the Disposal Line did not indicate potential contamination, and no exceedances of 18 AAC 75.340 Method Two cleanup levels were identified in laboratory results for samples PL24, PL25 and PL11 (**Figure 2-3**). Samples PL24, PL25 and PL11 were analyzed for DRO, GRO, RRO, VOCs, and SVOCs. DRO at approximately half of the cleanup level was identified in the sample collected from soils underlying the Disposal Line adjacent to the exit from the Composite Building (PL11), however no evidence of significant contamination along the Disposal Line was identified during the removal action.

2015 SRI. The 2015 SRI investigation included three soil borings with associated soil sampling along the Disposal Line and the installation of one monitoring well (MW18) adjacent to the Disposal Line near the Composite Building and sump and sample point PL11. Two soil samples were collected from boreholes DL-BH1, DL-BH2, and DL-BH3 between 5-6 feet bgs and 19-20 feet bgs, and the samples were analyzed for GRO, DRO, RRO, VOCs, PAHs, PCBs, pesticides, and metals. The only exceedance of the 18 AAC 75.340 Method 2 cleanup levels in these soil samples was associated with arsenic.

Groundwater samples were collected from MW18, and analyzed for GRO, DRO, RRO, VOCs, PAHs, EDB, pesticides, perfluorooctanoic acid/perfluorooctanesulfonic acid PFOA/PFOS, and metals. Laboratory results showed that the MW18 sample contained no contaminants above the 18 AAC 75.345 Table C cleanup levels.

6.1.7 Nature and Extent of Contamination

Laboratory results showed that only arsenic in samples DL-BH1, DL-BH2, and DL-BH3 exceeded 18 AAC 75.341, Table B1, cleanup levels. The maximum arsenic concentration was 8.07 mg/kg in DL-BH1 in the 5 to 6 ft bgs sample (**Figure 6-1**). There is no evidence of groundwater contamination within the Disposal Line AOC and therefore no impact to the SCS site groundwater associated with the Disposal Line AOC.

6.1.8 Conceptual Site Model

The CSM is the same as presented for the whole of the SCS (See Section 1.5.1) and the exposure assessment presented in Section 1.7.2.1.

6.2 CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USE

6.2.1 Land Use

This is the same for the whole of the SCS (See Section 1.6).

6.2.2 Ground and Surface Water Uses

There are no current groundwater uses at the SCS. The reasonably foreseeable future use of the SCS is expected to remain industrial while under U.S. Army ownership, and as the lead agency, the U.S. Army has the authority to determine the future anticipated land use of the SCS. The U.S. Army has not determined potential future uses and unrestricted use could be a possibility following property transfer.

Surface water is not present at the SCS.

COMPOSITE BUILDING
(BUILDING NO. 10-100)

ADEC SOIL CLEANUP LEVELS:
18 AAC 75.341 TABLES B1/B2
UNITS = MG/KG

BULK FUEL HYDROCARBONS	
DRO	250
GRO	300
VOCs	
ETHYLBENZENE	0.13
XYLENES (TOTAL)	1.5
1,2,4-TMB	0.61
1,3,5-TMB	0.66
1,1,2-TCA	0.0014
PAHs	
1-MNPT	0.41
2-MNPT	1.3
NAPHTHALENE	0.038

UNDER 40-INCH ZONE
MOST STRINGENT PATHWAY

ADEC GROUNDWATER CLEANUP LEVELS:
18 AAC 75.345 TABLE C
UNITS = MG/L

BULK FUEL HYDROCARBONS	
DRO	1.5
GRO	2.2
VOCs	
ETHYLBENZENE	0.015
XYLENES, TOTAL	0.19
1,2,4 TMB	0.056
1,3,5 TMB	0.06
PAHS	
1-MNPT	0.011
2-MNPT	0.036
NAPHTHALENE	0.0017
METALS	
ARSENIC	0.00052
THALLIUM	0.0002

ACRONYMS AND ABBREVIATIONS
ANALYTES
DRO - Diesel Range Organics
GRO - Gasoline Range Organics
1,2,4-TMB - 1,2,4 Trimethylbenzene
1,3,5-TMB - 1,3,5 Trimethylbenzene
1,1,2-TCA - 1,1,2-Trichloroethane
1-MNPT - 1-Methylnaphthalene
2-MNPT - 2-Methylnaphthalene
UNITS
MG/KG - Milligrams per Kilogram
MG/L - Milligrams per Liter
OTHER
FES - Fairbanks Environmental Services
SRI - Supplemental Remedial Investigation
VOCs - Volatile Organic Compounds
PAHs - Polynuclear Aromatic Hydrocarbons
ND - Not Detected at LOD Shown in Parenthesis
LOD - Limit of Detection
Q - result considered an estimate (L-low; N-uncertain) due to a quality control failure
J - Result Qualified as Estimate because it is less than the LOQ
LOQ - Limit of Quantitation
PPM - Parts per Million
BGS - Below Ground Surface
ADEC - Alaska Department of Environmental Conservation

DL-BH1		
SEPT 2015	5-6' BGS	19-20' BGS
ARSENIC	8.06	3.30

DL-BH2		
SEPT 2015	5-6' BGS	19-20' BGS
ARSENIC	3.45	4.41

DL-BH3		
SEPT 2015	5-6' BGS	19-20' BGS
ARSENIC	4.15	4.31

MW5-SOIL		
OCT 2007	5-7' BGS	15-17' BGS
ARSENIC	3.08	3.92

MW5	OCT	SEPT
38 – 58 BGS	2007	2015
ARSENIC	NA	0.0032 J
THALLIUM	0.00032 J	ND (0.001)
NAPHTHALENE	0.0026 J	ND (0.005)

15SB7	
OCT 2015	38-39' BGS
DRO	485
GRO	202 QN
ETHYLBENZENE	0.43
XYLENES (TOTAL)	3.76
NAPHTHALENE	2.44 J
1,2,4-TMB	13
1,3,5-TMB	5

15SB8	
OCT 2015	35-36' BGS
DRO	1,490
GRO	507 QN
NAPHTHALENE	0.157 J

15SB1	
OCT 2015	38.5-40' BGS
DRO	2,720
GRO	137 QN
NAPHTHALENE	1.7 J

MW17	SEPT
33.5 – 43.5 BGS	2015
ARSENIC	0.0054
DRO	2.22
GRO	4.56
ETHYLBENZENE	0.215
XYLENES	0.693
NAPHTHALENE	0.18
1,2,4-TMB	0.693
1,3,5-TMB	0.204
1-MNPT	0.039 QL
2-MNPT	0.059 QL

SB7B		
OCT 2007	5-7' BGS	15-17' BGS
GRO	653 QN	637 QN
DRO	1,080	1,540
ARSENIC	6.22	4.75
ETHYLBENZENE	ND(0.103)	0.54 J
XYLENES (TOTAL)	7.3	22.2
NAPHTHALENE	3.04	4.62
1,2,4-TMB	9.15	15.2
1,3,5-TMB	7.62	7.09
1,1,2-TCA	ND (0.103)	0.141 QN
2-MNPT	3.23	6.1

NOTES:
1. Background imagery is dated 13 June 1968, georeferenced to April 2015 and June 2015 GPS survey data.
2. Concentrations shown in Blue exceed ADEC cleanup levels
3. Arsenic detections are attributed to naturally occurring sources
4. The highest concentration between primary and duplicate samples is shown where duplicate samples were collected
5. Only 2015 results from sample locations that had at least one ADEC cleanup level exceedance are shown
6. Soil concentrations are in MG/KG. Groundwater concentrations are in MG/L
7. Depth listed for groundwater sample denotes the screened interval

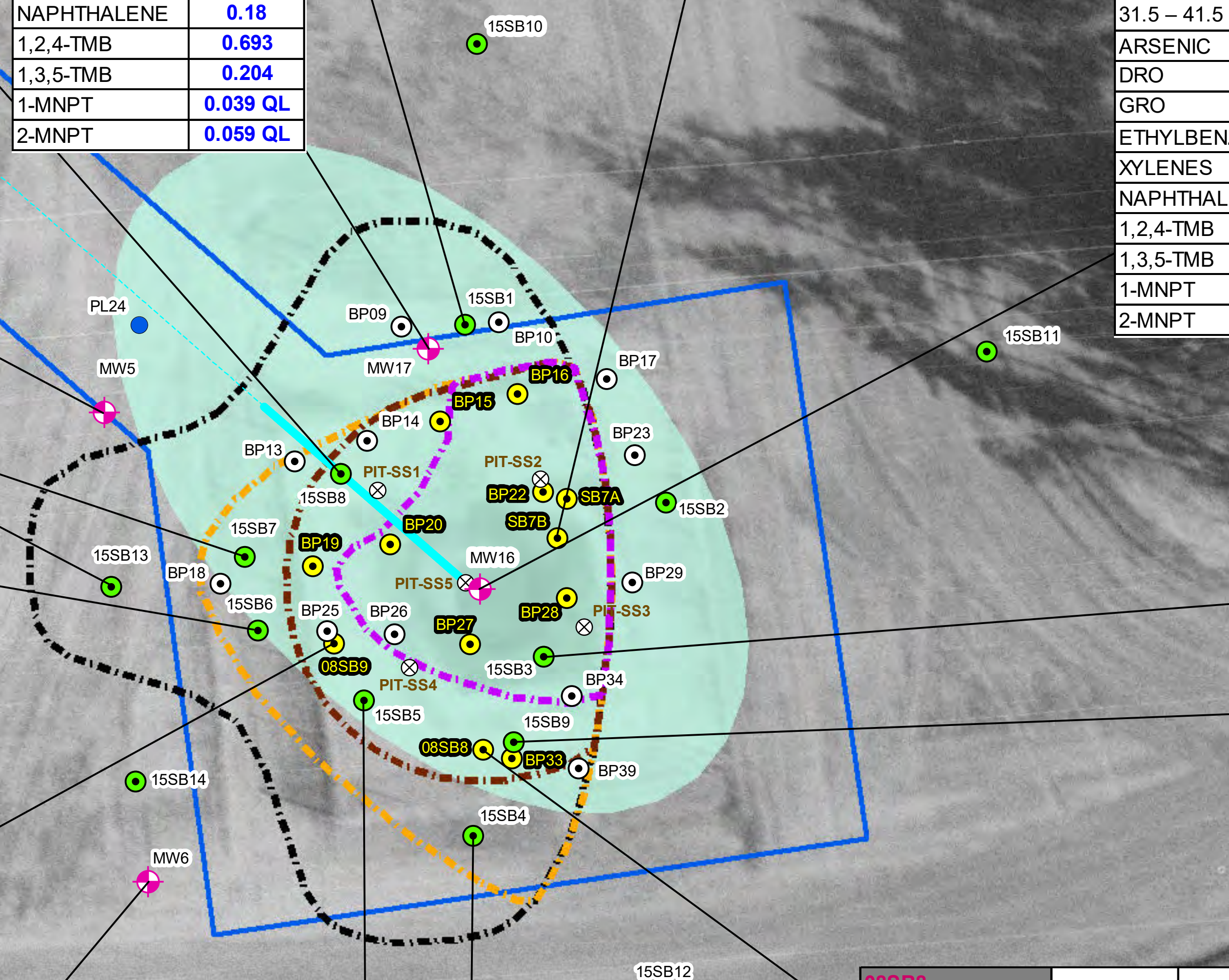
CHEMISTRY NOTES:
Twenty-One Soil Samples were Collected at different Depths from Seven Locations within or near the Burn Pit in 2007 and 2008 and Analyzed for Dioxins and Furans. Thirteen Samples had Detections, but all Toxicity Equivalence (TEQ) Concentrations were between 40 Times and 5 Orders of Magnitude below the Environmental Protection Agency (EPA) Region 9 Preliminary Remediation Goals (PRG) for Dioxins and Furans in Soil.

MW16	SEPT
31.5 – 41.5 BGS	2015
ARSENIC	0.0062
DRO	2.27
GRO	4.76
ETHYLBENZENE	0.156
XYLENES	0.612
NAPHTHALENE	0.125
1,2,4-TMB	0.625
1,3,5-TMB	0.198
1-MNPT	0.036
2-MNPT	0.0607

GRO AND/OR DRO CONCENTRATIONS ABOVE ADEC SOIL CLEANUP LEVELS
40+ FEET BGS
30-40 FEET BGS
20-40 FEET BGS
0-40 FEET BGS

CONTAMINANT CONCENTRATIONS ABOVE ADEC GROUNDWATER CLEANUP LEVELS
ESTIMATED GROUNDWATER CONTAMINATIONE EXTENT

15SB13			
OCT 2015	29-30' BGS	34-35' BGS	35-37' BGS
DRO	7.5 QN	526	1,160
GRO	1.07 J	2.85	62.8 QN



15SB3			
OCT 2015	4-5' BGS	19-20' BGS	39-40' BGS
DRO	3580 QN	620	794
GRO	254 QN	36.7 QN	487 QN
ETHYLBENZENE	ND (0.139)	0.0124 J	0.35
XYLENES (TOTAL)	22.9	1.41	0.76
NAPHTHALENE	5.78 J	0.752 J	1.47 J
1,2,4-TMB	34.7	7.0	8.1
1,3,5-TMB	17.9	2.8	6.2

15SB6			
OCT 2015	17-18' BGS	23-24' BGS	36-37.5' BGS
DRO	7.04 J	192	1,390
GRO	2.35	25.8 QN	411 QN
ETHYLBENZENE	ND (0.01)	ND (0.01)	1.92 J
XYLENES (TOTAL)	ND (0.03)	0.52	11.8 J
NAPHTHALENE	ND (0.02)	0.264 J	4.41 J
1,2,4-TMB	ND (0.02)	2.0	24.9 QN
1,3,5-TMB	ND (0.01)	1.2	7.5 J

15SB9	
OCT 2015	35-36' BGS
DRO	1,050
GRO	575 QN
ETHYLBENZENE	0.99
NAPHTHALENE	0.68
1,2,4-TMB	5.4
1,3,5-TMB	2.2

08SB9				
OCT 2008	0.5-1' BGS	5-7' BGS	10-15' BGS	20-22' BGS
GRO	1.83 J	1.02 J	2 J	350 QN
DRO	32.3	6.64 J	8.8 J	263
ARSENIC	20.4	3.94	6.29	3.25
XYLENES (TOTAL)	ND (0.172)	ND (0.0881)	ND (0.0643)	7.88
NAPHTHALENE	0.0766 J	ND (0.0881)	ND (0.0643)	2.17
1,2,4-TMB	0.279	ND (0.044)	ND (0.0322)	15.4
1,3,5-TMB	0.115	ND (0.044)	ND (0.0322)	6.2

MW6-SOIL				
OCT 2008	5-7' BGS	10-12" BGS	15-17' BGS	20-22' BGS
ARSENIC	6.71	3.41	2.57	4.5

15SB5	
OCT 2015	37-39' BGS
DRO	1,090
GRO	497 QN
ETHYLBENZENE	1.6
XYLENES (TOTAL)	11.6
NAPHTHALENE	4.23 J
1,2,4-TMB	22.4
1,3,5-TMB	8.0

15SB4	
OCT 2015	39-40' BGS
DRO	603
GRO	342 QN
NAPHTHALENE	0.94 J
1,2,4-TMB	1.0
1,3,5-TMB	2.3

08SB8						
OCT 2008	0.5-1' BGS	5-7' BGS	10-12' BGS	15-17' BGS	20-22' BGS	35-37' BGS
DRO	11.8 J	2.49 J	2.77 J	2,620	2,960	883
ARSENIC	4.6	6.68	3.65	3.91	6.21	3.59
ETHYLBENZENE	ND (0.032)	ND (0.0295)	ND (0.0334)	ND (0.0348)	0.0357 J	0.714
XYLENES (TOTAL)	ND (0.064)	ND (0.059)	ND (0.0667)	ND (0.0697)	4.46	2.75
NAPHTHALENE	ND (0.064)	ND (0.059)	ND (0.0667)	ND (0.0697)	3.62 J	1.26
1,2,4-TMB	ND (0.032)	ND (0.0295)	ND (0.0334)	ND (0.0348)	24 J	10.6
1,3,5-TMB	ND (0.032)	ND (0.0295)	ND (0.0334)	ND (0.0348)	9.3 J	4.66
2-MNPT	ND(0.00598)	ND(0.00519)	ND(0.00521)	ND(0.00519)	8.54	1.94

LEGEND:

GROUNDWATER MONITIORING WELL
REMOVAL ACTION SOIL SAMPLE (NO ADEC EXCEEDANCES) - BRISTOL
2015 SRI SURFACE SOIL SAMPLE
SUMP
DISPOSAL LINE REMAINING IN PLACE
FORMER DISPOSAL LINE (REMOVED IN 2015)
FORMER UNDERGROUND FUEL LINES (REMOVED IN 2015)

2015 SRI SOIL BORING - FES
2015 BURN PIT INVESTIGATION SOIL BORING - NORTH WIND
2007/2008 RI SOIL BORING WITH PID > 20 PPM - NORTH WIND
2007/2008 RI SOIL BORING WITH PID < 20 PPM - NORTH WIND
FENCE
SRI AREA OF CONCERN

GROUNDWATER SAMPLE FROM THE 2015 SUPPLEMENTAL REMEDIAL INVESTIGATION
SOIL BORING SAMPLE FROM THE 2015 SUPPLEMENTAL REMEDIAL INVESTIGATION
SOIL BORING FROM 2015 BURN PIT INVESTIGATION - NORTH WIND
SOIL BORING SAMPLE FROM PREVIOUS SITE INVESTIGATIONS

0 10 20
Feet

N
W E
S

Figure 6-1
Burn Pit and Disposal Line AOC Soil and Groundwater Sampling Results Exceeding ADEC Cleanup Levels
Sears Creek Station, Alaska
Petroleum Only and No Further Action Sites Decision Document

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SYSTEM: UTM ZONE 6 N		DWN.	CB
Project No.		SCALE	AS SHOWN
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6.3 SUMMARY OF SITE RISKS

A HHERA evaluated the human health and ecological risks associated with the Disposal Line AOC. The HHERA process and approach is presented in Section 1.7 and subsequent sub-sections. The following discussion is focused on the COPCs and risks that the HHERA identified for the Disposal Lines AOC.

