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SITE CHARACTERIZATION REPORT

Channel Flying Juneau Airport
ADEC File #: 1513.38.095
Juneau, Alaska

Prepared for:
COASTAL HELICOPTERS
JUNEAU INTERNATIONAL AIRPORT

Submitted to:
Alaska Department of Environmental Conservation
Division of Spill Prevention and Response
Contaminated Sites Program
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Signature Page

Channel Flying Juneau Airport
ADEC File #: 1513.38.095
Juneau, Alaska

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Date: June 18, 2024

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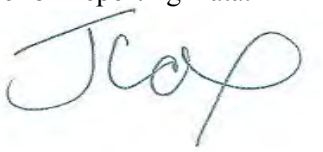

Printed Name: Jolene M. Cox
Principal Environmental Scientist
Date: June 18, 2024

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ACRONYM LIST

ADEC: Alaska Department of Environmental Conservation
BTEX: Benzene, Toluene, Ethylbenzene, Xylenes
CBJ: City and Borough of Juneau
CDI: Carson Dorn Inc.
CES: Cox Environmental Services
CY: Cubic Yard
DCAS: Dichloroethane
DRO: Diesel Range Organics
EDB: Ethylene Dibromide
IC: Institutional Control
IDW: Investigation-Derived Wastes
JIA: Juneau International Airport
PAH: Polycyclic Aromatic Hydrocarbon
PCB: Polychlorinated Biphenyl
PERP: Prevention, Preparedness, and Response Program
PM: Project Manager
PRP: Potentially Responsible Party
QEP: Qualified Environmental Professional
RCRA: Resource Conservation and Recovery Act
RRO: Residual Range Organics
SECON: Southeast Alaska Construction Company

1 Introduction & Site Background

Cox Environmental Services (CES) has been contracted by Coastal Helicopters Inc. and the Juneau International Airport (JIA) to conduct an Alaska Department of Environmental Conservation (ADEC) Site Characterization for property located at 8995 Yandukin Drive and JIA property to the south in Juneau, Alaska, herein referred to as the subject property.

The subject property consists of one parcel (Tract B), totaling approximately 37,083 sq ft (0.851 acres) developed with one 25,500 sq ft aircraft hangar building and paint booth building occupied by a commercial tenant (Coastal Helicopters Inc) which is owned by Channel Flying Inc and land owned by JIA located on the apron and adjacent south of Tract B.

The location of the site is depicted on *Figure 1. Site Location Map*. The site plan is depicted with an 2023 aerial photograph as *Figure 2. Site Overview*.

The subject property is associated with an ADEC contaminated site listing (Channel Flying Juneau Airport, ADEC File #: 1513.38.095).

Hazard ID	Site Name	Location	Status	File ID
26362	Channel Flying Juneau Airport	8995 Yandukin Drive, Juneau Airport, Juneau, AK 99801	Active	1513.38.095

A summary of the Problem/Comments Information at the Channel Flying Juneau Airport is as follows:

- On July 25, 2014 petroleum-contaminated soil was discovered during activities for an airport ramp paving project in front of a 20-foot shipping container housing a used oil heat recovery burner and tank. The shipping container and underlying property is located immediately adjacent to, and the contamination spread from, the privately-owned source property onto property owned by the JIA. Cleanup of the airport property was pursued but Groundwater was found to be impacted and confirmation samples were at levels above DEC cleanup. 40 super sacks of contaminated soil were excavated and scheduled to be shipped for treatment and disposal on or about December 8, 2014. A monitoring well was installed at or near the property line adjoining the two properties. Characterization sampling found petroleum compounds in soil and Groundwater and metals in soil above DEC cleanup levels. The area where contamination was found has been in active use by various airlines since at least the 1960s and perhaps earlier. On May 12, 2015 petroleum-contaminated soil was again discovered during additional construction activities approximately 140 feet east of the used oil burner and tank. Samples confirmed the presence of diesel range organics above DEC cleanup levels in surface and subsurface soil. Approximately 25 super sacks of contaminated soil were excavated and shipped for treatment and disposal.

A summary of the ADEC Site Chronology Action Information at the Channel Flying Juneau Airport is as follows:

ACTION DATE	ACTION	DESCRIPTION	DEC STAFF
7/28/2014	Potentially Responsible Party/State Interest Letter	Potentially Responsible Party / State Interest Letter for spill no. 14119920601 sent to City and Borough of Juneau, Juneau International Airport by PERP staff Bob Mattson.	Mitzi Read
7/28/2014	Potentially Responsible Party/State Interest Letter	Potentially Responsible Party / State Interest Letter for spill no. 14119920601 sent to Channel Flying, Inc. by PERP staff Bob Mattson.	Mitzi Read
2/23/2015	Spill Transferred from Prevention Preparedness and Response Program	Spill transferred by PERP staff Bob Mattson. Spill no. 14119920601; spill date = 7/25/14; substance = waste oil; quantity = ~15 gallons; source = handling practices associated with waste oil management and transfers for a used oil burner used to heat an airplane hangar.	Mitzi Read
3/17/2015	Site Added to Database	A new site has been added to the database	Mitzi Read
3/17/2015	Exposure Tracking Model Ranking	Initial ranking with ETM completed for source area id: 79745 name: Waste Oil Burner	Mitzi Read
5/14/2015	Potentially Responsible Party/State Interest Letter	Potentially Responsible Party / State Interest Letter for spill no. 15119913201 sent to City and Borough of Juneau, Juneau International Airport by PERP staff Kayley Moen.	Mitzi Read
7/30/2015	Potentially Responsible Party/State Interest Letter	Potentially Responsible Party / State Interest Letter for spill no. 15119913201 sent to Channel Flying, Inc. by PERP staff Kayley Moen.	Mitzi Read
7/30/2015	Spill Transferred from Prevention Preparedness and Response Program	Spill transferred by PERP staff Kayley Moen. Spill no. 15119913201; spill date = 5/12/15; substance = unknown petroleum; quantity = unknown; suspected source used oil tank and burner in connex ~140 feet from location where contamination was discovered; possibly related to spill no. 14119920601.	Mitzi Read
8/21/2015	Exposure Tracking	Initial ranking with ETM completed for source area id: 79807 name:	Mitzi Read

