THE STATE of ALASKA
GOVERNOR BILL WALKER

Department of Environmental Conservation

Division of Spill Prevention and Response
Contaminated Sites Program

610 University Ave.
Fairbanks, Alaska 99709-3643
Main: 907.451.2181
Fax: 907.451.5105
www.dec.alaska.gov

File No: 1510.38.005
1510.26.001

June 13, 2017

Mr. Dave Hanneman
Environmental Engineer
Federal Aviation Administration
222 W. 7th Ave, Suite 14
Anchorage, AK 99513

Re: Decision Document: FAA – Sisters Island Station

Dear Mr. Hanneman,

The Alaska Department of Environmental Conservation (ADEC) has reviewed the environmental records for various areas of concern (AOC) at the Federal Aviation Administration (FAA) Sisters Island (SSR) station. This decision letter memorializes the site history, cleanup actions, ADEC decision and any applicable conditions for long-term site management of each AOC.

Site Name and Location:
FAA - Sisters Island
The Sisters in Icy Straight
Hoonah, AK 99829

Name and Mailing Address of Contact Party:
Dave Hanneman
Federal Aviation Administration
222 W. 7th Ave, Suite 14
Anchorage, AK 99513

DEC Site Identifiers:
File No: 1510.38.005
Hazard ID: 1984

File No: 1510.26.001
Hazard ID: 24948

Regulatory Authority for Determination:
18 AAC 75, 18 AAC 78

Document Purpose and Organization

This decision document covers all AOC's identified by the FAA throughout Sisters Island (SSR) over the course of cleanup activities, in an effort to consolidate and record the status of all AOC's in a single document. Some of the AOCs have already received some form of closure letter from ADEC and some have not.

The ADEC Contaminated Sites database shows two entries for SSR (File No: 1510.26.001, Hazard ID: 24948 and File No: 1510.38.005, Hazard ID: 1984). File 1510.26.001 includes only the AOCs associated with tanks 41-B-001(Regulated UST) and 41-C-001. File 1510.38.005 includes all other AOCs, in general terms, resulting from the initial PA/SI documented in a report by E&E in 1992.

A 5 December 2006 letter from ADEC to FAA (See Appendix B) provides the most complete AOC list, and summary of the status of each AOC as of December 2006. The basis for the table in the December 2006 letter is the Environmental Compliance Investigation Report (ECIR) from 1992, which was the first effort by FAA to identify potential sources of contamination and releases to the environment. At SSR there are AOCs that resulted from a release associated with a single source (i.e. fuel tank, portion of a fuel line, etc), and there are AOCs that had more than one source in close proximity to each other, whose resulting contamination is comingled into a single volume of contaminated soil/groundwater.

This decision document is generally organized by the name given to an AOC in the most recently applicable reports (2009-2011) documenting work at that AOC. The AOCs are listed in order, starting at the northern end of the island and proceeding southerly.

This decision document includes all information necessary to understand the detailed history and results of cleanup activities associated with each AOC. The document includes a Site Description and Background, Cleanup Levels & Contaminants of Concern, Characterization and Cleanup Activities, Cumulative Risk Evaluation, Exposure Pathway Evaluation, and ADEC Decision.

Sisters Island General Description and Background

Sisters Island is located in the Icy Strait, approximately 25 miles southwest of Juneau, Alaska. The FAA Station is located at 58° 10' north latitude, and 135° 15' west longitude. The United States Public Land Survey coordinates are Township 43 South, Range 62 East, Section 3, Copper River Meridian. The island is accessible by float plane, helicopter or boat.

Sisters Island consists of approximately 34 acres leased from the United States Forest Service (USFS). Originally the FAA had full time personnel stationed on SSR. The FAA constructed housing, shops, water storage/treatment, prime power generation, fuel storage and delivery/supply piping, and various aids to navigation systems from approximately 1945 to the present. Most of the original buildings and structures have been removed. Current navigational aid facilities include the VORTAC, NDB and weather camera. Current structures include a combination shop/transient living quarters at Building 616, the VORTAC building, hazardous materials storage, NDB building, fuel tank farm and fuel delivery pipeline.

Currently, there are no permanent inhabitants on Sisters Island. FAA personnel from Juneau perform regular maintenance to the navigational systems on the island and stay in the transient quarters during these visits.

Chronology of Environmental Cleanup and Fuel Storage Tank Project Work

Environmental cleanup and fuel storage tank project work at SSR was generally done in large contracts covering many AOCs in each contract, due to the high cost of mobilization to the island. Following is a general description of work, and important milestones/correspondence, throughout the environmental cleanup history at SSR. The descriptions are general in nature and are meant to provide the "big picture" of work at SSR. Details are provided in the descriptions of work/results for each AOC in this decision document.

1991 ECIR and Hazardous Waste Removal

In August 1991, field work for the Environmental Compliance Investigation Report (ECIR) for the Sisters Island FAA station was conducted, with the final report dated May 1992. The report's primary purpose was to conduct a preliminary assessment/site investigation (PA/SI) for each site included in the report and to make a recommendation regarding any need for further remedial action. The secondary purpose of an ECI was to identify other potential environmental compliance issues at the station and observe hazardous material housekeeping and management practices. A toxic and hazardous materials (THM) inventory was also prepared.

The PA/SI level document (called the Environmental Compliance Investigation Report, or ECIR) was sent to EPA for use in their hazard ranking system scoring for SSR. The site was listed on EPA's Federal Hazardous Waste Compliance (FHWCD) under CERCLA 103c in the eighth publication on 11/10/1993 and received no further remedial action planned (NFRAP) on 4/1/1994. The ECIR forms the basis of the inventory of AOCs identified by ADEC.

Phase 1(of 2) hazardous waste removal/disposal actions were conducted in September 1991. Phase 1 removed all waste identified during the THM survey.

Documents:

1. Environmental Compliance Investigation Report, Sisters Island FAA Station, Sisters Island, Alaska, May 1992, Ecology and Environment.

   AOCs addressed in this document: VORTAC Area-Former Drum Rack/Gasoline AST Area, VORTAC Area-Former Burn Barrel, Former Incinerator Area and Dump Site, Building 102 Area, Pump House Area, Standby Generator Facility, Building 412 Area, Building 632 Area, Boat House Facility, Abandoned Pump House Facility, First Tank Farm/Building 207 Area, Former Tank Farm Area, H Marker Facility, Metal Shed Facility, Fuel Delivery Line, 1.25 Inch Fuel Line Site.

2. Trip Report, Federal Aviation Administration, Hazardous Waste Removal/Disposal Project, Sisters Island, Alaska, April 1992, Ecology and Environment.

1992 Hazardous Waste Removal

Phase 2 hazardous waste removal was conducted in October. Its purpose was to remove waste accumulated after the September 1991 removal action was complete. Phase 2 also included removal of the incinerator and limited soil sampling at the incinerator area.

A soil sample was collected from the area beneath the former incinerator for laboratory analysis of TRPH, EPH, VPH, BTEX, VOC, BNA, PCB, Dioxin and metals. TRPH was 51,000 milligrams per kilogram (mg/kg), EPH was 1,500 mg/kg, VPH was 340 mg/kg, total xylene was 350 ug/kg, ethylbenzene was 130 ug/kg, VOC/BNA/PCB/Dioxin were non detect, arsenic was 4.9 mg/kg, Cadmium was 5.8 mg/kg, Chromium was 20 mg/kg, Copper was 230 mg/kg, Lead was 110 mg/kg, Nickel was 19 mg/kg and Zinc was 1,100 mg/kg.

Document:

Trip Report, Federal Aviation Administration, Hazardous Waste Removal/Disposal Project, Sisters Island FAA Station, February 1993, Ecology and Environment.

AOCs addressed in this document: Former Incinerator Area and Dump Site

1997-1999 Remedial Activity

Fifteen fuel storage tanks were removed throughout the island, and a secondary 1 1/4" heating oil line was drained and removed. The existing primary fuel line was upgraded, and three new 8,000 gallon AST's at the VORTAC, one 2,000 gallon AST at building 616, and one 500 gallon AST at the new hazmat shed were installed. Contaminated soil was removed from various tank locations, with sample results at the limits of excavation from most tanks indicating petroleum contaminated soil remained in place. Excavated contaminated soil was placed in long term stockpiles and was eventually transported off island and thermally remediated at a permitted facility in Juneau. Limited site characterization work was performed at various AOCs using a backhoe. Due to prime contractor default issues, reports documenting work under this contract are dated from 1998-2001.

Documents: The following documents cover work done during the 1998-2001 period. AOCs covered in the report are in bold following the document title.

1. Sisters Island, Asbestos Abatement/Environmental Upgrade, remedial Action report, Final, May 31 2001, prepared for USACE by Connections Consulting.

   AOCs addressed in this document: VORTAC Area-Former Drum Rack/Gasoline AST Area, VORTAC Area-Former Burn Barrel, Former Incinerator Area and Dump Site, Building 102 Area, Pump House Area, Standby Generator Facility, Building 412 Area, Building 632 Area, Boat House Facility, Abandoned Pump House Facility, First Tank Farm/Building 207 Area, Former Tank Farm Area, H Marker Facility, Metal Shed Facility, Fuel Delivery Line, 1.25 Inch Fuel Line Site.

2. Site Assessment Report, Sisters Island Environmental Upgrade, Sisters Island, Alaska, September 21 1998, GeoEngineers for AEI Pacific Inc.

   AOCs addressed in this document: Building 102 Area, Building 412 Area, Building 632 Area, First Tank Farm/Building 207 Area, Former Tank Farm Area.

3. Revised Site Assessment Report-Volume II, Asbestos Abatement/Environmental Upgrade, 1997-1998 Activities, Federal Aviation Administration, Sisters Island, Alaska, October 4 1999, GeoEngineers for AEI Pacific Inc.

AOCs addressed in this document: VORTAC Area-Former Drum Rack/Gasoline AST Area, Former Tank Farm Area, Fuel Delivery Line Site, 1.25 Inch Fuel Line Site.

4. Release Investigation Report, Environmental Upgrade, Sisters Island, Alaska, 2 February 1998, Geo Engineers for AEI Pacific.

   AOCs addressed in this document: Building 102 Area, Pump House Area, First Tank Farm/Building 207 Area, Former Tank Farm Area

5. Regulated UST Tank Closure Report For FAA Asbestos Abatement Environmental Upgrades, UST 41-C-1, Sisters Island, Alaska, prepared by AEI Pacific Inc, Revised Feb 1998

   AOCs addressed in this document: Standby Generator Facility

6. Revision II, UST Decommissioning Report for Tank 41-B-1, Environmental Upgrade for DACW85-97-C-0023, Federal Aviation Administration, Sisters Island, Alaska, October 4 1999, GeoEngineers for AEI Pacific Inc.

   AOCs addressed in this document: VORTAC Area-Former Drum Rack/Gasoline AST Area

2006 Correspondence

After discussions with FAA, ADEC completed a file review. A 5 December 2006 letter from ADEC to FAA, "Re: FAA Sisters Island, near Wrangell, Alaska; reckey:" (see Appendix B) documents the results of the file review. The file review listed twelve areas of concern that required *"additional characterization or cleanup"*, one area of concern receiving *"site closure"*, and six areas of concern that ADEC determined *"no action is requested"* since no potential sources of contamination were identified. The results of the file review were the basis for the scope of work that took place in 2009 (see below).

Decisions:

Areas of concern requiring *"additional characterization or cleanup"* include: (1) VORTAC Tank 41-B-2, (2) VORTAC burn barrels, (3) Quarters Building 102 Tank 41-C-2, (4) Quarters Building 207 Tank 41-A-7, (5) Quarters building 412, (6) Former Water Tank Building 632 Tank 41-A-8, (7) Tank Farm tanks 41-A-1,2,3,4 and 5, (8) Dump Site/Incinerator, (9) Battery Casing Debris Area, (10) Engine Generator Building 616 Tank 41-B-4, (11) Pump House, (12) Former Tank Farm.

Area of concern receiving *"site closure"* includes: VORTAC Tank 41-B-1(Regulated UST).

Areas of concern that ADEC determined *"no action is requested"* since no potential sources of contamination were identified include: (1) VORTAC Tank 41-B-3, (2) VORTAC 41-B-4, (3) VORTAC 41-C-2, (4) Generator Building 617 Tank 41-C-1, (5) Fuel Line, (6) Engine Generator Building 616 Tank 41-A-6.

2009 Site Investigation

A site investigation was conducted in October 2009 to determine the horizontal and vertical extent of remaining soil and groundwater contamination at multiple AOCs, identified in the 2006 ADEC letter to FAA. The site investigation used the Ultra Violet Optical Screening Tool (UVOST) system, augmented with soil sampling at depth and the installation of groundwater monitoring wells. Groundwater sampling was conducted. Surface soil sampling was conducted utilizing the XRF tool at the battery casing debris area.

Document:

Final, Site Investigation Report, Federal Aviation Administration, Sisters Island, Alaska, March 24 2010, prepared for FAA by AHTNA Government Services Corporation.

AOCs addressed in this document: VORTAC Area-Former Drum Rack/Gasoline AST Area, VORTAC Area-Former Burn Barrel, Former Incinerator Area and Dump Site, Building 102 Area, Pump House Area, Building 412 Area, Building 632 Area, Battery Disposal Area, First Tank Farm/Building 207 Area, Former Tank Farm Area

2009-2010 Groundwater Sampling and Correspondence

Two rounds of groundwater sampling were conducted, one in June 2010 and one in October 2010, at AOCs identified in the 2009 site investigation. June was selected to represent the low water condition, and October was selected to represent the high water condition.

