THIRD FIVE-YEAR REVIEW REPORT FOR
ARCTIC SURPLUS SALVAGE YARD SUPERFUND SITE
FAIRBANKS, ALASKA

Prepared by

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Prepared for

U.S. Environmental Protection Agency
Region 10
Seattle, Washington

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Sheryl Bilbrey, Director	**Date**
Office of Environmental Cleanup	
U.S. EPA, Region 10	

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FINAL
THIRD FIVE-YEAR REVIEW REPORT FOR ARCTIC SURPLUS SALVAGE YARD (ASSY) FAIRBANKS, ALASKA

CONTRACT NO. W911KB-17-D-0019

NOVEMBER 2018

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ADEC APPROVAL PAGE

This third Five-Year Review (FYR) for the Arctic Surplus Salvage Yard (ASSY) Superfund Site located near Fairbanks, Alaska, has been reviewed and approved by the Alaska Department of Environmental Conservation, Contaminated Sites Program.

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Melinda Brunner, DSMOA Program Manager Date
Contaminated Sites Program
Alaska Department of Environmental Conservation

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ABRREVIATIONS & ACRONYMS

% .... percent
°C .... degrees Celsius
°F .... degrees Fahrenheit
± .... plus or minus
µg/kg .... micrograms per kilogram
µg/L .... micrograms per liter
ACM .... asbestos containing material
ADEC .... Alaska Department of Environmental Conservation
AECOM .... AECOM Technical Services
AFCEE .... Air Force Center for Engineering and Environment
Ahtna .... Ahtna Environmental, Inc.
ASSY .... Arctic Surplus Salvage Yard
ARARs .... applicable or relevant and appropriate requirements
CERCLA .... Comprehensive Environmental Response, Compensation, and Liability Act
DDD .... dichlorodiphenyl dichloroethane
DDT .... dichlorodiphenyl trichloroethane
DLA .... Defense Logistics Agency
DoD .... U.S. Department of Defense
EPA .... U.S. Environmental Protection Agency
ESD .... Explanation of Significant Differences
FS .... Feasibility Study
FYR .... Five-Year Review
GCL .... geosynthetic clay liner
HI .... Hazard Index
HQ .... Hazard Quotient
IC .... institutional control
IRIS .... Integrated Risk Information System
LTM .... long-term monitoring
MCLs .... maximum contaminant levels
mg/kg .... milligrams per kilogram
NCP .... National Contingency Plan
NPL .... National Priorities List
OE .... ordnance and explosives
O&M .... operations and maintenance
OU .... Operable Unit
PAH .... polycyclic aromatic hydrocarbons
PCB .... polychlorinated biphenyl
PCE .... tetrachloroethene
PM .... Project Manager
PPE .... personal protective equipment
QAPP .... Quality Assurance Project Plan
RAOs .... Remedial Action Objectives
RCRA .... Resource Conservation and Recovery Act
R_fC .... reference concentrations

R_fD........................reference dose
RI...........................Remedial Investigation
ROD......................Record of Decision
RSL.......................regional screening level
SVOCs..................semi-volatile organic compounds
TCDD...................tetrachlorodibenzo-p-dioxin
TCE.......................trichloroethylene
TCLP.....................toxicity characteristic leaching procedure
TLs........................tax lots
TSCA....................Toxic Substances Control Act
TSP........................trisodium phosphate
UFP-QAPP............Uniform Federal Policy for Quality Assurance Project Plans
USACE.................U.S. Army Corps of Engineers
UU/UE.................unlimited use and unrestricted exposure
VOC......................volatile organic compound

1.0 INTRODUCTION

This document presents the third Five-Year Review (FYR) for the Arctic Surplus Salvage Yard (ASSY) Superfund Site located near Fairbanks, Alaska. The purpose of a FYR is to evaluate the implementation and performance of a remedy in order to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings, and conclusions of the review are documented in this five-year review report. In addition, this report identifies issues found during the review (including the site visit), and summarizes actions taken to address them. Figure 1 presents the site vicinity map. The site consists of one Operable Unit (OU); therefore, this FYR covers site-wide conditions.

This FYR was prepared pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Contingency Plan (NCP) (40 CFR Section 300.430(f)(4)(ii)), and considering U.S. Environmental Protection Agency (EPA) policy.

The triggering action for this statutory review is the completion date of the second FYR report of January 10, 2014. The FYR has been prepared due to the fact that hazardous substances, pollutants, or contaminants remain at the site at levels that do not allow for unlimited use and unrestricted exposure (UU/UE).

The United States Environmental Protection Agency (EPA) is the lead agency for this former National Priorities List (NPL) site and has reviewed this FYR in accordance with existing five-year review guidance (EPA, 2001; EPA, 2016). The Defense Logistics Agency (DLA) and its contractor, Ahtna Environmental, Inc. assisted USACE in the preparation of this report for the EPA. The Alaska Department of Environmental Conservation (ADEC) contributed to review of this FYR. Additionally, the ADEC has reviewed and approved work plans and monitoring reports for this site. Participants included USACE Project Manager (PM) for ASSY (Ms. Julie Sharp-Dahl) and included support from the DLA representative (Ms. Therese Deardorff), ADEC PM (Ms. Erica Blake) and Ahtna PM (Mr. Anthony Pennino). The review began on 2/26/2018.

At the time of this five-year review, full implementation of the site remedy is complete. The Institutional Controls (ICs) outlined in the Record of Decision (ROD) and Explanation of Significant Differences (ESD) have been implemented. The final Remedial Action Report was completed during the summer of 2004, and the site was deleted from the NPL in 2006.

All available information pertaining to the site has been reviewed during the performance of this FYR, including, but not limited to, the Remedial Investigation (RI) (Shannon and Wilson, 1994), the ROD (EPA 1995), the Feasibility Study (FS) (Shannon and Wilson 1995), the ESD (EPA, 2004), the Remedial Action Report (Earth Tech 2004), the Operations & Monitoring Plan (Earth Tech 2004), various groundwater monitoring reports (AECOM 2009, 2010, 2011a, 2011b, 2012, 2013a), previous FYR (AECOM, 2013b) and other correspondence with the various parties involved with the response actions.

The principal documents used in preparing this report are referenced in Appendix A. An ASSY site chronology is included as Appendix B. The conservation easements are referenced in Appendix C. The 2018 groundwater monitoring report is included as Appendix D. Appendix E contains the interview forms. Appendix F presents historical analytical results for COCs. Appendix G presents the site inspection results. Appendix H contains the site fact sheet for owners/potential owners/tenants of ASSY.

1.1 Site Background

This section presents background information on the ASSY site. A site chronology summarizing significant events and documents from the time the property was first transferred to the private sector through 2018, including post-RA long term groundwater monitoring and site O&M activities are present in Appendix B.

1.1.1 Site Location and History

The ASSY site consists of six parcels of land totaling about 24.5 acres, located on the northeast corner of Badger Road and the Old Richardson Highway, approximately 5 miles southeast of Fairbanks, Alaska (see Figure 1). The western portion of the site was owned by the Department of Defense (DOD) and from 1944 to 1956 a landfill used by the military was located on this parcel. Following its sale by the DOD in 1959, the site was used as a salvage yard, resulting in the accumulation of a large amount of both salvageable and non-salvageable materials. Specific activities that have impacted the site include:

- Lead battery recycling: batteries were stored and then cracked to collect lead for recycling.
- Oil was drained from transformers, some of which contained PCBs.
- Spent transformer oils were burned to fuel an incinerator used to reclaim copper from transformer coils and lead from batteries.
- Mechanized equipment was salvaged, which may have caused fluids to leak.
- Spent ordnance and explosive (OE)-related scrap accumulated.
- Oils, chemicals, containerized gases, and other hazardous materials were stored improperly.

A Preliminary Assessment was conducted at the site in June 1987 and a Site Inspection in September 1989. The site was proposed for inclusion on the NPL on October 26, 1989 and was listed on August 30, 1990. Since its identification as a CERCLA site in 1989, numerous investigations and removal actions have been performed to characterize the site and address potential site risks (discussed in Sections 2.1 and 2.2).

1.1.2 Present and Anticipated Future Site Use

The site encompasses 6 parcels (Figure 2). Parcels are not the same as tax lots (TLs). Parcel VI is the 200 foot wide Alaska Railroad Right-of-Way. Parcel III contains 2 tax lots. The list of parcels and tax lots are as follows:

- Parcel I (UMB03, referred to in previous FYRs as TL 2101)
- Parcel II (TL 2131)
- Parcel III (TL 2112 and 2113)

- Parcel IV (TL 2111)
- Parcel V (TL 2106)
- Parcel VI (Railroad Right-of-Way).

The property is zoned as GU-1 as defined by Fairbanks North Star Borough Code which means a wide variety of uses is allowed; however, IC's placed on the property prevents any residences on the property and prevents any activities where remaining contamination creates receptor exposure such as agricultural use.. The site is currently used primarily for equipment and materials storage. The asphalt covered cap had been leased for use as a parking lot for vehicles and trailers from 2005 to 2018. The current lessee purchased the lots in 2014 and continued use as a parking lot until Summer 2018. The cap area is currently in use by a motorcycle club for training, rather than as a parking lot. The anticipated future use of the site is similar to the current use and the current owner has stated they do not plan to park large vehicles on the cap in the future.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Arctic Surplus Salvage Yard		
EPA ID: AKD980988158		
Region: 10	**State:** AK	**City/County:** Fairbanks / Fairbanks North Star Borough
SITE STATUS		
NPL Status: Deleted		
Multiple OUs? No	**Has the site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: Other Federal Agency ***[If "Other Federal Agency", enter Agency name]***: EPA		
Author name (Federal or State Project Manager): Mr. Chan Pongkhamsing		
Author affiliation: EPA		
Review period: 2/26/2018 - 8/31/2018		
Date of site inspection: 5/22/2018		
Type of review: Statutory		
Review number: 3		
Triggering action date: 1/10/2014		
Due date *(five years after triggering action date)*: 1/10/2019		

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2.0 RESPONSE ACTION SUMMARY

This section summarizes the risk drivers for the site, response actions taken, and status of implementation, including ICs, as well as long-term monitoring (LTM) and operations and maintenance (O&M) at the site.

2.1 Basis for Taking Action

A number of previous environmental investigations were completed at the site, culminating in the RI Report (Shannon & Wilson, 1995). As discussed in the RI Report, several potential source areas were identified, including:

- Battery cracking areas
- Buried materials, including the old military landfill
- Drum storage areas
- Incinerator areas
- Transformer processing areas
- Salvage and debris piles

These site investigations resulted in the identification of a wide range of contaminants of potential concern (COPCs) at ASSY including inorganic compounds, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyl (PCBs), pesticides, dioxins, and furans. Most of these contaminants were detected locally or in low concentrations at the site. However, some contaminants appeared to have a significantly greater potential as health risks because of their greater toxicity or carcinogenicity, widespread distribution, elevated concentrations, or mobility via transport mechanisms. The two primary COPCs identified were lead and PCBs. These contaminants had impacted surface soils and near surface soils over relatively wide areas, particularly within the western portion of the site.

High lead concentrations were identified in surface soils where battery processing (cracking) was known to have been conducted, and where battery processing debris was found. Highly contaminated soils were excavated and transported off-site during the 1990 removal actions. Lead was subsequently identified at concentrations greater than 500 milligrams per kilogram (mg/kg) in surface soils over much of the western portion of the site.

PCB transformer oils were found in old transformers and drums, and oil-stained soils were detected in several areas of the site. During the 1990 removal actions, most of the oil was removed, and heavily contaminated soils were excavated and removed from the site. Subsequent analyses of surface soils throughout much of the western part of the site detected elevated concentrations of PCBs in surface soils, locally in excess of 100 mg/kg. PCB-impacted off-site soils located immediately west of the property boundary were evaluated and remediated during the Badger Road expansion project conducted in 1994.

Additional localized soils impacted with dioxins and the chlorinated pesticides dichlorodiphenyl dichloroethane (DDD) and dichlorodiphenyl trichloroethane (DDT) were identified during the RI.

2.1.1 Site Risks

An evaluation of the potential risks to human health and the environment from site COPCs was conducted and is discussed in the ROD. The risk assessment concluded that hazardous substances were present on the site and that the actual or threatened release of these substances may present an imminent and substantial endangerment to public health, welfare or the environment if a response action is not taken. The soil, and to a lesser extent, the groundwater were identified as the media of concern at the site. Contaminants of Concern (COCs) based on site risks are summarized below.

In soil, COCs identified in the ROD were:

- PCBs,
- chlorinated dioxins/furans, and
- lead.

The estimated upper-bound cancer risks exceeded levels of concern (1×10^{-4}) for PCBs and chlorinated dioxins and furans. Lead levels above 1000 ppm (industrial exposure level for soil used in the 1994 risk assessment) were found. None of the other COPCs found in the soils presented a risk great enough to change the overall site risk when added to the risks from PCBs and lead.

In groundwater, the following eight COPCs were identified:

- antimony,
- arsenic,
- manganese,
- tetrachloroethene (PCE),
- trichloroethene (TCE),
- 1,2,4-trichlorobenzene,
- DDT, and
- PCBs.

For groundwater, the primary contributors to the cancer risks were arsenic, PCBs, PCE, and TCE, and the primary contributors to the non-cancer risks were arsenic and manganese. A portion of the estimated non-cancer impacts (and cancer risks for arsenic) result from naturally occurring levels of arsenic and manganese in the soil and water. The sources of TCE in soil were removed during historical removal actions, described in Section 2.2.1. A qualitative ecological risk assessment was completed to assess the ecological effects of the contaminants present at ASSY. The ecological risk assessment indicated that there was no measurable impact on the ecology of the site or near-site areas, and that the levels of contamination present at the site were not likely to cause adverse effects to plants and animals in the site vicinity.

2.2 Response Actions

2.2.1 Historical Removal Activities

Interim removal action activities were completed during 1989, 1990, and 1991 by the EPA and by the DLA in 1990 and 1996. During 1989, the site was fenced, approximately 22,000 pounds of asbestos were removed, and approximately 75 gallons of chlordane were stabilized and removed. During 1990, a more extensive removal action included:

- Dismantling of one incinerator and removal and disposal of the associated ash and soil,
- Removing and disposing approximately 13 cubic yards of PCB-contaminated soil,
- Removing and disposing approximately 315 cubic yards of lead-contaminated soil from “battery-cracking” areas, and
- Removing and disposing approximately 160 cubic yards of chlordane-contaminated soil.

The interim removal action activities also included bulking and removing of containerized waste, removing intact and broken battery casings, draining and properly disposing of transformer oils, and capping specific areas of contaminated soils. In 1991, another interim removal action was completed to investigate alleged buried hazardous wastes and delineate the extent of soil contamination. To facilitate the investigation, approximately 300 non-PCB transformers were moved and staged in the center of the site.

In 1996, approximately 3,100 empty drums and 21 transformers were drained, cleaned, and removed from the site for disposal.

2.2.2 Record of Decision Summary

Following completion of the RI, a FS was conducted to evaluate and recommend remedial alternatives for the site (Shannon and Wilson, 1995). Based on the alternative evaluations included in the FS, a remedy was selected and formally documented in the ROD, which was signed in 1995. The Remedial Action Objectives (RAOs) identified for site soils were to:

- Prevent exposure by ingestion, inhalation, and dermal contact with contaminated soils and dust that would result in an excess lifetime carcinogenic risk above 10^{-5}.
- Prevent exposure by ingestion, inhalation, and dermal contact with contaminated soils and dust that would result in a non-carcinogenic health effects as indicated by a Hazard Index (HI) greater than 1.0.
- Prevent offsite migration of contaminants caused by mechanical transport, runoff, or wind erosion.
- Prevent infiltration/migration of contaminants that would result in groundwater contamination in excess of regulatory standards.

The RAOs identified for site groundwater were to:

- Prevent inhalation of volatiles released from, or ingestion of, groundwater containing contaminants at levels above regulatory standards (i.e., maximum contaminant levels [MCLs] for drinking water).

If there were no regulatory standards for certain chemicals in groundwater, the RAOs were to:

- Prevent inhalation of volatiles released from, or ingestion of, groundwater contaminants that could result in an excess lifetime carcinogenic risk above the 10^{-5} level.
- Prevent ingestion of groundwater containing contaminants that could result in noncarcinogenic health effects as indicated by an HI in excess of 1.0.

The main components of the selected remedy identified in the 1995 ROD were:

- Relocation and sorting of salvage material and debris, to provide access to the contaminated soil.
- Excavation and stockpiling of soil exceeding cleanup standards for treatment or disposal.
- On-site treatment of soil with concentrations of PCBs exceeding 50 mg/kg by solvent extraction.
- On-site treatment of on-site soil exceeding the lead industrial cleanup standard of 1,000 mg/kg and of off-site soil exceeding the lead residential cleanup standard of 400 mg/kg by stabilization/solidification.
- Off-site disposal of soil exceeding cleanup standards of 21,000 micrograms per kilogram (µg/kg) 4,4-DDD, 15,000 µg/kg 4,4'-DDT, and 0.44 µg/kg for 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) equivalence for dioxin/furans.
- Consolidation of treated soils into a containment area over the old closed military landfill.
- Capping of the containment area and the existing landfill with a Toxic Substances Control Act (TSCA) chemical waste landfill cap.
- Implementation of ICs, including long-term groundwater monitoring, and O&M of fences and the cap. In addition, deed restrictions were put in place to prevent use of the groundwater, maintain an industrial site use designation, and prevent any unauthorized access or use of the capped area.

The ROD established cleanup levels for the three soil COCs and two groundwater COCs, as presented in Tables 1 and 2.

TABLE 1: CONTAMINANTS OF CONCERN IN SOIL IDENTIFIED IN THE ASSY ROD

Contaminant	ROD Cleanup Standards (mg/kg)	
	Industrial	Residential
Lead	1000[a]	400[b]
PCBs	10[c]	1[c]
Dioxins/Furans	0.44[d]	n/a [e]

[a] Lead cleanup goal for industrial land use; consistent with cleanup standards for other similar Region 10 CERCLA sites.
[b] Residential soil screening value for lead using the 1EUBK Model (EPA Revised Interim Soil Lead Guidance for CERCLA Site and RCRA Corrective Action Facilities, OSWER Directive No. 9355.4.12, Office of Solid Waste and Emergency Response, Washington, D.C.).
[c] Cleanup standard for PCBs from 40 CFR 761.25(c)(4)(v).
[d] Cleanup standard is based upon a cancer risk of $1x10^{-5}$.
[e] Not applicable. Dioxins/furans were not detected off-site; therefore, only the industrial soil cleanup standard is provided.

The cleanup standard for PCBs was taken from 40 CFR 761.25(c)(4)(v). Based on the Resource Conservation and Recovery Act (RCRA) characteristic waste criteria, the soil cleanup standard for lead at 1000 mg/kg was selected for industrial use area; consistent with cleanup standards for other similar Region 10 CERCLA sites. For dioxins and furans, the soil concentrations corresponding to a cancer risk-based level of $1x10^{-5}$ was selected as the soil cleanup standard.

TABLE 2: CONTAMINANTS OF CONCERN IN GROUNDWATER IDENTIFIED IN THE ASSY ROD

Contaminant	ROD Groundwater Cleanup Standard (µg/L)	EPA MCL for Drinking Water[a] (µg/L)
Lead	-	15
PCBs	-	0.5
Antimony	25[b]	n/a
Arsenic	-	10
Manganese	2900[b]	n/a
Tetrachloroethene	-	5
Trichloroethene	-	5
1,2,4-Trichlorobenzene	-	70
DDT	-	0.23[c]

- No cleanup level identified in the ROD. Where cleanup levels were not identified EPA MCLs for Drinking water were used. If no regulatory levels, then EPA regional screening levels ($1x10^{-5}$ and HQ of 1.0) were used.

n/a = Not applicable, ROD mandated cleanup standard established.
[a] MCLs established in 40 CFR 141.
[b] Cleanup standards are based upon regional aquifer background levels, which exceed risk-based levels.
[c] Ingestion RSL $1x10^{-5}$ and HQ of 1.0.

The ROD identified cleanup levels for Antimony (25 micrograms per liter [µg/L]) and Manganese (2,900 µg/L) based on regional aquifer background levels. The other six COPCs identified in groundwater were carried forward as COCs and compared to EPA's MCLs for drinking water. The ROD acknowledges intermittent detections of a few naturally occurring contaminants and potentially site related contaminants, such as TCE. The ROD stated these contaminants should be monitored to determine if source controls related to soils can prevent contaminants from entering the groundwater and requiring future controls. Therefore, lead was added as a COC in groundwater due to it being a COC in soil.

Groundwater monitoring and ICs (prevention of the use of on-site groundwater for drinking) is part of the selected remedy. The ROD provides flexibility in the performance of the groundwater monitoring activities (schedule, duration, etc.) based on the results of the site performance reviews and the groundwater monitoring data.

Finally, the ROD stated that the selected remedy will comply with land disposal restrictions for halogenated organic carbon (i.e., PCBs) through a treatability variance for the contaminated soil. The selected remedy will be protective of human health and the environment, comply with EPA guidance on long term management controls of PCBs, and will not present an unreasonable risk of injury to health or the environment. The ROD stated that this remedy will comply with TSCA landfill requirements (bottom liner, depth to groundwater, leachate collection system, and surface water monitoring) through a TSCA waiver.

2.2.3 Remedial Progress Optimization Activities

In 2002, DLA requested assistance from the Air Force Center for Engineering and Environment (AFCEE), now known as Air Force Civil Engineer Center, to optimize and implement the remedial actions at the site. In June 2002, an RPO Scoping Visit (RSV) was conducted at the site by representatives from the DLA, AFCEE, EPA, ADEC, and AFCEE contractors (Earth Tech [now known as AECOM], Parsons and Mitretek Systems). As requested by the DLA, the purpose of the RSV was to identify and recommend improvements to the ROD proposed remedy. The RSV recommendations included collecting and analyzing additional soil samples to refine quantities of soil requiring remediation, performing treatability testing to evaluate the feasibility of soil stabilization as a remedy for the lead-and PCB contaminated soils, collecting groundwater samples, and evaluating options for placing the stabilized soils on site. These recommendations were implemented during Fall 2002 to Summer 2003 period. Based on the results of these activities, specific changes to the ROD proposed remedy were recommended which included on-site stabilization of PCB and lead contaminated soils, a revised cap design and off-site disposal of soils with PCB concentrations greater than 50 mg/kg. In addition, several other site restoration issues not specifically addressed in the ROD were identified during the RPO activities, including the presence of large quantities of OE scrap that had not been properly demilitarized, several caches of compressed gas cylinders, potential radiological waste items, and multiple drums containing soil cuttings, purge water and personal and protective equipment from previous investigations.

2.2.4 Explanation of Significant Differences Summary

The changes to the ROD proposed remedy were formally documented and approved in the ESD issued in June 2003. The primary technical changes to the remedy included in the ESD were:

- Treatment of soil with PCB concentrations between 10 and 50 mg/kg by solidification/stabilization;
- Off-site treatment and disposal of soil with PCBs greater than 50 mg/kg;
- Capping stabilized soils with a geosynthetic clay liner (GCL) instead of compacted silt;
- Flattening the cap profile to allow for reuse of the land.