	Model Ranking	Petroleum Contamination ~140 Ft E of Used Oil Burner	
11/30/2015	Update or Other Action	Provided written authorization to Scott Rinkenberger at CBJ to continue the resurfacing project that included paving over the entire site where contamination was discovered on May 12, 2015. Soil investigation and cleanup included excavation and disposal of approximately 25yards of contaminated soil. Sub-surface contamination remains. The remaining detected concentrations of DRO are below the ADEC Method Two Soil Cleanup levels for ingestion and inhalation but exceed the ADEC Method Two Soil Cleanup Levels for migration to Groundwater. If the soil becomes accessible, the soil must be evaluated and contamination addressed in accordance with an ADEC approved work plan.	Christy Howard
6/28/2017	Exposure Tracking Model Ranking	Updated ETM for source area id: 79745 name: Waste Oil Burner	Amy Rodman
6/28/2017	Exposure Tracking Model Ranking	updated ETM for source area id: 79807 name: Petroleum Contamination ~140 Ft E of Used Oil Burner	Amy Rodman
1/3/2024	Meeting or Teleconference Held	Teleconference held with Juneau International Airport (Patty Wahto, Mike Greene, EMP1, EMP2, and PM) to discuss site.	Alena Voigt
1/30/2024	Potentially Responsible Party/State Interest Letter	PRP letter sent to Coastal Helicopters, Inc. (Ethan Berto and Robert Berto)	Alena Voigt

A summary of the investigative sampling at the Channel Flying Juneau Airport site to date is as follows. Copies of the investigation reports are included in Attachment B of this report.

Cleanup Action Report Channel Flying/JIA Contamination Prepared for Juneau International Airport, Carson Dorn, Inc., September 2014 (Revised December 2014)

According to the report: On July 25, 2014, JIA authorized Carson Dorn, Inc. (CDI) to provide professional services to oversee the removal of contaminated soil encountered during excavation for a new paved apron on the south side of the Channel Flying hangar at JIA. Contamination appeared to be localized at the south end of a Channel Flying container that housed a waste oil burner and waste oil tank. Contamination initially appeared to be the result of chronic spills and poor operating procedures associated with the waste oil burner, however, there may have been other historic contributing sources of contamination. The general area of contamination is illustrated in Figure 1 (Appendix A).

Based on visual evidence, an unknown quantity of used/waste oil entered the ground at the south end of the waste oil burner container, extending south of the container as well as some distance northward beneath that end of the container. The situation was discovered when SECON (JIA's apron paving contractor) was excavating in the vicinity south of the container in preparation for building structural section for the new apron. SECON stopped work until a cleanup action plan was submitted by CDI on July 28 and approved by ADEC that same day.

As required in the plan, CDI collected two characterization samples on Monday, July 28 and sent them to TestAmerica Analytical Laboratory to be analyzed for waste oil constituents (DRO, DRO, RRO, BTEX, PAHs, EDB 1, 2-DCAS, RCRA Metals, and PCBs). The lab results would identify contaminants of concern and provide the first step in characterizing the contamination for disposal.

On Thursday, July 31, SECON elected to proceed with excavation of contaminated soils within the footprint of the paving project, load the material into 1.5 CY super sacks, and store the sacks immediately adjacent the excavation but outside the project footprint. As it turns out, SECON's northern project limit coincided with the property boundary between JNU and the Channel Flying hangar. It was on the Channel Flying side of the line where the waste oil burner had been located. Excavation was completed on Friday, August 1, and that same day a monitoring well was installed at the property line between JNU and Channel Flying hangar, roughly where the door to the waste oil burner container had been located. In all, 40 super sacks were filled, with an estimated volume of 60 to 70 cubic yards.

At the JNU/Channel Flying property line, the excavation and contamination extended down to ground water (about 5' below finish grade) but as the contamination fanned southward from the container, it got shallower and eventually ended. After excavation was complete, four confirmation samples were collected and sent to TestAmerica on August 1. Because characterization sample results were not yet available, the four confirmation samples were also analyzed for waste oil constituents (DRO, DRO, RRO, BTEX, PAHs, EDB 1, 2-DCAS, RCRA Metals, and PCBs). Figure 2, Appendix A, shows characterization and confirmation sample locations and lab results that exceeded cleanup levels. TestAmerica lab reports are found in Appendix B.

The primary source of contamination appears to have been the waste oil burner container that was located on Channel Flying property. Contamination extended to Groundwater at the JNU/Channel Flying property line (roughly equating to the location of the container door), but contamination got shallower as it fanned out to the south. Characterization samples (JNU-1 and JNU-2) were collected within 1.5' of original ground surface. Results showed elevated levels of DRO and RRO. JNU-1 also had lead at 640 mg/Kg which exceeded the 400 mg/Kg cleanup standard. None of the confirmation samples, however, showed lead exceeding cleanup standard and none of the composite samples from the super sacks showed lead leachability above the 5.0 µg/L EPA standard. JNU-2 had arsenic at 11 mg/Kg which exceeded the 3.9 mg/Kg cleanup standard. None of the composite samples from the super sacks, however, showed arsenic leachability above 5.0 µg/L EPA standard. Confirmation sample "Confirm-1" was collected at the deepest point in the excavation, basically at ground water. The only exceedance for Confirm-1 was DRO (1,900 mg/Kg). Confirmation sample "Confirm-2" was collected at the JNU/Channel Flying property line about 2.5' below finish grade. The only exceedances for Confirm-2 were DRO (440 mg/Kg) and DRO (1,900 mg/Kg). Confirmation sample "Confirm-3" was collected at the south wall of the excavation about

2’ below finish grade and no cleanup standards were exceeded. Confirmation sample “Confirm-4” was collected from the east floor of the excavation at about 2.5’ below finish grade. The only exceedance for Confirm-4 was arsenic at 4.2 mg/Kg which exceeded the 3.9 mg/Kg cleanup standard. None of the composite samples from the super sacks, however, showed arsenic leachability above 5.0 µg/L EPA standard.

SECON successfully removed contaminated soil within the footprint of the runway apron paving project, although excavation necessarily stopped at Groundwater (5’ below finish grade). Groundwater in the area still has DRO/DRO/RRO levels that exceed cleanup levels. Since excavation did not proceed north of the JNU/Channel Flying property line, contaminated soil still exists on Channel Flying property and the Groundwater sample collected from the monitoring well on August 28, 2014 shows exceedances for DRO/DRO/RRO.

JNU requested no further action for the site for the following reasons:

1. The contamination was encountered during a paving project and was apparently caused by historic operation of a waste oil burner housed in a container on Channel Flying property.
2. The container and the waste oil burner have been removed from the site so the assumed primary source of contamination has been eliminated.
3. Contaminated soil within the footprint of the paving project was removed (as constrained by Groundwater) and replaced with clean crushed material.
4. Any remaining in-place contaminated soils are outside the paving project and largely off airport property.

JNU has authorized SECON to send the material south as non-RCRA, non-hazardous material for disposal at a suitable treatment facility. The sacks are scheduled to be loaded into containers and moved to the barge facility on Monday, December 8, 2014.

