Closure Report
for Nine Compliance Restoration Program Sites TU/US-C519, TU/US-C517, TU/US-C518, TU/US-C520, TU/US-C522, TU/US-C523, TU/US-C524, TU/US-C589, and TU/US-C592 at King Salmon Divert

King Salmon Divert, Alaska

Prepared for
Air Force Civil Engineer Center
Contract No. FA8903-08-D-8791
Contract Task Order No. 0039

This page intentionally left blank

January 2017
FINAL
EA Project No. 1456039

Closure Report
for Nine Compliance Restoration Program Sites TU/US-C519, TU/US-C517, TU/US-C518, TU/US-C520, TU/US-C522, TU/US-C523, TU/US-C524, TU/US-C589, and TU/US-C592 at King Salmon Divert

King Salmon Divert, Alaska

Prepared for

Air Force Civil Engineer Center
Contract No. FA8903-08-D-8791
Contract Task Order No. 0039

Prepared by

EA Engineering, Science, and Technology, Inc., PBC
711 H Street, Suite 330
Anchorage, Alaska 99501

January 2017
FINAL
EA Project No. 1456039

This page intentionally left blank

January 2017
FINAL
EA Project No. 1456039

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS AND ABBREVIATIONS

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
AFCEC	Air Force Civil Engineer Center
AST	Above-ground storage tank
ATSDR	Agency for Toxic Substances and Disease Registry
BEES	Bristol Environmental and Engineering Services Corporation
BESC	Bristol Environmental Services Corporation
BCP	Base comprehensive plan
bgs	Below ground surface
BTEX	Benzene, toluene, ethylbenzene, and xylenes
BTV	Background threshold value
CERCLA	Comprehensive Environmental Response, Compensation & Liability Act of 1980
CES	Civil Engineer Squadron
COC	Contaminant of concern
CS DB	Contaminated Sites Database
CSP	Contaminated Sites Program
DRO	Diesel range organics
EA	EA Engineering, Science, and Technology, Inc., PBC
EBS	Environmental Baseline Survey
ECP	Environmental Compliance Program
EMCON	EMCON Alaska Incorporated
ERP	Environmental Restoration Program
E-S	Engineering-Science
FAA	Federal Aviation Administration
FS	Feasibility study
ft	Foot (feet)
GRO	Gasoline range organics
ID	Identification
IRP	Installation Restoration Program
KSD	King Salmon Divert

LFI	Limited field investigation
LNAPL	Light non-aqueous-phase liquid
LUST	Leaking Underground Storage Tank
µg/kg	Microgram(s) per kilogram
µg/L	Microgram(s) per liter
MAP	Management Action Plan
mg/kg	Milligram(s) per kilogram
NPGI	Nakata Planning Group Incorporated
NTU	Nephelometric turbidity units
OASIS	OASIS Environmental Incorporated
OWS	Oil-water separator
PA	Preliminary assessment
PAL	Project action level
PCB	Polychlorinated biphenyl
PCE	Tetrachloroethylene
PI	Preliminary investigation
POL	Petroleum, oil, and lubricants
PVDC	Paug-Vik Development Corporation
RAPCON	Radar Approach Control
RI	Remedial investigation
ROD	Record of Decision
RRO	Residual range organics
SAIC	Science Applications International Corporation
SI	Site investigation
SVOC	Semi-volatile organic compound
TCE	Trichloroethene
TPH	Total petroleum hydrocarbons
UPL	Upper prediction limit
URS	URS Group Inc.
USACHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
USACE	U.S. Army Corps of Engineers
USAF	United States Air Force
USEPA	United States Environmental Protection Agency

UST	Underground storage tank
UTL	Upper tolerance limit
VOC	Volatile organic compound

1.0 INTRODUCTION

EA Engineering, Science, and Technology, Inc., PBC (EA), on behalf of the Air Force Civil Engineer Center (AFCEC), has prepared this Closure Report for Nine Compliance Restoration Program Sites at King Salmon Divert (KSD) in King Salmon, Alaska (Figure 1-1). This report was prepared under AFCEC Contract No. FA8903-08-D-8791, Task Order No. 0039 in accordance with Alaska Department of Environmental Conservation's (ADEC's) Closure Requirements described under Title 18 Alaska Administrative Code Chapter (AAC) 78 Articles 2 and 6 and 18 AAC 75 Article 3.

The purpose of this Site Closure Report is to document that Nine Compliance Restoration Program Sites, specifically Sites TU/US-C519, TU/US-C517, TU/US-C518, TU/US-C520, TU/US-C522 (Contaminated Sites Database [CS DB] Hazard identification [ID] 23248 and 1581), TU/US-C523 (CS DB Hazard ID 23354 and 506), TU/US-C524, TU/US-C589, and TU/US-C592 at KSD, Alaska, meet the following regulatory objectives and requirements:

1. Are protective of human health and the environment in accordance with the ADEC contaminated sites (18 AAC 75) and underground storage tank (UST) regulations (18 AAC 78); and

2. Meets state requirements that are applicable or relevant and appropriate.

With the approval from ADEC and agreement that levels of contamination attributed to each site is protective of human health and the environment, Sites TU/US-C519, TU/US-C517, TU/US-C518, TU/US-C520, TU/US-C522, TU/US-C523, TU/US-C524, TU/US-C589, and TU/US-C592 are therefore justified for closure.

This report was developed in accordance with Department of Defense Environmental Restoration Program protocol and in accordance with 18 AAC 75.380 and 18 AAC 78.276 final reporting requirements for site cleanup.

This page intentionally left blank

Data Source
Imagery: Alaska Mapped, Geographic Information Network of Alaska 2007

Legend
- Compliance Site
- Groundwater Zone

Groundwater Zone 3 (OT029)

Groundwater Zone 1 (OT027)

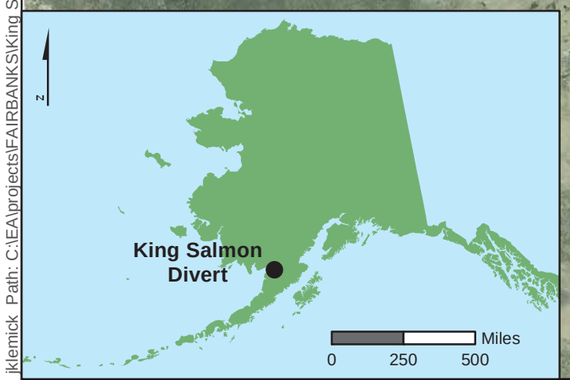
Groundwater Zone 4 (OT030)

Groundwater Zone 2 (OT028)

Groundwater Zone 5 (OT031)

To Groundwater Zone 6 (Rapids Camp) and Zone 7 (Lake Camp)

Site 520
Site 518
Site 519
Site 517
Site 589
Site 523
Site 524
Site 522
Site 592



N
Miles
0 0.25 0.5 1

jklemick Path: C:\EA\projects\FAIRBANKS\King Salmon\1456039\MXD\ClosureReport\KS_SiteLocation.mxd

Closure Report for Nine Compliance Restoration Program Sites
TU/US-C519, TU/US-C517, TU/US-C518, TU/US-C520, TU/US-C522, TU/US-C523, TU/US-C524, TU/US-C589, and TU/US-C592
at King Salmon Divert, King Salmon, Alaska

AFCEC Contract No. FA8903-08-D-8791-0039

Figure 1-1
Site Location Map

EA Project No. 1456039

This page intentionally left blank

2.0 SUMMARY OF SITE CONDITIONS

Site background information regarding previously conducted environmental activities at the KSD has been detailed in numerous historical documents. The purpose of this section is to provide a brief summary of previously-submitted information relevant to this investigation.

2.1 SITE LOCATION AND BACKGROUND INFORMATION

KSD encompasses approximately 220 acres along the northern bank of the Naknek River on the Alaska Peninsula adjacent to Bristol Bay and Katmai National Park and Preserve, approximately 280 miles southwest of Anchorage (Figure 1-1). The State of Alaska and Bristol Bay Borough occupy several buildings at KSD. Based upon the 2010 U.S. Census data, the population of King Salmon is approximately 374 people. The land encompassed as KSD is managed by the United States Department of the Interior, Bureau of Land Management, and the United States Air Force (USAF).

KSD was constructed in 1941 by the Civil Aeronautics Authority (now the Federal Aviation Administration [FAA]) and turned over to the U.S. Army to serve as an advance staging base and fuel stop for flight deployments to and from the Aleutian Islands. In 1945 control returned to the FAA, and in 1948 Alaska Air Command began using the airport as a Forward Operating Base, providing operation and maintenance support of aircraft on alert. In 1951 KSD became an operational ground-controlled intercept site, and then was converted to a North American Aerospace Defense Command Control Center in 1953. In 1959 the FAA turned the airport over to the State of Alaska, who continues to operate the airport under caretaker status with the USAF as its major tenant. Following the reduction of perceived air threat from the former Soviet Union, Department of Defense cost reduction initiatives were implemented and the alert mission at KSD was terminated, with all permanent military personnel and aircraft withdrawn. The station is on caretaker status, maintained under contract by Chugach Development Corporation in a condition to permit rapid reactivation (USAF 2000).

Currently, the State of Alaska utilizes KSD airfield as a commercial airport while the 611th Civil Engineer Squadron (CES) continues to implement Installation Restoration Program (IRP) remedial actions consistent with the National Contingency Plan. The primary activities at KSD are building and equipment maintenance and aiding in search and rescue missions.

2.2 PREVIOUS INVESTIGATIONS

This Closure Report focuses on nine sites: TU/US-C519, TU/US-C517, TU/US-C518, TU/US-C520, TU/US-C522, TU/US C523, TU/US C524, TU/US-C589, and TU/US-C592. These nine sites located at KSD have been reported or suspected of historical contaminant releases or activities that may have affected soil and groundwater at each site. These sites are shown on Figure 1-1. In general, all nine sites share similar sources of contamination (i.e., USTs that contained petroleum, oils and/or lubricants [POLs]) and media that have the potential to become contaminated. The types of releases for the nine sites at KSD include:

- Vadose Zone Source Areas from Surface Spills – Sites with known or potential surface releases of contaminants from aboveground storage tanks (ASTs) and/or aboveground pipelines.

- Vadose Zone Source Areas from Subsurface Releases – Sites with known or potential subsurface releases of contaminants from USTs, belowground pipelines, vaults, and/or refueling hydrants.

- Saturated Zone Source Areas subject to Seasonal Groundwater Fluctuation – Sites with known or potential contaminant releases where groundwater has been affected and seasonal fluctuations of the groundwater table cause light non-aqueous-phase liquid (LNAPL) to become smeared throughout the groundwater fluctuation zone.

- Complex Source Areas resulting from Multiple Releases – Sites with several known or potential contaminant releases where the LNAPL has combined, or the release areas have commingled.

Numerous previous environmental investigations and studies have been conducted at KSD; however, not all reports cover all nine sites simultaneously. The findings and results of the investigations can be found in the following documents:

- *Installation Restoration Program Phase I: Records Search AAC-Northern* (Engineering-Science [E-S], Inc. 1985)

- *Soil & Groundwater Contamination ADAL Refueler King Salmon AFS, Alaska* (U.S. Army Corps of Engineers [USACE] 1988)

- *Final Preliminary Assessment, King Salmon Airport, King Salmon, Alaska* (Science Applications International Corporation [SAIC] 1992)

- *Investigation of Current Practices, Under and Aboveground POL Storage Tank Operations, King Salmon Airport, Alaska.* (SAIC 1993a)

- *Final Preliminary Investigation/Feasibility Study Eleven Sites at King Salmon Airport, King Salmon, Alaska*. (SAIC 1993b)

- *Overview of Environmental and Hydrogeologic Conditions at King Salmon, Alaska* (Waythomas 1994)

- *Installation Restoration Program King Salmon Airport, King Salmon, Alaska: Remedial Investigation/Feasibility Study at Twelve Sites Final Feasibility Study Report. King Salmon Divert, Alaska* (EMCON Alaska Incorporated [EMCON] 1995)

- *Final Installation-wide Environmental Baseline Survey, King Salmon Air Force Station, Alaska* (AFCEC 1996)

- *Letter Report to ADEC - King Salmon Underground Storage Tanks – Summary of UST Historical Site Historical Information* (Bristol Environmental Services Corporation [BESC] 1998)

- *Final Underground Storage Tank and Pipeline Monitoring Report, King Salmon Airport, King Salmon, Alaska* (Bristol Environmental and Engineering Services Corporation [BEES] 2001)

- *Management Action Plan, Final Update, King Salmon Air Station, King Salmon, Alaska* (Paug-Vik Development Corporation [PVDC] 2001)

- *Record of Decision for Final Remediation Action Sites: Groundwater Zone OT028 (Zone 2), Waste Accumulation Area 3 (SS017), Eskimo Creek Dump (SS022), Refueler Shop (SS021), Old Power Plant Building (SS020)* (PVDC and OASIS Environmental Incorporated [OASIS] 2002)

- *Project Work Plan, Building 300 Oil/Water Separator Repair/Upgrade, King Salmon Airport, King Salmon, Alaska* (CH2M HILL 2004)

- *Final Technical Report, 2006 Long-Term Monitoring, RAPCON and Red Fox Creek Monitoring, King Salmon Air Station, Alaska* (PVDC 2007)

- *Final 2007 Comprehensive Environmental Monitoring Report, Volume I, King Salmon Air Station, Alaska* (PVDC 2008)

- *Volume II, Final Evaluation Report, Air Force Compliance Clean-Up Sites, Identification and Evaluation of DERA Eligibility for AFCEC, Multiple Locations* (URS Group Inc. [URS] 2009)

- *Final Evaluation Report, Volume II, Air Force Compliance Clean-Up Sites, Identification and Evaluation of DERA Eligibility for AFCEC, Multiple Locations* (URS 2010)

- *Contaminated Sites Program, Alaska Leaking Underground Storage Tank Report, Facility: 540 USAF King Salmon Airport* (Online Access) (ADEC 2011a)

- *Cleanup Chronology Report for King Salmon Airport - Bldg #160 Combat Alert Cell Site Report* (ADEC 2011b)

- *Preliminary Assessment/Site Inspection for Nine Compliance Sites at King Salmon Divert, Alaska (*CH2M HILL 2013).

- *Division of Spill Prevention and Response, Prevention Preparedness and Response, Underground Storage Tank Database Facility Search, Facility ID: 540, USAF King Salmon Airport* (Online Access) (ADEC 2017a).

- *Contaminated Sites Program, Site Report: King Salmon Combat Alert Cell (ADEC 2017b)*

- *Contaminated Sites Program, Site Report: King Salmon Air Station SS21* (ADEC 2017c)

In summary, these previous site investigations have revealed contamination in both soil and groundwater at the KSD from various source areas present across the KSD. The groundwater contamination within the Environmental Restoration Program (ERP) at KSD has been divided into seven environmental management zones (Groundwater Zones 1-7). Groundwater Zones 1 through 5 are depicted on Figure 1-1. Each zone is managed as a separate unit as each is considered to be a hydrogeologically-contiguous area (PVDC 2008). Primary source areas across these zones include USTs, ASTs, dry wells, fire training areas, and gas stations. Dissolved-phase petroleum hydrocarbons are the most widespread

contaminants identified in soil and groundwater. Trichloroethene (TCE), benzene, toluene, ethylbenzene, and xylenes (BTEX) are also present at several sites. Metals were detected in soil and groundwater above site-specific screening levels; however, a lack of defensible background concentrations made it difficult to determine if these levels were naturally occurring or a result of source area releases and will be discussed in the next section.

2.3 BACKGROUND METALS DATA

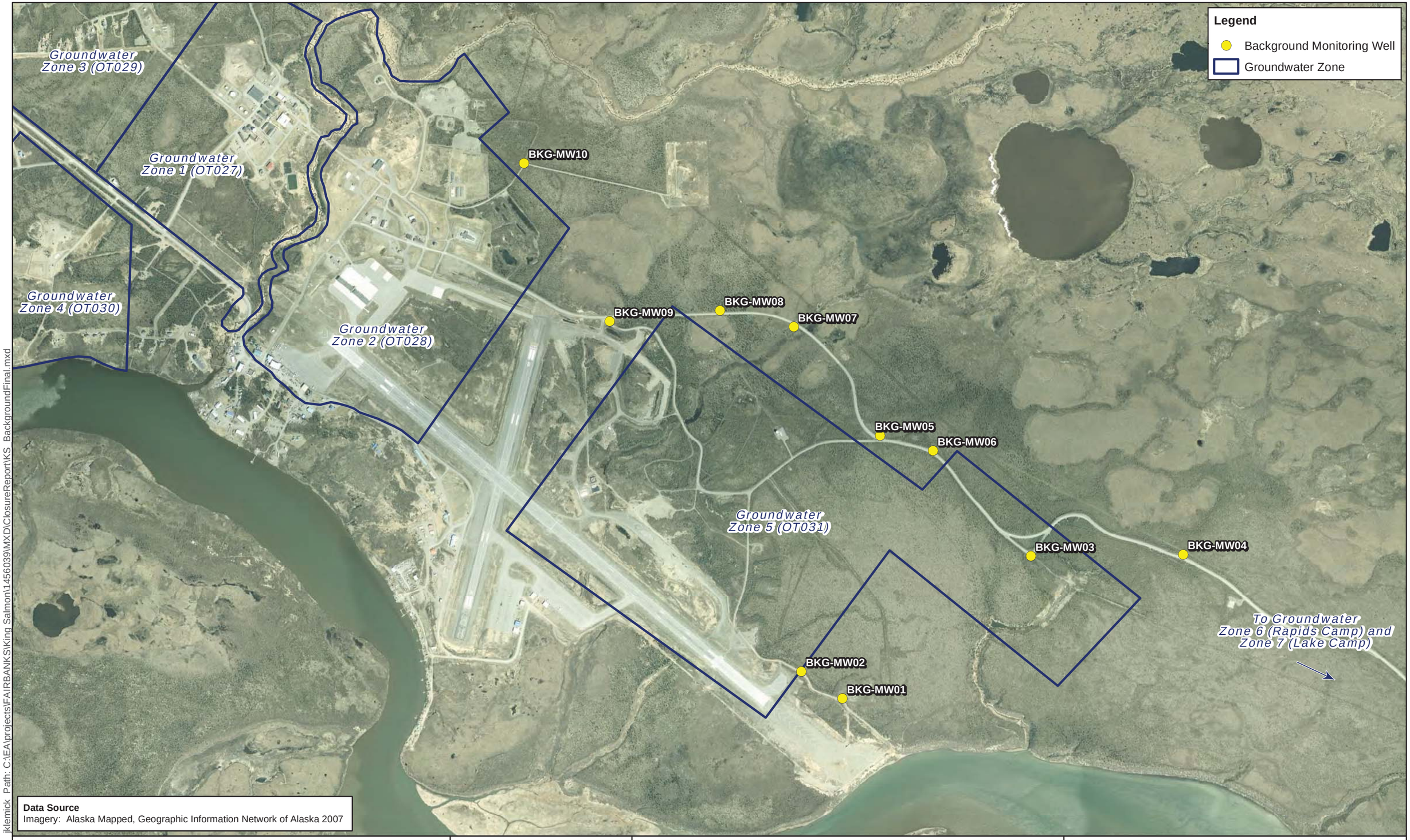
A previous background concentration study was completed in 1993 (SAIC 1993b) evaluating arsenic in some site investigations; however, this earlier background study and the resulting concentrations were not sufficient for use in site investigations. A review of the detection limits and uncertainty associated with the 1993 background sample depths presented potential data quality issues.

In order to provide accurate background data for environmental characterization activities at KSD, an investigation was performed in 2014 to establish background threshold values (BTVs) for metals in soil and groundwater (EA 2015).

Ten new monitoring wells were installed in randomized, undisturbed locations upgradient or cross-gradient from known sources of contamination (Figure 2-1). A total of 20 soil samples were collected from the soil borings of these wells, surface and subsurface in each location. Surface soil is considered to be less than or equal to 2 feet (ft) below ground surface (bgs) while subsurface soil is considered to be greater than 2 ft bgs (ADEC 2012). Following installation and development, groundwater samples were retrieved from each of the 10 monitoring wells. Both soil and groundwater samples were analyzed for metals.

Consistent with United States Environmental Protection Agency (USEPA) guidance, outliers within the background study data were removed and the statistical distribution of each metal in groundwater and soil was identified. Based on the distribution, appropriate Upper Tolerance Limits (UTLs) and Upper Prediction Limits (UPLs) were determined and documented, and instances where they exceeded maximum detected concentrations were marked (Table 2-1). Where the UPL or UTL exceed the maximum detected concentration, the maximum detected concentration was used as the BTV.

Based on the new BTV values, certain metals detections at the nine sites were determined to be naturally occurring. Additionally, the widespread contamination at KSD is not primarily due to tanks TU/US-C519, TU/US-C517, TU/US-C518, TU/US-C520, TU/US-C522, TU/US C523, TU/US C524, TU/US-C589, and TU/US-C592 and it is the purpose of this Closure Report to demonstrate that these nine sites may be closed out without negatively impacting separate and ongoing cleanup efforts of existing contamination observed at KSD. The following sections provide more information.



jklemick Path: C:\EA\projects\FAIRBANKS\King Salmon\1456039\MXD\ClosureReportKS_BackgroundFinal.mxd

Closure Report for Nine Compliance Restoration Program Sites
TU/US-C519, TU/US-C517, TU/US-C518, TU/US-C520, TU/US-C522,
TU/US-C523, TU/US-C524, TU/US-C589, and TU/US-C592
at King Salmon Divert, King Salmon, Alaska

AFCEC Contract No. FA8903-08-D-8791-0039

Figure 2-1
Background Monitoring Wells

EA Project No. 1456039

This page intentionally left blank

TABLE 2-1 METALS BACKGROUND THRESHOLD VALUES
Total Soil (SO)

Parameter	Number of Samples	Number of Detects	Number of Non-detects	Number of Distinct Detects	Frequency of Detects (FOD%)	Maximum Detected Concentration (mg/kg)	Maximum Concentration (mg/kg)	Mean Detected Concentration (mg/kg)	Data Distribution	Method Used[a]	UPL[b] (mg/kg)	UTL[c] (mg/kg)
Aluminum	20	20	0	20	100	37400	37400	20100	Normal	Student's t	35500	36800
Antimony	20	0	20	0	0	NA	0.82	NA	Not Detected	Minimum RL	0.041	0.041
Arsenic	20	20	0	17	100	5.6	5.6	3.69	Normal	Student's t	**5.67**	**5.84**
Barium	20	20	0	20	100	173	173	90.8	Normal	Student's t	153	159
Beryllium	20	19	1	13	95	0.51	0.51	0.248	Nonparametric	KM(t)	0.425	0.441
Cadmium	20	20	0	16	100	0.1	0.1	0.0562	Gamma	HW Gamma	0.0939	0.0982
Calcium	20	20	0	20	100	7770	7770	4860	Normal	Student's t	7370	7590
Chromium	20	20	0	17	100	21.1	21.1	13.7	Gamma	HW Gamma	19.5	20.1
Cobalt	20	20	0	16	100	11.6	11.6	6.77	Gamma	HW Gamma	10.2	10.6
Copper	20	20	0	16	100	16.1	16.1	11.5	Normal	Student's t	14.6	14.8
Iron	20	20	0	18	100	35000	35000	23600	Normal	Student's t	**35400**	**36500**
Lead	20	20	0	18	100	5	5	2.89	Normal	Student's t	4.79	4.95
Magnesium	19	19	0	19	100	5210	5210	4450	Approximate Gamma	HW Gamma	**5870**	**6020**
Manganese	20	20	0	19	100	995	995	350	Approximate Gamma	HW Gamma	713	759
Mercury	20	18	2	18	90	0.12	0.12	0.0395	Nonparametric	KM(t)	0.0897	0.0943
Molybdenum	20	3	17	3	15	0.73	0.73	NA	Nonparametric	Higher-Order	0.64	0.73
Nickel	20	20	0	16	100	11.1	11.1	8.46	Nonparametric	Higher-Order	10.3	11.1
Potassium	20	20	0	20	100	677	677	537	Normal	Student's t	**683**	**695**
Selenium	20	20	0	16	100	1.1	1.1	0.406	Gamma	HW Gamma	0.952	1.03
Silver	20	19	1	18	95	0.079	0.25	0.0371	Nonparametric	KM(t)	0.0649	0.0673
Sodium	20	20	0	19	100	1060	1060	608	Normal	Student's t	925	953
Thallium	20	0	20	0	0	NA	0.41	NA	Not Detected	Minimum RL	0.026	0.026
Vanadium	20	20	0	20	100	96.5	96.5	63.2	Normal	Student's t	90.1	92.4
Zinc	20	20	0	19	100	42.2	42.2	32	Normal	Student's t	40.7	41.4

Bold UTL and UPL values exceeded the maximum detected concentration

(a) Normal is based on the Student's t-distribution; Maximum is maximum detected concentration; KM(t) is the Kaplan-Meier method using the Student's t-distribution; Maximum RL is the maximum reporting limit; HW Gamma is based on the normal approximation to the gamma distribution using the Hawkins-Wixley approximation; Nonparametric UPL/UTL interpolated from higher-order statistics.