The ESD also stated that DLA and ADEC were evaluating options for permanent ICs to be attached to the property that will transfer with the land should it be sold. The ESD also updated the applicable or relevant and appropriate requirements (ARARs) by eliminating the land disposal restrictions and updating the Arsenic MCL from 50 µg/L to 10 µg/L or natural background (whichever is less stringent).

2.3 Status of Implementation

Upon finalization of the ESD, a detailed work plan for implementation of the RA was developed by the DLA and its contractor (Earth Tech). Procedures were also developed to identify, segregate and remove other site hazards such as OE materials, radiological contamination and scrap piles. The final RA Work Plan was issued in May 2003, and soil remediation activities began in June 2003. Remedial activities completed by Earth Tech for this project included:

- Relocation, sorting, and decontamination of salvage material, ancillary scrap (transformers, compressed gas cylinders, etc.), and debris;
- Excavation and stockpiling of contaminated soils with concentrations greater than 1,000 mg/kg lead or 10 mg/kg PCBs and off-site soils with concentrations greater than 400 mg/kg lead and/or 1 mg/kg PCBs for treatment;
- Excavation of soil with dioxin concentrations greater than 0.44 µg/kg;
- Excavation of soil with DDD concentrations greater than 21 mg/kg or DDT concentrations greater than 15 mg/kg;
- Shipment of dioxin-, DDT-, and DDD-contaminated soil and soil with PCB concentrations greater than 50 mg/kg off-site for disposal;
- Solidification/stabilization of contaminated soil containing lead at concentrations greater than 1,000 mg/kg and soil with PCB concentrations greater than 10 mg/kg but less than 50 mg/kg. The soil was mixed with approximately 0.5% trisodium phosphate (TSP) and 10% Portland cement by weight;
- Placement of stabilized soils into a consolidation cell, which also encompassed the old military landfill located in the southwestern section of the site;
- Collection of confirmation samples to verify that the cleanup goals were met. Over 400 confirmation samples were collected in the excavation areas for lead and PCBs analyses;

- Collection of stabilized soil samples for toxicity characteristic leaching procedure (TCLP) analysis for lead;
- Placement and compaction of stabilized soil in the consolidation cell and the existing landfill, placement of a GCL liner over the compacted soil, and placement of an 18" thick cover of clean fill over the GCL liner;
- Placement of 4" (thickness) of compacted road base and 4" (thickness) of asphalt over the clean fill and GCL cover to allow reuse of the cap as a parking lot, construction of perimeter runoff ditches and an infiltration basin to control surface water runoff from the cap and surrounding area. In addition to the infiltration basin, a ramp was constructed on the north side of the consolidation cell to allow vehicular traffic.
- Removal of the following materials
    - 72,210 OE-related items (including 335 live items)
    - 12 55-gallon drums and one 8-gallon drum of radioactive waste (including more than 300 dials and gauges)
    - 50,000 cubic yards of scrap metal
    - 344 PCB-containing fluorescent light ballasts
    - 688 fluorescent light bulbs (mercury vapor)
    - 760 pounds of asbestos containing material (ACM)
    - 8 Freon cylinders
    - 16 chlorine cylinders
    - 264 tons of tires
    - 6,985 gallons of non-hazardous oil
    - 50 drums of personal protective equipment (PPE)
- Site restoration activities including hydroseeding the site, rehabilitation of monitoring wells, installation of a new site fence and a new consolidation cell/parking lot fence and gate.

Figure 3 in the Second FYR (EPA, 2014) shows the areas of the site where COCs exceeded the cleanup levels. Excavation activities were conducted in these areas at the site. Approximately 9,500 cubic yards of contaminated soil was stabilized and placed in the consolidation cell. Approximately 10 metric tons of non-listed RCRA hazardous waste dioxin contaminated soil, 6 tons of non-listed RCRA hazardous waste pesticide contaminated soil and 195 metric tons of PCB (above 50 mg/kg) contaminated soil was transported for off-site disposal. Figure 4 in the Second FYR presents an aerial view of the site after completion of the remedial action activities. The Remedial Action Report was finalized in Summer 2004, and O&M activities were initiated in Fall 2004. The site was deleted from the NPL in 2006. The remedial action was completed by Earth Tech, under AFCEE contracts.

2.3.1 Institutional Controls

Institutional controls for the site include both physical and administrative controls. Chain-link fencing was installed around the consolidation cell and site boundary to restrict site access. Signs showing contact numbers for EPA and ADEC and prohibiting unauthorized access were posted on the fence surrounding the cell.

In accordance with the ESD, conservation easements were also executed by current property owners to provide legal access to the site (5 Tax Lots) for future operations, maintenance, and sampling activities. The easements were recorded October 21, 2004 with the State of Alaska, Department of Natural Resources, Division of Mining Land and Water Realty Services Section. Additionally, the executed agreements include legally enforceable restrictions that prohibit current and future property owners from activities that may adversely affect the implementation, integrity, or protectiveness of the remedial measures (ICs). Specific provisions of the agreements include the prohibition of:

- Digging, drilling, or other activities that might penetrate, damage, or interfere with the consolidation cover system, fencing, or drainage systems;
- Damaging or interfering with the groundwater monitoring network;
- Installing wells and using groundwater, unless approved in writing;
- Digging or moving soil that may create additional exposure to contaminants, or an environmental or health and safety risk, unless approved in writing;
- Transporting soil off-site, unless approved in writing; and
- Using the land for residential or agricultural use or similar uses causing exposure to contaminants.

Copies of the executed agreements are included in Appendix C. To ensure that current and future property owners are subject to the same restrictions and are required to provide the same access, each executed agreement contains general provisions that the conservation easement shall run with the land in perpetuity.

Inspections conducted at the site since 2004 indicate that the long-term ICs required by the ROD and ESD are being implemented.

2.3.2 Changes in Land Ownership

On July 11, 2018, a Limited Liability Report (Title Review) was prepared by Yukon Title, Inc., which is underwritten by First American Title. The Limited Liability Report is similar to preliminary title reports and only contain information that currently affects the title, such as property owner, easement, and encumbrance information. The purpose of the Title Review is to track any changes in land ownership and ensure that institutional controls, referred to as Conservation Easements in the Limited Liability Report, are properly recorded and identified during normal title transactions. The Title Review is included as Appendix C and summarized below.

Since the last FYR, a Statutory Warranty Deed was issued November 7, 2014 (Instrument 2014-016845-0) transferring ownership of Parcel I (UMB03) from the C M Pederson Family Trust to ARS, LLC (Mr. Cliff Everts). However, the original transfer document did not include the required restriction notification. A Corrective Deed was recorded Sept 21, 2015 (Instrument # 2015-014820-0) to correct the Warranty Deed recorded November 7, 2014 by adding the Conservation Easement Language. Currently Parcels I, II, III, and IV have Conservations Easements for institutional controls associated with the properties. Conservation easements were not identified for Parcel V and VI.

Mr. Hoople of HC Properties, LLC is still the current owner of Parcels II, III, IV, and V; Alaska Railroad Corporation is the still the current owner of Parcel VI.

2.4 Operation & Maintenance

During the first FYR, the long-term monitoring data was reviewed by DLA, ADEC, and EPA in September 2007. The team agreed to modify post-2007 long-term monitoring activities as follows:

- Reduce groundwater monitoring frequency to an annual basis;
- Replace monitoring well MW-5627-R. The new location for this well will be within the consolidation cell fenced area to prevent unauthorized access.
- Eliminate groundwater monitoring in wells MW-5626 and MW-D and decommission these wells in accordance with ADEC guidelines.
- Eliminate pesticide analyses from the groundwater monitoring protocol.

After completion of the 2008 event, DLA, ADEC and EPA agreed to drop manganese and antimony from the analyte list for the annual groundwater monitoring event since these metals were not detected above their MCLs in multiple sampling events (AECOM, 2010). In addition, annual monitoring for arsenic in groundwater was discontinued, since historical detections of arsenic were in the range of background concentrations. PCBs and lead were retained in the groundwater monitoring program to continue evaluation leaching potential from the stabilized materials. VOCs were retained for analyses based on continued trace detections (below MCLs) in the groundwater.

A draft final revised Long-term Monitoring (LTM) Work Plan in accordance with the Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP) was prepared by AECOM in 2014 (AECOM, 2014). The revised LTM plan addressed the recommended changes to field activities and schedule for issues that do not affect protectiveness, as presented in the second FYR. The second FYR recommended the following:

- DLA will conduct annual site inspections at the site to verify IC effectiveness, cap and fence integrity. Property owners will also be interviewed to see if they have any questions or concerns, and DLA will submit a Tech Memo summarizing the annual site inspection.
- Conduct cap and fencing inspections and routine cap, slope and vegetation maintenance activities every 2 years. The next maintenance event will be conducted in summer 2015.
- Since groundwater COCs have not exceeded their respective cleanup or background levels since 2005, conduct groundwater monitoring every 5 years. The next groundwater monitoring event will be conducted in 2018 and data included in the next five year review.
- Prepare a revised LTM plan in accordance with the Uniform Federal Policy for Quality Assurance Project Plans to document the above recommended changes.
- Update prepared fact sheet, as required, that summarizes the remedy, ICs, and the points of contact at DLA, ADEC and EPA. This fact sheet will be informative for future development of the site and an approval process for new structures and other land developments should be included.

Since the last FYR, a new contract was awarded to Ahtna by the USACE for work carried out on behalf of the DLA. This included the development and finalization of the UFP-QAPP which serves as the revised LTM Work Plan addressing the performance of groundwater monitoring and site inspection components of the FYR (Ahtna, 2018). LTM and operations and maintenance (O&M) activities performed from 2014 to 2018 are summarized below. Results of historical LTM activities and recommendations were documented in the second FYR (AECOM, 2017), and not repeated here for brevity.

2.4.1 O&M Activities

Per the Second FYR for the site, annual site visits were performed from 2014 to 2018 by DLA and documented in annual memorandum for record reports (Deardorff, 2015; Deardorff, 2016a; Deardorff, 2016b; Deardorff, 2018a, Deardorff, 2018b). During each site visit, the perimeter security fence, consolidation cell cap and slopes, and groundwater monitoring wells were inspected. Interviews were held with parties familiar with the ASSY site, as well as the regulatory Remedial Project Managers involved with the site. Routine cap, slope, and/or vegetation maintenance activities were conducted in 2015 and 2016. During each visit, the consolidation cell was inspected to:

- Assure continued protection of human health and the environment,
- Verify that no conditions exist that would result in an imminent hazard to human health or the environment from the consolidated/treated soil that has been placed in the cell,
- Verify that construction components of the cell are intact and operating properly,
- Verify that no excessive erosion is occurring that could endanger the security of the consolidation cell and/or that might result in exposure or release of the consolidated/treated soil in the cell, and
- Verify that the asphalt cover over the cell was in good condition.

In 2014, the cap fencing integrity was observed to be compromised by overgrown vegetation and the surficial weathering and plant breaches through the cap were noted. Frost jacking was observed at MW-5808. Subsequent vegetation clearing by the property owner in late fall of 2014 further damaged the fencing around the cap. Fence maintenance and repair, as well as asphalt resurfacing of the cap were recommended. Additionally, Mr. Hoople, of HC Properties, LLC, noted theft of copper wiring from his property (TL 2131), adjacent to the IC fencing in May 2014. The theft was reported to the Fairbanks Police and a new welded gate was installed to further restrict access. The cap perimeter fence was not affected during the theft.

Fence repair and clearing and grubbing of vegetation were completed in 2015. Re-surfacing of the cap was postponed due to contract delays. No new damage to the well network was observed during the 2015 site visit. Clarification on responsibility for fence maintenance was discussed with the property owner; DLA is responsible for fencing around the perimeter of the cap only, not fencing along the exterior property line to the north of the cap.

During the 2016 site visit, frost-jacking was observed at MW-5625-R. No new issues were identified at the remaining site wells. On August 10, 2016, DLA was notified that the southwest corner of the exterior cap fence was damaged by a vehicle collision. DLA's contractor completed fence repairs by October 22, 2016. Repairs to the cap including sealing cracks and repair of frost heaves was completed in fall of 2016. However, this maintenance was done late in the season, and cold temperatures precluded sealant from setting correctly.

During the 2017 site visit, the weight limitations of the cap were of concern based on observed use as a parking/storage lot for heavy equipment. Review of the cap design indicated that the cap could withstand the weight loads observed at the site. Regardless, the property owner agreed to spread out the equipment to balance weight loads on the cap and place protection under any tow bars, etc., to preserve the asphalt cap. No significant concerns were noted for MW-UG1, MW-2008A, and MW-5624. Monitoring wells MW-5808 and MW-5625-R showed signs of frost-jacking (well cap ajar) and recommendations were made to inspect and replace if necessary prior to the 2018 groundwater monitoring event. The planned 2017 cap maintenance was delayed until 2018 due to contractor issues. The protectiveness of the remedy has not been affected by the delayed maintenance, as primary concerns are vegetation growth and small surficial cracks.

In 2018 a preliminary site visit was performed to inspect the condition of monitoring wells prior to the 2018 groundwater sampling event. All wells were determined to be in usable condition with the exception of MW-5625-R. MW-5625-R had its casing blocked by bentonite at approximately 6 feet below top of casing. It appeared the casing had cracked in the subsurface or a joint had separated, allowing the bentonite annular seal to entering the casing. It was recommended for decommissioning and replacement during the 2018 groundwater monitoring event. Vegetation maintenance was completed in 2017 and surficial patching of the cap was completed in August 2018.

The annual O&M costs (including annual site visits, cap repairs, reporting, meetings, etc.) for ASSY from 2014 to 2018 have ranged from $25,000 to $35,000 per year

2.4.2 Long-term Monitoring Activities

In accordance with the revised LTM Work Plan (Ahtna, 2018), one sampling event (including monitoring well replacement and surveying) was conducted June 26 – 28, 2018. During this event, groundwater monitoring well MW-5625-R was decommissioned and replaced with a new monitoring well labeled MW-5625-R2. Five groundwater wells (MW-UG1, MW-2008A, MW-5808, MW-5624, and MW-5625-R2) were sampled for VOCs, RCRA metals, and PCBs (Figure 3). No analytes were detected above their respective MCLs. A groundwater monitoring report documenting field activities, laboratory and field analytical results, and data review in accordance with ADEC guidance is included as Appendix D.

3.0 PROGRESS SINCE THE LAST REVIEW

3.1 Protectiveness Statement from the Previous FYR

This section includes the protectiveness determinations and statements from the last FYR. There were no issues or recommendations presented in the last FYR that affect the protectiveness of the remedy.

TABLE 3: PROTECTIVENESS DETERMINATIONS/STATEMENTS FROM THE 2013 FYR

OU#	Protectiveness Determination	Protectiveness Statement
Sitewide	Protective	The remedy at Arctic Surplus is protective of human health and the environment. The remedy is expected to remain protective of human health and the environment. Based upon the review of relevant documents and the site inspection, the remedy is functioning as intended by the ROD and ESD. There have been no changes in the physical condition of the site that would affect the protectiveness of the remedy. Long-term protectiveness of the RAs will be verified by ICs, LTM and O&M program, which monitors groundwater COC concentrations and inspects and maintains the integrity of the landfill cap and fences.

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4.0 FIVE-YEAR REVIEW PROCESS

The five-year review process for ASSY was initiated in February 2018. The ASSY five-year review team included USACE PM for ASSY (Ms. Julie Sharp-Dahl), the DLA PM (Ms. Therese Deardorff), ADEC PM (Ms. Erica Blake), EPA PM (Mr. Chan Pongkhamsing) and Ahtna PM (Mr. Anthony Pennino). Activities conducted during the five-year review included community notifications and site interviews, data review, and site inspections to assess the protectiveness of the remedy.

4.1 Community Notification, Involvement & Site Interviews

The land owners were contacted in May 2018 and notified of the upcoming review. Comments from the site owners regarding the remedial actions and follow-on monitoring were collected in June 2018. A notice requesting public comments on the five-year review was printed in the Fairbanks News-Miner on March 13, 2018. No comments were received from the public. After completion of the five-year review, copies of the report will be made available via the administrative record. A public notice to announce the availability of the report will be issued.

The following two interviews were conducted as part of the FYR process:

- Mr. William Hoople, owner of HC Properties, LLC - June 27, 2018.
- Mr. Kelson Davis, representative for ARS, LLC – June 26, 2018.

The DLA PM met with Mr. Hoople on June 27, 2018 for an on-site interview. Mr. Hoople expressed concerns that the ICs in place prevent development of structures with foundations on his property. The installation of an aboveground protective shelter for equipment was discussed, and it was reiterated by Ms. Deardorff that no soil could be excavated nor any digging can take place without regulatory approval. The EPA, DLA, and ADEC will help site the location of any structure with input from Mr. Hoople. No date has been set for the installation of the aboveground structure. No other concerns regarding the integrity of the consolidation cell or the perimeter fence were expressed.

The DLA PM met with Mr. Davis June 26, 2018 for an on-site interview, concurrent with the 2018 site inspection. Mr. Davis is the representative for the property owner, ARS, LLC, and is familiar with the site and use restrictions. Current site use and potential impacts to the cap were discussed. Mr. Davis indicated that he believes the cap area will no longer be used as a parking area. No concerns regarding the integrity of the consolidation cell or the perimeter fence were expressed.

The interview forms are presented in Appendix E.

4.2 Data Review

This five-year review consisted of a review of relevant documents which included RI and RA reports, previous FYR reports, and annual O&M reports. The applicable groundwater cleanup levels specified in the ROD and ESD were also reviewed and compared with groundwater data collected from 2008 – 2013 and 2018. A complete list of the documents reviewed is shown in Appendix A.

From 2008 to 2013, groundwater monitoring was performed annually, then on a 5 year schedule with sampling occurring in June 2018. No COCs in any groundwater samples have been detected above the MCLs or ROD mandated cleanup levels, with most COCs reported as non-detects. TCE at MW-2008A is the only COC that has been consistently detected at frequencies allowing for a trend analysis. A Mann-Kendall trend analysis, included in the 2018 groundwater monitoring report (Appendix D), indicates a decreasing trend in TCE concentrations at the well. Historical groundwater analytical results (2008 to 2013) as well as the 2018 analytical results for each well are included in Appendix F.

4.3 Site Inspection

The 2018 FYR site inspection was performed by the DLA PM on June 26, 2018 with the above-mentioned representatives from ADEC and Ahtna. Mr. Davis, the ARS, LLC property's representative, was also onsite for the inspection. The consolidation cell cap, perimeter fence, cap side slopes, and all monitoring wells were inspected, including the newly installed well MW-5625-R2. Areas of the cap needing vegetation maintenance and surficial patching were marked with spray paint for subsequent maintenance in August 2018 (see Section 2.4.1). A site visit of the Hoople property (TLs 2131, 2112, and 2111) was performed by DLA on June 27, 2018, concurrent with the site interview (Section 4.1). No significant issues affecting the protectiveness of the remedy were noted during the 2018 site inspection. The site inspection reports are included in Appendix G.

5.0 TECHNICAL ASSESSMENT

In accordance with CERCLA, the NCP, and current EPA guidance (EPA, 2001), a five-year review should determine whether the remedy at the site is protective of human health and the environment. The technical assessment of a remedy examines three questions which provide a framework for organizing and evaluating data and information and ensures that all relevant issues are considered when determining the protectiveness of the remedy. These questions are presented in the following sections.

QUESTION A: Is the remedy functioning as intended by the decision documents?

Yes. The review of documents (Appendix A) indicates that the remedies are functioning as intended in the ROD and ESD have met the intent of the ROD and ESD.

The selected remedy for the site included excavation and off-site disposal of the most contaminated materials (dioxins-, pesticide-, and PCB-contaminated soils) and stabilization and on-site placement (in the consolidation cell) of the remaining PCB and lead contaminated soils above the ROD mandated cleanup levels.

The O&M program includes routine groundwater monitoring for the site COCs, vegetation clearing, inspection and maintenance of the cap and surrounding drainage areas, and inspection and maintenance of the site fence and monitoring wells. Since 2005, no COCs have been detected in the groundwater monitoring wells above their respective MCLs or background levels. The groundwater remedy of long-term monitoring has demonstrated that contaminant concentrations are not leaching from the capped area into the groundwater at concentrations in excess of MCLs, and concentrations are consistently below MCLs at the property boundary; protective of potential downgradient receptors.

ICs were implemented consistent with the selected remedy and address all areas of site-related contamination that are above levels that allow for unrestricted use and unlimited exposure. The ICs at the site restrict the installation of wells and use of groundwater, therefore revised cleanup levels will not affect the protectiveness of the site. The ICs, including deed restrictions, fencing/signage and routine inspections have been effective in preventing unauthorized access to or unauthorized development of the site. Land use at the site remains consistent with the ICs and selected remedy, and the only minor change, leasing of the area above the containment cell for use of a parking lot, is consistent with and will not compromise the ICs. A title search of the properties at the site confirmed that the land use restrictions are still in place. Based on this review, the existing ICs are appropriate and are expected to remain adequate and effective.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

The RAOs used at the time of the remedy selection (ROD and ESD) are still valid. There have been no changes in the potential exposure pathways at the site. The exposure assumptions used to develop the human health risk assessments remain valid. Changes to cleanup levels and toxicity factors for the primary COCs are discussed below.

The lead cleanup goal of 1,000 mg/kg is based on outdated guidance. EPA OLEM Directive 9285.6-56 (May 17, 2017) recommends using the Adult Lead Methodology to assess lead risks from soil for non-residential Superfund site scenarios. The recommended soil Preliminary Remediation Goal is 1,050 mg/kg which corresponds to a baseline blood lead concentration of 5 µg/deciliter. This updated goal is less stringent than the original cleanup goal, therefore the soil cleanup goal is still protective. A review of the ASSY confirmation sampling results for lead indicate that none of the samples (of over 400 confirmation samples collected) showed residual lead levels of over 1,050 mg/kg.

The oral and inhalation carcinogenic slope factors for PCBs have been revised since completion of the baseline human health risk assessment (Ecology & Environment, Inc., 1994). The current EPA industrial soil regional screening level (RSL) for high risk PCBs is 0.94 mg/kg, based on the target carcinogenic risk of 1 x 10-6, which is more conservative than the ROD-mandated TSCA value of 10 mg/kg. If the RSL was re-calculated based on a target risk of 1 x 10-5, which is often used in estimating cleanup levels (and is consistent with the ROD and ADEC guidelines), the resulting screening value would be 9.4 mg/kg. A review of the post-excavation PCB confirmation data indicates that only 19 out of 468 samples exceed the screening level of 9.4 mg/kg. Four of these sampling locations are underneath the consolidated cap and were treated with TSP and Portland cement prior to placing stabilized soil over these locations. One sampling location is underneath the eastern drainage canal and the sampling results around these locations showed PCB levels well below 9.4 mg/kg. Regardless, the cleanup level for PCBs in soil of 10 mg/kg is the promulgated TSCA value, which has not changed since the 1995 ROD for ASSY. Therefore, the changes in the PCB toxicity values will not affect the protectiveness of the remedy.