Site Investigation & Cleanup Report Juneau International Airport Prepared for Juneau International Airport, Carson Dorn, Inc., July 2015

According to the report: On May 12, 2015 JIA employees discovered an area of soil contamination in front of the Channel Flying hangar and to the west of the Ward Air hangar. The contamination was discovered during excavation work for a resurfacing project in that area. ADEC was notified by the JIA and then CDI was contracted to begin site characterization work. The contamination appeared to be surficial in nature and from historical spillage in the area.

The planned scope of work to be conducted was the collection and analysis of up to eight surface and/or subsurface soil samples from a series of test pits excavated to a depth of approximately 4-5 feet below ground surface (Groundwater is approximately 5 feet bgs). During the test pit investigation, obvious stained surface materials was to be scrapped with the excavator and stored in super sacks pending return

of analytical results. Additionally, the material that had previously been scraped back and stockpiled at the site was to be sampled.

Soil samples were analyzed for DRO and RRO, DRO, BTEX, PAHs, and metals.

The locations of the excavations and test pits are shown on the Site Sketch (Attachment A).

JIA employees excavated two areas of obviously contaminated surface soils in the northeast corner of the site. CDI then collected confirmation samples (S-2 & S-3) from the excavations. DRO was detected at a concentration of 770 mg/kg which exceeds the migration to Groundwater cleanup level in S-2. DRO was detected at a concentration of 94 mg/kg in S-3. A test pit was dug to the west of these excavations where the initial report of contamination was reported. Due to obvious odor and PID readings excavation continued deeper and wider in this area. The footprint of the excavated area was approximately 8 by 12 feet and it was 4 feet deep (approximately 10 yards was excavated). CDI then collected confirmation samples (S-4, S-5, S-6, S-7 & S-8 (S-9 Duplicate)) from the excavation. DRO was detected at a concentration of 3,200 mg/kg which exceeds the migration to Groundwater cleanup level in S-4 from the north wall. DRO was detected at a concentration of 1,500 mg/kg which exceeds the migration to Groundwater cleanup levels in S-5 from the east wall. DRO was detected at a concentration of 1,500 mg/kg which exceeds the migration to Groundwater cleanup levels in S-6 from the west wall. DRO was not detected in S-7 from the bottom of the excavation. DRO was detected at a concentration of 280 mg/kg (190 mg/kg duplicate) which exceeds the migration to Groundwater cleanup levels in S-8 (S-9 Duplicate) from the south wall. Five additional text pits were excavated, no visual or olfactory evidence of contamination was noted, and field screening with the PID were 0 PPM.

The material (less than 20 yards) that had previously been scraped back from the southern portion of the site and stockpiled was sampled. DRO was detected at a concentration of 50 mg/kg which is below the migration to Groundwater cleanup level in S-1 from the stockpile. The material that had previously been scraped back from the northern portion of the site and stored in fifteen super sacks (approximately 15 yards) at the tank farm at the airport was sampled. DRO was detected at a concentration of 310 mg/kg which exceeds the migration to Groundwater cleanup level in S-10 from the super sacks.

The 25 super sacks (approximately 25 yards) will be loaded and taken to the Bicknell Asphalt Plant for treatment.

The soil investigation and cleanup included excavation and disposal of approximately 25 yards of contaminated material. The confirmation samples indicate the remaining detected concentrations of DRO are below the ADEC Method Two Soil Cleanup Level for ingestion and inhalation but exceed the ADEC Method Two Soil Cleanup Level for migration to Groundwater. Groundwater was not encountered during the excavation and the sample from the bottom of the excavation (S-7) was non-detect. JIA planned to continue the resurfacing project which included paving over the entire site. CDI recommended the site be closed with the residual contamination left in place underneath the encapsulating cover.

2 Scope of Work

The scope of work conducted during this Site Characterization consisted of:

Channel Flying Property:

- Installation of twelve (12) on-site soil borings to delineate impacts to on-site soil.
- Installation of three (3) on-site groundwater monitoring wells to delineate impacts to on-site groundwater.
- Collection of soil samples (plus field duplicates) for laboratory analysis.
- Collection of groundwater samples (plus field duplicates) from the three (3) groundwater monitoring wells for laboratory analysis.

JIA Property:

- Installation of twelve (12) on-site soil borings to delineate impacts to on-site soil.
- Installation of three (3) on-site groundwater monitoring wells to delineate impacts to on-site groundwater.
- Collection of soil samples (plus field duplicates) for laboratory analysis.
- Collection of groundwater samples (plus field duplicates) from the three (3) groundwater monitoring wells for laboratory analysis.

The soil borings & monitoring well locations are depicted on *Figure 3. Soil Borings & Groundwater Monitoring Well Locations.*

2.1 Deviations from Approved Sampling Plan

- Groundwater monitoring well CF-5 was moved to the west to avoid an underground electrical conflict.
- Soil boring CF-7 was deleted after CF-5 was moved to the west.
- Groundwater monitoring well JIA-8 was moved to the west to avoid an underground electrical conflict.
- Soil boring JIA-9 was moved to the south of JIA-3 and JIA-4 to delineate contamination encountered in that area of the site.
- There were no other deviations from the approved sampling plan.

3 Soil Boring Installation, Sampling & Laboratory Analyses

The soil sampling activities were performed in general accordance with ADEC's Field Sampling Guidance, January 2022. Soil borings were advanced using a direct push Geoprobe and a continuous sampler. Field screening was conducted in 1- to 2-foot increments starting at the ground surface. The soil borings reached depths of 10 to 15 feet below ground surface, depending on the location, field screening results, and depth to groundwater. Samples for submission were selected based on the highest PID screening results, with at least two soil samples collected per soil boring.

Field screening samples were analyzed using ADEC heated headspace PID analysis as outlined in ADEC's Field Sampling Guidance, January 2022. The ADEC procedure summary is as follows:

- Calibrate the PID daily according to the manufacturer's specifications.
- Collect the sample from freshly uncovered soil if it is from an excavation sidewall.
- Partially fill (one-third to one-half) a clean resealable plastic bag with the sample material to be analyzed. The bag should have a total capacity of at least 8 ounces to avoid significant vapor diffusion and stratification effects.
- Quickly seal the plastic resealable bag.
- Allow headspace vapors to develop in the bag for at least 10 minutes but no longer than 1 hour. Shake or agitate the bag for 15 seconds at the beginning and end of the headspace development period to assist volatilization. Warm the headspace to at least 40°F (approximately 5°C).
- After headspace development, insert the instrument sampling probe to a point approximately halfway into the headspace depth. Minimize the container opening and avoid uptake of water droplets and soil particles into the probe device.
- After probe insertion, take the highest meter reading and record it; normally, this will occur between 2 and 5 seconds after probe insertion. If erratic meter response occurs at high organic vapor concentrations or conditions of elevated headspace moisture, note this with the headspace data.
- Record the reading in a field logbook, noting the location and depth of the sample.