Document:

Draft, 2009/2010 Ground Water Sampling report, Federal Aviation Administration, Sisters Island, Alaska, April 2011, AHTNA Government Services Corp.

AOCs addressed in this document: VORTAC Area-Former Drum Rack/Gasoline AST Area, VORTAC Area-Former Burn Barrel, Building 102 Area, Pump House Area, Building 412 Area, Building 632 Area, First Tank Farm/Building 207 Area, Former Tank Farm Area

Correspondence: FAA received a letter from ADEC, "Re: FAA Sisters Island, near Juneau, Alaska", dated November 19, 2010. The letter references ADEC review and approval of the Final Site Investigation Report from the 2009 field work. FAA requested closure of the VORTAC-Former Burn Barrel Area and Building 632 Area in a 26 March 2010 letter, and requested closure for the Beach Battery Debris Area in a 1 July 2010 letter. The November 19, 2010 letter from ADEC to FAA states *"closure complete status is approved for the VORTAC-area Former Burn Barrel, Building 632 and Beach Battery Debris areas of concern…"*

AOCs closed in this document (No ICs): VORTAC Area-Former Burn Barrel, Building 632 Area, Beach Battery Debris Area

2011 Correspondence and HRC

May 2011: FAA transmitted to ADEC the "Sisters Island DRAFT 2009/2010 Groundwater Sampling Report and DRAFT Sisters Island Groundwater Use Determination", in a letter dated 17 May 2011. The Groundwater Use Determination document presents information to support the conclusion that the groundwater at Sisters Island does not satisfy the criteria to be considered a current or reasonably expected potential future source of drinking water.

August 2011: FAA transmitted to ADEC the "DRAFT Hydrocarbon Risk Calculator Report, FAA Sisters Island, Alaska, Dated 22 August 2011", in a letter dated 29 August 2011. The report utilizes information from the site investigation of 2009 and groundwater sampling of 2009/2010 in the HRC calculations performed to evaluate risk to human health, and to evaluate site closure options for six areas of concern, based on two scenarios for groundwater use. FAA determined to keep the report in DRAFT pending the decision by the landowner concerning groundwater use.

Document:

Draft, Hydrocarbon Risk Calculator Report, Federal Aviation Administration, Sisters Island, Alaska, August 22 2011, AHTNA Government Services Corp.

AOCs addressed in this document: VORTAC Area-Former Drum Rack/Gasoline AST Area, Building 102 Area, Pump House Area, Building 412 Area, Building 632 Area, First Tank Farm/Building 207 Area, Former Tank Farm Area

October 2011: FAA sent a letter to the landowner (USFS), subject: "Landowner Concurrence Concerning Current and Future groundwater Use, Sisters Island FAA Station, Alaska" dated 14 October 2011. The letter transmitted a copy of the Groundwater Use Determination document, provided background on FAA's cleanup activities and requested landowner concurrence on a proposed determination that groundwater is not a "current or reasonably expected potential future source" of drinking water.

2012 Correspondence and Decommissioning Monitoring Wells

March 2012: FAA received a letter from the USFS dated 23 March 2012, referencing the FAA's 14 October 2011 letter. The letter provided landowner concurrence that "groundwater at Sisters Island meets the conditions of 18AAC.350; the groundwater is not a current or reasonably expected potential future drinking water source or a transport mechanism for hazardous substances."

Once the USFS letter concurring with the groundwater determination was received, the final Groundwater Use Document was prepared.

Document:

Final, Sisters Island, Groundwater Use Determination, In Accordance With 18 AAC 75.350, Sisters Island FAA Station Alaska, April 3 2012, AHTNA Government Services Corp.

AOCs addressed in this document: VORTAC Area-Former Drum Rack/Gasoline AST Area, VORTAC Area-Former Burn Barrel, Building 102 Area, Pump House Area, Building 412 Area, Building 632 Area, First Tank Farm/Building 207 Area, Former Tank Farm Area

August 2012: FAA received a letter from ADEC dated 14 August 2012, Re: Sisters Island Groundwater Use Determination in accordance with 18 AAC 75.350. The letter documented the ADEC determination that groundwater at Sisters Island does not meet the criteria to be considered a current or future drinking water source. ADEC also determined that contamination in the groundwater will not be transported to either surface water or to a current or reasonably expected future source of drinking water. The letter states "the migration to groundwater soil cleanup levels are no longer requirements for the cleanup."

September 2012: Groundwater monitoring wells installed during the 2009 site investigation were decommissioned between 26-28 September 2012 in accordance with an approved work plan.

Document:

Decommissioning, Monitoring Wells At, Sisters Island, Final Report, October 4 2012, AHTNA Engineering Services LLC.

AOCs addressed in this document: VORTAC Area-Former Drum Rack/Gasoline AST Area, VORTAC Area-Former Burn Barrel, Building 102 Area, Pump House Area, Building 412 Area, Building 632 Area, First Tank Farm/Building 207 Area, Former Tank Farm Area

October 2012: FAA sent a letter to ADEC dated 15 October 2012, Subject; Final Report, Decommissioning Monitoring Wells, Sisters Island, Alaska. The letter requested a "cleanup complete with institutional controls" determination to be issued by ADEC for the AOCs covered by the HRC report dated 22 August 2011.

Cleanup Levels

Since work has been going on for such a long time at Sisters Island, various ADEC cleanup levels have been applied. Following is a summary of cleanup levels used over the course of work at Sisters Island.

1991 ECIR

ADEC criteria for cleanup of non-UST contaminated soils were utilized for petroleum hydrocarbon constituents covered by ADEC guidance (ADEC 1991). The most stringent guidance (level A) for EPH, VPH, benzene, and BTEX was used as a threshold action level for further evaluation. Any analytes exceeding these criteria were flagged for further evaluation using the ADEC Matrix Score Sheet.

For the evaluation of PCBs in soils, the criterion of 25 ppm was utilized to determine the need for further evaluation of site-specific conditions.

The base action level for 2,3,7,8-TCDD in a residential soil exposure situation was 0.001mg/kg.

For soils at FAA sites, a lead level of 500 mg/kg was chosen as the threshold above which further investigation would be required.

1997-1999 Remedial Activity

The fieldwork at Sisters Island was conducted over the 1997, 1998 and 1999 seasons. During this timeframe, ADEC was rewriting the 18 AAC 75 and 18 AAC 78 regulations, which dictated the cleanup levels for the contaminated soils associated with both regulated and non-regulated tanks. As noted in the Site Assessment Report dated September 21, 1998, the original cleanup levels for the Island were set at Category A and Category B as defined in the ADEC UST program standards (revised October 17, 1997). After discussions with Eileen Olsen of ADEC in June 1998 it was decided that the cleanup levels in the proposed regulations dated May 4, 1998 could be applied to some of the sites on the Island. The new cleanup-levels would apply to 1) the Tank Farm area, 2) AST 41-B-2, 3) VORTAC Burn Barrels, 4) VORTAC Used Oil Tanks, and 5) the regulated UST 41-B-1. ADEC proposed that regulation standards dated May 4, 1998 for Method 1 and Method 2 Closures were the applicable Groundwater Cleanup Standards for the sites.

2009 Site Investigation (SI) and Groundwater Sampling

Soil:

While researching climate data for this site, it was discovered that a different Sisters Island exists in the Aleutian Chain. Previous reports may reference precipitation data for the Sisters Island located in the Aleutian chain, which could be the source of the discrepancies in the reported precipitation data. Based on the close proximity of Sisters Island to Southeast Alaska communities including Hoonah, Gustavas, and Juneau, Ahtna Government Services Corp (AGSC) estimated that Sisters Island receives an average annual precipitation similar to the average annual precipitation received in these communities. Therefore, it was estimated that Sisters Island receives an average of 58 to 61 inches of rainfall a year and soil sample results were thus evaluated against ADEC Method Two, Over 40 Inch Zone cleanup levels. Method Two cleanup levels are listed in 18 AAC 75.341, Tables B1 and B2.

As indicated in 18 AAC 75.341, Table B1, Note 11, the cleanup level for lead is determined on a site specific basis based on land use. FAA assumed the site specific land use to be residential, thus a lead in soil cleanup level of 400 mg/kg was applicable.

Groundwater:

Analytical results for water samples collected were evaluated against ADEC 18 AAC 75.345 Table C cleanup levels. The report documents the groundwater cleanup levels for typical petroleum product contaminants when groundwater is considered a current or potential future drinking water source.

2009-2010 Groundwater Sampling

Analytical results for water samples collected were evaluated against ADEC 18 AAC 75.341 Table C cleanup levels.

2011 Hydrocarbon Risk Calculator (HRC)

Soil:

The data collected during this SI was used to calculate risk to human health and the alternative cleanup levels using the HRC. Method Three site specific cleanup levels were proposed to replace the ADEC Method Two cleanup levels.

Groundwater:

The data collected during this SI was used to calculate risk to human health using the HRC.

2012 Approval of "350 Determination"

ADEC determined that groundwater at Sisters Island does not meet the criteria to be considered a current or future drinking water source per 18 AAC 75.350. ADEC also determined that contamination in the groundwater will not be transported to either surface water or to a current or reasonably expected future source of drinking water. The letter states "further groundwater monitoring at the Sisters Island sites will not be required and the migration to groundwater soil cleanup levels are no longer requirements for the cleanup."

ADEC Determination of Applicable Cleanup Levels:

It was determined that Groundwater does not meet the criteria to be considered a current or future drinking water source per 18 AAC 75.350. ADEC also determined that contamination in the groundwater will not be transported to either surface water or to a current or to a current or reasonably expected future source of drinking water. Therefore, pursuant to 18 AAC 75.345(b)(1), it is not required

that groundwater meet Table C cleanup levels prior to site closure. Institutional Controls will be implemented in the areas that exceed Table C cleanup levels to control dewatering and other uses of the groundwater.

Migration to groundwater soil cleanup levels are no longer requirements for cleanup at this site because of the ADEC approved "350 determination", per 18 AAC 75.350. The migration to groundwater pathway is no longer of concern at this site if the soil remains undisturbed.

For AOCs that are to be evaluated under 18 AAC 75.340 Method Two, the applicable cleanup levels are those in the "Over 40 Inch Zone" under the "Human Health", "Ingestion", and "Inhalation" columns of Tables B1 and B2 in 18 AAC 75.341. The "Over 40 Inch Zone" refers to the number of inches of rainwater the area receives each year.

Modeling to determine alternative cleanup levels was done using the approved Hydrocarbon Risk Calculator (HRC), an alternative cleanup levels and risk calculator developed in accordance with Method 3 under 18 AAC 75.340. The HRC is no longer consistent with how site-specific cleanup levels are calculated under 18 AAC 75, due to the promulgation of new regulations on November 6, 2016. Following a review of the site data, the Department has determined the HRC-derived ACLs do not need to be applied for site closure at Sisters Island AOCs.

Contaminants of Concern (COCs)

Petroleum Hydrocarbons: For all but one of the AOCs, petroleum hydrocarbons are the source of contaminated soil/groundwater. Most of the petroleum products used were diesel fuel (heating and power generation), with gasoline stored at two AOCs. Based on the use of diesel fuel and gasoline, DRO, GRO, RRO, BTEX and PAHs identified in soil and groundwater are COCs.

Lead in soil: Lead was detected in soil at the Battery Casing Debris Site resulting from improper disposal of automobile type batteries.

AOC Locations, AOC Naming Convention and Consolidation of Previous AOCs into the Current AOC Names

Various names have been applied to each AOC over time and can become confusing when reading the various reports.

The Environmental Compliance Investigation report (ECIR) from 1992 was the first effort by FAA to identify potential sources of contamination and releases to the environment. Each potential source of contamination was named using some combination of the function of the facility and the building number. Appendix A includes the drawings from the ECIR.

The 1997-1999 Remedial Activity reports sometimes used the same naming convention as the ECIR and sometimes did not. In all cases either the function of the facility, the tank number or the building number was used in the naming of the AOC in the reports documenting work during 1997-1999.

The 5 December 2006 letter from ADEC to FAA provides the most complete AOC list, and summary of the status of each AOC as of December 2006. The basis for the table in the December 2006 letter is

the ECIR, and this table uses the ECIR naming convention to a high degree. See Appendix B for this letter.

The naming convention used in the 2009 Site Investigation Report varies somewhat from the previous reports in that there are AOCs that resulted from a release associated with a single source (i.e. fuel tank, portion of a fuel line, etc.), and there are AOCs that had more than one source in close proximity to each other, whose resulting contamination is comingled into a single volume of contaminated soil/groundwater. The 2009 Site investigation Report is the first document to modify the AOC names based on the co-mingling of releases from multiple sources into a single volume of contaminated soil/groundwater. See Appendix A for a location drawing for all AOCs and drawings of each AOC.

This decision document primarily uses the AOC naming convention used in the 2009 Site Investigation Report, and subsequent reports in 2010-2012. The "site description and background" section of each AOC includes information to allow the reader to understand the sources of contamination identified in either the 1991 ECIR or the 1997-1999 Remedial Activity work that are included in the current definition of the AOC.

Water Supply House Facility

Site Description and Background

The Water Supply House Facility is located northwest of the VORTAC Facility and pumps water from a spring to the VORTAC for use as "gray" water. The remains of a wooden structure (previous use unknown) were noted near the Water Supply House Facility.