EPA's dioxin reassessment has been developed and undergone review for many years, with the participation of scientific experts in EPA and other federal agencies, as well as scientific experts in the private sector and academia. The Agency followed current guidelines and incorporated the latest data and physiological/biochemical research into the reassessment. On February 17, 2012, EPA released the final human health non-cancer dioxin reassessment, publishing an oral non-cancer toxicity value, or R_fD, of 7 x 10^{-10} mg/kg-day for 2,3,7,8-TCDD in EPA's IRIS. The dioxin cancer reassessment is underway at the time of the last significant revision. The dioxin R_fD was approved for immediate use at Superfund sites to ensure protection of human health.

The soil dioxin cleanup in the ROD is 0.44 µg/kg. The current EPA industrial carcinogenic RSL for dioxins in soil is 0.022 µg/kg, based on the target carcinogenic risk of 1 x 10^{-6}. The current EPA industrial RSL, based on EPA's 2012 non-cancer toxicity value for dioxin, and reflecting a hazard quotient (HQ) of 1, is 0.72 µg/kg. If the carcinogenic RSL was re-calculated based on a target risk of 1 x 10^{-5}, which is often used in estimating cleanup levels which is within the acceptable cancer risk range and reflects an HQ of less than 1, (and is consistent with the ROD and ADEC guidelines), the resulting screening value would be 0.22 µg/kg. The 2003 confirmation sampling results show that the residual onsite soil dioxin levels are less than the industrial carcinogenic RSL of 0.22 µg/kg, reflecting a target risk of 1 x 10^{-5}. Thus, the residual levels of soil dioxin remaining on site following the 2003 excavations are still protective of industrial workers.

The toxicity factors for DDD and DDT have also changed since the 1994 risk assessment. Based on the new carcinogenic inhalation slope factors, the current EPA industrial soil RSLs for DDD and DDT are 9.6 mg/kg and 8.5 mg/kg, respectively. These screening levels are based on the target carcinogenic risk of 1 x 10^{-6}. If the RSLs were re-calculated based on a target risk of 1 x 10^{-5}, the resulting screening values would be 96 and 85 mg/kg. The site cleanup levels are 21 mg/kg and 15 mg/kg for DDD and DDT, respectively. These are more protective than the revised RSLs, therefore amounts of DDD and DDT remaining on site following the 2003 excavations are still protective of the industrial worker.

The ROD and ESD-mandated cleanup levels for groundwater COCs are consistent with current EPA cleanup levels. Although there have been changes to the toxicity factors for some of the contaminants historically detected in groundwater (i.e., TCE), the 2005 to 2018 groundwater monitoring data indicates no exceedances of any COCs above the EPA MCLs for drinking water or background levels. The current EPA MCL of 5.0 µg/L for TCE may not be protective of the indoor air inhalation pathway (EPA, 2012). However, no permanent structures exist within the cap and fence area. ATCO trailers are present at the northern end of the property boundary, but no preferential VI pathway exist for these mobile units.

The EPA's Integrated Risk Information System (IRIS) program conducted a toxicological review of TCE (U.S. Environmental Protection Agency, 2011) for developing the reference concentrations (RfC) and reference dose (RfD). The RfC and RfD were determined partly on immunotoxic and developmental effects, including fetal cardiac malformations that may occur when the mother is exposed to TCE during a 21-day early gestation window. There are ongoing EPA assessments at the Office of Land and Emergency Management (OLEM, formerly called the Office of Solid Waste and Emergency Response, or OSWER) and risk assessors are developing guidance on how to apply the RfC and RfD for less-than-lifetime exposures (ADEC, 2017d).

The cancer slope factors and thus the RSLs for polycyclic aromatic hydrocarbons (PAHs) in soil have changed since the ROD was established. However, PAHs were excavated along with the PCBs and other COCs. Thus, the residual levels of PAHs possibly remaining on site following the 2003 excavations are still protective of industrial workers.

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

No. There is no new information that would question the protectiveness of the remedy. The groundwater monitoring data indicate that groundwater contaminant concentrations do not exceeded standards or background levels. The review of O&M and performance monitoring data indicates that the ICs and O&M activities at the site continue to be protective.

It is well documented that significant warming in Alaska is occurring as a result of climate change (NOAA, 2017). Research has also shown substantial permafrost warming in Alaska, from 0.3 to 3 degrees Celsius, since the 1980s, with new record highs for the entire period of permafrost temperature in Interior Alaska. However, permafrost is discontinuous in Interior Alaska and no evidence of shallow permafrost exists at the site. Additionally the long-term performance of the geosynthetic clay liner placed under the cap relative to freeze-thaw cycles experienced in Fairbanks was evaluated in the ESD. The cover layer is expected to provide long-term protection against infiltration into the consolidated, solidified/stabilized, contaminated soil. Continued site inspections will further ensure the continued integrity of the cap remedy in the future.

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6.0 ISSUES/RECOMMENDATIONS

There are no issues identified in this FYR for ASSY.

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the Five-Year Review:
The site does not have multiple OUs, Sitewide there are no issues or recommendations.

Issues and Recommendations Identified in the Five-Year Review:
None.

The following recommendations pertain to activities and schedule and do not affect protectiveness:

- DLA will conduct annual site inspections at the site to verify IC effectiveness, cap and fence integrity. Property owners will also be interviewed to see if they have any questions or concerns, DLA will submit a Tech Memo summarizing the annual site inspection;
- Conduct cap and fencing inspections and routine cap, slope and vegetation maintenance activities every 2 years. The next maintenance event will be conducted in summer 2020.
- Continue groundwater monitoring on a 5 year schedule to monitor contaminant trends. The next groundwater monitoring event will be conducted in 2023 and data included in the next five year review.
- Five year reviews will continue, per CERCLA, as long as waste remains on-site at levels that do not allow for UU/UE.
- Review the conservation easements for compliance with the Alaska Uniform Environmental Covenants Act, signed into Law November 7, 2018.
- Update prepared fact sheet, as required, that summarizes the remedy, ICs, and the points of contact at DLA, ADEC and EPA.

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7.0 PROTECTIVENESS STATEMENT

Sitewide Protectiveness Statement	
Protectiveness Determination: Protective	*Planned Addendum Completion Date:* N/A
Protectiveness Statement: The remedy at Arctic Surplus is protective of human health and the environment. The remedy is expected to remain protective of human health and the environment. Based upon the review of relevant documents and the site inspection, the remedy is functioning as intended by the ROD and ESD. There have been no changes in the physical condition of the site that would affect the protectiveness of the remedy. Long-term protectiveness of the RAs will be verified by ICs, LTM and O&M program, which monitors groundwater COC concentrations and inspects and maintains the integrity of the landfill cap and fences.	

The Superfund Long-Term Human Exposure Environmental Indicator Status for the Arctic Surplus Site remains "*Under Control and Protective Remedy In Place*" because the site is Construction Complete and the remedy is operating as intended. In addition, the required engineering and institutional controls are in place and effective.

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8.0 NEXT REVIEW

The next five-year review for ASSY Superfund Site is required five years from the date of the USEPA approval signature of this review. The integrity of the consolidation cell cap, groundwater monitoring data and ICs should be reviewed to ensure that the land use and groundwater restrictions are still in place and continue to be protective.

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FIGURES

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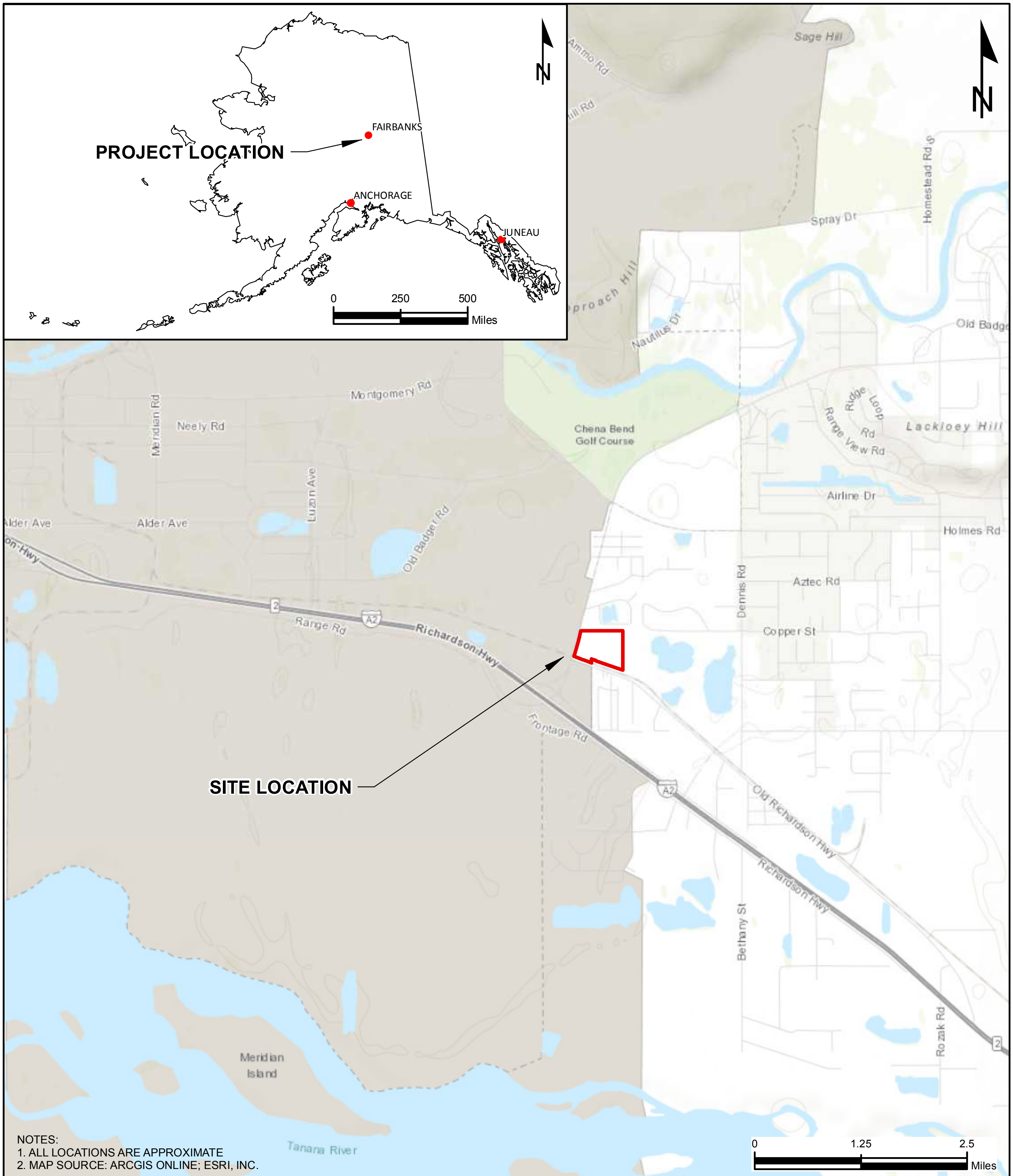


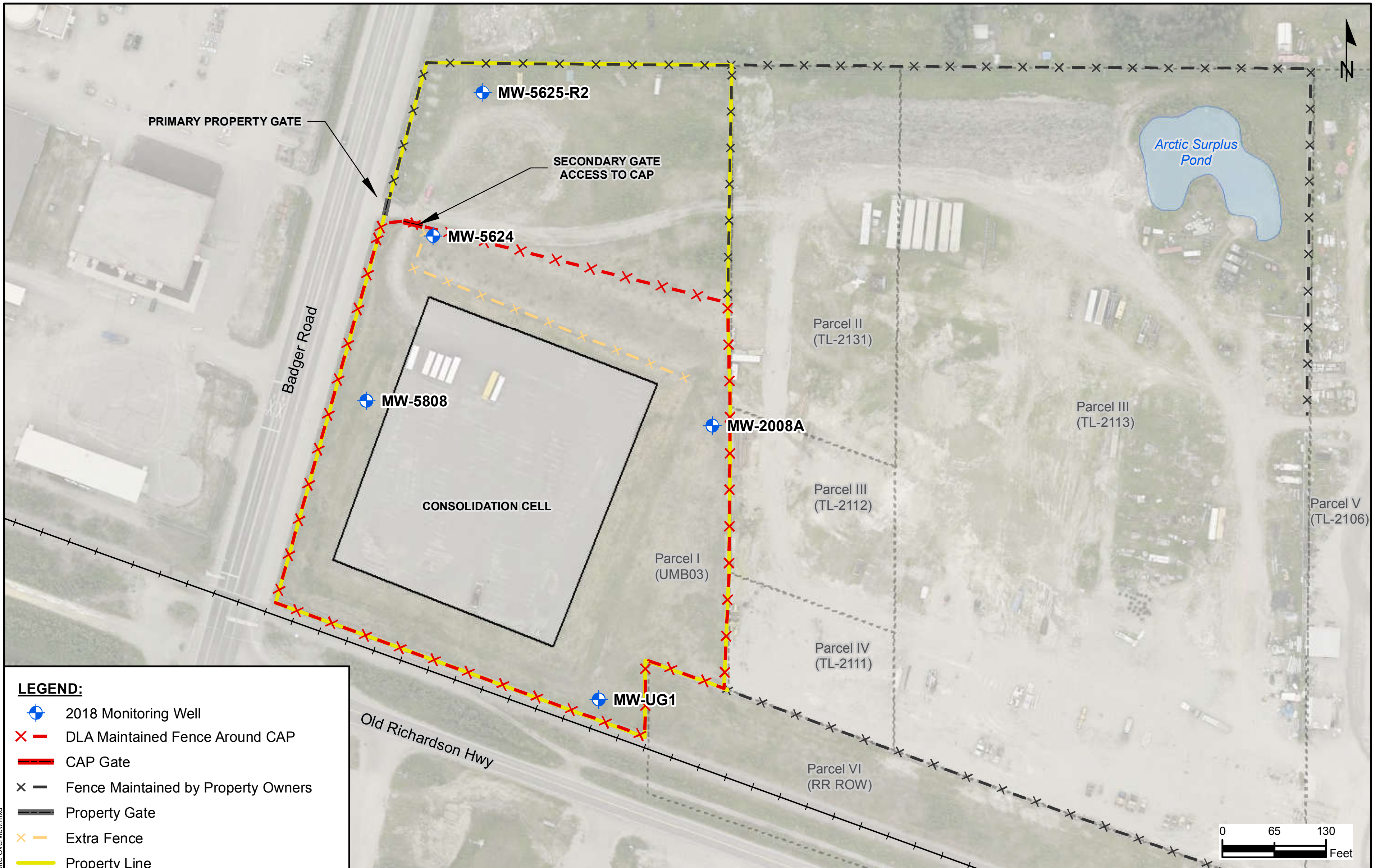
Third Five-Year Review
Former Arctic Surplus Salvage Yard (ASSY)
Fairbanks, Alaska

ALASKA DISTRICT
CORPS OF ENGINEERS
DEFENSE LOGISTICS AGENCY

STATE AND SITE VICINITY

Contract Number: W911KB-17-D-0019
Date: AUGUST 2018
Drafted By: L.D.
Figure Number: 1

Prepared by ldavis, 8/16/2018; K:\05172.003_ASSY\MXD\Fig1_State_Site.mxd



Third Five-Year Review
Former Arctic Surplus Salvage Yard (ASSY)
Fairbanks, Alaska

ALASKA DISTRICT
CORPS OF ENGINEERS
DEFENSE LOGISTICS AGENCY

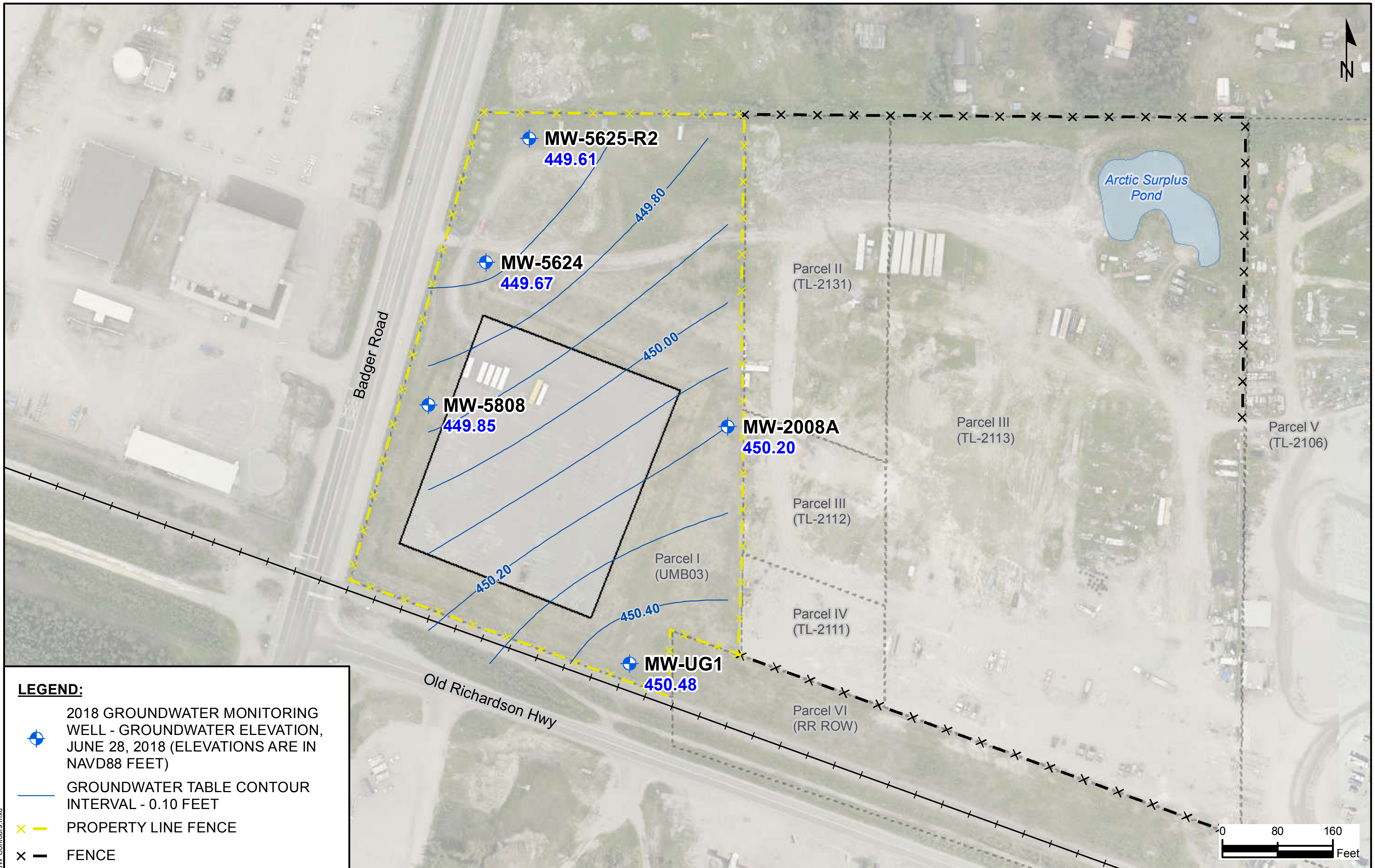
SITE OVERVIEW

Contract Number: W911KB-17-D-0019
Date: NOV 2018
Drafted By: L.D.

Figure Number: 2

NOTES:
1. Coordinate System - Projection: World Geodetic System 1984 (WGS84) - Universal Transverse Mercator (UTM), Zone 6N, US Survey Meters (displayed in feet)
2. Image acquired fro ESRI Basemaps 08.16.2018.

Document Path: K:\05172.003_ASSY\MXD\Fig2_Site Overview.mxd



LEGEND:

- 2018 GROUNDWATER MONITORING WELL - GROUNDWATER ELEVATION, JUNE 28, 2018 (ELEVATIONS ARE IN NAVD88 FEET)
- GROUNDWATER TABLE CONTOUR INTERVAL - 0.10 FEET
- PROPERTY LINE FENCE
- FENCE
- CONSOLIDATION CELL
- PARCEL BOUNDARY
- RAILROAD CENTERLINE

NOTES:
1. Coordinate System - Projection: World Geodetic System 1984 (WGS84) - Universal Transverse Mercator (UTM), Zone 6N, US Survey Meters (displayed in feet
2. Image acquired fro ESRI Basemaps 08.16.2018.

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Third Five-Year Review
Former Arctic Surplus Salvage Yard (ASSY)
Fairbanks, Alaska

ALASKA DISTRICT
CORPS OF ENGINEERS

DEFENSE LOGISTICS AGENCY

WELL LOCATION AND GROUNDWATER CONTOURS

Contract Number: W911KB-17-D-0019	Figure Number: 3
Date: AUGUST 2018	
Drafted By: L.D.	

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APPENDIX A

REFERENCE LIST

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APPENDIX A – REFERENCE LIST

Alaska Department of Environmental Conservation (ADEC), 2017. *Data Quality Objectives, Checklists, Quality Assurance Requirements for Laboratory Data, and Sample Handling*. Technical Memorandum. March.

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APPENDIX B

ASSY SITE CHRONOLOGY

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APPENDIX C

TITLE REVIEW AND CONSERVATION EASEMENTS

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APPENDIX D

2018 GROUNDWATER MONITORING REPORT

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FINAL

2018 GROUNDWATER MONITORING REPORT
ARCTIC SURPLUS SALVAGE YARD (ASSY)
FAIRBANKS, ALASKA

CONTRACT NO. W911KB-17-D-0019

NOVEMBER 2018

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ABRREVIATIONS & ACRONYMS

°C ....degrees Celsius
FYR.......................Five-Year Review
AAC ....Alaska Administrative Code
AFCEE.................Air Force Center for Environmental Excellence
ADEC....................Alaska Department of Environmental Conservation
AECOM................AECOM Technical Services
Ahtna.....................Ahtna Environmental, Inc.
ASSY ....Arctic Surplus Salvage Yard
bgs.........................below ground surface
CERCLA...............Comprehensive Environmental Response, Compensation, and Liability Act
COC ....contaminant of concern
CV.........................coefficient of variation
DCA ....dichloroethane
DCE.......................dichloroethylene
DLA ....Defense Logistics Agency
DO.........................dissolved oxygen
EDB.......................ethylene dibromide
EPA.......................U.S. Environmental Protection Agency
ESD.......................Explanation of Significant Differences
GAC ....granulated activated carbon
IC...........................institutional control
mg/L......................milligrams per liter
MS/MSD..............matrix spike/matrix spike duplicate
NPL.......................National Priorities List
O&M.....................operations and maintenance
ORP.......................oxygen reduction potential
PAL.......................project action limit
PCB.......................polychlorinated biphenyl
pH..........................potential of hydrogen
p.............................probability statistic
PPE........................personal protective equipment
PVC.......................polyvinyl chloride
ROD......................Record of Decision
S ....Mann-Kendall statistic
SARA....................Superfund Amendments and Reauthorization Act
TCE.......................trichloroethylene
UFP-QAPP............Uniform Federal Policy for Quality Assurance Project Plans
USACE .................U.S. Army Corps of Engineers
VOC ....volatile organic compound
WP.........................Work Plan
µg/L.......................micrograms per liter
% ....percent

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1.0 INTRODUCTION

This document presents the results of groundwater monitoring conducted at the Arctic Surplus Salvage Yard (ASSY) Site located in Fairbanks, Alaska (Figure 1). Groundwater monitoring activities were conducted in 2018 by Ahtna Environmental Inc. (Ahtna) under U.S. Army Corps of Engineers (USACE) contract number W911KB-17-D-0019, for work to be carried out on behalf of the Defense Logistics Agency (DLA). Groundwater monitoring is a component of the 2018 Five-Year Review (FYR) for the ASSY Site. The FYR requirement applies to all remedial actions selected under the 1980 Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for Sites with Records of Decision (RODs) signed after the effective date of the 1986 Superfund Amendments and Reauthorization Act (SARA). Per the second five-year review (EPA, 2014), groundwater monitoring at the site is to be conducted on a 5 year schedule, with this sampling event occurring June 26 to 28, 2018.