CES personnel used new spoons to collect soil samples. Prior to handling any soil, CES personnel donned a new pair of disposable nitrile gloves, changing gloves before collecting each soil sample. Each soil sample was placed into a laboratory-certified 4-ounce glass jar. Soil samples to be analyzed for DRO, RRO, PAHs, and metals were unpreserved, while samples for DRO and VOCs were immediately preserved with methanol. All sample jars were labeled with the project name, sample identification number, date and time of sample collection, preservative, requested analysis, and sampler's initials. The samples were stored in a cooler with ice (maintained at 4°C ± 2°C) until delivery to the contract laboratory.

4 Groundwater Installation, Development, Well Sampling & Laboratory Analyses

The groundwater monitoring wells were installed using a direct push Geoprobe, in general accordance with ADEC's Monitoring Well Guidance from September 2013. The wells were constructed with 1.0-inch diameter Schedule 40 PVC, including a 10-foot section of 0.010-inch slotted screen, riser, and threaded end caps. The outer filter pack consisted of 10/20 sand added up to 1 foot above the top of the screen, with bentonite chips added near the surface. The monitoring wells were completed with flush mount monuments.

Following development, groundwater sampling activities were conducted in general accordance with ADEC's Field Sampling Guidance from January 2022. The groundwater elevation in CF-12 was 23.77 feet MSL, in CF-3 was 24.061 feet MSL , in CF-5 was 23.88 feet MSL, in JIA-12 was 23.21 feet MSL, in JIA-10 was 23.62 feet MSL, and in JIA-8 was 23.83 feet MSL during sampling. Groundwater flow contours are shown on *Figure 4. Groundwater Monitoring Wells and Groundwater Contours*. Groundwater flow is to the southwest. CES personnel used a Proactive Storm 50® pump and Teflon tubing to collect groundwater samples after purging. During purging, CES removed at least one casing volume of water. Prior to handling any groundwater, CES personnel donned a new pair of disposable nitrile gloves, changing gloves before collecting each sample. Groundwater samples were placed into laboratory-certified containers: 40-mL VOA vials, 100 mL or 1-L amber glass jars, or 100 mL HDPE containers. Samples to be analyzed for DRO, DRO, RRO, and VOCs were immediately preserved with hydrochloric acid (HCl), while samples for total metals were preserved with nitric acid (HNO3). Groundwater samples for PAH analysis were left unpreserved. All sample containers were labeled with the project name, sample identification number, date and time of collection, preservative used, requested analysis, and sampler's initials. The samples were stored in a cooler with ice (maintained at 4°C ± 2°C) until delivery to the contract laboratory.

5 Soil & Groundwater Constituents of Concern

Based on the historical site usage and sampling conducted to date, the following are the soil & groundwater constituents of potential concern (COCs):

- Gasoline Range Organics (GRO)
- Diesel Range Organics (DRO)
- Residual Range Organics (RRO)
- Polyaromatic Hydrocarbons (PAHs)
- Volatile Organic Compounds (VOCs)
- Metals

6 ADEC Cleanup Levels

For this investigation, soil analytical data will be compared to the over 40-inch cleanup levels in 18 AAC 75.341 Table B1. Method Two – Soil Cleanup Levels Table and Table B2. Method Two – Petroleum Hydrocarbon Soil Cleanup Levels. Groundwater analytical data will be compared to ADEC Groundwater Human Health Cleanup Levels in 18 AAC 75.341 Table C. Groundwater Cleanup Levels.

7 Analytical Methods

Soil samples were analyzed by our contract laboratory, Fremont Analytical, Inc. for the following:

- Gasoline Range Organics (DRO) using Alaska Method AK101
- Diesel Range Organics (DRO) using Alaska Method AK102
- Residual Range Organics (RRO) using Alaska Method AK103
- Polyaromatic Hydrocarbons (PAHs) using USEPA Method 8270E SIM
- Volatile Organic Compounds (VOCs) using USEPA Method 8260D
- Total Metals using USEPA Method 6020B

Groundwater samples were analyzed by Fremont Analytical, Inc. for the following:

- Gasoline Range Organics (DRO) using Alaska Method AK101
- Diesel Range Organics (DRO) using Alaska Method AK102
- Residual Range Organics (RRO) using Alaska Method AK103
- Polyaromatic Hydrocarbons (PAHs) using USEPA Method 8270E SIM
- Volatile Organic Compounds (VOCs) using USEPA Method 8260D
- Total Metals using USEPA Method 6020B

CES conducted analytical data validation by completing the ADEC Laboratory Data Review Checklist for each laboratory data deliverable.

8 Soil Analytical Results

Table 1, Summary of Soil Analytical Results in Attachment A summarize the soil sampling results relative to ADEC soil cleanup levels. Table 2, Summary of Detected Soil Analytical Results in Attachment A summarize the detected soil sampling results relative to ADEC soil cleanup levels. The locations of the samples are shown on *Figure 4. Soil Boring & Monitoring Well Locations.*

- **GRO:** Detected in 9 of 52 soil samples with concentrations ranging from 35.3 mg/kg to 2,290 mg/kg. Eight samples exceeded the ADEC Method 2 Migration to Groundwater Cleanup Level of 260 mg/kg: 407 mg/kg (CF-1-6), 740 mg/kg (CF-10-8), 2,290 mg/kg (CF-11-4), 1,290 mg/kg (CF-11-10), 428 mg/kg (CF-12-8), 469 mg/kg (JIA-2-6), 617 mg/kg (JIA-2-10), 1,780 mg/kg (JIA-5-4.5). Two samples exceeded the Ingestion and Inhalation Cleanup Levels of 1,400 mg/kg: 2,290 mg/kg (CF-11-4) and 1,780 mg/kg (JIA-5-4.5).
- **DRO:** Detected in 14 of 52 soil samples with concentrations ranging from 63.7 mg/kg to 3,500 mg/kg. Twelve samples exceeded the ADEC Method 2 Migration to Groundwater Cleanup Level of 260 mg/kg: 478 mg/kg (CF-1-06), 992 mg/kg (CF-1-6), 626 mg/kg (CF-10-8), 3,500 mg/kg (CF-11-4), 2,460 mg/kg (CF-11-8), 932 mg/kg (CF-11-10), 1,620 mg/kg (CF-12-06), 1,010 mg/kg (CF-12-8), 956 mg/kg (JIA-2-6), 543 mg/kg (JIA-2-8), 1,150 mg/kg (JIA-2-10), and 604 mg/kg (JIA-5-4.5). All detected DRO concentrations were below the ADEC Method 2 Ingestion and Inhalation Cleanup Levels.
- **RRO:** Detected in 13 of 52 soil samples with concentrations ranging from 352 mg/kg to 8,430 mg/kg. One sample exceeded the ADEC Method 2 Ingestion Cleanup Level of 8,300 mg/kg: 8,430 mg/kg (CF-11-4).
- **METALS:** Five metals (Arsenic, Barium, Cadmium, Lead, and Selenium) were detected in the soil samples. Arsenic concentrations ranged from 0.608 mg/kg to 6.83 mg/kg, exceeding the ADEC Method 2 Migration to Groundwater Cleanup Level of 0.2 mg/kg in all soil samples.

