DECLARATION OF PROJECT CLOSEOUT DECISION
FOR
YAKUTAT AIR BASE FORMERLY USED DEFENSE SITE
CON/HTRW PROJECT F10AK0606-09
ARMY AIRWAYS COMMUNICATIONS SYSTEM
RECEIVER STATION POWERHOUSE – NO. 1202 [AACS]
YAKUTAT, ALASKA

STATEMENT OF BASIS

Authority for the Defense Environmental Restoration Program for Formerly Used Defense Sites (DERP-FUDS) for Containerized Hazardous, Toxic, or Radioactive Waste (CON/HTRW) projects is derived from the Defense Environmental Restoration Program, 10 United States Code (USC) 2701-2707. The decision to close out the CON/HTRW project F10AK0606-09 is based on the results of removal activities completed by the U.S. Army Corps of Engineers – Alaska District (USACE-AK) in 1984, and the remedial investigations by Shannon and Wilson in 2010, and AECOM in 2014.

SITE DESCRIPTION AND HISTORY

In 1995, an Inventory Project Report (INPR) was completed and a Hazardous, Toxic, or Radioactive Waste (HTRW) project, F10AK0606-02, was approved for the Yakutat Air Base. As part of the 1995 INPR, the Findings and Determination of Eligibility stated that the site was formerly used by the Department of Defense (DOD) and eligible for cleanup under the DERP-FUDS. In 2015, a revised INPR was completed and twelve new CON/HTRW projects (F10AK0606-08 through -19) were authorized, including F10AK0606-09, the Army Airways Communications System (AACS) Receiver Station Powerhouse – No. 1202.

The approximate site location is 59.504886 degrees North Latitude, 139.71409 degrees West Longitude; Section 7, Township 28 South, and Range 34 East, Copper River Meridian. The AACS is located on United States Forest Service (USFS) land to the north of Cannon Beach Road (Figure 1).

According to the 1944 *Engineer Narrative Report*, the AACS Remote Receiver Station Powerhouse was a 24 feet x 60 feet Quonset, occupied jointly by the AACS, Alaska Communications System, and CAA. Based on the 1984 Environmental Restoration Defense Account Debris Cleanup and Site Restoration Design, buildings in the AACS area were demolished, buried in excavation pits, and covered with soil (USACE 1984). Currently, the only evidence of structures at the AACS are two concrete tank saddles at the site center and two rusted drums located in standing water in a low-lying marsh area at the northern edge of the site.

DESCRIPTION OF THE DECISION

Based on the results of the removal action and remedial investigation efforts completed between 1984 and 2014, and the risk evaluation, USACE has determined that no further action is required at the AACS (F10AK0606-09) and project closeout is protective of public health, welfare, and the environment. The Alaska Department of Environmental Conservation (ADEC)

reviewed the remedial investigation reports and concurred with the conclusions and recommendations. This AACS project closeout decision was made in coordination with ADEC.

DECLARATION

In accordance with the Defense Environmental Restoration Program for Formerly Used Defense Sites, the U.S. Army Engineer District, Alaska has completed all CON/HTRW activities at the AACS (F10AK0606-09), in Yakutat, Alaska. This Declaration of Project Closeout Decision supports the conclusion that the detected chemicals of concern do not pose unacceptable risk to human health or the environment. No further CON/HTRW actions are required by the DOD at this project location. This decision may be reviewed and modified in the future if any new information becomes available indicating the presence of eligible CON/HTRW that may cause an unacceptable risk to human health or the environment.

This Declaration of Project Closeout Decision has been prepared and approved by the undersigned in accordance with the FUDS Program Policy, Engineer Regulation (ER) 200-3-1, May 10, 2004.

FOR: Jason Brooks Date 8/28/17

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REGULATORY REVIEW AND CONCURRENCE

The State of Alaska, through the Department of Environmental Conservation, agrees this F10AK0606-09 - Army Airways Communications System (AACS) Receiver Station Powerhouse CON/HTRW project closure is consistent with state cleanup requirements. The decision may be reviewed and modified in the future if information becomes available that indicates the presence of contaminants or waste that may cause unacceptable risk to human health or the environment.

Kimberly DeRuyter Date 9/1/17

Kimberly DeRuyter
Environmental Program Manager
Alaska Department of Environmental Conservation

United States Army
Corps of Engineers

Formerly Used Defense Sites Program

Project Closeout Report

Containerized Hazardous, Toxic, or Radioactive Waste Project #F10AK0606-09

Army Airways Communications System Receiver Station Powerhouse – No. 1202 (AACS)

Yakutat Air Base Formerly Used Defense Site
Yakutat, Alaska

August 2017

Prepared By:
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1.0 INTRODUCTION

The Defense Environmental Restoration Program for Formerly Used Defense Sites (DERP-FUDS) authorizes the cleanup of contamination resulting from past military activities at sites no longer owned by the Department of Defense (DOD). In 1995, an Inventory Project Report (INPR) was completed and a Hazardous, Toxic, or Radioactive Waste (HTRW) project, F10AK0606-02, was created for the Yakutat Air Base. In 2015, a revised INPR was completed and twelve new CON/HTRW projects were authorized (USACE 2015), including F10AK0606-09, the Army Airways Communications System (AACS) Receiver Station Powerhouse – No. 1202. The AACS was formerly used by the DOD and is eligible for cleanup under the DERP-FUDS.

The United States Army Corps of Engineers (USACE) is an agent for the Department of Defense and has been assigned the responsibility of coordinating activities at Formerly Used Defense Sites. This Project Closeout Report is issued by the United States Army Corps of Engineers, Alaska District (USACE-AK); the lead agency for the Yakutat Air Base FUDS. Based on the 1984 cleanup activities, and results of environmental investigations conducted in 2010 and 2014, the AACS site is recommended for project closeout and no further action status.

2.0 SUMMARY OF SITE CONDITIONS

2.1 Site Location

The City of Yakutat, Alaska is approximately 225 miles northwest of Juneau and 380 miles southeast of Anchorage, Alaska. Located at the mouth of Yakutat Bay, the community is bounded by the Wrangell-Saint Elias Mountains and Yakutat Bay to the north, the Tongass National Forest to the south and east, and the Gulf of Alaska to the west. The approximate site location is 59.504886 degrees North Latitude, 139.71409 degrees West Longitude; Section 7, Township 28 South, and Range 34 East, Copper River Meridian. The AACS is located on United States Forest Service (USFS) land to the north of Cannon Beach Road (Figure 1). The site is listed as Alaska Department of Environmental Conservation (ADEC) HAZARD_ID 26286.

2.2 Former Yakutat Air Base History

United States (U.S.) military interest in Yakutat began by Executive Order in 1929 with the creation of the Yakutat Bay Naval Reservation. However, occupation was not set in motion until 1939 with a proposal by the Civil Aeronautics Administration (CAA), now known as the Federal Aviation Administration, to develop a landing field. The War Department acquired 46,083 acres from the U.S. Department of the Interior, U.S. Department of the Navy, and the U.S. Department of Commerce to establish an "Auxiliary Landing Field and Staging Area." Runway construction began in 1940, and with the arrival of the first troops in October of that year, the Yakutat Landing Field was activated. In September 1942, the Yakutat Naval Base was established as a "Naval Air Facility," and

upon base completion in February 1943, was re-designated as a "Naval Auxiliary Air Facility." This small naval facility included a Seaplane Base.