Cleanup Levels & Contaminants of Concern

N/A

Characterization and Cleanup Activities

Characterization and cleanup activities conducted under the regulatory authority of the Contaminated Sites Program began in 1991. These activities are described below and are listed in the years the field work was performed.

1991 ECIR

The ECIR did not identify contaminants associated with this facility. The ECIR table ES-1 indicates *"no action"* required for "CERCLA concerns", "POL concerns" and "other regulatory compliance/management practice concerns".

Cumulative Risk Evaluation

N/A

Exposure Pathway Evaluation

N/A

ADEC Decision

The spreadsheet attached to the 5 December 2006 Letter from ADEC to FAA indicates *"no action required"*. No violations of 18AAC 75 were identified; therefore, no ADEC decision is required.

VORTAC Area – Former Drum Rack/ Gasoline AST Area

Site Description and Background

Current structures/configuration:
The VORTAC area consists of the VORTAC antenna, VORTAC Building 411, two 500 gallon ASTs for used oil storage, Garage Building 624 and a new Tank Farm consisting of three 8,000 gallon ASTs providing diesel fuel for the prime power generators.

Former structures/configuration:
The VORTAC area included UST 41-B-1, AST 41-B-3 and AST 41-C-2, former gasoline drum rack/ 250 gallon gasoline AST 41-B-2 which provided fuel for the VORTAC gasoline generators and equipment.

Two ASTs, 41-C-2 and 41-B-3, were located on the northeast side of the VORTAC Building/Transmitter Building 411. Both ASTs were 500 gallon steel tanks containing an approximate total of 700 gallons of used lubricating oil. Previous reports indicate that AST 41-C-2 was located next to Building 102 and used for heating oil storage prior to being moved to the VORTAC Building. AST 41-C-2 will be further discussed in the section titled "Building 102 Area" of this document.

The former drum rack/gasoline AST area consisted of a wooden drum rack and gasoline AST 41-B-2 located approximately 60 feet south of the VORTAC Building 411. The drum rack held seven 55-gallon drums containing about 70 gallons of gasoline and water. AST 41-B-2 was a 500 gallon AST situated in a steel cradle that held gasoline for equipment and vehicles.

The 4,000 gallon UST 41-B-1 was located approximately 60 feet south-southeast of the VORTAC Building 411. This regulated underground storage tank (ADEC UST registration number 2180-1) provided fuel for the prime power generators located in building 411. UST 41-B-1 and UST 41-C-1 (formerly part of the Generator Building 617 AOC) comprise a separate site in the ADEC database under file number 1510.26.001: "FAA-Sisters Island". This site was closed with a "cleanup complete" determination on 12/5/2006.

Cleanup Levels & Contaminants of Concern

Contaminants of Concern
The following contaminants of concern were identified above approved cleanup levels during the course of the site investigations summarized in the Characterization and Cleanup Activities section of this decision letter: GRO, DRO, RRO, BTEX, and PAHs.

Cleanup Levels
ADEC determined that groundwater at Sisters Island does not meet the criteria to be considered a current or future drinking water source per 18 AAC 75.350. ADEC also determined that contamination in the groundwater will not be transported to either surface water or to a current or reasonably expected future source of drinking water. Therefore, pursuant to 18 AAC 75.345(b)(1), it is not required that groundwater meet Table C cleanup levels. In addition, migration to groundwater soil cleanup levels are no longer requirements for cleanup. The migration to groundwater pathway is no longer of concern at this site if the soil remains undisturbed.

Under 18 AAC 75.340 Method Two, the applicable cleanup levels are those in the "Over 40 Inch Zone" under the "Human Health", "Ingestion", and "Inhalation" columns of Tables B1 and B2 in 18 AAC 75.341. The "Over 40 Inch Zone" refers to the number of inches of rainwater the area receives each year.

Modeling to determine alternative cleanup levels was done using the approved Hydrocarbon Risk Calculator (HRC), an alternative cleanup levels and risk calculator developed in accordance with Method 3 under 18 AAC 75.340. The HRC is no longer consistent with how site-specific cleanup levels are calculated under 18 AAC 75, due to the promulgation of new regulations on November 6, 2016. Following a review of the site data, the Department has determined the HRC-derived ACLs do not need to be applied for site closure at this AOC, as final confirmation samples meet Method 2 table B1 and B2 cleanup values. The final confirmation sample concentrations for each COC are detailed in the Table below ("Soil 2009 BTEX, GRO, DRO and RRO Data (mg/kg)").

Characterization and Cleanup Activities

Characterization and cleanup activities conducted under the regulatory authority of the Contaminated Sites Program began in 1992. These activities are described below and are listed in the years the field work was performed.

1991-1992 ECIR and Hazardous Waste Removal

The ECIR table ES-1 indicates *"no action"* required for CERCLA concerns, *"further action/further investigation"* for POL concerns and *"further action/further investigation"* for other regulatory compliance/management practice concerns.

Further action included; incorporating tanks into tank management program, evaluating one regulated UST for compliance with ADEC and EPA tank regulations (UST 41-B-1), evaluate 2 AST's for compliance with fire protection standards/SPCC requirements and establishing management/housekeeping standards for hazardous substances. Further investigation was recommended to determine the extent of soil contamination for POL soils and evaluate ACM and sample electrical equipment for PCB.
The Toxic and Hazardous Material Survey identified a 500 gallon AST used for lube oil storage, and active transformer with possible PCB containing oil, a garbage burn area (see burn barrel AOC), four rusted 55 gallon drums of kerosene, two rusted drums labeled "S", and an active 4,000 gallon UST (41-B-1).

In September 1991, Hazardous materials identified during the THM were properly packaged, transported and disposed of off island.

Composite soil sample FAA-SSR-SV-011 was collected from an area of stained soil near stored drums at the VORTAC. VPH results exceeded evaluation criteria. The ECIR recommended an expanded site investigation be conducted to further determine the type and extent of soil contamination at the VORTAC drum storage area.

1997-1999 Remedial Activity

UST 41-B-1

The 4,000 gallon UST 41-B-1 was decommissioned in July 1998. Excavation limits measured approximately 22 feet long by 18 feet wide by 9.5 feet deep. Groundwater was encountered at approximately 9 feet. The ADEC Method 1 Category B Action Level was applied to this site. Soils were field screened with a PID and 43 cubic yards of petroleum contaminated soil and 113 cubic yards of clean and/or probably clean soil were removed from the excavation and stockpiled separately. Three samples were taken at the limits of excavation were analyzed for DRO and BTEX. All results were ND and are below ADEC level A cleanup criteria. No PAH samples were taken. No groundwater sample was taken based on no visible sheen or vapor headspace. The clean soil was placed back in the excavation and 83 cubic yards of DRO contaminated soil was temporarily stockpiled in short term stockpiles and EP-2 boxes awaiting sample results. Lab results confirmed contamination and the soil was moved to the long term stockpiles in February 1999. The contaminated soil in long term stockpile and EP-2 boxes was transported off island by Channel Construction where it was thermally remediated at the Juneau Soil Recycling Facility operated by United Soil Recycling (USR). All USR work was completed by January 2000 and a Certificate of Destruction was issued to FAA by USR. A Geo-probe well, GP-10, was placed down-gradient from the excavation and sampled. Sample results from GP-10 were below Groundwater Cleanup Standards for BTEX, but above standards for DRO at 3.6 mg/L.

UST 41-C-2 and 41-B-3

Two above ground storage tanks (AST), 41-C-2 and 41-B-3, were co-located on the northeast side of the VORTAC Building/Transmitter Building 411. It is believed that AST 41-C-2 was previously located at Building 102 and used for heating oil storage. Therefore, AST 41-C-2 is referenced at both the VORTAC and Building 102. Both ASTs were 500 gallon steel tanks resting on wood beams/steel frame and contained an approximate total of 700 gallons of used lubricating oil from the prime power engines. ASTs 41-C-2 and 41-B-3 were decommissioned in August 1998.

Surface soil conditions in the vicinity of the two tanks were visually inspected and were field screened for vapors.

The ground surface beneath AST 41-B-3 did not appear to be stained. Shallow field screening samples in the sandy gravel soil exhibited PID readings ranging from 0.0 ppm to 0.8 ppm. Ground water was not encountered while collecting the shallow field screening and laboratory samples. No evidence of soil contamination was observed beneath the tank. One laboratory analytical sample was collected from the field screen location exhibiting the greatest concentration of residual hydrocarbons as measured by headspace vapors. The sample was collected at an approximate depth of 1.5 feet. DRO contamination was not detected; however, RRO compounds were detected at a concentration of 42 mg/kg. Total metals were detected in the soil sample at concentrations ranging from 3.5 mg/kg arsenic to 22 mg/kg chromium.

The ground surface beneath AST 41-C-2 did not appear to be stained. Shallow field screening samples in the sandy gravel soil exhibited PID readings ranging from 0.0 ppm to 1.2 ppm. Ground water was not encountered while collecting the shallow field screening and laboratory samples. No evidence of soil contamination was observed beneath the tank. Two laboratory analytical samples exhibiting the greatest concentration of residual hydrocarbons as measured by headspace vapors were collected from various field screen locations. Laboratory analytical samples were analyzed for DRO, RRO and total metals. DRO compounds were not detected in one soil sample but were detected in the second sample at a concentration of 27 mg/kg. RRO compounds were detected in both samples at concentrations ranging

from 89 mg/kg to 999 mg/kg. Total metals were detected in the two samples at concentrations ranging from 4.6 mg/kg arsenic to 24 mg/kg chromium.

ADEC Method I Category B cleanup standards were applied to this site. DRO and RRO concentrations detected in laboratory analysis of soil were below Method I Category B cleanup standards in the vicinity of ASTs 41-B-3 and 41-C-2. Since soil contamination was not detected at ASTs 41-B-3 and 41-C-2 during field screening, no stockpiles were generated.

Former Drum Rack and AST 41-B-2

The former drum rack/gasoline AST area consisted of a wooden drum rack and gasoline AST 41-B-2 located approximately 60 feet south of the VORTAC Building 411. The drum rack held seven 55-gallon drums containing about 70 gallons of gasoline and water. AST 41-B-2 was a 500 gallon AST situated in a steel cradle that held gasoline. The drum rack and AST 41-B-2 were decommissioned in June 1998.

The ground surface immediately beneath AST 41-B-2 did not appear to be stained and shallow field screening samples exhibited PID readings ranging from 16.4 ppm to 17.4 ppm. Moderate to heavy staining was observed in two areas near the adjacent drum rack. Shallow field screening samples collected from the stained areas exhibited PID readings ranging from 15.9 ppm to 902 ppm.

The tank was decommissioned in June 28-29, 1998. Soil was ultimately excavated to near top of bedrock, which was encountered at depths ranging from 4.5 to 7.0 feet in the vicinity of AST 41-B-2 during the June 1998 tank closure and during subsequent excavations in August 1998. Final excavation dimensions were approximately 30 feet by 45 feet. Approximately 178 cubic yards of petroleum-contaminated soil and 50 cubic yards of clean surface soil were removed from the AST 41-B-2 excavation and placed in four separate, lined/covered temporary stockpiles. Six field screen soil samples were collected from a depth of 18 inches in the clean soil stockpiles. Two soil samples (SSR98SS020V0I and SSR98SS02lV0I) were collected for laboratory analysis from the field screen locations at the clean soil stockpiles with the highest PID readings.

Two laboratory analytical samples were collected from the excavation sidewall and bottom during the June 1998 tank closure. During subsequent excavations in August 1998, five laboratory analytical samples were collected from the field screen locations along the east southeast excavation walls, exhibiting the greatest concentration of residual hydrocarbons as measured by headspace vapors. Additionally, sample SSR98SS037VOI was collected from the west margin of the excavation. Ground water was encountered at the southern limits of this excavation in soil immediately above the bedrock at depths as shallow as 5 feet. Ground water samples were not collected for analysis since no ground water impacts (i.e., sheen) were identified during this investigation.

Seven confirmation soil samples were collected from the AST 41-B-2 excavation and analyzed for GRO and BTEX. Additionally, five soil samples were also analyzed for total lead and PAHs. Additionally, five samples were collected during the August 1998 excavations. The samples were collected just above bedrock at depths ranging from 4.0 feet bgs to 6.0 feet bgs. GRO contamination was detected at concentrations ranging from 1.4 mg/kg to 51.7 mg/kg. BTEX compounds were detected in all seven soil samples. Benzene was detected at concentrations ranging from 0.0797 mg/kg to 6.55 mg/kg. Other BTEX compounds were detected at concentrations ranging from 0.027 mg/kg toluene to 6.24 mg/kg xylenes. Additionally, total lead was detected in all seven samples at concentrations ranging from 0.752

mg/kg to 10.5 mg/kg. PAHs were also analyzed for six of the seven soil samples. PAHs were detected at concentrations ranging from 0.00223 mg/kg benzo[b]flouoranthene to 0.081 mg/kg phenanthrene.

ADEC Method I Category B cleanup standards have been applied to the AST 41-B-2 site. GRO and BTEX concentrations detected in laboratory analysis of soil were below Method I Category B cleanup standards in all excavation areas except the southeast corner. Subsurface explorations near the southeast corner of the AST 41-B-2 excavation suggest that elevated benzene contamination in the soil remains along the east sidewall. This impacted area appears to extend east along the toe of slope near the recently constructed tank farm pad. Bedrock was encountered at depths of 7 feet bgs or less in the vicinity of the excavation and was shallowest (less than 4.5 foot bgs) on the south side.