All detected arsenic concentrations were below the ADEC Human Health Cleanup Level.
No other metals were detected above ADEC Method 2 Migration to Groundwater Cleanup Levels or ADEC Human Health Cleanup Levels.

- **VOCs:** Four VOCs (1,3,5-Trimethylbenzene, Ethylbenzene, Methylene Chloride, and Toluene) were detected in the soil samples. 1,3,5-Trimethylbenzene was detected at 4.32 mg/kg (CF-11-4), exceeding the ADEC Method 2 Migration to Groundwater Cleanup Level of 0.66 mg/kg. The detected concentration of 1,3,5-Trimethylbenzene was below the ADEC Human Health Cleanup Level. No other VOCs were detected above ADEC Method 2 Migration to Groundwater Cleanup Levels or ADEC Human Health Cleanup Levels.
- **PAHs:** Fourteen PAHs (1-Methylnaphthalene, 2-Methylnaphthalene, Acenaphthene, Anthracene, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(g,h,i)perylene, Chrysene, Fluoranthene, Fluorene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene) were detected in the soil samples. None of the detected PAHs exceeded ADEC Method 2 Migration to Groundwater Cleanup Levels or ADEC Human Health Cleanup Levels.

9 Groundwater Analytical Results

Table 3 in Attachment A provides a summary of the groundwater sampling results relative to ADEC Groundwater Human Health Cleanup Levels. Table 4 in Attachment A summarizes the detected groundwater sampling results in relation to ADEC Groundwater Human Health Cleanup Levels. The locations of the groundwater wells are shown in Figure 4, Soil Boring & Monitoring Well Locations.

- **GRO**: Detected in 1 of 6 groundwater samples at a concentration of 66.8 µg/L (CF-12), which is below the ADEC Groundwater Human Health Cleanup Level of 2,200 µg/L.
- **DRO**: Detected in 2 of 6 groundwater samples with concentrations ranging from 311 µg/L (JIA-12) to 1,430 µg/L (CF-12). None of the detected DRO concentrations exceed the ADEC Groundwater Human Health Cleanup Level of 1,500 µg/L.
- **RRO**: Detected in 1 of 6 samples at a concentration of 769 µg/L (CF-12), which is below the ADEC Groundwater Human Health Cleanup Level of 1,100 µg/L.
- **Arsenic**: Detected in all 6 groundwater samples with concentrations ranging from 0.757 µg/L (CF-5) to 14.9 µg/L (CF-12). All detected arsenic concentrations exceed the ADEC Groundwater Human Health Cleanup Level of 0.52 µg/L.
- **Barium**: Detected in all 6 groundwater samples with concentrations ranging from 128 µg/L (CF-3) to 525 µg/L (JIA-12). All detected barium concentrations are below the ADEC Groundwater Human Health Cleanup Level of 3,800 µg/L.
- **Cadmium**: Detected in all 6 groundwater samples with concentrations ranging from 0.122 µg/L (CF-3) to 0.786 µg/L (CF-12). All detected cadmium concentrations are below the ADEC Groundwater Human Health Cleanup Level of 5 µg/L.
- **Lead**: Detected in all 6 groundwater samples with concentrations ranging from 0.839 µg/L (CF-5) to 29.5 µg/L (JIA-12). Three detected lead concentrations, 25.3 µg/L (CF-12) and 29.5 µg/L (JIA-12), exceed the ADEC Groundwater Human Health Cleanup Level of 15 µg/L.
- **Selenium**: Detected in 5 of 6 groundwater samples with concentrations ranging from 0.272 µg/L (CF-3) to 0.945 µg/L (JIA-12). All detected selenium concentrations are below the ADEC Groundwater Human Health Cleanup Level of 100 µg/L.
- **VOCs**: Two VOCs were detected below ADEC Groundwater Human Health Cleanup Levels in one groundwater sample: 1,2,4-Trimethylbenzene at 0.809 µg/L (CF-12) and sec-Butylbenzene at 0.608 µg/L (CF-12), below the cleanup levels of 56 µg/L and 2,000 µg/L, respectively.
- **PAHs**: Two PAHs were detected below ADEC Groundwater Human Health Cleanup Levels in one groundwater sample: 1-Methylnaphthalene at 1.12 µg/L (CF-12) and Fluorene at 0.103 µg/L (CF-12), below the cleanup levels of 11 µg/L and 290 µg/L, respectively.

10 Quality Control Summary

CES has performed a two-step Data Quality Assurance Assessment on the soil and groundwater data. The first step included assessment of the quality of the data generated to identify and summarize any quality control problems noted after the data and field notes were reviewed. The second step was to determine whether or not the quality of the data is sufficient for the intended purpose.

CES has reviewed all laboratory results, including laboratory quality control (QC) sample results, and have evaluated the results for quality, and usability. The data quality review indicates no data quality issues associated with the laboratory reports, data quality is adequate, and the results can be used to characterize contaminant concentrations at the site. The ADEC Lab Data Review Checklists (LDRCs) completed by CES for each laboratory work order are included in Attachment B. Any data quality issues associated samples are further discussed in the LDRCs.

Field duplicate samples were obtained by collecting two identical sets of samples from a single sample location. The duplicate samples were analyzed for the same parameters analyzed in the original sample. The field duplicates were submitted as blind samples to the laboratory for analysis, given a unique sample number and sample collection time, and adequately documented in the field record or log book. Field duplicate results were used to calculate and report a precision value for field sampling quality control.