This report includes documentation of the field activities, laboratory and field analytical results, data review in accordance with Alaska Department of Environmental Conservation (ADEC) guidance, and recommendations for groundwater monitoring optimization.

1.1 Site History

The ASSY site was previously used as a landfill and salvage yard. Specific activities that impacted the site included lead-acid battery recycling; electric transformer salvage; and improper storage of oils, chemicals, containerized gases, and other hazardous materials. Soil contaminants previously detected on-site include lead, polychlorinated biphenyl (PCBs), pesticides, and dioxins/furans (AECOM, 2014).

The ASSY property was listed on the National Priorities List (NPL) in 1990, and in 1995 a ROD for the ASSY was signed. Changes to the ROD's proposed remedy were formally documented and approved in an Explanation of Significant Differences (ESD) issued in June 2003 (EPA, 2003). The final remedial action in 2003 addressed the remaining soil contamination with lead and PCBs above the industrial cleanup levels by solidification and stabilization of soils, then placement into a consolidation cell (landfill cap). The site was removed from the NPL in 2006. Routine groundwater monitoring, landfill cap inspection, and operations and maintenance (O&M) have been conducted since 2004. Detailed site history can be found in the *Second Five-Year Review, Arctic Surplus Salvage Yard, Fairbanks, Alaska* (EPA, 2014).

1.2 Contaminants of Potential Concern

Groundwater contaminants of concern (COCs) are volatile organic compounds (VOCs), lead, and PCBs. Only the VOC trichloroethylene (TCE) and arsenic have been detected at concentrations exceeding ADEC cleanup standards in one or more wells at the site. However, arsenic has been determined to be naturally occurring at the site..

1.3 Regulatory Setting

Per the approved UFP-QAPP for this monitoring event, the project action limits (PALs) are based on the ADEC's Table C Groundwater Cleanup Levels established in 18 Alaska Administrative Code (AAC) 75.345, *Oil and Other Hazardous Substances Pollution Control* (ADEC, 2017a). The 2018 FYR compares sampling results with the ROD/ESD mandated cleanup levels, including EPA maximum contaminant levels (MCLs) for drinking water or EPA regional screening levels (1x10-5 and HQ of 1.0). Per the ESD (EPA, 2003), the arsenic maximum contaminant level or PAL is based on the background level established for the area of 0.036 mg/L (USACE, 1994).

1.4 Project Objective

The objectives of the 2018 groundwater monitoring are to:

- Demonstrate that VOCs, lead, and PCBs are not leaching from the capped area into the groundwater at concentrations in excess of PALs, as applicable
- Monitor contaminant migration to ensure that VOCs, lead, and PCBs remain at concentrations below target levels at the property boundary to ensure protection of potential downgradient receptors

2.0 FIELD ACTIVITIES

This section describes the field activities performed May 22, 2018 and June 26 – 28, 2018. Field documentation including the field notebook and sampling forms are included in Appendix A. All work was performed in accordance with the Uniform Federal Policy Quality Assurance Project Plan (UFP-QAPP) Work Plan (WP) (Ahtna, 2018), and ADEC *Field Sampling Guidance* (ADEC, 2017b). Sampling was performed by Leslie Davis, an ADEC Qualified Environmental Professional, per 18 AAC 75 (ADEC, 2017a), with assistance from Nathan Hager, Ahtna geologist. Subcontractors included GeoTek Alaska, Inc. (drilling services) and Design Alaska, Inc. (well survey).

2.1.1 Groundwater Monitoring Well Network Inspection

Ahtna and DLA conducted an inspection of the existing monitoring wells at the site on May 22, 2018. All of the locks on the wells were unusable and had to be broken off to access the wells. Four of the wells (MW-5808, MW-5627-R, MW-5624, and MW-UG1) appeared to be in good condition based on the use of a water level indicator and visual observations. One of the wells (MW-5625-R) had its casing blocked by bentonite at approximately 6 feet below top of casing. It appeared the casing had cracked in the subsurface or a joint had separated, allowing the bentonite annular seal to entering the casing. This well was recommended for decommissioning prior to groundwater sampling.

2.1.2 Monitoring Well Decommissioning, Installation, and Development

Ahtna contracted GeoTek to decommission MW-5625-R and install a new monitoring well, labeled MW-5625-R2, approximately 5 feet to the south, on June 26, 2018. The well was decommissioned in accordance with the ADEC *Monitoring Well Guidance* (ADEC, 2013). The existing bollards and casing were removed without damage and were reused for the new well. The new well was constructed using 2-inch, Schedule 40 polyvinyl chloride (PVC) casing with a 20/40 pre-packed, 0.01-inch slotted well screen. A 10-foot-long screen was installed across the water table from 5.0 to 15.0 feet below ground surface (bgs); 10/20 silica sand was placed in the annulus from the base of the well to 1 foot above the screened interval, followed by bentonite chips to 2 feet bgs, which were immediately hydrated with water. Augured native soil was then placed above the bentonite seal to ground surface. The casing was cut approximately 2.5 feet above the ground surface.

Following a 48-hour waiting period after installation, the monitoring well was developed to remove fine-grained material from the filter pack and to facilitate groundwater movement from the formation through the well screen. Well development included cycles of surging and purging, using a bailer and peristaltic pump, to dislodge and remove fine-grained material. Well development was considered complete when water quality parameters stabilized and turbidity decreased to clear. Water quality parameters were recorded on a well development form included in Appendix A and summarized in Table 2.

2.1.3 Groundwater Sampling

Groundwater samples were collected from the five monitoring wells on June 28, 2018. Five primary samples and one field duplicate were collected.

A submersible bladder pump was used for purging and sampling groundwater, following the EPA low flow sampling procedure (Puls and Barcelona, 1996), and a Solinst® oil/water interface probe was used for monitoring water level. New, disposable polyethylene tubing was used for purging and sample collection at each well, and the oil/water interface probe and submersible pump were decontaminated following use at each well. Samples were collected from monitoring wells after groundwater quality parameters met the stabilization criteria identified in the ADEC *Field Sampling Guidance* (ADEC, 2017b) and the WP (Ahtna, 2018). Groundwater sampling details were recorded on sampling forms located in Appendix A.

Analytical groundwater samples were submitted to TestAmerica of Tacoma, Washington, for the analyses listed below.

- VOC by EPA Method 8260C and 8260C SIM (selective ion monitoring)
- ethylene dibromide (EDB) by Method 8011
- Metals by EPA Method 6020 Low Level
- PCB by EPA Method 8082A

Field duplicates were collected at a rate equal to 10 percent of primary samples collected, and matrix spike/matrix spike duplicate (MS/MSD) samples collected at a rate equal to 1 per 20 samples collected. One trip blank per cooler was included for VOC analysis. Laboratory analytical samples collected are shown in Table 3 included at the end of this document.

2.1.4 Survey

Ahtna contracted Design Alaska of Fairbanks, Alaska to perform a top of casing monitoring well survey on June 28, 2018. Survey results were provided in the World Geodetic System of 1984 (WGS84), Universal Transverse Mercator (UTM) Zone 6N (in meters). Vertical data were submitted in the North American Vertical Datum of 1988 (NAVD 88) in meters. Survey data was used to develop hydraulic gradient calculations shown on figure 2 and summarized in Section 3.1. Survey data is included in Appendix B.

2.2 Investigation-Derived Waste Management and Decontamination

The water level meter and bladder pump were washed with Alconox® and then rinsed with water after each use. Disposable bladders were changed out between wells. All other sampling equipment was disposable, requiring no decontamination. Disposable sample gear and PPE was bagged, taped shut, and disposed of in the Fairbanks North Star Borough landfill.

Decontamination and purge water was treated on-site with a granulated activated carbon (GAC) filter, and discharged to the ground surface after filtration. Soil cuttings generated during the installation of MW-5625-R2 were spread on the ground surface around the well.

2.3 Work Plan Deviations

The WP states that MW-5625-R2 will be installed with filter pack sand extending 2 feet above the top of the well screen. The filter pack height was reduced to 1 foot above the well screen so that the bentonite sealant was at least 2 feet bgs to minimize the potential for frost-jacking of the well casing.

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3.0 RESULTS

This section presents the results of field activities and analytical groundwater sampling conducted on June 28, 2018. Analytical results are presented in Table 3, located at the end of this report. A data quality report, laboratory analytical reports, and associated ADEC Laboratory Data Review Checklists are included in Attachment C.

3.1 Groundwater Field Measurements

Consistent with previous reports, groundwater flow at the site is to the northwest direction at a gradient of approximately 0.0013 ft/ft. Water levels at the site are an average 3.2 feet higher than water levels observed during the 2012 groundwater monitoring event (EPA, 2014). Groundwater elevations are summarized in Table 1 and shown on Figure 2. Groundwater quality parameters are summarized in Table 2.

TABLE 1: GROUNDWATER ELEVATION SUMMARY

Well ID	TOC Elevation (NAVD88, feet)	June, 28, 2018		
		Groundwater Depth (BTOC, feet)	Groundwater Elevation (NAVD88, feet)	Groundwater Depth (bgs, feet)
MW56252R2	458.291	8.68	449.61	5.99
MW5624	459.541	9.87	449.67	7.53
MW5808	459.011	9.16	449.85	7.45
MWUG1	458.781	8.3	450.48	5.62
MW2008A	458.281	8.08	450.20	4.90

TOC = top of casing
BTOC = below top of casing
bgs = below ground surface
NAVD88 = North American Vertical Datum of 1988

TABLE 2: GROUNDWATER QUALITY PARAMETERS SUMMARY

Well ID	Temp (ºC)	Conductivity (mS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (NTU)
MW56252R2	5.19	0.516	0.51	6.94	-10.5	91.09
MW5624	6.39	0.459	0.60	6.78	72.2	2.05
MW5808	5.19	0.419	0.59	7.29	-53.5	0.73
MWUG1	6.02	0.426	0.83	7.12	190.9	57.6
MW2008A	8.08	0.228	0.60	6.80	44.2	11.46

Well ID	Temp (ºC)	Conductivity (mS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (NTU)

°C = degree Celsius
DO = dissolved oxygen
mS/cm = milliSiemens per centimeter
mg/L = milligrams per liter
mV = millivolts
NTU = nephelometric turbidity units
ORP = oxidation reduction potential

3.2 Analytical Results

No COCs were detected at concentrations exceeding the PALs in any well sampled in 2018. Lead was detected in monitoring wells MW-5625-R2 at 0.0023 mg/L and MW-2008A at an estimated concentration of 0.00035 milligrams per liter (mg/L), below the PAL of 0.015 mg/L.

Arsenic was detected in all wells above the ADEC groundwater cleanup level of 0.00052 mg/L, but well below the naturally occurring arsenic level of 0.000036 mg/L (USACE, 1994). Arsenic concentrations ranged from 0.00072 mg/L to 0.014 mg/L. The highest concentration was detected at MW-5625-R2, located in the northwest corner of the site, consistent with previous reports (EPA, 2003; EPA, 2014).

TCE was detected in four wells, with the highest concentration reported at MW-2008A of 2.0 micrograms per liter (µg/L), below the PAL of 2.8 µg/L. Concentrations of TCE were reported at the other three wells ranging from 0.039 µg/L to 0.23 µg/L. Tetrachloroethylene (PCE) was detected at estimated concentrations of 0.033 µg/L and 0.079 µg/L at MW-5625-R2 and MW-2008A, respectively. Both concentrations are less than 1/10th of the PAL of 41 µg/L. Other VOCs including 1,1-dichloroethylene (-DCE) and 1,2-dichloroethane (-DCA) were detected at trace concentrations in one or more wells at the site.

Estimated concentrations of benzene were detected in four wells ranging from 0.1 µg/L to 0.096 µg/L, below the PAL of 4.6 µg/L. Naphthalene was detected in trace amounts in all samples, but concentrations are attributed to method blank contamination.

3.3 Trend Analysis

Ahtna performed a trend analysis using the historical monitoring results of TCE concentrations at MW-2008A. This well and COC were chosen as it had consistent detections of the analyte in at least 4 events, and had historic detections above the recently revised ADEC cleanup level. The analytical data were compared using the nonparametric Mann-Kendall test (Gilbert, 1987) to analyze whether concentrations of TCE exhibit an increasing or decreasing trend over time in a given well. The Mann-Kendall test compares a later-measured value to each earlier-measured value and assigns the integer value of -1, 0 or 1, indicating that the later value is lower, equal or higher than each earlier value. The Mann-Kendall test does not assume a distribution and is resistant to the influence of outliers. The Mann-Kendall calculation tables are presented in Appendix D.

The Mann-Kendall test assumes the null hypothesis of no trend unless the data indicate the alternative. Ahtna selected a significance level of $\alpha = 0.10$, or 10%. If the probability, p, of obtaining the computed Mann-Kendall statistic (S) is less than 0.10 (or 10%), the confidence level is greater than 90%. If $p < 0.10$, the null hypothesis is rejected and there is evidence to conclude that constituent 'x' in well point 'y' exhibits a trend. If the probability of obtaining S is greater than 0.10 ($p > 0.10$), then the confidence level is less than 90% and the null hypothesis is not rejected. If the confidence level is greater than 90%, then the sign of the S value indicates the trend direction, with a positive S value indicating an increasing trend and a negative S value indicating a decreasing trend.

The coefficient of variation (CV) for each data set was computed to determine the stability of the contaminants regardless of the trend. The CV value identifies the degree of variation in concentrations between sampling events and is defined as the sample standard deviation divided by the sample mean. The lower the value of the CV, the less variation exists and the more stable the concentration is in the well. Ahtna assigned a benchmark CV value of one based on Table 3.2 in the Air Force Center for Environmental Excellence (AFCEE) document: Designing Monitoring Programs to Effectively Evaluate the Performance of Natural Attenuation (AFCEE, 2000). For a negative S value with a confidence level of < 90%, a coefficient of variation less than one (CV < 1) indicates that the concentration at that location is stable, and CV > 1 indicates no trend.

A linear regression analysis was also performed on the data as a parametric alternative to the Mann-Kendall test. The analysis assesses the slope and computes the R^2 value of the least-squares regression on the sample mean. The R^2 value indicates the fit of the data, or distance of data points from the regression line. Higher R^2 values (> 0.8) indicate a close fit of the data and a strong correlation, suggesting that there is a trend. Values of R^2 between 0.5 and 0.8 suggest some correlation in the data and the possibility of a trend. Linear regression is based on the assumption that the data approximately follow a normal distribution and can confidently be used with 8 or more data points. With fewer than 8 data points it is difficult to determine if the normality assumption has been met and the linear regression has low power, or a lower probability of correctly detecting a trend when a trend exists. Linear regressions are provided as a qualitative assessment of trend, but should be used for decision-making with caution since the distribution of the data has not been determined and the number of data points has not been considered.

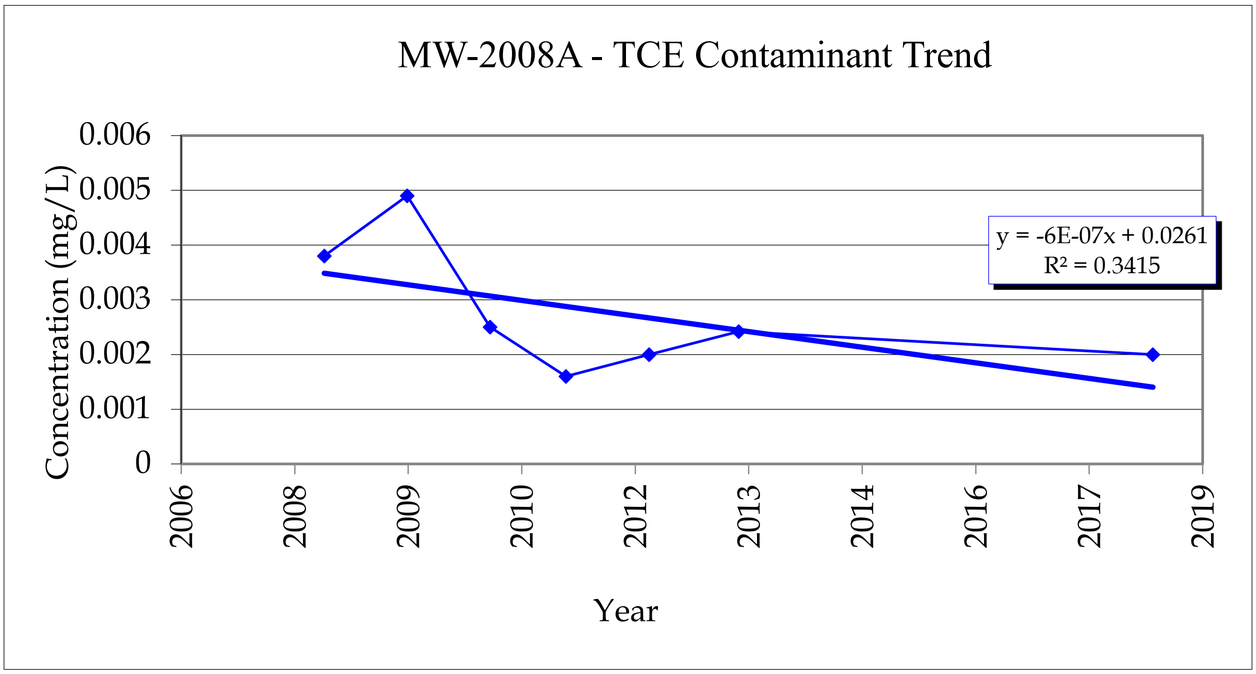
The results of the regression analyses and the Mann-Kendall tests for TCE concentrations are shown in Table 4 and Figure 3, below.

TABLE 4: MANN-KENDALL AND LINEAR REGRESSION STATISTICAL SUMMARY

Well ID	Statistical Method	n	S	Confidence Level	CV	R^2	Result
MW-2008A	Linear Regression	7	-10	0.93	0.43	0.3277	Probable Decreasing
	Mann-Kendall						Probable Decreasing

n = number of events
S = Mann-Kendall Statistic
R^2 = linear regression
CV = Coefficient of variance

FIGURE 3: LINEAR REGRESSION TREND ANALYSIS FOR TCE AT MW-2008A



4.0 DISCUSSION AND RECOMMENDATIONS

Select VOCs have had continued trace detections in groundwater, however there is no evidence of migration of contaminants to groundwater. TCE concentrations in MW-2008A exceeded the recently revised ADEC groundwater cleanup level of 2.8 µg/L in 2008 and 2009. Since 2010, TCE concentrations in MW-2008A have been below the PAL, ranging from 1.6 to 2.42 µg/L. The Mann-Kendall trend analysis indicates a probable decreasing trend in TCE concentrations at the well. It is recommended to continue groundwater monitoring on a 5 year schedule to monitor contaminant trends. The next groundwater monitoring event will be conducted in 2023 and data included in the next five year review.

Based on groundwater analytical results, the current remedy in place at the ASSY site (stabilization/capping) is functioning as intended to meet remedial action objectives.