Because of its strategic geographic location, the Yakutat Air Base was intended as an advanced airfield supporting pursuit and bombardment aircraft against Japanese invasion forces. However, as western Aleutian bases expanded and the Japanese were stopped on Attu and Kiska, its military value diminished significantly and no aircraft were permanently assigned. Instead, the base served as a ferrying post and temporary station for aircraft squadrons and as a refueling stop between the 48 contiguous states and points in Alaska. In December 1943, after the Japanese were expelled from the Aleutians, military activities were gradually reduced with personnel and equipment being transferred elsewhere.

Completed in June 1943, the Air Base was placed on caretaker status less than a year later in April 1944. In December 1945, it was declared surplus to military requirements and operation of the former Army airfield was transferred to the CAA. Improvements, equipment, and materials, not transferred to CAA, were declared by the War Department to the War Assets Administration for disposal in June 1948, pursuant to the Surplus Property Act of 1944.

Beginning in 1946, ownership of the air base property was relinquished and retransferred to the Department of the Interior, Bureau of Land Management (Tract B containing 42,437 acres - in two portions: July 1946 and March 1947), the Department of Commerce (Tract C, 147 acres – November 1948), and the Department of the Navy (Tract A, 3,500 acres – March 1949). In 1953, the Yakutat Bay Naval Reservation was revoked, which withdrew 266 acres for the CAA (now known as the Federal Aviation Administration), and returned the remainder to the Tongass National Forest. The USACE conducted cleanup operations around Yakutat in 1984 and most of the remaining World War II facilities were removed at that time.

The AACS contained the Remote Receiver Station Powerhouse - No. 1202, which a 1944 Engineer Narrative Report described as “a 24 feet x 60 feet Quonset, occupied jointly by the AACS, Alaska Communications System, and CAA.” This site was labeled AACS “Transmitter” on some maps and referred to as the “AACS Transmitter Station” in the 2010 Supplemental RI (S&W 2012). According to the 1984 Environmental Restoration Defense Account Debris Cleanup and Site Restoration Design, buildings in the AACS area were demolished, buried in excavation pits, and covered with soil (USACE 1984).

Currently, the only evidence of structures at the AACS are two concrete tank saddles at the site center and two rusted drums located in standing water in a low-lying marsh area at the northern edge of the site. This appears to be the northern surface water extent leading to an overflow ditch that parallels the west side of the site access trail. There is little to no flow in this ditch near the site. Another stream flowing from north to south parallels the east side of the access trail, but continues north away from the site near the AACS entrance.

3.0 REMEDIAL ACTIVITIES

3.1 2010 Remedial Investigation

During a 2010 Remedial Investigation (RI), surface soil, sediment, surface water, and groundwater samples were collected. One surface soil sample had diesel range organics (DRO) above the ADEC Method Two cleanup level (230 milligrams per kilogram [mg/kg]) at a concentration of 706 mg/kg. Barium was detected in surface water at a concentration of 0.021 milligrams per liter (mg/L), which exceeded the 0.0039 mg/L National Oceanic and Atmospheric Administration (NOAA) Screening Quick Reference Table (SQuiRT) screening level. Constituent concentrations detected in groundwater were below the applicable cleanup levels (S&W 2012).

3.2 2014 RI - Surface Water Barium

In 2014, a Supplemental RI was conducted. Surface water samples were collected at locations onsite, upgradient, and downgradient. All barium results were at concentrations below the Alaska Water Quality Standards (WQS) human health criterion for drinking water (2.0 mg/L). Values protective of freshwater aquatic life have not been promulgated through the WQS. The potential ecological risk for barium in surface water was previously evaluated using the NOAA SQuiRT screening criteria. All five sample locations had concentrations above the NOAA SQuiRT chronic value (0.0039 mg/L), but below the acute value (0.110 mg/L).

Total and dissolved barium results indicate that the barium is in the dissolved phase and is not present as suspended particulates. Barium concentrations in the on-site sample (0.017 mg/L) are similar, but slightly lower than those detected upgradient (0.026 to 0.030 mg/L) and downgradient (0.019 to 0.024 mg/L). While the concentrations are fairly consistent, the highest are located upgradient indicating that the FUDS is not a contributing barium source and concentrations likely reflect natural conditions (AECOM 2016).

3.3 2014 RI - DRO Soil Contamination

Field screening results from the 2014 Supplemental RI indicated that impacted soils were limited to a small isolated area at the end of the western most tank saddle. Soil samples collected for laboratory analysis were selected from a single boring, at the location with historical surface soil impacts, and from five surrounding borings for delineation. Analytical results showed that DRO concentrations exceeded the Method Two cleanup level at one boring location and only in the deeper sample, indicating that these impacts are very isolated and located within the smear zone. No other constituent concentrations exceeded the Method Two cleanup levels (AECOM 2016).

Site-specific soil and aquifer parameters were also collected and used to calculate alternative residential soil cleanup levels using the ADEC Hydrocarbon Risk Calculator (HRC). Soil samples were collected in the most contaminated area and analyzed for GRO, DRO, RRO, benzene, toluene, ethylbenzene and xylenes (BTEX) and State of Washington Department of Ecology extractable petroleum hydrocarbon and volatile

petroleum hydrocarbon methods (EPH & VPH). Using the HRC, the calculated alternative cleanup level for total DRO was 10,190 mg/kg, the cumulative hazard index (HI) was an order of magnitude below the ADEC risk benchmark, and the cumulative cancer risk met the ADEC risk standard of 1 x 10^{-5}. The 2014 RI concluded that site conditions are protective of human health under an unrestricted (residential) land use scenario. (AECOM 2016). In November 2016, ADEC suspended the use of their HRC to calculate alternative cleanup levels.

3.4 ADEC Method Three DRO Evaluation

Because ADEC suspended the use of their HRC calculator the DRO soil contamination was reevaluated in this report. The maximum analytical result for total DRO was 850 mg/kg. The duplicate sample had a result of 490 mg/kg and the QA triplicate result of 380 mg/kg. The maximum total DRO is below the ADEC method 2 ingestion cleanup level of 8300 mg/kg but exceeds the migration to groundwater cleanup level of 230 mg/kg. It should be noted that the groundwater in the source area was sampled in 2010 for a full suite of analyticals, including volatiles and DRO, and none of the results exceeded screening values (S&W 2012).

This report presents alternative cleanup levels using the current online ADEC Petroleum Cleanup Level Calculator (May 2017) and the current ADEC Mass Fraction spreadsheet. The online Petroleum Cleanup Level Calculator allows for entry of site specific parameters and allows for the calculation of alternative cleanup levels for total DRO, aromatic DRO and aliphatic DRO. Site specific parameters from the 2014 RI (AECOM 2016) were used to calculate alternative cleanup levels for total, aromatic and aliphatic DRO. Using the online calculator the total DRO migration to groundwater cleanup level was 800 mg/kg, the total DRO ingestion level was 8,300 mg/kg, the DRO aliphatic migration to groundwater was 23,300 mg/kg, the DRO aliphatic ingestion level was 8,300 mg/kg, and the aromatic DRO migration to groundwater was 320 mg/kg and the aromatic DRO ingestion level was 3,300 mg/kg (Attachment 1).