6.3.1 Summary of Human Health Risk Assessment

This is the same for the whole of the SCS (See Section 1.7.2).

6.3.1.1 Exposure Assessment

This is the same for the whole of the SCS (See Section 1.7.2.1).

6.3.1.2 Identification of Chemicals of Potential Concern

This is the same for the whole of the SCS (See Section 1.7.2.2), apart from the AOC specific details described below.

Residential Screening: COPCs, chemicals with MDCs exceeding residential soil RSLs and cleanup levels for GRO, DRO and RRO in 18 AAC 75.341 Table B2, under 40-inch zone, were not identified in surface or subsurface soil at the Disposal Line AOC.

Industrial Screening: COPCs, chemicals with MDCs exceeding industrial soil RSLs and cleanup levels for GRO, DRO and RRO in 18 AAC 75.341 Table B2, under 40-inch zone, were not identified in surface or subsurface soil at the Disposal Line AOC.

The data used in the risk assessment was deemed to be of sufficient quality and quantity for its intended use.

6.3.1.3 Toxicity Assessment

This is the same for the whole of the SCS (See Section 1.7.2.3).

6.3.1.4 Risk Characterization

This is the same for the whole of the SCS (See Section 1.7), apart from the site-specific details described below.

No COPCs were identified at the Disposal Line AOC. Therefore, there are no carcinogenic risks or noncarcinogenic impacts presented for residential or industrial receptors.

6.3.2 Summary of Ecological Risk Assessment

This is the same for the whole of the SCS (See Section 1.7.3).

6.3.2.1 ADEC Step 1 Ecological Scoping Evaluation

This is the same for the whole of the SCS (See Section 1.7.3.1)**.**

6.3.2.2 ADEC Step 2 Preliminary Screening Evaluation

This is the same for the whole of the SCS (See Section 1.7.3.2), apart from the site-specific details described below.

Ecological COPCs, chemicals with MDCs exceeding screening levels at the Disposal Line AOC included:

- Surface soil: Lead

Lead, with an MDC of 30.4 mg/kg (PL25) exceeded the BTV of 22.3 mg/kg and the ecological screening level of 11 mg/kg (USEPA, 2005) at the Disposal Line evaluation area.

In shallow subsurface soil (>2-4 feet bgs), lead was also detected above the subsurface soil BTV (14.9 mg/kg) and ecological screening level at the Disposal Line AOC (PL-011, MDC of 16 mg/kg).

In all cases, inorganic concentrations were relatively low and exceedances were within about one-order of magnitude of the conservative screening levels applied. The ecological evaluation concludes that exposure to residual chemicals in surface and shallow subsurface soil is potentially complete but unlikely to result in significant exposure to ecological receptors. Per ADEC decision criteria, available information are considered adequate to conclude that reported exposure (and potential risk) is negligible and there is no need of further evaluation or remedial action based on potential ecological risk (U.S. Army, 2018).

6.3.3 Basis for Action

Based on the results of the HHERA, as summarized above, the Disposal Line AOC does not contain COC's that are risks to human or ecological receptors. However, as noted in Section 6.1.7, arsenic exceed ADEC Method Two migration-to-groundwater cleanup levels.

As discussed in Section 1.8, ADEC Method Three migration-to-groundwater levels were calculated to further refine the constituents that are a migration to groundwater threat and should be established as COCs. **Table 6-1** presents the COPCs identified, along with the:

- ADEC Method Two migration-to-groundwater cleanup value.
- ADEC maximum allowable concentration (for petroleum hydrocarbons only).
- Most conservative ADEC Method Two human health, under 40-inch zone, cleanup value.
- ADEC Method Three migration-to-groundwater cleanup value.
- Selection of the Site-Specific ACL, which is based on the most conservative of the ADEC Method Two human health cleanup level (18 AAC 75.341 Tables B1 and B2, under 40-inch zone), the maximum allowable concentration (for petroleum hydrocarbons only), and the ADEC Method Three migration-to-groundwater value.

Table 6-1 Cleanup Levels for Soil Contaminants of Potential Concern

Compound	ADEC Method Two Migration-to-Groundwater Cleanup Level[1] (mg/kg)	ADEC Maximum Allowable Concentration[2] (mg/kg)	ADEC Human Health Level[3] (mg/kg)	ADEC Method Three Calculator Value – Migration-to-Groundwater[4] (mg/kg)	Site-Specific Alternative Cleanup Level[5] (mg/kg)	Maximum Detected Concen-tration (mg/kg)
Arsenic	0.2	NA	8.8	210	8.8	8.06

Notes:
1 – Tables B1 and B2, 18 AAC 75.341 (ADEC. 2023).
2 – Table B2, 18 AAC 75.341 (ADEC. 2023).
3 – Human Health value based on the Under 40-inch zone in Table B1 and most conservative of the ingestion and inhalation value for the under 40-inch zone in Table B2 (for diesel range organics and gasoline range organics) (ADEC. 2023).
4 – Value determined for the migration-to-groundwater scenario using the ADEC Cleanup Levels Calculator and the Petroleum Cleanup Levels Calculator (U.S. Army, 2018).
5 – Site-specific alternative cleanup level for soil is the lowest value between: 1) ADEC Maximum Allowable Concentration, 2) ADEC Human Health Level, and 3) ADEC Method Three Calculator Value – Migration-to-Groundwater.

Key:
AAC – Alaska Administrative Code
ADEC – Alaska Department of Environmental Conservation
mg/kg – milligrams per kilogram
NA – not applicable

No COPCs exceeded the site-specific ACL at the Disposal Line AOC.

Based on the absence of human and ecological risks and chemical constituents are less than associated site-specific alternative cleanup level the Disposal Line AOC requires no further evaluation and site closure.

7.0 DIESEL TRANSFER PUMP AOC

The Diesel Transfer Pump AOC transferred fuel from the diesel AST #37 to the Composite Building (**Figure 1-2**). The Diesel Transfer Pump was located east of AST #37. The 1,400-barrel (bbl) diesel AST #37 and a 500 bbl gasoline AST #36 comprise the Aboveground Fuel Tanks AOC. The fuel lines connecting the diesel transfer pump to the aboveground fuel tanks comprise the Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOC. The fuel lines associated with the ASTs and Diesel Transfer Pump were underground outside of the tank berms and then transitioned aboveground, where they connected to the ASTs.

The Diesel Transfer Pump, Aboveground Fuel Tanks, and Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOCs had removal actions completed (Bristol, 2016a) and were evaluated in the SRI (U.S. Army, 2018) as a singular area due to proximity. As such this section provides the area wide evaluation of the three AOCs and Diesel Transfer Pump AOC specific remedy determination.

7.1 SITE CHARACTERISTICS

7.1.1 Topography and Climate

This is the same for the whole of the SCS (See Section 1.5.2.2).

7.1.2 Geology

This is the same for the whole of the SCS (See Section 1.5.2.3).

7.1.3 Hydrogeology

This is the same for the whole of the SCS (See Section 1.5.2.4).

7.1.4 Surface Water Hydrology

This is the same for the whole of the SCS (See Section 1.5.2.5).

7.1.5 Ecological Setting

This is the same for the whole of the SCS (See Section 1.5.2.6).

7.1.6 Site Characterization Activities

1994 Investigation. Five surface soil samples (S3 thru S7) were collected in the vicinity of the Diesel Transfer Pump, Aboveground Fuel Tanks, Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOCs during the 1994 investigation (**Figure 2-1**). The samples were analyzed for VOCs, basic/neutral/acid extractables, PCBs, pesticides, and toxic metals (USAPACEHEA, 1994). Results indicated contaminant concentrations were lower than applicable state and federal cleanup standards or consistent with the background sample concentrations (North Wind, 2012).

2007/2008 RI. Investigation of the AST area was conducted as part of the 2007/2008 RI/FS, and during a supplemental investigation conducted in 2008 (North Wind, 2010). However, since the ASTs were intact, sampling was limited to the areas around the tanks; sample locations from the previous investigations are shown on **Figures 2-2** and **7-1**. One shallow soil boring was drilled inside and two were drilled outside of the western most tank berm (08AST01, 08AST02, and 08AST03) as part of the RI/FS; however, samples were not submitted for laboratory analysis. In addition, two borings located northwest and southwest were drilled and completed as monitoring wells (MW2 and MW8). The soil and groundwater samples were analyzed for GRO, DRO, RRO, VOCs, PAHs, and lead. Arsenic was the only soil constituent detected, in both samples at MW2 with a high of 4.34 mg/kg at 5 to 7.5 ft bgs, above cleanup levels in 18 AAC 75.341, Tables B1 and B2, and none of the groundwater samples had contaminant concentrations exceeding 18 AAC 75.345 Table C cleanup levels.

Investigation of the Diesel Fuel Transfer Pump area was also conducted in 2007. One soil boring was completed to a depth of 22.5 feet bgs northeast of the pump in 2007 (SB2), as shown on **Figure 7-1**. Soil samples were analyzed for GRO, DRO, RRO, VOCs, PAHs, and lead. The 2007 soil sample did not have contaminant concentrations exceeding cleanup levels in 18 AAC 75.341, Tables B1 and B2.

2014 Data Gap Analysis. The 2014 Data Gap Analysis reviewed site features and determined if a site feature had sufficient data to verify that a release had not occurred and that a site feature had sufficient data to determine the nature and extent of any contamination. No documentation was found as to whether the fuel lines were flushed and cleaned during the deactivation of the pump station. It was recommended to determine whether any fuel was still remaining in the lines and investigate the possibility that leakage has occurred through valves and joints over time (North Wind, 2014).

2015 Removal Action and Sampling. The two ASTs and the Diesel Transfer Pump were decommissioned during the 2015 removal action. The ASTs and associated above ground piping were removed in accordance with the American Petroleum Institute (API) standards, and the metal from the tanks and piping was recycled (Bristol, 2016a). Field screening and laboratory confirmation samples were collected within the footprint of the former ASTs and under the above ground piping run as shown in **Figure 2-3**. Although none of the PID results were greater than 20 ppmv, the laboratory results showed DRO above the cleanup level in 18 AAC 75.341 Table B2, in one sample from the AST #37 footprint. Soil contamination was not identified in the vicinity of the gasoline AST (AST #36) or in the vicinity of the above ground piping.

The Diesel Transfer Pump, along with the associated underground pipelines, was also removed in 2015. Obvious fuel contamination and PID results greater than 20 ppmv were observed in the trench associated with the piping to the Diesel Transfer Pump (PL08), and soil samples for laboratory analysis were collected from this location as shown in **Figures 2-3** and **7-1**. Analytical results from this sample (PL08) showed DRO, ethylbenzene, xylenes, naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene concentrations exceeded the cleanup levels in 18 AAC 75.341, Tables B1 and B2. Elevated PID results were also identified in a field screening sample from a 90-degree bend in the piping north of the Diesel Transfer Pump (PL07), and laboratory results from the sample at this location showed benzene, ethylbenzene, xylenes, and naphthalene above the cleanup level.

PREVIOUS SOIL INVESTIGATION RESULTS

Year	Boring/Sample #	Previous Analyses	Previous Detections	Previous Exceedances
2007	SB2	GRO, DRO, RRO, BTEX, lead, PAH	DRO, lead	None
2008	AST01, AST02, AST03	GRO, DRO, RRO, VOC, lead, PAH	GRO, lead	None

ADEC SOIL CLEANUP LEVELS:
18 AAC 75.341 TABLES B1/B2
UNITS = MG/KG

BULK FUEL HYDROCARBONS	
DRO	250
VOCs	
BENZENE	0.022
ETHYLBENZENE	0.13
XYLENES (TOTAL)	1.5
PAHs	
1-MNPT	0.41
2-MNPT	1.3
NAPHTHALENE	0.038

UNDER 40-INCH ZONE
MOST STRINGENT PATHWAY

ADEC GROUNDWATER CLEANUP LEVELS:
18 AAC 75.345 TABLE C
UNITS = MG/L

METALS	
ARSENIC	0.00052

ACRONYMS AND ABBREVIATIONS

ANALYTES
DRO - Diesel Range Organics
1-MNPT - 1-Methylnaphthalene
2-MNPT - 2-Methylnaphthalene

UNITS
MG/KG - Milligrams per Kilogram
MG/L - Milligrams per Liter

OTHER
J - Result qualified as estimate because it is less than the LOQ
LOQ - Limit of Quantitation
FES - Fairbanks Environmental Services
VOCs - Volatile Organic Compounds
PAH - Polynuclear Aromatic Hydrocarbon
BTEX - Benzene, Toluene, Ethylbenzene, Xylenes
AST - Above Ground Storage Tank
BGS - Below Ground Surface
ADEC - Alaska Department of Environmental Conservation