(b) UPL is the 95% Upper Prediction Limit

(c) UTL is the 95% Upper Tolerance Limit with 90% coverage

Notes:
FOD = frequency of detection
mg/kg = milligrams per kilogram
UPL = upper prediction limit
UTL = upper threshold limit

TABLE 2-1 CONTINUED - METALS BACKGROUND THRESHOLD VALUES
Surface Soil (SS) ≤ 2 Feet Below Ground Surface

Parameter	Number of Samples	Number of Detects	Number of Non-detects	Number of Distinct Detects	Frequency of Detects (FOD%)	Maximum Detected Concentration (mg/kg)	Maximum Concentration (mg/kg)	Mean Detected Concentration (mg/kg)	Data Distribution	Method Used[a]	UPL[b] (mg/kg)	UTL[c] (mg/kg)
Aluminum	10	10	0	10	100	37400	37400	25700	Normal	Student's t	**39400**	**42500**
Antimony	10	0	10	0	0	NA	0.82	NA	Not Detected	Minimum RL	0.051	0.051
Arsenic	10	10	0	9	100	5.6	5.6	4.35	Normal	Student's t	**5.95**	**6.31**
Barium	10	10	0	10	100	173	173	112	Normal	Student's t	168	**180**
Beryllium	10	10	0	10	100	0.51	0.51	0.308	Normal	Student's t	**0.511**	**0.556**
Cadmium	10	10	0	10	100	0.097	0.097	0.0599	Normal	Student's t	**0.103**	**0.113**
Calcium	10	10	0	10	100	6520	6520	4180	Normal	Student's t	6300	**6780**
Chromium	10	10	0	10	100	21.1	21.1	13.9	Normal	Student's t	20.6	**22.1**
Cobalt	10	10	0	9	100	11.6	11.6	7.51	Normal	Student's t	**11.9**	**12.9**
Copper	10	10	0	10	100	13.5	13.5	11.3	Normal	Student's t	**14.7**	**15.5**
Iron	10	10	0	8	100	35000	35000	27200	Normal	Student's t	**36900**	**39100**
Lead	10	10	0	9	100	5	5	3.63	Normal	Student's t	**5.48**	**5.89**
Magnesium	10	10	0	10	100	4990	4990	4310	Nonparametric	Higher-Order	4990	4990
Manganese	10	10	0	9	100	995	995	400	Gamma	HW Gamma	981	**1190**
Mercury	10	10	0	10	100	0.077	0.077	0.0462	Normal	Student's t	**0.0967**	**0.108**
Molybdenum	10	3	7	3	30	0.73	0.73	0.653	Nonparametric	Higher-Order	0.73	0.73
Nickel	10	10	0	9	100	11.1	11.1	8.36	Normal	Student's t	**12.1**	**13**
Potassium	10	10	0	10	100	604	604	529	Approximate Gamma	HW Gamma	**647**	**674**
Selenium	10	10	0	9	100	1.1	1.1	0.577	Normal	Student's t	1.08	**1.19**
Silver	10	10	0	10	100	0.079	0.079	0.0471	Normal	Student's t	0.0764	**0.083**
Sodium	10	10	0	10	100	795	795	516	Normal	Student's t	766	**822**
Thallium	10	0	10	0	0	NA	0.41	NA	Not Detected	Minimum RL	0.031	0.031
Vanadium	10	10	0	10	100	96.5	96.5	70.5	Normal	Student's t	**97.6**	**104**
Zinc	10	10	0	9	100	39	39	33.4	Normal	Student's t	**40**	**41.5**

Bold UTL and UPL values exceeded the maximum detected concentration

(a) Normal is based on the Student's t-distribution; Maximum is maximum detected concentration; KM(t) is the Kaplan-Meier method using the Student's t-distribution; Maximum RL is the maximum reporting limit; HW Gamma is based on the normal approximation to the gamma distribution using the Hawkins-Wixley approximation; Nonparametric UPL/UTL interpolated from higher-order statistics.

(b) UPL is the 95% Upper Prediction Limit

(c) UTL is the 95% Upper Tolerance Limit with 90% coverage

(d) The detected concentrations are "J" qualifed. Therefore, the resulting higher-order statistics are nondetects, and the resulting UPL and UTL are both equal to the laboratory reporting limit.

Notes:
FOD = frequency of detection
mg/kg = milligrams per kilogram
UPL = upper prediction limit
UTL = upper threshold limit

TABLE 2-1 CONTINUED - METALS BACKGROUND THRESHOLD VALUES
Subsurface Soil (SB) > 2 Feet Below Ground Surface

Parameter	Number of Samples	Number of Detects	Number of Non-detects	Number of Distinct Detects	Frequency of Detects (FOD%)	Maximum Detected Concentration (mg/kg)	Maximum Concentration (mg/kg)	Mean Detected Concentration (mg/kg)	Data Distribution	Method Used[a]	UPL[b] (mg/kg)	UTL[c] (mg/kg)
Aluminum	10	10	0	10	100	29900	29900	14500	Gamma	HW Gamma	26700	**30500**
Antimony	10	0	10	0	0	NA	0.67	NA	Not Detected	Minimum RL	0.041	0.041
Arsenic	10	10	0	9	100	4.6	4.6	3.03	Normal	Student's t	**4.92**	**5.35**
Barium	10	10	0	10	100	129	129	69.3	Normal	Student's t	123	**134**
Beryllium	10	9	1	6	90	0.27	0.27	0.182	Nonparametric	KM(t)	**0.275**	**0.298**
Cadmium	10	10	0	9	100	0.1	0.1	0.0524	Approximate Gamma	HW Gamma	0.0596	0.0632
Calcium	10	10	0	10	100	7770	7770	5540	Normal	Student's t	**8250**	**8860**
Chromium	10	10	0	8	100	20.5	20.5	13.4	Normal	Student's t	19.1	20.4
Cobalt	10	10	0	8	100	7.2	7.2	6.03	Normal	Student's t	**7.7**	**8.08**
Copper	10	10	0	9	100	16.1	16.1	11.7	Approximate Gamma	HW Gamma	12.9	13.3
Iron	10	10	0	10	100	32400	32400	20000	Approximate Gamma	HW Gamma	**32700**	**36500**
Lead	10	10	0	9	100	3.3	3.3	2.15	Normal	Student's t	3.17	**3.4**
Magnesium	10	10	0	10	100	6810	6810	4820	Normal	Student's t	6470	**6840**
Manganese	10	10	0	10	100	571	571	301	Normal	Student's t	522	**572**
Mercury	10	8	2	8	80	0.12	0.12	0.0312	Nonparametric	KM(t)	0.029	0.029
Molybdenum	10	0	10	0	0	NA	0.4	NA	Not Detected	Minimum RL	0.031	0.031
Nickel	10	10	0	8	100	9.3	9.3	8.56	Normal	Student's t	**9.83**	**10.1**
Potassium	10	10	0	10	100	677	677	545	Approximate Gamma	HW Gamma	**725**	**773**
Selenium	10	10	0	7	100	0.51	0.51	0.234	Nonparametric	Higher-Order	0.51	0.51
Silver	10	9	1	9	90	0.038	0.25	0.026	Nonparametric	KM(t)	**0.0399**	**0.0431**
Sodium	10	10	0	10	100	1060	1060	700	Normal	Student's t	1040	**1120**
Thallium	10	0	10	0	0	NA	0.33	NA	Not Detected	Minimum RL	0.026	0.026
Vanadium	10	10	0	10	100	82.1	82.1	55.9	Normal	Student's t	80.9	**86.6**
Zinc	10	10	0	10	100	42.2	42.2	30.6	Nonparametric	Higher-Order	42.2	42.2

Bold UTL and UPL values exceeded the maximum detected concentration

(a) Normal is based on the Student's t-distribution; Maximum is maximum detected concentration; KM(t) is the Kaplan-Meier method using the Student's t-distribution; Maximum RL is the maximum reporting limit; HW Gamma is based on the normal approximation to the gamma distribution using the Hawkins-Wixley approximation; Nonparametric UPL/UTL interpolated from higher-order statistics.

(b) UPL is the 95% Upper Prediction Limit

(c) UTL is the 95% Upper Tolerance Limit with 90% coverage

(d) The detected concentrations are "J" qualifed. Therefore, the resulting higher-order statistics are nondetects, and the resulting UPL and UTL are both equal to the laboratory reporting limit.

Notes:
FOD = frequency of detection
mg/kg = milligrams per kilogram
UPL = upper prediction limit
UTL = upper threshold limit

TABLE 2-1 CONTINUED - METALS BACKGROUND THRESHOLD VALUES
Ground Water (WG)

Parameter	Number of Samples	Number of Detects	Number of Non-detects	Number of Distinct Detects	Frequency of Detects (FOD%)	Maximum Detected Concentration (ug/L)	Maximum Concentration (ug/L)	Mean Detected Concentration (ug/L)	Data Distribution	Method Used[a]	UPL[b] (ug/L)	UTL[c] (ug/L)
Aluminum	10	9	1	9	90	882	882	448	Nonparametric	KM(t)	**894**	**1000**
Antimony	10	0	10	0	0	NA	2	NA	Not Detected	Minimum RL	0.12	0.12
Arsenic	10	0	10	0	0	NA	2	NA	Not Detected	Minimum RL	0.23	0.23
Barium	10	5	5	5	50	8.9	8.9	7	Nonparametric	Higher-Order	8.9	8.9
Beryllium	10	2	8	2	20	0.068	0.5	0.048	Nonparametric	Higher-Order	**0.5**	**0.5**
Cadmium	10	0	10	0	0	NA	4	NA	Not Detected	Minimum RL	0.22	0.22
Calcium	10	10	0	10	100	12900	12900	6510	Approximate Gamma	HW Gamma	**13900**	**16400**
Chromium	10	0	10	0	0	NA	6	NA	Not Detected	Minimum RL	0.3	0.3
Cobalt	9	9	0	8	100	0.47	0.47	0.283	Normal	Student's t	**0.523**	**0.583**
Copper	10	0	10	0	0	NA	4	NA	Not Detected	Minimum RL	0.22	0.22
Iron	10	7	3	7	70	717	717	515	Nonparametric	Higher-Order	717	717
Lead	10	0	10	0	0	NA	2	NA	Not Detected	Minimum RL	0.027	0.027
Magnesium	10	10	0	10	100	6290	6290	2410	Nonparametric	Higher-Order	6290	6290
Manganese	9	9	0	9	100	57.1	57.1	25.5	Normal	Student's t	**60.3**	**69.1**
Mercury	10	0	10	0	0	NA	0.15	NA	Not Detected	Minimum RL	0.064	0.064
Molybdenum	10	0	10	0	0	NA	1	NA	Not Detected	Minimum RL	0.17	0.17
Nickel	10	0	10	0	0	NA	4	NA	Not Detected	Minimum RL	0.062	0.062
Potassium	10	10	0	10	100	1700	1700	1080	Normal	Student's t	**1800**	**1960**
Selenium	10	8	2	6	80	0.19	1	0.125	Nonparametric	KM(t)	0.182	**0.195**
Silver	10	0	10	0	0	NA	1	NA	Not Detected	Minimum RL	0.1	0.1
Sodium	10	10	0	10	100	6450	6450	4460	Nonparametric	Higher-Order	6450	6450
Thallium	10	0	10	0	0	NA	1	NA	Not Detected	Minimum RL	0.17	0.17
Vanadium	10	2	8	2	20	5.3	5.3	4.95	Nonparametric	Higher-Order	5.3	5.3
Zinc	10	0	10	0	0	NA	6	NA	Not Detected	Minimum RL	0.93	0.93

Bold UTL and UPL values exceeded the maximum detected concentration

(a) Normal is based on the Student's t-distribution; Maximum is maximum detected concentration; KM(t) is the Kaplan-Meier method using the Student's t-distribution; Maximum RL is the maximum reporting limit; HW Gamma is based on the normal approximation to the gamma distribution using the Hawkins-Wixley approximation; Nonparametric UPL/UTL interpolated from higher-order statistics.

(b) UPL is the 95% Upper Prediction Limit

(c) UTL is the 95% Upper Tolerance Limit with 90% coverage

(d) The detected concentrations are "J" qualifed. Therefore, the resulting higher-order statistics are nondetects, and the resulting UPL and UTL are both equal to the laboratory reporting limit.

Notes:
FOD = frequency of detection
mg/kg = milligrams per kilogram
UPL = upper prediction limit
UTL = upper threshold limit

3.0 ENVIRONMENTAL SETTINGS

3.1 GEOLOGY

KSD is situated in a poorly drained lowland area bounded by the northeastern Aleutian Range on the east, the Kuskokwim Mountains on the north, and the Ahklun Mountains on the west. Scattered bedrock outcrops consisting of mostly basaltic composition are present northeast of KSD. In KSD, thick surficial deposits overlie bedrock. Deposits consist of unconsolidated gravels, sands, silts, and clays. Water wells drilled to depths of up to 200 ft bgs in the area did not encounter bedrock (EMCON 1995). The topography consists of a hummocky plain interrupted by drainages, with minimal topographic relief. Ground elevations range from 30 to 68 ft above mean sea level across KSD (CH2M HILL 2013).

Soils typically have an organic surface mat underlain by 3-4 ft of volcanic ash and silty sands and gravels. Permafrost is isolated or absent in the area. The nine sites vicinity is primarily underlain by glacial-fluvial sand and gravel aquifers with indications of groundwater flow to the south, towards the Naknek River (CH2M HILL 2013).

3.2 HYDROGEOLOGY

Groundwater at KSD has been divided into seven distinct zones based on similarities in groundwater movement, contaminants of concern (COCs), geology, and location (Figure 1-1). Groundwater remediation at KSD is being managed by zone, consisting of seven groundwater zones, under a separate base-wide program. Background samples were collected adjacent to and within Groundwater Zones 5 and 2 (Figure 2-1).

Groundwater is the primary source of drinking water in the area. Three aquifer units are present beneath KSD: A-Aquifer, B-Aquifer, and C-Aquifer, in order of increasing depth. The aquifers are comprised of unconsolidated, well-sorted to poorly sorted silty and gravelly sands, separated by aquitard units of silty sands, silts, and clays (CH2M HILL 2013).

The shallowest aquifer is the A-Aquifer, which is unconfined and exposed in several areas on KSD. The depth of the A-Aquifer ranges from the surface at water bodies and wetlands to 45 ft bgs along the northern portion of KSD, with a saturated thickness ranging from 0 to 15 ft. Groundwater movement in this shallow aquifer generally flows towards topographic lows and surface drainages such as wetlands, rivers, creeks, and ditches, with an overall southeasterly flow. Flow becomes more easterly near Eskimo Creek and more southwesterly on the western portion near King Salmon Creek. Groundwater within the A-Aquifer is not currently used as a drinking water supply or considered a future water supply within the KSD (USAF 2006).

Underlying the A-Aquifer is the discontinuous A-Aquitard. The A-Aquitard is between 7-22 ft thick and the elevation varies across the area. Eskimo Creek, King Salmon Creek, and the Naknek River have eroded through the A-Aquifer (CH2M HILL 2013).

The B-Aquifer is encountered below the A-Aquitard at depths ranging from 50 to 80 ft bgs and ranges in thickness from 15 to 40 ft bgs. Groundwater in the B-Aquifer is most likely in equilibrium with the

A-Aquifer due to similar piezometric surface measurements. Numerous residential drinking water supply wells are screened in the B-Aquifer downgradient of the KSD near the north bank of the Naknek River (CH2M HILL 2013).

The B-Aquitard separates the B-Aquifer and C-Aquifer, varies in thickness from 10 to 120 ft, and has been shown to be discontinuous (CH2M HILL 2013).

The C-Aquifer is approximately 200 ft bgs, but the total thickness and groundwater flow direction of this deep aquifer are unknown. Two water supply wells for KSD Groundwater Zone 1 are located within the C-Aquifer (CH2M HILL 2013).

Depth to groundwater for the nine compliance sites, located in Groundwater Zones 1, 2 and 5 is variable based on the topography at each site:

- Site TU/US-C519 — ranges from 25 to 30 ft bgs (SAIC 1993a).
- Site TU/US-C517 — generally 22 ft bgs (CH2M HILL 2013).
- Site TU/US-C518 — variable from the surface adjacent to creeks and wetlands to approximately 33 ft bgs on the north side of KSD (CH2M HILL 2013).
- Site TU/US-C520 — generally encountered at approximately 28 ft bgs (BEES 2001).
- Site TU/US-C522 — generally encountered at approximately 5.5 ft bgs (CH2M HILL 2013).
- Site TU/US-C523 — generally encountered at approximately 14 ft bgs (CH2M HILL 2013).
- Site TU/US-C524 — generally encountered at approximately 14 ft bgs (CH2M HILL 2013).
- Site TU/US-C589 — generally encountered at approximately 14 ft bgs (CH2M HILL 2013).
- Site TU/US-C592 — variable from the surface adjacent to Red Fox Creek and wetlands to approximately 20 ft bgs (CH2M HILL 2013).

3.3 SURFACE WATER HYDROGEOLOGY

The Naknek River is the principal drainage in the area, fed by a 3,600-square mile watershed with numerous small creeks, lakes, and streams. KSD is drained centrally by Eskimo Creek along the eastern boundary of Zone 1. King Salmon Creek runs along the northern boundary of KSD and Red Fox Creek flows along the southeast edge of KSD. All three creeks flow into the Naknek River (CH2M HILL 2013).

The Naknek River flows westwards and empties into Kvichak Bay. The river is tidally influenced and the lower portion is an estuary that extends at least 6 miles upriver and can flow opposite of its normal direction during the incoming tide (Waythomas 1994).

4.0 SITE CLOSURE RECOMMENDATIONS

4.1 SITE TU/US-C517 - UST 300-2

4.1.1 Description

Site TU/US-C517 is located in Groundwater Zone 2 adjacent to the east side of Building 300, the Fire Station (Figure 1-1). The site formerly contained UST 300-2, a regulated 1,000-gallon diesel fuel UST, as shown in Figures 4-1a and 4-1b. According to ADEC's UST Facility Report Database, UST 300-2 (ADEC Tank ID 9) was installed in 1985 and removed with permanent closure in 1993 (ADEC 2017a).

4.1.2 Previous Investigation Results

In 1988, Nakata Planning Group Incorporated (NPGI) prepared a base comprehensive plan (BCP), which lists Building 300, completed in 1988, as the Fire/Rescue Station located within the Industrial Area. At that time, no fuel storage tank was listed in association with Building 300 (NPGI 1988).

In 1992, SAIC surveyed existing USTs at King Salmon Air Station, now KSD, to evaluate environmental risks posed by 30 USTs and 33 ASTs at King Salmon, defining to what extent tanks were contributing or could contribute to the contaminated aquifer identified under the IRP. UST 300-2 was evaluated in the investigation. The map prepared with the report shows UST 300-2 located near the northeastern side of Building 300, the Fire Station Building. The report identified the following concerns with regard to UST 300-2: stained soils were visible in the vicinity of the tank and attributed to overfilling; the interstitial release detection and monitoring system was inoperative; no release detection for piping appeared to be in effect; and neither spill protection nor overfill protection were present (SAIC 1993a).

In 1993, NPGI utilized the 1992 SAIC study to develop a Management Action Plan (MAP) summarizing the status of the King Salmon ERP and Environmental Compliance Program (ECP), and to develop a strategy for implementing response actions necessary to protect human health and the environment (NPGI 1993). The MAP integrated and coordinated activities under both the IRP and the ECP and identified a total of 30 USTs, 17 of which were scheduled for removal in 1994 as part of a compliance project. Removed USTs would be replaced by ASTs. UST activities were being conducted under the ADEC UST program. UST 300-2 was not included in the UST removal plan.

In 2011, ADEC released a UST Facility Report describing UST 300-2 (ADEC Tank ID 9) as permanently out-of-use and notes that the tank was removed from the ground after failing a tightness test. Interstitial monitoring did not confirm a release, rather the nylon bushings at the top of the tank were suspected of leaking (ADEC 2011a).

In 2012, CH2M HILL performed a preliminary assessment (PA)/site investigation (SI) including visual inspection of the site and surface soil (0-2 ft bgs), subsurface soil (greater than 2 ft bgs), and groundwater sampling using temporary monitoring well points. The visual inspection showed maintained grass and asphalt areas surrounding Building 300 with no evidence of the former UST and no evidence of surface staining or stressed vegetation (CH2M HILL 2013). In subsurface soil, volatile organic compounds (VOCs) including methylene chloride and TCE were detected above ADEC screening levels (Figure 4-1a

and Table 4-1.1). In groundwater, TCE was detected along the smear zone at approximately 22 ft bgs and exceeded ADEC screening levels (Figure 4-1b and Table 4-1.2). Additionally, metals in surface soil, subsurface soil, and groundwater were detected above screening levels (Table 4-1.3) (CH2M HILL 2013).

4.1.3 Evaluation of Findings

Methylene chloride and TCE are not associated with diesel fuel and are unlikely to have originated from UST 300-2. Rather, these analytes are attributed to a zone-wide issue from elsewhere on KSD, possibly due to a surface release related to the stained soils and vegetation noted in the 1992 SAIC study. In addition, while metals exceedances were detected in soils and groundwater, these metals are not associated with diesel fuel and are below or near the BTVs shown in Table 4-1.3. These elevated metals are likely attributed to backfill from an offsite source rather than UST 300-2.

While a separate investigation of TCE may be warranted, it appears TCE is attributed to a surface release and not associated with UST 300-2, particularly combined with TCE detections in the smear zone and elsewhere throughout Groundwater Zone 2. With UST 300-2 removed and closed and with no evidence of diesel fuel present at the site above ADEC cleanup levels, Site TU/US-C517 is recommended for closure.

4.1.4 Description of Exposure Pathways, Potential Receptors, and Contaminant Screening

Site TU/US-C517 is within Groundwater Zone 2 in the industrial area of KSD. Potential human receptors are adult workers. The immediate area surrounding Building 300 is not likely to be accessed by mammals and/or birds as a source of forage. Potential human health exposure pathways for adult workers include incidental ingestion of soils, dermal contact with soils, inhalation of indoor and outdoor vapors from subsurface soils and groundwater, inhalation of dust, and ingestion of groundwater.

Based on sampling results from the 2012 PA/SI, and the comparison of metals detections to 2015 BTVs, there are no exposure sources relating to the former diesel UST 300-2. Therefore, exposure pathways for soil and groundwater are incomplete and no longer pose a risk to human health and the environment.

4.1.5 Justification for Closure

Closure is justified based on the determination that no significant risk or threat to human health and the environment exists at Site TU/US-C517 from UST 300-2. The most recent field investigation revealed no soil or groundwater contamination exists at the site above ADEC cleanup levels related to diesel fuel formerly stored within UST 300-2 (Tables 4-1.1 and 4-1.2) (CH2M HILL 2013). Contamination present at the site above ADEC cleanup levels is not related to UST 300-2 at Site TU/US-C517 and should be evaluated under the area-wide Groundwater Zone 2 Record of Decision (ROD). Based on these findings, closure is appropriate for Site TU/US-C517.

Notes:
Charts identify sample depths and analytical suites. A dot signifies at least one analyte was detected above ADEC screening criteria.

Acronyms:
ADEC - Alaska Department of Environmental Conservation

Data Source:
Samples collected during 2012 Preliminary Assessment/Site Inspection.
Imagery: Aerometrics 2012

Legend

- Monitoring Well
- Soil Bore Location
- Former UST 300-2
- Underground Storage Tank
- 604 Structure
- Fuel Line
- Wastewater Line
- Water Line
- Electric Line - Overhead
- Electric Line - Underground

Approximate Direction of Groundwater Flow

UST 300-1

300

UST 300-2

AP-1

205

KSC517DP002

Parameter Suite	Sample Depth (ft)			
	0-2	2-4	5-7	20-22
GRO/DRO/RRO				
VOCs		•		
SVOCs				

KSC517DP001

Parameter Suite	Sample Depth (ft)			
	0-2	2-4	5-7	20-22
GRO/DRO/RRO				
VOCs				•
SVOCs				

KSC517DP003

Parameter Suite	Sample Depth (ft)			
	0-2	2-4	5-7	20-22
GRO/DRO/RRO				
VOCs				•
SVOCs				

N

1 inch = 50 feet
(11x17 print-out)

0 25 50 100 Feet

jschwertz Path: C:\DATA\King Salmon\Report\MXD\Site_517.mxd

Closure Report for Nine Compliance Restoration Program Sites
TU/US-C519, TU/US-C517, TU/US-C518, TU/US-C520, TU/US-C522, TU/US-C523, TU/US-C524, TU/US-C589, and TU/US-C592
at King Salmon Divert, King Salmon, Alaska

AFCEC Contract No. FA8903-08-D-8791-0039

Figure 4-1a
Soil Data Exceedance Summary
at Site TU/US-C517 - UST 300-2

EA Project No. 1456039

This page intentionally left blank

Notes:
Charts identify sample depths and analytical suites. A dot signifies at least one analyte was detected above ADEC screening criteria.

Acronyms:
ADEC - Alaska Department of Environmental Conservation

Data Source:
Samples collected during 2012 Preliminary Assessment/Site Inspection.
Imagery: Aerometrics 2012

Approximate Direction of Groundwater Flow

Legend

- Monitoring Well
- Soil Bore Location
- Former UST 300-2
- Underground Storage Tank
- 604 Structure
- Fuel Line
- Wastewater Line
- Water Line
- Electric Line - Overhead
- Electric Line - Underground

UST 300-1

300

UST 300-2

AP-1

205

KSC517DP002	
Parameter Suite	**Screen Interval (ft)**
	23-26
GRO/DRO/RRO	
VOCs	•
SVOCs	

KSC517DP001	
Parameter Suite	**Screen Interval (ft)**
	23-26
GRO/DRO/RRO	
VOCs	•
SVOCs	

KSC517DP003	
Parameter Suite	**Screen Interval (ft)**
	23-26
GRO/DRO/RRO	
VOCs	•
SVOCs	

N

1 inch = 50 feet
(11x17 print-out)

0 25 50 100 Feet

Closure Report for Nine Compliance Restoration Program Sites
TU/US-C519, TU/US-C517, TU/US-C518, TU/US-C520, TU/US-C522, TU/US-C523, TU/US-C524, TU/US-C589, and TU/US-C592
at King Salmon Divert, King Salmon, Alaska

AFCEC Contract No. FA8903-08-D-8791-0039

Figure 4-1b
Groundwater Data Exceedance Summary
at Site TU/US-C517 - UST 300-2

EA Project No. 1456039

jschwertz Path: C:\DATA\King Salmon\Report\MXD\Site_517gw.mxd

This page intentionally left blank

TABLE 4-1.1 - Site TU/US-C517 - UST 300-2
Summary of PA/SI Chemicals Exceeding Screening Levels in Soil (Non-Metals)

	Location		KSC517DP001				KSC517DP002					KSC517DP003			
	Sample ID		KSC517DP001SO01-01	KSC517DP001SO01-02	KSC517DP001SO01-05	KSC517DP001SO01-20	KSC517DP002SO01-01	KSC517DP002SO01-02	KSC517DP002SO01-05	KSC517DP002SO01-20	KSC517DP902SO01-20	KSC517DP003SO01-01	KSC517DP003SO01-02	KSC517DP003SO01-05	KSC517DP003SO01-20
	Sample Depth (ft)		0-2	2-4	5-7	20-22	0-2	2-4	5-7	20-22	20-22	0-2	2-4	5-7	20-22
Analyte	**Screening Level**	**Screening Level Source**													
VOCs (µg/kg)															
Methylene Chloride	16	E						34.1 J							
Trichloroethene (TCE)	20	E				38.2 J									48.3
SVOCs (µg/kg)	No Exceedances														
Petroleum Hydrocarbons (mg/kg)	No Exceedances														

Notes:
A=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B2, Method 2, Ingestion, Under-40 inch zone.
B=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B1, Method 2, Direct Contact, Under-40 inch zone (corrected for additivity noncarcinogen for HQ = 0.1 and carcinogenic risk level of 1x10-6).
C=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B2, Method 2, Inhalation, Under-40 inch zone.
D=ADEC Soil Cleanup Levels (2012), 18 AAC 75.340 Table B1, Method 2, Outdoor Inhalation, Under 40-inch zone (corrected for noncarcinogenic risk of HQ = 0.1 and carcinogenic risk level of 1x10-6).
E=ADEC Soil Cleanup Levels (2012), 18 AAC 75.340 Table B1 and Table B2, Method 2, Migration to Groundwater Under-40 inch zone.
F=1/10 ADEC Groundwater Cleanup Levels (2012), 18 AAC 75.345 Table C adjusted based on the ADEC Cumulative Risk Guidance (ADEC 2008).
µg/kg = Microgram(s) per kilogram mg/kg = Milligram(s) per kilogram
ADEC = Alaska Department of Environmental Conservation
J = The reported result is an estimated value (e.g., the analyte was detected at a concentration outside the quantitation range or a quality control exceedance was identified).