The aliphatic and aromatic DRO results were calculated using the maximum results from the 2014 RI and inputting the results into the November 2016 ADEC Mass Fraction spreadsheet. The spreadsheet calculates a DRO aliphatics of 666 mg/kg and a DRO aromatics of 152.1 mg/kg (Attachment 1). These calculated aliphatic and aromatic DRO results are below the corresponding ADEC Method 3 most stringent alternative cleanup levels of 8,300 mg/kg and 320 mg/kg respectively.

The total DRO maximum result of 850 mg/kg slightly exceeds the migration to groundwater Method 3 alternative cleanup level of 800 mg/kg for the primary sample but is below the alternative cleanup level in the duplicate and triplicate samples. The ADEC Petroleum Cleanup Level Calculator for total DRO has an assumed ratio of aliphatic and aromatic DRO which is different than site conditions. Measure or calculated values of aliphatic and aromatic DRO are more representative, than total DRO to the site conditions and more demonstrative of protectiveness of human health. Base on the aliphatic and aromatic DRO soil results and there being no exceedances in the source area

groundwater, it is concluded the DRO at the site does not present an unacceptable risk to human health.

3.5 Cumulative Risk

Cumulative risk was calculated using the ADEC (May 2017) Online Calculator. Toluene, xylenes and polycyclic aromatic hydrocarbons were detected below ADEC method two cleanup levels. The source area data set for toluene and total xylenes was limited to detections in one sample; therefore, the maximum detected values from the source area were used as exposure point concentrations for these constituents. Benzene and ethylbenzene were not detected, so the limit of detection was used as the exposure point concentration for these constituents. The results show a cumulative hazard index (HI) an order of magnitude below the ADEC risk benchmark, and the cumulative cancer risk meets the ADEC risk standard of 1×10^{-5} (Attachment 1).

3.6 Ecological Risk

Ecological risk was evaluated by following the ADEC Ecoscoping Guidance. A preliminary ecological conceptual site model was developed and indicated that a more in-depth risk evaluation is not needed and site conditions are protective of the environment (AECOM 2016).

3.7 Summary

In summary, the site conditions are protective of human health and the environment under an unrestricted (residential) land use scenario.

4.0 SUMMARY OF DECISION

Based on the results of the removal and remedial investigation efforts completed between 1984 and 2014, and the risk evaluation, USACE has determined that no further action is required at the AACS (F10AK0606-09) and project closeout is protective of public health, welfare, and the environment. This Project Closeout/No Further Action determination may be reevaluated in the event that additional information becomes available, or previously undiscovered and FUDS-eligible contamination is present.

5.0 REFERENCES

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ADEC. 2017b. Petroleum Cleanup Level Calculator. Division of Spill Prevention and Response, Contaminated Sites Program. May.

ADEC. 2017c. Cumulative Risk Calculator. Division of Spill Prevention and Response, Contaminated Sites Program. May.

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USACE. 2015. Defense Environmental Restoration Program - Formerly Used Defense Sites (DERP-FUDS) Revised Inventory Project Report for Property No. F10AK0606. Yakutat Air Base, Yakutat, AK. September. F10AK0606--_01.08_0502_a.

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FIGURE 1 – AACS VICINITY MAP YAKUTAT AIR BASE