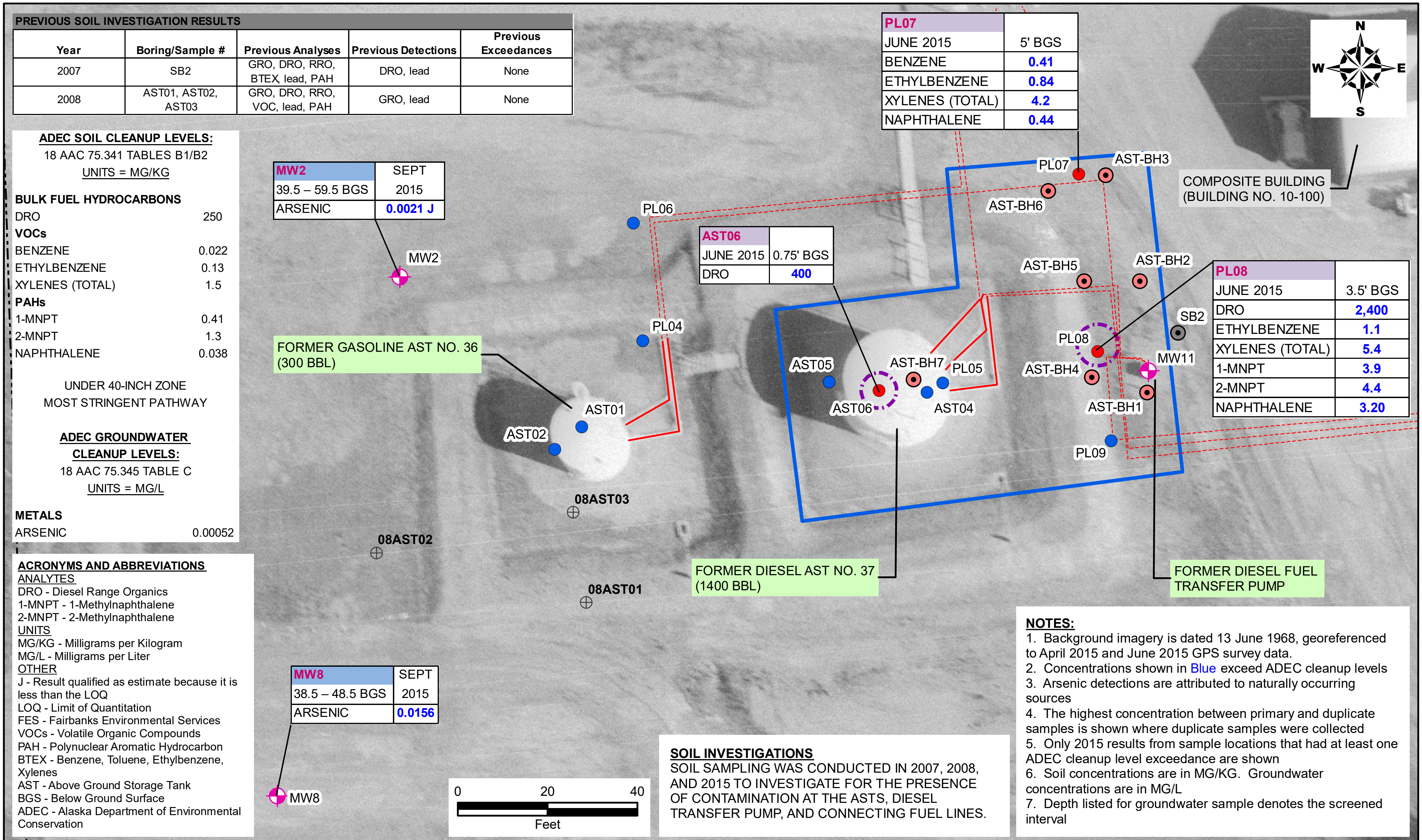
MW2	SEPT
39.5 – 59.5 BGS	2015
ARSENIC	0.0021 J

PL07	
JUNE 2015	5' BGS
BENZENE	0.41
ETHYLBENZENE	0.84
XYLENES (TOTAL)	4.2
NAPHTHALENE	0.44

AST06	
JUNE 2015	0.75' BGS
DRO	400

PL08	
JUNE 2015	3.5' BGS
DRO	2,400
ETHYLBENZENE	1.1
XYLENES (TOTAL)	5.4
1-MNPT	3.9
2-MNPT	4.4
NAPHTHALENE	3.20

MW8	SEPT
38.5 – 48.5 BGS	2015
ARSENIC	0.0156



SOIL INVESTIGATIONS
SOIL SAMPLING WAS CONDUCTED IN 2007, 2008, AND 2015 TO INVESTIGATE FOR THE PRESENCE OF CONTAMINATION AT THE ASTS, DIESEL TRANSFER PUMP, AND CONNECTING FUEL LINES.

NOTES:
1. Background imagery is dated 13 June 1968, georeferenced to April 2015 and June 2015 GPS survey data.
2. Concentrations shown in Blue exceed ADEC cleanup levels
3. Arsenic detections are attributed to naturally occurring sources
4. The highest concentration between primary and duplicate samples is shown where duplicate samples were collected
5. Only 2015 results from sample locations that had at least one ADEC cleanup level exceedance are shown
6. Soil concentrations are in MG/KG. Groundwater concentrations are in MG/L
7. Depth listed for groundwater sample denotes the screened interval

LEGEND:
- GROUNDWATER MONITORING WELL
- REMOVAL ACTION SOIL SAMPLE - BRISTOL
- REMOVAL ACTION SOIL SAMPLE (NO ADEC EXCEEDANCES) - BRISTOL
- 2015 SRI SOIL BORING - FES
- PRE-2015 SOIL BORING
- 2008 SURFACE SOIL SAMPLE
- FORMER ABOVEGROUND FUEL LINES (REMOVED IN 2015)
- FORMER UNDERGROUND FUEL LINES (REMOVED IN 2015)
- FENCE
- REMAINING SOIL CONTAMINATION WITH DRO CONCENTRATION ABOVE ADEC SOIL CLEANUP LEVEL
- DATA GAP AREA OF CONCERN
- GROUNDWATER SAMPLE FROM THE 2015 SUPPLEMENTAL REMEDIAL INVESTIGATION
- SOIL SAMPLE FROM THE 2015 REMOVAL ACTION INVESTIGATION - BRISTOL

Figure 7-1
Diesel AST, Diesel Transfer Pump, and Adjacent Fuel Lines AOC
Soil and Groundwater Sampling Results Exceeding ADEC Cleanup Levels
Sears Creek Station, Alaska
Petroleum Only and No Further Action Sites Decision Document

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SYSTEM: UTM ZONE 6 N	DWN. CB
Project No. 34150037	SCALE AS SHOWN
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2015 SRI. Seven soil borings were completed and one monitoring well was installed as part of the SRI. One soil boring was completed in the AST #37 footprint, and six soil borings were completed in the vicinity of the former Diesel Transfer Pump and former underground pipelines. The soil boring and monitoring well locations are shown on **Figure 7-1**.

Each boring was completed to 20 feet bgs since there was no evidence of contamination identified in the soil samples based on field screening results and visual observations. Two soil samples were collected from each boring; one soil sample was collected between 0 and 10 feet bgs, and one sample was collected between 15 and 20 feet bgs. Soil samples were analyzed for GRO, DRO, RRO, VOCs, PAHs, and lead. Laboratory sampling results showed only trace detections of fuels and fuel constituents, and no exceedances of cleanup levels in 18 AAC 75.341, Tables B1 and B2.

Monitoring well MW11 was installed adjacent to AST-BH1 in the vicinity of the former Diesel Transfer Pump. No elevated PID readings were observed in the soil cuttings at the time of drilling, and the depth to groundwater was approximately 50 feet bgs at the time of drilling. Groundwater samples were collected from cross-gradient well MW2 and newly installed well MW11 and analyzed for GRO, DRO, RRO, VOCs, PAHs, EDB, pesticides, and metals. Arsenic was the only constituent to exceed the 18 AAC 75.345 Table C cleanup levels (detected in MW2); however, the concentration was less than the detection in upgradient well MW8. Arsenic was not detected in the groundwater in MW11.

7.1.7 Nature and Extent of Contamination

Sampling results from previous investigations (North Wind, 2010), the 2015 removal action (Bristol, 2016a), and the 2015 SRI were used to determine the nature and extent of contamination at the Diesel AST, Diesel Transfer Pump, and Adjacent Fuel Lines AOC. Arsenic was detected in soil at MW2 in 2007. The soil sampling results from the 2015 removal action identified three areas of shallow contamination associated with potential fuel releases. However, sampling results from the SRI suggest that the contamination is very limited in extent. The results suggest the fuel contamination (i.e., DRO, ethylbenzene, xylenes, naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene) in the vicinity of the diesel transfer pump is limited to soils directly underlying the former pipeline, and the fuel (i.e. DRO) contamination under the former diesel tank is shallow and covers a limited areal extent. The soil contamination in the pipeline trench north of the diesel transfer pump is also very limited in extent, as contamination exceeding cleanup levels in 18 AAC 75.341, Tables B1 and B2 was not detected in samples from two nearby borings. The exceedances in the sample collected during the removal action were associated with benzene, ethylbenzene, xylenes, and naphthalene; and were unexpected since fuel contamination (GRO or DRO) was not identified in significant concentrations.

Groundwater sampling results from the SRI show that the residual soil contamination identified during the 2015 removal action has not resulted in groundwater cleanup level exceedances in this AOC.

7.1.8 Conceptual Site Model

The CSM is the same as presented for the whole of the SCS (See Section 1.5.1) and the exposure assessment presented in Section 1.7.2.1.

7.2 CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USE

7.2.1 Land Use

This is the same for the whole of the SCS (See Section 1.6).

7.2.2 Ground and Surface Water Uses

There are no current groundwater uses at the SCS. The reasonably foreseeable future use of the SCS is expected to remain industrial while under U.S. Army ownership and, as the lead agency, the U.S. Army has the authority to determine the future anticipated land use of the SCS. The U.S. Army has not determined potential future uses and unrestricted use could be a possibility following property transfer.

Surface water is not present at the SCS.

7.3 SUMMARY OF SITE RISKS

A HHERA evaluated the human health and ecological risks associated with the Diesel Transfer Pump, Aboveground Fuel Tanks, and Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOCs. The HHERA process and approach is presented in Section 1.7 and subsequent sub-sections. The following discussion is focused on the COPCs and risks that the HHERA identified for the Diesel Transfer Pump, Aboveground Fuel Tanks, and Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOCs.

7.3.1 Summary of Human Health Risk Assessment

This is the same for the whole of the SCS (See Section 1.7.2).

7.3.1.1 Exposure Assessment

This is the same for the whole of the SCS (See Section 1.7.2.1).

7.3.1.2 Identification of Chemicals of Potential Concern

This is the same for the whole of the SCS (See Section 1.7.2.2), apart from the site-specific details described below.

Residential Screening: COPCs, chemicals with MDCs exceeding residential soil RSLs and cleanup levels for GRO, DRO and RRO in 18 AAC 75.341 Table B2, under 40-inch zone, were only identified in surface soil at the Diesel Transfer Pump, Aboveground Fuel Tanks, and Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOCs:

- Surface soil: benzo(a)pyrene.

Industrial Screening: COPCs, chemicals with MDCs exceeding industrial soil RSLs, and cleanup levels for GRO, DRO and RRO in 18 AAC 75.341 (Table B2, under 40-inch zone) were not identified at the in the soil at the Diesel Transfer Pump, Aboveground Fuel Tanks, and Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOCs.

The data used in the risk assessment was deemed to be of sufficient quality and quantity for its intended use. The detection frequency (number of samples in which the chemical was detected divided by the total number of samples analyzed), the MDCs, and residential and industrial screening levels are presented in **Table 7-1**.

7.3.1.3 Toxicity Assessment

This is the same for the whole of the SCS (See Section 1.7.2.3).

7.3.1.4 Risk Characterization

This is the same for the whole of the SCS (See Section 1.7.2.4), apart from the site-specific details described below.

Preliminary estimated cancer risks are within the EPA's risk management range of 10^{-6} to 10^{-4} and below the ADEC excess cancer risk threshold of 1×10^{-5}. Preliminary non-cancer hazards are below the EPA's target hazard index of 1 since non-cancer chemicals are not present at concentrations that exceed screening criteria. No exceedances of the ADEC soil cleanup levels were noted. Therefore, based on the various lines of evidence, it is unlikely that chemicals are present at concentrations that would potentially pose risks to human health of residential or industrial receptors.

7.3.2 Summary of Ecological Risk Assessment

This is the same for the whole of the SCS (See Section 1.7.3).

7.3.2.1 ADEC Step 1 Ecological Scoping Evaluation

This is the same for the whole of the SCS (See Section 1.7.3.1).

7.3.2.2 ADEC Step 2 Preliminary Screening Evaluation

This is the same for the whole of the SCS (See Section 1.7.3.2), apart from the site-specific details described below.

Table 7-1 Summary of Cumulative Risk Estimates for Human Receptors – Diesel Transfer Pump, Aboveground Fuel Tanks, and Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOCs

Medium/Risk Driver[1]	**Number of Samples**	**Number of detections**	**MDC (mg/kg)**	**Residential Soil RSL[2] THQ=0.1 or TCR=1 x 10^{-6}**	**Industrial Soil RSL[2] THQ=0.1 or TCR=1 x 10^{-6}**	**Hypothetical Future Resident**	
						Estimated Cancer Risk[3]	**Estimated Noncancer Hazard[3]**
Surface Soil							
Benzo(a)pyrene	9	5	0.13	0.12	NA	1.1 x 10^{-6}	NA
					Cumulative Media Cancer Risk/Noncancer Hazard:	1.1 x 10^{-6}	NA
					ADEC Risk Criteria:	10^{-5}	1
					EPA Risk Range:	10^{-6} – 10^{-4}	1

Key:

1 – Summary of risk estimates for COPCs are presented if the COPC is a risk driver for at least one receptor. Risk estimates for all COPCs are presented in the Human Health and Ecological Risk Assessment which is Appendix H of the Supplemental Remedial Investigation (U.S. Army, 2018).

2 – Human Health Screening levels are the May 2016 EPA Regional Screening Levels for Residential Soil, except for the carcinogenic PAHs. The screening levels for the carcinogenic PAHs were calculated using the RSL calculator in May 2017.

3 – Estimated Cancer Risk = (MDC/RSL) *10^{-6}; Estimated Noncancer Hazard = (MDC/RSL)*0.1

ADEC – Alaska Department of Environmental Conservation

AOC – Area of Concern

COPC – contaminant of potential concern

EPA – U.S. Environmental Protection Agency

mg/kg – milligrams per kilogram

MDC – maximum detected concentration

NA – not applicable

PAH – polynuclear aromatic hydrocarbon

RSL – regional screening level

TCR – target cancer risk

THQ – target hazard quotient

Ecological COPCs, chemicals with MDCs exceeding screening levels at the Diesel Transfer Pump, Aboveground Fuel Tanks, and Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOCs included:

- Surface soil: Lead.

7.3.3 Summary of Ecological Risk Assessment

This is the same for the whole of the SCS (See Section 1.7.3).

7.3.3.1 ADEC Step 1 Ecological Scoping Evaluation

This is the same for the whole of the SCS (See Section 1.7.3.1)**.**

7.3.3.2 ADEC Step 2 Preliminary Screening Evaluation

This is the same for the whole of the SCS (See Section 1.7.3.2), apart from the site-specific details described below.

Ecological COPCs, chemicals with MDCs exceeding screening levels within the Diesel Transfer Pump, Aboveground Fuel Tanks, and Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOCs included:

- Surface soil: Lead

In all cases, inorganic concentrations were relatively low and exceedances were within about one-order of magnitude of the conservative screening levels applied. The ecological evaluation concludes that exposure to residual chemicals in surface and shallow subsurface soil is potentially complete but unlikely to result in significant exposure to ecological receptors. Per ADEC decision criteria, available information are considered adequate to conclude that reported exposure (and potential risk) is negligible and there is no need of further evaluation or remedial action based on potential ecological risk (U.S. Army, 2018).

7.3.4 Basis for Action

Based on the results of the HHERA, as summarized above, the Diesel Transfer Pump AOC does not contain COC's that are risks to human or ecological receptors. However, as noted in Section 7.1.7, there are COPCs that exceed ADEC Method Two migration-to-groundwater cleanup levels.

As discussed in Section 1.8, ADEC Method Three migration-to-groundwater levels were calculated to further refine the constituents that are a migration to groundwater threat and should be established as COCs. **Table 7-2** presents the COPCs identified, along with the:

- under 40-inch zone), the maximum allowable concentration (for petroleum hydrocarbons only), and the ADEC Method Three migration-to-groundwater value.