A groundwater sample collected from well GP11A, which was located downgradient of 41-B-2, indicated that diesel range organics (DRO) and benzene, toluene, ethylbenzene, and xylenes (BTEX) concentrations were non-detect.

2006 Correspondence

UST-41-B-1

In a letter from ADEC to FAA, dated 5 December 2006, (See appendix B) addressing the status of all AOCs on the island, the letter states; "The department has determined that "*site closure is approved"* at the following area of concern: 1. VORTAC Tank 41-B-l: This 4000-gallon regulated underground storage tank (UST) was removed in 1999. Forty-three (43) cubic yards of petroleum contaminated soil were excavated and sent to United Soil Recycling (USR) for disposal. Three (3) confirmation samples were collected from the bottom of the excavation at a depth of 9.5 feet below ground surface (bgs) and all results were non-detect for contaminants of potential concern."

The ADEC CS database contains the following notation: "41-B-1: 4000 gallon tank removed in 1999. 43 cubic yards of petroleum-contaminated soil removed and sent to USR for disposal. Three samples met the method 2 cleanup levels."

UST 41-C-2 and 41-B-3

In a letter from ADEC to FAA, dated 5 December 2006, (See Appendix B) addressing the status of all AOCs on the island, the letter states the department has determined that "*no action is requested*" at these potential areas of concern as no contamination was found. The letter states: VORTAC 41-C-2: This lube oil AST was removed in 1999. Two (2) samples were collected and none of the analytes were found to be present above applicable cleanup levels. VORTAC Tank 41-B-3: This 500-gallon aboveground storage tank (AST) was removed in 1999 and no contamination was observed. One (1) sample was collected and none of the analytes were found to be present above applicable cleanup levels.

Former Drum Rack and AST 41-B-2

In a letter from ADEC to FAA, dated 5 December 2006, (See Appendix B) addressing the status of all AOCs on the island, the letter requests "*additional characterization or cleanup"* at the VORTAC Tank 41-B-2 as elevated levels of benzene were left in place during tank removal and a groundwater sample showed elevated diesel range organics.

2009 Site Investigation

During the October 2009 Site Investigation (SI), the extent of contamination from the former drum rack/gasoline AST 41-B-2 area at the VORTAC was investigated using the Ultra-Violet Optical

Screening Tool (UVOST) and laser-induced fluorescence (LIF) probe. A Geoprobe® 6610DT was used to advance soil borings, collect subsurface soil samples, and install groundwater monitoring wells. During the SI, the extent of contamination from the former drum rack/gasoline AST 41- B-2 area at the VORTAC was investigated. The approximate boundaries of the 1998 remedial excavation were delineated using historical photographs and site documents.

A total of 12 UVOST probes were advanced in this area of concern. UVOST probes were advanced around the perimeter of the 1998 remedial excavation and near previous sample points with elevated benzene and toluene concentrations. Potential petroleum contamination in soil was detected at low levels in one of the 12 UVOST probes advanced at this area of concern. The maximum LIF response was 2.4% Relative Emittance (RE) in UVOST probe UV-10 at depths of 1.7 to 2 feet bgs.

A total of five soil borings were advanced and five soil samples were collected for laboratory analysis. Analytical samples included: five for DRO/RRO and GRO/BTEX analyses, two for EPH/VPH analyses and one for PAH analysis. Soil samples for TOC, bulk density, sieve, specific gravity, and moisture content analyses were also collected in this area of concern.

DRO and RRO were detected at concentrations less than the method reporting limits (MRLs) in all but one analytical soil sample collected from borings near the former drum rack and former gasoline AST 41-B-2. All reported DRO, RRO, GRO, toluene, ethylbenzene, and xylenes results were less than the most stringent, ADEC Method Two, Over 40 Inch Zone, Migration to Groundwater cleanup levels. Benzene was the only analyte detected at a concentration greater than this ADEC Method Two cleanup level, which is 0.025 mg/kg for benzene. Benzene was detected at a concentration of 0.313 mg/kg in sample SSR09SSB29DR03 collected from boring B29. However this result was qualified to be estimated with have high bias (J+).

Benzene was the only analyte detected at a concentration greater than the ADEC Method Two, Over 40 Inch Zone, Migration to Groundwater cleanup level in an analytical soil sample. Benzene was detected at a concentration of 0.313 mg/kg at a depth interval of 2 to 4 feet bgs in boring B29 installed near the east sidewall of the previous remedial excavation. Bedrock refusal was encountered at 4 feet bgs in this boring. Depth to bedrock in this area of concern varied from approximately 3.4 to 10 feet bgs. All other DRO, RRO, GRO, and BTEX analytical results were less than the most stringent Method Two cleanup levels.

Groundwater was present in two of the five borings installed in the former drum rack/gasoline AST area. Monitoring wells MW-14 and MW-15 were installed in borings B27 and B28, respectively. MW-14 and MW-15 were installed to approximate depths of 10 feet bgs and 7.5 feet bgs, respectively. Depth to bedrock ranged from approximately 3.4 to 10 feet bgs. Groundwater samples were analyzed for DRO, GRO, RRO, BTEX, EPH, and VPH. Groundwater from MW-14 was also analyzed for PAH. Groundwater in this shallow, unconfined aquifer appears to be discontinuous based on the presence of groundwater in only two of the five borings installed in this area.

DRO and benzene were detected at concentrations greater than the MRLs in monitoring well MW-14. DRO was detected at a concentration of 0.386 mg/l and benzene was detected at a concentration of 0.00128 mg/l. All reported analytical results were less than the ADEC 18 AAC 75 Table C groundwater cleanup levels.

DRO and benzene in groundwater were the only analytes detected at concentrations greater than the MRLs, but less than the ADEC 18 AAC 75 Table C groundwater cleanup levels in monitoring well MW-14. All other analytical results were not detected at concentrations greater than the MRLs in MW-14 and MW-15.

Based on analytical sample results, it appears that an isolated area of benzene contamination is present in subsurface soil just above bedrock at 2 to 4 feet bgs in an area extending approximately 10 feet by 10 feet horizontally. This residual contamination is located near the east sidewall of the remedial excavation performed in 1998 during the AST 41-B-2 and drum rack decommissioning activities. This residual contamination is also located adjacent to the southwest corner of the gravel pad for the existing Tank Farm. Benzene concentrations were less than ADEC 18 AAC 75 Table C cleanup levels in groundwater samples collected from monitoring wells MW-14 and MW-15, so it appears that benzene has not impacted the shallow perched groundwater in this area of concern.

Benzene is listed in ADEC's CSM Guidance as a volatile contaminant that is of concern for the vapor intrusion pathway. The soil sample that indicated an elevated benzene concentration was collected during the 2009 SI from an area located approximately 50 feet south of VORTAC Building 411 and Garage Building 624. Potential impacts to indoor air are considered insignificant at the two buildings in the VORTAC area because the impacted area is relatively small and Buildings 411 and 624 are only used occasionally by FAA personnel when performing maintenance on the VORTAC generators.

2009-2010 Groundwater Sampling

Groundwater samples were collected from monitoring wells during three sampling events conducted in 2009 and 2010: These sampling events occurred in October during the 2009 SI, in June 2010, and in October 2010. June was chosen to represent the low groundwater condition, and October was chosen to represent the high groundwater condition. Both conditions were supported by groundwater elevation measurements.

Groundwater was present in two of the five borings installed during the 2009 SI. Monitoring wells MW-14 and MW-15 were installed to approximate depths of 10 feet bgs and 7.5 feet bgs, respectively. Groundwater samples were analyzed for DRO, GRO, RRO, BTEX, PAH, EPH, and VPH. Groundwater from MW-15 during the 2009 SI sampling event was not analyzed for PAHs.

In MW-14, DRO was detected at a concentration of 0.386 mg/L and benzene was detected at a concentration of 0.0013 mg/L during the 2009 SI. During the June 2010 sampling event DRO was detected at a concentration of 0.159 mg/L, benzene was detected at a concentration of 0.0008 mg/L, toluene was detected at a concentration of 0.0012 mg/L, ethylbenzene at a concentration of 0.0002 mg/L, and xylenes at a concentration of 0.0011 mg/L. During the October 2010 sampling event DRO was detected at a concentration of 0.249 mg/L, RRO was detected at a concentration of 0.247 mg/L, and benzene was detected at a concentration of 0.0004 mg/L.

In MW-15, no analytes were detected at concentrations greater than the MDLs during the 2009 SI. During the June 2010 sampling event benzene was detected at a concentration of 0.0005 mg/L, toluene was detected at a concentration of 0.0008 mg/L, ethylbenzene at a concentration of 0.0002 mg/L, and xylenes at a concentration of 0.0008 mg/L. During the October 2010 sampling event DRO was detected at 0.229 mg/L and RRO was detected at 0.387 mg/L.

All reported analytical results were less than the ADEC 18 AAC 75 Table C groundwater cleanup levels in MW-14 and MW-15 during the 2009 SI and both 2010 groundwater sampling events.

Summary of findings:
During all three events all reported DRO, RRO, GRO, BTEX, and PAH analytical results were less than the ADEC 18 AAC 75 Table C groundwater cleanup levels in MW-14 and MW-15.

2011 Correspondence and Hydrocarbon Risk Calculator

The Hydrocarbon Risk Calculator (HRC) was used to assess the human health risks associated with petroleum hydrocarbon contaminated sites.

The HRC can be used to calculate human health risk and alternative cleanup levels and to help support Cleanup Complete determinations with or without Institutional Controls (ICs). To determine alternative cleanup levels, if the site is found to present acceptable risks with existing concentrations, then the existing concentrations would become the site "alternative cleanup levels" and the site would be eligible for a "cleanup complete" determination by ADEC per 18 AAC 75.380. The HRC report was prepared assessing two scenarios for groundwater use, potable and non-potable. After the completion of the HRC Report, ADEC approved the 18 AAC 75.350 "350 determination," which documents groundwater is "non-potable" (to use the terminology in the HRC report).

The HRC calculations were performed using data collected during the site investigation (SI) conducted in October 2009 and subsequent groundwater monitoring events in June and October 2010.

Soil 2009 BTEX, GRO, DRO and RRO Data (mg/kg)

	Benzene	Toluene	Ethylbenzene	Xylene	GRO	DRO	RRO
95% UCL	0.1678	0.0585	0.1483	2.2484	18.7375	28.4100	43.8500
Maximum	0.313	0.0873	0.2740	4.1800	32.1000	31.8000	51.1000

The HRC results for the former drum rack/gasoline AST area, assuming groundwater is non potable, indicated that site conditions meet the ADEC human health risk standard established in 18 AAC 75.325. Based on the HRC results, all exposure pathways, including soil direct contact, outdoor air vapor inhalation, indoor air vapor inhalation, migration to groundwater, and groundwater ingestion, posed acceptable risk or were incomplete.

2012 Correspondence and Decommissioning Monitoring Wells

MW-14 and MW-15 were decommissioned in accordance with the ADEC approved workplan.

FAA sent a letter to ADEC dated 15 October 2012, Subject; Final Report, Decommissioning Monitoring Wells, Sisters Island, Alaska. The letter requests a "cleanup complete with institutional controls" determination be issued by ADEC for the AOCs covered by the HRC report dated 22 August 2011.

Cumulative Risk Evaluation

Pursuant to 18 AAC 75.325(g), when detectable contamination remains on-site following a cleanup, a cumulative risk determination must be made that the risk from hazardous substances does not exceed a cumulative carcinogenic risk standard of 1 in 100,000 across all exposure pathways and does not exceed a cumulative noncarcinogenic risk standard at a hazard index of one across all exposure pathways.

Based on a review of the environmental record, ADEC has determined that residual contaminant concentrations meet the human health cumulative risk criteria for residential land use.

Exposure Pathway Evaluation

Soil Ingestion and Direct Contact Pathways: Subsurface soil ingestion and direct contact pathways are considered complete since contamination is greater than 2 feet bgs.

Vapor Intrusion Pathway: The vapor intrusion pathway is considered complete if petroleum contamination in soil or groundwater is expected to be present within 30 horizontal or vertical feet of buildings. Building 624 is within 30 feet of the contamination at this AOC, and is a garage building used to store equipment/tools.

Outdoor Air Pathway: The outdoor air exposure pathway is complete but is not considered significant for petroleum hydrocarbons.

Biota Pathway: The wild plant ingestion route is interpreted to be incomplete (or is insignificant) for petroleum hydrocarbons because plants do not significantly take up fuel hydrocarbons into their tissues. Similarly, the wild meat ingestion route is interpreted to be incomplete (or is insignificant) for petroleum hydrocarbons because the plants do not significantly take up the fuel hydrocarbons and hence, the animals feeding on the plants are not significantly exposed.

Surface Water Pathway: Surface water is not considered a medium impacted by petroleum contamination. Sheen was not detected on the Icy Strait surface water during visual monitoring conducted during the 2009 SI and June and October 2010 groundwater sampling events. Petroleum contamination is generally present in subsurface soils (greater than 2 feet bgs) so surface water runoff is not likely to be a transport mechanism for transporting petroleum contamination into surface water. The software, BIOSCREEN (EPA model), was used to assess dissolved phase transport and plume areal extent through time and to estimate natural attenuation rates. BIOSCREEN simulations indicate that potential contaminant migration through the discontinuous groundwater perched above bedrock would not impact the Icy Straight, which is the nearest surface water body.