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TABLES

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TABLE 1: 2018 GROUNDWATER MONITORING ANALYTICAL RESULTS

				Sample ID	18-GW-MW-UG1-01	18-GW-MW-5625-R2-01	18-GW-MW-5808-01	18-GW-MW-2008A-01
				Location ID	MW-UG-01	MW-5625-R2	MW-5808	MW-2008A
				Collection Date/Time	6/28/2018 10:30	6/28/2018 14:00	6/28/2018 15:20	6/28/2018 16:30
				Sample Delivery Group	580-78623-1	580-78623-1	580-78623-1	580-78623-1
				Sample Type	Primary MS/MSD	Primary	Primary	Primary
Analyte	**Method**	**CAS**	**Units**	**PAL[1]**	**Result [LOD] Qualifier**	**Result [LOD] Qualifier**	**Result [LOD] Qualifier**	**Result [LOD] Qualifier**
1,1,1,2-Tetrachloroethane	8260C SIM	630-20-6	ug/L	5.7	ND (0.009)	ND (0.009)	ND (0.009)	ND (0.009)
1,1,1-Trichloroethane	8260C	71-55-6	ug/L	8000	ND (0.14)	ND (0.14)	ND (0.14)	ND (0.14)
1,1,2,2-Tetrachloroethane	8260C SIM	79-34-5	ug/L	0.76	ND (0.049)	ND (0.049)	ND (0.049)	ND (0.049)
1,1,2-Trichloroethane	8260C SIM	79-00-5	ug/L	0.41	ND (0.017)	ND (0.017)	ND (0.017)	ND (0.017)
1,1-Dichloroethane	8260C	75-34-3	ug/L	28	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)
1,1-Dichloroethene	8260C SIM	75-35-4	ug/L	280	ND (0.014)	ND (0.014)	0.018 (0.014) J	ND (0.014)
1,1-Dichloropropene	8260C	563-58-6	ug/L	NE	ND (0.29)	ND (0.29)	ND (0.29)	ND (0.29)
1,2,3-Trichlorobenzene	8260C	87-61-6	ug/L	7	ND (0.46)	ND (0.46)	ND (0.46)	ND (0.46)
1,2,3-Trichloropropane	8011	96-18-4	ug/L	0.0075	ND (0.41)	ND (0.41)	ND (0.41)	ND (0.41)
1,2,4-Trichlorobenzene	8260C	120-82-1	ug/L	4	ND (0.33)	ND (0.33)	ND (0.33)	ND (0.33)
1,2,4-Trimethylbenzene	8260C	95-63-6	ug/L	15	ND (0.61)	ND (0.61)	ND (0.61)	ND (0.61)
1,2-Dibromo-3-Chloropropane	8260C	96-12-8	ug/L	NE	ND (1.8) J	ND (1.8)	ND (1.8)	ND (1.8)
1,2-Dibromoethane	8260C SIM	106-93-4	ug/L	0.075	ND (0.014)	ND (0.002)	ND (0.002)	ND (0.002)
1,2-Dibromopropane	8011	78-75-1	ug/L	NE	0.17 (0.011)	0.18 (0.011)	0.19 (0.011)	0.19 (0.011)
1,2-Dichlorobenzene	8260C	95-50-1	ug/L	300	ND (0.46)	ND (0.46)	ND (0.46)	ND (0.46)
1,2-Dichloroethane	8260C SIM	107-06-2	ug/L	1.7	ND (0.024)	0.035 (0.024) J	0.22 (0.024) J	ND (0.024)
1,2-Dichloroethane-d4 (Surr)	8260C SIM	17060-07-0	ug/L	NE	20 (0.2)	20 (0.2)	20 (0.2)	20 (0.2)
1,2-Dichloropropane	8260C	78-87-5	ug/L	4.4	ND (0.18)	ND (0.18)	ND (0.18)	ND (0.18)
1,3,5-Trimethylbenzene	8260C	108-67-8	ug/L	120	ND (0.55)	ND (0.55)	ND (0.55)	ND (0.55)
1,3-Dichlorobenzene	8260C	541-73-1	ug/L	300	ND (0.18)	ND (0.18)	0.66 (0.18) J	ND (0.18)
1,3-Dichloropropane	8260C	142-28-9	ug/L	NE	ND (0.35)	ND (0.35)	ND (0.35)	ND (0.35)
1,4-Dichlorobenzene	8260C SIM	106-46-7	ug/L	4.8	ND (0.014)	ND (0.014)	0.35 (0.014) J	ND (0.014)
2,2-Dichloropropane	8260C	594-20-7	ug/L	NE	ND (0.32)	ND (0.32)	ND (0.32)	ND (0.32)
2-Butanone	8260C	78-93-3	ug/L	5600	ND (4.7)	ND (4.7)	ND (4.7)	ND (4.7)
2-Chlorotoluene	8260C	95-49-8	ug/L	NE	ND (0.51)	ND (0.51)	ND (0.51)	ND (0.51)
2-He anone	8260C SIM	591-78-6	ug/L	38	ND (0.098)	ND (0.098)	ND (0.098)	ND (0.098)
4-Bromofluorobenzene (Surr)	8260C SIM	460-00-4	ug/L	NE	9.8 (0.17)	9.9 (0.17)	9.8 (0.17)	9.9 (0.17)
4-Chlorotoluene	8260C	106-43-4	ug/L	NE	ND (0.51)	ND (0.51)	ND (0.51)	ND (0.51)
4-Isopropyltoluene	8260C	99-87-6	ug/L	NE	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.28)
4-Methyl-2-pentanone	8260C	108-10-1	ug/L	6300	ND (2.5)	ND (2.5)	ND (2.5)	ND (2.5)
Acetone	8260C	67-64-1	ug/L	14000	ND (7.8) J	ND (7.8)	ND (7.8)	ND (7.8)
Arsenic	6020A	7440-38-2	mg/L	0.00052 / 0.036[2]	0.0091 (0.0002)	0.017 (0.0002)	0.014 (0.0002)	0.00072 (0.0002) J
Barium	6020A	7440-39-3	mg/L	3.8	0.13 (0.00021)	0.18 (0.00021)	0.15 (0.00021)	0.061 (0.00021)
Benzene	8260C SIM	71-43-2	ug/L	4.6	ND (0.009)	0.029 (0.009) J	0.096 (0.009) J	0.01 (0.009) J
Bromobenzene	8260C	108-86-1	ug/L	62	ND (0.18)	ND (0.18)	ND (0.18)	ND (0.18)
Bromochloromethane	8260C	74-97-5	ug/L	NE	ND (0.29)	ND (0.29)	ND (0.29)	ND (0.29)
Bromodichloromethane	8260C SIM	75-27-4	ug/L	1.3	ND (0.006)	ND (0.006)	ND (0.006)	ND (0.006)
Bromoform	8260C SIM	75-25-2	ug/L	33	ND (0.013)	ND (0.013)	ND (0.013)	ND (0.013)
Bromomethane	8260C SIM	74-83-9	ug/L	7.5	ND (0.012)	ND (0.012)	ND (0.012)	ND (0.012)
Cadmium	6020A	7440-43-9	mg/L	0.0092	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND (0.0001)
Carbon disulfide	8260C	75-15-0	ug/L	810	ND (0.53)	ND (0.53)	ND (0.53)	ND (0.53)
Carbon tetrachloride	8260C	56-23-5	ug/L	4.6	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)
Chlorobenzene	8260C	108-90-7	ug/L	78	ND (0.44)	ND (0.44)	2 (0.44)	ND (0.44)
Chloroethane	8260C	75-00-3	ug/L	21000	ND (1.1)	ND (1.1)	ND (1.1)	ND (1.1)
Chloroform	8260C SIM	67-66-3	ug/L	2.2	ND (0.009)	ND (0.009)	ND (0.009)	ND (0.009)
Chloromethane	8260C	74-87-3	ug/L	190	ND (5.4) J	ND (5.4)	ND (5.4)	ND (5.4)
Chromium	6020A	7440-47-3	mg/L	NE	0.0002 (0.00017) J F5	0.0027 (0.00017)	0.00024 (0.00017) J	0.00046 (0.00017)
cis-1,2-Dichloroethene	8260C	156-59-2	ug/L	36	ND (0.69)	ND (0.69)	ND (0.69)	ND (0.69)
cis-1,3-Dichloropropene	8260C SIM	10061-01-5	ug/L	NE	ND (0.026)	ND (0.026)	ND (0.026)	ND (0.026)
DCB Decachlorobiphenyl	8082A	2051-24-3	ug/L	NE	0.12 (0.0061)	0.12 (0.0061)	0.13 (0.0062)	0.15 (0.0065)
Dibromochloromethane	8260C SIM	124-48-1	ug/L	8.7	ND (0.016)	ND (0.016)	ND (0.016)	ND (0.016)
Dibromofluoromethane (Surr)	8260C SIM	1868-53-7	ug/L		9.9 (0.19)	20 (0.19)	9.9 (0.19)	20 (0.19)
Dibromomethane	8260C SIM	74-95-3	ug/L	8.3	ND (0.017)	ND (0.017)	ND (0.017)	ND (0.017)
Dichlorodifluoromethane	8260C	75-71-8	ug/L	200	ND (2.3) J	ND (2.3)	ND (2.3)	ND (2.3)
Ethylbenzene	8260C	100-41-4	ug/L	15	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Ethylene Dibromide	8011	106-93-4	ug/L	0.075	ND (0.002)	ND (0.014)	ND (0.014)	ND (0.014)
He achlorobutadiene	8260C SIM	87-68-3	ug/L	1.4	ND (0.026)	0.12 (0.026) J B	0.045 (0.026) J B	ND (0.026)
Isopropylbenzene	8260C	98-82-8	ug/L	450	ND (0.51)	ND (0.51)	ND (0.51)	ND (0.51)
Lead	6020A	7439-92-1	mg/L	0.015	ND (0.0002) J	0.0023 (0.0002)	ND (0.0002)	0.00035 (0.0002) J
Methyl tert-butyl ether	8260C	1634-04-4	ug/L	140	ND (0.44)	ND (0.44)	ND (0.44)	ND (0.44)
Methylene Chloride	8260C	75-09-2	ug/L	110	ND (1.4)	ND (1.4)	ND (1.4)	ND (1.4)
m- ylene & p- ylene	8260C	179601-23-1	ug/L	190	ND (0.75)	ND (0.75)	ND (0.75)	ND (0.75)
Naphthalene	8260C SIM	91-20-3	ug/L	1.7	0.016 (0.013) J B	0.08 (0.013) J B	0.027 (0.013) J B	0.022 (0.013) J B
n-Butylbenzene	8260C	104-51-8	ug/L	1000	ND (0.44)	ND (0.44)	ND (0.44)	ND (0.44)
N-Propylbenzene	8260C	103-65-1	ug/L	660	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
o- ylene	8260C	95-47-6	ug/L	190	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)
PCB-1016	8082A	12674-11-2	ug/L	NE	ND (0.062)	ND (0.062)	ND (0.063)	ND (0.066)
PCB-1221	8082A	11104-28-2	ug/L	NE	ND (0.076)	ND (0.076)	ND (0.077)	ND (0.081)
PCB-1232	8082A	11141-16-5	ug/L	NE	ND (0.064)	ND (0.064)	ND (0.065)	ND (0.068)
PCB-1242	8082A	53469-21-9	ug/L	NE	ND (0.06)	ND (0.06)	ND (0.061)	ND (0.064)
PCB-1248	8082A	12672-29-6	ug/L	NE	ND (0.053)	ND (0.053)	ND (0.053)	ND (0.056)
PCB-1254	8082A	11097-69-1	ug/L	NE	ND (0.076)	ND (0.076)	ND (0.077)	ND (0.081)
PCB-1260	8082A	11096-82-5	ug/L	NE	ND (0.062)	ND (0.062)	ND (0.063)	ND (0.066)
sec-Butylbenzene	8260C	135-98-8	ug/L	2000	ND (0.49)	ND (0.49)	ND (0.49)	ND (0.49)
Selenium	6020A	7782-49-2	mg/L	0.1	ND (0.0021)	ND (0.0021)	ND (0.0021)	ND (0.0021)
Silver	6020A	7440-22-4	mg/L	0.094	ND (0.000055)	ND (0.000055)	ND (0.000055)	ND (0.000055)
Styrene	8260C	100-42-5	ug/L	1200	ND (0.51)	ND (0.51)	ND (0.51)	ND (0.51)
t-Butylbenzene	8260C	98-06-6	ug/L	690	ND (0.58)	ND (0.58)	ND (0.58)	ND (0.58)
Tetrachloroethene	8260C SIM	127-18-4	ug/L	41	ND (0.017)	0.033 (0.017) J	ND (0.017)	0.079 (0.017) J
Tetrachloro-m- ylene	8082A	877-09-8	ug/L	NE	0.12 (0.0081)	0.1 (0.0081)	0.11 (0.0082)	0.13 (0.0086)
Toluene	8260C	108-88-3	ug/L	1100	ND (0.39)	ND (0.39)	ND (0.39)	ND (0.39)
Toluene-d8 (Surr)	8260C SIM	2037-26-5	ug/L	NE	9.6 (0.13)	9.6 (0.13)	9.6 (0.13)	9.5 (0.13)
trans-1,2-Dichloroethene	8260C	156-60-5	ug/L	360	ND (0.39)	ND (0.39)	ND (0.39)	ND (0.39)
trans-1,3-Dichloropropene	8260C SIM	10061-02-6	ug/L	NE	ND (0.027)	ND (0.027)	ND (0.027)	ND (0.027)
Trichloroethene	8260C SIM	79-01-6	ug/L	2.8	ND (0.009)	0.23 (0.009) J	0.065 (0.009) J	2.0 (0.009)
Trichlorofluoromethane	8260C	75-69-4	ug/L	NE	ND (0.63)	ND (0.63)	ND (0.63)	ND (0.63)
Trifluorotoluene (Surr)	8260C SIM	98-08-8	ug/L	NE	20 (1.2)	21 (1.2)	20 (1.2)	21 (1.2)
Vinyl chloride	8260C SIM	75-01-4	ug/L	0.19	ND (0.013)	ND (0.013)	0.019 (0.013) J	ND (0.013)

Notes

Gray highlighted results are non-detect with LODs above cleanup levels.

[1] PALs are derived from 18 AAC 75.341, Table C, *Oil and Other Hazardous Substances Pollution Control* (ADEC, 2017).

[2] Background level - Ft. Wainwright (USACE, 1994).

Data Qualifiers

J = Result is considered an estimated value; analyte was detected below the limit of quantitation (LOQ) but above the detection limit (DL).

B = Analyte result is considered a high estimated value due to contamination present in the method, trip, or equipment blank.

Acronyms and Abbreviations

µg/L = micrograms per liter
mg/L = milligrams per liter
PAL = project action limit
AAC = Alaska Administrative Code
ADEC = Alaska Department of Environmental Conservation
ID = identification
LOD = limit of detection
MS/MSD = matrix spike/matrix spike duplicate
NE = not established
NA = not analyzed
ND = not detected [LOD presented in brackets]
SIM = selective ion monitoring

TABLE 1: 2018 GROUNDWATER MONITORING ANALYTICAL RESULTS

				Sample ID	18-GW-MW-5624-01	18-GW-MW-5624-02	TBW-062818
				Location ID	MW-5624	MW-5624	N/A
				Collection Date/Time	6/28/2018 17:40	6/28/2018 17:50	6/28/2018 8:00
				Sample Delivery Group	580-78623-1	580-78623-1	580-78623-1
				Sample Type	Primary	Duplicate (18-GW-MW-5624-01)	Trip Blank
Analyte	**Method**	**CAS**	**Units**	**PAL[1]**	**Result [LOD] Qualifier**	**Result [LOD] Qualifier**	**Result [LOD] Qualifier**
1,1,1,2-Tetrachloroethane	8260C SIM	630-20-6	ug/L	5.7	ND (0.009)	ND (0.009)	ND (0.009)
1,1,1-Trichloroethane	8260C	71-55-6	ug/L	8000	ND (0.14)	ND (0.14)	ND (0.14)
1,1,2,2-Tetrachloroethane	8260C SIM	79-34-5	ug/L	0.76	ND (0.049)	ND (0.049)	ND (0.049)
1,1,2-Trichloroethane	8260C SIM	79-00-5	ug/L	0.41	ND (0.017)	ND (0.017)	ND (0.017)
1,1-Dichloroethane	8260C	75-34-3	ug/L	28	ND (0.22)	ND (0.22)	ND (0.22)
1,1-Dichloroethene	8260C SIM	75-35-4	ug/L	280	0.024 (0.014) J	ND (0.014)	ND (0.014)
1,1-Dichloropropene	8260C	563-58-6	ug/L	NE	ND (0.29)	ND (0.29)	ND (0.29)
1,2,3-Trichlorobenzene	8260C	87-61-6	ug/L	7	ND (0.46)	ND (0.46)	ND (0.46)
1,2,3-Trichloropropane	8011	96-18-4	ug/L	0.0075	ND (0.41)	ND (0.41)	ND (0.41)
1,2,4-Trichlorobenzene	8260C	120-82-1	ug/L	4	1.1 (0.33) J	1 (0.33) J	ND (0.33)
1,2,4-Trimethylbenzene	8260C	95-63-6	ug/L	15	ND (0.61)	ND (0.61)	ND (0.61)
1,2-Dibromo-3-Chloropropane	8260C	96-12-8	ug/L	NE	ND (1.8)	ND (1.8)	ND (1.8)
1,2-Dibromoethane	8260C SIM	106-93-4	ug/L	0.075	ND (0.002)	ND (0.002)	ND (0.0021)
1,2-Dibromopropane	8011	78-75-1	ug/L	NE	0.19 (0.011)	0.19 (0.011)	0.18 (0.011)
1,2-Dichlorobenzene	8260C	95-50-1	ug/L	300	0.47 (0.46) J	ND (0.46)	ND (0.46)
1,2-Dichloroethane	8260C SIM	107-06-2	ug/L	1.7	0.025 (0.024) J	0.029 (0.024) J	ND (0.024)
1,2-Dichloroethane-d4 (Surr)	8260C SIM	17060-07-0	ug/L	NE	20 (0.2)	20 (0.2)	20 (0.2)
1,2-Dichloropropane	8260C	78-87-5	ug/L	4.4	ND (0.18)	ND (0.18)	ND (0.18)
1,3,5-Trimethylbenzene	8260C	108-67-8	ug/L	120	ND (0.55)	ND (0.55)	ND (0.55)
1,3-Dichlorobenzene	8260C	541-73-1	ug/L	300	8.8 (0.18)	8.7 (0.18)	ND (0.18)
1,3-Dichloropropane	8260C	142-28-9	ug/L	NE	ND (0.35)	ND (0.35)	ND (0.35)
1,4-Dichlorobenzene	8260C SIM	106-46-7	ug/L	4.8	1.7 (0.014)	1.7 (0.014)	0.027 (0.014) J
2,2-Dichloropropane	8260C	594-20-7	ug/L	NE	ND (0.32)	ND (0.32)	ND (0.32)
2-Butanone	8260C	78-93-3	ug/L	5600	ND (4.7)	ND (4.7)	ND (4.7)
2-Chlorotoluene	8260C	95-49-8	ug/L	NE	ND (0.51)	ND (0.51)	ND (0.51)
2-He anone	8260C SIM	591-78-6	ug/L	38	ND (0.098)	ND (0.098)	ND (0.098)
4-Bromofluorobenzene (Surr)	8260C SIM	460-00-4	ug/L	NE	9.8 (0.17)	9.8 (0.17)	9.9 (0.17)
4-Chlorotoluene	8260C	106-43-4	ug/L	NE	ND (0.51)	ND (0.51)	ND (0.51)
4-Isopropyltoluene	8260C	99-87-6	ug/L	NE	ND (0.28)	ND (0.28)	ND (0.28)
4-Methyl-2-pentanone	8260C	108-10-1	ug/L	6300	ND (2.5)	ND (2.5)	ND (2.5)
Acetone	8260C	67-64-1	ug/L	14000	ND (7.8)	ND (7.8)	ND (7.8)
Arsenic	6020A	7440-38-2	mg/L	0.00052 / 0.036[2]	0.0015 (0.0002)	0.0013 (0.0002)	NA
Barium	6020A	7440-39-3	mg/L	3.8	0.055 (0.00021)	0.055 (0.00021)	NA
Benzene	8260C SIM	71-43-2	ug/L	4.6	0.053 (0.009) J	0.054 (0.009) J	0.0097 (0.009) J
Bromobenzene	8260C	108-86-1	ug/L	62	ND (0.18)	ND (0.18)	ND (0.18)
Bromochloromethane	8260C	74-97-5	ug/L	NE	ND (0.29)	ND (0.29)	ND (0.29)
Bromodichloromethane	8260C SIM	75-27-4	ug/L	1.3	ND (0.006)	ND (0.006)	ND (0.006)
Bromoform	8260C SIM	75-25-2	ug/L	33	ND (0.013)	ND (0.013)	ND (0.013)
Bromomethane	8260C SIM	74-83-9	ug/L	7.5	ND (0.012)	ND (0.012)	ND (0.012)
Cadmium	6020A	7440-43-9	mg/L	0.0092	ND (0.0001)	ND (0.0001)	NA
Carbon disulfide	8260C	75-15-0	ug/L	810	ND (0.53)	ND (0.53)	ND (0.53)
Carbon tetrachloride	8260C	56-23-5	ug/L	4.6	ND (0.3)	ND (0.3)	ND (0.3)
Chlorobenzene	8260C	108-90-7	ug/L	78	ND (0.44)	ND (0.44)	ND (0.44)
Chloroethane	8260C	75-00-3	ug/L	21000	ND (1.1)	ND (1.1)	ND (1.1)
Chloroform	8260C SIM	67-66-3	ug/L	2.2	ND (0.009)	ND (0.009)	0.012 (0.009) J
Chloromethane	8260C	74-87-3	ug/L	190	ND (5.4)	ND (5.4)	ND (5.4)
Chromium	6020A	7440-47-3	mg/L	NE	0.00036 (0.00017) J	0.00029 (0.00017) J	NA
cis-1,2-Dichloroethene	8260C	156-59-2	ug/L	36	ND (0.69)	ND (0.69)	ND (0.69)
cis-1,3-Dichloropropene	8260C SIM	10061-01-5	ug/L	NE	ND (0.026)	ND (0.026)	ND (0.026)
DCB Decachlorobiphenyl	8082A	2051-24-3	ug/L	NE	0.15 (0.0066)	0.16 (0.0065)	NA
Dibromochloromethane	8260C SIM	124-48-1	ug/L	8.7	ND (0.016)	ND (0.016)	ND (0.016)
Dibromofluoromethane (Surr)	8260C SIM	1868-53-7	ug/L		9.9 (0.19)	9.9 (0.19)	19 (0.19)
Dibromomethane	8260C SIM	74-95-3	ug/L	8.3	ND (0.017)	ND (0.017)	ND (0.017)
Dichlorodifluoromethane	8260C	75-71-8	ug/L	200	ND (2.3)	ND (2.3)	ND (2.3)
Ethylbenzene	8260C	100-41-4	ug/L	15	ND (0.5)	ND (0.5)	ND (0.5)
Ethylene Dibromide	8011	106-93-4	ug/L	0.075	ND (0.014)	ND (0.014)	ND (0.014)
He achlorobutadiene	8260C SIM	87-68-3	ug/L	1.4	ND (0.026)	ND (0.026)	0.12 (0.026) J B
Isopropylbenzene	8260C	98-82-8	ug/L	450	ND (0.51)	ND (0.51)	ND (0.51)
Lead	6020A	7439-92-1	mg/L	0.015	ND (0.0002)	ND (0.0002)	NA
Methyl tert-butyl ether	8260C	1634-04-4	ug/L	140	ND (0.44)	ND (0.44)	ND (0.44)
Methylene Chloride	8260C	75-09-2	ug/L	110	ND (1.4)	ND (1.4)	ND (1.4)
m- ylene & p- ylene	8260C	179601-23-1	ug/L	190	ND (0.75)	ND (0.75)	ND (0.75)
Naphthalene	8260C SIM	91-20-3	ug/L	1.7	0.019 (0.013) J B	0.019 (0.013) J B	0.081 (0.013) J B
n-Butylbenzene	8260C	104-51-8	ug/L	1000	ND (0.44)	ND (0.44)	ND (0.44)
N-Propylbenzene	8260C	103-65-1	ug/L	660	ND (0.5)	ND (0.5)	ND (0.5)
o- ylene	8260C	95-47-6	ug/L	190	ND (0.15)	ND (0.15)	ND (0.15)
PCB-1016	8082A	12674-11-2	ug/L	NE	ND (0.067)	ND (0.066)	NA
PCB-1221	8082A	11104-28-2	ug/L	NE	ND (0.083)	ND (0.081)	NA
PCB-1232	8082A	11141-16-5	ug/L	NE	ND (0.069)	ND (0.068)	NA
PCB-1242	8082A	53469-21-9	ug/L	NE	ND (0.065)	ND (0.064)	NA
PCB-1248	8082A	12672-29-6	ug/L	NE	ND (0.057)	ND (0.056)	NA
PCB-1254	8082A	11097-69-1	ug/L	NE	ND (0.083)	ND (0.081)	NA
PCB-1260	8082A	11096-82-5	ug/L	NE	ND (0.067)	ND (0.066)	NA
sec-Butylbenzene	8260C	135-98-8	ug/L	2000	ND (0.49)	ND (0.49)	ND (0.49)
Selenium	6020A	7782-49-2	mg/L	0.1	ND (0.0021)	ND (0.0021)	NA
Silver	6020A	7440-22-4	mg/L	0.094	ND (0.000055)	ND (0.000055)	NA
Styrene	8260C	100-42-5	ug/L	1200	ND (0.51)	ND (0.51)	ND (0.51)
t-Butylbenzene	8260C	98-06-6	ug/L	690	ND (0.58)	ND (0.58)	ND (0.58)
Tetrachloroethene	8260C SIM	127-18-4	ug/L	41	ND (0.017)	ND (0.017)	ND (0.017)
Tetrachloro-m- ylene	8082A	877-09-8	ug/L	NE	0.13 (0.0088)	0.14 (0.0087)	NA
Toluene	8260C	108-88-3	ug/L	1100	ND (0.39)	ND (0.39)	ND (0.39)
Toluene-d8 (Surr)	8260C SIM	2037-26-5	ug/L	NE	9.6 (0.13)	9.6 (0.13)	9.6 (0.13)
trans-1,2-Dichloroethene	8260C	156-60-5	ug/L	360	ND (0.39)	ND (0.39)	ND (0.39)
trans-1,3-Dichloropropene	8260C SIM	10061-02-6	ug/L	NE	ND (0.027)	ND (0.027)	ND (0.027)
Trichloroethene	8260C SIM	79-01-6	ug/L	2.8	0.043 (0.009) J	0.039 (0.009) J	ND (0.009)
Trichlorofluoromethane	8260C	75-69-4	ug/L	NE	ND (0.63)	ND (0.63)	ND (0.63)
Trifluorotoluene (Surr)	8260C SIM	98-08-8	ug/L	NE	21 (1.2)	21 (1.2)	20 (1.2)
Vinyl chloride	8260C SIM	75-01-4	ug/L	0.19	ND (0.013)	ND (0.013)	ND (0.013)

Notes

Gray highlighted results are non-detect with LODs above cleanup levels.