Table 7-2 Cleanup Levels for Soil Contaminants of Potential Concern

Compound	ADEC Method Two Migration-to-Groundwater Cleanup Level[1] (mg/kg)	ADEC Maximum Allowable Concentration[2] (mg/kg)	ADEC Human Health Level[3] (mg/kg)	ADEC Method Three Calculator Value – Migration-to-Groundwater[4] (mg/kg)	Site-Specific Alternative Cleanup Level[5] (mg/kg)	Maximum Detected Concentration (mg/kg)
Diesel Range Organics	250	12,500	10,250	3,300	3,300	2,400
Benzene	0.022	NA	11	12	11	0.41
Ethylbenzene	0.13	NA	49	61	49	1.1
Xylenes (Total)	1.5	NA	57	710	57	5.4
1-Methylnaphthalene	0.41	NA	68	130	68	3.9
2-Methylnaphthalene	1.3	NA	310	410	310	4.4
Naphthalene	0.038	NA	29	13	13	3.2
Arsenic	0.2	NA	8.8	210	8.8	4.34

Notes:
1 – Tables B1 and B2, 18 AAC 75.341 (ADEC. 2023).
2 – Table B2, 18 AAC 75.341 (ADEC. 2023).
3 – Human Health value based on the Under 40-inch zone in Table B1 and most conservative of the ingestion and inhalation value for the under 40-inch zone in Table B2 (for diesel range organics and gasoline range organics) (ADEC. 2023).
4 – Value determined for the migration-to-groundwater scenario using the ADEC Cleanup Levels Calculator and the Petroleum Cleanup Levels Calculator (U.S. Army, 2018).
5 – Site-specific alternative cleanup level for soil is the lowest value between: 1) ADEC Maximum Allowable Concentration, 2) ADEC Human Health Level, and 3) ADEC Method Three Calculator Value – Migration-to-Groundwater.
Key:
AAC – Alaska Administrative Code
ADEC – Alaska Department of Environmental Conservation
mg/kg – milligrams per kilogram
NA – not applicable

No COPCs exceeded the site-specific ACL at the Diesel Transfer Pump, Aboveground Fuel Tanks, and Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOCs.

Based on the absence of human and ecological risks and chemical constituents are less than associated site-specific alternative cleanup level the Diesel Transfer Pump AOC requires no further evaluation and site closure.

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8.0 ABOVERGROUND FUEL TANKS AOC

The 1,400 bbl diesel AST #37 and a 500 bbl gasoline AST #36 comprise the Aboveground Fuel Tanks AOC (**Figure 1-2**). The Diesel Transfer Pump AOC transferred fuel from the diesel AST #37 to the Composite Building. The Diesel Transfer Pump was located east of AST #37. The fuel lines connecting the diesel transfer pump to the aboveground fuel tanks comprise the Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOC. The fuel lines associated with the ASTs and Diesel Transfer Pump were underground outside of the tank berms and then transitioned aboveground, where they connected to the ASTs.

The Diesel Transfer Pump, Aboveground Fuel Tanks, and Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOCs had removal actions completed (Bristol, 2016a) and were evaluated in the SRI (U.S. Army, 2018) as a singular area due to proximity. As such this section provides the area wide evaluation of the three AOCs and Aboveground Fuel Tanks AOC specific remedy determination.

8.1 SITE CHARACTERISTICS

8.1.1 Topography and Climate

This is the same for the whole of the SCS (See Section 1.5.2.2).

8.1.2 Geology

This is the same for the whole of the SCS (See Section 1.5.2.3).

8.1.3 Hydrogeology

This is the same for the whole of the SCS (See Section 1.5.2.4).

8.1.4 Surface Water Hydrology

This is the same for the whole of the SCS (See Section 1.5.2.5).

8.1.5 Ecological Setting

This is the same for the whole of the SCS (See Section 1.5.2.6).

8.1.6 Site Characterization Activities

1994 Investigation. Five surface soil samples (S3 thru S7) were collected in the vicinity of the Diesel Transfer Pump, Aboveground Fuel Tanks, Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOCs during the 1994 investigation (**Figure 2-1**). The samples were analyzed for VOCs, basic/neutral/acid extractables, PCBs, pesticides, and toxic metals (USAPACEHEA, 1994). Results indicated contaminant concentrations were lower than applicable state and federal cleanup standards or consistent with the background sample concentrations (North Wind, 2012).

2007/2008 RI. Investigation of the AST area was conducted as part of the 2007/2008 RI/FS, and during a supplemental investigation conducted in 2008 (North Wind, 2010). However, since the ASTs were intact, sampling was limited to the areas around the tanks; sample locations from the previous investigations are shown on **Figures 2-2** and **7-1**. One shallow soil boring was drilled inside and two were drilled outside of the western most tank berm (08AST01, 08AST02, and 08AST03) as part of the RI/FS; however, samples were not submitted for laboratory analysis. In addition, two borings located northwest and southwest were drilled and completed as monitoring wells (MW2 and MW8). The soil and groundwater samples were analyzed for GRO, DRO, RRO, VOCs, PAHs, and lead. Arsenic was the only soil constituent detected, in both samples at MW2 with a high of 4.34 mg/kg at 5 to 7.5 ft bgs, above cleanup levels in 18 AAC 75.341, Tables B1 and B2, and none of the groundwater samples had contaminant concentrations exceeding 18 AAC 75.345 Table C cleanup levels.

Investigation of the Diesel Fuel Transfer Pump area was also conducted in 2007. One soil boring was completed to a depth of 22.5 feet bgs northeast of the pump in 2007 (SB2), as shown on **Figure 7-1**. Soil samples were analyzed for GRO, DRO, RRO, VOCs, PAHs, and lead. The 2007 soil sample did not have contaminant concentrations exceeding cleanup levels in 18 AAC 75.341, Tables B1 and B2.

2014 Data Gap Analysis. The 2014 Data Gap Analysis reviewed site features and determined if a site feature had sufficient data to verify that a release had not occurred and that a site feature had sufficient data to determine the nature and extent of any contamination. No documentation was found as to whether the fuel lines were flushed and cleaned during the deactivation of the pump station. It was recommended to determine whether any fuel was still remaining in the lines and investigate the possibility that leakage has occurred through valves and joints over time (North Wind, 2014).

2015 Removal Action and Sampling. The two ASTs and the Diesel Transfer Pump were decommissioned during the 2015 removal action. The ASTs and associated above ground piping were removed in accordance with the American Petroleum Institute (API) standards, and the metal from the tanks and piping was recycled (Bristol, 2016a). Field screening and laboratory confirmation samples were collected within the footprint of the former ASTs and under the above ground piping run as shown in **Figure 2-3**. Although none of the PID results were greater than 20 ppmv, the laboratory results showed DRO above the cleanup level in 18 AAC 75.341 Table B2, in one sample from the AST #37 footprint. Soil contamination was not identified in the vicinity of the gasoline AST (AST #36) or in the vicinity of the above ground piping.

The Diesel Transfer Pump, along with the associated underground pipelines, was also removed in 2015. Obvious fuel contamination and PID results greater than 20 ppmv were observed in the trench associated with the piping to the Diesel Transfer Pump (PL08), and soil samples for laboratory analysis were collected from this location as shown in **Figures 2-3** and **7-1**. Analytical results from this sample (PL08) showed DRO, ethylbenzene, xylenes, naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene concentrations exceeded the cleanup levels in 18 AAC 75.341, Tables B1 and B2. Elevated PID results were also identified in a field screening sample from a 90-degree bend in the piping north of the Diesel Transfer Pump (PL07), and laboratory results from the sample at this location showed benzene, ethylbenzene, xylenes, and naphthalene above the cleanup level.

2015 SRI. Seven soil borings were completed and one monitoring well was installed as part of the SRI. One soil boring was completed in the AST #37 footprint, and six soil borings were completed in the vicinity of the former Diesel Transfer Pump and former underground pipelines. The soil boring and monitoring well locations are shown on **Figure 7-1**.

Each boring was completed to 20 feet bgs since there was no evidence of contamination identified in the soil samples based on field screening results and visual observations. Two soil samples were collected from each boring; one soil sample was collected between 0 and 10 feet bgs, and one sample was collected between 15 and 20 feet bgs. Soil samples were analyzed for GRO, DRO, RRO, VOCs, PAHs, and lead. Laboratory sampling results showed only trace detections of fuels and fuel constituents, and no exceedances of cleanup levels in 18 AAC 75.341, Tables B1 and B2.

Monitoring well MW11 was installed adjacent to AST-BH1 in the vicinity of the former Diesel Transfer Pump. No elevated PID readings were observed in the soil cuttings at the time of drilling, and the depth to groundwater was approximately 50 feet bgs at the time of drilling. Groundwater samples were collected from cross-gradient well MW2 and newly installed well MW11 and analyzed for GRO, DRO, RRO, VOCs, PAHs, EDB, pesticides, and metals. Arsenic was the only constituent to exceed the 18 AAC 75.345 Table C cleanup levels (detected in MW2); however, the concentration was less than the detection in upgradient well MW8. Arsenic was not detected in the groundwater in MW11.

8.1.7 Nature and Extent of Contamination

Sampling results from previous investigations (North Wind, 2010), the 2015 removal action (Bristol, 2016a), and the 2015 SRI were used to determine the nature and extent of contamination at the Diesel AST, Diesel Transfer Pump, and Adjacent Fuel Lines AOC. Arsenic was detected in soil at MW2 in 2007. The soil sampling results from the 2015 removal action identified three areas of shallow contamination associated with potential fuel releases. However, sampling results from the SRI suggest that the contamination is very limited in extent. The results suggest the fuel contamination (i.e., DRO, ethylbenzene, xylenes, naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene) in the vicinity of the diesel transfer pump is limited to soils directly underlying the former pipeline, and the fuel (i.e. DRO) contamination under the former diesel tank is shallow and covers a limited areal extent. The soil contamination in the pipeline trench north of the diesel transfer pump is also very limited in extent, as contamination exceeding cleanup levels in 18 AAC 75.341, Tables B1 and B2 was not detected in samples from two nearby borings. The exceedances in the sample collected during the removal action were associated with benzene, ethylbenzene, xylenes, and naphthalene; and were unexpected since fuel contamination (GRO or DRO) was not identified in significant concentrations.

Groundwater sampling results from the SRI show that the residual soil contamination identified during the 2015 removal action has not resulted in groundwater cleanup level exceedances in this AOC.

8.1.8 Conceptual Site Model

The CSM is the same as presented for the whole of the SCS (See Section 1.5.1) and the exposure assessment presented in Section 1.7.2.1.

8.2 CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USE

8.2.1 Land Use

This is the same for the whole of the SCS (See Section 1.6).

8.2.2 Ground and Surface Water Uses

There are no current groundwater uses at the SCS. The reasonably foreseeable future use of the SCS is expected to remain industrial while under U.S. Army ownership and, as the lead agency, the U.S. Army has the authority to determine the future anticipated land use of the SCS. The U.S. Army has not determined potential future uses and unrestricted use could be a possibility following property transfer.

Surface water is not present at the SCS.

8.3 SUMMARY OF SITE RISKS

A HHERA evaluated the human health and ecological risks associated with the Diesel Transfer Pump, Aboveground Fuel Tanks, and Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOCs. The HHERA process and approach is presented in Section 1.7 and subsequent sub-sections. The following discussion is focused on the COPCs and risks that the HHERA identified for the Diesel Transfer Pump, Aboveground Fuel Tanks, and Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOCs.

8.3.1 Summary of Human Health Risk Assessment

This is the same for the whole of the SCS (See Section 1.7.2).

8.3.1.1 Exposure Assessment

This is the same for the whole of the SCS (See Section 1.7.2.1).

8.3.1.2 Identification of Chemicals of Potential Concern

This is the same for the whole of the SCS (See Section 1.7.2.2), apart from the site-specific details described below.

Residential Screening: COPCs, chemicals with MDCs exceeding residential soil RSLs and cleanup levels for GRO, DRO and RRO in 18 AAC 75.341 Table B2, under 40-inch zone, were only identified in surface soil at the Diesel Transfer Pump, Aboveground Fuel Tanks, and Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOCs:

- Surface soil: benzo(a)pyrene.

Industrial Screening: COPCs, chemicals with MDCs exceeding industrial soil RSLs, and cleanup levels for GRO, DRO and RRO in 18 AAC 75.341 (Table B2, under 40-inch zone) were not identified at the in the soil at the Diesel Transfer Pump, Aboveground Fuel Tanks, and Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOCs.

The data used in the risk assessment was deemed to be of sufficient quality and quantity for its intended use. The detection frequency (number of samples in which the chemical was detected divided by the total number of samples analyzed), the MDCs, and residential and industrial screening levels are presented in **Table 8-1**.

8.3.1.3 Toxicity Assessment

This is the same for the whole of the SCS (See Section 1.7.2.3).

8.3.1.4 Risk Characterization

This is the same for the whole of the SCS (See Section 1.7.2.4), apart from the site-specific details described below.

Preliminary estimated cancer risks are within the EPA's risk management range of 10^{-6} to 10^{-4} and below the ADEC excess cancer risk threshold of 1×10^{-5}. Preliminary non-cancer hazards are below the EPA's target hazard index of 1 since non-cancer chemicals are not present at concentrations that exceed screening criteria. No exceedances of the ADEC soil cleanup levels were noted. Therefore, based on the various lines of evidence, it is unlikely that chemicals are present at concentrations that would potentially pose risks to human health of residential or industrial receptors.

8.3.2 Summary of Ecological Risk Assessment

This is the same for the whole of the SCS (See Section 1.7.3).

8.3.2.1 ADEC Step 1 Ecological Scoping Evaluation

This is the same for the whole of the SCS (See Section 1.7.3.1).

8.3.2.2 ADEC Step 2 Preliminary Screening Evaluation

This is the same for the whole of the SCS (See Section 1.7.3.2), apart from the site-specific details described below.

Table 8-1 Summary of Cumulative Risk Estimates for Human Receptors – Diesel Transfer Pump, Aboveground Fuel Tanks, and Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOCs

Medium/Risk Driver[1]	Number of Samples	Number of detections	MDC (mg/kg)	Residential Soil RSL[2] THQ=0.1 or TCR=1 x 10^{-6}	Industrial Soil RSL[2] THQ=0.1 or TCR=1 x 10^{-6}	Hypothetical Future Resident	
						Estimated Cancer Risk[3]	Estimated Noncancer Hazard[3]
Surface Soil							
Benzo(a)pyrene	9	5	0.13	0.12	NA	1.1 x 10^{-6}	NA
Cumulative Media Cancer Risk/Noncancer Hazard:						1.1 x 10^{-6}	NA
ADEC Risk Criteria:						10^{-5}	1
EPA Risk Range:						10^{-6} – 10^{-4}	1

Notes:

1 – Summary of risk estimates for COPCs are presented if the COPC is a risk driver for at least one receptor. Risk estimates for all COPCs are presented in the Human Health and Ecological Risk Assessment which is Appendix H of the Supplemental Remedial Investigation (U.S. Army, 2018).

2 – Human Health Screening levels are the May 2016 EPA Regional Screening Levels for Residential Soil, except for the carcinogenic PAHs. The screening levels for the carcinogenic PAHs were calculated using the RSL calculator in May 2017.

3 – Estimated Cancer Risk = (MDC/RSL) *10^{-6}; Estimated Noncancer Hazard = (MDC/RSL)*0.1

Key:

ADEC – Alaska Department of Environmental Conservation
AOC – Area of Concern
COPC – contaminant of potential concern
EPA – U.S. Environmental Protection Agency
mg/kg – milligrams per kilogram
MDC – maximum detected concentration
NA – not applicable
PAH – polynuclear aromatic hydrocarbon
RSL – regional screening level
TCR – target cancer risk
THQ – target hazard quotient

Ecological COPCs, chemicals with MDCs exceeding screening levels at the Diesel Transfer Pump, Aboveground Fuel Tanks, and Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOCs included:

- Surface soil: Lead.

8.3.3 Summary of Ecological Risk Assessment

This is the same for the whole of the SCS (See Section 1.7.3).

8.3.3.1 ADEC Step 1 Ecological Scoping Evaluation

This is the same for the whole of the SCS (See Section 1.7.3.1)**.**

8.3.3.2 ADEC Step 2 Preliminary Screening Evaluation

This is the same for the whole of the SCS (See Section 1.7.3.2), apart from the site-specific details described below.

Ecological COPCs, chemicals with MDCs exceeding screening levels within the Diesel Transfer Pump, Aboveground Fuel Tanks, and Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOCs included:

- Surface soil: Lead

In all cases, inorganic concentrations were relatively low and exceedances were within about one-order of magnitude of the conservative screening levels applied. The ecological evaluation concludes that exposure to residual chemicals in surface and shallow subsurface soil is potentially complete but unlikely to result in significant exposure to ecological receptors. Per ADEC decision criteria, available information is considered adequate to conclude that reported exposure (and potential risk) is negligible and there is no need of further evaluation or remedial action based on potential ecological risk (U.S. Army, 2018).

8.3.4 Basis for Action

Based on the results of the HHERA, as summarized above, the Aboveground Fuel Tanks AOC does not contain COCs that are risks to human or ecological receptors. However, as noted in Section 8.1.7, there are COPCs that exceed ADEC Method Two migration-to-groundwater cleanup levels.