Groundwater Pathway: Groundwater does not represent a potentially complete exposure pathway. ADEC approved a determination that groundwater at Sisters Island does not meet the criteria to be considered a current or future drinking water source. The landowner, the U.S. Forest Service, has also concurred that the groundwater is not a current or reasonably expected potential future drinking water source or a transport mechanism for hazardous substances.

Exposure Pathway Conclusion: All exposure pathways, including soil direct contact, outdoor air vapor inhalation, indoor air vapor inhalation, migration to groundwater, and groundwater ingestion, pose acceptable risk or are incomplete. Therefore the remaining contamination is de minimis for all complete exposure pathways. Site conditions are protective of human health under an unrestricted (residential) land use scenario, and they may be used to support a Cleanup Complete determination in accordance with 18 AAC 75.380.

ADEC Decision

Remaining petroleum contamination in soil is below method 2 Table B1 and B2 human health, ingestion, and inhalation cleanup levels. All groundwater is below Table C cleanup levels. Migration to

groundwater soil cleanup levels are no longer requirements for cleanup at this site because of the ADEC approved "350 determination", per 18 AAC 75.350. This site will receive a "Cleanup Complete" designation on the Contaminated Sites Database, subject to the following standard conditions.

Standard Conditions

1. Any proposal to transport soil or groundwater off-site requires ADEC approval in accordance with 18 AAC 75.325. A "site" [as defined by 18 AAC 75.990 (115)] means an area that is contaminated, including areas contaminated by the migration of hazardous substances from a source area, regardless of property ownership.

2. Movement or use of contaminated material in a manner that results in a violation of 18 AAC 70 water quality standards is prohibited.

This determination is in accordance with 18 AAC 75.380 and does not preclude ADEC from requiring additional assessment and/or cleanup action if future information indicates that this site may pose an unacceptable risk to human health or the environment.

Appeal

Any person who disagrees with this decision may request an adjudicatory hearing in accordance with 18 AAC 15.195 – 18 AAC 15.340 or an informal review by the Division Director in accordance with 18 AAC 15.185. Informal review requests must be delivered to the Division Director, 410 Willoughby Avenue, Suite 303, Juneau, Alaska 99811-1800, within 15 days after receiving the department's decision reviewable under this section. Adjudicatory hearing requests must be delivered to the Commissioner of the Department of Environmental Conservation, 410 Willoughby Avenue, Suite 303, Juneau, Alaska 99811-1800, within 30 days after the date of issuance of this letter, or within 30 days after the department issues a final decision under 18 AAC 15.185. If a hearing is not requested within 30 days, the right to appeal is waived.

VORTAC Area – Former Burn Barrel

Site Description and Background

Two burn barrels were located west of VORTAC Building/Transmitter Building 411.

Cleanup Levels & Contaminants of Concern

Contaminants of Concern

The following contaminants of concern were identified above approved cleanup levels during the course of the site investigations summarized in the Characterization and Cleanup Activities section of this decision letter: GRO, DRO, RRO, BTEX, and PAHs.

Cleanup Levels

ADEC determined that groundwater at Sisters Island does not meet the criteria to be considered a current or future drinking water source per 18 AAC 75.350. ADEC also determined that contamination in the groundwater will not be transported to either surface water or to a current or reasonably expected future source of drinking water. Migration to groundwater soil cleanup levels are no longer requirements for cleanup. The migration to groundwater pathway is no longer of concern at this site if the soil remains undisturbed.

Under 18 AAC 75.340 Method Two, the applicable cleanup levels are those in the "Over 40 Inch Zone" under the "Human Health", "Ingestion", and "Inhalation" columns of Tables B1 and B2 in 18 AAC 75.341. The "Over 40 Inch Zone" refers to the number of inches of rainwater the area receives each year.

Characterization and Cleanup Activities

Characterization and cleanup activities conducted under the regulatory authority of the Contaminated Sites Program began in 1992. These activities are described below and are listed in the years the field work was performed.

1992 ECIR

There is no mention of the burn barrels in the ECIR.

1997-1999 Remedial Activity

In August 1998 analytical samples were collected from soil beneath the barrels and from the barrel contents (ash). Analytical results indicated that the burn barrel contents (ash) were non-RCRA waste. The ash was disposed of in the Juneau Landfill. The barrels were properly disposed of at a permitted disposal facility.

The ADEC Method 2 Migration to Groundwater Pathway and< 40"of rainfall Action Level was applied to the Burn Barrel site. Petroleum contamination was detected in soil samples collected beneath the barrels, and approximately 15 cubic yards of soil was removed from this area. The soil was placed into super-sacks and stored in a long-term stockpile. The long term stockpile was transported to Juneau in November 1999 for thermal remediation. Analytical results for confirmation samples at the limits of the excavation indicated that residual benzene contamination remained at the limits of the excavation.

Well GP12 was advanced using the backhoe bucket near the burn barrel area. The location of GP12 was not documented in previous reports. Analytical results for the groundwater sample collected from well GP12 indicated that DRO and BTEX concentrations were less than ADEC groundwater cleanup levels.

2006 Correspondence

In a letter from ADEC to FAA, dated 5 December 2006, addressing the status of all AOCs on the island, the letter requests *additional characterization or cleanup occur* at the VORTAC Bum Barrels: A geoprobe groundwater sampling result from an unspecified location in this general area showed elevated benzene. The attachment to the ADEC letter to FAA lists "*Geoprobe well GP-12 near burn barrels-benzene (2.1 mg/l)*" resulting from reading the 2001 Asbestos Abatement/Environmental Upgrade report. ADEC notes under "data gaps" indicate "2007 ROST" which is a reference to FAA's proposed use of the UVOST equipment originally planned for 2007 which was delayed until 2009 due to funding constraints. Discussions with ADEC indicated FAA needed to either investigate the remaining contamination or remove it.

2009 Site Investigation

AGSC reviewed historic photographs and site plans from previous reports to determine the location of the former burn barrel area and associated remedial excavation. A total of five UVOST probes were advanced to investigate the area for residual benzene contamination. The LIF signal response in the UVOST probes did not indicate contamination in this area of concern.

To verify the results of the UVOST system and to further investigate the area for benzene contamination in soil, five borings were advanced and five analytical soil samples were collected. Analytical samples included: five for DRO/RRO and GRO/BTEX analyses, two for EPH/VPH analyses and one for PAH analysis. Soil samples for TOC, bulk density, sieve, specific gravity, and moisture content analyses were also collected from this area of concern. DRO, RRO, GRO, BTEX, and PAH analytes were not detected at concentrations greater than the MRLs in all samples collected from the burn barrel area.

Groundwater was not observed in the five borings installed in the former burn barrel area. Groundwater was present approximately three days after the wells were installed and developed in this area of concern. Depth to bedrock varied from 3.4 to 5 feet bgs in this area of concern. Monitoring wells MW-12 and MW-13 were installed to depths of 5 feet bgs and 3.7 feet bgs, respectively, and had approximate water depths of 2 and 2.7 feet bgs, respectively. MW-12 produced sufficient water to collect groundwater quality parameters and analytical samples. MW-13 was purged dry after less than one gallon, so analytical samples were collected without stable parameters and/or turbid water.

In MW-13, DRO and xylenes were detected at concentrations of 0.699 mg/l and 0.00405 mg/l, respectively, which is less than the ADEC 18 AAC 75 Table C cleanup levels for DRO and xylenes. All other analytes in MW-12 and MW-13 were not detected a concentrations greater than the MRLs. All reported analytical results for groundwater samples collected from the former burn barrel area were less than ADEC 18 AAC 75 Table C groundwater cleanup levels.

2009-2010 Groundwater Sampling and Correspondence

Groundwater samples were collected from monitoring wells during three sampling events. One conducted in 2009 during the SI, and two conducted in 2010 (June, and October). June 2010 was chosen to represent the low groundwater condition, and October 2010 was chosen to represent the high groundwater condition. Both conditions were supported by groundwater elevation measurements.

MW-12 had sufficient water volume available and did not run dry during the 2009 SI and October 2010 sampling events. During the June 2010 sampling event the well ran dry after approximately 0.35 liters of water was collected. During the 2009 SI, MW-13 was purged dry after less than one gallon. During the June 2010 sampling event only 0.01 liters of water was available, and during the October 2010 sampling event MW-13 was purged dry after removing approximately 3.0 liters.

The groundwater flow direction was estimated during the 2009 SI and 2010 sampling events based on the groundwater elevations measured during each of the sampling events in three monitoring wells. Based on the calculations, it appears that groundwater in this shallow, unconfined aquifer follows surface topography and flows in a southwesterly direction. In addition, low groundwater yield characterized the monitoring wells installed in this AOC, which indicates that groundwater is likely discontinuous and an actual gradient or flow direction may not be representative.

Summary of groundwater findings:
Due to insufficient water, groundwater samples were not collected from MW-13 during the June 2010 sampling event. During all three events all reported DRO, RRO, GRO, BTEX, and PAH analytical results were less than ADEC 18 AAC 75 Table C groundwater cleanup levels in MW-12 and MW-13.

Correspondence: FAA receives a letter from ADEC, "Re: FAA Sisters Island, near Juneau, Alaska", dated November 19, 2010. The letter references ADEC review of the Final Site Investigation Report from the 2009 field work, and a letter from FAA to ADEC (March 26, 2010) requesting closure of this AOC based on the report findings. The ADEC letter states *"closure complete status is approved for the VORTAC-area former burn barrel…"*

2012 Decommissioning Monitoring Wells
MW-12 and MW-13 were decommissioned in accordance with the ADEC approved workplan.

Cumulative Risk Evaluation
Previously closed by ADEC.

Exposure Pathway Evaluation
Previously closed by ADEC.

ADEC Decision
"Closure complete" status issued by ADEC in the November 19, 2010, letter to FAA, see Appendix B.

Former Incinerator Area and Dump Site

Site Description and Background

The FAA Sisters Island facility has been remotely operated since 1986 and no one currently resides on the island. Solid waste from the facility operations was dumped along the central western side of the island in an area approximately 300 feet long by 100 feet wide from approximately 1945 to 1997. An incinerator was used for an unknown time period to reduce the volume of waste material.

The original incinerator was decommissioned in 1992, and it appears another incinerator was installed/constructed and used between 1992 and 1997 when the second incinerator was removed and the dumpsite closed.

In 1997 approximately 70-90 (conflicting information in documents) cubic yards of compacted surface debris was removed and transported off island to a permitted landfill. The remaining partially buried debris was covered with at least two feet of soil, of which the uppermost six inches is suitable to sustain plant growth. The landfill meets federal and state requirement for closure as documented in a report titled "Sisters Island FAA Station Landfill Closure Documentation", prepared by CH2-OH, dated January 1998.

From 1997 to the present time, the FAA utilizes a small on-site combustion unit ("Smart Ash") to burn combustible waste, and the ash from the unit and all other non-combustible solid waste is removed from the island periodically. Hazardous waste generated during FAA operations is stored in a secure hazardous materials storage building, and is routinely removed from the island.

Cleanup Levels & Contaminants of Concern

GRO, DRO, RRO, BTEX, PAH

Characterization and Cleanup Activities

Characterization and cleanup activities conducted under the regulatory authority of the Contaminated Sites Program began in 1991. These activities are described below and are listed in the years the field work was performed.

1991-1992 ECIR and Hazardous Waste Removal

The ECIR indicates *"further investigation"* for CERCLA concerns, *"no action"* for POL concerns, and *"further action"* and *"further investigation"* for Other Regulatory Compliance/Management Practice concerns. CERCLA concerns arise from a soil sample (and its duplicate) collected from ashy soil near the incinerator which exceed evaluation criteria for benzo(g,h,i)perylene, and the ECIR recommends an expanded site investigation.

The Toxic and Hazardous Material Survey indicates; Incinerator-ash-contaminated-soil, oil in plastic bucket, and debris area-electronic equipment, drums etc.

In September 1991 and October 1992, waste items identified in the THM inventory, and additional waste items not identified in the THM inventory, were properly packaged and transported off island for disposal.

The inactive Dump Site is located south of the VORTAC Facility and consists of an incinerator, a debris and trash area, and an abandoned electrical equipment area. The Dump Site encompasses a total area of approximately 2,000-3,000 square feet.

Incinerator area:
An incinerator was used by FAA to reduce the volume of waste material and consisted of a combustion chamber fueled by waste oil and/or fuel oil. The incinerator sat on a concrete pad.

A drum containing oil which was fuel for the incinerator was screened for potential contaminants and was categorized as "waste oil" for disposal purposes. The contents of the drum were properly packaged and shipped off island for disposal.

Ash from inside and under the incinerator was removed and packaged for disposal in three over pack drums. The incinerator was demolished, packaged and transported off island for proper disposal.

Ash and solid remains from incinerator operations surround the incinerator and cover approximately 64 square feet. Composite soil sample FAA-SSR-SV-002 and its field duplicate, FAA-SSR-SV-010, were collected from ashy soil near the incinerator at the Dump Site. Sample results for benzo(g,h,i)perylene exceeded evaluation criteria in the duplicate sample.

The ground beneath the former incinerator was found to be saturated with an oil-like substance in an approximately 3' x 4' visibly stained area, and appeared to extend several inches below the surface. A composite soil sample (FAA-SSR-RE-001) was collected from five points on the surface of the stained area, and analyzed for PCB, EPH, VPH, BTEX, TRPH, VOC, BNA, dioxins and metals. Sample results exceeded criteria for EPH, VPH and TRPH. The soil was left in place for future action.

Debris and trash Area:
A surface soil sample (FAA-SSR-SV-003) was collected and analyzed for PCB, EPH, VPH, BTEX, TRPH, VOC, BNA, dioxins, OP-Pesticides, CL-herbicides and metals. All analytes were below applicable evaluation criteria.