[1] PALs are derived from 18 AAC 75.341, Table C, *Oil and Other Hazardous Substances Pollution Control* (ADEC, 2017).

[2] Background level - Ft. Wainwright (USACE, 1994).

Data Qualifiers

J = Result is considered an estimated value; analyte was detected below the limit of quantitation (LOQ) but above the detection limit (DL).

B = Analyte result is considered a high estimated value due to contamination present in the method, trip, or equipment blank.

Acronyms and Abbreviations

µg/L = micrograms per liter
mg/L = milligrams per liter
PAL = project action limit
AAC = Alaska Administrative Code
ADEC = Alaska Department of Environmental Conservation
ID = identification
LOD = limit of detection
MS/MSD = matrix spike/matrix spike duplicate
NE = not established
NA = not analyzed
ND = not detected [LOD presented in brackets]
SIM = selective ion monitoring

FIGURES

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APPENDIX A

FIELD LOGBOOK AND SAMPLING FORMS

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APPENDIX B

SURVEY DATA

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APPENDIX C

DATA QUALITY REVIEW, ADEC CHECKLIST, AND LAB REPORTS

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APPENDIX D

MANN-KENDAL TREND ANALYSIS CALCULATIONS

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ASSY

Mann-Kendall Test for Trend Analysis

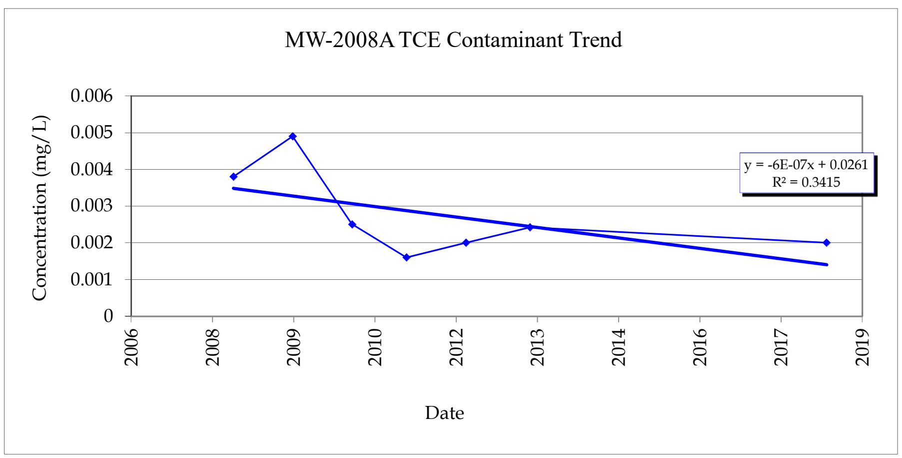
Monitoring Well: MW-2008A
Contaminant: TCE

Result above Reporting Limit (Y/N)?	y	y	y	y	y	y	y									
Monitoring date:	1-Jul-08	1-Jul-09	1-Jul-10	1-Jun-11	1-Jun-12	1-Jul-13	30-Jun-18									
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Event 11	Event 12	Event 13	Event 14	Event 15	
Concentration (mg/L):	0.0038	0.0049	0.0025	0.0016	0.002	0.00242	0.002									
Row 1: Compare to Event 1		1	-1	-1	-1	-1	-1									-4
Row 2: Compare to Event 2			-1	-1	-1	-1	-1									-5
Row 3: Compare to Event 3				-1	-1	-1	-1									-4
Row 4: Compare to Event 4					1	1	1									3
Row 5: Compare to Event 5						1	0									1
Row 6: Compare to Event 6							-1									-1
Row 7: Compare to Event 7																0
Row 8: Compare to Event 8																0
Row 9: Compare to Event 9																0
Row 10: Compare to Event 10																0
Row 11: Compare to Event 11																0
																0
																0
																0

Mann-Kendall Statistic (S) = Total	**-10**
Confidence Level	**0.933436**
Coefficient of Variance (CV)	**0.43**
Number of Events (n)	**7**
R^2	**0.3277**

Notes:

– A minimum of four (4) independent sampling events are required for the Mann-Kendall test to be valid.
– Non-detects are listed as 1/2 of the Reporting Limit (RL)
– A negative S value with confidence > 90% and < 95% indicates a probable decreasing concentration trend.
– A negative S value with confidence > 95% indicates a decreasing concentration trend.
– A positive S value with confidence > 90% and < 95% indicates a probable increasing concentration trend.
– A positive S value with confidence > 95% indicates an increasing concentration trend.
– A positive S value with confidence < 90% indicates that there is likely no concentration trend.
– A negative S value with confidence < 90% and COV > 1 indicates that there is likely no concentration trend.
– A negative S value with confidence < 90% and COV < 1 indicates a stable concentration trend.
– The closer to zero the CV is, the less variation in concentrations between sampling events.
- R^2 is calculated without testing the approximate normality of the data. Additionally, if sample size is < 8, the power of the linear regression is low.
- R^2 values between 0.5 and 0.8 indicate possible correlation, suggesting that there is possibly a trend.
- R^2 values greater than 0.8 indicate a correlation, suggesting that there is likely a trend.
Confidence Level Determination Based on Table A18 (Gilbert 1987)
Effects of Coefficient of Variance based on Table 3.2 (AFCEE, 2000)



Trend Analysis	
Statistical Method	**Result**
Linear Regression	bable Decreasing
Mann-Kendall	bable Decreasing

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Location	Statistical Method	n	S	Confidence Level	CV	R^2	Result
MW-2008A	Linear Regression	7	-10	0.93343576	0.43	0.3277	Probable Decreasing
	Mann-Kendall						Probable Decreasing

Notes:

Contaminant: **Trichloroethylene (TCE)**

n = Number of Events

S = Mann-Kendall Statistic

R^2 = Linear Regression

CV = Coefficient of Variance

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Confidence Levels for Mann-Kendall S Statistic and Sample Size, from Standard Normal Z-Score

S (+/-)	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
4	0.9128843	0.8364066	0.7738148	0.7259972	0.6896546	0.6616713	0.6397426	0.6222516	0.6080692	0.5963984	0.586667	0.5784574	0.5714591	0.5654377	0.5602136	0.5556472	0.5516286
5	0.9552853	0.8896643	0.826221	0.7736554	0.7319066	0.6989162	0.6726396	0.6514542	0.6341491	0.6198338	0.6078518	0.5977145	0.5890542	0.5815901	0.5751058	0.5694318	0.5644343
6	0.97923	0.9291777	0.8701718	0.8162396	0.7710495	0.7341927	0.7042475	0.6797856	0.6596233	0.6428374	0.6287216	0.6167374	0.6064718	0.5976062	0.5898916	0.5831324	0.5771727
7	0.9912914	0.9567946	0.905757	0.853443	0.8067619	0.7672439	0.734375	0.7071058	0.6843891	0.665333	0.6492195	0.6354828	0.623679	0.61346	0.6045507	0.5967327	0.5898309
8	0.9967108	0.9749782	0.9335725	0.8852219	0.8388502	0.7978758	0.7628628	0.7332917	0.7083533	0.6872503	0.669292	0.6539096	0.6406438	0.6291266	0.6190633	0.610217	0.6023962
9	0.9988827	0.9862568	0.954563	0.9117629	0.8672448	0.8259587	0.7895857	0.758239	0.7314331	0.7085247	0.6888891	0.671979	0.6573357	0.644582	0.6334103	0.6235699	0.6148561
10	0.9996591	0.9928471	0.9698554	0.9334358	0.8919897	0.8514267	0.8144533	0.7818625	0.7535569	0.7290985	0.7079648	0.6896546	0.673726	0.6598033	0.6475733	0.6367765	0.6271986
11	0.9999067	0.9964746	0.9806112	0.9507395	0.9132269	0.8742739	0.8374103	0.8040976	0.7746649	0.7489209	0.7264774	0.7069027	0.6897874	0.6747684	0.6615345	0.6498225	0.6394118
12	0.9999771	0.9983557	0.9879147	0.9642473	0.9311771	0.8945485	0.8584346	0.8248993	0.7947092	0.7679483	0.7443898	0.7236924	0.7054946	0.6894569	0.6752772	0.662694	0.6514845
13	0.999995	0.9992746	0.9927025	0.9745571	0.9461189	0.912346	0.8775356	0.8442426	0.8136543	0.7861447	0.7616696	0.739996	0.7208245	0.7038494	0.6887853	0.6753779	0.6634056
14	0.999999	0.9996974	0.9957325	0.9822509	0.9583677	0.9278001	0.8947511	0.8621211	0.8314763	0.803482	0.7782893	0.7557888	0.7357558	0.7179278	0.7020438	0.6878616	0.6751647
15	0.9999998	0.9998807	0.9975839	0.9878647	0.9682567	0.9410746	0.9101438	0.8785459	0.8481634	0.8199392	0.7942262	0.7710495	0.7502694	0.7316759	0.7150387	0.7001332	0.6867519
16	1	0.9999556	0.9986759	0.9918695	0.9761194	0.9523536	0.9237969	0.893544	0.8637144	0.835503	0.8094628	0.7857598	0.7643484	0.7450785	0.727757	0.7121815	0.6981575
17	1	0.9999844	0.9992978	0.994663	0.9822761	0.9618336	0.9358106	0.9071568	0.8781389	0.8501673	0.8239861	0.799905	0.7779782	0.7581221	0.7401866	0.7239963	0.7093726
18	1	0.9999948	0.9996397	0.9965681	0.9870238	0.9697156	0.9462977	0.9194375	0.8914555	0.8639327	0.8377882	0.8134734	0.7911464	0.7707949	0.7523169	0.7355677	0.7203889
19	1	0.9999984	0.9998212	0.9978384	0.9906294	0.976198	0.9553792	0.9304496	0.9036919	0.8768063	0.8508656	0.8264569	0.8038428	0.7830866	0.7641378	0.7468871	0.7311984
20	1	0.9999995	0.9999141	0.9986667	0.9933262	0.9814719	0.9631809	0.9402645	0.9148828	0.8888013	0.8632193	0.8388502	0.8160597	0.7949883	0.775641	0.7579462	0.7417939
21	1	0.9999999	0.9999601	0.9991946	0.9953126	0.9857162	0.9698297	0.9489595	0.9250696	0.8999359	0.8748545	0.8506512	0.8277912	0.806493	0.7868188	0.768738	0.7521686
22	1	1	0.9999821	0.9995236	0.9967536	0.9890949	0.975451	0.9566159	0.934299	0.9102337	0.8857801	0.8618608	0.839034	0.817595	0.7976649	0.7792559	0.7623166
23	1	1	0.9999922	0.9997242	0.997783	0.9917557	0.9801657	0.963317	0.9426216	0.9197221	0.8960088	0.8724825	0.8497864	0.8282903	0.808174	0.7894944	0.7722323
24	1	1	0.9999967	0.9998436	0.9985073	0.9938283	0.9840884	0.9691467	0.9500915	0.9284322	0.9055563	0.8825226	0.8600492	0.8385762	0.818342	0.7994487	0.7819108
25	1	1	0.9999987	0.9999132	0.9990091	0.9954254	0.9873263	0.9741875	0.9567644	0.9363982	0.9144413	0.8919897	0.8698247	0.8484517	0.828166	0.8091149	0.7913479
26	1	1	0.9999995	0.9999529	0.9993516	0.9966428	0.9899777	0.9785199	0.9626976	0.9436565	0.9226851	0.9008947	0.8791173	0.8579172	0.8376438	0.8184898	0.8005399
27	1	1	0.9999998	0.9999749	0.9995817	0.9975607	0.9921314	0.982221	0.9679482	0.9502456	0.9303111	0.9092504	0.8879328	0.8669741	0.8467747	0.8275711	0.8094838
28	1	1	0.9999999	0.999987	0.999734	0.9982454	0.993867	0.9853637	0.972573	0.9562049	0.9373444	0.9170717	0.896279	0.8756256	0.8555586	0.8363572	0.8181771
29	1	1	1	0.9999934	0.9998333	0.9987505	0.9952545	0.9880162	0.9766275	0.9615746	0.9438118	0.9243747	0.9041647	0.8838756	0.8639967	0.8448473	0.8266179
30	1	1	1	0.9999967	0.999897	0.9991191	0.9963548	0.9902413	0.9801654	0.966395	0.9497409	0.9311771	0.9116003	0.8917296	0.872091	0.8530414	0.834805
31	1	1	1	0.9999984	0.9999373	0.9993853	0.9972205	0.9920966	0.9832379	0.9707062	0.9551603	0.9374977	0.9185973	0.8991938	0.8798443	0.8609401	0.8427376
32	1	1	1	0.9999992	0.9999624	0.9995754	0.9978962	0.9936343	0.9858938	0.9745478	0.960099	0.9433564	0.9251682	0.9062756	0.8872604	0.8685447	0.8504155
33	1	1	1	0.9999996	0.9999777	0.9997097	0.9984194	0.9949011	0.9881789	0.9779581	0.9645862	0.9487735	0.9313265	0.9129832	0.8943437	0.8758573	0.8578391
34	1	1	1	0.9999998	0.999987	0.9998035	0.9988212	0.9959383	0.9901356	0.9809744	0.9686509	0.9537702	0.9370863	0.9193256	0.9010995	0.8828804	0.8650094
35	1	1	1	0.9999999	0.9999925	0.9998684	0.9991274	0.9967825	0.9918033	0.9836322	0.972322	0.9583677	0.9424627	0.9253124	0.9075337	0.8896172	0.8719275
36	1	1	1	1	0.9999958	0.9999127	0.9993589	0.9974653	0.9932181	0.9859655	0.9756275	0.9625877	0.9474709	0.9309541	0.9136528	0.8960716	0.8785955
37	1	1	1	1	0.9999976	0.9999427	0.9995325	0.9980144	0.9944126	0.9880062	0.9785951	0.9664516	0.9521267	0.9362615	0.919464	0.9022478	0.8850155

> 90% and < 95% Confidence

> 95% Confidence

Notes:

– The test statistic, tau, is computed as $\tau = S/(n(n-1)/2)$

Donald W. Meals, Jean Spooner, Steven A. Dressing, and Jon B. Harcum. 2011. Statistical analysis for monotonic trends, Tech Notes 6, November 2011. Developed for U.S. Environmental Protection Agency by Tetra Tech, Inc., Fairfax, VA, 23 p. Available online at www.bae.ncsu.edu/programs/extension/wqg/319monitoring/tech_notes.htm.

– The standard normal *z*-score is defined as $z = \tau((9n(n-1))/(2(2n+5)))^{1/2}$

Ajit C. Tamhane and Dorothy D. Dunlop. 2000. Statistics and Data Analysis, from Elementary to Intermediate. Prentice Hall, Upper Saddle River, NJ 07458. p. 591

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APPENDIX E

SITE INTERVIEW FORMS

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APPENDIX F

HISTORICAL GROUNDWATER MONITORING RESULTS

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Historical Groundwater Analytical Results
Arctic Surplus Salvage Yard

		MW-5624								
Analyte	Unit	Jul-08	Sep-09	Jul-10	Jun-11	Jun-12	Jul-13	Jun-18	ROD/ESD[a] or EPA MCL[b] Groundwater Cleanup Standards	ADEC Groundwater Cleanup Levels[c]
Primary Contaminants of Concern										
Lead	mg/L	0.001 U	0.0001 B	0.00003	0.002 U	0.0002 U	0.00025 U	0.00020 U	0.015[d]	0.015[d]
Polychlorinated Biphenyls (PCBs)										
Aroclor-1016	µg/L	0.111 U	0.01 U	-	0.48 U	0.48 U	0.408 U	0.067 U	0.5[b]	0.5
Aroclor-1221	µg/L	0.111 U	0.02 U	-	0.48 U	0.48 U	0.408 U	0.083 U	0.5[b]	0.5
Aroclor-1232	µg/L	0.111 U	0.01 U	-	0.48 U	0.48 U	0.408 U	0.069 U	0.5[b]	0.5
Aroclor-1242	µg/L	0.111 U	0.01 U	-	0.48 U	0.48 U	0.408 U	0.065 U	0.5[b]	0.5
Aroclor-1248	µg/L	0.111 U	0.01 U	-	0.48 U	0.48 U	0.408 U	0.057 U	0.5[b]	0.5
Aroclor-1254	µg/L	0.111 U	0.01 U	-	0.48 U	0.48 U	0.408 U	0.083 U	0.5[b]	0.5
Aroclor-1260	µg/L	0.111 U	0.008 J	-	0.48 U	0.48 U	0.408 U	0.067 U	0.5[b]	0.5
Trichloroethene	µg/L	1 U	0.12 J	1 U	1 U	1 U	1 U	0.043 J	5[b]	2.8
Volatile Organic Compounds (VOCs) by Method 8260B or 8260C (2018 Results)										
1,1-Dichloroethane	µg/L	-	0.10 B	0.11 J	0.079 F	0.065 F	1 U	0.22 U	140[e]	28
1,1-Dichloroethene	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	0.024 J	7[b]	280
1,2-Dichlorobenzene	µg/L	-	0.94 J	0.56 J	0.38 F	0.49 F	0.312 F	0.47 J	600[b]	300
1,3-Dichlorobenzene	µg/L	-	17 B	14	14	13	7.38	8.8	n/a	300
1,4-Dichlorobenzene	µg/L	-	1.6 B	1.2	0.50 U	1.2	0.927 F	1.7	75[b]	4.8
1,2,3-Trichlorobenzene	µg/L	-	0.28 B	0.13 B	1 U	1 U	1 U	0.46 U	70*	7
1,2,4-Trichlorobenzene	µg/L	13.4	14 B	8.9	6.2	4.9	2.23	1.1 J	70[b]	4
Benzene	µg/L	-	0.24 B	0.21 J	0.4 U	0.4 U	1 U	0.053 J	5[b]	4.6
Chlorobenzene	µg/L	-	0.10 J	0.5 U	0.5 U	0.5 U	1 U	0.44 U	100[b]	78
cis-1,2-Dichloroethene	µg/L	0.980 J	1.1	0.72 J	0.55 F	0.58 F	0.318 F	0.69 U	70[b]	36
Tetrachloroethene	µg/L	1 U	1.0 U	1 U	1 U	1 U	1 U	0.017 U	5[b]	41
Toluene	µg/L	-	0.40 B	0.36 B	1 U	1 U	1 U	0.39 U	1000[b]	1100
trans-1,2-Dichloroethene	µg/L	0.620 J	0.52 J	0.43 J	0.34 F	0.27 F	1 U	0.39 U	100[b]	360
Vinyl Chloride	µg/L	1 U	1.0 U	1 U	1 U	1 U	1 U	0.013 U	2[b]	0.19
Pesticides by Method 8081A										
4,4'-DDD	µg/L	0.033 U	-	-	-	-	-	-	3.2[e]	0.32
4,4'-DDE	µg/L	0.033 U	-	-	-	-	-	-	2.3[e]	0.46
4,4'-DDT	µg/L	0.033 U	-	-	-	-	-	-	2.3[e]	2.3
Metals by Method 6020										
Antimony	mg/L	0.001 U	-	0.000122	-	-	0.0005 U	-	0.025[a]	0.0078
Arsenic	mg/L	0.00321 J	-	0.0028	-	-	0.00146	0.0015	0.036[d]	0.00052[a]
Manganese	mg/L	0.815	-	0.828	-	-	0.45	-	2.9[a]	n/a
EDB and DBCP by Method 8011										
1,2,3-Trichloropropane	µg/L	-	-	-	-	-	-	0.0080 U	0.0084[e]	0.0075
Ethylene Dibromide	µg/L	-	-	-	-	-	-	0.0020 U	0.05[b]	0.075

Qualifier	Description
B	The analyte was postively identified; the result is from blank contamination.
J / F	The analyte was positively identified; the quantitation is an estimate.
U	The analyte was analyzed for, but not detected. The associated numerical value is at or below the MDL.
UJ	The analyte was analyzed for, but not detected. The quantitation is an estimate.
R	The data is rejected; data is not usable.
Notes	
a	Arctic Surplus Record of Decision (ROD)/ Explanation of Significant Differences (ESD)
b	Environmental Protection Agency (EPA) Maximum Contaminant Levels (MCL) for Drinking Water (40 CFR 141)
c	ADEC groundwater cleanup levels established in 18 AAC 75.345 (November 2017)
d	Background level - Ft. Wainwright (USACE, 1994), as mandated in the ESD.
e	EPA regional screening levels ($1x10^{-5}$ and HQ of 1.0)
*	EPA regional screening level (Noncarcinogenic SL Child THI = 1)
-	Not analyzed
n/a	no cleanup level established
µg/L	microgram per liter
AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
CFR	Code of Federal Regulations
EDB	ethlyene dibromide
MCL	Maximum Contaminant Level
MDL	method detection limit
mg/L	milligram per liter