FIGURE 2 – AACS NAPL SOURCE AREA AND SAMPLE LOCATIONS

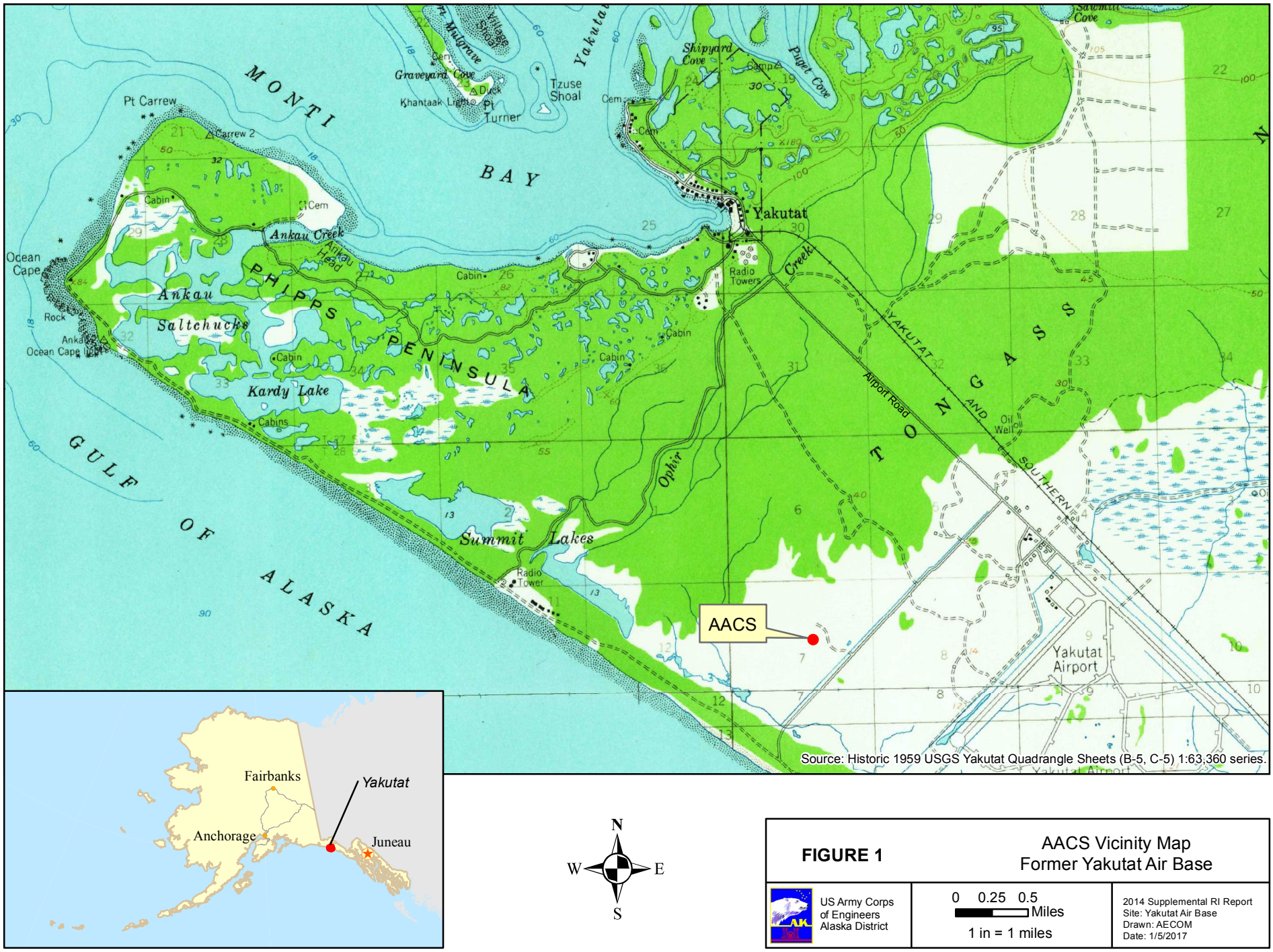

FIGURE 1

AACS Vicinity Map
Former Yakutat Air Base

US Army Corps of Engineers
Alaska District

0 0.25 0.5 Miles

1 in = 1 miles

2014 Supplemental RI Report
Site: Yakutat Air Base
Drawn: AECOM
Date: 1/5/2017

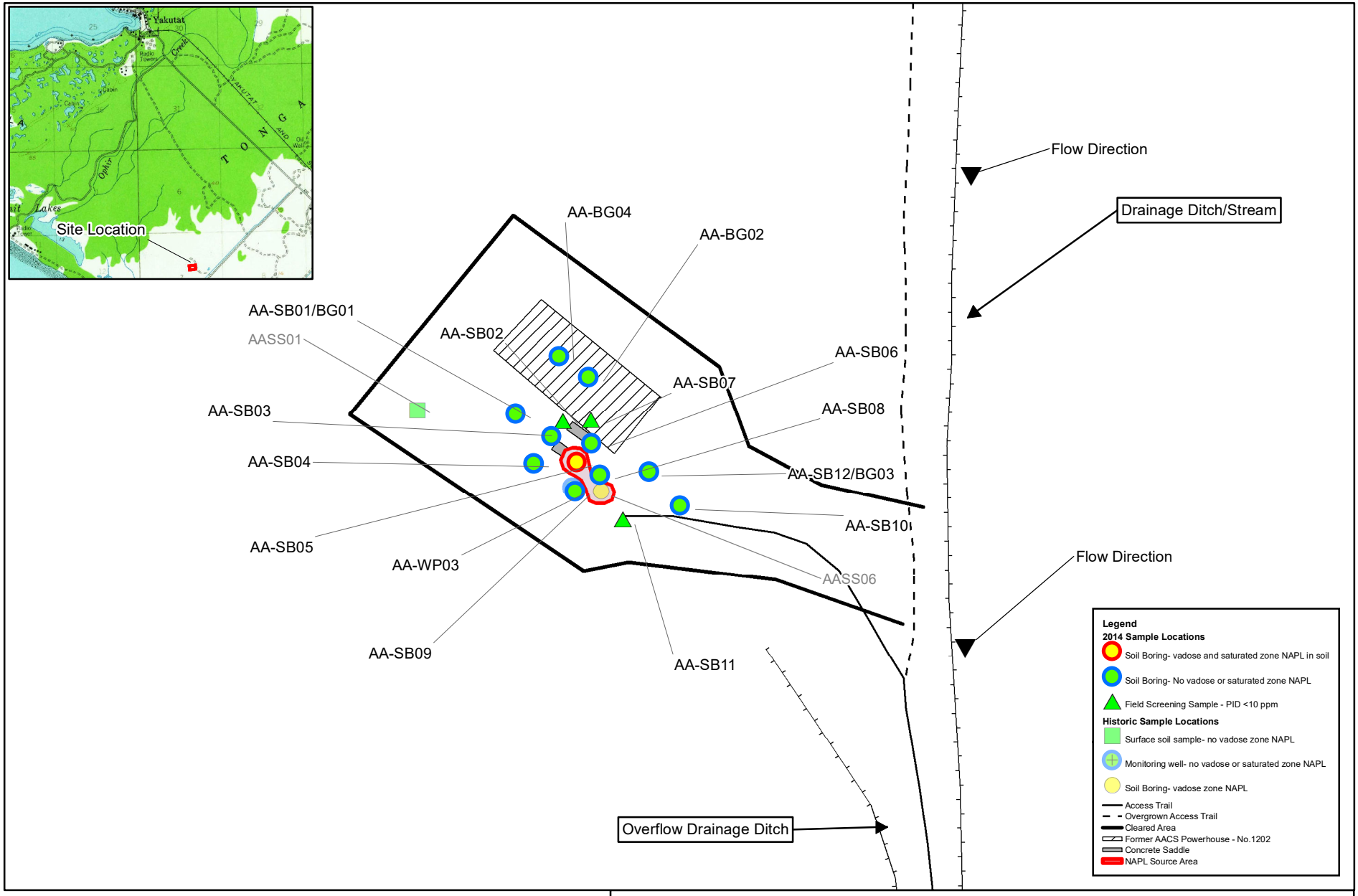

FIGURE 2

AACS
NAPL Source Area and Sample Locations

US Army Corps of Engineers
Alaska District

0 20 40 Feet
1 in = 40 ft

Date: 7/25/2017

ATTACHMENT 1 – ALTERNATIVE CLEANUP LEVELS AND RISK CALCULATIONS

Petroleum Cleanup Level Calculator

AACS

Site zone and exposure scenario: Over 40-inch Zone - Residential Exposures

Cleanup Level Calculations 5/25/2017

Chemical	CAS	Type	Calculations	
DRO Aliphatic		Organic Non-Carcinogenic Petroleum	Ingestion Cleanup Level:	8300 mg/kg
			Inhalation Cleanup Level:	278000 mg/kg
			Groundwater Cleanup Level:	3.7 mg/L
			Migration to Groundwater:	23300 mg/kg
DRO Aromatic		Organic Non-Carcinogenic Petroleum	Ingestion Cleanup Level:	3300 mg/kg
			Inhalation Cleanup Level:	71000 mg/kg
			Groundwater Cleanup Level:	1.5 mg/L
			Migration to Groundwater:	320 mg/kg
DRO (Total)		Organic Non-Carcinogenic Petroleum	Ingestion Cleanup Level:	8300 mg/kg
			Inhalation Cleanup Level:	178000 mg/kg
			Groundwater Cleanup Level:	1.5 mg/L
			Migration to Groundwater:	800 mg/kg

Please Note

Chemical	Notes
DRO Aliphatic	The Maximum Allowable DRO Aliphatic concentration is 10000 mg/kg
DRO Aromatic	The Maximum Allowable DRO Aromatic concentration is 5000 mg/kg
DRO (Total)	The Maximum Allowable DRO concentration is 12500 mg/kg

The parameters used to calculate the above cleanup levels and the parameters' default values are as follows:

Volatilization Pathway Parameters

Symbol	Description	Value	Default	Units
ρ_b	Dry soil bulk density	1.93	1.5	g/cm^3
n	Total soil porosity	0.282	0.434	L_{pore}/L_{soil}
Θ_w	Water-filled soil porosity	0.227	0.15	L_{water}/L_{soil}
Θ_a	Air-filled soil porosity	0.052	0.284	L_{air}/L_{soil}
w	Average soil moisture content	0.118	0.1	g_{water}/g_{soil}
f_{oc}	Organic carbon content of soil	0.002225	0.001	g/g

Groundwater Pathway Parameters

Symbol	Description	Value	Default	Units
Θ_w	Water-filled soil porosity	0.227	0.3	L_{water}/L_{soil}
Θ_a	Air-filled soil porosity	0.052	0.13	L_{air}/L_{soil}
w	Average soil moisture content	0.118	0.1	g_{water}/g_{soil}