As discussed in Section 1.8, ADEC Method Three migration-to-groundwater levels were calculated to further refine the constituents that are a migration to groundwater threat and should be established as COCs. **Table 8-2** presents the COPCs identified, along with the:

- ADEC Method Two migration-to-groundwater cleanup value.
- Maximum allowable concentration (for petroleum hydrocarbons only).
- Most conservative ADEC Method Two human health, under 40-inch zone, cleanup value.
- ADEC Method Three migration-to-groundwater cleanup value.

- Selection of the Site-Specific ACL, which is based on the most conservative of the ADEC Method Two human health cleanup level (18 AAC 75.341 Tables B1 and B2, under 40-inch zone), the maximum allowable concentration (for petroleum hydrocarbons only), and the ADEC Method Three migration-to-groundwater value.

Table 8-2 Cleanup Levels for Soil Contaminants of Potential Concern

Compound	ADEC Method Two Migration-to-Groundwater Cleanup Level[1] (mg/kg)	ADEC Maximum Allowable Concentration[2] (mg/kg)	ADEC Human Health Level[3] (mg/kg)	ADEC Method Three Calculator Value – Migration-to-Groundwater[4] (mg/kg)	Site-Specific Alternative Cleanup Level[5] (mg/kg)	Maximum Detected Concentration (mg/kg)
Diesel Range Organics	250	12,500	10,250	3,300	3,300	2,400
Benzene	0.022	NA	11	12	11	0.41
Ethylbenzene	0.13	NA	49	61	49	1.1
Xylenes (Total)	1.5	NA	57	710	57	5.4
1-Methylnaphthalene	0.41	NA	68	130	68	3.9
2-Methylnaphthalene	1.3	NA	310	410	310	4.4
Naphthalene	0.038	NA	29	13	13	3.2
Arsenic	0.2	NA	8.8	210	8.8	4.34

Notes:
1 – Tables B1 and B2, 18 AAC 75.341 (ADEC. 2023).
2 – Table B2, 18 AAC 75.341 (ADEC. 2023).
3 – Human Health value based on the Under 40-inch zone in Table B1 and most conservative of the ingestion and inhalation value for the under 40-inch zone in Table B2 (for diesel range organics and gasoline range organics) (ADEC. 2023).
4 – Value determined for the migration-to-groundwater scenario using the ADEC Cleanup Levels Calculator and the Petroleum Cleanup Levels Calculator (U.S. Army, 2018).
5 – Site-specific alternative cleanup level for soil is the lowest value between: 1) ADEC Maximum Allowable Concentration, 2) ADEC Human Health Level, and 3) ADEC Method Three Calculator Value – Migration-to-Groundwater.
Key:
AAC – Alaska Administrative Code
ADEC – Alaska Department of Environmental Conservation
mg/kg – milligrams per kilogram
NA – not applicable

No COPCs exceeded the site-specific ACL at the Diesel Transfer Pump, Aboveground Fuel Tanks, and Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOCs.

Based on the absence of human and ecological risks and chemical constituents are less than associated site-specific alternative cleanup level the Aboveground Fuel Tanks AOC requires no further evaluation and site closure.

9.0 FUEL LINES (ASSOCIATED WITH THE ASTS AND DIESEL TRANSFER PUMP) AOC

The fuel lines connecting the diesel transfer pump to the aboveground fuel tanks comprise the Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOC (**Figure 1-2**). The Diesel Transfer Pump AOC transferred fuel from the diesel AST #37 to the Composite Building. The Diesel Transfer Pump was located east of AST #37. The 1,400 bbl diesel AST #37 and a 500 bbl gasoline AST #36 comprise the Aboveground Fuel Tanks AOC. The fuel lines associated with the ASTs and Diesel Transfer Pump were underground outside of the tank berms and then transitioned aboveground, where they connected to the ASTs.

The Diesel Transfer Pump, Aboveground Fuel Tanks, and Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOCs had removal actions completed (Bristol, 2016a) and were evaluated in the SRI (U.S. Army, 2018) as a singular area due to proximity. As such this section provides the area wide evaluation of the three AOCs and Aboveground Fuel Tanks AOC specific remedy determination.

9.1 SITE CHARACTERISTICS

9.1.1 Topography and Climate

This is the same for the whole of the SCS (See Section 1.5.2.2).

9.1.2 Geology

This is the same for the whole of the SCS (See Section 1.5.2.3).

9.1.3 Hydrogeology

This is the same for the whole of the SCS (See Section 1.5.2.4).

9.1.4 Surface Water Hydrology

This is the same for the whole of the SCS (See Section 1.5.2.5).

9.1.5 Ecological Setting

This is the same for the whole of the SCS (See Section 1.5.2.6).

9.1.6 Site Characterization Activities

1994 Investigation. Five surface soil samples (S3 thru S7) were collected in the vicinity of the Diesel Transfer Pump, Aboveground Fuel Tanks, Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOCs during the 1994 investigation (**Figure 2-1**). The samples were analyzed for VOCs, basic/neutral/acid extractables, PCBs, pesticides, and toxic metals (USAPACEHEA, 1994). Results indicated contaminant concentrations were lower than applicable state and federal cleanup standards or consistent with the background sample concentrations (North Wind, 2012).

2007/2008 RI. Investigation of the AST area was conducted as part of the 2007/2008 RI/FS, and during a supplemental investigation conducted in 2008 (North Wind, 2010). However, since the ASTs were intact, sampling was limited to the areas around the tanks; sample locations from the previous investigations are shown on **Figures 2-2** and **7-1**. One shallow soil boring was drilled inside and two were drilled outside of the western most tank berm (08AST01, 08AST02, and 08AST03) as part of the RI/FS; however, samples were not submitted for laboratory analysis. In addition, two borings located northwest and southwest were drilled and completed as monitoring wells (MW2 and MW8). The soil and groundwater samples were analyzed for GRO, DRO, RRO, VOCs, PAHs, and lead. Arsenic was the only soil constituent detected, in both samples at MW2 with a high of 4.34 mg/kg at 5 to 7.5 ft bgs, above cleanup levels in 18 AAC 75.341, Tables B1 and B2, and none of the groundwater samples had contaminant concentrations exceeding 18 AAC 75.345 Table C cleanup levels.

Investigation of the Diesel Fuel Transfer Pump area was also conducted in 2007. One soil boring was completed to a depth of 22.5 feet bgs northeast of the pump in 2007 (SB2), as shown on **Figure 7-1**. Soil samples were analyzed for GRO, DRO, RRO, VOCs, PAHs, and lead. The 2007 soil sample did not have contaminant concentrations exceeding cleanup levels in 18 AAC 75.341, Tables B1 and B2.

2014 Data Gap Analysis. The 2014 Data Gap Analysis reviewed site features and determined if a site feature had sufficient data to verify that a release had not occurred and that a site feature had sufficient data to determine the nature and extent of any contamination. No documentation was found as to whether the fuel lines were flushed and cleaned during the deactivation of the pump station. It was recommended to determine whether any fuel was still remaining in the lines and investigate the possibility that leakage has occurred through valves and joints over time (North Wind, 2014).

2015 Removal Action and Sampling. The two ASTs and the Diesel Transfer Pump were decommissioned during the 2015 removal action. The ASTs and associated above ground piping were removed in accordance with the American Petroleum Institute (API) standards, and the metal from the tanks and piping was recycled (Bristol, 2016a). Field screening and laboratory confirmation samples were collected within the footprint of the former ASTs and under the above ground piping run as shown in **Figure 2-3**. Although none of the PID results were greater than 20 ppmv, the laboratory results showed DRO above the cleanup level in 18 AAC 75.341 Table B2, in one sample from the AST #37 footprint. Soil contamination was not identified in the vicinity of the gasoline AST (AST #36) or in the vicinity of the above ground piping.

The Diesel Transfer Pump, along with the associated underground pipelines, was also removed in 2015. Obvious fuel contamination and PID results greater than 20 ppmv were observed in the trench associated with the piping to the Diesel Transfer Pump (PL08), and soil samples for laboratory analysis were collected from this location as shown in **Figures 2-3** and **7-1**. Analytical results from this sample (PL08) showed DRO, ethylbenzene, xylenes, naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene concentrations exceeded the cleanup levels in 18 AAC 75.341, Tables B1 and B2. Elevated PID results were also identified in a field screening sample from a 90-degree bend in the piping north of the Diesel Transfer Pump (PL07), and laboratory results from the sample at this location showed benzene, ethylbenzene, xylenes, and naphthalene above the cleanup level.

2015 SRI. Seven soil borings were completed and one monitoring well was installed as part of the SRI. One soil boring was completed in the AST #37 footprint, and six soil borings were completed in the vicinity of the former Diesel Transfer Pump and former underground pipelines. The soil boring and monitoring well locations are shown on **Figure 7-1**.

Each boring was completed to 20 feet bgs since there was no evidence of contamination identified in the soil samples based on field screening results and visual observations. Two soil samples were collected from each boring; one soil sample was collected between 0 and 10 feet bgs, and one sample was collected between 15 and 20 feet bgs. Soil samples were analyzed for GRO, DRO, RRO, VOCs, PAHs, and lead. Laboratory sampling results showed only trace detections of fuels and fuel constituents, and no exceedances of cleanup levels in 18 AAC 75.341, Tables B1 and B2.

Monitoring well MW11 was installed adjacent to AST-BH1 in the vicinity of the former Diesel Transfer Pump. No elevated PID readings were observed in the soil cuttings at the time of drilling, and the depth to groundwater was approximately 50 feet bgs at the time of drilling. Groundwater samples were collected from cross-gradient well MW2 and newly installed well MW11 and analyzed for GRO, DRO, RRO, VOCs, PAHs, EDB, pesticides, and metals. Arsenic was the only constituent to exceed the 18 AAC 75.345 Table C cleanup levels (detected in MW2); however, the concentration was less than the detection in upgradient well MW8. Arsenic was not detected in the groundwater in MW11.

9.1.7 Nature and Extent of Contamination

Sampling results from previous investigations (North Wind, 2010), the 2015 removal action (Bristol, 2016a), and the 2015 SRI were used to determine the nature and extent of contamination at the Diesel AST, Diesel Transfer Pump, and Adjacent Fuel Lines AOC. Arsenic was detected in soil at MW2 in 2007. The soil sampling results from the 2015 removal action identified three areas of shallow contamination associated with potential fuel releases. However, sampling results from the SRI suggest that the contamination is very limited in extent. The results suggest the fuel contamination (i.e., DRO, ethylbenzene, xylenes, naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene) in the vicinity of the diesel transfer pump is limited to soils directly underlying the former pipeline, and the fuel (i.e. DRO) contamination under the former diesel tank is shallow and covers a limited areal extent. The soil contamination in the pipeline trench north of the diesel transfer pump is also very limited in extent, as contamination exceeding cleanup levels in 18 AAC 75.341, Tables B1 and B2 was not detected in samples from two nearby borings. The exceedances in the sample collected during the removal action were associated with benzene, ethylbenzene, xylenes, and naphthalene; and were unexpected since fuel contamination (GRO or DRO) was not identified in significant concentrations.

Groundwater sampling results from the SRI show that the residual soil contamination identified during the 2015 removal action has not resulted in groundwater cleanup level exceedances in this AOC.

9.1.8 Conceptual Site Model

The CSM is the same as presented for the whole of the SCS (See Section 1.5.1) and the exposure assessment presented in Section 1.7.2.1.

9.2 CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USE

9.2.1 Land Use

This is the same for the whole of the SCS (See Section 1.6).

9.2.2 Ground and Surface Water Uses

There are no current groundwater uses at the SCS. The reasonably foreseeable future use of the SCS is expected to remain industrial while under U.S. Army ownership and, as the lead agency, the U.S. Army has the authority to determine the future anticipated land use of the SCS. The U.S. Army has not determined potential future uses and unrestricted use could be a possibility following property transfer.

Surface water is not present at the SCS.

9.3 SUMMARY OF SITE RISKS

A HHERA evaluated the human health and ecological risks associated with the Diesel Transfer Pump, Aboveground Fuel Tanks, and Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOCs. The HHERA process and approach is presented in Section 1.7 and subsequent sub-sections. The following discussion is focused on the COPCs and risks that the HHERA identified for the Diesel Transfer Pump, Aboveground Fuel Tanks, and Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOCs.

9.3.1 Summary of Human Health Risk Assessment

This is the same for the whole of the SCS (See Section 1.7.2).

9.3.1.1 Exposure Assessment

This is the same for the whole of the SCS (See Section 1.7.2.1).

9.3.1.2 Identification of Chemicals of Potential Concern

This is the same for the whole of the SCS (See Section 1.7.2.2), apart from the site-specific details described below.

Residential Screening: COPCs, chemicals with MDCs exceeding residential soil RSLs and cleanup levels for GRO, DRO and RRO in 18 AAC 75.341 Table B2, under 40-inch zone, were only identified in surface soil at the Diesel Transfer Pump, Aboveground Fuel Tanks, and Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOCs:

- Surface soil: benzo(a)pyrene.

Industrial Screening: COPCs, chemicals with MDCs exceeding industrial soil RSLs, and cleanup levels for GRO, DRO and RRO in 18 AAC 75.341 (Table B2, under 40-inch zone) were not identified at the in the soil at the Diesel Transfer Pump, Aboveground Fuel Tanks, and Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOCs.

The data used in the risk assessment was deemed to be of sufficient quality and quantity for its intended use. The detection frequency (number of samples in which the chemical was detected divided by the total number of samples analyzed), the MDCs, and residential and industrial screening levels are presented in **Table 9-1**.

9.3.1.3 Toxicity Assessment

This is the same for the whole of the SCS (See Section 1.7.2.3).

9.3.1.4 Risk Characterization

This is the same for the whole of the SCS (See Section 1.7.2.4), apart from the site-specific details described below.

Preliminary estimated cancer risks are within the EPA's risk management range of 10^{-6} to 10^{-4} and below the ADEC excess cancer risk threshold of 1×10^{-5}. Preliminary non-cancer hazards are below the EPA's target hazard index of 1 since non-cancer chemicals are not present at concentrations that exceed screening criteria. No exceedances of the ADEC soil cleanup levels were noted. Therefore, based on the various lines of evidence, it is unlikely that chemicals are present at concentrations that would potentially pose risks to human health of residential or industrial receptors.

9.3.2 Summary of Ecological Risk Assessment

This is the same for the whole of the SCS (See Section 1.7.3).

9.3.2.1 ADEC Step 1 Ecological Scoping Evaluation

This is the same for the whole of the SCS (See Section 1.7.3.1).

9.3.2.2 ADEC Step 2 Preliminary Screening Evaluation

This is the same for the whole of the SCS (See Section 1.7.3.2), apart from the site-specific details described below.

Table 9-1 Summary of Cumulative Risk Estimates for Human Receptors – Diesel Transfer Pump, Aboveground Fuel Tanks, and Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOCs

Medium/Risk Driver[1]	Number of Samples	Number of detections	MDC (mg/kg)	Residential Soil RSL[2] THQ=0.1 or TCR=1 x 10^{-6}	Industrial Soil RSL[2] THQ=0.1 or TCR=1 x 10^{-6}	Hypothetical Future Resident	
						Estimated Cancer Risk[3]	Estimated Noncancer Hazard[3]
Surface Soil							
Benzo(a)pyrene	9	5	0.13	0.12	NA	1.1 x 10^{-6}	NA
					Cumulative Media Cancer Risk/Noncancer Hazard:	1.1 x 10^{-6}	NA
					ADEC Risk Criteria:	10^{-5}	1
					EPA Risk Range:	10^{-6} – 10^{-4}	1

Notes:

1 – Summary of risk estimates for COPCs are presented if the COPC is a risk driver for at least one receptor. Risk estimates for all COPCs are presented in the Human Health and Ecological Risk Assessment which is Appendix H of the Supplemental Remedial Investigation (U.S. Army, 2018).

2 – Human Health Screening levels are the May 2016 EPA Regional Screening Levels for Residential Soil, except for the carcinogenic PAHs. The screening levels for the carcinogenic PAHs were calculated using the RSL calculator in May 2017.