Historical Groundwater Analytical Results
Arctic Surplus Salvage Yard

Analyte	Unit	MW-5625-R / R2**							ROD/ESD[a] or EPA MCL[b] Groundwater Cleanup Standards	ADEC Groundwater Cleanup Levels[c]
		Jul-08	Sep-09	Jul-10	Jun-11	Jun-12	Jul-13	Jun-18		
Primary Contaminants of Concern										
Lead	mg/L	0.001 U	0.00014	0.000015 B	0.002 U	0.0002 U	0.0004 F	0.0023	0.015[d]	0.015[d]
Polychlorinated Biphenyls (PCBs)										
Aroclor-1016	μg/L	0.108 U	0.005 U	-	0.48 U	0.52 U	0.408 U	0.062 U	0.5[b]	0.5
Aroclor-1221	μg/L	0.108 U	0.01 U	-	0.48 U	0.52 U	0.408 U	0.076 U	0.5[b]	0.5
Aroclor-1232	μg/L	0.108 U	0.005 U	-	0.48 U	0.52 U	0.408 U	0.064 U	0.5[b]	0.5
Aroclor-1242	μg/L	0.108 U	0.005 U	-	0.48 U	0.52 U	0.408 U	0.060 U	0.5[b]	0.5
Aroclor-1248	μg/L	0.108 U	0.005 U	-	0.48 U	0.52 U	0.408 U	0.053 U	0.5[b]	0.5
Aroclor-1254	μg/L	0.108 U	0.005 U	-	0.48 U	0.52 U	0.408 U	0.076 U	0.5[b]	0.5
Aroclor-1260	μg/L	0.108 U	0.015	-	0.48 U	0.52 U	0.408 U	0.062 U	0.5[b]	0.5
Trichloroethene	μg/L	0.570 J	0.57 J	0.37 J	0.32 F	0.29 F	1 U	0.23 J	5[b]	2.8
Volatile Organic Compounds (VOCs) by Method 8260B or 8260C (2018 Results)										
1,1-Dichloroethane	μg/L	-	1 U	0.80 J	1 U	0.057 F	1 U	0.22 U	140[e]	28
1,1-Dichloroethene	μg/L	1 U	1 U	1 U	1 U	1 U	1 U	0.014 U	7[b]	280
1,2-Dichlorobenzene	μg/L	-	0.16 J	1 U	1 U	1 U	1 U	0.46 U	600[b]	300
1,2,3-Trichlorobenzene	μg/L	-	0.18 B	1 U	1 U	1 U	1 U	0.46 U	70*	7
1,2,4-Trichlorobenzene	μg/L	1 U	0.79 B	1 U	1 U	1 U	1 U	0.33 U	70[b]	4
1,3-Dichlorobenzene	μg/L	-	0.32 B	1 U	1 U	1 U	1 U	0.18 U	n/a	300
Benzene	μg/L	-	0.4 U	0.80 J	0.4 U	0.4 U	1 U	0.029 J	5[b]	4.6
cis-1,2-Dichloroethene	μg/L	1 U	0.26 J	0.19 J	0.18 F	0.15 F	1 U	0.69 U	70[b]	36
Dichlorodifluoromethane	μg/L	-	0.79 J	0.38 J	0.33 F	1 U	1 U	2.3 U	2000*	200
Tetrachloroethene	μg/L	1 U	1 U	1 U	1 U	1 U	1 U	0.033 J	5[b]	41
Toluene	μg/L	-	1 U	0.47 B	1 U	1 U	1 U	0.39 U	1000[b]	1100
trans-1,2-Dichloroethene	μg/L	1 U	0.14 J	0.10 J	0.097 F	0.058 F	1 U	0.39 U	100[b]	360
Vinyl Chloride	μg/L	1 U	1 U	1 U	1 U	1 U	1 U	0.013 U	2[b]	0.19
Pesticides by Method 8081A (ug/L)										
4,4'-DDD	μg/L	0.032 U	-	-	-	-	-	-	3.2[e]	0.32
4,4'-DDE	μg/L	0.032 U	-	-	-	-	-	-	2.3[e]	0.46
4,4'-DDT	μg/L	0.032 U	-	-	-	-	-	-	2.3[e]	2.3
Metals by Method 6020 (mg/L)										
Antimony	mg/L	0.001 U	-	0.000043 B	-	-	0.0005 U	-	0.025[a]	0.0078
Arsenic	mg/L	0.0185	-	0.017	-	-	0.0208	0.017	0.036[d]	0.00052[a]
Manganese	mg/L	1.28	-	1.67	-	-	1.86	-	2.9[a]	n/a
EDB and DBCP by Method 8011 (ug/L)										
1,2,3-Trichloropropane	μg/L	-	-	-	-	-	-	0.0080 U	0.0084[e]	0.0075
Ethylene Dibromide	μg/L	-	-	-	-	-	-	0.0020 U	0.05[b]	0.075

**MW-5625-R was decommissioned and replaced with MW-5625-R2 in 2018.

Qualifier	Description
B	The analyte was postively identified; the result is from blank contamination.
J / F	The analyte was positively identified; the quantitation is an estimate.
U	The analyte was analyzed for, but not detected. The associated numerical value is at or below the MDL.
UJ	The analyte was analyzed for, but not detected. The quantitation is an estimate.
R	The data is rejected; data is not usable.
Notes	
a	Arctic Surplus Record of Decision (ROD)/ Explanation of Significant Differences (ESD)
b	Environmental Protection Agency (EPA) Maximum Contaminant Levels (MCL) for Drinking Water (40 CFR 141)
c	ADEC groundwater cleanup levels established in 18 AAC 75.345 (November 2017)
d	Background level - Ft. Wainwright (USACE, 1994), as mandated in the ESD.
e	EPA regional screening levels (1x10^{-5} and HQ of 1.0)
*	EPA regional screening level (Noncarcinogenic SL Child THI = 1)
-	Not analyzed
n/a	no cleanup level established
μg/L	microgram per liter
AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
CFR	Code of Federal Regulations
EDB	ethlyene dibromide
MCL	Maximum Contaminant Level
MDL	method detection limit
mg/L	milligram per liter

Historical Groundwater Analytical Results
Arctic Surplus Salvage Yard

Analyte	Unit	MW-5808							ROD/ESD[a] or EPA MCL[b] Groundwater Cleanup Standards	ADEC Groundwater Cleanup Levels[c]
		Jul-08	Sep-09	Jul-10	Jun-11	Jun-12	Jul-13	Jun-18		
Primary Contaminants of Concern										
Lead	mg/L	0.001 U	0.00005 U	0.000035	0.002 U	0.0002 U	0.00033 F	0.00080 U	0.015[d]	0.015[d]
Polychlorinated Biphenyls (PCBs)										
Aroclor-1016	µg/L	0.105 U	0.005 U	-	0.47 U	0.48 U	0.40 U	0.063 U	0.5[b]	0.5
Aroclor-1221	µg/L	0.105 U	0.010 U	-	0.47 U	0.48 U	0.40 U	0.077 U	0.5[b]	0.5
Aroclor-1232	µg/L	0.105 U	0.005 U	-	0.47 U	0.48 U	0.40 U	0.065 U	0.5[b]	0.5
Aroclor-1242	µg/L	0.105 U	0.005 U	-	0.47 U	0.48 U	0.40 U	0.061 U	0.5[b]	0.5
Aroclor-1248	µg/L	0.105 U	0.005 U	-	0.47 U	0.48 U	0.40 U	0.053 U	0.5[b]	0.5
Aroclor-1254	µg/L	0.105 U	0.005 U	-	0.47 U	0.48 U	0.40 U	0.077 U	0.5[b]	0.5
Aroclor-1260	µg/L	0.105 U	0.005 U	-	0.47 U	0.48 U	0.40 U	0.063 U	0.5[b]	0.5
Trichloroethene	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	0.065 J	5[b]	2.8
Volatile Organic Compounds (VOCs) by Method 8260B or 8260C (2018 Results)										
1,1-Dichloroethane	µg/L	-	0.16 B	0.15 J	0.12 F	0.11 F	1 U	0.22 U	140[e]	28
1,1-Dichloroethene	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	0.018 J	7[b]	280
1,2-Dichlorobenzene	µg/L	-	0.35 J	0.29 J	0.29 J	0.32 F	1 U	0.46 U	600[b]	300
1,2-Dichloroethane	µg/L	-	0.23 B	0.16 J	0.5 U	0.5 U	1 U	0.22 J	8.6	1.7[a]
1,3-Dichlorobenzene	µg/L	-	0.19 B	0.17 J	1 U	0.24 F	1 U	0.66 J	n/a	300
1,4-Dichlorobenzene	µg/L	-	0.16 B	0.5 U	0.5 U	0.5 U	1 U	0.35 J	75[b]	4.8
1,2,3-Trichlorobenzene	µg/L	-	0.090 B	1 U	1 U	1 U	1 U	0.46 U	70*	7
1,2,4-Trichlorobenzene	µg/L	0.580 J	0.23 B	0.10 J	1 U	0.26 F	1 U	0.33 U	70[b]	4
Benzene	µg/L	-	0.4 U	0.10 J	0.4 U	0.4 U	1 U	0.096 J	5[b]	4.6
Chlorobenzene	µg/L	-	0.62	0.46 J	0..43 F	0.57	0.598 F	2.0	100[b]	78
cis-1,2-Dichloroethene	µg/L	1 U	0.17 J	0.14 J	0.17 F	0.14 F	1 U	0.69 U	70[b]	36
Tetrachloroethene	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	0.017 U	5[b]	41
Toluene	µg/L	-	1 U	2.5	1 U	1 U	1 U	0.39 U	1000[b]	1100
trans-1,2-Dichloroethene	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	0.39 U	100[b]	360
Vinyl chloride	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	0.019 J	2[b]	0.19
Pesticides by Method 8081A (ug/L)										
4,4'-DDD	µg/L	0.032 U	-	-	-	-	-	-	3.2[e]	0.32
4,4'-DDE	µg/L	0.032 U	-	-	-	-	-	-	2.3[e]	0.46
4,4'-DDT	µg/L	0.032 U	-	-	-	-	-	-	2.3[e]	2.3
Metals by Method 6020 (mg/L)										
Antimony	mg/L	0.001 U	-	0.000051 B	-	-	0.0005 U	-	0.025[a]	0.0078
Arsenic	mg/L	0.0138	-	0.0143	-	-	0.0154	0.014	0.036[d]	0.00052[a]
Manganese	mg/L	1.18	-	1.38	-	-	1.71	-	2.9[a]	n/a
EDB and DBCP by Method 8011 (ug/L)										
1,2,3-Trichloropropane	µg/L	-	-	-	-	-	-	0.0081 U	0.0084[e]	0.0075
Ethylene Dibromide	µg/L	-	-	-	-	-	-	0.0020 U	0.05[b]	0.075

Qualifier	Description
B	The analyte was postively identified; the result is from blank contamination.
J / F	The analyte was positively identified; the quantitation is an estimate.
U	The analyte was analyzed for, but not detected. The associated numerical value is at or below the MDL.
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R	The data is rejected; data is not usable.

Notes

a	Arctic Surplus Record of Decision (ROD)/ Explanation of Significant Differences (ESD)
b	Environmental Protection Agency (EPA) Maximum Contaminant Levels (MCL) for Drinking Water (40 CFR 141)
c	ADEC groundwater cleanup levels established in 18 AAC 75.345 (November 2017)
d	Background level - Ft. Wainwright (USACE, 1994), as mandated in the ESD.
e	EPA regional screening levels ($1x10^{-5}$ and HQ of 1.0)
*	EPA regional screening level (Noncarcinogenic SL Child THI = 1)
-	Not analyzed
n/a	no cleanup level established
µg/L	microgram per liter
AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
CFR	Code of Federal Regulations
EDB	ethlyene dibromide
MCL	Maximum Contaminant Level
MDL	method detection limit
mg/L	milligram per liter

Historical Groundwater Analytical Results
Arctic Surplus Salvage Yard

Analyte	Unit	MW-UG1 Jul-08	Sep-09	Jul-10	Jun-11	Jun-12	Jul-13	Jun-18	ROD/ESD[a] or EPA MCL[b] Groundwater Cleanup Standards	ADEC Groundwater Cleanup Levels[c]
Primary Contaminants of Concern										
Lead	mg/L	0.000669 J	0.00024 B	0.000018 B	0.002 U	0.0002 U	0.00025 U	0.00020 U	0.015[d]	0.015[d]
Polychlorinated Biphenyls (PCBs)										
Aroclor-1016	µg/L	0.105 U	0.005 U	-	0.48 U	0.48 U	0.40 U	0.062 U	0.5[b]	0.5
Aroclor-1221	µg/L	0.105 U	0.010 U	-	0.48 U	0.48 U	0.40 U	0.076 U	0.5[b]	0.5
Aroclor-1232	µg/L	0.105 U	0.005 U	-	0.48 U	0.48 U	0.40 U	0.064 U	0.5[b]	0.5
Aroclor-1242	µg/L	0.105 U	0.005 U	-	0.48 U	0.48 U	0.40 U	0.060 U	0.5[b]	0.5
Aroclor-1248	µg/L	0.105 U	0.005 U	-	0.48 U	0.48 U	0.40 U	0.053 U	0.5[b]	0.5
Aroclor-1254	µg/L	0.105 U	0.005 U	-	0.48 U	0.48 U	0.40 U	0.076 U	0.5[b]	0.5
Aroclor-1260	µg/L	0.105 U	0.0019 J	-	0.48 U	0.48 U	0.40 U	0.062 U	0.5[b]	0.5
Trichloroethene	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	0.0090 U	5[b]	2.8
Volatile Organic Compounds (VOCs) by Method 8260B or 8260C (2018 Results) (ug/L)										
1,1-Dichloroethane	µg/L	-	0.16 J	0.21 J	0.12 F	0.15 F	1 U	0.22 U	140[e]	28
1,1-Dichloroethene	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	0.014 U	7[b]	280
1,2,3-Trichlorobenzene	µg/L	-	0.10 B	1 U	1 U	1 U	1 U	0.46 U	70*	7
1,2,4-Trichlorobenzene	µg/L	1 U	0.22 B	1 U	1 U	1 U	1 U	0.33 U	70[b]	4
cis-1,2-Dichloroethene	µg/L	1 U	1 U	0.070 J	1 U	1 U	1 U	0.69 U	70[b]	36
Tetrachloroethene	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	0.017 U	5[b]	41
Toluene	µg/L	-	1 U	0.41 B	1 U	1 U	1 U	0.39 U	1000[b]	1100
trans-1,2-Dichloroethene	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	0.39 U	100[b]	360
Vinyl Chloride	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	0.013 U	2[b]	0.19
Pesticides by Method 8081A (ug/L)										
4,4'-DDD	µg/L	0.032 U	-	-	-	-	-	-	3.2[e]	0.32
4,4'-DDE	µg/L	0.032 U	-	-	-	-	-	-	2.3[e]	0.46
4,4'-DDT	µg/L	0.032 U	-	-	-	-	-	-	2.3[e]	2.3
Metals by Method 6020 (mg/L)										
Antimony	mg/L	0.001 U	-	0.000042 B	-	-	0.0005 U	-	0.025[a]	0.0078
Arsenic	mg/L	0.00383 J	-	0.0051	-	-	0.00899	0.0091	0.036[d]	0.00052[a]
Manganese	mg/L	1.17	-	1.29	-	-	1.54	-	2.9[a]	n/a
EDB and DBCP by Method 8011 (ug/L)										
1,2,3-Trichloropropane	µg/L	-	-	-	-	-	-	0.0081 U	0.0084[e]	0.0075
Ethylene Dibromide	µg/L	-	-	-	-	-	-	0.0020 U	0.05[b]	0.075

Qualifier	Description
B	The analyte was postively identified; the result is from blank contamination.
J / F	The analyte was positively identified; the quantitation is an estimate.
U	The analyte was analyzed for, but not detected. The associated numerical value is at or below the MDL.
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R	The data is rejected; data is not usable.

Notes

a	Arctic Surplus Record of Decision (ROD)/ Explanation of Significant Differences (ESD)
b	Environmental Protection Agency (EPA) Maximum Contaminant Levels (MCL) for Drinking Water (40 CFR 141)
c	ADEC groundwater cleanup levels established in 18 AAC 75.345 (November 2017)
d	Background level - Ft. Wainwright (USACE, 1994), as mandated in the ESD.
e	EPA regional screening levels ($1x10^{5}$ and HQ of 1.0)
*	EPA regional screening level (Noncarcinogenic SL Child THI = 1)
-	Not analyzed
n/a	no cleanup level established
µg/L	microgram per liter
AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
CFR	Code of Federal Regulations
EDB	ethylene dibromide
MCL	Maximum Contaminant Level
MDL	method detection limit
mg/L	milligram per liter

Historical Groundwater Analytical Results
Arctic Surplus Salvage Yard

Analyte	Unit	MW-2008A							ROD/ESD[a] or EPA MCL[b] Groundwater Cleanup Standards	ADEC Groundwater Cleanup Levels[c]
		Jul-08	Sep-09	Jul-10	Jun-11	Jun-12	Jul-13	Jun-18		
Primary Contaminants of Concern										
Lead	mg/L	0.001 U	0.00028 B	0.000021 B	0.002 U	0.0002 U	0.00035 F	0.00035 J	0.015[d]	0.015[d]
Polychlorinated Biphenyls (PCBs)										
Aroclor-1016	µg/L	0.1 U	0.005 U	-	0.49 U	0.49 U	0.40 U	0.066 U	0.5[b]	0.5
Aroclor-1221	µg/L	0.1 U	0.010 U	-	0.49 U	0.49 U	0.40 U	0.081 U	0.5[b]	0.5
Aroclor-1232	µg/L	0.1 U	0.005 U	-	0.49 U	0.49 U	0.40 U	0.068 U	0.5[b]	0.5
Aroclor-1242	µg/L	0.1 U	0.005 U	-	0.49 U	0.49 U	0.40 U	0.064 U	0.5[b]	0.5
Aroclor-1248	µg/L	0.1 U	0.005 U	-	0.49 U	0.49 U	0.40 U	0.056 U	0.5[b]	0.5
Aroclor-1254	µg/L	0.1 U	0.005 U	-	0.49 U	0.49 U	0.40 U	0.081 U	0.5[b]	0.5
Aroclor-1260	µg/L	0.1 U	0.0047 J	-	0.49 U	0.49 U	0.40 U	0.066 U	0.5[b]	0.5
Trichloroethene	µg/L	3.8	4.9	2.5	1.6	2	2.42	2.0	5[b]	2.8
Volatile Organic Compounds (VOCs) by Method 8260B										
1,1-Dichloroethane	µg/L	-	1 U	0.090 J	1 U	1 U	1 U	0.22 U	140[e]	28
1,1-Dichloroethene	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	0.014 U	7[b]	280
1,2,3-Trichlorobenzene	µg/L	-	0.10 B	1 U	1 U	1 U	1 U	0.46 U	70*	7
1,2,4-Trichlorobenzene	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	0.33 U	70[b]	4
2,2-Dichloropropane	µg/L	-	-	-	-	-	0.170 UJ	0.32 U	NA	NA
cis-1,2-Dichloroethene	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	0.69 U	70[b]	36
Tetrachloroethene	µg/L	1 U	0.17 B	1 U	1 U	1 U	1 U	0.079 J	5[b]	41
Toluene	µg/L	-	1 U	0.25 B	1 U	1 U	1 U	0.39 U	1000[b]	1100
trans-1,2-Dichloroethene	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	0.39 U	100[b]	360
Vinyl Chloride	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	0.013 U	2[b]	0.19
Pesticides by Method 8081A										
4,4'-DDD	µg/L	0.032 U	-	-	-	-	-	-	3.2[e]	0.32
4,4'-DDE	µg/L	0.032 U	-	-	-	-	-	-	2.3[e]	0.46
4,4'-DDT	µg/L	0.032 U	-	-	-	-	-	-	2.3[e]	2.3
Metals by Method 6020										
Antimony	mg/L	0.001 U	-	0.000129	-	-	0.0005 U	-	0.025[a]	0.0078
Arsenic	mg/L	0.00246 J	-	0.0007	-	-	0.00066 F	0.00072 J	0.036[d]	0.00052[a]
Manganese	mg/L	0.659	-	0.341	-	-	0.291 J	-	2.9[a]	n/a
Method 8011 EDB DBCP										
1,2,3-Trichloropropane	µg/L	-	-	-	-	-	-	0.0080 U	0.0084[e]	0.0075
Ethylene Dibromide	µg/L	-	-	-	-	-	-	0.0020 U	0.05[b]	0.075

Qualifier	Description
B	The analyte was postively identified; the result is from blank contamination.
J / F	The analyte was positively identified; the quantitation is an estimate.
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Notes

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b	Environmental Protection Agency (EPA) Maximum Contaminant Levels (MCL) for Drinking Water (40 CFR 141)
c	ADEC groundwater cleanup levels established in 18 AAC 75.345 (November 2017)
d	Background level - Ft. Wainwright (USACE, 1994), as mandated in the ESD.
e	EPA regional screening levels ($1x10^{-5}$ and HQ of 1.0)
*	EPA regional screening level (Noncarcinogenic SL Child THI = 1)
-	Not analyzed
n/a	no cleanup level established
µg/L	microgram per liter
AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
CFR	Code of Federal Regulations
EDB	ethlyene dibromide
MCL	Maximum Contaminant Level
MDL	method detection limit
mg/L	milligram per liter

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APPENDIX G

SITE INSPECTION RESULTS

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APPENDIX H

ASSY SITE FACT SHEET

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APPENDIX I

REVIEWER COMMENTS

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 155
Seattle, WA 98101-3140

OFFICE OF ENVIRONMENTAL CLEANUP

October 26, 2018

USEPA Region 10 Review/Comments
Project Site: Arctic Surplus, Fairbanks, Alaska
DOCUMENT: Draft Third Five-Year Review Report For Arctic Surplus Salvage Yard (ASSY) Fairbanks, Alaska
Prepared for Defense Logistics Agency & U.S. Army Corps of Engineers
Prepared by Ahtna Environmental, Inc.
Contract: W911KB-17-D-0019

USEPA Reviewers: Chan Pongkhamsing, Allison Hiltner, Dave Einan, Jennifer Edwards, Marlene Berg, Dean Ingemansen