K	Aquifer hydraulic conductivity	11125	876	m/yr
i	Hydraulic gradient	0.0038	0.002	m/m
L	Source length parallel to groundwater flow	2	32	m
I	Infiltration rate	0.729	0.13	m/yr
d_a	Aquifer thickness	3.048	10	m

Attachment 1
AACS Mass Fraction Calculations

25-May-17

AACS Source Area BTEX and VPH Data
NAPL Contaminated Soil Source Area Hydrocarbon Characterization

Site Name	Boring or Well Number	Sample Starting Depth (ft)	Sampling Date	Sample Name	Benzene Lab Result (mg/kg)	Benzene Method Detection Limit (mg/kg)	Benzene Stat Value (mg/kg)	Toluene Lab Result (mg/kg)	Toluene Method Detection Limit (mg/kg)	Toluene Stat Value (mg/kg)	Ethylbenzene Lab Result (mg/kg)	Ethylbenzene Method Detection Limit (mg/kg)	Ethylbenzene Stat Value (mg/kg)	Xylene (total) Lab Result (mg/kg)	Xylene (total) Method Detection Limit (mg/kg)	Xylene (total) Stat Value (mg/kg)	C8-C10 Aromatics Lab Result (mg/kg)	C8-C10 Aromatics Method Detection Limit (mg/kg)	C8-C10 Aromatics Stat Value (mg/kg)	C9-C10 Aromatics Calculated Value (mg/kg)	C10-C12 Aromatics Lab Result (mg/kg)	C10-C12 Aromatics Method Detection Limit (mg/kg)	C10-C12 Aromatics Stat Value (mg/kg)	C12-C13 Aromatics Lab Result (mg/kg)	C12-C13 Aromatics Method Detection Limit (mg/kg)	C12-C13 Aromatics Stat Value (mg/kg)	C5-C6 Aliphatics Lab Result (mg/kg)	C5-C6 Aliphatics Method Detection Limit (mg/kg)	C5-C6 Aliphatics Stat Value (mg/kg)	C6-C8 Aliphatics Lab Result (mg/kg)	C6-C8 Aliphatics Method Detection Limit (mg/kg)	C6-C8 Aliphatics Stat Value (mg/kg)	C8-C10 Aliphatics Lab Result (mg/kg)	C8-C10 Aliphatics Method Detection Limit (mg/kg)	C8-C10 Aliphatics Stat Value (mg/kg)	C10-C12 Aliphatics Lab Result (mg/kg)	C10-C12 Aliphatics Method Detection Limit (mg/kg)	C10-C12 Aliphatics Stat Value (mg/kg)	Total VPH Lab Result (mg/kg)	Total VPH Method Detection Limit (mg/kg)	GRO (calculated as sum of C5 to C10 A&A) (mg/kg)
AACS	AA-SB05	0-2	7/3/2014	AA-SB05-0.0-2.0-0714	ND	0.0091	0.0091	0.0031		0.0031	0.0091		0.0091	0.0186		0.0186	26.9		26.9	26.8723	17		17	-		-	0.44		0.44	0.33		0.33	2.3		2.3	18		18			29.98
				average concentration within fraction			0.009			0.003			0.009			0.019			26.900	26.872			17.000						0.440			0.330			2.300			18.000			29.98

"ND" results are assumed to be the following fraction of the detection lim: 1

Calculated Values

	GRO by AK101 (Stat Value, mg/kg)	DRO by AK102 (Stat Value, mg/kg)	RRO by AK103 (Stat Value, mg/kg)		% GRO	% DRO	% RRO
1	29.98	818.1	72		0.032586	0.88916	0.078254

AACS Source Area EPH Data
NAPL Contaminated Soil Source Area Hydrocarbon Characterization

Sample Location /Facility	Boring or Well Number	Sample Starting Depth (ft)	Sampling Date	Sample Name	C8-C10 Aromatics Lab Result (mg/kg)	C8-C10 Aromatics Method Detection Limit (mg/kg)	C8-C10 Aromatics Stat Value (mg/kg)	C9-C10 Aromatics Calculated Value (mg/kg)	C10-C12 Aromatics Lab Result (mg/kg)	C10-C12 Aromatics Method Detection Limit (mg/kg)	C10-C12 Aromatics Stat Value (mg/kg)	C12-C16 Aromatics Lab Result (mg/kg)	C12-C16 Aromatics Method Detection Limit (mg/kg)	C12-C16 Aromatics Stat Value (mg/kg)	C16-C21 Aromatics Lab Result (mg/kg)	C16-C21 Aromatics Method Detection Limit (mg/kg)	C16-C21 Aromatics Stat Value (mg/kg)	C21-C34 Aromatics Lab Result (mg/kg)	C21-C34 Aromatics Method Detection Limit (mg/kg)	C21-C34 Aromatics Stat Value (mg/kg)	C8-C10 Aliphatics Lab Result (mg/kg)	C8-C10 Aliphatics Method Detection Limit (mg/kg)	C8-C10 Aliphatics Stat Value (mg/kg)	C10-C12 Aliphatics Lab Result (mg/kg)	C10-C12 Aliphatics Method Detection Limit (mg/kg)	C10-C12 Aliphatics Stat Value (mg/kg)	C12-C16 Aliphatics Lab Result (mg/kg)	C12-C16 Aliphatics Method Detection Limit (mg/kg)	C12-C16 Aliphatics Stat Value (mg/kg)	C16-C21 Aliphatics Lab Result (mg/kg)	C16-C21 Aliphatics Method Detection Limit (mg/kg)	C16-C21 Aliphatics Stat Value (mg/kg)	C21-C34 Aliphatics Lab Result (mg/kg)	C21-C34 Aliphatics Method Detection Limit (mg/kg)	C21-C34 Aliphatics Stat Value (mg/kg)	DRO Aromatics C10 to C21 (mg/kg)	DRO Aliphatics C10 to C21 (mg/kg)	DRO (Sum of C10 to C21 A&A) (mg/kg)	RRO (sum of C21 to C34 A&A) (mg/kg)	Sum of all EPH Fractions Stat Values (mg/kg)	Extractable Petroleum Hydrocarbons (mg/kg)
					-		-	#N/A	4.1		4.1	38		38	110		110	20		20	-		-	66		66	330		330	270		270	52		52	152.1	666	818.1	72	890.1	
				average concentration within fraction				#N/A			4.100			38.000			110.000			20.000				66.000			330.000			270.000			52.000							

Sample AA-SB05-2.0-4.0-071FT (Most Contaminated)

	GRO by AK101 (Max Value, mg/kg)	DRO by AK102 (Max Value, mg/kg)	RRO by AK103 (Max Value, mg/kg)		% GRO	% DRO	% RRO
1	27	850	64		0.028693	0.903294	0.068013