An undetermined number of empty and abandoned drums were present at the Dump Site. Drums were collected, cleaned, crushed and transported off island for proper disposal.

A 10-gallon bucket of what appeared to be waste oil at the Dump Site was sampled and the sample was submitted for petroleum product identification. Results did not indicate the presence of petroleum products. The bucket and contents were packaged and transported off island for proper disposal.

Abandoned electrical equipment area:
Inactive and sealed electrical equipment were present. This equipment was properly packaged, transported and disposed of off island.

1997-1999 Remedial Activity

Incinerator area:
A soil sample was collected from a nearby location previously occupied by the incinerator. This sample was analyzed for eight RCRA metals, volatiles, semi-volatiles, and PCBs. Approximately five cubic yards of soil was excavated from within the site and stockpiled near the excavation. The excavated material was

covered with poly on both the top and bottom awaiting sample results. Analysis confirmed the soil to be non-RCRA. The excavated soil was placed back into the excavation.

Within the area was an incinerator containing ash. Similar to the bum barrels, this ash was initially sampled for eight RCRA metals, volatiles, semi-volatiles, and PCBs. The ash was then containerized, labeled, and placed in the FAA hazardous materials shed on the island. A second sample of the ash was taken for TCLP metals to determine RCRA characteristics. Analysis confirmed the ash was non RCRA waste. The ash was then disposed of with other general debris.

Due to the limited availability of clean soil on the island, beach sand was used to cap the debris. Approximately eighteen inches of beach sand was spread over the remaining debris with the wheel loader and compacted with the loader bucket. To facilitate the recovery of vegetation in disturbed areas, an additional six inches of clean soil was cut with the track dozer from the area around Building 102 and spread over the top of the beach sand. All disturbed areas within the former landfill were seeded and fertilized prior to demobilization from the island.

Debris and trash area:
All debris exposed more than 50% above the surface was removed from the landfill area. Approximately 70-90 (conflicting numbers between two reports) cubic yards of debris was located and removed.

Four piles of debris were encountered but not removed from the landfill. Brush removed to access the debris was burned near the VORTAC area. Wood debris removed from the area was also burned. All metal, plastic, and other non-burnable debris was transported to the Juneau Landfill

Due to the limited availability of clean soil on the island, beach sand was used to cap the debris. Approximately eighteen inches of beach sand was spread over the remaining debris with the wheel loader and compacted with the loader bucket. To facilitate the recovery of vegetation in disturbed areas, an additional six inches of clean soil was cut with the track dozer from the area around Building 102 and spread over the top of the beach sand. All disturbed areas within the former landfill were seeded and fertilized prior to demobilization from the island.

Within the landfill area was a large pit with approximately twenty cubic yards of soil adjacent to the excavation. Using the excavator, the mound of soil was placed back into the pit and mounded slightly to account for settling. This area was also seeded and fertilized.

A 6'x6' concrete pad was located along the south side of a path to the landfill, and is thought to be the pad for the first incinerator. The pad was lifted with the excavator and transported back to the water tank excavations for burial. There were no indications of contamination under the pad.

Landfill Closure Documentation:
The landfill meets federal and state requirements for closure as documented in a report titled "Sisters Island FAA Station Landfill Closure Documentation", prepared by CH2-OH, dated January 1998.

2006 Correspondence

In a letter from ADEC to FAA, dated 5 December 2006, addressing the status of all AOCs on the island, the letter requests *additional characterization or cleanup occur* at the "Dump Site/Incinerator: An incinerator that had been disposed in the dump was found to contain ash with low levels of dioxin. The incinerator

and ash were subsequently disposed of properly. The original location of the incinerator is unknown. The department requests that FAA review the facility records or take other steps to determine the original location of the incinerator and, if this location can be found, conduct sampling for dioxin".

2009 Site Investigation

FAA and AGSC personnel used a metal detector and advanced test pits throughout the former Dump Site area in an effort to relocate the former incinerator, incinerator pad, ash, or other debris related to the former incinerator. The search revealed no indication of the former incinerator or ash so no soil samples for dioxin analysis were collected.

2010 Correspondence

FAA received a letter from ADEC, "Re: FAA Sisters Island, near Juneau, Alaska", dated November 19, 2010. The letter references ADEC review of the Final Site Investigation Report from the 2009 field work, and a letter from FAA to ADEC (March 26, 2010) requesting closure of this AOC based on the report findings. The ADEC letter states "DEC has determined that "*no action is requested"* at the following potential area of concern as no contamination was found. Dump Site/Incinerator: As requested by DEC in its December 2006 letter, FAA conducted a visual survey in the suspected area of the dump site and incinerator. Neither ash nor debris was located and no samples were collected.

Cumulative Risk Evaluation

N/A

ADEC Decision

All contaminated debris has been removed from the site, and no ash remains from the burning activities. As stated in the 2010 letter, no action is requested. DEC Contaminated Sites Program staff recommends that the FAA follow through with placing permanent markers on the ground to identify the location of the buried solid waste and continue tracking information on these landfills internally, however, it is not a requirement under the Site Cleanup Rules in 18 AAC 75. This site will receive a "Cleanup Complete" designation on the Contaminated Sites Database, subject to the following standard conditions.

1. Any proposal to transport soil or groundwater off-site requires ADEC approval in accordance with 18 AAC 78.600(h). A "site" [as defined by 18 AAC 75.990 (115)] means an area that is contaminated, including areas contaminated by the migration of hazardous substances from a source area, regardless of property ownership.

2. Movement or use of contaminated material in a manner that results in a violation of 18 AAC 70 water quality standards is prohibited.

This determination is in accordance with 18 AAC 75.380 and does not preclude ADEC from requiring additional assessment and/or cleanup action if future information indicates that this site may pose an unacceptable risk to human health or the environment.

Appeal

Any person who disagrees with this decision may request an adjudicatory hearing in accordance with 18 AAC 15.195 – 18 AAC 15.340 or an informal review by the Division Director in accordance with 18 AAC 15.185. Informal review requests must be delivered to the Division Director, 410 Willoughby Avenue, Suite 303, Juneau, Alaska 99811-1800, within 15 days after receiving the department's decision

reviewable under this section. Adjudicatory hearing requests must be delivered to the Commissioner of the Department of Environmental Conservation, 410 Willoughby Avenue, Suite 303, Juneau, Alaska 99811-1800, within 30 days after the date of issuance of this letter, or within 30 days after the department issues a final decision under 18 AAC 15.185. If a hearing is not requested within 30 days, the right to appeal is waived.

Picric Acid Detonation Site

Site Description and Background

The Picric Acid Detonation Site is an area located on the east side of the island on the beach between the VORTAC Facility and the housing area. A bottle of picric acid was discovered at the station in June 1991. Due to its unstable chemical characteristics, the United States Army Detonation Team, at the request of the FAA, detonated the picric acid on August 9, 1991, at the beach on the east side of Sisters Island.

Cleanup Levels & Contaminants of Concern

N/A

Characterization and Cleanup Activities

Characterization and cleanup activities conducted under the regulatory authority of the Contaminated Sites Program began in 1991. These activities are described below and are listed in the years the field work was performed.

1991 ECIR and Hazardous Waste Disposal

In August 1991, field work for the Sisters Island FAA station was conducted, with the final ECIR report dated May 1992. The report's primary purpose was to conduct a preliminary assessment/site investigation for each site included in the report and to make a recommendation regarding if there is a need for further remedial action. The secondary purpose of an ECI is to identify other potential environmental compliance issues at the station and observe hazardous material housekeeping and management practices. A toxic and hazardous materials (THM) inventory was also prepared.

A sediment sample (FAA-SSR-SV-001) was taken in the area of the picric acid detonation, and analyzed for Volatile Organic Compounds, Base/neutral extractables and acid extractables. Sample results were all ND, except Toluene at 4.0 ug/kg, which is below 18AAC75 table B1value of 6.5 mg/kg.

The ECIR table ES-1 indicates *"no action"* required for "CERCLA concerns", "POL concerns" and "other regulatory compliance/management practice concerns".

Cumulative Risk Evaluation

N/A

Exposure Pathway Evaluation

N/A

ADEC Decision

The spreadsheet attached to the 5 December 2006, Letter from ADEC to FAA indicates *"no action required"*. No violation of 18 AAC 75. See Appendix B.

Building 102 Area

Site Description and Background

Building 102 was located west of the Pump House and was used for housing prior to 1986. Previous reports indicate that AST 41-C-2 was located next to Building 102 and was used for heating oil storage prior to being relocated to the VORTAC where it held lubricating oil. A 1 ¼ inch fuel line piping was located north of Building 102 and formerly transferred heating oil from AST 41-C-2. The fuel line was disconnected from the main pipeline and drained.

Cleanup Levels & Contaminants of Concern

Contaminants of Concern

The following contaminants of concern were identified above approved cleanup levels during the course of the site investigations summarized in the Characterization and Cleanup Activities section of this decision letter: GRO, DRO, RRO, BTEX, and PAHs.

Cleanup Levels

ADEC determined that groundwater at Sisters Island does not meet the criteria to be considered a current or future drinking water source per 18 AAC 75.350. ADEC also determined that contamination in the groundwater will not be transported to either surface water or to a current or reasonably expected future source of drinking water. Therefore, pursuant to 18 AAC 75.345(b)(1), it is not required that groundwater meet Table C cleanup levels. In addition, migration to groundwater soil cleanup levels are no longer requirements for cleanup. The migration to groundwater pathway is no longer of concern at this site if the soil remains undisturbed.

Under 18 AAC 75.340 Method Two, the applicable cleanup levels are those in the "Over 40 Inch Zone" under the "Human Health", "Ingestion", and "Inhalation" columns of Tables B1 and B2 in 18 AAC 75.341. The "Over 40 Inch Zone" refers to the number of inches of rainwater the area receives each year.

Modeling to determine alternative cleanup levels was done using the approved Hydrocarbon Risk Calculator (HRC), an alternative cleanup levels and risk calculator developed in accordance with Method 3 under 18 AAC 75.340. The HRC is no longer consistent with how site-specific cleanup levels are calculated under 18 AAC 75, due to the promulgation of new regulations on November 6, 2016. Following a review of the site data, the Department has determined the HRC-derived ACLs do not need to be applied for site closure at this AOC, as final confirmation samples meet Method 2 table B1 and B2 cleanup values. The final confirmation sample concentrations for each COC are detailed in the Table below ("Soil 2009 BTEX, GRO, DRO and RRO Data (mg/kg)").

Characterization and Cleanup Activities

Characterization and cleanup activities conducted under the regulatory authority of the Contaminated Sites Program began in 1992. These activities are described below and are listed in the years the field work was performed.

1992 ECIR and Hazardous Waste Removal

The ECIR indicates *"no action"* for CERCLA concerns, *"further action"* for POL concerns, and *"further investigation"* for Other Regulatory Compliance/Management Practice concerns (Asbestos containing pipe-not an ADEC CS issue).

The ECIR recommended evaluating the inactive UST for compliance with ADEC and EPA tank registration and management standards. The assumption that there was a UST was incorrect; there was no UST discovered at this site during any work on the site.

1997-1999 Remedial Activity

Tank and piping removal

Located on the north side of Building l02 was a tank cradle for a former aboveground heating oil tank. There was no storage tank present at this location. It is believed that AST 41-C-2, a 500 gallon non-regulated tank, was removed from this location at an earlier date and placed at the VORTAC to store used lubricating oil. Approximately thirty feet of one-inch fuel piping connected the secondary 1 ¼ inch pipeline on the eastside of the island, under the main access road, and terminated approximately three feet above-grade at the former tank connection point. The piping was located approximately one foot below the surface and was exposed by hand digging. Soil samples were taken at each of four pipe section joints, were field screened for organic vapors and had PID readings ranging from 0 to 1.4 ppm. The soil did not exhibit visual signs of fuel contamination.

Site Assessment

The ADEC Method I Category B Action Level was applied to the AST 41-C-2 site for the sampling work done in 1997.

A site assessment was conducted on October 11 and 12, 1997. Soil field screening was conducted in the area surrounding former AST. During tank closure, the excavation could not be extended to the south due to the close proximity of Building 102. A total of 37 field screening samples were collected by Platt to characterize subsurface conditions in the vicinity of the former tank. Subsurface soil in the area consisted of organic rich surface soil overlying rust colored medium sand and gray coarse-grained, well graded sand. The gray sand was present from about 4 to 10 feet bgs and was immediately overlying bedrock. A thin zone of shaley beach cobbles was present above the rust colored sand. Headspace vapors were detected in soil samples collected from the excavation at concentrations ranging from 0 to 23 ppm using a PID. Soil was segregated based on vapor readings and placed in temporary stockpiles adjacent to the excavation. 53 cubic yards of petroleum contaminated soil was identified. . Upon confirmation of contamination by laboratory analysis, all contaminated soil from this site was transferred to a long-term stockpile at the south end of the island in February 1998. The soil was ultimately transported to Juneau during November 1999 for remediation. Petroleum-contaminated soil was encountered beneath the tank and adjacent areas to the north and west of the tank at approximate depths from 5.5 to 10 feet bgs. Two laboratory confirmation soil samples were collected from the excavation by Platt, one form the northern limits of the excavation and one from the southeast corner of the excavation. The northern sample showed DRO of 2,580 mg/kg, aliphatics of 700 mg/kg and aromatics of 83 mg/kg. The southeast corner showed DRO of 2,170 mg/kg, aliphatics of 2,000 mg/kg and aromatics of 190 mg/kg. Two test pits were excavated around the perimeter of the excavation on October 12, 1997, to investigate the extent of soil contamination to the north and west. Test Pit I, located 15 feet north of the excavation and Test Pit #2, located 33 feet west of the excavation both resulted in PID readings of 0 ppm in soil found 14 feet bgs, just above bedrock.