- CES collected five duplicates in soil (CF-11-4 & CF-11-4-1, JIA-6-6 & JIA-6-6-1, JIA-1-1 & JIA-1-1-1, JIA-2-6 & JIA-2-6-1, and JIA-6-2 & JIA-6-2-1).
- The relative percent differences (RPDs) for the soil duplicates during the sampling event are within the allowable tolerance of 50% with the exception of Arsenic 51%, Lead 67% and Selinium 84% (CF-11-4 & CF-11-4-1) and Cadmium 51%, Lead 60% and Selinium 53% (JIA-2-6 & JIA-2-6-1)
- CES collected one duplicate in groundwater (CF-12 & CF-12-1).
- The relative percent differences (RPDs) for the groundwater duplicates during the sampling event are within the allowable tolerance of 30% with the exception of RRO 60% (CF-12 & CF-12-1)
- RPDs are not calculated for constituentss with concentrations below laboratory detection limits.

CES compared the soil and groundwater detection limits (DL) with the ADEC Cleanup Levels. DLs were above the ADEC Method II Cleanup Levels for Migration to Groundwater for the following: 1,1,1,2-Tetrachloroethane, 1,1,2,2-Tetrachloroethane, 1,1,2-Trichloroethane, 1,2,3-Trichloropropane, 1,2-Dibromoethane (EDB), 1,2-Dibromoethane (EDB), 1,2-Dichloropropane, 2-Hexanone (MBK), Bromodichloromethane, Bromomethane, Carbon tetrachloride, Chloroform, Dibromochloromethane, Dibromomethane, Hexachloro-1,3-butadiene, Naphthalene, Trichloroethene (TCE), Vinyl chloride. DLs were below ADEC Method II Cleanup Levels for Migration to Groundwater for all groundwater samples with the exception of 1,1,2-Trichloroethane, 1,2,3-Trichloropropane, 1,2-Dibromoethane (EDB), Vinyl chloride.

With the exception of 1,1,2-Trichloroethane, 1,2,3-Trichloropropane, 1,2-Dibromoethane (EDB), and Vinyl chloride, all of the constituents with elevated DLs in soil were met in the groundwater samples and were not-detected. 1,1,2-Trichloroethane is primarily used as an industrial solvent and in the production of other chemicals. 1,2,3-Trichloropropane is a synthetic chemical used primarily as a solvent and an

intermediate in chemical manufacturing. Vinyl chloride is a key industrial chemical used in the production of polyvinyl chloride (PVC). 1,1,2-Trichloroethane, 1,2,3-Trichloropropane, and Vinyl chloride are not typically present in petroleum fuels. 1,2-Dibromoethane (EDB) was historically used as a gasoline additive in leaded fuels to prevent engine knocking. However, its use in this context has been largely phased out. While it was present in some formulations of petroleum fuels in the past, it is not commonly found in fuels today.

11 Investigation-Derived Wastes (IDW)

During the investigative work, CES generated IDW that includes the following:

- Used personal protective equipment (PPE)
- Disposable sampling equipment
- Decontamination fluids
- Soil drill cuttings
- Purged Groundwater
- Used PPE and disposable sampling equipment was double bagged and placed in a municipal refuse dumpster. These wastes are not considered hazardous and was sent to the local landfill. Any PPE and disposable equipment that was disposed of which can still be reused was rendered inoperable before disposal in the refuse dumpster.
- Decontamination fluids (residual contaminants, water with non-phosphate detergent) and purged groundwater (contaminants, water) were containerized in a 55-gallon, Department of Transportation (DOT) approved, steel drum labeled as to type of waste (water), the source location, and date. The container is labeled and secured, and will remain on-site pending management, characterization, profiling and disposal of IDW generated by CES.
- Soil drill cuttings were containerized in a 55-gallon, Department of Transportation (DOT) approved, steel drum labeled as to type of waste (soil), the source location, and date. The container is labeled and secured, and will remain on-site pending management, characterization, profiling and disposal of IDW generated by CES.

CES will request an ADEC Contaminated Media Transport and Treatment or Disposal Approval Form, and coordinate transport and disposal of the water/soil as hazardous or non-hazardous waste at a ADEC and USEPA approved disposal facility after profiling is complete. No contaminated media will be transported off-site until a ADEC Contaminated Media Transport and Treatment or Disposal Approval Form is issued.

12 Exposure Pathway Analysis

CES has conducted an exposure pathway analysis which includes completion of the ADEC Human Health Conceptual Site Model Scoping Form And Standardized Graphic and the ADEC Human Health Conceptual Site Model Graphic Form (Attachment D).

Surface Soil Contact

Direct contact with surface soil is possible for construction workers involved in surface excavation activities. Direct contact with soil comprises two exposure routes, ingestion of soil (incidental ingestion of soil through everyday hand-to-mouth activities and the ingestion of soil as airborne dust particles) and dermal absorption (absorbed into the body through the skin).This pathway must be investigated if contamination is found or suspected in the surface soil (0-2 ft bgs). The pathway is still complete regardless of concentration, but may be considered insignificant if concentrations are below 1/10th the Table B1 Human Health Soil Cleanup Values. The Human Health Soil Cleanup Level is considered protective of both ingestion of soil and dermal exposure to soil.

- This pathway is considered to be complete.
- Contamination is present in surface soil (0 to 2' below ground surface) above ADEC Method 2 Cleanup Levels for Migration to Groundwater, Ingestion, Inhalation, or Human Health.
- GRO, DRO, RRO, and 1,3,5-Trimethylbenzene contamination above the ADEC Method 2 Ingestion and Inhalation (GRO), Migration to Groundwater (DRO), Ingestion (DRO), and Migration to Groundwater (1,3,5-Trimethylbenzene) Cleanup Levels remains in the vicinity of the historic waste oil burner on the Channel Flying Property and the JIA property to the south.
- This pathway could be an "exposure controlled" pathway through an Institutional Control (IC).

Subsurface Soil Contact

Direct contact with subsurface soil is possible for construction workers involved in subsurface excavation activities. Direct contact with soil comprises two exposure routes, ingestion of soil and dermal absorption of contaminants from soil. This pathway must be investigated if contamination is found or suspected in the subsurface soil down to a depth of at least 15 ft bgs. The pathway is considered complete for subsurface soil between 2 and 15 ft bgs unless permafrost, bedrock, or site conditions prohibit excavation. The pathway is still complete regardless of concentration, but may be considered insignificant if concentrations are below 1/10th the Table B1 Human Health Soil Cleanup Values. The Human Health Soil Cleanup Level is considered protective of both ingestion of soil and dermal exposure to soil.