AACS Source Area Hydrocarbon Characterization

Compounds and A&A EC Fractions	B	T	E	X	C9-C10 Aromatics	C10-C12 Aromatics	C12-C16 Aromatics	C16-C21 Aromatics	C21-C34 Aromatics	C5-C6 Aliphatics	C6-C8 Aliphatics	C8-C10 Aliphatics	C10-C12 Aliphatics	C12-C16 Aliphatics	C16-C21 Aliphatics	C21-C34 Aliphatics	TPH
Source of data used as input to the characterization wer overlap exists (enter: max, VPH or EPH)					VPH	EPH						VPH	EPH				
Average concentration in A&A EC groups (mg/kg)	0.0091	0.0031	0.0091	0.0186	26.8723	4.100	38.000	110.000	20.000	0.44	0.33	2.30	66.00	330.00	270.00	52.00	920
Fraction of TPH mass in A&A EC groups	9.89042E-06	3.369E-06	9.89E-06	2.022E-05	0.02920641	0.00445612	0.04130066	0.11955454	0.021737188	0.0004782	0.0003587	0.00249978	0.0717327	0.3586636	0.293452	0.056516689	1.000
GRO, DRO & RRO A&A Groups	**GRO aromatics**					**DRO aromatics**			**RRO aromatics**	**GRO aliphatics**			**DRO aliphatics**			**RRO aliphatics**	
Sum of A&A EC mass fractions within GRO, DRO & RRO A&A Groups	0.029249778					0.165311317			0.021737188	0.003336658			0.723848369			0.056516689	1.000
Mass fraction of A&A EC Groups within GRO, DRO & RRO A&A Groups	0.000338137	0.0001152	0.0003381	0.0006911	0.9985174	0.02695595	0.24983563	0.72320842	1	0.1433225	0.1074919	0.74918567	0.0990991	0.4954955	0.4054054	1	
Sum of A&A EC mass fractions within GRO, DRO & RRO A&A Groups	1.000					1.000			1	1.000			1.000			1	

AACS Fractions

input to cells C14 to C16 (4-phase, cumulative risk calcs)	
GRO: fraction aromatic	0.8976
DRO: fraction aromatic	0.1859
RRO: fraction aromatic	0.2778

input to cells D75 to D77 (4-phase, cumulative risk calcs)	
Aromatic C_{12}-C_{12}	0.02695595
Aromatic C_{12}-C_{16}	0.24983563
Aromatic C_{16}-C_{21}	0.72320842

input to cells D79 to D84 (4-phase, cumulative risk calcs)	
Aliphatic C_{5}-C_{6}	0.1433225
Aliphatic C_{6}-C_{8}	0.1074919
Aliphatic C_{8}-C_{10}	0.7491857
Aliphatic C_{12}-C_{12}	0.0990991
Aliphatic C_{12}-C_{16}	0.4954955
Aliphatic C_{16}-C_{21}	0.4054054

GRO: fraction aliphatic	0.1024
DRO: fraction aliphatic	0.8141
RRO: fraction aliphatic	0.7222

27193.268	value without formatting
27,193.	value with custom formatting (each lower line decreases by an order of magnitude)
2,719.	
272.	
27.1933	
2.7193	
0.2719	
0.0272	
0.0027	
2.72E-04	

Notes: A&A EC = aliphatic and aromatic equivalent carbon

1 This spreadsheet has been developed to help users calculate 1) the soil GRO, DRO and RRO aromatic fractions; and 2) the equivalent carbon mass fractions within the GRO aliphatic, DRO aromatic, and DRO aliphatic groups. The table number, title and data in this spreadsheet are presented as an example and should be changed by the user so that the data becomes specific to their site.

2 Enter the BTEX, EPH and VPH concentration data from the more heavily contaminated portions of the source area (sample results with GRO concentrations above 300 and DRO or RRO concentrations above 250 mg/kg) into the unshaded cells in Tables 6A and 6B (it is best if the lab results are reported to the detection limit and estimated or "J" results are used when they occur). The BTEX data should come from the same sample as the VPH and EPH data, and should be from the 8021 or 8260 test methods (don't use the BTEX values produced by the VPH test method). If a lab result is non-detect, enter "ND" into the "Lab Result" column of Table 6A and/or 6B. By default the spreadsheet assigns a "statistical value" equal to the method detection limit to all non-detect concentration data (the fraction of the detection limit used in the statistical value calculation may be adjusted by changing cell H18) . The values will be calculated automatically and displayed in Table 6D.

3 The spreadsheet calculates the average concentration value within each A&A EC fraction (e.g., C8 – C10 aromatics) as shown in the gray highlighted lines of Table 6A and 6B. The spreadsheet pulls the average concentrations in each A&A EC fractio the VPH and EPH data into a summary table (line 3 of Table 6C).

4 For A&A EC fractions measured by both the VPH and EPH methods, the spreadsheet, by default, selects the higher of the two overlapping average concentrations (if cells I45, J45, P45 and O45 are left blank). If the user has reason to believe that the either the VPH or EPH result of the overlapping ranges is a more representative value, then that value may be selected by entering "VPH" or "EPH" in the light yellow cells in line 2 of Table 6C (rational for the selection must be supplied in the report). In general, the VPH data is thought to be more representative of the C9-C10 fractions and the EPH data is thought to be more representative of the C10-C12 fractions (but the laboratory QA/QC data, and the correlation of the GRO and DRO data from the AK101 and AK102 tests with the VPH and EPH data may be used to help assess whether the VPH or EPH data is used as input to the hydrocarbon characterization).

5 The concentrations within the A&A EC fractions are added to get a total petroleum hydrocarbon (TPH) concentration (cell V40). Then the mass fraction within each A&A EC fraction is calculated by dividing the average concentration within the fraction by the TPH concentration as shown in the row labeled "Fraction of TPH mass within A&A EC groups".

6 The spreadsheet calculates the mass fraction of each A&A EC group within the larger GRO aliphatic, DRO aromatic and DRO aliphatic groups by dividing the mass fraction of each A&A EC group within the TPH, by the sum of the mass fractions within the larger GRO aliphatic, DRO aromatic and DRO aliphatic groups (as shown lines 6 and 7 of Table 6C) . These values are shown in Table 6D.

7 The GRO, DRO and RRO aromatic fractions are calculated (e.g. the sum of the GRO aromatic mass fractions divided by the sum of the GRO aromatic and aliphatic mass fractions) and are shown in Table 6D.

8 Note that the fractions used as input to cells D75 to D77, D79 to D81 and D82 to D84 must total to 1.

9 The user can add rows the middle of Table 6B and 6B as needed.

10 Please enter the GRO, DRO and RRO concentration measured by the AK101, AK102 and AK103 test methods in columns AR throught AT. The concentrations and percentages of GRO, DRO and RRO in the samples maybe used to help assess if the sample is from a source area and whether the source is associated with a gasoline, diesel or lube oil/waste oil release. If GRO, DRO, RRO, VPH and EPH data indicate significantly different hydrocarbon character (for example some of the source area samples show >90% DRO and <10% RRO while others show ~75% RRO and only ~25% DRO then a waste oil or lube oil spill is indicated and the source may be subdivdied into two separate source areas-- a diesel source area and a waste oil source area.