This page intentionally left blank

TABLE 4-1.2 - Site TU/US-C517 - UST 300-2
Summary of PA/SI Chemicals Exceeding Screening Levels in Groundwater (Non-Metals)

	Location		KSC517DP001	KSC517DP002	KSC517DP003
	Sample ID		KSC517MW001GW01-45	KSC517MW002GW01-45	KSC517MW003GW01-45
	Sample Depth (ft)		23-26	23-26	23-26
Analyte	**Screening Level**	**Screening Level Source**			
VOCs (µg/L)					
Trichloroethene (TCE)	0.5	F	15.7	1.78	49
SVOCs (µg/L)	No Exceedances				
Petroleum Hydrocarbons (µg/L)	No Exceedances				

Notes:
A=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B2, Method 2, Ingestion, Under-40 inch zone.
B=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B1, Method 2, Direct Contact, Under-40 inch zone (corrected for additivity noncarcinogen for HQ = 0.1 and carcinogenic risk level of 1x10-6).
C=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B2, Method 2, Inhalation, Under-40 inch zone.
D=ADEC Soil Cleanup Levels (2012), 18 AAC 75.340 Table B1, Method 2, Outdoor Inhalation, Under 40-inch zone (corrected for noncarcinogenic risk of HQ = 0.1 and carcinogenic risk level of 1x10-6).
E=ADEC Soil Cleanup Levels (2012), 18 AAC 75.340 Table B1 and Table B2, Method 2, Migration to Groundwater Under-40 inch zone.
F=1/10 ADEC Groundwater Cleanup Levels (2012), 18 AAC 75.345 Table C adjusted based on the ADEC Cumulative Risk Guidance (ADEC 2008).
µg/kg = Microgram(s) per kilogram mg/kg = Milligram(s) per kilogram
ADEC = Alaska Department of Environmental Conservation
J = The reported result is an estimated value (e.g., the analyte was detected at a concentration outside the quantitation range or a quality control exceedance was identified).

TABLE 4-1.3 - Site TU/US-C517 - UST 300-2
Summary of PA/SI Metals Exceedances Compared to
Background Threshold Values

Analyte	Units	Total Samples	Total Detections	Total Samples Exceeding Cleanup Level	PAL [1,2]	BTV UPL [5]	BTV UTL [6]	Maximum Detected Concentration
Surface Soil (SS) ≤ 2 Feet Below Ground Surface								
Arsenic	mg/kg	3	3	3	0.45	5.95	6.31	5.63
Cobalt	mg/kg	3	3	3	2.7 [2]	11.9	12.9	8.52
Iron	mg/kg	3	3	3	350 [2]	36,900	39,100	20,300
Manganese	mg/kg	3	3	3	28 [2]	981	1,190	562
Subsurface Soil (SB) > 2 Feet Below Ground Surface								
Arsenic	mg/kg	9	9	9	0.45	4.92	5.35	6.03
Cobalt	mg/kg	9	9	9	2.7 [2]	7.7	8.08	9.09
Iron	mg/kg	9	9	9	350 [2]	32,700	36,500	22,000
Manganese	mg/kg	9	9	9	28 [2]	522	572	443
Analyte	**Units**	**Total Samples**	**Total Detections**	**Total Samples Exceeding Cleanup Level**	**PAL [3,4]**	**BTV UPL [5]**	**BTV UTL [6]**	**Maximum Detected Concentration**
Ground Water (WG)								
Aluminum	µg/L	3	3	2	2,000 [4]	894	1,000	5,770
Arsenic	µg/L	3	1	1	1.0	0.23	0.23	8.5 J
Beryllium	µg/L	3	3	1	0.4	0.50	0.50	0.45 J
Iron	µg/L	3	3	3	1,400 [4]	717	717	9,030
Lead	µg/L	3	1	1	1.5	0.027	0.027	3.9 J
Manganese	µg/L	3	3	3	43 [4]	60.3	69.1	404
Vanadium	µg/L	3	3	1	26	5.3	5.3	31.6 J

Notes:
1. Project Action Level (PAL) is set at the most stringent ADEC Method Two Soil Cleanup level for Under 40-inch Zone (corrected for noncarcinogenic risk of HQ = 0.1 and carcinogenic risk level of 1x10-6.) and Migration to Groundwater (18 AAC 75.341) (ADEC 2012)
2. Analytes has no ADEC cleanup level. The value shown is USEPA Regional Screening Level for Protection of Groundwater.
3. PAL is set to 1/10 ADEC Groundwater Cleanup level (18 AAC 75.345) per ADEC Cumulative Risk Guidance (ADEC 2008)
4. Analyte has no ADEC cleanup level; the value shown is the USEPA Tapwater Regional Screening Level.
5. UPL is the 95% Upper Prediction Limit
6. UTL is the 95% Upper Tolerance Limit with 90% coverage
J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

4.2 SITE TU/US-C519 - UST 300-1

4.2.1 Description

Site TU/US-C519 is located in Groundwater Zone 2 (Figure 1-1) within Building 300, the Fire Station, just within the west bay door. The site contains UST 300-1, an out-of-use, regulated double-walled 1,000-gallon waste oil UST, shown in Figures 4-2a and 4-2b. According to ADEC's UST Facility Report Database, UST 300-1 (ADEC Tank ID 8) was installed in 1985 (ADEC 2017a).

As of April 2016, UST 300-1 was still in place at Site TU/US-C519 and listed in ADEC's UST Facility Report Database as temporarily out of use. On 21 August 2015 ADEC's Division of Spill Prevention and Response issued a Notice of Non-Compliance (#2919) to the 611th CES citing deficiencies in inspections and provision of inspection results, spill and overflow protection, and release detection monitoring. Corrective actions to bring the tank into compliance or to permanently close the UST system were recommended (ADEC 2015a). On 29 October 2015, the 611th CES requested an extension to complete permanent closure of Tank 300-1. ADEC Division of Spill Prevention and Response replied to the extension request on 25 January 2016 requiring a copy of the funding instrument and a list of required deadlines, including submittal of a Notice of Intent to Close by 30 April 2016, a Notice of Post-Closure by 30 June 2016, and a Site Assessment and Release Investigation Report by 31 July 2016 (ADEC 2016).

A Notice of Post-Closure and a Site Assessment/Release Investigation report have been submitted to ADEC (by others). The status of Tank 300-1 has been updated to "closed in place" in the UST database as of 30 September 2016 (ADEC 2017a). Discussion with AFCEC indicates that closure of Tank 300-1 will be conducted under a separate contract and will not be addressed further in this Closure Report document. Data regarding Tank 300-1 known at the time of this report has been included for reference. Any further discussion regarding Tank 300-1 will be addressed in future reporting documents.

This page intentionally left blank

Notes:
Charts identify sample depths and analytical suites. A dot signifies at least one analyte was detected above ADEC screening criteria.

Acronyms:
ADEC - Alaska Department of Environmental Conservation

Data Source:
Samples collected during 2012 Preliminary Assessment/Site Inspection.
Imagery: Aerometrics 2012

Approximate Direction of Groundwater Flow

KSC519DP001

Parameter Suite	Sample Depth (ft)			
	0-2	2-4	5-7	20-22
GRO/DRO/RRO	No Exceedances			
VOCs				
SVOCs				
PCB/Pesticides				

KSC519DP002

Parameter Suite	Sample Depth (ft)			
	0-2	2-4	5-7	20-22
GRO/DRO/RRO	No Exceedances			
VOCs				
SVOCs				
PCB/Pesticides				

KSC519DP003

Parameter Suite	Sample Depth (ft)			
	0-2	2-4	5-7	20-22
GRO/DRO/RRO	No Exceedances			
VOCs				
SVOCs				
PCB/Pesticides				

Legend
- Monitoring Well
- Soil Bore Location
- UST 300-1
- Former Underground Storage Tank
- 604 Structure
- Fuel Line
- Wastewater Line
- Water Line
- Electric Line - Overhead
- Electric Line - Underground

UST 300-1
300
UST 300-2
AP-1
205

jschwertz Path: C:\DATA\King Salmon\Report\MXD\Site_519.mxd

1 inch = 50 feet
(11x17 print-out)
0 25 50 100 Feet
N

Closure Report for Nine Compliance Restoration Program Sites
TU/US-C519, TU/US-C517, TU/US-C518, TU/US-C520, TU/US-C522, TU/US-C523, TU/US-C524, TU/US-C589, and TU/US-C592
at King Salmon Divert, King Salmon, Alaska

AFCEC Contract No. FA8903-08-D-8791-0039

Figure 4-2a
Soil Data Exceedance Summary
at Site TU/US-C519 - UST 300-1

EA Project No. 1456039

This page intentionally left blank

Notes:
Charts identify sample depths and analytical suites. A dot signifies at least one analyte was detected above ADEC screening criteria.

Acronyms:
ADEC - Alaska Department of Environmental Conservation

Data Source:
Samples collected during 2012 Preliminary Assessment/Site Inspection.
Imagery: Aerometrics 2012

KSC519DP001	
Parameter Suite	**Screen Interval (ft)**
	23-26
GRO/DRO/RRO	No Exceedances
VOCs	
SVOCs	
PCB/Pesticides	

KSC519DP002	
Parameter Suite	**Screen Interval (ft)**
	23-26
GRO/DRO/RRO	•
VOCs	
SVOCs	
PCB/Pesticides	

KSC519DP003	
Parameter Suite	**Screen Interval (ft)**
	23-26
GRO/DRO/RRO	No Exceedances
VOCs	
SVOCs	
PCB/Pesticides	

Approximate Direction of Groundwater Flow

UST 300-1

300

UST 300-2

AP-1

205

Legend

- Monitoring Well
- Soil Bore Location
- UST 300-1
- Former Underground Storage Tank
- 604 Structure
- Fuel Line
- Wastewater Line
- Water Line
- Electric Line - Overhead
- Electric Line - Underground

jschwertz Path: C:\DATA\King Salmon\Report\MXD\Site_519gw.mxd

1 inch = 50 feet
(11x17 print-out)

N

0 25 50 100 Feet

Closure Report for Nine Compliance Restoration Program Sites
TU/US-C519, TU/US-C517, TU/US-C518, TU/US-C520, TU/US-C522, TU/US-C523, TU/US-C524, TU/US-C589, and TU/US-C592
at King Salmon Divert, King Salmon, Alaska

AFCEC Contract No. FA8903-08-D-8791-0039

Figure 4-2b
Groundwater Data Exceedance Summary at Site TU/US-C519 - UST 300-1

EA Project No. 1456039

This page intentionally left blank

TABLE 4-2.1 - Site TU/US-C519 - UST 300-1
Summary of PA/SI Chemicals Exceeding Screening Levels in Soil (Non-Metals)

	Location		KSC519DP001					KSC519DP002				KSC519DP003				
	Sample ID		KSC519DP001SO01-01	KSC519DP001SO01-02	KSC519DP001SO01-05	KSC519DP901SO01-05	KSC519DP001SO01-20	KSC519DP002SO01-01	KSC519DP002SO01-02	KSC519DP002SO01-05	KSC519DP002SO01-20	KSC519DP003SO01-01	KSC519DP003SO01-02	KSC519DP003SO01-05	KSC519DP903SO01-05	KSC519DP003SO01-01
	Sample Depth (ft)		0-2	2-4	5-7	5-7	20-22	0-2	2-4	5-7	20-22	0-2	2-4	5-7	5-7	0-2
Analyte	**Screening Level**	**Screening Level Source**														
VOCs (µg/kg)	No Exceedances															
SVOCs (µg/kg)	No Exceedances															
Petroleum Hydrocarbons (mg/kg)	No Exceedances															

Notes:
A=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B2, Method 2, Ingestion, Under-40 inch zone.
B=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B1, Method 2, Direct Contact, Under-40 inch zone (corrected for additivity noncarcinogen for HQ = 0.1 and carcinogenic risk level of 1x10-6).
C=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B2, Method 2, Inhalation, Under-40 inch zone.
D=ADEC Soil Cleanup Levels (2012), 18 AAC 75.340 Table B1, Method 2, Outdoor Inhalation, Under 40-inch zone (corrected for noncarcinogenic risk of HQ = 0.1 and carcinogenic risk level of 1x10-6).
E=ADEC Soil Cleanup Levels (2012), 18 AAC 75.340 Table B1 and Table B2, Method 2, Migration to Groundwater Under-40 inch zone.
F=1/10 ADEC Groundwater Cleanup Levels (2012), 18 AAC 75.345 Table C adjusted based on the ADEC Cumulative Risk Guidance (ADEC 2008).
µg/kg = Microgram(s) per kilogram mg/kg = Milligram(s) per kilogram
ADEC = Alaska Department of Environmental Conservation
J = The reported result is an estimated value (e.g., the analyte was detected at a concentration outside the quantitation range or a quality control exceedance was identified).

This page intentionally left blank

TABLE 4-2.2 - Site TU/US-C519 - UST 300-1
Summary of PA/SI Chemicals Exceeding Screening Levels in Groundwater (Non-Metals)

	Location		KSC519DP001	KSC519DP002		KSC519DP003
	Sample ID		KSC519MW001GW01-45	KSC519MW002GW01-45	KSC519MW902GW01-45	KSC519MW003GW01-45
	Sample Depth (ft)		23 to 26	23 to 26	23 to 26	23 to 26
Analyte	**Screening Level**	**Screening Level Source**				
VOCs (µg/L)	No Exceedances					
SVOCs (µg/L)	No Exceedances					
Petroleum Hydrocarbons (mg/L)						
Residual Range Organics (C25 to C36)	0.11	F		0.117 (B)	0.150 (B)	
PCB/Pesticides (µg/kg)	No Exceedances					

Notes:
A=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B2, Method 2, Ingestion, Under-40 inch zone.
B=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B1, Method 2, Direct Contact, Under-40 inch zone (corrected for additivity noncarcinogen for HQ = 0.1 and carcinogenic risk level of 1x10-6).
C=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B2, Method 2, Inhalation, Under-40 inch zone.
D=ADEC Soil Cleanup Levels (2012), 18 AAC 75.340 Table B1, Method 2, Outdoor Inhalation, Under 40-inch zone (corrected for noncarcinogenic risk of HQ = 0.1 and carcinogenic risk level of 1x10-6).
E=ADEC Soil Cleanup Levels (2012), 18 AAC 75.340 Table B1 and Table B2, Method 2, Migration to Groundwater Under-40 inch zone.
F=1/10 ADEC Groundwater Cleanup Levels (2012), 18 AAC 75.345 Table C adjusted based on the ADEC Cumulative Risk Guidance (ADEC 2008).
µg/kg = Microgram(s) per kilogram mg/kg = Milligram(s) per kilogram
ADEC = Alaska Department of Environmental Conservation PCB = polychlorinated biphenyl
J = The reported result is an estimated value (e.g., the analyte was detected at a concentration outside the quantitation range or a quality control exceedance was identified).
(B) = The analyte was detected in the sample at a concentration less than or equal to five times (10 times for common laboratory contaminants) the blank concentration.

TABLE 4-2.3 - Site TU/US-C519 - UST 300-1
Summary of Metals Exceedances from PA/SI Sampling Compared to Background Threshold Values

Analyte	Units	Total Samples	Total Detections	Total Samples Exceeding Cleanup Level	PAL [1,2]	BTV UPL [5]	BTV UTL [6]	Maximum Detected Concentration
Surface Soil (SS) ≤ 2 Feet Below Ground Surface								
Arsenic	mg/kg	3	3	3	0.45	5.95	6.31	5.53
Cobalt	mg/kg	3	3	3	2.7 [2]	11.9	12.9	9.39
Iron	mg/kg	3	3	3	350 [2]	36,900	39,100	22,100
Manganese	mg/kg	3	3	3	28 [2]	981	1,190	436
Subsurface Soil (SB) > 2 Feet Below Ground Surface								
Arsenic	mg/kg	9	9	9	0.45	4.92	5.35	6.13
Cobalt	mg/kg	9	9	9	2.7 [2]	7.7	8.08	9.95
Iron	mg/kg	9	9	9	350 [2]	32,700	36,500	22,300
Manganese	mg/kg	9	9	9	28 [2]	522	572	554
Analyte	**Units**	**Total Samples**	**Total Detections**	**Total Samples Exceeding Cleanup Level**	**PAL [3,4]**	**BTV UPL [5]**	**BTV UTL [6]**	**Maximum Detected Concentration**
Ground Water (WG)								
Aluminum	µg/L	3	3	2	2,000 [4]	894	1,000	76,200
Antimony	µg/L	3	1	1	0.6	0.12	0.12	3.8 B
Arsenic	µg/L	3	1	1	1.0	0.23	0.23	30.4 J
Barium	µg/L	3	3	2	20	8.9	8.9	435 J
Beryllium	µg/L	3	1	1	0.4	0.5	0.5	2.39 J
Chromium	µg/L	3	2	1	10	0.3	0.3	71.3
Cobalt	µg/L	3	2	1	6 [4]	0.523	0.583	38.5
Copper	µg/L	3	3	1	100	0.22	0.22	108
Iron	µg/L	3	3	2	1,400 [4]	717	717	59,900
Lead	µg/L	3	1	1	1.5	0.027	0.027	17
Manganese	µg/L	3	3	2	43 [4]	60.3	69.1	2,410
Nickel	µg/L	3	1	1	10	0.062	0.062	44 J
Vanadium	µg/L	3	3	1	26	5.3	5.3	145 J

Notes:
1. Project Action Level (PAL) is set at the most stringent ADEC Method Two Soil Cleanup level for Under 40-inch Zone (corrected for noncarcinogenic risk of HQ = 0.1 and carcinogenic risk level of 1x10-6.) and Migration to Groundwater (18 AAC 75.341) (ADEC 2012)
2. Analytes has no ADEC cleanup level. The value shown is USEPA Regional Screening Level for Protection of Groundwater.
3. PAL is set to 1/10 ADEC Groundwater Cleanup level (18 AAC 75.345) per ADEC Cumulative Risk Guidance (ADEC 2008)
4. Analyte has no ADEC cleanup level; the value shown is the USEPA Tapwater Regional Screening Level.
5. UPL is the 95% Upper Prediction Limit
6. UTL is the 95% Upper Tolerance Limit with 90% coverage
J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
B = The analyte was detected in the sample at a concentration less than or equal to five times (10 times for common laboratory contaminants) the blank concentration.

4.3 SITE TU/US-C518 - UST 614

4.3.1 Description

Site TU/US-C518 is located in Groundwater Zone 1 in the industrial area on the southern corner of Building 614, the Communications Facility (Figure 1-1). The site formerly contained UST 614, a regulated 2,000-gallon diesel fuel UST, as shown in Figures 4-3a and 4-3b. According to ADEC's UST Facility Report Database, UST 614 (ADEC Tank ID 36) was installed in 1989 and removed with permanent closure in 2003 (ADEC 2014; ADEC 2017a).

4.3.2 Previous Investigation Results

A 1988 Facility Site Plan describes UST 614 as a 2,000-gallon tank along the southwest side of Building 614, near the southern corner, covered with 2 ft of fill with the base of the tank 6 ft below grade, and presumably connected to Building 614 through underground suction pipelines (USACE 1988).

In 1989, NPGI prepared a BCP which did not identify Building 614. The Communications Center was located at Building 624 at the time of the BCP, with demolition of Building 624 and construction of a new Communications Center scheduled for fiscal year 1989 (NPGI 1988).

In 1992, SAIC surveyed existing USTs at King Salmon Air Station, now KSD, to evaluate environmental risks posed by 30 USTs and 33 ASTs at King Salmon, defining to what extent tanks were contributing or could contribute to the contaminated aquifer identified under the IRP. UST 614 was evaluated in the investigation and described as a 2,000-gallon steel, double-walled diesel UST used for emergency power generation at Building 614. The report identified the following with regard to UST 614: cathodic protection was equipped with interstitial monitoring systems; no spill or overflow protection were installed; depth to groundwater was within 30 ft bgs with highly permeable underlying soils; and was located within 200 ft of a wetland or a river. Additionally, tank piping did not have release or corrosion detection, however UST 614 was reportedly exempt from state and federal regulations requiring such protection as it was used solely for powering emergency generators (SAIC 1993a).

In 1993, NPGI utilized the 1992 SAIC study to develop a MAP summarizing the status of the King Salmon ERP and ECP, and to develop a strategy for implementing response actions necessary to protect human health and the environment (NPGI 1993). The MAP integrated and coordinated activities under both the IRP and the ECP and identified a total of 30 USTs, 17 of which were scheduled for removal in 1994 as part of a compliance project. Decommissioned USTs would be replaced by ASTs. UST closure activities were being conducted under the ADEC UST program. UST 614 was not included in the UST removal plan.

In 1995, USAF conducted an Environmental Baseline Survey (EBS) at King Salmon to establish real property physical conditions, focusing on results from historical storage, use, and disposal of hazardous substances and petroleum products (AFCEC 1996). The EBS noted the USTs at King Salmon had not been previously investigated by the time of the study and so were considered to be Category 7, an un-evaluated area requiring further study. UST 614 was listed in the EBS as an active, 2,000-gallon, diesel fuel arctic UST in operation since 1989, and was subsequently assigned an EBS Category 7 (AFCEC 1996).

In 1997, Hart Crowser, Inc. updated the 1993 NPGI MAP. The updated MAP identified nine regulated and six unregulated USTs in use and reported insufficient leak data due to an irregular testing schedule. The MAP referenced a 1995 ADEC site closure tank removal report with a full compliance upgrade of UST 614 as part of the 1997 compliance program action items (Hart Crowser, Inc. 1997).

In 2001, PVDC updated the MAP once again, referencing 18 UST removals by Central Environmental, Inc. from 12 buildings at the main installation area. UST 614 was not listed as one of the USTs removed during 1994. One of the short-term goals identified in the updated MAP was the future management of active installation USTs under ADEC's UST compliance program (PVDC 2001).

In 2002, the Surface Water and Wastewater Program of the U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) reported that a total of nine USTs containing fuel products and two USTs containing used oil from oil-water separators (OWSs) were in use at King Salmon Air Station. Two of the tanks stored heating oil for on-site emergency consumption and, as such, were identified as being excluded from federal and state UST regulations. UST 614 was listed as one of these exempt tanks, storing DF8 for emergency generator fuel (USACHPPM 2003).

In 2012, CH2M HILL performed a PA/SI including visual inspection of the site and surface soil (0-2 ft bgs), subsurface soil (greater than 2 ft bgs), and groundwater sampling using temporary monitoring well points. The visual inspection showed a grass-covered yard in the area of the former UST 614 with a gravel roadway to the southwest and some evidence of soil staining and stressed vegetation (CH2M HILL 2013). In one sample location, southwest of the former tank location, diesel range organics (DRO) in surface soil, and tetrachloroethylene (PCE) in subsurface soil were detected above ADEC screening levels (Figure 4-3a and Table 4-3.1). Additionally, metals in surface soil and subsurface soil were detected above screening levels (Table 4-1.3) (CH2M HILL 2013).

Groundwater at Site TU/US-C518 was not sampled due to the depth to groundwater being greater than 27 ft bgs, which prevented sampling with a peristaltic pump. Also, silty subsurface soil conditions made the groundwater highly turbid. Both the Geoprobe mechanical bladder pump and alternate bailers ceased to function once the check valves became coated in silt particles and caused improper mechanical seating. In an attempt to collect a groundwater sample, the check valve on the bottom of the bailer was cut off and attached to the Geoprobe tubing to use as an inertial pump. After numerous attempts, groundwater only entered the bottom one-third of the tubing before flow stopped. It is believed that the silty conditions prevented collection of groundwater via the inertial pumping method. On 27 June 2012, CH2M HILL again attempted to collect groundwater samples using stainless steel screens. Due to silty soils, groundwater did not enter 8- or 10-slot well screens installed to a depth of 35 to 40 ft bgs (CH2M HILL 2013).

4.3.3 Evaluation of Findings

Surficial detections (0-2 ft bgs) of DRO in soil are too shallow to be indicative of a UST release, rather they indicate surface spills due to overflow or vehicular leaks. Groundwater downgradient of the former UST 614 did not exhibit any detections of DRO (USAF 2006). Additionally, Site TU/US-C518 falls within OT027 (Groundwater Zone 1) where VOCs and DRO in groundwater are currently being addressed. The single detection of PCE was of an estimated quantity just over ADEC cleanup levels and PCE is not associated with a diesel fuel UST. The metals that were detected at concentrations that exceeded screening levels at this site include arsenic, cobalt, iron, and manganese. These analytes are not

congruent with diesel, and were detected at or below BTVs as shown in Table 4-3.2. They are not COCs for OT027 and are likely naturally occurring at the site. With UST 614 removed and closed and absence of contamination clearly related to the former tank, with additional OT027 cleanup addressing VOCs and DRO at this site, among others, Site TU/US-C518 is recommended for closure with no further investigation.

4.3.4 Description of Exposure Pathways, Potential Receptors, and Contaminant Screening

Site TU/US-C518 is within Groundwater Zone 1 in the industrial area of KSD. Potential human receptors are adult workers. Terrestrial vegetation in the area includes wetland vegetation (scrub-brush) that is available as forage wetlands (U.S. Fish and Wildlife Service 2012). Grasses and other plants are readily consumed by herbivorous animals. Small mammals and birds are the primary terrestrial groups that may be receptors. Small mammals are relatively mobile and may access the site. Potential human health exposure pathways for adult workers include incidental ingestion of soils, dermal contact with soils, inhalation of indoor and outdoor vapors from subsurface soils and groundwater, inhalation of dust, and ingestion of groundwater.

Based on sampling results from the 2012 PA/SI, and the comparison of metals detections to 2015 BTVs, there are no exposure sources relating to the former diesel UST 614. Therefore, exposure pathways for soil are incomplete and no longer pose a risk to human health and the environment.

4.3.5 Justification for Closure

Closure is justified based on the determination no significant risk or threat to human health and the environment exists at Site TU/US-C518 from UST 614. The most recent field investigation revealed no soil contamination exists at the site above ADEC cleanup levels related to diesel fuel formerly stored within UST 614 (Table 4-1.1) (CH2M HILL 2013). Contamination present at the site above ADEC cleanup levels is not related to UST 614 at Site TU/US-C518 and should be evaluated under the area-wide Groundwater Zone 1 Record of Decision (ROD) (OT027). Based on these findings, closure is appropriate for Site TU/US-C518.

This page intentionally left blank

Notes:
Charts identify sample depths and analytical suites. A dot signifies at least one analyte was detected above ADEC screening criteria.