- This pathway is considered to be complete.
- Contamination is present in surface soil (2 to 15' below ground surface) above ADEC Method 2 Cleanup Levels for Migration to Groundwater, Ingestion, Inhalation, or Human Health.
- GRO, DRO, RRO, and 1,3,5-Trimethylbenzene contamination above the ADEC Method 2 Ingestion and Inhalation (GRO), Migration to Groundwater (DRO), Ingestion (DRO), and Migration to Groundwater (1,3,5-Trimethylbenzene) Cleanup Levels remains in the vicinity of the historic waste oil burner on the Channel Flying Property and the JIA property to the south.
- This pathway could be an "exposure controlled" pathway through an Institutional Control (IC).

Groundwater

Direct contact with groundwater is possible if construction workers involved in subsurface activities excavate down to the water table or if a private groundwater drinking water well was installed on the site. The ingestion of contaminants in groundwater should be considered a complete pathway if contaminants are detected in groundwater or could migrate to groundwater and the groundwater is considered a drinking water source. Groundwater at a site is assumed to be a current or future drinking water source unless it can be demonstrated, to ADEC's satisfaction, that it will not be used as such.

Determining that the ingestion of groundwater pathway is complete does not mean that there is current exposure resulting in unacceptable risk. Concentrations below cleanup levels do not mean the pathway is incomplete, but it may be considered insignificant if concentrations are below 1/10th of Table C values.

If soil is contaminated and groundwater is present, soil contaminants may migrate to groundwater. Ingestion of groundwater is a complete pathway for commercial or industrial workers in this case as well, unless the requirements of 18 AAC 75.350 have been met to determine that groundwater is not a current or future drinking water source.

Lack of current contamination in groundwater alone may not be sufficient evidence to determine if contaminants could migrate in the future. Characterization of site conditions (e.g., presence of impermeable layers, attenuation of contaminants with depth) or modeling, subject to ADEC approval, may also be used to determine the likelihood that contamination in groundwater could occur in the future. If contaminants in soil are less than 1/10 Table B1 and B2 Cleanup Levels for the human health exposure pathways in addition to being less than the migration to groundwater cleanup level, then the migration to groundwater pathway may be deemed insignificant.

- This pathway is considered to be complete.
- GRO, DRO, RRO, and 1,3,5-Trimethylbenzene contamination above the ADEC Method 2 Ingestion and Inhalation (GRO), Migration to Groundwater (DRO), Ingestion (DRO), and Migration to Groundwater (1,3,5-Trimethylbenzene) Cleanup Levels remains in the vicinity of the historic waste oil burner on the Channel Flying Property and the JIA property to the south.
- Arsenic groundwater contamination is present above the ADEC Groundwater Human Health Cleanup Level of 0.52 µg/L in all six groundwater monitoring wells.
- Lead groundwater contamination is present above the ADEC Groundwater Human Health Cleanup Level of 15 µg/L in CF-12 and JIA-12.
- This pathway could be an "exposure controlled" pathway through an Institutional Control (IC).

Inhalation of Outdoor Air

Volatile constituents in soil may potentially be released to ambient (outdoor) air through volatilization. Commercial or industrial workers and/or construction workers could be exposed to vapors via inhalation. The inhalation of contaminants in outdoor air is a complete pathway for volatile chemicals that are

present in surface and subsurface soil. This pathway should only be eliminated if there are no volatile compounds in soil. This pathway should also be investigated for GRO and DRO.

A complete pathway does not mean that the exposure results in unacceptable risk at the site. Low concentrations of contaminants do not imply that the pathway is incomplete, but if they are below 1/10th of the human health cleanup level, the pathway may be considered insignificant.

- GRO, DRO, RRO, and 1,3,5-Trimethylbenzene contamination above the ADEC Method 2 Ingestion and Inhalation (GRO), Migration to Groundwater (DRO), Ingestion (DRO), and Migration to Groundwater (1,3,5-Trimethylbenzene) Cleanup Levels remains in the vicinity of the historic waste oil burner on the Channel Flying Property and the JIA property to the south.
- This pathway is considered to be complete but insignificant, as the VOCs and PAHs detected in soil are below 1/10th of the human health cleanup level.

Inhalation of Indoor Air

Volatile constituents in soil and groundwater may potentially intrude into the indoor air of current & future buildings. Commercial or industrial workers and/or construction workers could be exposed to vapors via inhalation.

The vapor intrusion pathway should be considered complete if petroleum contamination is found within 30 feet, or other non-petroleum contamination is found within 100 feet (horizontally or vertically) of a building or potential location for a building. ADEC will generally not require an evaluation for vapor intrusion if the only chemicals of concern at a site are the GRO, DRO, and residual range organic (RRO) petroleum fractions.

DEC does not have regulatory cleanup levels for the vapor intrusion pathway; however, the DEC Vapor Intrusion Guidance for Contaminated Sites (2016) provides target levels for groundwater, soil gas, and indoor air. Soil data are not good predictors of soil gas concentrations, and are therefore not used by DEC to predict risk posed by the indoor air pathway. Once chemical concentrations are measured in groundwater, soil gas, and indoor air, risk from the vapor intrusion pathway can be estimated using the target levels. Decisions about site characterization, assessment, management and cleanup should take this additional pathway under consideration. Absence of existing buildings on site does not necessarily preclude the elimination of the vapor intrusion pathway from possible consideration.

- GRO, DRO, RRO, and 1,3,5-Trimethylbenzene contamination above the ADEC Method 2 Ingestion and Inhalation (GRO), Migration to Groundwater (DRO), Ingestion (DRO), and Migration to Groundwater (1,3,5-Trimethylbenzene) Cleanup Levels remains in the vicinity of the historic waste oil burner on the Channel Flying Property and the JIA property to the south.
- This pathway is considered to be complete but insignificant, as the VOCs and PAHs detected in soil are below 1/10th of the human health cleanup level.

Surface Water

For receptors with potential exposure to surface water, incidental ingestion of surface water, dermal absorption of contaminants in surface water, and inhalation of volatile constituents in tap water are the exposure pathways/routes evaluated.

Surface water can become affected by site contaminants from direct discharge, overland flow, or migration from groundwater. It is important to know if a contaminated surface water body, such as a lake or stream, is used as a drinking water source. Use of the drinking water could be seasonal, such as during recreational or subsistence activities, but this is not preclude it from being considered a complete exposure pathway.

Even if ingestion of surface water is not a complete pathway, Alaska's water quality standards for surface water (18 AAC 70) must be met during cleanup.

- This pathway is considered to be incomplete.
- There is no surface water in the vicinity of the site.

Sediment

Direct contact with sediment involves people coming into contact with sediment, such as during some recreational, subsistence, or industrial activities. People then incidentally ingest sediment from normal hand-to-mouth activities. In addition, dermal absorption of contaminants may be of concern if the contaminants are able to permeate the skin. This type of exposure should be investigated if: Climate permits recreational activities around sediment or the community has identified subsistence or recreational activities that would result in exposure to the sediment, such as clam digging.