Site-specific Risk Models

Resident Equation Inputs for Soil (>40" Precipitation Zone)

Variable	Value
ED_{ress} (exposure duration - resident) yr	26
ED_{ressc} (exposure duration - child) yr	6
ED_{ressa} (exposure duration - adult) yr	20
ET_{ress} (exposure time - resident) hr	24
ET_{ressc} (exposure time - child) hr	24
ET_{ressa} (exposure time - adult) hr	24
BW_{ressa} (body weight - adult) kg	80
BW_{ressc} (body weight - child) kg	15
SA_{ressa} (skin surface area - adult) cm^2/day	6032
SA_{ressc} (skin surface area - child) cm^2/day	2373
LT (lifetime - resident) yr	70
$EF_{ress>40"}$ (exposure frequency - resident) day/yr	330
$EF_{ressc>40"}$ (exposure frequency - child) day/yr	330
$EF_{ressa>40"}$ (exposure frequency - adult) day/yr	330
IRS_{ressa} (soil intake rate - adult) mg/day	100
IRS_{ressc} (soil intake rate - child) mg/day	200
AF_{ressa} (skin adherence factor - adult) mg/cm^2	0.07
AF_{ressc} (skin adherence factor - child) mg/cm^2	0.2
$IFS_{res>40"-adj}$ (age-adjusted soil ingestion factor) mg/kg	34650
$DFS_{res>40"-adj}$ (age-adjusted soil dermal factor) mg/kg	97482
$IFSM_{res>40"-adj}$ (mutagenic age-adjusted soil ingestion factor) mg/kg	157300
$DFSM_{res>40"-adj}$ (mutagenic age-adjusted soil dermal factor) mg/kg	403788
AF_{0-2} (skin adherence factor) mg/cm^2	0.2
AF_{2-6} (skin adherence factor) mg/cm^2	0.2
AF_{6-16} (skin adherence factor) mg/cm^2	0.07
AF_{16-30} (skin adherence factor) mg/cm^2	0.07
BW_{0-2} (body weight) kg	15
BW_{2-6} (body weight) kg	15
BW_{6-16} (body weight) kg	80
BW_{16-30} (body weight) kg	80
ED_{0-2} (exposure duration) yr	2
ED_{2-6} (exposure duration) yr	4

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Site-specific Risk Models

Resident Equation Inputs for Soil (>40" Precipitation Zone)

Variable	Value
ED_{6-16} (exposure duration) yr	10
ED_{16-30} (exposure duration) yr	10
$EF_{0-2>40"}$ (exposure frequency) day/yr	330
$EF_{2-6>40"}$ (exposure frequency) day/yr	330
$EF_{6-16>40"}$ (exposure frequency) day/yr	330
$EF_{16-30>40"}$ (exposure frequency) day/yr	330
ET_{0-2} (exposure time) hr/day	24
ET_{2-6} (exposure time) hr/day	24
ET_{6-16} (exposure time) hr/day	24
ET_{16-30} (exposure time) hr/day	24
IRS_{0-2} (soil intake rate) mg/day	200
IRS_{2-6} (soil intake rate) mg/day	200
IRS_{6-16} (soil intake rate) mg/day	100
IRS_{16-30} (soil intake rate) mg/day	100
SA_{0-2} (skin surface area) cm^2/day	2373
SA_{2-6} (skin surface area) cm^2/day	2373
SA_{6-16} (skin surface area) cm^2/day	6032
SA_{16-30} (skin surface area) cm^2/day	6032
A_c (acres)	0.5
Q/C_{wp} (g/m^2-s per kg/m^3)	81.7066
PEF (particulate emission factor) m^3/kg	5.71E+09
A (PEF Dispersion Constant)	14.2253
B (PEF Dispersion Constant)	18.8366
C (PEF Dispersion Constant)	218.1845
V (fraction of vegetative cover) unitless	0.5
U_m (mean annual wind speed) m/s	4.07
U_t (equivalent threshold value)	11.32
F(x) (function dependent on U_m/U_t) unitless	0.0616
A_c (acres)	0.5
Q/C_{wp} (g/m^2-s per kg/m^3)	81.7066
foc (fraction organic carbon in soil) g/g	0.001
p_b (dry soil bulk density) g/cm^3	1.5

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Site-specific Risk Models

Resident Equation Inputs for Soil (>40" Precipitation Zone)

Variable	Value
p_s (soil particle density) g/cm ^{3}	2.65
θ $_w$ (water-filled soil porosity) L_{water}/L_{soil}	0.15
θ $_a$ (air-filled soil porosity) L_{air}/L_{soil}	0.28396
n (total soil porosity) L_{pore}/L_{soil}	0.43396
T (exposure interval) s	819936000
A (VF Dispersion Constant)	14.2253
B (VF Dispersion Constant)	18.8366
C (VF Dispersion Constant)	218.1845

Site-specific Risk Models

Resident Cumulative Risk Calculator for Soil (>40" Precipitation Zone)

ca=Cancer, nc=Noncancer, ca* (Where nc CL < 100 x ca CL), ca** (Where nc CL < 10 x ca CL),
max=CL exceeds ceiling limit (see User's Guide), sat=CL exceeds csat, sol=CL exceeds Solubility
I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE

Chemical	Mutagen?	VOC?	Volatilization Factor (m^3/kg)	Particulate Emission Factor (m^3/kg)	RBA	Concentration (mg/kg)	Ingestion HI Child	Inhalation (Volatiles) HI Child	Inhalation (Particulates) HI Child	Dermal HI Child
Acenaphthene	No	Yes	6.94E+04	5.71E+09	1.00E+00	2.00E-03	4.02E-07	-	-	1.24E-07
Acenaphthylene	No	Yes	9.35E+04	5.71E+09	1.00E+00	9.50E-03	3.82E-06	-	-	1.18E-06
Anthracene	No	Yes	2.57E+05	5.71E+09	1.00E+00	2.20E-03	8.84E-08	-	-	2.73E-08
Benz[a]anthracene	Yes	Yes	2.16E+06	5.71E+09	1.00E+00	1.30E-02	-	-	-	-
Benzene	No	Yes	2.26E+03	5.71E+09	1.00E+00	1.35E-02	4.07E-05	1.80E-04	7.13E-11	-
Benzo[a]pyrene	Yes	No	-	5.71E+09	1.00E+00	1.10E-02	-	-	-	-
Benzo[b]fluoranthene	Yes	No	-	5.71E+09	1.00E+00	1.30E-02	-	-	-	-
Benzo[g,h,i]perylene	No	No	-	5.71E+09	1.00E+00	1.20E-02	4.82E-06	-	-	1.49E-06
Benzo[k]fluoranthene	Yes	No	-	5.71E+09	1.00E+00	1.40E-02	-	-	-	-
Chrysene	Yes	No	-	5.71E+09	1.00E+00	1.40E-02	-	-	-	-
Dibenz[a,h]anthracene	Yes	No	-	5.71E+09	1.00E+00	1.00E-02	-	-	-	-
Ethylbenzene	No	Yes	3.14E+03	5.71E+09	1.00E+00	2.70E-02	3.25E-06	7.77E-06	4.28E-12	-
Fluoranthene	No	No	-	5.71E+09	1.00E+00	7.60E-03	2.29E-06	-	-	7.07E-07
Fluorene	No	Yes	1.38E+05	5.71E+09	1.00E+00	5.70E-03	1.72E-06	-	-	5.30E-07
Indeno[1,2,3-cd]pyrene	Yes	No	-	5.71E+09	1.00E+00	1.30E-02	-	-	-	-
Methylnaphthalene, 1-	No	Yes	2.92E+04	5.71E+09	1.00E+00	6.10E-02	1.05E-05	-	-	3.24E-06
Methylnaphthalene, 2-	No	Yes	2.89E+04	5.71E+09	1.00E+00	1.30E-01	3.92E-04	-	-	1.21E-04
Naphthalene	No	Yes	2.33E+04	5.71E+09	1.00E+00	2.20E-02	1.33E-05	2.85E-04	1.16E-09	4.09E-06
Phenanthrene	No	Yes	3.16E+05	5.71E+09	1.00E+00	9.00E-02	3.62E-05	-	-	1.12E-05
Pyrene	No	Yes	1.16E+06	5.71E+09	1.00E+00	8.40E-03	3.38E-06	-	-	1.04E-06
Toluene	No	Yes	2.56E+03	5.71E+09	1.00E+00	3.10E-03	4.67E-07	2.19E-07	9.82E-14	-
Xylenes	No	Yes	3.21E+03	5.71E+09	1.00E+00	1.96E-02	1.18E-06	5.52E-05	3.10E-11	-
*Total Risk/HI			-	-	-	-	*5.14E-04*	*5.28E-04*	*1.27E-09*	*1.44E-04*