Acronyms:
ADEC - Alaska Department of Environmental Conservation

Data Source:
Samples collected during 2012 Preliminary Assessment/Site Inspection.
Imagery: Aerometrics 2012

Legend

- Monitoring Well
- Soil Bore Location
- UST 614
- 604 Structure
- Fuel Line
- Wastewater Line
- Water Line
- Electric Line - Overhead
- Electric Line - Underground

MW11-05B

MW-

616

614

618

UST 614

Approximate Direction of Groundwater Flow

KSC518DP001				
Parameter Suite	Sample Depth (ft)			
	0-2	10-12	13-15	31.3-32
GRO/DRO/RRO	No Exceedances			
VOCs				
SVOCs				

KSC518DP002				
Parameter Suite	Sample Depth (ft)			
	0-2	10-12	13-15	30-32
GRO/DRO/RRO	•			
VOCs				•
SVOCs				

KSC518DP003				
Parameter Suite	Sample Depth (ft)			
	0-2	10-12	13-15	30-32
GRO/DRO/RRO	No Exceedances			
VOCs				
SVOCs				

N

1 inch = 30 feet
(11x17 print-out)

0 15 30 60 Feet

jschwertz Path: C:\DATA\King Salmon\Report\MXD\Site 518.mxd

Closure Report for Nine Compliance Restoration Program Sites
TU/US-C519, TU/US-C517, TU/US-C518, TU/US-C520, TU/US-C522, TU/US-C523, TU/US-C524, TU/US-C589, and TU/US-C592
at King Salmon Divert, King Salmon, Alaska

AFCEC Contract No. FA8903-08-D-8791-0039

EA Project No. 1456039

Figure 4-3a
Soil Data Exceedance Summary
at Site TU/US-C518 - UST 614

This page intentionally left blank

TABLE 4-3.1 - Site TU/US-C518 - UST 614
Summary of PA/SI Chemicals Exceeding Screening Levels in Soil (Non-Metals)

	Location		KSC518DP001				KSC518DP002				KSC518DP003				
	Sample ID		KSC518DP001SO01-01	KSC518DP001SO01-02	KSC518DP001SO01-05	KSC518DP001SO01-20	KSC518DP002SO01-01	KSC518DP002SO01-02	KSC518DP002SO01-05	KSC518DP002SO01-20	KSC518DP003SO01-01	KSC518DP003SO01-02	KSC518DP903SO01-02	KSC518DP003SO01-05	KSC518DP003SO01-20
	Sample Depth (ft)		0-2	10-12	13-15	31-32	0-2	10-12	13-15	30-32	0-2	10-12	10-12	13-15	30-32
Analyte	**Screening Level**	**Screening Level Source**													
VOCs (µg/kg)															
Tetrachloroethene (PCE)	24	E								26.5 J					
SVOCs (µg/kg)	No Exceedances														
Petroleum Hydrocarbons (mg/kg)															
Diesel Range Organics (C_{10} to C_{25})	250	F					263								

Notes:
A=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B2, Method 2, Ingestion, Under-40 inch zone.
B=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B1, Method 2, Direct Contact, Under-40 inch zone (corrected for additivity noncarcinogen for HQ = 0.1 and carcinogenic risk level of 1x10-6).
C=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B2, Method 2, Inhalation, Under-40 inch zone.
D=ADEC Soil Cleanup Levels (2012), 18 AAC 75.340 Table B1, Method 2, Outdoor Inhalation, Under 40-inch zone (corrected for noncarcinogenic risk of HQ = 0.1 and carcinogenic risk level of 1x10-6).
E=ADEC Soil Cleanup Levels (2012), 18 AAC 75.340 Table B1 and Table B2, Method 2, Migration to Groundwater Under-40 inch zone.
F=1/10 ADEC Groundwater Cleanup Levels (2012), 18 AAC 75.345 Table C adjusted based on the ADEC Cumulative Risk Guidance (ADEC 2008).
µg/kg = Microgram(s) per kilogram mg/kg = Milligram(s) per kilogram
ADEC = Alaska Department of Environmental Conservation
J = The reported result is an estimated value (e.g., the analyte was detected at a concentration outside the quantitation range or a quality control exceedance was identified).

This page intentionally left blank

TABLE 4-3.2 - Site TU/US-C518 - UST 614
Summary of Metals Exceedances from PA/SI Sampling Compared to Background Threshold Values

Analyte	Units	Total Samples	Total Detections	Total Samples Exceeding Cleanup Level	PAL [1,2]	BTV UPL [5]	BTV UTL [6]	Maximum Detected Concentration
Surface Soil (SS) ≤ 2 Feet Below Ground Surface								
Arsenic	mg/kg	3	3	3	0.45	5.95	6.31	4.74
Cobalt	mg/kg	3	3	3	2.7 [2]	11.9	12.9	8.05
Iron	mg/kg	3	3	3	350 [2]	36,900	39,100	19,100
Manganese	mg/kg	3	3	3	28 [2]	981	1,190	518
Subsurface Soil (SB) > 2 Feet Below Ground Surface								
Arsenic	mg/kg	9	9	9	0.45	4.92	5.35	5.15
Cobalt	mg/kg	9	9	9	2.7 [2]	7.7	8.08	8.97
Iron	mg/kg	9	9	9	350 [2]	32,700	36,500	23,200
Manganese	mg/kg	9	9	9	28 [2]	522	572	442
Analyte	**Units**	**Total Samples**	**Total Detections**	**Total Samples Exceeding Cleanup Level**	**PAL [3,4]**	**BTV UPL [5]**	**BTV UTL [6]**	**Maximum Detected Concentration**
Ground Water (WG)								
Groundwater unable to be sampled, refer to Section 4.4.2. No analytical data from PA/SI.								

Notes:
1. Project Action Level (PAL) is set at the most stringent ADEC Method Two Soil Cleanup level for Under 40-inch Zone (corrected for noncarcinogenic risk of HQ = 0.1 and carcinogenic risk level of 1x10-6.) and Migration to Groundwater (18 AAC 75.341) (ADEC 2012)
2. Analytes has no ADEC cleanup level. The value shown is USEPA Regional Screening Level for Protection of Groundwater.
3. PAL is set to 1/10 ADEC Groundwater Cleanup level (18 AAC 75.345) per ADEC Cumulative Risk Guidance (ADEC 2008)
4. Analyte has no ADEC cleanup level; the value shown is the USEPA Tapwater Regional Screening Level.
5. UPL is the 95% Upper Prediction Limit
6. UTL is the 95% Upper Tolerance Limit with 90% coverage

This page intentionally left blank

4.4 SITE TU/US-C520 - UST 638

4.4.1 Description

Site TU/US-C520 is located in OT027 Groundwater Zone 1 adjacent to the northwest side of Building 638, the Electric Power Station (Figure 1-1). The site formerly contained UST 638, a regulated 10,000-gallon diesel fuel UST, as shown in Figures 4-4a and 4-4b. According to ADEC's UST Facility Report Database, UST 638 (ADEC Tank ID 4) was installed in 1952 and removed with permanent closure in 1994 (ADEC 2017a).

4.4.2 Previous Investigation Results

In 1985, E-S investigated King Salmon Air Station under Phase I of the IRP (E-S 1985). IRP Site SS15, the location of POL storage tanks is located to the north of Building 638 across from Silver Street. Records focusing on work conducted in the vicinity of Building 638 (Site TU/US-C520) were reviewed to determine the extent to which IRP Site SS15 may have affected Site TU/US-C520.

In 1988, NPGI prepared a BCP, which lists Building 638, completed in 1951, as the Utilities Plant. At the time, Building 638 reportedly contained the only central heating system on base, which served all inhabited buildings in the community center. The boiler plant in Building 638 housed three identical boilers dating from the 1950s, and was the largest user of diesel fuel. Four diesel fuel storage tanks for Building 638 were located in the northwest corner of the community center (NPGI 1988)

In 1992, SAIC surveyed existing USTs at King Salmon Air Station, now KSD, to evaluate environmental risks posed by 30 USTs and 33 ASTs at King Salmon, defining to what extent tanks were contributing or could contribute to the contaminated aquifer identified under the IRP. During preliminary investigation of IRP Site SS15 (POL Storage Tanks), a soil sample was collected adjacent to and north of former UST 638. Photoionization detector readings were elevated during field screening of soils and the following analytes and concentrations were detected: total petroleum hydrocarbons (TPH), 8,800 milligrams per kilogram (mg/kg); ethylbenzene, 3 mg/kg; total xylenes, 41 mg/kg; lead, 1.6 mg/kg; and several semi-volatile organic compounds (SVOCs), including naphthalene at 30 mg/kg (SAIC 1993a). Lead was detected below defined background levels. Subsurface soil contamination was suspected to be the result of subsurface releases from the underground pipeline connecting former UST 638 to the former truck fill stand. The report identified the following concerns with regard to UST 638: tank piping was pressurized; petroleum product was visible in the vault of UST 638; cathodic protection appeared to be inoperative; neither spill protection nor overfill protection for the UST were present; piping had neither corrosion protection nor leak detection; UST release detection was absent (leak detection appeared to consist of manual tank gauging, irregular inventory control, and irregular tank tightness testing); depth to groundwater was relatively shallow, approximately 30 ft or less in the vicinity of all tanks; and soils underlying the USTs were reported to be highly permeable, consisting mostly of fine sands (SAIC 1993a).

In 1993, NPGI utilized the 1992 SAIC study to develop a MAP summarizing the status of the King Salmon ERP and ECP, and to develop a strategy for implementing response actions necessary to protect human health and the environment (NPGI 1993). The MAP integrated and coordinated activities under both the IRP and the ECP and identified a total of 30 USTs, 17 of which were scheduled for removal in 1994 as part of a compliance project. Removed USTs would be replaced by ASTs. UST activities were being conducted under the ADEC UST program. UST 638 was not included in the UST removal plan.

In 1993, SAIC conducted a preliminary investigation (PI)/feasibility study (FS) at 11 existing King Salmon IRP sites to characterize the sites for further action. The POL storage tanks (11, 12, 13, and 14) located northwest of UST 638 were one of the IRP sites assessed (IRP Site SS15) due to historical operations suspected of contributing to soil and groundwater contamination. Petroleum-saturated soils resulting from fuel transfers and piping leaks in the POL tank area were believed to have contributed to groundwater contamination (SAIC 1993b)

In 1994, Central Environmental, Inc. removed USTs from 12 sites at King Salmon Air Station, including the 10,000-gallon UST 638 at Building 638 and 275 ft of its 4-inch diameter pipeline. The UST removal site assessments were conducted by Environmental Management, Inc. UST 638 was found to contain diesel fuel and was still in use in 1994 prior to removal. UST closure documentation noted an estimated 5,500-gallon diesel fuel release at Building 638 that was likely a result of overfilling the UST. The report presented conflicting information, citing first only one contaminant and later estimating multiple contaminants from either one location or commingled in the area. POL storage tanks 11 and 12, north of Building 638 (IRP Site SS15), were in the area of the excavated pipeline. Contaminated soil was found above the pipeline connecting UST 638 to the fill stand island, 3 ft from the surface to the bottom of the pipeline trench. Analytical results indicated DRO in soil up to 19,000 mg/kg under the UST. The contaminated soil was removed, UST 638 was excavated and backfilled with clean soil. Depth to groundwater was measured at 28 ft bgs in a nearby monitoring well and not encountered during excavation and removal activities (BEES 2001). During removal, UST 638's feed and return piping were capped and abandoned in place with contamination evident throughout the excavation and at the "low drain point" along the pipeline approximately 200 yards east of the UST. A DRO level of 12,000 parts per million was reported for the single soil sample collected from the pipeline excavation. Contaminated soil discovered during pipeline removal was placed back into the trench (BESC 1998).

In 1998, BESC attempted to investigate soil and groundwater in support of site closure at three former King Salmon UST sites. Former UST 638 was one of the sites to be investigated. Hazardous working conditions cause by numerous active underground utilities, including the main high-power electric distribution line for the base, prevented the installation of a bioventing remediation system for Building 638 (BEES 2001). BESC made several attempts to locate and clear areas, however utility marking tape was encountered within 2 ft bgs each time. BESC recommended no further investigation at Building 638 due to the utility conflicts and safety concerns. Additionally, they indicated any residual soil at Building 638 potentially contaminating groundwater was minor in comparison with the volume of the non-aqueous-phase liquid plume running partially cross-gradient, partially up-gradient to Building 638 and originating near the POL tanks to the north (IRP Site SS015).

In 2012, CH2M HILL performed a PA/SI including visual inspection of the site and surface soil (0-2 ft bgs), subsurface soil (greater than 2 ft bgs), and groundwater sampling using temporary monitoring well points. The visual inspection showed gravel surrounding the former UST area to the northeast and southwest and asphalt-paved Air Force Base Drive on the northwest. Many active and abandoned utilities transected the site with high-voltage electrical boxes observed along the southeast edge of the former UST location and electrical and other utility conduits observed connecting to Building 638. Signage and an asphalt roadway patch suggested a POL pipeline crossed beneath Air Force Base Drive from Site TU/US-C520 toward the northwest. No surficial evidence of the former UST location was visible, except a slight depression creating a large storm water puddle. No surface staining or stressed vegetation was noted in the area of the former UST or along the pipeline traveling northwest of the site (CH2M HILL 2013). Detections exceeding ADEC cleanup levels included DRO and methylene chloride in surface soil

and DRO, gasoline range organics (GRO), VOCs including benzene, methylene chloride, naphthalene, TCE, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, and xylenes, and SVOCs isophorone and 2-methylnaphthalene (Table 4-4.1). Exceedances in groundwater included GRO, DRO, residual range organics (RRO), benzene, 1,2-dichloroethane, cis-1,2-dichloroethene, naphthalene, and TCE (Figure 4-4.2). Metals were detected in surface soil, subsurface soil, and groundwater, as shown in Table 4-4.3 (CH2M HILL 2013).

4.4.3 Evaluation of Findings

Previous investigations at Site 520 report exceedances associated with diesel fuel, which may be associated with former UST 638. However other analytes were also reported in exceedance of cleanup levels indicating contamination from other sources. While there may be residual diesel fuel contamination from UST 638, the 5,500 gallons of diesel fuel reportedly released at Building 638 due to overfilling is likely negligible compared to contamination from diesel fuel and other compounds shown to be present throughout Zone 1 from other source locations, specifically the DRO plume attributed to the POL tanks north of Site 520, shown on Figures 4-4a and 4-4b. Site 520 is currently being addressed separately by a remedial investigation (RI)/ FS CERCLA ROD covering Zone 1 at KSD. The CERCLA process will incorporate contamination in Zone 1 under future decisions, including and thoroughly addressing any residual fuel contamination from UST 638. Pursuing continued cleanup at Site 520 is redundant to the ongoing CERCLA process at Zone 1 and additional UST investigations of former UST 638 are superfluous to the larger Zone 1 CERCLA process.

With UST 638 removed, Site TU/US-C520 is recommended for closure. The presence of DRO in the area will be addressed by the Zone 1 CERCLA investigation at OT027.

4.4.4 Description of Exposure Pathways, Potential Receptors, and Contaminant Screening

Site TU/US-C520 is within Groundwater Zone 1 of KSD in a developed area with no vegetation. Terrestrial wildlife is not expected to be at risk from exposure to chemicals in soil. Potential human receptors are occupational site workers, site visitors, and excavation/construction workers. Potential human health exposure pathways for adult workers include incidental ingestion of soils, dermal contact with soils, inhalation of dust, and ingestion of groundwater.

Based on sampling results from the 2012 PA/SI, and the comparison of metals detections to 2015 BTVs, there are no exposure sources relating to the former diesel UST 638. Therefore, exposure pathways for soil and groundwater are incomplete and no longer pose a risk to human health and the environment.

4.4.5 Justification for Closure

Closure is justified for Site TU/US-C520 based on the determination that any residual contamination from diesel fuels potentially associated with UST 638 (Tables 4-4.1 and 4-4.2) are being addressed by a larger and more comprehensive RI/FS CERCLA process and will be evaluated under the area-wide Groundwater Zone 1 ROD (OT027). Based on these findings, closure is appropriate for Site TU/US-C520.

This page intentionally left blank

Notes:
Charts identify sample depths and analytical suites. A dot signifies at least one analyte was detected above ADEC screening criteria.

Acronyms:
ADEC - Alaska Department of Environmental Conservation

Data Source:
Samples collected during 2012 Preliminary Assessment/Site Inspection.
Imagery: Aerometrics 2012

KSC520DP003

Parameter Suite	Sample Depth (ft)			
	0-2	10-15	24-26	26-28
GRO/DRO/RRO		•		•
VOCs		•		•
SVOCs		•		•

KSC520DP001

Parameter Suite	Sample Depth (ft)			
	0-2	10-15	22-24	24-25
GRO/DRO/RRO	•		•	•
VOCs			•	
SVOCs				•

KSC520DP002

Parameter Suite	Sample Depth (ft)			
	0-2	10-15	21-23	24-26
GRO/DRO/RRO		•		•
VOCs	•	•		•
SVOCs		•		

Legend

- Monitoring Well
- Soil Bore Location
- Former UST 638
- Aboveground Storage Tank
- Former Aboveground Storage Tank
- Former Underground Storage Tank
- Indicates DRO in A-Aquifer groundwater exceeding ADEC groundwater cleanup levels of 1.5 mg/L
- 604 Structure
- Fuel Line
- Wastewater Line
- Water Line
- Electric Line - Overhead
- Electric Line - Underground

Detail map

Approximate Direction of Groundwater Flow

See Detail map

1 inch = 100 feet
(11x17 print-out)
0 50 100 200 Feet
N

Closure Report for Nine Compliance Restoration Program Sites
TU/US-C519, TU/US-C517, TU/US-C518, TU/US-C520, TU/US-C522, TU/US-C523, TU/US-C524, TU/US-C589, and TU/US-C592
at King Salmon Divert, King Salmon, Alaska

AFCEC Contract No. FA8903-08-D-8791-0039

Figure 4-4a
Soil Data Exceedance Summary
at Site TU/US-C520 - UST 638

EA Project No. 1456039

jschwertz Path: C:\DATA\King Salmon\Report\MXD\Site 520.mxd

This page intentionally left blank

Notes:
Charts identify sample depths and analytical suites. A dot signifies at least one analyte was detected above ADEC screening criteria.

Acronyms:
ADEC - Alaska Department of Environmental Conservation

Data Source:
Samples collected during 2012 Preliminary Assessment/Site Inspection.
Imagery: Aerometrics 2012

KSC520DP003	
Parameter Suite	Screen Interval (ft)
	25-28
GRO/DRO/RRO	•
VOCs	•
SVOCs	

KSC520DP001	
Parameter Suite	Screen Interval (ft)
	26-29
GRO/DRO/RRO	•
VOCs	•
SVOCs	

KSC520DP002	
Parameter Suite	Screen Interval (ft)
	25-28
GRO/DRO/RRO	•
VOCs	•
SVOCs	

Legend

- Monitoring Well
- Soil Bore Location
- Former UST 638
- Aboveground Storage Tank
- Former Aboveground Storage Tank
- Former Underground Storage Tank
- Indicates DRO in A-Aquifer groundwater exceeding ADEC groundwater cleanup levels of 1.5 mg/L
- 604 Structure
- Fuel Line
- Wastewater Line
- Water Line
- Electric Line - Overhead
- Electric Line - Underground

Detail map

Approximate Direction of Groundwater Flow

See Detail map

1 inch = 100 feet
(11x17 print-out)
0 50 100 200 Feet
N

Closure Report for Nine Compliance Restoration Program Sites
TU/US-C519, TU/US-C517, TU/US-C518, TU/US-C520, TU/US-C522, TU/US-C523, TU/US-C524, TU/US-C589, and TU/US-C592
at King Salmon Divert, King Salmon, Alaska

AFCEC Contract No. FA8903-08-D-8791-0039

Figure 4-4b
Groundwater Data Exceedance Summary
at Site TU/US-C520 - UST 638

EA Project No. 1456039

jschwertz Path: C:\DATA\King Salmon\Report\MXD\Site_520gw.mxd

This page intentionally left blank

TABLE 4-4.1 - Site TU/US-C520 - UST 638
Summary of PA/SI Chemicals Exceeding Screening Levels in Soil (Non-Metals)

	Location		KSC520DP001				KSC520DP002				KSC520DP003				
	Sample ID		KSC520DP001SO01-01	KSC520DP001SO01-02	KSC520DP001SO01-05	KSC520DP001SO01-20	KSC520DP002SO01-01	KSC520DP002SO01-02	KSC520DP002SO01-05	KSC520DP002SO01-20	KSC520DP003SO01-01	KSC520DP003SO01-02	KSC520DP003SO01-05	KSC520DP003SO01-20	KSC520DP903SO01-20
	Sample Depth (ft)		0-2	10-15	22-24	24-25	0-2	10-15	21-23	24-26	0-2	10-15	24-26	26-28	26-28
Analyte	**Screening Level**	**Screening Level Source**													
VOCs (µg/kg)															
Benzene	25	E								34.4				39.5 J	36.2 J
Methylene Chloride	16	E			43.5 J		17.3 J								
Naphthalene	2,800	B						8,360		3,910		18,700		11,500	12,300
Trichloroethene (TCE)	20	E								76.7		249 J		121	96.1
1,2,4-Trimethylbenzene	4,900	B										32,400			
1,3,5-Trimethylbenzene	4,200	B						6,360				10,500			
Xylenes	6,300	D						8,510				15,500			
SVOCs (µg/kg)															
Isophorone	3,100	E										3,820			
2-Methylnaphthalene	6,100	E				8,340		10,500				21,500		10,400	8,130
Petroleum Hydrocarbons (mg/kg)															
Gasoline Range Organics (C_6 to C_{10})	300	E						489				713			
Diesel Range Organics (C_{10} to C_{25})	250	E	414		630	4,080		3,730		2,490		6,720		2,220 J	845 J

Notes:
A=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B2, Method 2, Ingestion, Under-40 inch zone.
Notes (continued):
B=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B1, Method 2, Direct Contact, Under-40 inch zone (corrected for additivity noncarcinogen for HQ = 0.1 and carcinogenic risk level of 1x10-6).
C=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B2, Method 2, Inhalation, Under-40 inch zone.
D=ADEC Soil Cleanup Levels (2012), 18 AAC 75.340 Table B1, Method 2, Outdoor Inhalation, Under 40-inch zone (corrected for noncarcinogenic risk of HQ = 0.1 and carcinogenic risk level of 1x10-6).
E=ADEC Soil Cleanup Levels (2012), 18 AAC 75.340 Table B1 and Table B2, Method 2, Migration to Groundwater Under-40 inch zone.
F=1/10 ADEC Groundwater Cleanup Levels (2012), 18 AAC 75.345 Table C adjusted based on the ADEC Cumulative Risk Guidance (ADEC 2008).
µg/kg = Microgram(s) per kilogram mg/kg = Milligram(s) per kilogram
ADEC = Alaska Department of Environmental Conservation
J = The reported result is an estimated value (e.g., the analyte was detected at a concentration outside the quantitation range or a quality control exceedance was identified).

TABLE 4-4.2 - Site TU/US-C520 - UST 638
Summary of PA/SI Chemicals Exceeding Screening Levels in Groundwater (Non-Metals)

	Location		KSC520DP001	KSC520DP002	KSC520DP003
	Sample ID		KSC520MW001GW01-45	KSC520MW002GW01-45	KSC520MW003GW01-45
	Sample Depth (ft)		27-30	25-28	25-28
Analyte	**Screening Level**	**Screening Level Source**			
VOCs (µg/L)					
Benzene	0.5	F		88.8	60.7
1,2-Dichloroethane	0.5	F			0.62
cis-1,2-Dichloroethene	7	F		34.9	31.2
Naphthalene	73	F		396	364
Trichloroethene (TCE)	0.5	F	8.55	85	92.3
SVOCs (µg/L)	No Exceedances				
Petroleum Hydrocarbons (mg/L)					
Gasoline Range Organics (C6 to C10)	220	F		974	582
Diesel Range Organics (C10 to C25)	150	F	506	10,200	9,820
Residual Range Organics (C25 to C36)	110	F		1,080 J	1,070 J

Notes:
A=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B2, Method 2, Ingestion, Under-40 inch zone.
B=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B1, Method 2, Direct Contact, Under-40 inch zone (corrected for additivity noncarcinogen for HQ = 0.1 and carcinogenic risk level of 1x10-6).
C=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B2, Method 2, Inhalation, Under-40 inch zone.
D=ADEC Soil Cleanup Levels (2012), 18 AAC 75.340 Table B1, Method 2, Outdoor Inhalation, Under 40-inch zone (corrected for noncarcinogenic risk of HQ = 0.1 and carcinogenic risk level of 1x10-6).
E=ADEC Soil Cleanup Levels (2012), 18 AAC 75.340 Table B1 and Table B2, Method 2, Migration to Groundwater Under-40 inch zone.
F=1/10 ADEC Groundwater Cleanup Levels (2012), 18 AAC 75.345 Table C adjusted based on the ADEC Cumulative Risk Guidance (ADEC 2008).
µg/kg = Microgram(s) per kilogram mg/kg = Milligram(s) per kilogram
ADEC = Alaska Department of Environmental Conservation
J = The reported result is an estimated value (e.g., the analyte was detected at a concentration outside the quantitation range or a quality control exceedance was identified).

TABLE 4-4.3 - Site TU/US-C520 - UST 638
Summary of Metals Exceedances from PA/SI Sampling Compared to Background Threshold Values

Analyte	Units	Total Samples	Total Detections	Total Samples Exceeding Cleanup Level	PAL [1,2]	BTV UPL [5]	BTV UTL [6]	Maximum Detected Concentration
Surface Soil (SS) ≤ 2 Feet Below Ground Surface								
Arsenic	mg/kg	3	3	3	0.45	5.95	6.31	5.35
Cobalt	mg/kg	3	3	3	2.7 [2]	11.9	12.9	7.87
Iron	mg/kg	3	3	3	350 [2]	36,900	39,100	21,000
Manganese	mg/kg	3	3	3	28 [2]	981	1,190	391
Subsurface Soil (SB) > 2 Feet Below Ground Surface								
Arsenic	mg/kg	9	9	6	0.45	4.92	5.35	4.71
Cobalt	mg/kg	9	9	9	2.7 [2]	7.7	8.08	10.3
Iron	mg/kg	9	9	9	350 [2]	32,700	36,500	24,700
Manganese	mg/kg	9	9	9	28 [2]	522	572	526
Analyte	**Units**	**Total Samples**	**Total Detections**	**Total Samples Exceeding Cleanup Level**	**PAL [3,4]**	**BTV UPL [5]**	**BTV UTL [6]**	**Maximum Detected Concentration**
Ground Water (WG)								
Cobalt	µg/L	3	3	1	6 [4]	0.523	0.583	6.2 J
Iron	µg/L	3	3	2	1,400 [4]	717	717	2,140
Lead	µg/L	3	1	1	1.5	0.027	0.027	1.9 J
Manganese	µg/L	3	3	3	43 [4]	60.3	69.1	6,820
Nickel	µg/L	3	2	1	10	0.062	0.062	13.1 J

Notes:
1. Project Action Level (PAL) is set at the most stringent ADEC Method Two Soil Cleanup level for Under 40-inch Zone (corrected for noncarcinogenic risk of HQ = 0.1 and carcinogenic risk level of 1x10-6.) and Migration to Groundwater (18 AAC 75.341) (ADEC 2012)
2. Analytes has no ADEC cleanup level. The value shown is USEPA Regional Screening Level for Protection of Groundwater.
3. PAL is set to 1/10 ADEC Groundwater Cleanup level (18 AAC 75.345) per ADEC Cumulative Risk Guidance (ADEC 2008)
4. Analyte has no ADEC cleanup level; the value shown is the USEPA Tapwater Regional Screening Level.
5. UPL is the 95% Upper Prediction Limit
6. UTL is the 95% Upper Tolerance Limit with 90% coverage
J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
B = The analyte was detected in the sample at a concentration less than or equal to five times (10 times for common laboratory contaminants) the blank concentration.