- This pathway is considered to be incomplete.
- There is no sediment in the vicinity of the site.

Ingestion of Wild & Farmed Foods

For receptors with potential exposure to biota, ingestion of wild or farmed foods is the exposure pathways/route evaluated. Exposure to site-related contaminants through the ingestion of wild or farmed foods should be investigated if the site is used for hunting, fishing, or harvesting of wild or farmed foods. It should also be investigated if hunting or fishing is conducted near the site and animals are exposed to the site. This pathway is of particular concern when contaminants have the potential to bioaccumulate in the food chain. Current and future land use should be considered. This pathway is of particular concern to residents, subsistence users, and recreational users at a site. The parts and quantities of animals and plants consumed by subsistence harvesters vary greatly across Alaska. Consultation with subsistence users to determine relevant pathways is strongly recommended. Contaminants from soil, sediment, surface water, or other plant and animal life can accumulate in plants and animals that are eaten by people.

ADEC does not have cleanup levels specifically designed to be protective of the ingestion of wild and farmed foods pathway. If this pathway is complete, further evaluation – either qualitative or quantitative -- may be necessary to aid risk management decisions.

- The site and adjacent properties do not offer significant exposure to biota or exposure from wild harvest or farmed foods opportunities.
- This pathway is considered to be incomplete.

13 Summary & Recommendations

- GRO soil contamination is present above the ADEC Method 2 Ingestion and Inhalation Cleanup Levels of 1,400 mg/kg in CF-11-4 and JIA-5-4.5.
- DRO soil contamination is present above the Migration to Groundwater Cleanup Level of 260 mg/kg in CF-1-06, CF-1-6, CF-10-8, CF-11-4, CF-11-8, CF-11-10, CF-12-06, CF-12-8, JIA-2-6, JIA-2-8, JIA-2-10, and JIA-5-4.5.
- RRO soil contamination is present above the ADEC Method 2 Ingestion Cleanup Level of 8,300 mg/kg in CF-11-4.
- Arsenic soil contamination is present above the ADEC Method 2 Migration to Groundwater Cleanup Level of 0.2 mg/kg in all soil samples.
- 1,3,5-Trimethylbenzene soil contamination is present above the ADEC Method 2 Migration to Groundwater Cleanup Level of 0.66 mg/kg in CF-11-4.
- Arsenic groundwater contamination is present above the ADEC Groundwater Human Health Cleanup Level of 0.52 µg/L in all six groundwater monitoring wells.
- Lead groundwater contamination is present above the ADEC Groundwater Human Health Cleanup Level of 15 µg/L in CF-12 and JIA-12.
- GRO, DRO, RRO, and 1,3,5-Trimethylbenzene soil contamination above the ADEC Method 2 Ingestion and Inhalation (GRO), Migration to Groundwater (DRO), Ingestion (DRO), and Migration to Groundwater (1,3,5-Trimethylbenzene) Cleanup Levels remains in the vicinity of the historic waste oil burner on the Channel Flying Property and the JIA property to the south. The horizontal & vertical extent of the GRO, DRO, RRO, and 1,3,5-Trimethylbenzene soil contamination has been delineated.
- GRO, DRO, RRO, and 1,3,5-Trimethylbenzene groundwater contamination is not present above ADEC Groundwater Human Health Cleanup Levels in the vicinity of the historic waste oil burner on the Channel Flying Property and the JIA property to the south. The horizontal extent of the GRO, DRO, RRO, and 1,3,5-Trimethylbenzene groundwater contamination has been delineated.
- Arsenic soil and groundwater contamination is present across the entire subject property. Arsenic is not a typical component of petroleum fuels and it is not intentionally added to gasoline or diesel fuel as part of the refining process. However, trace amounts of arsenic can sometimes be found in petroleum and petroleum products as contaminants. These trace amounts can originate from the crude oil itself or from the refining process if the crude oil came from arsenic-containing geological formations. Additionally, Arsenic is a naturally occurring metal in Alaska. It is often found in concentrations above ADEC Method 2 Cleanup Levels. These concentrations are typically referred to as “background.” The presence of arsenic may be considered naturally occurring if a site has no known or suspected anthropogenic arsenic sources. Naturally occurring arsenic is released into the environment by volcanoes and through weathering of arsenic-containing minerals and ores.
- Lead groundwater contamination is present above the ADEC Groundwater Human Health Cleanup Level in the vicinity of the historic waste oil burner on the Channel Flying Property and the JIA property to the south. The horizontal extent of the Lead groundwater contamination has not been delineated.

- CES recommends additional groundwater wells be installed on the JIA property to delineate the extent of the lead groundwater contamination plume to the south and west.
- CES recommends a long-term groundwater monitoring plan be developed to monitor lead groundwater contamination on the JIA property to determine if concentrations are increasing/decreasing/or have reached steady-state conditions.
- CES recommends after the extent of the lead groundwater contamination plume is delineated the site be evaluated by ADEC for Site Closure with a determination of "Cleanup Complete with Institutional Controls".
    - At sites where residual hazardous substances do not currently pose an unacceptable risk to human health, safety, welfare or to the environment, but where ADEC determines limitations on future land or water use are necessary to prevent activities that could result in exposure and increased risk or the spread of contaminants, institutional controls (ICs) will be required (18 AAC 75.375(a) and 18 AAC 78.625(a)).
    - ICs must be applied to sites where a cleanup complete decision is being made and current or potential future exposure to contaminated media (soil, groundwater, sediment, surface water and/or air) could pose an unacceptable risk to human health, safety, or welfare, or to the environment. This includes sites where contamination remains in place above applicable cleanup levels in soil and/or groundwater; sites with approved alternative cleanup levels developed under Methods 3 or 4 that are based on assumed limitations on future land or groundwater use; sites were groundwater is determined not to be a current or reasonably expected future drinking water source (350 determination); and sites where maintenance of engineering controls such as a cap over contaminated soil, signs or fencing are necessary.
    - If ICs are required, they must be established in an environmental covenant, notice of activity and use limitation, and/or another approved IC mechanism, and ADEC must validate their effectiveness through periodic reporting by the responsible person or landowner.
    - Any determination that a cleanup is complete may be subject to a future determination that the cleanup or applicable ICs are not protective of human health, safety, or welfare, or of the environment, per 18 AAC 75.380(d)(2) and/or 18 AAC 78.276(£)(2).
    - If ADEC makes a determination that conditions at a site are no longer protective, the site will be reopened and additional action will be necessary to meet the requirements of the UST regulations or Site Cleanup Rules.