3 – Estimated Cancer Risk = (MDC/RSL) *10^{-6}; Estimated Noncancer Hazard = (MDC/RSL)*0.1

Key:

ADEC – Alaska Department of Environmental Conservation
AOC – Area of Concern
COPC – contaminant of potential concern
EPA – U.S. Environmental Protection Agency
mg/kg – milligrams per kilogram
MDC – maximum detected concentration
NA – not applicable
PAH – polynuclear aromatic hydrocarbon
RSL – regional screening level
TCR – target cancer risk
THQ – target hazard quotient

Ecological COPCs, chemicals with MDCs exceeding screening levels at the Diesel Transfer Pump, Aboveground Fuel Tanks, and Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOCs included:

- Surface soil: Lead.

9.3.3 Summary of Ecological Risk Assessment

This is the same for the whole of the SCS (See Section 1.7.3).

9.3.3.1 ADEC Step 1 Ecological Scoping Evaluation

This is the same for the whole of the SCS (See Section 1.7.3.1)**.**

9.3.3.2 ADEC Step 2 Preliminary Screening Evaluation

This is the same for the whole of the SCS (See Section 1.7.3.2), apart from the site-specific details described below.

Ecological COPCs, chemicals with MDCs exceeding screening levels within the Diesel Transfer Pump, Aboveground Fuel Tanks, and Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOCs included:

- Surface soil: Lead

In all cases, inorganic concentrations were relatively low and exceedances were within about one-order of magnitude of the conservative screening levels applied. The ecological evaluation concludes that exposure to residual chemicals in surface and shallow subsurface soil is potentially complete but unlikely to result in significant exposure to ecological receptors. Per ADEC decision criteria, available information are considered adequate to conclude that reported exposure (and potential risk) is negligible and there is no need of further evaluation or remedial action based on potential ecological risk (U.S. Army, 2018).

9.3.4 Basis for Action

Based on the results of the HHERA, as summarized above, the Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOC does not contain COCs that are risks to human or ecological receptors. However, as noted in Section 8.1.7, there are COPCs that exceed ADEC Method Two migration-to-groundwater cleanup levels.

As discussed in Section 1.8, ADEC Method Three migration-to-groundwater levels were calculated to further refine the constituents that are a migration to groundwater threat and should be established as COCs. **Table 9-2** presents the COPCs identified, along with the:

- ADEC Method Two migration-to-groundwater cleanup value.
- Maximum allowable concentration (for petroleum hydrocarbons only).
- Most conservative ADEC Method Two human health, under 40-inch zone, cleanup value.
- ADEC Method Three migration-to-groundwater cleanup value.

- Selection of the Site-Specific ACL, which is based on the most conservative of the ADEC Method Two human health cleanup level (18 AAC 75.341 Tables B1 and B2, under 40-inch zone), the maximum allowable concentration (for petroleum hydrocarbons only), and the ADEC Method Three migration-to-groundwater value.

Table 9-2 Cleanup Levels for Soil Contaminants of Potential Concern

Compound	ADEC Method Two Migration-to-Groundwater Cleanup Level[1] (mg/kg)	ADEC Maximum Allowable Concentration[2] (mg/kg)	ADEC Human Health Level[3] (mg/kg)	ADEC Method Three Calculator Value – Migration-to-Groundwater[4] (mg/kg)	Site-Specific Alternative Cleanup Level[5] (mg/kg)	Maximum Detected Concentration (mg/kg)
Diesel Range Organics	250	12,500	10,250	3,300	3,300	2,400
Benzene	0.022	NA	11	12	11	0.41
Ethylbenzene	0.13	NA	49	61	49	1.1
Xylenes (Total)	1.5	NA	57	710	57	5.4
1-Methylnaphthalene	0.41	NA	68	130	68	3.9
2-Methylnaphthalene	1.3	NA	310	410	310	4.4
Naphthalene	0.038	NA	29	13	13	3.2
Arsenic	0.2	NA	8.8	210	8.8	4.34

Notes:
1 – Tables B1 and B2, 18 AAC 75.341 (ADEC. 2023).
2 – Table B2, 18 AAC 75.341 (ADEC. 2023).
3 – Human Health value based on the Under 40-inch zone in Table B1 and most conservative of the ingestion and inhalation value for the under 40-inch zone in Table B2 (for diesel range organics and gasoline range organics) (ADEC. 2023).
4 – Value determined for the migration-to-groundwater scenario using the ADEC Cleanup Levels Calculator and the Petroleum Cleanup Levels Calculator (U.S. Army, 2018).
5 – Site-specific alternative cleanup level for soil is the lowest value between: 1) ADEC Maximum Allowable Concentration, 2) ADEC Human Health Level, and 3) ADEC Method Three Calculator Value – Migration-to-Groundwater.
Key:
AAC – Alaska Administrative Code
ADEC – Alaska Department of Environmental Conservation
mg/kg – milligrams per kilogram
NA – not applicable

No COPCs exceeded the site-specific ACL at the Diesel Transfer Pump, Aboveground Fuel Tanks, and Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOCs.

Based on the absence of human and ecological risks and chemical constituents are less than associated site-specific alternative cleanup level the Fuel Lines (associated with the ASTs and Diesel Transfer Pump) AOC requires no further evaluation and site closure.

10.0 UNDERGROUND STORAGE TANKS AOC

The Underground Storage Tanks AOC is comprised the location of a 540-gallon diesel UST and a 540-gallon mogas (motor gasoline) UST that were located northeast of the 1,400-barrel AST and west of the composite building as seen in **Figure 1-2**. The easternmost UST was the diesel UST, and the westernmost UST was the gasoline UST.

10.1 SITE CHARACTERISTICS

10.1.1 Topography and Climate

This is the same for the whole of the SCS (See Section 1.5.2.2).

10.1.2 Geology

This is the same for the whole of the SCS (See Section 1.5.2.3).

10.1.3 Hydrogeology

This is the same for the whole of the SCS (See Section 1.5.2.4).

10.1.4 Surface Water Hydrology

This is the same for the whole of the SCS (See Section 1.5.2.5).

10.1.5 Ecological Setting

This is the same for the whole of the SCS (See Section 1.5.2.6).

10.1.6 Site Characterization Activities

1994 Investigation. Two surface soil samples (S1 and S2) were collected in the vicinity of the Underground Storage Tank AOC during the 1994 investigation (**Figure 2-1**). The samples were analyzed for VOCs, basic/neutral/acid extractables, PCBs, pesticides, and toxic metals (USAPACEHEA, 1994). Results indicated contaminant concentrations were lower than applicable state and federal cleanup standards or consistent with the background sample concentrations (North Wind, 2012).

2007/2008 RI. Three soil borings (SB1, SB5, and MW1) and one groundwater monitoring well (MW1) were installed in the UST area. SB1 and SB5 were each drilled to a total depth of 22.5 feet bgs and MW1 was drilled to a total depth of 62.5 feet bgs. Soil samples were collected from the 5 to 7 feet bgs and 15 to 17 feet bgs intervals in SB1 and SB5, respectively, and from the 15 to 17 feet bgs depth intervals in MW1. Soil and groundwater samples were analyzed for GRO, DRO, RRO, BTEX, PAHs, lead, EDB, and TOC (soil only). No contaminants were detected in soil and groundwater above ADEC cleanup levels (**Figure 2-2**) (North Wind, 2010).

2014 Data Gap Analysis. The 2014 Data Gap Analysis reviewed site features and determined if a site feature had sufficient data to verify that a release had not occurred and that a site feature had sufficient data to determine the nature and extent of any contamination. Prior to the 2014 data gap analysis, analytical results indicated the soil around the USTs met ADEC cleanup levels (North Wind, 2010), yet it was unknown whether the USTs were pumped dry during deactivation of the pipeline or if they contained liquid. During the Sears Creek hazardous building material survey in 2013 sample collection from the USTs was attempted. Sample tubing was lowered into what was thought to be fill pipes or access ports for the USTs. Both UST sampling attempts provided insufficient liquid to run any of the required analyses, and it appeared that the sample tubing may not have reached the bottom of the UST, possibly due to configuration of the piping. No samples from either UST were collected at that time (North Wind, 2014).

2015 Removal Action and Sampling. Removal of the USTs was conducted in 2015 (Bristol, 2016a). Soil samples UST01, UST04, UST05, UST06, UST07 and PL03 were collected from excavated soil and from below the removed components. The soil samples were screened using a PID and confirmation samples from areas with high PID results were submitted for laboratory analysis (**Figure 2-3**). The only contaminant identified above the 18 AAC 75.340 Method Two cleanup level in the Underground Storage Tanks AOC was naphthalene at UST04. The USTs were intact, and no other evidence or indication of contamination was identified during the removal action (including in 11 screening samples from the floor of the excavation) or in previous investigations. Review of the record drawing for the USTs showed the tanks were coated with coal tar, which is a likely source of the naphthalene detection. As a result, no further investigation of the USTs was conducted in the SRI. However, ADEC requested the information regarding the USTs should be carried forward into this Decision Document where a final determination regarding the site status will be made.

10.1.7 Nature and Extent of Contamination

Sampling results from the 2007/2008 RI (North Wind, 2010), and the 2015 removal action (Bristol, 2016a) were used to determine the nature and extent of contamination at the Underground Storage Tanks AOC. The only contaminant identified above the 18 AAC 75.340 Method Two cleanup level in the Underground Storage Tanks AOC was naphthalene at UST04 during the 2015 removal action. The USTs were intact, and no other evidence or indication of contamination was identified during the removal action or in previous investigations. Review of the record drawing for the USTs showed the tanks were coated with coal tar, which is a likely source of the naphthalene detection. As a result, no further investigation of the USTs was conducted in the SRI.

Groundwater samples from MW1 analyzed for GRO, DRO, RRO, BTEX, PAHs, lead, EDB during the 2007/2008 RI showed no exceedance of 18 AAC 75.345 Table C groundwater cleanup levels (North Wind, 2010).

10.1.8 Conceptual Site Model

The CSM is the same as presented for the whole of the SCS (See Section 1.5.1) and the exposure assessment presented in Section 1.7.2.1.

10.2 CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USE

10.2.1 Land Use

This is the same for the whole of the SCS (See Section 1.6).

10.2.2 Ground and Surface Water Uses

There are no current groundwater uses at the SCS. The reasonably foreseeable future use of the SCS is expected to remain industrial while under U.S. Army ownership and, as the lead agency, the U.S. Army has the authority to determine the future anticipated land use of the SCS. The U.S. Army has not determined potential future uses and unrestricted use could be a possibility following property transfer.

Surface water is not present at the SCS.

10.3 SUMMARY OF SITE RISKS

10.3.1 Human health and Ecological Risk

A HHERA specifically evaluating the Underground Storage Tanks AOC was not completed. The HHERA completed for SCS (U.S. Army 2018) did not note human health risks extending into the vicinity of the Underground Storage Tanks AOC. The ecological evaluation of the HHERA determined:

- That the areal extent of the SCS, particularly formerly active areas associated with the six AOCs evaluated was small and meets the *de minimis* criterion (i.e., areal extent of petroleum related impacts are less than 0.5 acres).

- That the Burn Pit AOC had the only non-petroleum organic detected above screening levels.

- In all cases, inorganic concentrations were relatively low and exceedances were within about one-order of magnitude of the conservative screening levels applied. The ecological evaluation concludes that exposure to residual chemicals in surface and shallow subsurface soil is potentially complete but unlikely to result in significant exposure to ecological receptors. Per ADEC decision criteria, available information are considered adequate to conclude that reported exposure (and potential risk) is negligible and there is no need of further evaluation or remedial action based on potential ecological risk (U.S. Army, 2018).

The HHERA process and approach is presented in Section 1.7.

10.3.2 Basis for Action

As noted in Section 10.1.7, there is a COPC, naphthalene, that exceeded ADEC Method Two migration-to-groundwater cleanup levels.

As discussed in Section 1.8, ADEC Method Three migration-to-groundwater levels were calculated to further refine the constituents that are a migration to groundwater threat and should be established as COCs. **Table 10-1** presents the COPCs identified, along with the:

- ADEC Method Two migration-to-groundwater cleanup value.

- Maximum allowable concentration (for petroleum hydrocarbons only).

- Most conservative ADEC Method Two human health, under 40-inch zone, cleanup value.

- ADEC Method Three migration-to-groundwater cleanup value.

- Selection of the Site-Specific ACL, which is based on the most conservative of the ADEC Method Two human health cleanup level (18 AAC 75.341 Tables B1 and B2, under 40-inch zone), the maximum allowable concentration (for petroleum hydrocarbons only), and the ADEC Method Three migration-to-groundwater value.

Table 10-1 Cleanup Levels for Soil Contaminants of Potential Concern

Compound	ADEC Method Two Migration-to-Groundwater Cleanup Level[1] (mg/kg)	ADEC Maximum Allowable Concentration[2] (mg/kg)	ADEC Human Health Level[3] (mg/kg)	ADEC Method Three Calculator Value – Migration-to-Groundwater[4] (mg/kg)	Site-Specific Alternative Cleanup Level[5] (mg/kg)	Maximum Detected Concentration (mg/kg)
Naphthalene	0.038	NA	29	13	13	0.12

Notes:
1 – Tables B1 and B2, 18 AAC 75.341 (ADEC. 2023).
2 – Table B2, 18 AAC 75.341 (ADEC. 2023).
3 – Human Health value based on the Under 40-inch zone in Table B1 and most conservative of the ingestion and inhalation value for the under 40-inch zone in Table B2 (for diesel range organics and gasoline range organics) (ADEC. 2023).
4 – Value determined for the migration-to-groundwater scenario using the ADEC Cleanup Levels Calculator and the Petroleum Cleanup Levels Calculator (U.S. Army, 2018).
5 – Site-specific alternative cleanup level for soil is the lowest value between: 1) ADEC Maximum Allowable Concentration, 2) ADEC Human Health Level, and 3) ADEC Method Three Calculator Value – Migration-to-Groundwater.
Key:
AAC – Alaska Administrative Code
ADEC – Alaska Department of Environmental Conservation
mg/kg – milligrams per kilogram
NA – not applicable

No COPCs exceeded the site-specific ACL at the Underground Storage Tanks AOC.

Based on the absence of human and ecological risks and chemical constituents are less than associated site-specific alternative cleanup level the Underground Storage Tanks AOC requires no further evaluation and site closure.

11.0 COMPOSITE BUILDING AOC

The Composite Building AOC is the largest structure and is centrally located on the SCS site. It is located between the Dewatering Tower AOC and the former trailer houses (**Figure 1-2**). Currently, the Composite Building is the only structure still on the site. The Composite Building has eight rooms that were previously used as the engine, pump, generator, and mechanical rooms; an office, storage, and refrigeration area; and a garage.

11.1 SITE CHARACTERISTICS

11.1.1 Topography and Climate

This is the same for the whole of the SCS (See Section 1.5.2.2).

11.1.2 Geology

This is the same for the whole of the SCS (See Section 1.5.2.3).

11.1.3 Hydrogeology

This is the same for the whole of the SCS (See Section 1.5.2.4).

11.1.4 Surface Water Hydrology

This is the same for the whole of the SCS (See Section 1.5.2.5).

11.1.5 Ecological Setting

This is the same for the whole of the SCS (See Section 1.5.2.6).

11.1.6 Site Characterization Activities

1994 Investigation. One surface soil sample (S10) was collected near the southeast corner of the Composite Building during the 1994 investigation (**Figure 2-1**). The sample was analyzed for VOCs, basic/neutral/acid extractables, PCBs, pesticides, and toxic metals (USAPACEHEA, 1994). Results indicated contaminant concentrations were lower than applicable state and federal cleanup standards or consistent with the background sample concentrations (North Wind, 2012).

2007/2008 RI. Three soil borings (SB8, SB9, and SB10) were completed around the perimeter of the Composite Building in 2007 (**Figure 2-2**). Two soil samples were collected from each of SB8 (10 to 12.5 and 20 to 22.5 ft bgs), SB9 (15 to 17.5 and 20 to 22.5 ft bgs), and SB10 (10 to 12.5 and 15 to 17.5 ft bgs). Soil samples were analyzed for GRO, DRO, RRO, BTEX, PAHs, lead, EDB, and TOC. Arsenic was the only constituent detected, in 4 of 6 samples, above ADEC cleanup levels, with maximum concentration of 5.55 mg/kg at SB8 in the 10 to 12.5 ft bgs sample (**Figure 2-2**) (North Wind, 2010).