4.5 SITE TU/US-C522 - UST 104

4.5.1 Description

Site TU/US-C522 is located in Groundwater Zone 2 within the aircraft operations and maintenance area of King Salmon and associated with Building 160, the Combat Alert Cell (Figure 1-1). The site formerly contained UST 104, a regulated 10,000-gallon UST, as shown in Figures 4-5a and 4-5b. According to ADEC's UST Facility Report Database, UST 104 (ADEC ID 27) contained gasoline and was installed in 1957 with removal and permanent closure in 1992 (ADEC 2017a).

4.5.2 Previous Investigation Results

In 1988, NPGI prepared a BCP which lists former UST 104 in association with Building 160. Fire/Rescue Station located within the Industrial Area. The UST 104 was listed as having a capacity of 10,000 gallons for diesel fuel storage (NPGI 1988).

In 1992, UST 104 was added to the ADEC Contaminated Sites Program (CSP) database (File Number 2569.38.022.03; Hazard ID 1581) and to ADEC's Leaking Underground Storage Tank (LUST) list (spill number 92-2-5-149-2; Hazard ID 23248) (ADEC 2011b, ADEC 2017b). According to the CSP site summary report, the supply line to the CAC boiler room broke during removal of the diesel UST system. The CSP site summary report indicates a diesel spill, which contrasts the UST facility report which reports UST 104 as a gasoline storage tank (ADEC 2011c). Former UST 104 was replaced with UST 160 (ADEC Tank ID 37) on 1 January 1992 (ADEC 2011b), reportedly without soil remediation (ADEC 2011c).

In 1992, SAIC conducted several studies for King Salmon Air Station, including a tank assessment, PI/FS, and PA. The PA identified an active 10,000-gallon diesel fuel storage tank at Building 160 as UST 104 (SAIC 1992).

In 2012, CH2M HILL performed a PA/SI including visual inspection of the site and surface soil (0-2 ft bgs), subsurface soil (greater than 2 ft bgs), and groundwater sampling using temporary monitoring well points. The visual inspection showed tarmac/aircraft parking ramp and taxiway for the Alert Hanger (Facility 160) in the area of former UST 104/current UST 160. The area is covered in concrete from the north end of the building to a security fence with active flight-line restricted access and locked security fencing. Facility 160 is not currently used to stage alert aircraft and there are no residents in the former administrative and alert pilot living areas (CH2M HILL 2013). In subsurface soil, PCE was detected above ADEC screening levels (Figure 4-5a and Table 4-5.1). In groundwater, TCE exceeded ADEC screening levels and RRO and DRO were above 1/10th the ADEC groundwater screening level, adjusted based on the ADEC Cumulative Risk Guidance (ADEC 2008) (Figure 4-5b and Table 4-5.2). Additionally, metals in surface soil, subsurface soil, and groundwater were detected above screening levels (Table 4-5.3) (CH2M HILL 2013). Exceedances of lead were attributed to elevated turbidity during sampling (25 nephelometric turbidity units [NTU]) within the temporary wellpoints (CH2M HILL 2013).

4.5.3 Evaluation of Findings

Exceedances of PCE in subsurface soil and TCE in groundwater do not originate from the petroleum fuels observed in the vault during removal. While DRO and RRO were detected in groundwater, all detections are of an estimated quantity near 1/10th the ADEC Screening Levels and adjusted based on

cumulative risk guidance (Table 4-5.2) (ADEC 2008). Detections of DRO and RRO are a similar value at locations cross-gradient of former UST-104, adjacent to a different former UST location. Metals in surface soil and subsurface soil exceeding cleanup levels are approximately at or below BTVs, with any remaining exceedances from analytes not typically associated with diesel or gasoline fuels. The metals in groundwater exceeding screening levels and BTVs are not associated with diesel or gasoline fuels, except for lead, which could be associated with gasoline. Previous investigations and the spill report indicate UST 104 formerly contained diesel fuel, not gasoline as indicated by the ADEC UST Facility Database Report, and there were no detections of GRO adjacent to former UST 104 so the former tank is believed to have contained diesel. Due to the low detections of DRO and RRO, and their distribution cross-gradient of the former tank location, there is not a clear correlation of contamination at this site with the diesel reportedly stored in UST 104. Site TU/US-522 is thereby recommended for closure.

4.5.4 Description of Exposure Pathways, Potential Receptors, and Contaminant Screening

Site TU/US-C522 is within Groundwater Zone 2 in the industrial area of KSD. Potential human receptors are adult workers. The immediate area surrounding the site is paved tarmac and asphalt within security fencing and is not likely to be accessed by mammals and/or birds as a source of forage. Potential human health exposure pathways for adult workers include incidental ingestion of soils, dermal contact with soils, inhalation of indoor and outdoor vapors from subsurface soils and groundwater, inhalation of dust, and ingestion of groundwater.

Based on sampling results from the 2012 PA/SI, and the comparison of metals detections to 2015 BTVs, there is not a clear exposure source relating to the former diesel UST 104. Additionally, exposure pathways are not complete due to the paved and concrete nature of the site location. Therefore, exposure pathways for soil and groundwater are incomplete and no longer pose a risk to human health and the environment.

4.5.5 Justification for Closure

Closure is justified based on the determination that no significant risk or threat to human health and the environment exists at Site TU/US-C522 from former UST 104. The most recent field investigation revealed no soil or groundwater contamination exists at the site above ADEC cleanup levels in relation to diesel or gasoline fuel formerly stored within UST 104 (Tables 4-5.1 through 4-5.3) (CH2M HILL 2013). Based on the closure of the tank and the investigation documenting no additional soil contamination above ADEC cleanup levels associated with tank UST 104. Discussion with ADEC indicates that ADEC plans to close the two contaminated sites (Cleanup Complete) after this report is finalized. The remaining TCE/PCE contamination at the site is not the result of a release at the tank and should be evaluated under the area-wide Groundwater Zone 2 ROD. Based on these findings, closure is appropriate for Site TU/US-C522.

Notes:
Charts identify sample depths and analytical suites. A dot signifies at least one analyte was detected above ADEC screening criteria.

Acronyms:
ADEC - Alaska Department of Environmental Conservation

Data Source:
Samples collected during 2012 Preliminary Assessment/Site Inspection.
Imagery: Aerometrics 2012

Legend

- Monitoring Well
- Soil Bore Location
- Former UST 104
- Underground Storage Tank
- Former Underground Storage Tank
- 604 Structure
- Fuel Line
- Wastewater Line
- Water Line
- Electric Line - Overhead
- Electric Line - Underground

162

160

UST

UST

UST 104

Approximate Direction of Groundwater Flow

KSC522DP003				
Parameter Suite	Sample Depth (ft)			
	0-2	2-4	5-7	7-9
GRO/DRO/RRO	No Exceedances			
VOCs				
SVOCs				

KSC522DP002				
Parameter Suite	Sample Depth (ft)			
	0-2	2-4	5-7	7-9
GRO/DRO/RRO				
VOCs		•		
SVOCs				

KSC522DP001				
Parameter Suite	Sample Depth (ft)			
	0-2	2-4	5-7	7-9
GRO/DRO/RRO	No Exceedances			
VOCs				
SVOCs				

N

1 inch = 50 feet
(11x17 print-out)

0 25 50 100 Feet

Closure Report for Nine Compliance Restoration Program Sites
TU/US-C519, TU/US-C517, TU/US-C518, TU/US-C520, TU/US-C522,
TU/US-C523, TU/US-C524, TU/US-C589, and TU/US-C592
at King Salmon Divert, King Salmon, Alaska

AFCEC Contract No. FA8903-08-D-8791-0039

Figure 4-5a
Soil Data Exceedance Summary
at Site TU/US-C522 - UST 104

EA Project No. 1456039

jschwertz Path: C:\DATA\King Salmon\Report\MXD\Site 522.mxd

This page intentionally left blank

Notes:
Charts identify sample depths and analytical suites. A dot signifies at least one analyte was detected above ADEC screening criteria.

Acronyms:
ADEC - Alaska Department of Environmental Conservation

Data Source:
Samples collected during 2012 Preliminary Assessment/Site Inspection.
Imagery: Aerometrics 2012

Legend

- Monitoring Well
- Soil Bore Location
- Former UST 104
- Underground Storage Tank
- Former Underground Storage Tank
- 604 Structure
- Fuel Line
- Wastewater Line
- Water Line
- Electric Line - Overhead
- Electric Line - Underground

162

160

UST

UST

UST 104

KSC522DP003	
Parameter Suite	Screen Interval (ft)
	10-13
GRO/DRO/RRO	•
VOCs	
SVOCs	

KSC522DP002	
Parameter Suite	Screen Interval (ft)
	10-13
GRO/DRO/RRO	•
VOCs	•
SVOCs	

KSC522DP001	
Parameter Suite	Screen Interval (ft)
	10-13
GRO/DRO/RRO	•
VOCs	
SVOCs	

N

1 inch = 50 feet
(11x17 print-out)

0 25 50 100 Feet

Closure Report for Nine Compliance Restoration Program Sites
TU/US-C519, TU/US-C517, TU/US-C518, TU/US-C520, TU/US-C522, TU/US-C523, TU/US-C524, TU/US-C589, and TU/US-C592
at King Salmon Divert, King Salmon, Alaska

AFCEC Contract No. FA8903-08-D-8791-0039

Figure 4-5b
Groundwater Data Exceedance Summary
at Site TU/US-C522 - UST 104

EA Project No. 1456039

jschwertz Path: C:\DATA\King Salmon\Report\MXD\Site 522gw.mxd

This page intentionally left blank

TABLE 4-5.1 - Site TU/US-C522 - UST 104
Summary of PA/SI Chemicals Exceeding Screening Levels in Soil (Non-Metals)

	Location		KSC522DP001					KSC522DP002			KSC522DP003				
	Sample ID		KSC522DP001SO01-01	KSC522DP001SO01-02	KSC522DP001SO01-05	KSC522DP001SO01-20	KSC522DP901SO01-20	KSC522DP002SO01-01	KSC522DP002SO01-02	KSC522DP002SO01-05	KSC522DP002SO01-20	KSC522DP003SO01-01	KSC522DP003SO01-02	KSC522DP003SO01-05	KSC522DP003SO01-20
	Sample Depth (ft)		0-2	2-4	5-7	7-9	7-9	0-2	2-4	5-7	7-9	0-2	2-4	5-7	7-9
Analyte	**Screening Level**	**Screening Level Source**													
VOCs (µg/kg)															
Tetrachloroethene (PCE)	24	E							39.6 J						
SVOCs (µg/kg)	No Exceedances														
Petroleum Hydrocarbons (mg/kg)	No Exceedances														

Notes:
A=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B2, Method 2, Ingestion, Under-40 inch zone.
B=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B1, Method 2, Direct Contact, Under-40 inch zone (corrected for additivity noncarcinogen for HQ = 0.1 and carcinogenic risk level of 1x10-6).
C=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B2, Method 2, Inhalation, Under-40 inch zone.
D=ADEC Soil Cleanup Levels (2012), 18 AAC 75.340 Table B1, Method 2, Outdoor Inhalation, Under 40-inch zone (corrected for noncarcinogenic risk of HQ = 0.1 and carcinogenic risk level of 1x10-6).
E=ADEC Soil Cleanup Levels (2012), 18 AAC 75.340 Table B1 and Table B2, Method 2, Migration to Groundwater Under-40 inch zone.
F=1/10 ADEC Groundwater Cleanup Levels (2012), 18 AAC 75.345 Table C adjusted based on the ADEC Cumulative Risk Guidance (ADEC 2008).
µg/kg = Microgram(s) per kilogram mg/kg = Milligram(s) per kilogram
ADEC = Alaska Department of Environmental Conservation
J = The reported result is an estimated value (e.g., the analyte was detected at a concentration outside the quantitation range or a quality control exceedance was identified).

This page intentionally left blank

TABLE 4-5.2 - Site TU/US-C522 - UST 104
Summary of PA/SI Chemicals Exceeding Screening Levels in Groundwater (Non-Metals)

	Location		KSC522DP001	KSC522DP002		KSC522DP003
	Sample ID		KSC522MW001GW01-45	KSC522MW002GW01-45	KSC522MW902GW01-45	KSC522MW003GW01-45
	Sample Depth (ft)		10-13	10-13	10-13	10-13
Analyte	**Screening Level**	**Screening Level Source**				
VOCs (µg/L)	No Exceedances					
Trichloroethene (TCE)	0.5	F		0.65	0.63	
SVOCs (µg/L)	No Exceedances					
Petroleum Hydrocarbons (mg/L)						
Diesel Range Organics (C10 to C25)	150	F	233 J	198 J	203 J	
Residual Range Organics (C25 to C36)	110	F	158 J	151 J	152 J	131 J

Notes:
A=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B2, Method 2, Ingestion, Under-40 inch zone.
B=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B1, Method 2, Direct Contact, Under-40 inch zone (corrected for additivity noncarcinogen for HQ = 0.1 and carcinogenic risk level of 1x10-6).
C=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B2, Method 2, Inhalation, Under-40 inch zone.
D=ADEC Soil Cleanup Levels (2012), 18 AAC 75.340 Table B1, Method 2, Outdoor Inhalation, Under 40-inch zone (corrected for noncarcinogenic risk of HQ = 0.1 and carcinogenic risk level of 1x10-6).
E=ADEC Soil Cleanup Levels (2012), 18 AAC 75.340 Table B1 and Table B2, Method 2, Migration to Groundwater Under-40 inch zone.
F=1/10 ADEC Groundwater Cleanup Levels (2012), 18 AAC 75.345 Table C adjusted based on the ADEC Cumulative Risk Guidance (ADEC 2008).
µg/kg = Microgram(s) per kilogram mg/kg = Milligram(s) per kilogram
ADEC = Alaska Department of Environmental Conservation
J = The reported result is an estimated value (e.g., the analyte was detected at a concentration outside the quantitation range or a quality control exceedance was identified).

TABLE 4-5.3 - Site TU/US-C522 - UST 104
Summary of Metals Exceedances from PA/SI Sampling Compared to Background Threshold Values

Analyte	Units	Total Samples	Total Detections	Total Samples Exceeding Cleanup Level	PAL [1,2]	BTV UPL [5]	BTV UTL [6]	Maximum Detected Concentration
Surface Soil (SS) ≤ 2 Feet Below Ground Surface								
Arsenic	mg/kg	3	3	3	0.45	5.95	6.31	5.05
Cobalt	mg/kg	3	3	3	2.7 [2]	11.9	12.9	10.1
Iron	mg/kg	3	3	3	350 [2]	36,900	39,100	22,100
Manganese	mg/kg	3	3	3	28 [2]	981	1,190	403
Subsurface Soil (SB) > 2 Feet Below Ground Surface								
Arsenic	mg/kg	9	9	9	0.45	4.92	5.35	5.79
Cobalt	mg/kg	9	9	9	2.7 [2]	7.7	8.08	9.13
Iron	mg/kg	9	9	9	350 [2]	32,700	36,500	19,000
Manganese	mg/kg	9	9	9	28 [2]	522	572	464
Analyte	**Units**	**Total Samples**	**Total Detections**	**Total Samples Exceeding Cleanup Level**	**PAL [3,4]**	**BTV UPL [5]**	**BTV UTL [6]**	**Maximum Detected Concentration**
Ground Water (WG)								
Aluminum	µg/L	3	3	3	2,000 [4]	894	1,000	11,100
Arsenic	µg/L	3	3	3	1.0	0.23	0.23	15.2 J
Chromium	µg/L	3	3	1	10	0.3	0.3	13.1
Cobalt	µg/L	3	3	3	6 [4]	0.523	0.583	30.2
Iron	µg/L	3	3	3	1,400 [4]	717	717	130,000
Lead	µg/L	3	3	3	1.5	0.027	0.027	8.4 J
Manganese	µg/L	3	3	3	43 [4]	60.3	69.1	19,100
Nickel	µg/L	3	2	1	10	0.062	0.062	13 J
Thallium	µg/L	3	1	1	0.2	0.17	0.17	11.5 J
Vanadium	µg/L	3	3	1	26	5.3	5.3	42.1

Notes:
1. Project Action Level (PAL) is set at the most stringent ADEC Method Two Soil Cleanup level for Under 40-inch Zone (corrected for noncarcinogenic risk of HQ = 0.1 and carcinogenic risk level of 1x10-6.) and Migration to Groundwater (18 AAC 75.341) (ADEC 2012)
2. Analytes has no ADEC cleanup level. The value shown is USEPA Regional Screening Level for Protection of Groundwater.
3. PAL is set to 1/10 ADEC Groundwater Cleanup level (18 AAC 75.345) per ADEC Cumulative Risk Guidance (ADEC 2008)
4. Analyte has no ADEC cleanup level; the value shown is the USEPA Tapwater Regional Screening Level.
5. UPL is the 95% Upper Prediction Limit
6. UTL is the 95% Upper Tolerance Limit with 90% coverage
J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

4.6 SITE TU/US-C523 - UST 122

4.6.1 Description

Site TU/US-C523 is located in Groundwater Zone 2 in an industrial area of KSD adjacent to and east of Building 149 (Refueler Shop) (Figure 1-1). The site formerly contained UST 122, a regulated 1,000-gallon used oil tank, as shown in Figures 4-6a and 4-6b. According to ADEC's UST Facility Report Database, UST 122 (ADEC Tank ID 31) was installed in January 1997 and removed with permanent closure in October 1997 (ADEC 2017a).

4.6.2 Previous Investigation Results

On 20 July 1988, the Refueler Shop (IRP SS021) was added to the ADEC CSP database (File Number 2569.38.022.05; Hazard ID 23354) and to ADEC's LUST list (spill number 92-2-5-149-2; Hazard ID 506) (ADEC 2011c, ADEC 2017c). The Refueler Shop, identified as Building 149, was located approximately 2,000 ft north of Runway 29 and adjacent to the King Salmon Air Station flight line and was reportedly used for storage and maintenance of aircraft fuel tanker trucks. Contamination at the site was attributed to USTs south-southwest of Building 149 at Buildings 158 and 159 (ADEC 2011b).

In 1988, the USACE conducted soil and groundwater sampling to address soil and groundwater contamination associated with the Refueler Shop, Building 149 (USACE 1988). Detections from sampling indicated the following in the area surrounding Building 149:

- Directly west; xylene soil detections at 15 ft bgs
- Farther west; BTEX soil detections at 20 ft bgs
- To the north; BTEX and TPH soil detections at 15 ft bgs, no TPH or BTEX soil detections at 20 ft bgs, and BTEX and TPH groundwater detections at 20 ft bgs
- To the north-west; TPH but no BTEX soil detections at 10 ft bgs, BTEX and TPH soil detections at 15 ft bgs, toluene and ethylbenzene soil detections at 20 ft bgs, and BTEX and TPH groundwater detections at 15 ft bgs
- To the north-east; benzene soil detections at 15 ft bgs, TPH but no BTEX soil detections at 19 ft bgs
- To the east; no BTEX or TPH soil detections at 15 ft bgs, BTEX and TPH soil detections at 20 ft bgs, and BTEX and TPH groundwater detections at 17 ft bgs

The Refueler Shop was identified as having three general sources of contamination: overfilling of the diesel UST as indicated by fuel saturated soils observed around the UST; an old dry well formerly located north of Building 149 previously serving as a drain field for the shop before replacement with an OWS; and spills occurring when the OWS was emptied through transfer of its contents into barrels reportedly lacking spill containment. These three sources, particularly the dry well, were believed to be the source of a plume of contaminants migrating in a west-southwesterly direction. Soils were logged as medium sand, with the potential to allow migration of contaminants to groundwater.

In 1988, NPGI prepared a BCP, which lists a fuel storage tank, Number 122, in association with Building 149. The tank was listed as a 500-gallon diesel tank. A tank having 1,000-gallon capacity (UST 122) was not listed (NPGI 1988).

In 1992, SAIC conducted several studies for King Salmon Air Station, including a PA, a tank assessment, and a PI/FS. The PA stated that primarily, industrial wastewater generated at King Salmon Air Station was underflow from oil traps at Building 149 which discharged to aerated sewage lagoons. The PA listed UST 122 as an active 500-gallon AST storing diesel at Building 149. A UST at Building 149 was not listed (SAIC 1992).

During the 1992 tank assessment, SAIC surveyed existing USTs at King Salmon Air Station, now KSD, to evaluate environmental risks posed by 30 USTs and 33 ASTs at King Salmon, defining to what extent tanks were contributing or could contribute to the contaminated aquifer identified under the IRP. UST 122 was one of the tanks assessed. The report noted two tanks located at Building 149: one 1,000-gallon UST and one 500-gallon AST (SAIC 1993a). The AST is likely the tank identified in the BCP. The map prepared with the report shows UST 122 to the west of Building 149, near the southwestern corner of the building, and the AST immediately south of the UST. The following concerns regarding UST 122 were identified: there was petroleum product visible in the tank vault; neither corrosion protection nor cathodic protection were present; overfill protection was not present; and UST 122 (capacity of 1,000 gallons) was reported to be out of service, yet still contained product.

During the 1992 PI/FS, SAIC determined the magnitude of contamination, the extent and potential for migration, and identified removal alternatives (SAIC 1993b). A soil-gas survey conducted at the Refueler Shop was used to approximate the boundary of the plume described in the USACE report (USACE 1988). Subsurface soil samples did not have detectable levels of VOCs, SVOCs, or TPH. Further soil characterization was recommended because groundwater data suggested that one source of petroleum hydrocarbons was located in the area of the Refueler Shop (at the time of this report, the source had not been identified). Data also suggested the groundwater contaminant plume was commingled with one or more plumes originating from offsite. Groundwater contaminants of potential concern identified included petroleum hydrocarbons, VOCs, and SVOCs, which were suspected at the time of the investigation but were not detected.

In 1995, EMCON prepared an RI/FS for 12 sites at King Salmon Air Station, including the Refueler Shop (also identified as IRP Site SS021), establishing five zones for groundwater evaluation (EMCON 1995). Groundwater Zone 2 contained the Refueler Shop (Site SS021) and displayed contamination including fuel hydrocarbons and halogenated volatile organic compounds. At the Refueler Shop, soil contamination consisted primarily of fuel hydrocarbons, including DRO and GRO, but free-phase product had not been observed in nearby monitoring wells. The RI/FS indicated that the Refueler Shop area was the main source of DRO contamination in soil and in the A-Aquifer. Four isolated areas of contamination were reported at 5 to 15 ft bgs, suggesting a significant portion of soil contamination may have been in the capillary fringe and seasonal smear zone. Soil-gas data collected during the RI/FS indicated contamination was encountered at the Refueler Shop, Building 149, extending to Building 147, with soil samples south of Building 149 containing DRO concentrations ranging from 12 to 5,400 mg/kg, and GRO concentrations ranging from 416 to 890 mg/kg. Two smaller, concentrated areas of soil contamination were noted: one located 100 ft northwest of Building 149 with DRO detected up to 6,300 mg/kg, and the second located southwest of Building 149 and approximately 100 ft south of Building 159 with DRO detected up to 8,100 mg/kg and GRO detected up to 2,140 mg/kg.

In 1997, according to the ADEC's UST Facility Report Database, UST 122 was installed and removed. It is listed as a regulated 1,000-gallon used oil UST with cathodic and spill protection (ADEC 2011c).

In 2002, PVDC and OASIS prepared a remedial action ROD for five sites at King Salmon Air Station, including the Refueler Shop. According to the ROD, available soil and groundwater analytical results collected in 1992, 1993, 1994, 1996, 1997, and 2000 identify five discrete areas of soil contamination in the area of Site SS021 (Refueler Shop), with DRO being the primary COC, and benzene, toluene, and ethylbenzene being the secondary COCs (PVDC and OASIS 2002). Groundwater samples collected in 1993 and 1997 near Building 149, contained detections of DRO and BTEX with DRO also detected in soil in 1993. The maps did not indicate any plumes under the area of Building 149. The ROD indicates that contamination at the Refueler Shop Building 149 was associated with the USTs at Buildings 157 and 159. The final remedy includes the following components: soil remediation of contaminated soil outside the bioventing system's area of influence at Buildings 154, 157/159, 306, and 307; institutional controls to be documented in the base master plan and state land records to minimize human contact with contaminated soil; annual long-term groundwater monitoring with a 5-year review; and soil sampling to confirm cleanup levels are being achieved.

In 2009, URS prepared an evaluation report stating site investigations had been conducted at IRP Refueler Shop Building 149, Site SS021, located adjacent and to the east of UST 122; however, URS was unable to find site investigation documentation describing the extent of subsurface contamination at Site TU/US-C523 (URS 2009).

In 2012, CH2M HILL performed a PA/SI including visual inspection of the site and surface soil (0-2 ft bgs), subsurface soil (greater than 2 ft bgs), and groundwater sampling using temporary monitoring well points. The visual inspection showed the location of former UST 122 was replaced with an active AST directly over the former UST location and currently supplying heating oil to Building 149. An active monitoring well and former UST vault were identified west of the AST, with another well, possibly associated with a former bioventing or similar system, adjacent to and along the southern side of the AST. The AST was installed above-grade on a 6-inch thick gravel pad. Areas to the west and north of the AST were vegetated with grass. To the south of Building 149, gravel driveways lead from the main road. No visual evidence existed of past spills or stressed vegetation in the area of former UST 122 or in the area of Building 149 (CH2M HILL 2013). In surface soil, SVOCs and polychlorinated biphenyls were detected above ADEC screening levels. In subsurface soil, TCE was detected above ADEC screening levels (Figure 4-6a and Table 4-6.1). In groundwater, VOCs, SVOCs, GRO, DRO, and RRO were detected above ADEC screening levels (Figure 4-6b and Table 4-6.2). Additionally, metals in surface soil, subsurface soil, and groundwater were detected above screening levels (Table 4-6.3) (CH2M HILL 2013).

4.6.3 Evaluation of Findings

The presence of contamination near Building 149 (Refueler Shop) has been documented since before the installation and removal of UST 122. The Zone 2 ROD, which sampled VOCs, GRO, DRO and monitoring natural attenuation parameters in groundwater for at least the first 5 years, also identified DRO in soil at depth near Buildings 147, 149, 157, and 158 all of which are inside SS021. A sample from south of Building 149, upgradient of UST 122, detected DRO at 5 ft bgs (CH2M HILL 2013).