Release Investigation

Release investigation field activities were conducted between November 12 through 14, 1997 to further delineate the lateral and vertical extent of subsurface contamination. The release investigation included four test pits surrounding the open excavation and one groundwater sampling probe. Test pit excavations were conducted using a backhoe and were extended from the ground surface to bedrock. Subsurface conditions in this area were observed to consist of approximately 6.0 to 7.5 feet of brown, sandy gravel with thin, silty zones overlying 1.5 to 2.5 feet of gray, medium sand. Bedrock was encountered in each test pit beneath the gray sand at depths ranging from 7.5 feet below ground surface (bgs) at the east margin of the study area to 9.5 feet bgs at the western margin. Ground water was observed at a depth of about 6.0 feet bgs. . During the test pit excavations, a slight sheen was observed on the surface of water that collected in the bottom of test pit TP102-l. Analytical results for soil samples collected from the test pits indicated petroleum concentrations were less than ADEC cleanup levels, so the extent of petroleum contamination was limited to within these boundaries. The volume of in-place soil containing DRO contamination in excess of ADEC Level B cleanup standards is estimated to be less than 50 cubic yards. Soil contamination predominantly exists within the rusty brown and gray medium sand found approximately 6 to 8 feet bgs and extending to bedrock, approximately 7.5 to 9.5 feet bgs. One GeoProbe® implant well (GP-1) was installed using the bucket of a backhoe to drive the well. GP-1, was installed approximately 10 feet from the southern wall of the excavation, to facilitate collection of a ground water sample. The well screen was installed at an approximate depth of 7 feet bgs. BTEX compounds were not detected in the ground water sample collected from implant well GP-1. DRO was detected in the sample at a concentration of 8.0 milligrams per liter (mg/1), which is greater than the applicable ADEC groundwater cleanup level.

2006 Correspondence

In a letter from ADEC to FAA, dated 5 December 2006, (See Appendix B) addressing the status of all AOCs on the island, the letter requests "*additional characterization or cleanup occur"* at the "Quarters Building 102 Tank 4l-C-2: Elevated levels of diesel-range organics were left in place during the tank removal. Also, a geoprobe groundwater sampling result from an unspecified location in this general area showed elevated levels of benzene".

2009 Site Investigation

During the 2009 fieldwork, the exact location of GP-1 was not identified. Historic photographs and site plans from previous reports were reviewed to determine the former locations of Building 102, AST 41-C-2, and the associated remedial excavation. A total of 27 UVOST probes were advanced to investigate the area for residual petroleum contamination. UVOST probes were installed to delineate the boundaries of petroleum-contaminated soil and to verify the locations of previous soil samples that contained elevated DRO concentrations.

Potential petroleum-contaminated soil was detected in 13 of the 27 UVOST probes. Maximum LIF responses were 46.1%RE at UVOST probe UV-07 and 39.6%RE in UVOST probe UV-16. The UVOST/LIF responses indicate that the contaminated area at this site has likely been fully delineated. Based on the continuous clean UVOST/LIF responses at probe locations beyond the contaminated area, it appears that contamination in soil is stable and is not migrating offsite.

To verify the results of the UVOST system and to further investigate the area for petroleum-contaminated soil, seven borings were advanced and ten analytical soil samples, including two duplicates, were collected. Borings were advanced near UVOST locations that indicated the highest potential for

petroleum-contaminated soil based on the LIF signal response. Analytical samples included: ten for DRO/RRO and GRO/BTEX analyses, two for EPH/VPH analysis, and two for PAH analysis. Soil samples for TOC, bulk density, sieve, specific gravity, and moisture content analyses were also collected.

DRO was detected at concentrations greater than the MRLs in eight analytical soil samples, and seven results were greater than the ADEC Method Two cleanup level of 230 mg/kg. DRO concentrations ranged from 107 mg/kg to 4520 mg/kg. RRO was not detected at concentrations greater than the MRLs in any of the soil samples collected. All reported GRO, BTEX, and PAH results were less than the most stringent, ADEC Method Two, Over 40 Inch Zone, Migration to Groundwater cleanup levels.

Three monitoring wells were installed. Monitoring wells MW-18, MW-19, and MW-20 were installed in borings B38, B39, and B40, respectively, to depths of approximately 8 feet bgs. Groundwater samples were analyzed for DRO/RRO, GRO/BTEX, VPH/EPH and one sample was analyzed for PAH.

Groundwater was present in all three monitoring wells. Depth to bedrock ranged from approximately 7 to 10 feet bgs. The approximate depth to water in monitoring wells MW-18, MW-19, and MW-20 was 5 feet bgs. MW-18 was purged dry after 1.1 gallons, and MW-19 and MW-20 were purged dry after less than one gallon. Analytical samples from monitoring wells MW-18, MW-19, and MW-20 were collected without stable parameters and/or turbid water approximately 24 hours after the wells were purged dry.

DRO was detected at concentrations greater than the ADEC 18 AAC 75 Table C groundwater cleanup level in all three wells. DRO concentrations ranged from 1.60 mg/l to 3.31 mg/l. All other reported analytical results were less than ADEC 18 AAC 75 Table C groundwater cleanup levels. MW-20 was located near the approximate location of previous well GP1 installed in 1997. DRO was detected at concentrations of 3.31 mg/l in MW-20 during this SI and 8 mg/L in GP1 during the RI performed in 1997.

Soil summary;
The UVOST screening indicated potential petroleum-contaminated soil in 13 out of the 27 UVOST probes advanced at the former Building 102 area. Based on UVOST screening and analytical results, it appears that petroleum contamination is primarily present in subsurface soil just above bedrock at depths of 4.5 to 7 feet bgs in an area extending approximately 50 feet in diameter. This residual contamination is located around the perimeter and at the limits of the 1998 remedial excavation and beneath the north end of the former Building 102 footprint. DRO was detected at a maximum concentration of 4,520 mg/kg in a soil sample collected near the east sidewall of the 1998 remedial excavation at a depth interval of 5 to 7 feet bgs. Reported analytical results for RRO, GRO, BTEX and PAH analytes in soil were less than ADEC Method Two, Over 40 Inch Zone, Migration to Groundwater cleanup levels.

Groundwater summary:
Analytical groundwater samples indicate that DRO contamination from former AST 41-C-2 has impacted the shallow perched groundwater in this area of concern. In the three monitoring wells installed at the former Building 102 area, DRO concentrations ranged from 1.60 mg/L to 3.31 mg/L, which are greater than ADEC 18 AAC 75 Table C groundwater cleanup levels. All other reported analytes were detected at concentrations less than the groundwater cleanup levels. The report recommends that biannual or annual groundwater monitoring be conducted in this area of concern for one to two years to monitor DRO concentrations for stable and/or decreasing trends of remaining concentrations in groundwater.

2009-2010 Groundwater Sampling

Groundwater samples were collected from monitoring wells during three sampling events conducted in 2009 and 2010: These sampling events occurred in October during the 2009 SI, in June 2010, and in October 2010. June was chosen to represent the low groundwater condition, and October was chosen to represent the high groundwater condition. Both conditions were supported by groundwater elevation measurements.

Groundwater from MW-18 and MW-19 during the 2009 SI was not analyzed for PAHs. In addition, groundwater quality parameters could not be collected from MW-18, MW-19, and MW-20 during the 2009 SI due to insufficient water.

Groundwater was present in all three monitoring wells installed in the Building 102 area. Depth to bedrock ranged from approximately 7 to 10 feet bgs. Casing elevations, total well depth, and depth to water measured during the 2009 SI and 2010 groundwater sampling events are summarized in Table 7-1. The approximate groundwater flow direction was estimated using calculations to estimate groundwater flow direction during the 2009 SI and 2010 sampling events was calculated using groundwater elevations measured in the three monitoring wells during each of the sampling events. Based on the calculations, it appears that groundwater flow direction in this AOC is inconsistent as shown on Figure 3. In addition, low water yield characterized the monitoring wells in this AOC, which indicates that groundwater is likely discontinuous.

During the 2009 SI, MW-18 was purged dry after 1.1 gallons; during the June 2010 sampling event MW-18 was purged dry after 0.5 liters; and during the October 2010 sampling event MW-18 was purged dry after approximately 0.7 liters. The recharge rate in this monitoring well was relatively slow.

MW-19 purged dry during the 2009 SI after approximately 0.4 liters and during the June 2010 sampling event after approximately 1.5 liters. Sufficient water volume was available during the October 2010 sampling event and the well did not run dry during sampling.

MW-20 purged dry during the 2009 SI after approximately 0.8 liters and after approximately 2.5 liters during the June 2010 sampling event. Sufficient water volume was available during the October 2010 sampling event and the well did not run dry.

Summary of contaminant findings-groundwater:

During the 2009 SI, DRO was detected at concentrations greater than the ADEC 18 AAC 75 Table C groundwater cleanup level in all three wells installed in the Building 102 area. DRO was detected at 1.6 mg/L in MW-18, 3.14 mg/L in MW-19, and 3.31 mg/L in MW- 20 during the 2009 SI. During the 2010 sample events, DRO was not detected at concentrations greater than the ADEC groundwater cleanup level in MW-18. However DRO was detected at concentrations greater than the ADEC groundwater cleanup level in MW-19 and MW-20 during both 2010 sampling events. During the June 2010 sampling event, DRO concentrations in MW-19 and MW-20 were 75.7 mg/L and 5.26 mg/L, respectively. During the October 2010 sampling event, DRO concentrations in MW-19 and MW-20 were 4.38 mg/L and 2.32 mg/L, respectively. All other reported analytical results were less than ADEC 18 AAC 75 Table C groundwater cleanup levels.

The analytical DRO results compared to the effective solubilities calculated in the HRC indicate that a significant amount of the DRO mass in the analytical samples was present as NAPL and was not in dissolved phase. The HRC calculated the effective solubility of DRO aromatics to be 0.685 mg/L and the effective solubility of DRO aliphatics to be 0.00359 mg/L for the Building 102 area. Based on a comparison between the analytical DRO results and the effective solubilities calculated in the HRC, it appears that a significant amount of the DRO mass in the analytical samples was present as NAPL and was not in dissolved phase.

2011 Hydrocarbon Risk Calculator

The ADEC approved Hydrocarbon Risk Calculator (HRC) was used to assess the human health risks associated with petroleum hydrocarbon contaminated sites.

The HRC can be used to calculate human health risk and alternative cleanup levels and to help support Cleanup Complete determinations with or without Institutional Controls (ICs). To determine alternative cleanup levels, if the site is found to present acceptable risks with existing concentrations, then the existing concentrations would become the site "alternative cleanup levels" and the site would be eligible for a "cleanup complete" determination by ADEC per 18 AAC 75.380. The HRC report was prepared assessing two scenarios for groundwater use, potable and non-potable. After the completion of the HRC Report, ADEC approved the "350 determination" which documents groundwater is "non-potable" (to use the terminology in the HRC report).

The HRC calculations were performed using data collected during the site investigation (SI) conducted in October 2009 and subsequent groundwater monitoring events in June and October 2010.

Soil 2009 BTEX, GRO, DRO and RRO Data (mg/kg)

	Benzene	Toluene	Ethylbenzene	Xylene	GRO	DRO	RRO
95% UCL	0.00085	0.12261	0.76901	0.7514	34.4597	2,410.2231	33.5415
Maximum	0.00105	0.25900	1.73000	1.3800	69.7000	4,520.0000	57.8000

The HRC results for the former Building 102 area, assuming groundwater is non-potable, indicate that site conditions meet the ADEC human health risk standard established in 18 AAC 75.325. Based on the HRC results, all exposure pathways, including soil direct contact, outdoor air vapor inhalation, indoor air vapor inhalation, migration to groundwater, and groundwater ingestion, posed acceptable risk or were incomplete.

2012 Decommissioning Monitoring Wells and Correspondence

MW-18, MW-19 and MW-20 were decommissioned in accordance with the ADEC approved workplan.

FAA sent a letter to ADEC dated 15 October 2012, Subject; Final Report, Decommissioning Monitoring Wells, Sisters Island, Alaska. The letter requests a "cleanup complete with institutional controls" determination be issued by ADEC for the AOCs covered by the HRC report dated 22 August 2011.

Cumulative Risk Evaluation

Pursuant to 18 AAC 75.325(g), when detectable contamination remains on-site following a cleanup, a cumulative risk determination must be made that the risk from hazardous substances does not exceed a

cumulative carcinogenic risk standard of 1 in 100,000 across all exposure pathways and does not exceed a cumulative noncarcinogenic risk standard at a hazard index of one across all exposure pathways.

Based on a review of the environmental record, ADEC has determined that residual contaminant concentrations meet the human health cumulative risk criteria for residential land use.

Exposure Pathway Evaluation

Soil Ingestion and Direct Contact Pathways: Subsurface soil ingestion and direct contact pathways are considered complete since contamination is greater than 2 feet bgs.

Vapor Intrusion Pathway: The vapor intrusion pathway is considered complete if petroleum contamination in soil or groundwater is expected to be present within 30 horizontal or vertical feet of buildings. There are no buildings within 30 feet of the contamination, therefore the vapor intrusion pathway is considered incomplete.