2013 Hazardous Building Materials Survey. In October 2013, North Wind completed a Hazardous Building Material Survey (HBMS) in the Composite Building to determine if the hydraulic fluid in the pumps and/or mechanical/electrical equipment contains PCBs, and to characterize the product/liquid within the sump for disposal purposes. Further sampling was conducted to assess whether the Composite Building has asbestos containing material (ACM) and lead-based paint (LBP) that may impact future projects associated with the building. Sample results indicated that the liquid contained within the pumps, turbines, and sump did not contain PCBs and is used oil. Results of the ACM and lead-in-paint survey show that 11 of the 24 bulk samples contained asbestos, and that all 21 paint chips analyzed contained lead (North Wind, 2014).

2014 Data Gap Analysis. The 2014 Data Gap Analysis reviewed site features and determined if a site feature had sufficient data to verify that a release had not occurred and that a site feature had sufficient data to determine the nature and extent of any contamination. The Composite Building AOC was not identified as having a data gap.

2015 Removal Action and Sampling. A 3-inch diameter cast iron pipe connecting the Dry Well to the Composite Building was removed during the 2015 removal action. In addition, the floor drains in the composite building leading to the Dry Well were cleaned, and then sealed using expandable plumber's plugs and concrete grout (Bristol, 2016a). The septic system piping from the Composite Building to the septic tank was decommissioned in place (Bristol, 2016a). The sump in the composite building was drained and the internal drain in the sump was plugged (Bristol, 2016b). The Composite Building was not removed during the 2015 Removal action and remains intact on-site.

11.1.7 Nature and Extent of Contamination

Laboratory results showed that only arsenic in samples SB8, SB9, and SB10 exceeded 18 AAC 75.341, Table B1, cleanup levels. The maximum arsenic concentration was 5.55 mg/kg in SB8 in the 10 to 12.5 ft bgs sample (**Figure 2-2**).

11.1.8 Conceptual Site Model

The CSM is the same as presented for the whole of the SCS (See Section 1.5.1) and the exposure assessment presented in Section 1.7.2.1.

11.2 CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USE

11.2.1 Land Use

This is the same for the whole of the SCS (See Section 1.6).

11.2.2 Ground and Surface Water Uses

There are no current groundwater uses at the SCS. The reasonably foreseeable future use of the SCS is expected to remain industrial while under U.S. Army ownership and, as the lead agency, the U.S. Army has the authority to determine the future anticipated land use of the SCS. The U.S. Army has not determined potential future uses and unrestricted use could be a possibility following property transfer.

Surface water is not present at the SCS.

11.3 SUMMARY OF SITE RISKS

11.3.1 Human health and Ecological Risk

A HHERA specifically evaluating the Composite Building AOC was not completed. The HHERA completed for SCS (U.S. Army 2018) did not note human health risks extending into the vicinity of the Composite Building AOC The ecological evaluation of the HHERA determined:

- That the areal extent of the SCS, particularly formerly active areas associated with the six AOCs evaluated was small and meets the *de minimis* criterion (i.e., areal extent of petroleum related impacts are less than 0.5 acres).

- That the Burn Pit AOC had the only non-petroleum organic detected above screening levels.

- In all cases, inorganic concentrations were relatively low and exceedances were within about one-order of magnitude of the conservative screening levels applied. The ecological evaluation concludes that exposure to residual chemicals in surface and shallow subsurface soil is potentially complete but unlikely to result in significant exposure to ecological receptors. Per ADEC decision criteria, available information are considered adequate to conclude that reported exposure (and potential risk) is negligible and there is no need of further evaluation or remedial action based on potential ecological risk (U.S. Army, 2018).

The HHERA process and approach is presented in Section 1.7.

11.3.2 Basis for Action

As noted in Section 11.1.7, there is a COPC, arsenic, that exceeded ADEC Method Two migration-to-groundwater cleanup levels.

As discussed in Section 1.8, ADEC Method Three migration-to-groundwater levels were calculated to further refine the constituents that are a migration to groundwater threat and should be established as COCs. **Table 11-1** presents the COPCs identified, along with the:

- ADEC Method Two migration-to-groundwater cleanup value.

- Maximum allowable concentration (for petroleum hydrocarbons only).

- Most conservative ADEC Method Two human health, under 40-inch zone, cleanup value.

- ADEC Method Three migration-to-groundwater cleanup value.

- Selection of the Site-Specific ACL, which is based on the most conservative of the ADEC Method Two human health cleanup level (18 AAC 75.341 Tables B1 and B2, under 40-inch zone), the maximum allowable concentration (for petroleum hydrocarbons only), and the ADEC Method Three migration-to-groundwater value.

Table 11-1 Cleanup Levels for Soil Contaminants of Potential Concern

Compound	ADEC Method Two Migration-to-Groundwater Cleanup Level[1] (mg/kg)	ADEC Maximum Allowable Concentration[2] (mg/kg)	ADEC Human Health Level[3] (mg/kg)	ADEC Method Three Calculator Value – Migration-to-Groundwater[4] (mg/kg)	Site-Specific Alternative Cleanup Level[5] (mg/kg)	Maximum Detected Concentration (mg/kg)
Arsenic	0.2	NA	8.8	210	8.8	5.55

Notes:
1 – Tables B1 and B2, 18 AAC 75.341 (ADEC. 2023).
2 – Table B2, 18 AAC 75.341 (ADEC. 2023).
3 – Human Health value based on the Under 40-inch zone in Table B1 and most conservative of the ingestion and inhalation value for the under 40-inch zone in Table B2 (for diesel range organics and gasoline range organics) (ADEC. 2023).
4 – Value determined for the migration-to-groundwater scenario using the ADEC Cleanup Levels Calculator and the Petroleum Cleanup Levels Calculator (U.S. Army, 2018).
5 – Site-specific alternative cleanup level for soil is the lowest value between: 1) ADEC Maximum Allowable Concentration, 2) ADEC Human Health Level, and 3) ADEC Method Three Calculator Value – Migration-to-Groundwater.
Key:
AAC – Alaska Administrative Code
ADEC – Alaska Department of Environmental Conservation
mg/kg – milligrams per kilogram
NA – not applicable

No COPCs exceeded the site-specific ACL at the Composite Building AOC.

Based on the absence of human and ecological risks and chemical constituents are less than associated site-specific alternative cleanup level the Composite Building AOC requires no further evaluation and site closure.

12.0 COMPOSITE BUILDING SUMP AOC

The Composite Building Sump AOC is located within the Composite Building on the east side (**Figure 1-2)**.

The characterization completed for the Composite Building AOC is applicable to the Composite Building Sump AOC, as the soil samples collected around the Composite Building also represent the characterization of the soils below the sump. The soil near the connection of the Composite Building Sump to the Disposal Line is assessed as part of the Disposal Line AOC in Section 6 of this DD.

12.1 SITE CHARACTERISTICS

12.1.1 Topography and Climate

This is the same for the whole of the SCS (See Section 1.5.2.2).

12.1.2 Geology

This is the same for the whole of the SCS (See Section 1.5.2.3).

12.1.3 Hydrogeology

This is the same for the whole of the SCS (See Section 1.5.2.4).

12.1.4 Surface Water Hydrology

This is the same for the whole of the SCS (See Section 1.5.2.5).

12.1.5 Ecological Setting

This is the same for the whole of the SCS (See Section 1.5.2.6).

12.1.6 Site Characterization Activities

1994 Investigation. One surface soil sample (S10) was collected near the southeast corner of the Composite Building during the 1994 investigation (**Figure 2-1**). The sample was analyzed for VOCs, basic/neutral/acid extractables, PCBs, pesticides, and toxic metals (USAPACEHEA, 1994). Results indicated contaminant concentrations were lower than applicable state and federal cleanup standards or consistent with the background sample concentrations (North Wind, 2012).

2007/2008 RI. Three soil borings (SB8, SB9, and SB10) were completed around the perimeter of the Composite Building in 2007 (**Figure 2-2**). Two soil samples were collected from each of SB8 (10 to 12.5 and 20 to 22.5 ft bgs), SB9 (15 to 17.5 and 20 to 22.5 ft bgs), and SB10 (10 to 12.5 and 15 to 17.5 ft bgs). Soil samples were analyzed for GRO, DRO, RRO, BTEX, PAHs, lead, EDB, and TOC. Arsenic was the only constituent detected, in 4 of 6 samples, above ADEC cleanup levels, with maximum concentration of 5.55 mg/kg at SB8 in the 10 to 12.5 ft bgs sample (**Figure 2-2**) (North Wind, 2010).

2013 Hazardous Building Materials Survey. In October 2013, North Wind completed a Hazardous Building Material Survey (HBMS) in the Composite Building to determine if the hydraulic fluid in the pumps and/or mechanical/electrical equipment contains PCBs, and to characterize the product/liquid within the sump for disposal purposes. Further sampling was conducted to assess whether the Composite Building has asbestos containing material (ACM) and lead-based paint (LBP) that may impact future projects associated with the building. Sample results indicated that the liquid contained within the pumps, turbines, and sump did not contain PCBs and is used oil. Results of the ACM and lead-in-paint survey show that 11 of the 24 bulk samples contained asbestos, and that all 21 paint chips analyzed contained lead (North Wind, 2014).

2014 Data Gap Analysis. The 2014 Data Gap Analysis reviewed site features and determined if a site feature had sufficient data to verify that a release had not occurred and that a site feature had sufficient data to determine the nature and extent of any contamination. The Composite Building AOC was not identified as having a data gap.

2015 Removal Action and Sampling. A 3-inch diameter cast iron pipe connecting the Dry Well to the Composite Building was removed during the 2015 removal action. In addition, the floor drains in the composite building leading to the Dry Well were cleaned, and then sealed using expandable plumber’s plugs and concrete grout (Bristol, 2016a). The septic system piping from the Composite Building to the septic tank was decommissioned in place (Bristol, 2016a). The sump in the composite building was drained and the internal drain in the sump was plugged (Bristol, 2016b). The Composite Building was not removed during the 2015 Removal action and remains intact on-site.

12.1.7 Nature and Extent of Contamination

Laboratory results showed that only arsenic in samples SB8, SB9, and SB10 exceeded 18 AAC 75.341, Table B1, cleanup levels. The maximum arsenic concentration was 5.55 mg/kg in SB8 in the 10 to 12.5 ft bgs sample (**Figure 2-2**).

12.1.8 Conceptual Site Model

The CSM is the same as presented for the whole of the SCS (See Section 1.5.1) and the exposure assessment presented in Section 1.7.2.1.

12.2 CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USE

12.2.1 Land Use

This is the same for the whole of the SCS (See Section 1.6).

12.2.2 Ground and Surface Water Uses

There are no current groundwater uses at the SCS. The reasonably foreseeable future use of the SCS is expected to remain industrial while under U.S. Army ownership and, as the lead agency, the U.S. Army has the authority to determine the future anticipated land use of the SCS. The U.S. Army has not determined potential future uses and unrestricted use could be a possibility following property transfer.

Surface water is not present at the SCS.

12.3 SUMMARY OF SITE RISKS

12.3.1 Human health and Ecological Risk

A HHERA specifically evaluating the Composite Building Sump AOC was not completed. The HHERA completed for SCS (U.S. Army 2018) did not note human health risks extending into the vicinity of the Composite Building Sump AOC The ecological evaluation of the HHERA determined:

- That the areal extent of the SCS, particularly formerly active areas associated with the six AOCs evaluated was small and meets the *de minimis* criterion (i.e., areal extent of petroleum related impacts are less than 0.5 acres).

- That the Burn Pit AOC had the only non-petroleum organic detected above screening levels.

- In all cases, inorganic concentrations were relatively low and exceedances were within about one-order of magnitude of the conservative screening levels applied. The ecological evaluation concludes that exposure to residual chemicals in surface and shallow subsurface soil is potentially complete but unlikely to result in significant exposure to ecological receptors. Per ADEC decision criteria, available information are considered adequate to conclude that reported exposure (and potential risk) is negligible and there is no need of further evaluation or remedial action based on potential ecological risk (U.S. Army, 2018).

The HHERA process and approach is presented in Section 1.7.

12.3.2 Basis for Action

As noted in Section 12.1.7, there is a COPC, arsenic, that exceeded ADEC Method Two migration-to-groundwater cleanup levels.

As discussed in Section 1.8, ADEC Method Three migration-to-groundwater levels were calculated to further refine the constituents that are a migration to groundwater threat and should be established as COCs. **Table 12-1** presents the COPCs identified, along with the:

- ADEC Method Two migration-to-groundwater cleanup value.

- Maximum allowable concentration (for petroleum hydrocarbons only).

- Most conservative ADEC Method Two human health, under 40-inch zone, cleanup value.

- ADEC Method Three migration-to-groundwater cleanup value.

- Selection of the Site-Specific ACL, which is based on the most conservative of the ADEC Method Two human health cleanup level (18 AAC 75.341 Tables B1 and B2, under 40-inch zone), the maximum allowable concentration (for petroleum hydrocarbons only), and the ADEC Method Three migration-to-groundwater value.

Table 12-1 Cleanup Levels for Soil Contaminants of Potential Concern

Compound	ADEC Method Two Migration-to-Groundwater Cleanup Level[1] (mg/kg)	ADEC Maximum Allowable Concentration[2] (mg/kg)	ADEC Human Health Level[3] (mg/kg)	ADEC Method Three Calculator Value – Migration-to-Groundwater[4] (mg/kg)	Site-Specific Alternative Cleanup Level[5] (mg/kg)	Maximum Detected Concentration (mg/kg)
Arsenic	0.2	NA	8.8	210	8.8	5.55

Notes:
1 – Tables B1 and B2, 18 AAC 75.341 (ADEC. 2023).
2 – Table B2, 18 AAC 75.341 (ADEC. 2023).
3 – Human Health value based on the Under 40-inch zone in Table B1 and most conservative of the ingestion and inhalation value for the under 40-inch zone in Table B2 (for diesel range organics and gasoline range organics) (ADEC. 2023).
4 – Value determined for the migration-to-groundwater scenario using the ADEC Cleanup Levels Calculator and the Petroleum Cleanup Levels Calculator (U.S. Army, 2018).
5 – Site-specific alternative cleanup level for soil is the lowest value between: 1) ADEC Maximum Allowable Concentration, 2) ADEC Human Health Level, and 3) ADEC Method Three Calculator Value – Migration-to-Groundwater.
Key:
AAC – Alaska Administrative Code
ADEC – Alaska Department of Environmental Conservation
mg/kg – milligrams per kilogram
NA – not applicable

No COPCs exceeded the site-specific ACL at the Composite Building Sump AOC.

Based on the absence of human and ecological risks and chemical constituents are less than associated site-specific alternative cleanup level the Composite Building Sump AOC requires no further evaluation and site closure.

13.0 SCRAPER TRAP AOC

The Scraper Trap AOC is located south of the eastern end of the Composite Building and directly west of the Burn Pit as seen in **Figure 1-2**. The Scraper Trap (also referred to as the "pigging station" or "pigging loop") consisted primarily of aboveground and underground piping and was used for insertion and recovery of pigs, or scrapers, whose purpose was to clean the inside surface of the pipeline.

13.1 SITE CHARACTERISTICS

13.1.1 Topography and Climate

This is the same for the whole of the SCS (See Section 1.5.2.2).

13.1.2 Geology

This is the same for the whole of the SCS (See Section 1.5.2.3).

13.1.3 Hydrogeology

This is the same for the whole of the SCS (See Section 1.5.2.4).

13.1.4 Surface Water Hydrology

This is the same for the whole of the SCS (See Section 1.5.2.5).

13.1.5 Ecological Setting

This is the same for the whole of the SCS (See Section 1.5.2.6).

13.1.6 Site Characterization Activities

1994 Investigation. Two surface soil samples (S11 and S13) were collected in the vicinity of the Warehouse Building AOC during the 1994 investigation (**Figure 2-1**). The samples were analyzed for VOCs, basic/neutral/acid extractables, PCBs, pesticides, and toxic metals (USAPACEHEA, 1994). Results indicated contaminant concentrations were lower than applicable state and federal cleanup standards or consistent with the background sample concentrations (North Wind, 2012).