At former UST 122, the highest detections of DRO and TCE in groundwater were located upgradient with groundwater samples immediately up and downgradient of the former UST 122 almost a full order of

magnitude below ADEC groundwater cleanup levels. Metal exceedances in soils were either approximately at or below BTVs (Table 4-6.3) with the exception of molybdenum. Metal exceedances in groundwater included arsenic, lead, and thallium above ADEC screening level and cobalt, iron, and manganese above USEPA cleanup levels. These metals were above 2015 BTVs, but other than lead, are not associated with fuel oils. Only one groundwater sample, cross-gradient of UST 122, displayed multiple metal exceedances while groundwater metals detections upgradient and downgradient of UST 122 were within background levels. Elevated turbidity in this sample (14.8 NTU) may have biased metals results high.

Based on this information, the estimated source of soil contamination appears to be upgradient or cross-gradient of UST 122. With UST 122 removed and closed, and a lack of contamination directly connected to UST 122, Site TU/US-C523 is therefore recommended for closure.

4.6.4 Description of Exposure Pathways, Potential Receptors, and Contaminant Screening

Site TU/US-C523 is within Groundwater Zone 2 in the industrial area of KSD. Potential human receptors are adult workers. Potential human health exposure pathways for adult workers include incidental ingestion of soils, dermal contact with soils, inhalation of indoor and outdoor vapors from subsurface soils and groundwater, inhalation of dust, and ingestion of groundwater.

Based on sampling results from the 2012 PA/SI, the comparison of metals detections to 2015 BTVs, and the long history of contamination from Site SS021 not directly tied to the brief installation of UST 122 it is likely there are no exposure sources relating to the former used oil UST 122. Therefore, exposure pathways for soil and groundwater from UST 122 are incomplete and no longer pose a risk to human health and the environment.

4.6.5 Justification for Closure

Closure is justified based on the determination no significant risk or threat to human health and the environment exists at Site TU/US-C523 from UST 122. An extended history of field investigations indicate contamination from IRP Site SS021, particularly Buildings 157, 158, and 159, is the source of contamination near Site TU/US-C523, not UST 122. The most recent field investigation revealed an increasing trend of detections moving outward from UST 122 (Figures 4-6a and 4-6b) (CH2M HILL 2013). Contamination present at the site above ADEC cleanup levels is not related to UST 122 at Site TU/US-C523 and should be evaluated under the area-wide Groundwater Zone 2 ROD. Based on these findings, closure is appropriate for Site TU/US-C523.

According to the ADEC this site is closed with Institutional Controls (ICs) (bioventing, land use controls, annual inspections, 5-year review) and was inaccurately closed without ICs in the CSDB. Once this report is finalized, ADEC plans to close (Cleanup Complete) the LUST site Hazard ID: 23354 and update the CSP site Hazard ID 506 to closed (Cleanup Complete with ICs). IC documentation will be tracked in the CS database CSP site Hazard ID: 2629 “King Salmon AS OT028 GW Zone 2”.

Notes:
Charts identify sample depths and analytical suites. A dot signifies at least one analyte was detected above ADEC screening criteria.

Acronyms:
ADEC - Alaska Department of Environmental Conservation

Data Source:
Samples collected during 2012 Preliminary Assessment/Site Inspection.
Imagery: Aerometrics 2012

KSC523DP002

Parameter Suite	Sample Depth (ft)			
	0-2	5-7	8-10	10-15
GRO/DRO/RRO				
VOCs		•	•	
SVOCs	•			
PCB/Pesticides	•			

KSC523DP003

Parameter Suite	Sample Depth (ft)			
	0-2	4-5	5-10	10-14
GRO/DRO/RRO	No Exceedances			
VOCs				
SVOCs				
PCB/Pesticides				

KSC523DP001

Parameter Suite	Sample Depth (ft)			
	0-2	2-3	5-10	10-14
GRO/DRO/RRO	No Exceedances			
VOCs				
SVOCs				
PCB/Pesticides				

Legend
- Monitoring Well
- Soil Bore Location
- Former UST 122
- Former Aboveground Storage Tank
- 604 Structure
- Fuel Line
- Wastewater Line
- Water Line
- Electric Line - Overhead
- Electric Line - Underground

KSC523DP002
B-06
B-02
MW-97
MW00-05
MW00-05
KSC523DP003
KSC523DP001
AST
UST-122
149
MW-96
147
SS021441
MW-441
Approximate Direction of Groundwater Flow

1 inch = 30 feet
(11x17 print-out)
N
0 15 30 60 Feet

Closure Report for Nine Compliance Restoration Program Sites
TU/US-C519, TU/US-C517, TU/US-C518, TU/US-C520, TU/US-C522, TU/US-C523, TU/US-C524, TU/US-C589, and TU/US-C592
at King Salmon Divert, King Salmon, Alaska

AFCEC Contract No. FA8903-08-D-8791-0039

Figure 4-6a
Soil Data Exceedance Summary
at Site TU/US-C523 - UST 122

EA Project No. 1456039

jschwertz Path: C:\DATA\King Salmon\Report\MXD\Site_523.mxd

This page intentionally left blank

Notes:
Charts identify sample depths and analytical suites. A dot signifies at least one analyte was detected above ADEC screening criteria.

Acronyms:
ADEC - Alaska Department of Environmental Conservation

Data Source:
Samples collected during 2012 Preliminary Assessment/Site Inspection.
Imagery: Aerometrics 2012

KSC523DP002	
Parameter Suite	**Screen Interval (ft)**
	17-21
GRO/DRO/RRO	•
VOCs	•
SVOCs	•

KSC523DP003	
Parameter Suite	**Screen Interval (ft)**
	17-20
GRO/DRO/RRO	
VOCs	•
SVOCs	

KSC523DP001	
Parameter Suite	**Screen Interval (ft)**
	17-21
GRO/DRO/RRO	•
VOCs	•
SVOCs	

Legend
- Monitoring Well
- Soil Bore Location
- Former UST 122
- Former Aboveground Storage Tank
- 604 Structure
- Fuel Line
- Wastewater Line
- Water Line
- Electric Line - Overhead
- Electric Line - Underground

KSC523DP002
B-06
B-02
MW-97
MW00-05
MW00-05
KSC523DP003
KSC523DP001
AST
UST 122
149
MW-96
SS021441
MW-441
147
Approximate Direction of Groundwater Flow

N

1 inch = 30 feet
(11x17 print-out)

0 15 30 60 Feet

Closure Report for Nine Compliance Restoration Program Sites
TU/US-C519, TU/US-C517, TU/US-C518, TU/US-C520, TU/US-C522, TU/US-C523, TU/US-C524, TU/US-C589, and TU/US-C592
at King Salmon Divert, King Salmon, Alaska

AFCEC Contract No. FA8903-08-D-8791-0039

Figure 4-6b
Groundwater Data Exceedance Summary at Site TU/US-C523 - UST 122

EA Project No. 1456039

jschwertz Path: C:\DATA\King Salmon\Report\MXD\Site_523gw.mxd

This page intentionally left blank

TABLE 4-6.1 - Site TU/US-C523 - UST 122
Summary of PA/SI Chemicals Exceeding Screening Levels in Soil (Non-Metals)

	Location		KSC523DP001				KSC523DP002					KSC523DP003				
	Sample ID		KSC523DP001SO01-01	KSC523DP001SO01-02	KSC523DP001SO01-05	KSC523DP001SO01-20	KSC523DP002SO01-01	KSC523DP902SO01-01	KSC523DP002SO01-02	KSC523DP902SO01-02	KSC523DP002SO01-05	KSC523DP002SO01-20	KSC523DP003SO01-01	KSC523DP003SO01-02	KSC523DP003SO01-05	KSC523DP003SO01-20
	Sample Depth (ft)		0-2	2-3	5-10	10-14	0-2	0-2	5-7	5-7	8-10	10-15	0-2	4-5	5-10	10-14
Analyte	**Screening Level**	**Screening Level Source**														
VOCs (µg/kg)																
Trichloroethene (TCE)	20	E							23.3 J	22.1 J	26.4 J					
SVOCs (µg/kg)																
Benzo(a)anthracene	490	B					1,330 J									
Benzo(a)pyrene	49	B					4,220 J									
Benzo(b)fluoranthene	490	B					4,160 J									
Dibenz(ah)anthracene	49	B					4,140 J									
Petroleum Hydrocarbons (mg/kg)	No Exceedances															
PCBs/Pesticides (µg/kg)																
Total PCBs	100	B					108.1 J									

Notes:
A=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B2, Method 2, Ingestion, Under-40 inch zone.
B=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B1, Method 2, Direct Contact, Under-40 inch zone (corrected for additivity noncarcinogen for HQ = 0.1 and carcinogenic risk level of 1x10-6).
C=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B2, Method 2, Inhalation, Under-40 inch zone.
D=ADEC Soil Cleanup Levels (2012), 18 AAC 75.340 Table B1, Method 2, Outdoor Inhalation, Under 40-inch zone (corrected for noncarcinogenic risk of HQ = 0.1 and carcinogenic risk level of 1x10-6).
E=ADEC Soil Cleanup Levels (2012), 18 AAC 75.340 Table B1 and Table B2, Method 2, Migration to Groundwater Under-40 inch zone.
F=1/10 ADEC Groundwater Cleanup Levels (2012), 18 AAC 75.345 Table C adjusted based on the ADEC Cumulative Risk Guidance (ADEC 2008).

µg/kg = Microgram(s) per kilogram mg/kg = Milligram(s) per kilogram PCB = polychlorinated biphenyl
Notes (continued):
ADEC = Alaska Department of Environmental Conservation
J = The reported result is an estimated value (e.g., the analyte was detected at a concentration outside the quantitation range or a quality control exceedance was identified).

TABLE 4-6.2 - Site TU/US-C523 - UST 122
Summary of PA/SI Chemicals Exceeding Screening Levels in Groundwater (Non-Metals)

	Location		KSC523DP001	KSC523DP002	KSC523DP003
	Sample ID		KS523MW001GW01-45	KS523MW002GW01-45	KS523MW003GW01-45
	Sample Depth (ft)		17-20	17-21	17-20
Analyte	**Screening Level**	**Screening Level Source**			
VOCs (µg/L)					
Benzene	0.5	F		2.59	
Ethylbenzene	70	F		351	
Naphthalene	73	F		189	
n-Propylbenzene	37	F		54.2	
Toluene	100	F		533	
Trichloroethene (TCE)	0.5	F	2.45	40.6	0.93
1,2,4-Trimethylbenzene	180	F		530	
1,3,5-Trimethylbenzene	180	F		193	
Xylenes	1,000	F		2,720	
SVOCs (µg/L)	No Exceedances				
2-Methylnaphthalene	15	F		37.3	
3- & 4-Methylphenol	18	F		83.9	
Petroleum Hydrocarbons (mg/L)					
Gasoline Range Organics (C6 to C10)	220	F		12,400	
Diesel Range Organics (C10 to C25)	150	F	263 J	10,200	
Residual Range Organics (C25 to C36)	110	F	141 J	1,200 J	

Notes:
A=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B2, Method 2, Ingestion, Under-40 inch zone.
B=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B1, Method 2, Direct Contact, Under-40 inch zone (corrected for additivity noncarcinogen for HQ = 0.1 and carcinogenic risk level of 1x10-6).
C=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B2, Method 2, Inhalation, Under-40 inch zone.
D=ADEC Soil Cleanup Levels (2012), 18 AAC 75.340 Table B1, Method 2, Outdoor Inhalation, Under 40-inch zone (corrected for noncarcinogenic risk of HQ = 0.1 and carcinogenic risk level of 1x10-6).
E=ADEC Soil Cleanup Levels (2012), 18 AAC 75.340 Table B1 and Table B2, Method 2, Migration to Groundwater Under-40 inch zone.
F=1/10 ADEC Groundwater Cleanup Levels (2012), 18 AAC 75.345 Table C adjusted based on the ADEC Cumulative Risk Guidance (ADEC 2008).
µg/kg = Microgram(s) per kilogram mg/kg = Milligram(s) per kilogram
ADEC = Alaska Department of Environmental Conservation
J = The reported result is an estimated value (e.g., the analyte was detected at a concentration outside the quantitation range or a quality control exceedance was identified).

TABLE 4-6.3 - Site TU/US-C523 - UST 122
Summary of Metals Exceedances from PA/SI Sampling Compared to Background Threshold Values

Analyte	Units	Total Samples	Total Detections	Total Samples Exceeding Cleanup Level	PAL [1,2]	BTV UPL [5]	BTV UTL [6]	Maximum Detected Concentration
Surface Soil (SS) ≤ 2 Feet Below Ground Surface								
Arsenic	mg/kg	3	3	3	0.45	5.95	6.31	7.13
Cobalt	mg/kg	3	3	3	2.7 [2]	11.9	12.9	7.67
Iron	mg/kg	3	3	3	350 [2]	36,900	39,100	17,500
Manganese	mg/kg	3	3	3	28 [2]	981	1,190	356
Molybdenum	mg/kg	3	3	1	2 [2]	0.73	0.73	3.48
Subsurface Soil (SB) > 2 Feet Below Ground Surface								
Arsenic	mg/kg	9	9	9	0.45	4.92	5.35	4.34
Cobalt	mg/kg	9	9	9	2.7 [2]	7.7	8.08	7.36
Iron	mg/kg	9	9	9	350 [2]	32,700	36,500	18,000
Manganese	mg/kg	9	9	9	28 [2]	522	572	416
Molybdenum	mg/kg	9	9	0	2 [2]	0.73	0.73	1.31 J

Analyte	Units	Total Samples	Total Detections	Total Samples Exceeding Cleanup Level	PAL [3,4]	BTV UPL [5]	BTV UTL [6]	Maximum Detected Concentration
Ground Water (WG)								
Arsenic	µg/L	3	1	1	1.0	0.23	0.23	9.9 J
Cobalt	µg/L	3	2	1	6 [4]	0.523	0.583	6.1 J
Iron	µg/L	3	3	1	1,400 [4]	717	717	20,900
Lead	µg/L	3	1	1	1.5	0.027	0.027	5.9 J
Manganese	µg/L	3	3	2	43 [4]	60.3	69.1	3,120
Thallium	µg/L	3	1	1	0.2	0.17	0.17	4 J

Notes:
1. Project Action Level (PAL) is set at the most stringent ADEC Method Two Soil Cleanup level for Under 40-inch Zone (corrected for noncarcinogenic risk of HQ = 0.1 and carcinogenic risk level of 1x10-6.) and Migration to Groundwater (18 AAC 75.341) (ADEC 2012)
2. Analytes has no ADEC cleanup level. The value shown is USEPA Regional Screening Level for Protection of Groundwater.
3. PAL is set to 1/10 ADEC Groundwater Cleanup level (18 AAC 75.345) per ADEC Cumulative Risk Guidance (ADEC 2008)
4. Analyte has no ADEC cleanup level; the value shown is the USEPA Tapwater Regional Screening Level.
5. UPL is the 95% Upper Prediction Limit
6. UTL is the 95% Upper Tolerance Limit with 90% coverage
J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
B = The analyte was detected in the sample at a concentration less than or equal to five times (10 times for common laboratory contaminants) the blank concentration.

4.7 SITE TU/US-C524 - UST 152

4.7.1 Description

Site TU/US-C524 is located in Groundwater Zone 2 and is associated with former Building 152, the former Fire Station (Figure 1-1). The site formerly contained UST 152, a non-regulated 10,000-gallon UST as shown in Figures 4-7a and 4-7b. UST 152 has a limited background history because it was a non-regulated tank and neither the tank nor Building 152 are included in ADEC's UST Facility Report Database (ADEC 2017a).

4.7.2 Previous Investigation Results

In 1985, E-S investigated King Salmon Air Station under Phase I of the IRP (E-S 1985). Building 152 was not identified in the report.

In 1988, NPGI prepared a BCP. Building 152 was not listed in the plan (NPGI 1988).

In 1992, SAIC conducted several studies for King Salmon Air Station, including a PA, a tank assessment, and a PI/FS. The PA listed Building 152, the former Fire Station, and stated its construction was completed in 1957. An active 500-gallon AST storing diesel at nearby Building 154 was also listed (SAIC 1992).

In 2012, CH2M HILL performed a PA/SI including visual inspection of the site and surface soil (0-2 ft bgs), subsurface soil (greater than 2 ft bgs), and groundwater sampling using temporary monitoring well points. The PA/SI statement of work described Site TU/US-C524 as a non-regulated, 10,000-gallon UST (UST 152), likely to contain fuels, which had been installed adjacent to the southwest corner of former Building 152 (the former Fire Station) in 1957 and may have been removed during the demolition of Building 152 in 1989 (AFCEC 2011). Documentation of the removal was not found therefore UST 152 might potentially still remain at Site TU/US-C524.

The 2012 PA/SI visual inspection showed native grasses in the vicinity of former Building 152. No remnants of the former facility were observed and no foundations, low areas, or areas of construction debris were identified. Evidence of past spills or releases such as stressed vegetation and stained soil was not observed (CH2M HILL 2013). The only analyte to exceed ADEC screening levels in soil was one estimated exceedance of SVOC n-nitrosodipropylamine in subsurface soil (Figure 4-7a and Table 4-7.1). In groundwater, TCE, DRO and RRO were detected above 1/10th the ADEC screening level (adjusted) based on ADEC Cumulative Risk Guidance (ADEC 2008) (Figure 4-7b and Table 4-7.2), metals in surface soil, subsurface soil, and groundwater were detected above screening levels (Table 4-7.3) (CH2M HILL 2013).

In 2015, EA Engineering, Science and Technology, Inc., PBC performed an electromagnetic survey at Site TU/US-524 in order to determine if UST 152 still remained onsite. Resulting imagery from the survey indicate the UST is no longer present onsite at the former Building 152 location, as seen in Figure 4-7c.

4.7.3 Evaluation of Findings

The single exceedance of n-nitrosodipropylamine in soil is not associated with the fuels reportedly stored in former UST 152, because according to the Agency for Toxic Substances and Disease Registry (ATSDR), n-nitrosodipropylamine is produced as a side reaction in some manufacturing processes, as a contaminant in weed killer, or during the manufacture of some rubber products (ATSDR 1999). The detections of TCE, DRO, and RRO in groundwater exceed 1/10th the ADEC screening level, but are below the full ADEC cleanup levels. With the exception of manganese in groundwater, all metal exceedances were at or below background threshold values (Table 4-7.3). Manganese is not typically associated with a fuel oil UST. Closeout of Site TU/US-C524 is recommended.

4.7.4 Description of Exposure Pathways, Potential Receptors, and Contaminant Screening

Site TU/US-C524 is within Groundwater Zone 2 in the industrial area of KSD. Potential human receptors are adult workers. Potential human health exposure pathways for adult workers include incidental ingestion of soils, dermal contact with soils, inhalation of indoor and outdoor vapors from subsurface soils and groundwater, inhalation of dust, and ingestion of groundwater.

Based on sampling results from the 2012 PA/SI, the comparison of metals detections to 2015 BTVs, and confirmation that UST 152 does not still exist at the site, there are no exposure sources above ADEC screening levels relating to the former fuel oil UST. Therefore, exposure pathways for soil and groundwater are incomplete and no longer pose a risk to human health and the environment.

4.7.5 Justification for Cleanup Complete

Cleanup Complete without institutional controls is being requested based on the determination no significant risk or threat to human health and the environment exists at Site TU/US-C524 from UST 152. The most recent field investigation revealed no soil or groundwater contamination at the site above ADEC cleanup levels related to fuel oils formerly stored within UST 152 (CH2M HILL 2013). Contamination present at the site above ADEC cleanup levels is not related to UST 152 at Site TU/US-C524 and should be evaluated under the area-wide Groundwater Zone 2 ROD. Based on these findings, Cleanup Complete with site closure is appropriate for Site TU/US-C524.

Notes:
Charts identify sample depths and analytical suites. A dot signifies at least one analyte was detected above ADEC screening criteria.

Acronyms:
ADEC - Alaska Department of Environmental Conservation

Data Source:
Samples collected during 2012 Preliminary Assessment/Site Inspection.
Imagery: Aerometrics 2012

Legend

- Monitoring Well
- Soil Bore Location
- Former UST 152
- 604 Structure
- Fuel Line
- Wastewater Line
- Water Line
- Electric Line - Overhead
- Electric Line - Underground

177

158

UST 152

Approximate Direction of Groundwater Flow

SS021445
MW-445

KSC524DP001				
Parameter Suite	Sample Depth (ft)			
	0-2	5-7.5	7.5-10	10-12.5
GRO/DRO/RRO	No Exceedances			
VOCs				
SVOCs				
PCB/Pesticides				

KSC524DP002				
Parameter Suite	Sample Depth (ft)			
	0-2	5-7.5	7.5-10	10-12.5
GRO/DRO/RRO	No Exceedances			
VOCs				
SVOCs				
PCB/Pesticides				

KSC524DP003				
Parameter Suite	Sample Depth (ft)			
	0-2	5-7.5	7.5-10	10-12.5
GRO/DRO/RRO				
VOCs				
SVOCs		?		
PCB/Pesticides		?		

N

1 inch = 30 feet
(11x17 print-out)

0 15 30 60 Feet

Closure Report for Nine Compliance Restoration Program Sites
TU/US-C519, TU/US-C517, TU/US-C518, TU/US-C520, TU/US-C522, TU/US-C523, TU/US-C524, TU/US-C589, and TU/US-C592
at King Salmon Divert, King Salmon, Alaska

AFCEC Contract No. FA8903-08-D-8791-0039

Figure 4-7a
Soil Data Exceedance Summary
at Site TU/US-C524 - UST 152

EA Project No. 1456039

jschwertz Path: C:\DATA\King Salmon\Report\MXD\Site_524.mxd

This page intentionally left blank

Notes:
Charts identify sample depths and analytical suites. A dot signifies at least one analyte was detected above ADEC screening criteria.

Acronyms:
ADEC - Alaska Department of Environmental Conservation

Data Source:
Samples collected during 2012 Preliminary Assessment/Site Inspection.
Imagery: Aerometrics 2012

Legend

- Monitoring Well
- Soil Bore Location
- Former UST 152
- 604 Structure
- Fuel Line
- Wastewater Line
- Water Line
- Electric Line - Overhead
- Electric Line - Underground

177

158

UST 152

KSC524DP001	
Parameter Suite	Screen Interval (ft)
	17-20
GRO/DRO/RRO	•
VOCs	•
SVOCs	
PCB/Pesticides	

KSC524DP002	
Parameter Suite	Screen Interval (ft)
	13-17
GRO/DRO/RRO	•
VOCs	•
SVOCs	
PCB/Pesticides	

KSC524DP003	
Parameter Suite	Screen Interval (ft)
	13-17
GRO/DRO/RRO	•
VOCs	•
SVOCs	
PCB/Pesticides	

Approximate Direction of Groundwater Flow

SS021445
MW-445

jschwertz Path: C:\DATA\King Salmon\Report\MXD\Site_524qw.mxd

N

1 inch = 30 feet
(11x17 print-out)

0 15 30 60 Feet

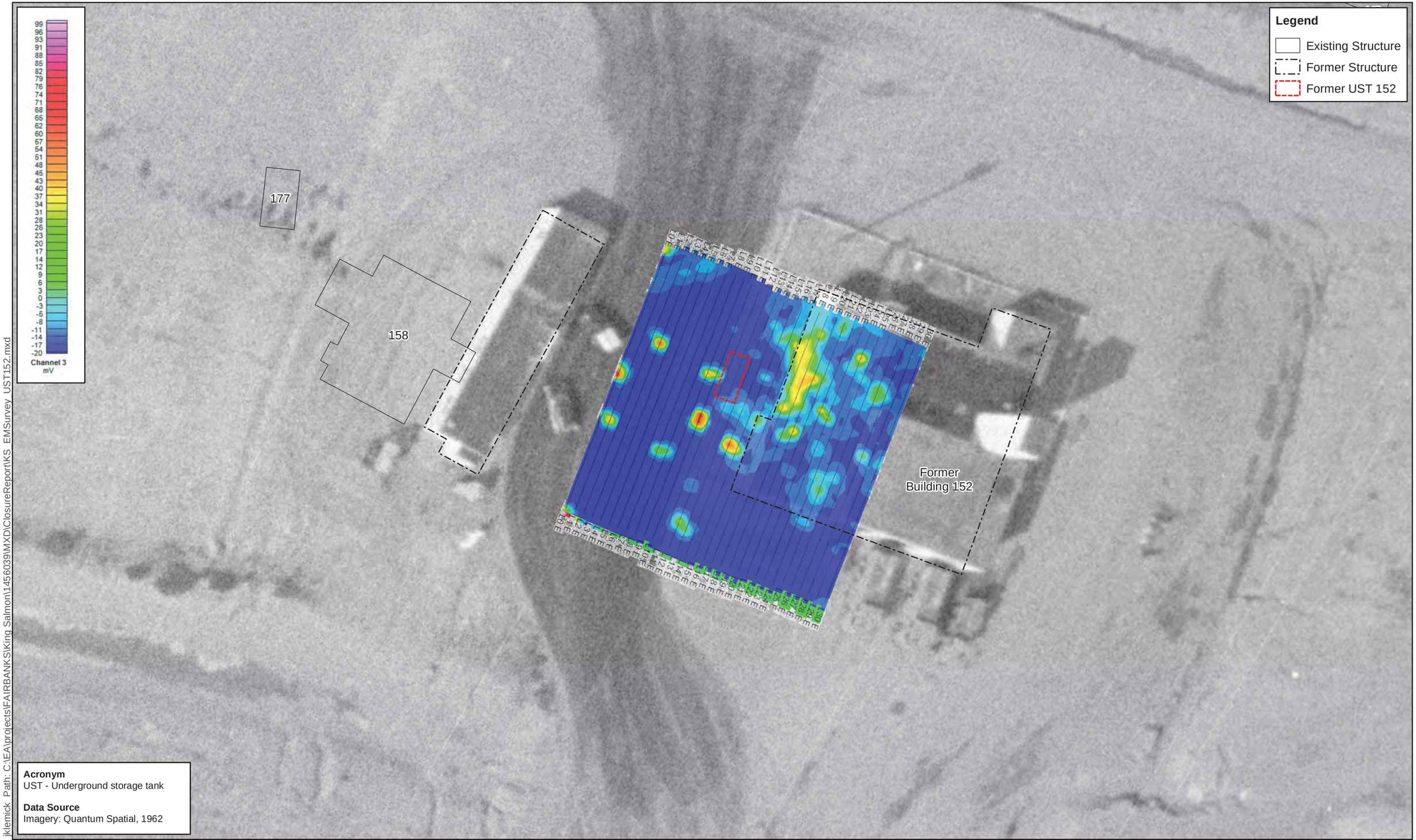
Closure Report for Nine Compliance Restoration Program Sites
TU/US-C519, TU/US-C517, TU/US-C518, TU/US-C520, TU/US-C522,
TU/US-C523, TU/US-C524, TU/US-C589, and TU/US-C592
at King Salmon Divert, King Salmon, Alaska

AFCEC Contract No. FA8903-08-D-8791-0039

Figure 4-7b
Groundwater Data Exceedance Summary
at Site TU/US-C524 - UST 152

EA Project No. 1456039

This page intentionally left blank



Acronym
UST - Underground storage tank

Data Source
Imagery: Quantum Spatial, 1962

N

0 25 50 100 Feet

Closure Report for Nine Compliance Restoration Program Sites
TU/US-C519, TU/US-C517, TU/US-C518, TU/US-C520, TU/US-C522,
TU/US-C523, TU/US-C524, TU/US-C589, and TU/US-C592
at King Salmon Divert, King Salmon, Alaska

AFCEC Contract No. FA8903-08-D-8791-0039

Figure 4-7c
Electromagnetic Survey at
Site TU/US-C524 - UST 152

EA Project No. 1456039

jklemick Path: C:\EA\projects\FAIRBANKS\King Salmon\1456039\MXD\ClosureReport\KS_EMSurvey_UST152.mxd

This page intentionally left blank

TABLE 4-7.1 - Site TU/US-C524 - UST 152
Summary of PA/SI Chemicals Exceeding Screening Levels in Soil (Non-Metals)

	Location		KSC524DP001				KSC524DP002				KSC524DP003				
	Sample ID		KSC524DP001SO01-01	KSC524DP001SO01-02	KSC524DP001SO01-05	KSC524DP001SO01-20	KSC524DP002SO01-01	KSC524DP002SO01-02	KSC524DP002SO01-05	KSC524DP002SO01-20	KSC524DP003SO01-01	KSC524DP003SO01-02	KSC524DP903SO01-02	KSC524DP003SO01-05	KSC524DP003SO01-20
	Sample Depth (ft)		0-2	5-8	8-10	10-13	0-2	5-8	8-10	10-13	0-2	5-8	5-8	8-10	10-13
Analyte	**Screening Level**	**Screening Level Source**													
VOCs (µg/kg)	No Exceedances														
SVOCs (µg/kg)															
N-Nitrosodipropylamine	1.1	E										161 J			
Petroleum Hydrocarbons (mg/kg)	No Exceedances														
PCBs/Pesticides (µg/kg)	No Exceedances														

Notes:
A=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B2, Method 2, Ingestion, Under-40 inch zone.
B=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B1, Method 2, Direct Contact, Under-40 inch zone (corrected for additivity noncarcinogen for HQ = 0.1 and carcinogenic risk level of 1x10-6).
C=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B2, Method 2, Inhalation, Under-40 inch zone.
D=ADEC Soil Cleanup Levels (2012), 18 AAC 75.340 Table B1, Method 2, Outdoor Inhalation, Under 40-inch zone (corrected for noncarcinogenic risk of HQ = 0.1 and carcinogenic risk level of 1x10-6).
E=ADEC Soil Cleanup Levels (2012), 18 AAC 75.340 Table B1 and Table B2, Method 2, Migration to Groundwater Under-40 inch zone.
F=1/10 ADEC Groundwater Cleanup Levels (2012), 18 AAC 75.345 Table C adjusted based on the ADEC Cumulative Risk Guidance (ADEC 2008).
µg/kg = Microgram(s) per kilogram mg/kg = Milligram(s) per kilogram
ADEC = Alaska Department of Environmental Conservation PCB = polychlorinated biphenyl
J = The reported result is an estimated value (e.g., the analyte was detected at a concentration outside the quantitation range or a quality control exceedance was identified).