Comment #	Page / Section	Comment	Response	EPA Agrees or Disagrees
1	General	Please provide a figure that shows the location of the site features described in the FYR (cap, parking lot, fence, etc)	Site features are shown in Figure 2. For clarity a 3rd figure will be added as "Site Overview" focused on the cap and fence.	Agreed
2	Page 1/ 4th para	Need to clarify who is the lead agency. The cover page is written as if DLA is the lead agency; whereas the Introduction states EPA is the lead agency. However, no EPA staff are listed as participants in the FYR. If EPA is the lead, our logo should appear on the cover page and there should be a signature line for Sheryl Bilbrey.	This will remain an EPA lead document since EPA has historically been the lead agency. A signature page for Sheryl Bilbrey will be added to the document with EPA logo.	Agreed
3	General and Page 1 / 4th Para	Clarify ADEC's role at this site and in developing this FYR. State whether ADEC was involved in development and/or review of the draft FYR.	The statement will be added: *"The ADEC contributed to review of this draft FYR. Additionally, the ADEC has reviewed and approved work plans and monitoring reports for this site."*	Agreed
4	Pg. 3 / 1st para	What does "general use district" mean? What land uses are allowed under that designation? This term should be explained and clarified, so the reader knows what land uses (and therefore, potential	Text will be revised to state "*The property is zoned as GU-1 as defined by Fairbanks North Star Borough Code which means a wide variety of uses is allowed; however, IC's*	Agreed

		human exposures) might be allowed by the local jurisdiction.	*placed on the property prevents any residences on the property and prevents any activities where remaining contamination creates receptor exposure such as agricultural use."*	
5	Page 6/Section 2.1.1	It is not necessary to provide the information in Tables 1 and 2, or to provide generic information about the purpose of a Superfund risk assessment. The FYR should focus on which media and exposure pathways were found to exceed EPA's risk thresholds. This section (or the previous one) should also list COCs for each medium.	Superfund risk assessment tables and generic info will be removed. The lists of COCs identified in the ROD will be listed for each media (groundwater and soil). Compounds mentioned in the RI summary (Section 2.1) will be clarified as COPCs, as referenced in the ROD. COCs identified the ROD in soil were: • PCBs, • chlorinated dioxins/furans, • and lead. In groundwater: • antimony, • arsenic, • manganese, • tetrachloroethene (PCE), • trichloroethene (TCE), • 1,2,4-trichlorobenzene, • DDT, • and PCBs	Agreed
6	Page 8, Section 2.2.2	Provide a table with cleanup levels for each COC in each medium, along with the basis for the cleanup levels. Although some cleanup levels are presented in the text, it is difficult to discern whether all cleanup levels and COCs are listed.	A table of cleanup levels for COCs identified in the ROD for soil and groundwater will be added (as shown at the end of this document). The basis for the cleanup levels will be discussed as follows: For soil *"The cleanup standard for PCBs was taken from 40 CFR 761.25(c)(4)(v). Based on the RCRA characteristic waste criteria, the soil cleanup standard for lead at 1000 mg/kg was*	Agreed

			selected for industrial use area; consistent with cleanup standards for other similar Region 10 CERCLA sites. *For dioxins and furans, the soil concentrations corresponding to a cancer risk-based level of $1x10^{-5}$ was selected as the soil cleanup standard.*" For groundwater, "*The ROD identified cleanup levels for Antimony (25 micrograms per liter [µg/L]) and Manganese (2,900 µg/L) based on regional aquifer background levels. The other six COPCs identified in groundwater were carried forward as COCs and compared to EPA's MCLs for drinking water. The ROD acknowledges intermittent detections of a few naturally occurring contaminants and potentially site related contaminants, such as TCE. The ROD stated these contaminants should be monitored to determine if source controls related to soils can prevent contaminants from entering the groundwater and requiring future controls. Therefore, lead was added as a COC in groundwater due to it being a COC in soil.*"	
7	Page 11, Section 2.3 Last Paragraph	What is meant by non-hazardous. Non-listed RCRA hazardous waste?	The term will be revised to "*non-listed RCRA hazardous waste*".	Agreed
8	Page 11, Section 2.3.1	It would be helpful to include the dates that deed restrictions and the date the equitable servitude was filed with the state. **Also see Dean's comments*	A table with dates will be added and a recommendation to review the UECA statue will be added to Section 6 - Recommendations for the next FYR.	Agreed

9	Page 15, Section 3.1	It is not necessary to include the environmental indicator status or the cross-program revitalization measure status from the last FYR.	Acknowledged and removed	Agreed
10	Page 15-16, Section 3.2	Move the information in this section to Section 2.3.1, Institutional Controls.	Acknowledged and information moved to Section 2.3.1	Agreed
11	Page 17, Section 4.1	Clarify whether Mr. Hoople is a private citizen or the representative of a company. If he is a private citizen, his name must be redacted from the report before publication to the web.	Mr. Hoople is owner and representative of HC Properties, LLC. This will be clarified in the FYR.	OK, then no redaction is necessary.
12	Page 17, Section 4.1	It appears from Appendix E that EPA and ADEC staff were interviewed in addition to the property owners. This section should list all of the interviews and provide a brief summary of the results of the interviews.	A bulleted list of all interviews will be added. Only two interviews were conducted as part of the FYR process and are summarized in Section 4.1, one with Mr. Hoople and one with Mr. Davis. A site inspection occurred with ADEC as part of the FYR review process and is summarized in Section 4.3. Previous regulatory discussions with EPA and ADEC were part of the OM&M annual site visits and discussed in Section 2.4.1.	Agreed
13	Page 17, Section 4.1	How will DLA/ADEC/EPA ensure that any support pilings driven into the ground will not damage the cap or expose contaminated soils? **Also see Dean's comments*	The ICs clearly state that nothing can be done without EPA (State/DLA) approval and coordination. The property in question is not part of the fenced cap area, but is an adjacent property. In addition, no building of any type was agreed to during the interview with Mr. Hoople, so that statement was inaccurate. Language will be revised to: "The installation of an aboveground … was *discussed, and it was reiterated by Mr. Deardorff that no soil could be excavated nor any digging can take place without regulatory approval."* The word,	Agreed

			"Additionally" from the next sentence will be deleted, and EPA will be added to those that would help cite any building(s). It should again be noted that Mr. Hoople's property is not within the protective cap and the area he was hoping to install an above-ground shelter on is a bit of a ways from the fence and protective cap.	
14	Page 17, Section 4.2	First paragraph states that groundwater monitoring data are compared to ADEC MCLs. First, Alaska has not (to my knowledge) recently revised the MCL for TCE. The revised value is the groundwater cleanup level in 18 AAC 75, Alaska's cleanup rule. Second, while it's ok to mention this new cleanup value as a point of information, in this section, groundwater monitoring data should be compared cleanup levels in the ROD/ESD. As noted in previous comments, please include a table with cleanup levels for all media in the FYR. Changes in ARARs, such as the revised Alaska cleanup rule, should be discussed in the Technical Assessment, Question B.	The term MCLs was used to define all regulatory cleanup levels to be consistent with the previous FYR, which compared historical results to ADEC groundwater cleanup levels. Discussion will be revised in reference to either the ROD/ESD MCLs or the EPA MCL for drinking water as this was the regulatory level identified in the ROD. A table of COCs and cleanup levels will be added to Section 2.2.2 and referenced here. Groundwater cleanup levels, when discussed, will be correctly referenced to 18 AAC 75.	Agreed
15	Page 18, Section 4.2	On page 10, the FYR states that the ESD modified the cleanup levels for arsenic (from 50 µg/L to 10 µg/L or natural background (whichever is less stringent)), which would indicate that arsenic is a COC for the site. However, the FYR states on page 18 that arsenic is not considered a site COC. Please reconcile these two statements. Also, there is no revised arsenic MCL of 0.52 ug/L – change the reference to the revised Alaska groundwater cleanup levels in 18 AAC 75.	Arsenic was dropped from the COC analyte list, per the 2008 FYR recommendations for the long-term monitoring plan. Additional discussion of changes made to the LTM outlined in previous FYRs will be added to Section 2.4.2 for clarity. The discussion of arsenic will be removed.	Agreed
16	Page 19, Section 5	Delete the following sentence: "In accordance with current EPA guidance (EPA, 2001), a five-year review should determine	Revised as suggested.	Agreed

		whether the remedy at the site is protective of human health and the environment." Or modify to clarify that this requirement is in CERCLA and the NCP, not just in guidance.		
17	Page 19, Section 5, Question B	In general, it is very hard to review this section without knowing what the cleanup levels in the ROD are, hence the previous comments about needing a table with the ROD cleanup levels. Appendix H compares 2008 ADEC cleanup levels to 2016 ADEC cleanup levels but it doesn't appear that many of the ROD/ESD cleanup levels were based on ADEC cleanup levels.	Appendix H was included to facilitate comparisons between the second FYR which listed the 2008 ADEC groundwater cleanup levels as cleanup criteria in the historical groundwater results tables. Appendix H will be removed and historical tables updated to include EPA MCLs for drinking water and more clearly show the ROD cleanup levels. The table key will be included at the bottom of each MW Historical Result Table for ease of reading.	Agreed
18	Page 20, Section 5, Question B, first paragraph on page	Presumably this paragraph is discussing soils, but that should be stated. Replace the discussion of the lead cleanup level with: "The lead cleanup goal of 1,000 mg/kg is based on outdated guidance. EPA OLEM Directive 9285.6-56 (May 17, 2017) recommends using the Adult Lead Methodology to assess lead risks from soil for non-residential Superfund site scenarios. The recommended soil Preliminary Remediation Goal is 1,050 mg/kg which corresponds to a baseline blood lead concentration of 5 µg/deciliter. This updated goal is less stringent than the original cleanup goal, therefore the soil cleanup goal is still protective." Then, modify the discussion of site specific data to be consistent with this new text.	Specific reference to soils will be stated and text replaced with the recommended statement. Site specific data discussion will be revised to "*A review of the ASSY confirmation sampling results for lead indicate that none of the samples (of over 400 confirmation samples collected) showed residual lead levels of over 1,050 mg/kg.*"	Agreed
19	Page 20, Section 5, Question B, third paragraph on page	It is confusing that there are two paragraphs that discuss TCE, this one and the last paragraph under Question B. It's not clear from the FYR whether TCE is a COC for soils and whether there is a soil TCE cleanup level for soil in the ROD/ESD. If TCE is not a COC for soils, there is no need to discuss soil TCE	TCE is not a COC for soil, and discussion will be removed from the technical assessment. TCE in groundwater will be compared to EPA's MCLs of 5.0 µg/L.	Agreed

		cleanup levels in the Technical Assessment. For TCE in groundwater, see previous comments that the ADEC cleanup level is not an MCL. If the original TCE groundwater cleanup level is based on the previous ADEC cleanup level (and not risk-based), you can omit the risk information and just discuss the change in ADEC cleanup levels.		
20	Page 20, Section 5, Question B, third paragraph on page (JLE)	In addition, I think it would be helpful to explicitly tie your discussion of TCE and the cleanup number to the exposure pathway- it seems as though you are referring to GW ingestion, because of the tie to ADEC GW numbers, but does this also impact the inhalation pathway? I think the understanding of VI we have now indicates that an MCL may not be entirely predictive of indoor air concentrations (however you may not have any structures for exposure to occur...).	Discussion will be revised as follows: *"The ROD and ESD-mandated cleanup levels for groundwater COCs are consistent with current EPA cleanup levels. Although there have been changes to the toxicity factors for some of the contaminants historically detected in groundwater (i.e., TCE), the 2005 to 2018 groundwater monitoring data indicates no exceedances of any COCs above the EPA MCLs for drinking water or background levels. The current EPA MCL of 5.0 µg/L for TCE may not be protective of the indoor air inhalation pathway (EPA, 2012). However, no permanent structures exist within the cap and fence area. ATCO trailers are present at the northern end of the property boundary, but no preferential VI pathway exist for these mobile units.* *The EPA's Integrated Risk Information System (IRIS) program conducted a toxicological review of TCE (U.S. Environmental Protection Agency, 2011) for developing the reference concentrations (R_fC) and reference dose (R_fD). The R_fC and R_fD were determined partly on immunotoxic and developmental effects, including fetal cardiac malformations that may occur when the mother is exposed to TCE during a 21-day early gestation window. There are ongoing EPA assessments at the Office of*	Agreed

			Land and Emergency Management (OLEM, formerly called the Office of Solid Waste and Emergency Response, or OSWER) and risk assessors are developing guidance on how to apply the R_fC and R_fD for less-than-lifetime exposures (ADEC, 2017d).”	
21	Page 20, Section 5, Question B, third paragraph on page, last sentence (JLE)	While the statement *“…The ICs at the site restrict the installation of wells and use of groundwater, therefore the new cleanup level for TCE will not affect the protectiveness of the site...*” is true, that is not the questions that is being asked in question B. Is the cleanup level for TCE still valid? If the cleanup number selected is no longer a protective cleanup number (i.e. within cancer risk range or HQ of 1), it may no longer be valid although the ICs are preventing exposure. Suggest deleting or moving this sentence to Question A which is discussing whether the remedy is functioning as intended. The IC discussion in Question A currently does not address the restriction on installing wells, so it could be a good addition there.	The statement will be moved to the discussion in Question A, and revised as follows: “*The ICs at the site restrict the installation of wells and use of groundwater, therefore revised cleanup levels will not affect the protectiveness of the site.”*	Agreed
22	Page 20 and 21, Section 5 Question B (JLE)	Please see comments in word document related to dioxin from Marlene Berg. (emailed 10/12 and uploaded).	The ROD and ICs restrict any future land use to industrial only. Off-site areas are expected to continue to be industrial. Residual dioxins are not present in off-site areas.	OK
23	Page 21, Section 5, fourth paragraph on page	Per the previous comment, this paragraph should be merged with the other paragraph that discusses TCE in groundwater. The term “PAHs” is used here for the first time and is not defined. What is this?	PAH has been defined as polycyclic aromatic hydrocarbons. This sentence will be moved to Section 5, Question A.	Agreed
24	Page 21, Question C	Please consider whether climate change (e.g., melting permafrost) might affect the integrity of the remedy in the future?	The following will be added, “It is well documented that significant warming in Alaska is occurring as a result of climate change (NOAA, 2017). Research has also shown substantial permafrost warming in Alaska,	Excellent! Agreed

			from 0.3 to 3 degrees C, since the 1980s, with new record highs for the entire period of permafrost temperature in Interior Alaska. However, permafrost is discontinuous in Interior Alaska and no evidence of shallow permafrost exists at the site. Additionally the long-term performance of the geosynthetic clay liner placed under the cap relative to freeze-thaw cycles experienced in Fairbanks was evaluated in the ESD. The cover layer is expected to provide long-term protection against infiltration into the consolidated, solidified/stabilized, contaminated soil. Continued site inspections will further ensure the continued integrity of the cap remedy in the future.	
25	Page 23, Section 6	Although evaluating whether groundwater monitoring should be discontinued may be a good idea, the third bullet under "The following recommendations . . ." must be modified or deleted. Four consecutive groundwater sampling events with COCs below cleanup levels is insufficient to determine whether cleanup levels have been met. DLA should consult the many EPA guidance documents on the topic of how to determine if groundwater cleanup levels have been met, including: "Recommended Approach for Evaluating Completion of Groundwater Restoration Remedial Actions at a Monitoring Well", August 2014, OSWER 9283.1-44, and "Groundwater Statistics Tool" (September 2018) and User's Guide, among others. See https://www.epa.gov/superfund/superfund-groundwater-groundwater-response-completion	Since the Remedial Action in 2003, groundwater monitoring occurred semi-annually from 2004-2007, then annually from 2008 to 2013. There have been no COCs that have exceeded their respective MCLs, since 2005, with most results reported as non-detects. Several groundwater COCs have been removed from the monitoring program based on these historical results as documented in the 2008 and 2013 FYR review. In 2013 the FYR team (EPA, ADEC, and DLA) recommended the groundwater monitoring frequency be reduced to every 5 years. Text will be replaced with, "Continue groundwater monitoring on a 5 year schedule to monitor contaminant trends. The next groundwater monitoring event will be	Agreed

		(Thought for possible discussion outside this FYR: It may be to DLA's benefit to increase the monitoring frequency for a while to get sufficient data to show cleanup levels are being met.)	conducted in 2023 and data included in the next five year review."	
26	Page 23, Section 6 (JLE)	The sentence ..."*Five year reviews should continue on a 5 year schedule until 2033 (30 years from completion of the remedial action).*" ... should be deleted or revised. FYRs will continue, per CERCLA, as long as waste remains on-site above levels that allow UU/UE.	Acknowledged, revised to state "*FYRs will continue, per CERCLA, as long as waste remains on-site at levels that do not allow for UU/UE.*"	Agreed
27	Page 25, Section 7	Add the human exposure under control environmental indicator status.	The following will be added: "*The Superfund Long-Term Human Exposure Environmental Indicator Status for the Arctic Surplus Site remains "Under Control and Protective Remedy In Place" because the site is Construction Complete and the remedy is operating as intended. In addition, the required engineering and institutional controls are in place and effective.*"	Agreed
28	Appendix F	As noted in previous comments, although it's ok to present the revised Alaska groundwater cleanup levels as a point of information, groundwater monitoring data should be compared to the cleanup levels in the ROD/ESD. It would be helpful to highlight any data that exceed a cleanup standard.	No data presented in Appendix F has exceeded the ROD/MCLs, the cleanup standards will be revised to include EPA MCLs, and the COCs lead, PCB, and TCE will be moved to the top of the analyte list and identified as COCs. The remaining analytes reported will be included for continuity with the past FYRs.	Agreed
29	Appendix H (JLE)	Same comment as above. This information is not helpful without knowing the cleanup levels specified in the ROD were and what they based on.	Acknowledged. Appendix H was included for reference to the previous FYR and will be removed. Changes to ADEC groundwater cleanup levels for site COCs are discussed briefly in Section 5.0 and will be listed in the historical GW results tables as reference.	Agreed

TABLE 1: CONTAMINANTS OF CONCERN IN SOIL IDENTIFIED IN THE ASSY ROD

Contaminant	ROD Cleanup Standards (mg/kg)	
	Industrial	Residential
Lead	1000[a]	400[b]
PCBs	10[c]	1[c]
Dioxins/Furans	0.44[d]	n/a [e]

[a] Lead cleanup goal for industrial land use; consistent with cleanup standards for other similar Region 10 CERCLA sites.

[b] Residential soil screening value for lead using the 1EUBK Model (EPA Revised Interim Soil Lead Guidance for CERCLA Site and RCRA Corrective Action Facilities, OSWER Directive No. 9355.4.12, Office of Solid Waste and Emergency Response, Washington, D.C.).

[c] Cleanup standard for PCBs from 40 CFR 761.25(c)(4)(v).

[d] Cleanup standard is based upon a cancer risk of $1x10^{-5}$.

[e] Not applicable. Dioxins/furans were not detected off-site; therefore, only the industrial soil cleanup standard is provided.

TABLE 2: CONTAMINANTS OF CONCERN IN GROUNDWATER IDENTIFIED IN THE ASSY ROD

Contaminant	ROD Groundwater Cleanup Standard (µg/L)	EPA MCL for Drinking Water[a] (µg/L)
Lead	**-**	**15**
PCBs	**-**	**0.5**
Antimony	**25[b]**	**n/a**
Arsenic	**-**	**10**
Manganese	**2900[b]**	**n/a**
Tetrachloroethene	**-**	**5**
Trichloroethene	**-**	**5**
1,2,4-Trichlorobenzene	**-**	**70**
DDT	**-**	**0.23[c]**

- No cleanup level identified in the ROD. Where cleanup levels were not identified EPA MCLs for Drinking water were used. If no regulatory levels, then EPA regional screening levels ($1x10^{-5}$ and HQ of 1.0) were used.

n/a = Not applicable, ROD mandated cleanup standard established.

[a] MCLs established in 40 CFR 141.

[b] Cleanup standards are based upon regional aquifer background levels, which exceed risk-based levels.

[c] Ingestion RSL $1x10^{-5}$ and HQ of 1.0.

New References:

NOAA, 2017. *National Climate Report – Annual 2017*. National Centers for Environmental Information. Accessed on 11-01-18. https://www.ncdc.noaa.gov/sotc/national/201713

DEC Comments on
Third Five-Year Review Report For Arctic Surplus Salvage Yard (ASSY) Fairbanks, Alaska
November 21, 2018

Reviewer: Alaska Department of Environmental Conservation

Comment No.	Page	Section	Comment / Recommendation	Response
1.	1	1.0	Third Paragraph: Change "at the site above levels" to "at the site at levels"	Correction will be made.
2.	1	1.0	Fourth Paragraph: Overall, this paragraph is confusing. What did EPA do and what did the Corps do? The report was prepared for DLA, not EPA.	Will be revised to: "*The United States Environmental Protection Agency (EPA) is the lead agency for this former National Priorities List (NPL) site and has reviewed this FYR in accordance with existing five-year review guidance (EPA, 2001; EPA, 2016). The Defense Logistics Agency (DLA) and its contractor, Ahtna Environmental, Inc. assisted USACE in the preparation of this report for EPA. The ADEC contributed to review of this draft FYR.*"
3.	3	1.1.2	Delete second period at the end of the paragraph proceeding the "Five-Year Review Summary Form."	Corrected.
4.	13	2.4.1	Add an "s" to the end of the word visit.	Corrected.
5.	14	2.4.1	6th paragraph, last sentence: Replace "were" with "was."	Corrected.
6.	14	2.4.2	Do all of the constituents have MCL's?	All but dioxins in groundwater, The RSL of $1x10^{-5}$ and HQ of 1 was used per the ROD. A table of COCs and their respective MCLs will be added.
7.	18	4.3	Was the surficial patching and vegetation maintenance completed in August 2018?	Yes, text has been added: *"Vegetation maintenance was completed in 2017 and surficial patching of the cap was completed*

				in August 2018."
8.	23	6.0	Third Bullet: Remove the final sentence. Five year reviews don't stop until UU/UE is reached.	Acknowledged, revised to state that "*FYRs will continue, per CERCLA, as long as waste remains on-site at levels that do not allow for UU/UE.*"

From:	Anthony Pennino
To:	Deardorff, Therese M CIV DLA INSTALLATION SUPPORT (US); Julie.L.Sharp-Dahl@usace.army.mil; Robert C CIV USARMY CEPOA Hazlett (US); Leslie Davis
Subject:	RE: [Non-DoD Source] ASSS FYR
Date:	Friday, November 16, 2018 8:37:20

From: Deardorff, Therese M CIV DLA INSTALLATION SUPPORT (US) <Therese.Deardorff@dla.mil>
Sent: Friday, November 16, 2018 8:36 AM
To: Julie.L.Sharp-Dahl@usace.army.mil; Robert C CIV USARMY CEPOA Hazlett (US) <bob.c.hazlett@usace.army.mil>; Anthony Pennino <apennino@ahtna.net>
Subject: Fwd: [Non-DoD Source] ASSS FYR

Please forward to Leslie. I don't have her email in my phone for some reason

THANK YOU
EPA email coming next

Begin forwarded message:

> **From:** "Clark, Bri Renee (DEC)" <bri.clark@alaska.gov>
> **Date:** November 15, 2018 at 3:47:14 PM AKST
> **To:** "Deardorff, Therese M CIV DLA INSTALLATION SUPPORT (US)" <Therese.Deardorff@dla.mil>
> **Cc:** "Pongkhamsing, Chan" <Pongkhamsing.Chan@epa.gov>
> **Subject: [Non-DoD Source] ASSS FYR**
>
> Ms. Deardorff,
>
> DEC has completed review of the response to comments from DLA in regards to the *Draft Third Five-Year Review for Arctic Surplus Salvage Yard (ASSY) Fairbanks, Alaska*, dated September 2018. All comments have been sufficiently addressed. Please provide a final copy of the document for approval and signature. A signature page for Melinda Brunner on behalf of DEC should be included in the final document. The signature block information is below.
>
> Melinda Brunner
> DSMOA Program Manager
> Contaminated Sites Program
> Alaska Department of Environmental Conservation
>
> Regards,

Bri Clark
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Contaminated Site Program
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