2007/2008 RI. Three soil sample locations (SB6, PS02, and MW4), eight soil samples, and two groundwater wells (MW4 and MW7) were sampled in the area of the Scraper Trap AOC during the 2007/2008 RI (**Figure 2-2**). These soil and groundwater samples were analyzed for GRO, DRO, RRO, BTEX, PAHs, and lead. Benzene was detected in one soil boring sample from MW7 at 17 feet bgs; however, benzene concentrations did not exceed the ADEC cleanup level (North Wind, 2012 and 2014).

2014 Data Gap Analysis. The 2014 Data Gap Analysis reviewed site features and determined if a site feature had sufficient data to verify that a release had not occurred and that a site feature had sufficient data to determine the nature and extent of any contamination. No documentation was found as to whether the fuel lines were flushed and cleaned during the deactivation of the pump station. It was recommended to determine whether any fuel was still remaining in the lines and investigate the possibility that leakage has occurred through valves and joints over time (North Wind, 2014).

2015 Removal Action and Sampling. The piping associated with the scraper trap was removed and soil samples PL14, PL15, and PL16 were collected during the 2015 removal action. As seen in **Figure 2-3**, breaks in the Scraper Trap piping were observed at the time of removal with samples collected at each point. However, no evidence of soil contamination was identified in the immediate vicinity of the breaks, no elevated PID readings were observed in any field screening samples, and no exceedances of 18 AAC 75.340 Method 2 cleanup levels were observed in laboratory samples (Bristol, 2016a). As a result, no further investigation of this area was conducted as part of the 2015 SRI.

13.1.7 Nature and Extent of Contamination

Sampling results from the 2007/2008 RI (North Wind, 2010), and the 2015 removal action (Bristol, 2016a) were used to determine the nature and extent of contamination at the Scraper Trap AOC. No contaminants exceeding 18 AAC 75.340 Method Two cleanup levels were identified in the Scraper Trap AOC.

Groundwater samples analyzed for GRO, DRO, RRO, BTEX, PAHs, and lead during the 2007/2008 RI showed no exceedance of ADEC cleanup levels.

13.1.8 Conceptual Site Model

The CSM is the same as presented for the whole of the SCS (See Section 1.5.1) and the exposure assessment presented in Section 1.7.2.1.

13.2 CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USE

13.2.1 Land Use

This is the same for the whole of the SCS (See Section 1.6).

13.2.2 Ground and Surface Water Uses

There are no current groundwater uses at the SCS. The reasonably foreseeable future use of the SCS is expected to remain industrial while under U.S. Army ownership and, as the lead agency, the U.S. Army has the authority to determine the future anticipated land use of the SCS. The U.S. Army has not determined potential future uses and unrestricted use could be a possibility following property transfer.

Surface water is not present at the SCS.

13.3 SUMMARY OF SITE RISKS

13.3.1 Human Health and Ecological Risk

A HHERA specifically evaluating the Scraper Trap AOC was not completed. The HHERA completed for SCS (U.S. Army 2018) did not note human health risks extending into the vicinity of the Scraper Trap AOC. The ecological evaluation of the HHERA determined:

- That the areal extent of the SCS, particularly formerly active areas associated with the six AOCs evaluated was small and meets the *de minimis* criterion (i.e., areal extent of petroleum related impacts are less than 0.5 acres).

- That the Burn Pit AOC had the only non-petroleum organic detected above screening levels.

- In all cases, inorganic concentrations were relatively low and exceedances were within about one-order of magnitude of the conservative screening levels applied. The ecological evaluation concludes that exposure to residual chemicals in surface and shallow subsurface soil is potentially complete but unlikely to result in significant exposure to ecological receptors. Per ADEC decision criteria, available information are considered adequate to conclude that reported exposure (and potential risk) is negligible and there is no need of further evaluation or remedial action based on potential ecological risk (U.S. Army, 2018).

The HHERA process and approach is presented in Section 1.7.

13.3.2 Basis for Action

As noted in Section 13.1.7, there are no constituents that exceeded the ADEC cleanup levels.

Based on the absence of human and ecological risks and chemical constituents are less than associated ADEC cleanup levels the Scraper Trap AOC requires no further evaluation and site closure.

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14.0 WAREHOUSE BUILDING AOC

The Warehouse Building AOC is located to the northeast of the composite building and is shown on **Figure 1-2**. The Warehouse Building was part of the auxiliary facilities associated with the primary functions of the SCS site. Currently, only the warehouse foundation remains in place.

14.1 SITE CHARACTERISTICS

14.1.1 Topography and Climate

This is the same for the whole of the SCS (See Section 1.5.2.2).

14.1.2 Geology

This is the same for the whole of the SCS (See Section 1.5.2.3).

14.1.3 Hydrogeology

This is the same for the whole of the SCS (See Section 1.5.2.4).

14.1.4 Surface Water Hydrology

This is the same for the whole of the SCS (See Section 1.5.2.5).

14.1.5 Ecological Setting

This is the same for the whole of the SCS (See Section 1.5.2.6).

14.1.6 Site Characterization Activities

1994 Investigation. One surface soil sample (S13) was collected in the vicinity of the Warehouse Building AOC during the 1994 investigation (**Figure 2-1**). The sample was analyzed for VOCs, basic/neutral/acid extractables, PCBs, pesticides, and toxic metals (USAPACEHEA, 1994). Results indicated contaminant concentrations were lower than applicable state and federal cleanup standards or consistent with the background sample concentrations (North Wind, 2012).

2007/2008 Remedial Investigation. One soil boring (SB11) was installed in the all-purpose warehouse area in 2007 near the entrance to the building. Two soil samples were collected SB11 (15 to 17.5 and 20 to 22.5 ft bgs). Soil samples were analyzed for GRO, DRO, RRO, BTEX, PAHs, lead, EDB, and TOC. Arsenic was the only constituent detected, in both samples, above ADEC cleanup levels, with maximum concentration of 3.96 mg/kg at in the 20 to 22.5 ft bgs sample (**Figure 2-2**) (North Wind, 2010)

2012 Decision Document. The 2012 Decision Document recommended no further action at the Warehouse Building AOC (North Wind, 2012).

2014 Data Gap Analysis. The 2014 Data Gap Analysis reviewed site features and determined if a site feature had sufficient data to verify that a release had not occurred and that a site feature had sufficient data to determine the nature and extent of any contamination. The Warehouse Building AOC was not identified having data gaps (North Wind, 2014).

14.1.7 Nature and Extent of Contamination

Laboratory results showed that only arsenic in samples from SB11 exceeded 18 AAC 75.341, Table B1, cleanup levels. The maximum arsenic concentration was 3.96 mg/kg in SB11 in the 20 to 22.5 ft bgs sample (**Figure 2-2**).

14.1.8 Conceptual Site Model

The CSM is the same as presented for the whole of the SCS (See Section 1.5.1) and the exposure assessment presented in Section 1.7.2.1.

14.2 CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USE

14.2.1 Land Use

This is the same for the whole of the SCS (See Section 1.6).

14.2.2 Ground and Surface Water Uses

There are no current groundwater uses at the SCS. The reasonably foreseeable future use of the SCS is expected to remain industrial while under U.S. Army ownership and, as the lead agency, the U.S. Army has the authority to determine the future anticipated land use of the SCS. The U.S. Army has not determined potential future uses and unrestricted use could be a possibility following property transfer.

Surface water is not present at the SCS.

14.3 SUMMARY OF SITE RISKS

14.3.1 Human health and Ecological Risk

A HHERA specifically evaluating the Warehouse Building AOC was not completed. The HHERA completed for SCS (U.S. Army 2018) did not note human health risks extending into the vicinity of the Warehouse Building AOC The ecological evaluation of the HHERA determined:

- That the areal extent of the SCS, particularly formerly active areas associated with the six AOCs evaluated was small and meets the *de minimis* criterion (i.e., areal extent of petroleum related impacts are less than 0.5 acres).

- That the Burn Pit AOC had the only non-petroleum organic detected above screening levels.

- In all cases, inorganic concentrations were relatively low and exceedances were within about one-order of magnitude of the conservative screening levels applied. The ecological evaluation concludes that exposure to residual chemicals in surface and shallow subsurface soil is potentially complete but unlikely to result in significant exposure to ecological receptors. Per ADEC decision criteria, available information are considered adequate to conclude that reported exposure (and potential risk) is negligible and there is no need of further evaluation or remedial action based on potential ecological risk (U.S. Army, 2018).

The HHERA process and approach is presented in Section 1.7.

14.3.2 Basis for Action

As noted in Section 14.1.7, there is a COPC, arsenic, that exceeded ADEC Method Two migration-to-groundwater cleanup levels.

As discussed in Section 1.8, ADEC Method Three migration-to-groundwater levels were calculated to further refine the constituents that are a migration to groundwater threat and should be established as COCs. **Table 14-1** presents the COPCs identified, along with the:

- ADEC Method Two migration-to-groundwater cleanup value.
- Maximum allowable concentration (for petroleum hydrocarbons only).
- Most conservative ADEC Method Two human health, under 40-inch zone, cleanup value.
- ADEC Method Three migration-to-groundwater cleanup value.
- Selection of the Site-Specific ACL, which is based on the most conservative of the ADEC Method Two human health cleanup level (18 AAC 75.341 Tables B1 and B2, under 40-inch zone), the maximum allowable concentration (for petroleum hydrocarbons only), and the ADEC Method Three migration-to-groundwater value.

Table 14-1 Cleanup Levels for Soil Contaminants of Potential Concern

Compound	ADEC Method Two Migration-to-Groundwater Cleanup Level[1] (mg/kg)	ADEC Maximum Allowable Concentration[2] (mg/kg)	ADEC Human Health Level[3] (mg/kg)	ADEC Method Three Calculator Value – Migration-to-Groundwater[4] (mg/kg)	Site-Specific Alternative Cleanup Level[5] (mg/kg)	Maximum Detected Concentration (mg/kg)
Arsenic	0.2	NA	8.8	210	8.8	3.96

Notes:

1 – Tables B1 and B2, 18 AAC 75.341 (ADEC. 2023).

2 – Table B2, 18 AAC 75.341 (ADEC. 2023).

3 – Human Health value based on the Under 40-inch zone in Table B1 and most conservative of the ingestion and inhalation value for the under 40-inch zone in Table B2 (for diesel range organics and gasoline range organics) (ADEC. 2023).

4 – Value determined for the migration-to-groundwater scenario using the ADEC Cleanup Levels Calculator and the Petroleum Cleanup Levels Calculator (U.S. Army, 2018).

5 – Site-specific alternative cleanup level for soil is the lowest value between: 1) ADEC Maximum Allowable Concentration, 2) ADEC Human Health Level, and 3) ADEC Method Three Calculator Value – Migration-to-Groundwater.

Key:

AAC – Alaska Administrative Code

ADEC – Alaska Department of Environmental Conservation

mg/kg – milligrams per kilogram

NA – not applicable

No COPCs exceeded the site-specific ACL at the Warehouse Building AOC.

Based on the absence of human and ecological risks and chemical constituents are less than associated site-specific alternative cleanup level the Composite Building AOC requires no further evaluation and site closure.

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Appendix A

Response to Comments

REVIEW COMMENTS **PROJECT:** Sears Creek Pump Station **DOCUMENT:** Draft Decision Document			
DATE: 12/20/24		**REVIEWER:** Anne Marie Palmieri **PHONE:** (907) 766-3184	
Item No.	**Location (page, par., sen.)**	**COMMENTS**	**Army Response**

1.	Cover Page	'Material' is misspelled	Agreed. Change made as requested. 2025.02.21 DEC Response: Accepted.
2.	P. 19, ADEC Concurrence Page, line 3	Revise : "…indicates the ~~presents~~ *presence* of…"	Agreed. Change made as requested. 2025.02.21 DEC Response: Accepted.
3.	P. 26, Section 1.4	Document reads: "Septic Tank/Leach Wells (closure documented in the *Draft Class V UIC Well Closure Report, Revision 1* [Bristol, 2016a])". Is there a final version for this report or a closure approval letter from EPA that can be cited rather than a draft report?	Noted. The Draft Class V UIC Closure Report, Revision 1 was never finalized. However, the EPA did approve this report on August 16, 2017 via Certified Letter . Text revised to read: • Septic Tank/Leach Wells (closure documented in the *Draft Class V UIC Well Closure Report, Revision 1* [Bristol, 2016a], and approved by EPA [USEPA, 2017b]). Previous references to USEPA, 2017 updated to USEPA, 2017a. Reference added for USEPA, 2017b as follows: USEPA. 2017b. Certified Mail from Peter Contreras, Manager Ground Water Unit. Re: Closure of Four Class V Injection Wells at Sears Creek Station, Milepost 1376, Alaska Highway, UIC ID No. AK240F5-30-13855. August 16. 2025.02.21 DEC Response: Accepted.
4.	P. 27, Section 1.5.1, bullet 2	Please revise: "…have not occurred *at these AOCs* at the SCS…"	Agreed. Change made as requested. 2025.02.21 DEC Response: Accepted.

REVIEW COMMENTS **PROJECT:** Sears Creek Pump Station **DOCUMENT:** Draft Decision Document			
DATE: 12/20/24		**REVIEWER:** Anne Marie Palmieri **PHONE:** (907) 766-3184	
Item No.	**Location (page, par., sen.)**	**COMMENTS**	**Army Response**
5.	P. 34, Section 1.7.2.3	This section uses the values in the 2016 18 AAC 75 regulations and the 2016 and 2017 EPA RSLs. The values should be updated to the 2024 values and recalculated.	Disagree. At the time of the development of the RI and HHERA, these were current. Updating these two from 2016 and 2017 values to the 2024 reference would create inconsistencies and require revisions to the RI, HHERA, PP, as well as this DD. However. References to ADEC, 2020 contained within Tables 2-2, 3-2, 4-2, 5-2, 6-1, 7-2, 8-2, 9-2, 10-1, 11-1, 12-1, and 14-1, have been updated to ADEC, 2023 (As amended through October 18), and the References section updated from ADEC, 2020, to ADEC, 2023. References to ADEC, 2022 (Field Sampling Guidance) have been updated to ADEC, 2024. 2025.02.21 DEC Response: DEC understands the Army's position and hesitancy to create inconsistencies within the documents. Thus, DEC requests that the Army add a footnote stating the following (or something similar), "This DD uses human health cleanup levels from the 2016 version of 18 AAC 75 which were updated in 2018. The following COCs had the same human health cleanup levels in 2016 and 2018: benzene, ethylbenzene, 2-methylnaphthalene, and arsenic. The following COCs had higher human health cleanup levels in 2016 than in 2018: 1-methylnapthalene and naphthalene."
6.	Section 1.9, RAOs	Since this is a petroleum decision document, the entirety of the 18 AAC 75, Site Cleanup Rules, should be considered ARARs. Suggest revising the sentence to read, "The RAOs must *comply with the 18 AAC 75, Site Cleanup Rules.*"	Agreed. Section 1.9 paragraph 1 sentence 2 updated to read: *"The RAOs must comply with the 18 AAC 75, Site Cleanup Rules."* 2025.02.21 DEC Response: Accepted.

REVIEW COMMENTS			
PROJECT: Sears Creek Pump Station		**DOCUMENT:** Draft Decision Document	
DATE: 12/20/24		**REVIEWER:** Anne Marie Palmieri	**PHONE:** (907) 766-3184
Item No.	**Location (page, par., sen.)**	**COMMENTS**	**Army Response**
7.	P. 46, Section 1.11	This section should be revised to indicate that as this is a petroleum decision document, the 18 AAC 75 Site Cleanup Rules must be met.	Agreed. Sentence added to 1.11 end of paragraph 1. *"As this is a petroleum decision document, the 18 AAC 75 Site Cleanup Rules are applicable and must be met."* 2025.02.21 DEC Response: Accepted.
8.	Table 1-3	This can be deleted or renamed to "Description of *State Regulations Considered* for Selected Remedies at the SCS"	Agreed. Change made to title as suggested. 2025.02.21 DEC Response: Accepted.
9.	Section 15.0	Current versions of documents should be cited: 2018 ADEC Risk Assessment Procedures Manual, 2024 ADEC 18 AAC 75.	Disagree. See comment 5 response. 2025.02.21 DEC Response: See DEC response to comment 5.
10.		--end--	