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Site-specific Risk Models

Resident Cumulative Risk Calculator for Soil (>40" Precipitation Zone)

ca=Cancer, nc=Noncancer, ca* (Where nc CL < 100 x ca CL), ca** (Where nc CL < 10 x ca CL),
max=CL exceeds ceiling limit (see User's Guide), sat=CL exceeds csat, sol=CL exceeds Solubility
I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE

Chemical	Noncarcinogenic HI Child	Ingestion Risk	Inhalation (Volatiles) Risk	Inhalation (Particulates) Risk	Dermal Risk	Carcinogenic Risk
Acenaphthene	**5.26E-07**	-	-	-	-	**-**
Acenaphthylene	**4.99E-06**	-	-	-	-	**-**
Anthracene	**1.16E-07**	-	-	-	-	**-**
Benz[a]anthracene	**-**	5.84E-08	6.16E-10	2.33E-13	1.95E-08	**7.85E-08**
Benzene	**2.21E-04**	1.01E-09	1.57E-08	6.19E-15	-	**1.67E-08**
Benzo[a]pyrene	**-**	4.94E-07	-	1.97E-12	1.65E-07	**6.59E-07**
Benzo[b]fluoranthene	**-**	5.84E-08	-	2.33E-13	1.95E-08	**7.79E-08**
Benzo[g,h,i]perylene	**6.31E-06**	-	-	-	-	**-**
Benzo[k]fluoranthene	**-**	6.29E-09	-	2.51E-13	2.10E-09	**8.39E-09**
Chrysene	**-**	6.29E-10	-	2.51E-14	2.10E-10	**8.39E-10**
Dibenz[a,h]anthracene	**-**	4.49E-07	-	1.95E-12	1.50E-07	**5.99E-07**
Ethylbenzene	**1.10E-05**	4.03E-10	7.22E-09	3.97E-15	-	**7.62E-09**
Fluoranthene	**3.00E-06**	-	-	-	-	**-**
Fluorene	**2.25E-06**	-	-	-	-	**-**
Indeno[1,2,3-cd]pyrene	**-**	5.84E-08	-	2.33E-13	1.95E-08	**7.79E-08**
Methylnaphthalene, 1-	**1.37E-05**	2.40E-09	-	-	8.77E-10	**3.28E-09**
Methylnaphthalene, 2-	**5.13E-04**	-	-	-	-	**-**
Naphthalene	**3.02E-04**	-	1.08E-08	4.40E-14	-	**1.08E-08**
Phenanthrene	**4.73E-05**	-	-	-	-	**-**
Pyrene	**4.42E-06**	-	-	-	-	**-**
Toluene	**6.86E-07**	-	-	-	-	**-**
Xylenes	**5.64E-05**	-	-	-	-	**-**
**Total Risk/HI*	***1.19E-03***	*1.13E-06*	*3.43E-08*	*4.95E-12*	*3.77E-07*	***1.54E-06***

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U.S. ARMY CORPS OF ENGINEERS ALASKA DISTRICT **POA STAFF ACTION SUMMARY** HQUSACE Staff Action Handbook, the proponent is the Executive Office	1. CONTROL# PM-17-096	2. Suspense 2017-08-16 3. Today's Date 2017-08-08

4. Subject: Project Closure Document Approval for Yakutat Air Base FUDS #F10AK0606-09

5. Office Symbol	6. Action Officer	7. Telephone #	8. E-mail
PM-ESP	Christy Baez	753-5568	christy.j.baez@usace.army.mil

COORDINATION

9. Division	10. Name	11. Concur/Nonconcur	12. Comments	13. Date
6 DC	Brooks	_		
5 DDC	Buursma	_		AUG 2 8 2017
4 DPM	Bowker	RWB _		8/28/17
_ EA		_		
_ E&C		_		

14. Routing	☒ DC	☒ DDC	☒ DMP	☐ EA	☐ E&C
15. For:	☐ Information	☐ Read-Ahead	☐ Decision	☒ Approval	☒ Signature

16. PURPOSE/BOTTOM LINE/DISCUSSION:

1. PURPOSE: Routing FUDS Project Closure Document for Yakutat Air Base, AACS # F10AK0606-09 through POA for DC signature.

2. BOTTOM LINE: This report documents the completion of remedial investigation activities at the AACS site and recommends closure of the project.

3. DISCUSSION: Based upon the results of the 1984 removal action, and two remedial investigations, USACE has determined that no further action is required at the AACS site F10AK0606-09. The ADEC regulator is in support of the closure decision for this site.

4. RESOURCE IMPACT: Project closure meets the scheduled FY17 metric & documents FUDS Program progress.

17. Releaser: Larry M. Phyfe, Branch Chief, PM-ESP — Larry M. Phyfe 8/8/17

18. Recommendation: Approve and sign documents

19. Action:	Approved ☐	See Me ☐	Other ☐

COORDINATION (cont.)				
20. Division	21. Name	22. Concur/Nonconcur	23. Comments	24. Date
3 OC	V. Davis	(SBC) –		28 AUG 17
_ RM		–		
_ CT		–		
_ RE		–		
_ RD		–		
_ LM		–		
_ IR		–		
_ SO		–		
_ SEC		–		
_ PAO		–		
_ SB		–		
_ EEO		–		
_ CPAC		–		
_ ACE-IT		–		
_ EM		–		
_ HR		–		
PM-ESP (2)	Phyfe	–		8/8/17
FUDS (1)	Sorum	8/8/17 –	Concur	8/8/2017
Misc. Offices		–		
Misc. Offices		–		
Misc. Offices		–		
Misc. Offices		–		
Misc. Offices		–		
Misc. Offices		–		
Misc. Offices		–		