This page intentionally left blank

TABLE 4-7.2 - Site TU/US-C524 - UST 152
Summary of PA/SI Chemicals Exceeding Screening Levels in Groundwater (Non-Metals)

	Location		KSC524DP001	KSC524DP002	KSC5204DP003
	Sample ID		KSC524MW001GW01-45	KSC524MW002GW01-45	KSC524MW003GW01-45
	Sample Depth (ft)		17-20	13-17	13-17
Analyte	**Screening Level**	**Screening Level Source**			
VOCs (µg/L)					
Trichloroethene (TCE)	0.5	F	1.04	0.53	1.1
SVOCs (µg/L)	No Exceedances				
Petroleum Hydrocarbons (mg/L)					
Diesel Range Organics (C10 to C25)	150	F	500		186 J
Residual Range Organics (C25 to C36)	110	F	205 J	126 J	195 J
PCBs/Pesticides (µg/kg)	No Exceedances				

Notes:
A=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B2, Method 2, Ingestion, Under-40 inch zone.
B=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B1, Method 2, Direct Contact, Under-40 inch zone (corrected for additivity noncarcinogen for HQ = 0.1 and carcinogenic risk level of 1x10-6).
C=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B2, Method 2, Inhalation, Under-40 inch zone.
D=ADEC Soil Cleanup Levels (2012), 18 AAC 75.340 Table B1, Method 2, Outdoor Inhalation, Under 40-inch zone (corrected for noncarcinogenic risk of HQ = 0.1 and carcinogenic risk level of 1x10-6).
E=ADEC Soil Cleanup Levels (2012), 18 AAC 75.340 Table B1 and Table B2, Method 2, Migration to Groundwater Under-40 inch zone.
F=1/10 ADEC Groundwater Cleanup Levels (2012), 18 AAC 75.345 Table C adjusted based on the ADEC Cumulative Risk Guidance (ADEC 2008).
µg/kg = Microgram(s) per kilogram mg/kg = Milligram(s) per kilogram
ADEC = Alaska Department of Environmental Conservation PCB = polychlorinated biphenyl
J = The reported result is an estimated value (e.g., the analyte was detected at a concentration outside the quantitation range or a quality control exceedance was identified).

TABLE 4-7.3 - Site TU/US-C524 - UST 152
Summary of Metals Exceedances from PA/SI Sampling Compared to Background Threshold Values

Analyte	Units	Total Samples	Total Detections	Total Samples Exceeding Cleanup Level	PAL [1,2]	BTV UPL [5]	BTV UTL [6]	Maximum Detected Concentration
Surface Soil (SS) ≤ 2 Feet Below Ground Surface								
Arsenic	mg/kg	3	3	3	0.45	5.95	6.31	5.92
Cobalt	mg/kg	3	3	3	2.7 [2]	11.9	12.9	8.37
Iron	mg/kg	3	3	3	350 [2]	36,900	39,100	20,100
Manganese	mg/kg	3	3	3	28 [2]	981	1,190	355
Subsurface Soil (SB) > 2 Feet Below Ground Surface								
Arsenic	mg/kg	9	9	9	0.45	4.92	5.35	4.87
Cobalt	mg/kg	9	9	9	2.7 [2]	7.7	8.08	8.1
Iron	mg/kg	9	9	9	350 [2]	32,700	36,500	18,500
Manganese	mg/kg	9	9	9	28 [2]	522	572	401
Analyte	**Units**	**Total Samples**	**Total Detections**	**Total Samples Exceeding Cleanup Level**	**PAL [3,4]**	**BTV UPL [5]**	**BTV UTL [6]**	**Maximum Detected Concentration**
Ground Water (WG)								
Cobalt	µg/L	3	3	0	6 [4]	0.523	0.583	1.4 J
Manganese	µg/L	3	3	2	43 [4]	60.3	69.1	1,830

Notes:
1. Project Action Level (PAL) is set at the most stringent ADEC Method Two Soil Cleanup level for Under 40-inch Zone (corrected for noncarcinogenic risk of HQ = 0.1 and carcinogenic risk level of 1x10-6.) and Migration to Groundwater (18 AAC 75.341) (ADEC 2012)
2. Analytes has no ADEC cleanup level. The value shown is USEPA Regional Screening Level for Protection of Groundwater.
3. PAL is set to 1/10 ADEC Groundwater Cleanup level (18 AAC 75.345) per ADEC Cumulative Risk Guidance (ADEC 2008)
4. Analyte has no ADEC cleanup level; the value shown is the USEPA Tapwater Regional Screening Level.
5. UPL is the 95% Upper Prediction Limit
6. UTL is the 95% Upper Tolerance Limit with 90% coverage
J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

4.8 SITE TU/US-C589 - UST 52

4.8.1 Description

Site TU/US-C589 is located in Groundwater Zone 2 at Building 154, the Old Power Plant (Figure 1-1), previously known as IRP Site SS020. The site formerly contained UST 52, a non-regulated 10,000-gallon UST, as shown in Figures 4-8a and 4-8b. According to ADEC's UST Facility Report Database, UST 52 (ADEC Tank ID 26) was installed in 1958 for storage of heating fuel and removed with permanent closure in 1994 (ADEC 2017a).

4.8.2 Previous Investigation Results

In 1985, E-S investigated King Salmon Air Station under Phase I of the IRP. The study described the general fuel transfer process at King Salmon Air Station, noting that both ASTs and USTs were used for jet propellant grade 4, diesel fuel and motor gasoline storage. Fuels were barged to Naknek and offloaded into storage tanks near the Naknek River. At the time of the report, jet propellant grade 4 was transferred by an aboveground pipeline from the storage area near the Naknek River to tanks near Building 157, located southeast of Building 154. Motor gasoline and diesel fuel were transferred to tanker trucks and delivered to the diesel fuel tanks near the power plant (Building 638). Inventory controls were used to detect leaks from tanks. Building 154 was not mentioned in the Phase I records search (E-S 1985)

In 1988, NPGI prepared a BCP, which listed Tank No. 52 as a 10,000-gallon diesel fuel storage tank in association with Building 154 (NPGI 1988).

In 1992, SAIC conducted several studies for King Salmon Air Station, including a PA, a tank assessment, and a PI/FS. The PA listed an active 10,000-gallon diesel UST (Tank 52). An active 500-gallon diesel AST at Building 154 was also listed (SAIC 1992).

In 1992, the SAIC surveyed existing USTs at King Salmon Air Station, now KSD, to evaluate environmental risks posed by 30 USTs and 33 ASTs at King Salmon, defining to what extent tanks were contributing or could contribute to the contaminated aquifer identified under the IRP. UST 52 at Building 154 was one of the tanks assessed in the investigation. The map prepared with the report shows UST 52 located southwest of Building 154, near the road, with an AST located immediately southeast of Building 154. The installation date of UST 52 was reported to be prior to 1974. The report identified the following concerns with regard to UST 52: neither corrosion protection nor cathodic protection were present, overfill protection was not present, and UST 52 posed a high risk for failure from corrosion due to its age (SAIC 1993). According to the report, because UST 52 contained diesel fuel and was used to store heating oil for use on the premises, the tank was exempt from state and federal regulations requiring release detection, corrosion, spill, and overfill protection (SAIC 1993b).

In 1994, EMCON conducted a limited field investigation (LFI) for several sites at King Salmon Air Station including Building 154 (IRP Site SS020), identifying COCs and levels of contamination, developing conceptual site models, and evaluating potential future actions at each site. The investigation reports Building 154 was located on the north corner of Operations Avenue and Security Road immediately south of the Roads and Grounds Building 155. Approximately 20 ft west of Building 154 between Operations Avenue and the southwest side of the building was a 10,000-gallon heating oil UST (Tank 52). Also in

the vicinity of Building 154 was a 200-gallon waste oil AST which was also identified as a potential contamination source. The LFI discussed sampling activities from 1992 that occurred in the vicinity of the storage tanks. Analytical results for both soil and groundwater revealed DRO detections up to 5,100 mg/kg in subsurface soil samples and 15,900 micrograms per liter (µg/L) in groundwater (EMCON 1995).

In November 1994, after LFI sampling was conducted, the 10,000-gallon UST, Tank 52, was removed and a site assessment was conducted summarizing tank removal activities. Excavation dimensions were 8 ft by 28 ft with a maximum depth of 15 ft. Soil removed during excavation of the UST was placed back into the excavation. Groundwater was not encountered during tank removal although it was estimated at 14 to 20 ft bgs. Soil and groundwater collected during excavation indicated the presence of DRO in soils and groundwater. The full extent of contamination was not determined during the 1994 site assessment and Building 154 was recommended for inclusion in the IRP process, designated as IRP Site SS020 (EMCON 1995).

In 2000, BEES prepared a UST and pipeline monitoring report for King Salmon Air Station. Bioventing systems were installed to treat contamination at seven of the former UST sites, including Building 154, UST 52. To characterize soil contamination levels and provide a baseline for remediation progress, soil and groundwater samples were collected at Building 154. Groundwater was encountered at 19 ft bgs. DRO and GRO were detected in soil samples from all boreholes, with varying concentrations of DRO from 4,720 to 12,100 mg/kg and of GRO from 82.8 to 194 mg/kg at 19 ft bgs. Total BTEX was detected in all boreholes, ranging from 2.4 to 29.7 mg/kg at 19 ft bgs. In groundwater, detections included DRO at 3,790 µg/L, GRO at 110 µg/L, total BTEX at 1.4 µg/L, and total xylenes at 1.4 µg/L (BEES 2001).

In 2002, PVDC and OASIS jointly prepared a remedial action ROD for five sites at King Salmon Air Station, including Site SS020/Building 154. The final remedy for IRP Site SS020/Building 154 consisted of: continued in situ bioventing until remedial action objectives were met; intrinsic remediation of contaminated soils located outside of the areas of influence for the bioventing systems; documentation of institutional controls to minimize human contact with contaminated soil in the base master plan and state land records; annual long-term groundwater monitoring with a 5-year review; soil sampling to confirm achieved cleanup levels. Site SS020 was transferred to the UST compliance program, and cleanup is being implemented by the 611 CES Compliance Section under regulatory oversight by the ADEC UST program. Reportedly the bioventing system has been shut down (Schick 2012; PVDC and OASIS 2002).

In 2012, CH2M HILL performed a PA/SI including visual inspection of the site and surface soil (0-2 ft bgs), subsurface soil (greater than 2 ft bgs), and groundwater sampling using temporary monitoring well points. The visual inspection showed several of the bioventing wells and previously installed monitoring wells at the site. In subsurface soil, DRO was detected above ADEC screening levels (Figure 4-8a and Table 4-8.1). In groundwater, TCE, 2-methylnaphthalene, DRO, RRO, and GRO exceeded screening levels (Figure 4-8b and Table 4-8.2). Additionally, metals in surface soil, subsurface soil, and groundwater were detected above screening levels (Table 4-8.3) (CH2M HILL 2013).

4.8.3 Evaluation of Findings

Because DRO was detected in samples collected at the former tank location at depth between 13 and 17 ft bgs, impacts to soil in the smear zone still appear to be present. Groundwater included detections of DRO, GRO and RRO above ADEC cleanup levels from samples collected directly below the former UST and cross/down gradient of the former UST 52, which is cited as the source. However, previous

investigations also indicated a 200-gallon waste oil AST in the vicinity of Building 154 could have been a potential source of contamination. Waste oil can contain contaminants such as metals, VOCs, and SVOCs, all of which were detected in groundwater at this site. Most metal exceedances in surface and subsurface soil are not typically associated with heating oil and are approximately at or below the BTVs shown in Table 4-8.3. In groundwater, multiple metals exceeded both screening levels as well as BTVs; however, the elevated metals are not typically associated with heating fuel. As contamination at the former UST 52 location is being addressed as Site SS020 under the 611th Compliance Program IRP ROD, Site TU/US-C589 is recommended for closure.

4.8.4 Description of Exposure Pathways, Potential Receptors, and Contaminant Screening

Site TU/US-C589 is within Groundwater Zone 2 in the industrial area of KSD. Potential human receptors are adult workers. Potential human health exposure pathways for adult workers include incidental ingestion of soils, dermal contact with soils, inhalation of indoor and outdoor vapors from subsurface soils and groundwater, inhalation of dust, and ingestion of groundwater. For child and adult residents, additional exposure pathways include ingestion of plants gathered throughout the installation, ingestion of moose or caribou harvests, and ingestion of salmon and trout from Eskimo Creek.

Exposure sources relating to the former heating oil UST 52 are being addressed as Site SS020 under the 611th Compliance Program IRP ROD. Therefore, exposure pathways for soil and groundwater from Site TU/US-C589 are incomplete and no longer pose a risk to human health and the environment.

4.8.5 Justification for Closure

Closure is justified based on the determination no significant risk or threat to human health and the environment exists at Site TU/US-C589 from UST 52. Contamination present at the site above ADEC cleanup levels is either not related to UST 52 or is being addressed under Site SS020 of the 611th Compliance Program IRP ROD under regulatory oversight by the ADEC UST program. Based on these findings, closure is appropriate for Site TU/US-C589.

This page intentionally left blank

Notes:
Charts identify sample depths and analytical suites. A dot signifies at least one analyte was detected above ADEC screening criteria.

Acronyms:
ADEC - Alaska Department of Environmental Conservation

Data Source:
Samples collected during 2012 Preliminary Assessment/Site Inspection.
Imagery: Aerometrics 2012

Legend

- Monitoring Well
- Soil Bore Location
- Former UST 52
- Former Aboveground Storage Tank
- 604 Structure
- Fuel Line
- Wastewater Line
- Water Line
- Electric Line - Overhead
- Electric Line - Underground

Approximate Direction of Groundwater Flow

KSC589DP003				
Parameter Suite	Sample Depth (ft)			
	0-2	5-7.5	7.5-10	10-15
GRO/DRO/RRO	No Exceedances			
VOCs				
SVOCs				
PCB/Pesticides				

KSC589DP001				
Parameter Suite	Sample Depth (ft)			
	0-2	5-7.5	7.5-10	13-15
GRO/DRO/RRO		•		•
VOCs				
SVOCs				
PCB/Pesticides				

KSC589DP002				
Parameter Suite	Sample Depth (ft)			
	0-2	5-7.5	7.5-10	13-15
GRO/DRO/RRO		•	•	
VOCs				
SVOCs				
PCB/Pesticides				

SS017132
132
155
VP-9
154
VP-27
UST 52
VP-8
SS020158
BV-7
AST
VP-28
151
SS021446

1 inch = 30 feet
(11x17 print-out)
N
0 15 30 60 Feet

Closure Report for Nine Compliance Restoration Program Sites
TU/US-C519, TU/US-C517, TU/US-C518, TU/US-C520, TU/US-C522, TU/US-C523, TU/US-C524, TU/US-C589, and TU/US-C592
at King Salmon Divert, King Salmon, Alaska

AFCEC Contract No. FA8903-08-D-8791-0039

Figure 4-8a
Soil Data Exceedance Summary
at SiteTU/US-C589 - UST 52

EA Project No. 1456039

jschwertz Path: C:\DATA\King Salmon\Report\MXD\Site 589.mxd

This page intentionally left blank

Notes:
Charts identify sample depths and analytical suites. A dot signifies at least one analyte was detected above ADEC screening criteria.

Acronyms:
ADEC - Alaska Department of Environmental Conservation

Data Source:
Samples collected during 2012 Preliminary Assessment/Site Inspection.
Imagery: Aerometrics 2012

Legend

- Monitoring Well
- Soil Bore Location
- Former UST 52
- Former Aboveground Storage Tank
- 604 Structure
- Fuel Line
- Wastewater Line
- Water Line
- Electric Line - Overhead
- Electric Line - Underground

Approximate Direction of Groundwater Flow

KSC589DP003	
Parameter Suite	Screen Interval (ft) 13-17
GRO/DRO/RRO	•
VOCs	
SVOCs	•
PCB/Pesticides	

KSC589DP001	
Parameter Suite	Screen Interval (ft) 13-17
GRO/DRO/RRO	•
VOCs	
SVOCs	
PCB/Pesticides	

KSC589DP002	
Parameter Suite	Screen Interval (ft) 13-17
GRO/DRO/RRO	•
VOCs	•
SVOCs	
PCB/Pesticides	

SS017132
132
155
VP-9
154
VP-27
UST 52
VP-8
SS020158
BV-7
AST
VP-28
151
SS021446

N

1 inch = 30 feet
(11x17 print-out)

0 15 30 60 Feet

Closure Report for Nine Compliance Restoration Program Sites
TU/US-C519, TU/US-C517, TU/US-C518, TU/US-C520, TU/US-C522, TU/US-C523, TU/US-C524, TU/US-C589, and TU/US-C592
at King Salmon Divert, King Salmon, Alaska

Figure 4-8b
Groundwater Data Exceedance Summary
at Site TU/US-C589 - UST 52

AFCEC Contract No. FA8903-08-D-8791-0039

EA Project No. 1456039

jschwertz Path: C:\DATA\King Salmon\Report\MXD\Site 589gw.mxd

This page intentionally left blank

TABLE 4-8.1 - Site TU/US-C589 - UST 52
Summary of PA/SI Chemicals Exceeding Screening Levels in Soil (Non-Metals)

	Location		KSC589DP001				KSC589DP002					KSC589DP003			
	Sample ID		KSC589DP001SO01-01	KSC589DP001SO01-02	KSC589DP001SO01-05	KSC589DP001SO01-20	KSC589DP002SO01-01	KSC589DP002SO01-02	KSC589DP002SO01-05	KSC589DP002SO01-20	KSC589DP902SO01-20	KSC589DP003SO01-01	KSC589DP003SO01-02	KSC589DP003SO01-05	KSC589DP003SO01-20
	Sample Depth (ft)		0-2	5-8	8-10	13-15	0-2	5-8	8-10	13-15	13-15	0-2	5-8	8-10	10-15
Analyte	**Screening Level**	**Screening Level Source**													
VOCs (µg/kg)	No Exceedances														
SVOCs (µg/kg)	No Exceedances														
Petroleum Hydrocarbons (mg/kg)	No Exceedances														
Diesel Range Organics (C_{10} to C_{25})	250	F		334		443		499	423						
PCBs/Pesticides (µg/kg)	No Exceedances														

Notes:
A=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B2, Method 2, Ingestion, Under-40 inch zone.
B=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B1, Method 2, Direct Contact, Under-40 inch zone (corrected for additivity noncarcinogen for HQ = 0.1 and carcinogenic risk level of 1x10-6).
C=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B2, Method 2, Inhalation, Under-40 inch zone.
D=ADEC Soil Cleanup Levels (2012), 18 AAC 75.340 Table B1, Method 2, Outdoor Inhalation, Under 40-inch zone (corrected for noncarcinogenic risk of HQ = 0.1 and carcinogenic risk level of 1x10-6).
E=ADEC Soil Cleanup Levels (2012), 18 AAC 75.340 Table B1 and Table B2, Method 2, Migration to Groundwater Under-40 inch zone.
F=1/10 ADEC Groundwater Cleanup Levels (2012), 18 AAC 75.345 Table C adjusted based on the ADEC Cumulative Risk Guidance (ADEC 2008).
µg/kg = Microgram(s) per kilogram mg/kg = Milligram(s) per kilogram
ADEC = Alaska Department of Environmental Conservation PCB = polychlorinated biphenyl
J = The reported result is an estimated value (e.g., the analyte was detected at a concentration outside the quantitation range or a quality control exceedance was identified).

This page intentionally left blank

TABLE 4-8.2 - Site TU/US-C589 - UST 52
Summary of PA/SI Chemicals Exceeding Screening Levels in Groundwater (Non-Metals)

	Location		KSC589DP001	KSC589DP002		KSC589DP003
	Sample ID		KSC58MW001GW01-45	KSC589MW002GW01-45	KSC589MW902GW01-45	KSC589MW003GW01-45
	Sample Depth (ft)		13-17	13-17	13-17	13-17
Analyte	**Screening Level**	**Screening Level Source**				
VOCs (µg/L)						
Trichloroethene (TCE)	0.5	F		0.71	0.72	
SVOCs (µg/L)						
2-Methylnaphthalene	15	F				70.3
Petroleum Hydrocarbons (mg/L)						
Gasoline Range Organics (C6 to C10)	220	F				298
Diesel Range Organics (C10 to C25)	150	F	3,680	712	666	8,970 J
Residual Range Organics (C25 to C36)	110	F	558	310 J	270 J	969
PCBs/Pesticides (µg/kg)	No Exceedances					

Notes:
A=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B2, Method 2, Ingestion, Under-40 inch zone.
B=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B1, Method 2, Direct Contact, Under-40 inch zone (corrected for additivity noncarcinogen for HQ = 0.1 and carcinogenic risk level of 1x10-6).
C=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B2, Method 2, Inhalation, Under-40 inch zone.
D=ADEC Soil Cleanup Levels (2012), 18 AAC 75.340 Table B1, Method 2, Outdoor Inhalation, Under 40-inch zone (corrected for noncarcinogenic risk of HQ = 0.1 and carcinogenic risk level of 1x10-6).
E=ADEC Soil Cleanup Levels (2012), 18 AAC 75.340 Table B1 and Table B2, Method 2, Migration to Groundwater Under-40 inch zone.
F=1/10 ADEC Groundwater Cleanup Levels (2012), 18 AAC 75.345 Table C adjusted based on the ADEC Cumulative Risk Guidance (ADEC 2008).
µg/kg = Microgram(s) per kilogram mg/kg = Milligram(s) per kilogram
ADEC = Alaska Department of Environmental Conservation PCB = polychlorinated biphenyl
J = The reported result is an estimated value (e.g., the analyte was detected at a concentration outside the quantitation range or a quality control exceedance was identified).

TABLE 4-8.3 - Site TU/US-C589 - UST 52
Summary of Metals Exceedances from PA/SI Sampling Compared to Background Threshold Values

Analyte	Units	Total Samples	Total Detections	Total Samples Exceeding Cleanup Level	PAL [1,2]	BTV UPL [5]	BTV UTL [6]	Maximum Detected Concentration
Surface Soil (SS) ≤ 2 Feet Below Ground Surface								
Arsenic	mg/kg	3	3	3	0.45	5.95	6.31	5.68
Cobalt	mg/kg	3	3	3	2.7 [2]	11.9	12.9	8.54
Iron	mg/kg	3	3	3	350 [2]	36,900	39,100	22,800
Manganese	mg/kg	3	3	3	28 [2]	981	1,190	555
Subsurface Soil (SB) > 2 Feet Below Ground Surface								
Arsenic	mg/kg	9	9	9	0.45	4.92	5.35	4.1
Cobalt	mg/kg	9	9	9	2.7 [2]	7.7	8.08	6.83
Iron	mg/kg	9	9	9	350 [2]	32,700	36,500	15,700
Manganese	mg/kg	9	9	9	28 [2]	522	572	420
Analyte	**Units**	**Total Samples**	**Total Detections**	**Total Samples Exceeding Cleanup Level**	**PAL [3,4]**	**BTV UPL [5]**	**BTV UTL [6]**	**Maximum Detected Concentration**
Ground Water (WG)								
Aluminum	µg/L	3	2	1	2,000 [4]	894	1,000	8,270
Antimony	µg/L	3	1	1	0.6	0.12	0.12	5.2 J
Chromium	µg/L	3	1	1	10	0.3	0.3	41.9
Cobalt	µg/L	3	2	1	6 [4]	0.523	0.583	20.7
Iron	µg/L	3	3	2	1,400 [4]	717	717	20,100
Lead	µg/L	3	1	1	1.5	0.027	0.027	2.5 J
Manganese	µg/L	3	3	2	43 [4]	60.3	69.1	1,220 J
Molybdenum	µg/L	3	3	1	10 [4]	0.17	0.17	13 J
Nickel	µg/L	3	2	1	10	0.062	0.062	14.4 J
Thallium	µg/L	3	2	2	0.2	0.17	0.17	4.9 J

Notes:
1. Project Action Level (PAL) is set at the most stringent ADEC Method Two Soil Cleanup level for Under 40-inch Zone (corrected for noncarcinogenic risk of HQ = 0.1 and carcinogenic risk level of 1x10-6.) and Migration to Groundwater (18 AAC 75.341) (ADEC 2012)
2. Analytes has no ADEC cleanup level. The value shown is USEPA Regional Screening Level for Protection of Groundwater.
3. PAL is set to 1/10 ADEC Groundwater Cleanup level (18 AAC 75.345) per ADEC Cumulative Risk Guidance (ADEC 2008)
4. Analyte has no ADEC cleanup level; the value shown is the USEPA Tapwater Regional Screening Level.
5. UPL is the 95% Upper Prediction Limit
6. UTL is the 95% Upper Tolerance Limit with 90% coverage
J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

4.9 SITE TU/US-C592 - UST 560A

4.9.1 Description

Site TU/US-C592 is located in Groundwater Zone 5 on the northwest side of Red Fox Creek, at the King Salmon firefighting and rescue grounds, along the southwestern side of Building 560 (Radar Approach Control [RAPCON] facility) (Figure 1-1). The site formerly contained UST 560a, a non-regulated 500-gallon diesel fuel arctic tank, as shown in Figures 4-9a and 4-9b. According to ADEC's UST Facility Report Database, UST 560a (ADEC Tank ID 3) was removed with permanent closure in 1994 (ADEC 2017a).

4.9.2 Previous Investigation Results

In 1992, SAIC surveyed existing USTs at King Salmon Air Station, now KSD, to evaluate environmental risks posed by 30 USTs and 33 ASTs at King Salmon, defining to what extent tanks were contributing or could contribute to the contaminated aquifer identified under the IRP. UST 560a was evaluated in the investigation as not having spill, overflow, or corrosion protection and no release protection, however since UST 560a was identified as storing heating oil for use on the premises; the tank was exempt from state and federal regulations requiring said protections. Several recommendations for reducing environmental risk at Tank 560a were suggested, including: verifying ADEC required manual tank gauging practices; installing automatic line leak detectors, implementing quarterly line tightness testing or ADEC-approved monthly monitoring; installing or reactivating tank and pipeline corrosion protection; and installing spill and overfill controls (SAIC 1993b).

In 1993, NPGI utilized the 1992 SAIC study to develop a MAP summarizing the status of the King Salmon ERP and ECP, and to develop a strategy for implementing response actions necessary to protect human health and the environment (NPGI 1993). The MAP integrated and coordinated activities under both the IRP and the ECP and identified a total of 30 USTs, 17 of which were scheduled for removal in 1994 as part of a compliance project. Removed USTs would be replaced by ASTs. UST activities were being conducted under the ADEC UST program. Tank 560a was removed during these 1994 compliance activities (NPGI 1993).

In May 1994, UST 560a was removed and a UST site assessment and preliminary risk evaluation were completed. According to the ADEC incident report, contamination in soil was encountered through the full depth of excavation, reportedly from the fill pipe. Contamination was estimated to be approximately a 10- to 5,500-gallon diesel fuel overfill release. Results from seven field-screening samples indicated DRO detections above the UST at higher concentrations (4,500 mg/kg) than below the tank (ranging from 54 to 1,900 mg/kg), with the greatest DRO concentration detected above the UST at the tank fill pipe approximately 1.5 ft bgs. Following excavation of 8 cubic yards of diesel-contaminated soil, Tank 560a, in "like-new" condition, was cleaned and disposed of, piping capped and abandoned, and the excavation backfilled with clean soils (BEES 2001; BESC 1998). Tank 560a was not treated as a LUST as the tank was not regulated and used for on-premises consumption of heating oil, an exemption allowed under EPA and state regulations (18 AAC 78.005; 40 Code of Federal Regulations 280.12[b]).

In 2012, CH2M HILL performed a PA/SI including visual inspection of the site and surface soil (0-2 ft bgs), subsurface soil (greater than 2 ft bgs), and groundwater sampling using temporary monitoring well points. The visual inspection showed the footprint of former Tank 560a located off the southwestern side of

existing Building 560. The surrounding area consisted of a gravel pad overgrown with vegetation. No surface staining or stressed vegetation was noted in the area of the former UST or along the pipeline traveling northwest of the site (CH2M HILL 2013). In surface and subsurface soils, PCE was detected above ADEC screening levels (Figure 4-9a and Table 4-9.1). In groundwater, no exceedances of VOCs, SVOCs, or TPH were observed (Figure 4-9b and Table 4-9.2). Metals in surface soil, subsurface soil, and groundwater were detected above screening levels (Table 4-1.3) (CH2M HILL 2013).

4.9.3 Evaluation of Findings

Detections of PCE in soils occurred between 0-4 ft bgs, a depth that is not associated with potential leaks from UST-560a. PCE is also not associated with diesel fuel and is unlikely to have originated from UST-560a. Other than iron in surface and subsurface soils, all soil metals exceedances are approximately at or below BTVs as shown in Table 4-9.3. Iron is significantly higher than background but is likely associated with fill material. In groundwater, only iron exceeds both USEPA screening levels and BTVs; however, iron is not regulated by ADEC cleanup levels, with near BTV detection. Additionally, iron is not associated with diesel fuel. As there are no recent DRO exceedances in groundwater or soil, no VOCs above screening levels in groundwater, and PCE is not associated with diesel fuel, Site TU/US-C592 is recommended for closure.

4.9.4 Description of Exposure Pathways, Potential Receptors, and Contaminant Screening

Site TU/US-C592 is within Groundwater Zone 5 at KSD. Potential human health exposure pathways include incidental human ingestion, dermal contact with soil, and groundwater. Biota of concern include terrestrial and aquatic flora and fauna. The area surrounding Site TU/US-C592 includes palustrine scrub-shrub wetland which is available as forage. Small mammals and birds are the primary terrestrial group receptors. Small mammals are abundant onsite and offsite, relatively mobile, and widely distributed. Ground-feeding birds and mammals are potentially at risk from ingestion of food and soil contaminated with petroleum compounds. Fish, if present in Red Creek may also be exposed to contaminants directly or indirectly, through exposure to contaminated surface water and/or sediments. Bald eagles (*Haliaeetus leucocephalus*), peregrine falcons (*Falco peregrinus*), and osprey (*Pandion haliaetus*) also occur in the area and are potential ecological receptors because these species forage fish (U.S. Fish and Wildlife Service 2012)

Based on sampling results from the 2012 PA/SI, and the comparison of metals detections to 2015 BTVs, there are no exposure sources relating to the former diesel UST 592. Therefore, exposure pathways for soil and groundwater are incomplete and no longer pose a risk to human health and the environment.

4.9.5 Justification for Closure

Closure is justified based on the determination that no significant risk or threat to human health and the environment exists at Site TU/US-C592 from UST 560a. The most recent field investigation revealed no soil or groundwater contamination exists at the site above ADEC cleanup levels related to diesel fuel formerly stored within UST 560a (Tables 4-9.1 and 4-9.2) (CH2M HILL 2013). Contamination present at the site above ADEC cleanup levels is not related to UST 560a at Site TU/US-C592 and should be evaluated under the area-wide Groundwater Zone 5 ROD. Based on these findings, closure is appropriate for Site TU/US-C592.

Notes:
Charts identify sample depths and analytical suites. A dot signifies at least one analyte was detected above ADEC screening criteria.

Acronyms:
ADEC - Alaska Department of Environmental Conservation

Data Source:
Samples collected during 2012 Preliminary Assessment/Site Inspection.
Imagery: Aerometrics 2012

KSC592DP002

Parameter Suite	Sample Depth (ft)			
	0-2	2-4	6-8	9-11
GRO/DRO/RRO				
VOCs		•		
SVOCs				

KSC592DP001

Parameter Suite	Sample Depth (ft)			
	0-2	2-4	6-8	9-11
GRO/DRO/RRO				
VOCs	•			
SVOCs				

KSC592DP003

Parameter Suite	Sample Depth (ft)			
	0-2	2-4	6-8	9-11
GRO/DRO/RRO	No Exceedances			
VOCs				
SVOCs				

Approximate Direction of Groundwater Flow

560

UST 560a

563

LF006435

435

FT01-FD8

FT01-SVE2

Legend

- Monitoring Well
- Soil Bore Location
- UST 560a
- 604 Structure
- Fuel Line
- Wastewater Line
- Water Line
- Electric Line - Overhead
- Electric Line - Underground

jschwertz Path: C:\DATA\King Salmon\ReportMXD\Site_592.mxd

N

1 inch = 30 feet
(11x17 print-out)

0 15 30 60 Feet

Closure Report for Nine Compliance Restoration Program Sites
TU/US-C519, TU/US-C517, TU/US-C518, TU/US-C520, TU/US-C522,
TU/US-C523, TU/US-C524, TU/US-C589, and TU/US-C592
at King Salmon Divert, King Salmon, Alaska

AFCEC Contract No. FA8903-08-D-8791-0039

Figure 4-9a
Soil Data Exceedance Summary
at Site TU/US-C592 - UST 560a

EA Project No. 1456039

This page intentionally left blank

Notes:
Charts identify sample depths and analytical suites. A dot signifies at least one analyte was detected above ADEC screening criteria.

Acronyms:
ADEC - Alaska Department of Environmental Conservation

Data Source:
Samples collected during 2012 Preliminary Assessment/Site Inspection.
Imagery: Aerometrics 2012

KSC592DP002	
Parameter Suite	**Screen Interval (ft)**
	12-15
GRO/DRO/RRO	**No Exceedances**
VOCs	
SVOCs	

KSC592DP001	
Parameter Suite	**Screen Interval (ft)**
	12-15
GRO/DRO/RRO	**No Exceedances**
VOCs	
SVOCs	

KSC592DP003	
Parameter Suite	**Screen Interval (ft)**
	12-15
GRO/DRO/RRO	**No Exceedances**
VOCs	
SVOCs	

Approximate Direction of Groundwater Flow

560

563

UST 560a

LF006435 435

FT01-FD8

FT01-SVE2

Legend

- Monitoring Well
- Soil Bore Location
- UST 560a
- 604 Structure
- Fuel Line
- Wastewater Line
- Water Line
- Electric Line - Overhead
- Electric Line - Underground

jschwertz Path: C:\DATA\King Salmon\Report\MXD\Site 592gw.mxd

1 inch = 30 feet
(11x17 print-out)

N

0 15 30 60 Feet

Closure Report for Nine Compliance Restoration Program Sites
TU/US-C519, TU/US-C517, TU/US-C518, TU/US-C520, TU/US-C522, TU/US-C523, TU/US-C524, TU/US-C589, and TU/US-C592
at King Salmon Divert, King Salmon, Alaska

AFCEC Contract No. FA8903-08-D-8791-0039

Figure 4-9b
Groundwater Data Exceedance Summary at Site TU/US-C592 - UST 560a

EA Project No. 1456039

This page intentionally left blank

TABLE 4-9.1 - Site TU/US-C592 - UST 560a
Summary of PA/SI Chemicals Exceeding Screening Levels in Soil (Non-Metals)

	Location		KSC592DP001				KSC592DP002					KSC592DP003			
	Sample ID		KSC592DP001SO01-01	KSC592DP001SO01-02	KSC592DP001SO01-05	KSC592DP001SO01-20	KSC592DP002SO01-01	KSC592DP002SO01-02	KSC592DP902SO01-02	KSC592DP002SO01-05	KSC592DP002SO01-20	KSC592DP003SO01-01	KSC592DP003SO01-02	KSC592DP003SO01-05	KSC592DP003SO01-20
	Sample Depth (ft)		0-2	2-4	6-8	9-11	0-2	2-4	2-4	6-8	9-11	0-2	2-4	6-8	9-11
Analyte	**Screening Level**	**Screening Level Source**													
VOCs (µg/kg)	No Exceedances														
Tetrachloroethene (PCE)	24	E	40.2					25.4 J							
SVOCs (µg/kg)	No Exceedances														
Petroleum Hydrocarbons (mg/kg)	No Exceedances														

Notes:
A=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B2, Method 2, Ingestion, Under-40 inch zone.
B=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B1, Method 2, Direct Contact, Under-40 inch zone (corrected for additivity noncarcinogen for HQ = 0.1 and carcinogenic risk level of 1x10-6).
C=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B2, Method 2, Inhalation, Under-40 inch zone.
D=ADEC Soil Cleanup Levels (2012), 18 AAC 75.340 Table B1, Method 2, Outdoor Inhalation, Under 40-inch zone (corrected for noncarcinogenic risk of HQ = 0.1 and carcinogenic risk level of 1x10-6).
E=ADEC Soil Cleanup Levels (2012), 18 AAC 75.340 Table B1 and Table B2, Method 2, Migration to Groundwater Under-40 inch zone.
F=1/10 ADEC Groundwater Cleanup Levels (2012), 18 AAC 75.345 Table C adjusted based on the ADEC Cumulative Risk Guidance (ADEC 2008).
µg/kg = Microgram(s) per kilogram mg/kg = Milligram(s) per kilogram
ADEC = Alaska Department of Environmental Conservation
J = The reported result is an estimated value (e.g., the analyte was detected at a concentration outside the quantitation range or a quality control exceedance was identified).

This page intentionally left blank

TABLE 4-9.2 - Site TU/US-C592 - UST 560a
Summary of PA/SI Chemicals Exceeding Screening Levels in Groundwater (Non-Metals)

	Location		KSC592DP001	KSC592DP002	KSC592DP003
	Sample ID		KSC592MW001GW01-45	KSC592MW002GW01-45	KSC592MW003GW01-45
	Sample Depth (ft)		12-15	12-15	12-15
Analyte	**Screening Level**	**Screening Level Source**			
VOCs (µg/L)	No Exceedances				
SVOCs (µg/L)	No Exceedances				
Petroleum Hydrocarbons (mg/L)	No Exceedances				

Notes:
A=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B2, Method 2, Ingestion, Under-40 inch zone.
B=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B1, Method 2, Direct Contact, Under-40 inch zone (corrected for additivity noncarcinogen for HQ = 0.1 and carcinogenic risk level of 1x10-6).
C=ADEC Soil Cleanup Levels (2012), 18 AAC 75.341 Table B2, Method 2, Inhalation, Under-40 inch zone.
D=ADEC Soil Cleanup Levels (2012), 18 AAC 75.340 Table B1, Method 2, Outdoor Inhalation, Under 40-inch zone (corrected for noncarcinogenic risk of HQ = 0.1 and carcinogenic risk level of 1x10-6).
E=ADEC Soil Cleanup Levels (2012), 18 AAC 75.340 Table B1 and Table B2, Method 2, Migration to Groundwater Under-40 inch zone.
F=1/10 ADEC Groundwater Cleanup Levels (2012), 18 AAC 75.345 Table C adjusted based on the ADEC Cumulative Risk Guidance (ADEC 2008).
µg/kg = Microgram(s) per kilogram mg/kg = Milligram(s) per kilogram
ADEC = Alaska Department of Environmental Conservation
J = The reported result is an estimated value (e.g., the analyte was detected at a concentration outside the quantitation range or a quality control exceedance was identified).

TABLE 4-9.3 - Site TU/US-C592 - UST 560a
Summary of Metals Exceedances from PA/SI Sampling Compared to Background Threshold Values

Analyte	Units	Total Samples	Total Detections	Total Samples Exceeding Cleanup Level	PAL [1,2]	BTV UPL [5]	BTV UTL [6]	Maximum Detected Concentration
Surface Soil (SS) ≤ 2 Feet Below Ground Surface								
Arsenic	mg/kg	3	3	3	0.45	5.95	6.31	4.78
Cobalt	mg/kg	3	3	3	2.7 [2]	11.9	12.9	8.22
Iron	mg/kg	3	3	3	350 [2]	36,900	39,100	186,000
Manganese	mg/kg	3	3	3	28 [2]	981	1,190	355
Subsurface Soil (SB) > 2 Feet Below Ground Surface								
Arsenic	mg/kg	9	9	9	0.45	4.92	5.35	5.08
Cobalt	mg/kg	9	9	9	2.7 [2]	7.7	8.08	7.93
Iron	mg/kg	9	9	9	350 [2]	32,700	36,500	223,000
Manganese	mg/kg	9	9	9	28 [2]	522	572	479
Analyte	**Units**	**Total Samples**	**Total Detections**	**Total Samples Exceeding Cleanup Level**	**PAL [3,4]**	**BTV UPL [5]**	**BTV UTL [6]**	**Maximum Detected Concentration**
Ground Water (WG)								
Aluminum	µg/L	3	3	0	2,000 [4]	894	1,000	1,900
Iron	µg/L	3	3	1	1,400 [4]	717	717	1,840
Manganese	µg/L	3	3	2	43 [4]	60.3	69.1	69.4

Notes:
1. Project Action Level (PAL) is set at the most stringent ADEC Method Two Soil Cleanup level for Under 40-inch Zone (corrected for noncarcinogenic risk of HQ = 0.1 and carcinogenic risk level of 1x10-6.) and Migration to Groundwater (18 AAC 75.341) (ADEC 2012)
2. Analytes has no ADEC cleanup level. The value shown is USEPA Regional Screening Level for Protection of Groundwater.
3. PAL is set to 1/10 ADEC Groundwater Cleanup level (18 AAC 75.345) per ADEC Cumulative Risk Guidance (ADEC 2008)
4. Analyte has no ADEC cleanup level; the value shown is the USEPA Tapwater Regional Screening Level.
5. UPL is the 95% Upper Prediction Limit
6. UTL is the 95% Upper Tolerance Limit with 90% coverage
J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

5.0 SUMMARY OF OPERATIONS AND MAINTENANCE

Operations and maintenance activities are not required because site closure is recommended.

This page intentionally left blank

6.0 PROTECTIVENESS DECLARATION

All completion requirements for Sites TU/US-C517, TU/US-C518, TU/US-C520, TU/US-C522 (CS DB Hazard ID 23248), TU/US-C523 (CS DB Hazard ID 23354), TU/US-C524, TU/US-C589, and TU/US-C592 at KSD have been met as specified in ADEC Regulations 18 AAC 75 (ADEC 2012) and 18 AAC 78 (ADEC 2015b) specifically:

- The selected remedy of site closure achieves state requirements that are applicable or relevant and appropriate

- Contaminant levels at the site have been determined to either present no significant threat to human health and the environment, or are not associate with the sites listed above; thus, no cleanup activities are required for the sites listed.

Based on the existing conditions and the information available, it has been determined by ADEC that Sites TU/US-C517, TU/US-C518, TU/US-C520, TU/US-C522, TU/US-C523, TU/US-C524, TU/US-C589, and TU/US-C592 do not pose a significant threat to human health and the environment. Therefore, ADEC has determined "closed" designation under ADEC regulations 18 AAC 75 is appropriate and all corrective action required by 18 AAC 78 has been completed. These sites are declared formally closed.

This page intentionally left blank

7.0 REFERENCES

Alaska Department of Environmental Conservation (ADEC). 2008. Cumulative Risk Guidance. June.

ADEC. 2011a. *Contaminated Sites Program, Alaska Underground Storage Tank Facility Summary Report, Facility: 540 USAF King Salmon Airport Online*. http://dec.alaska.gov/applications/spar/USTFacilitySearch/fac_report.asp?FacilityID=540. Accessed June 2014.

ADEC. 2011b. *Contaminated Sites Program, Alaska Cleanup Chronology Report for King Salmon Airport - Bldg #160 Combat Alert Cell Site Report,* http://dec.alaska.gov/Applications/SPAR/CCReports/Site_Report.aspx?Hazard_ID=23248. Accessed June _, 2014.

ADEC. 2011c. *Contaminated Sites Database Cleanup Chronology Report for King Salmon Airport SS21 Refueler Shop.* http://146.63.9.103/Applications/SPAR/CCReports/Site_Report.aspx?Hazard_ID=23354. Accessed November 10, 2011.

ADEC. 2012. *18 AAC 75, Oil and Other Hazardous Substances Pollution Control*. 8 April 2012.

ADEC. 2015a. ADEC Facility #540-USAF King Salmon AS, *Notice of Non-Compliance #2919*, Permanently Close Substandard UST System. 21 August.

ADEC. 2015b. *18 AAC 78, Underground Storage Tanks.* 17 June 2015.

ADEC. 2016. ADEC Facility #540-USAF King Salmon AS, *Notice of Non-Compliance #2919*, Request for Extension of UST Closure. 26 January.

ADEC. 2017a. Division of Spill Prevention and Response, Prevention Preparedness and Response, Underground Storage Tank Database Facility Search, Facility ID: 540, USAF King Salmon Airport Online. http://dec.alaska.gov/Applications/SPAR/TankStorage/USTSearch.aspx. Accessed January 2017.

ADEC 2017b. *Contaminated Sites Program, Site Report: King Salmon Combat Alert Cell.* http://dec.alaska.gov/Applications/SPAR/PublicMVC/CSP/SiteReport/1581. Accessed January 2017.

ADEC 2017c. *Contaminated Sites Program, Site Report: King Salmon Air Station SS21.* http://dec.alaska.gov/Applications/SPAR/PublicMVC/CSP/SiteReport/506. Accessed January 2017.

Air Force Civil Engineer Center (formerly Air Force Center for Engineering and the Environment) (AFCEC). 1996. *Final Installation-wide Environmental Baseline Survey, King Salmon Air Force Station, Alaska*. June.

AFCEC. 2011. Statement of Work for Preliminary Assessment/Site Inspection (PA/SI) for Multiple PACAF Installations: Cape Lisburne LRRS, Cape Newenham, Eielson AFB, Indian Mountain LRRS, King Salmon AS, Tatalina LRRS, and Wake Island Airfield; and Compliance Site Evaluation (CSE) for Eareckson AS. Contract Number: FA8903-08-D-8769; Task Order Number: 0314.

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. *ToxFAQs™ for n-Nitrosodi-n-propylamine.* http://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=1004&tid=211. Updated July 1999. Accessed August 22, 2016.

Bristol Environmental and Engineering Services Corporation (BEES). 2001. *Final Underground Storage Tank and Pipeline Monitoring Report, King Salmon Airport, King Salmon, Alaska*. April.

Bristol Environmental Services Corporation (BESC). 1998. Letter Report to ADEC – *King Salmon Underground Storage Tanks – Summary of UST Historical Site Historical Information*. April.

CH2M HILL. 2004. *Project Work Plan, Building 300 Oil/Water Separator Repair/Upgrade, King Salmon Airport, King Salmon, Alaska*. September.

CH2M HILL. 2013. *Final Preliminary Assessment/Site Inspection Report for Nine Compliance Sites at King Salmon Air Station, Alaska.* March.

EA Engineering, Science and Technology, Inc. PBC. (EA). 2015. *Background Concentration Report for Nine Compliance Restoration Program Sites at King Salmon Divert, King Salmon Divert, Alaska.* April.

EMCON Alaska Incorporated (EMCON). 1995. *Installation Restoration Program King Salmon Airport, King Salmon, Alaska: Remedial Investigation/Feasibility Study at Twelve Sites Final Feasibility Study Report*. May.

Engineering-Science, Inc. 1985. *Installation Restoration Program Phase I: Records Search AAC-Northern Region*. September.

Hart Crowser, Inc. 1997. *Management Action Plan King Salmon Airport, King Salmon, Alaska*. June.

Nakata Planning Group Incorporated (NPGI). 1988. Base Comprehensive Plan King Salmon Airport, Alaska. November.

NPGI. 1993. *Management Action Plan King Salmon Airport, King Salmon, Alaska*. September.

Paug-Vik Development Corporation (PVDC). 2001. *Installation Restoration Program Management Action Plan, Final Update*. October.

PVDC. 2007. *Final Technical Report, 2006 Long-Term Monitoring, RAPCON and Red Fox Creek Monitoring, King Salmon Air Station, Alaska*. October 2.

PVDC. 2008. *Final 2007 Comprehensive Environmental Monitoring Report, Volume I, King Salmon Air Station, Alaska*.

PVDC and OASIS Environmental Incorporated (OASIS). 2002. *Record of Decision for Final Remediation Action Sites: Groundwater Zone OT028 (Zone 2), Waste Accumulation Area 3 (SS017), Eskimo Creek Dump (SS022), Refueler Shop (SS021), Old Power Plant Building (SS020).* December.

Schick, Jonathan/ADEC Project Manager. 2012. Personal communication with Jeremy Blei/CH2M HILL. April 3.

Science Applications International Corporation (SAIC). 1992. *Final Preliminary Assessment King Salmon Airport, King Salmon, Alaska*. July.

SAIC. 1993a. *Investigation of Current Practices, Under and Aboveground POL Storage Tank Operations, King Salmon Airport, Alaska*. April.

SAIC. 1993b. *Final Preliminary Investigation/Feasibility Study Eleven Sites at King Salmon Airport, King Salmon, Alaska*. September.

U.S. Army Corps of Engineers (USACE). 1986. King Salmon Airport, Alaska, Fire Station Civil Utilities Plan, Inventory No. DACA85-86-B-0031. July 3.

USACE. 1988. *King Salmon Airport, Alaska, Communications Facility Site Plan, Legend, & Schedules Drawing*. Inventory No. DACA85-89-B-0001. August 22.

U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM). 2003. Draft Storage Tank and Oil/Water Separator Evaluation U.S. Air Force Radar Sites and Forward Operating Locations, Alaska. March.

United States Air Force (USAF). 2000. Implementation of Long-Term Groundwater Monitoring and Intrinsic Remediation Assessment of King Salmon Airport Groundwater Zones 2 and 4. November 2000.

USAF. 2006. *Final First Five-Year Review, OT027 – Ground Water Zone 1, OT028 – Ground Water Zone 2, OT029 – Ground Water Zone 3, OT030 – Ground Water Zone 4, OT032 – Groundwater Zone 6, King Salmon Air Station, Alaska*. September.

USEPA. 2008. *National Functional Guidelines for Superfund Organic Methods Data Review. Final.* June.

U.S. Fish and Wildlife Service. 2012. Wetlands Mapper Online. Available at http://107.20.228.18/Wetlands/WetlandsMapper.html. Accessed September 26, 2012.

URS Group, Inc. (URS). 2009. *Volume II, Final Evaluation Report, Air Force Compliance Clean-Up Sites, Identification and Evaluation of Defense Restoration Account (DERA) Eligibility for AFCEC, Multiple Locations*. September.

URS. 2010. *Final Evaluation Report, Volume II, Air Force Compliance Clean-Up Sites, Identification and Evaluation of Defense Environmental Restoration Account (DERA) Eligibility for AFCEC, Multiple Locations*. July.

Waythomas, C.F. 1994. *Overview of Environmental and Hydrogeologic Conditions at King Salmon, Alaska*.

This page intentionally left blank