Outdoor Air Pathway: The outdoor air exposure pathway is complete but is not considered significant for petroleum hydrocarbons.

Biota Pathway: The wild plant ingestion route is interpreted to be incomplete (or is insignificant) for petroleum hydrocarbons because plants do not significantly take up fuel hydrocarbons into their tissues. Similarly, the wild meat ingestion route is interpreted to be incomplete (or is insignificant) for petroleum hydrocarbons because the plants do not significantly take up the fuel hydrocarbons and hence, the animals feeding on the plants are not significantly exposed. Furthermore, the remote location of the Sisters Island FAA Station deters the ingestion of plants and wildlife.

Surface Water Pathway: Surface water is not considered a medium impacted by petroleum contamination. Sheen was not detected on the Icy Strait surface water during visual monitoring conducted during the 2009 SI and June and October 2010 groundwater sampling events. Petroleum contamination is generally present in subsurface soils (greater than 2 feet bgs) so surface water runoff is not likely to be a transport mechanism for transporting petroleum contamination into surface water. The software, BIOSCREEN (EPA model), was used to assess dissolved phase transport and plume areal extent through time and to estimate natural attenuation rates. BIOSCREEN simulations indicate that potential contaminant migration through the discontinuous groundwater perched above bedrock would not impact the Icy Straight, which is the nearest surface water body.

Groundwater Pathway: Groundwater does not represent a potentially complete exposure pathway. ADEC approved a determination that groundwater at Sisters Island does not meet the criteria to be considered a current or future drinking water source.

Exposure Pathway Conclusion: All exposure pathways, including soil direct contact, outdoor air vapor inhalation, indoor air vapor inhalation, migration to groundwater, and groundwater ingestion, pose acceptable risk or are incomplete. Therefore the remaining contamination is de minimis for all complete exposure pathways. Site conditions are protective of human health under an unrestricted (residential) land use scenario, and they may be used to support a Cleanup Complete determination in accordance with 18 AAC 75.

ADEC Decision

Remaining petroleum contamination in soil is below method 2 Tables B1 and B2 human health, ingestion, and inhalation cleanup levels. Migration to groundwater soil cleanup levels are not applicable at this site because ADEC determined that groundwater at the site is not a current or likely potential future drinking water source, per 18 AAC 75.350, and that contamination in the shallow groundwater will not be transported to either surface water or groundwater that is a reasonably expected future source of drinking water. Additionally, site characterization data demonstrate that the groundwater contaminant plumes are steady state or shrinking and contaminants do not pose a migration to surface water concern. However, petroleum contamination remains in groundwater above Table C cleanup levels, and is not suitable for *unrestricted* future use; therefore, ADEC has approved the use of institutional controls to limit potential future exposure and risk to human health or the environment.

Institutional controls necessary to support this closure determination include:

1. A restriction on using groundwater from the site without prior ADEC review. Figures attached for this site indicate the areal extent where the groundwater ICs apply.

Standard site closure conditions that apply to all sites include:

3. Any proposal to transport soil or groundwater off-site requires ADEC approval in accordance with 18 AAC 75.325(i). A "site" as defined by 18 AAC 75.990 (115) means an area that is contaminated, including areas contaminated by the migration of hazardous substances from a source area, regardless of property ownership.

4. Movement or use of contaminated material in a manner that results in a violation of 18 AAC 70 water quality standards is prohibited.

5. Groundwater throughout Alaska is protected for use as a water supply for drinking, culinary and food processing, agriculture including irrigation and stock watering, aquaculture, and industrial use. Contaminated site cleanup complete determinations are based on groundwater being considered a potential drinking water source. In the event that groundwater from this site is to be used for other purposes in the future, such as aquaculture, additional testing and treatment may be required to ensure the water is suitable for its intended use.

ADEC has determined the cleanup is complete as long as the institutional controls are properly implemented and no new information becomes available that indicates residual contamination may pose an unacceptable risk.

The ADEC Contaminated Sites Database will be updated to reflect the change in site status to "Cleanup Complete with Institutional Controls" and will include a description of the contamination remaining at the site.

The institutional controls will be removed in the future if documentation is provided that shows concentrations of all residual hazardous substances remaining at the site are below the levels that allow for unrestricted exposure to, and use of, the contaminated media and that the site does not pose a potential unacceptable risk to human health, safety or welfare, or to the environment. Standard conditions 1-3 above will remain in effect after ICs are removed.

This determination is in accordance with 18 AAC 75.380 and does not preclude ADEC from requiring additional assessment and/or cleanup action if the institutional controls are determined to be ineffective or if new information indicates that contaminants at this site may pose an unacceptable risk to human health or the environment.

Appeal

Any person who disagrees with this decision may request an adjudicatory hearing in accordance with 18 AAC 15.195 – 18 AAC 15.340 or an informal review by the Division Director in accordance with 18 AAC 15.185. Informal review requests must be delivered to the Division Director, 555 Cordova Street, Anchorage, Alaska 99501-2617, within 15 days after receiving the department's decision reviewable under this section. Adjudicatory hearing requests must be delivered to the Commissioner of the Department of Environmental Conservation, 410 Willoughby Avenue, Suite 303, P.O. Box 111800, Juneau, Alaska 99811-1800, within 30 days after the date of issuance of this letter, or within 30 days after the department issues a final decision under 18 AAC 15.185. If a hearing is not requested within 30 days, the right to appeal is waived.

Pump House Area

Site Description and Background

The Pump House was used to supply drinking water prior to 1986 and a chlorinator unit and fire hoses were located in this building during the ECIR. The Pump House was located down-gradient (southeast) of the northern terminus of the 1¼ inch fuel line piping and on the east side of Sisters Island Road. Approximately 30 feet of one inch pipe, with a valve at the junction of the one inch and 1 ¼ inch pipelines, supplied fuel to the former tank at building 102. The source of contamination at the Pump House area is assumed to be associated with the former pipeline and valve which supplied fuel (heating oil) to Building 102.

Cleanup Levels & Contaminants of Concern

Contaminants of Concern

The following contaminants of concern were identified above approved cleanup levels during the course of the site investigations summarized in the Characterization and Cleanup Activities section of this decision letter: GRO, DRO, RRO, BTEX, and PAHs.

Cleanup Levels

ADEC determined that groundwater at Sisters Island does not meet the criteria to be considered a current or future drinking water source per 18 AAC 75.350. ADEC also determined that contamination in the groundwater will not be transported to either surface water or to a current or reasonably expected future source of drinking water. Therefore, pursuant to 18 AAC 75.345(b)(1), it is not required that groundwater meet Table C cleanup levels. Migration to groundwater soil cleanup levels are no longer requirements for cleanup. The migration to groundwater pathway is no longer of concern at this site if the soil remains undisturbed.

Under 18 AAC 75.340 Method Two, the applicable cleanup levels are those in the "Over 40 Inch Zone" under the "Human Health", "Ingestion", and "Inhalation" columns of Tables B1 and B2 in 18 AAC 75.341. The "Over 40 Inch Zone" refers to the number of inches of rainwater the area receives each year.

Modeling to determine alternative cleanup levels was done using the approved Hydrocarbon Risk Calculator (HRC), an alternative cleanup levels and risk calculator developed in accordance with Method 3 under 18 AAC 75.340. The HRC is no longer consistent with how site-specific cleanup levels are calculated under 18 AAC 75, due to the promulgation of new regulations on November 6, 2016. Following a review of the site data, the Department has determined the HRC-derived ACLs do not need to be applied for site closure at this AOC, as final confirmation samples meet Method 2 table B1 and B2 cleanup values. The final confirmation sample concentrations for each COC are detailed in the Table below ("Soil 2009 BTEX, GRO, DRO and RRO Data (mg/kg)").

Characterization and Cleanup Activities

Characterization and cleanup activities conducted under the regulatory authority of the Contaminated Sites Program began in 1992. These activities are described below and are listed in the years the field work was performed.

1992 ECIR

The ECIR shows *"no action"* for CERCLA concerns, *"no action"* for POL concerns, and *"further investigation"* for Other Regulatory Compliance/Management Practice Concerns. Further action concerning other regulatory compliance/management practices is related to asbestos containing material.

1997-1999 Remedial Activity

The three wooden water storage tanks located north of the former Pump House were removed.

Two test pits (PH-1 and PH-2) were excavated in the vicinity of the former pump house on November 14, 1997. Bedrock was encountered at depths of 5.0 and 7.5 feet bgs. Soils overlying the bedrock consisted of dark brown, sandy silt above a gray, fine to medium sand. Ground water was encountered within the gray sand, at a depth of 6 feet bgs in test pit PH-2.

Four field screening samples were collected from the two test pits in the vicinity of the former pump house. Headspace vapors were not detected in test pit PH-I, but were as high as 240 ppm in test pit PH-2. One soil sample was collected from each of the test pits for chemical analysis. Ethylbenzene and xylenes were detected in sample SSR97SS102M22PH at concentrations of 1.2 ug/1 and 10 ug/1, respectively. No other BTEX compounds were detected in the soil samples collected. DRO compounds were detected in sample SSR97SS102M22PH at a concentration of 13,000 mg/kg. Six PAH compounds were also detected in this sample at concentrations ranging from 98 ug/kg anthracene to 2,300 ug/kg phenanthrene.

An implant well (GP-4) was installed three feet north of test pit PH-2. The well screen was placed at an approximate depth of 7 feet bgs. Sufficient sample volume could not be withdrawn from the implant well for laboratory submittal.

DRO contamination exists primarily in coarse cobbles and in gray medium sand found from 5.5 to 7.5 feet bgs. The total quantity of in-place, subsurface soil contaminated with DRO is estimated to be approximately 20 to 50 cubic yards.

2006 Correspondence

In a letter from ADEC to FAA, dated 5 December 2006, (See Appendix B) addressing the status of all AOCs on the island, the letter requests "*additional characterization or cleanup occur"* at "Pump House: Petroleum-contaminated soil was found at the valve near the former Pump House. A geoprobe groundwater sampling result from an unspecified location in this general area showed elevated levels of diesel-range organics."

2009 Site Investigation

Previously reported diesel-contaminated soil encountered in a test pit on the south side of the former Pump House was investigated during the SI. Historic photographs and site plans from previous reports were reviewed to determine the location of the former Pump House building and test pit locations. Due to site conditions, Geoprobe® access and additional soil investigation was limited in the area north and east of the former Pump House. A total of 13 UVOST probes were advanced in this area of concern.

Results from the UVOST/LIF probes indicated potential petroleum contamination in soil in four of the 13 probes completed in this area of concern. The maximum LIF response was 21.6%RE at UVOST probe UV-09. A relatively small contaminated area is focused around UV-10 at depths of 4.6 to 8.5 feet

bgs. UVOST screening and analytical results indicate that contamination is located on the east side of the existing and former 1¼ inch fuel pipelines that run parallel to the road. It appears that contamination has not migrated into soil located beneath or west of the existing pipeline. The UVOST/LIF responses indicate that the contaminated area at this site has likely been fully delineated. Based on the continuous clean UVOST/LIF responses at probe locations just beyond the contaminated area, it appears that contamination in soil is stable and is not migrating offsite.

Five borings were advanced to verify UVOST screening results and to further characterize the extent of contamination in this area. A total of five soil samples were collected and analyzed as follows: five for DRO/RRO, GRO/BTEX analysis, two for VPH/EPH analysis and one for PAH analysis. Soil samples for TOC, bulk density, sieve, specific gravity, and moisture content analyses were also collected from this area of concern.

DRO was detected at concentrations greater than the MRLs in three soil samples collected near the former Pump House, and two results were greater than the most stringent ADEC Method Two cleanup level of 230 mg/kg DRO. DRO concentrations ranged from 219 mg/kg to 1690 mg/kg. All reported GRO, BTEX, and PAH results were less than the most stringent, ADEC Method Two, Over 40 Inch Zone, Migration to Groundwater cleanup levels.

Groundwater was detected in two of the five borings advanced. Monitoring wells MW-16 and MW-17 were installed in borings B32 and B33, respectively, to depths of approximately 10 feet bgs. Due to insufficient water, analytical samples could not be collected from MW-16. Groundwater samples were collected from MW-17 and analyzed for DRO/RRO, GRO/BTEX, and VPH/EPH. MW-17 had insufficient water to collect a PAH sample.

Analytical groundwater samples indicate that DRO contamination has impacted the shallow perched groundwater in this area of concern. The perched groundwater aquifer appears to be discontinuous in this area since MW-16 was dry during 2009 SI activities. DRO was detected at a concentration of 2.37 mg/l in MW-17, which is greater than ADEC 18 AAC 75 Table C groundwater cleanup level for DRO. All other reported analytes were detected at concentrations less than the groundwater cleanup levels.

The vapor intrusion pathway is not a concern in this area and requires no further assessment because there are no buildings located within 100 feet of this area of concern. In addition, DRO is the only contaminant of concern and DRO is not listed as a compound of concern for vapor migration in ADEC's CSM Guidance.

The report recommends groundwater monitoring for one or two years to determine if DRO concentrations are stable and/or decreasing.

2009-2010 Groundwater Sampling

Groundwater samples were collected from monitoring wells during three sampling events conducted in 2009 and 2010: These sampling events occurred in October during the 2009 SI, in June 2010, and in October 2010. June was chosen to represent the low groundwater condition, and October was chosen to represent the high groundwater condition. Both conditions were supported by groundwater elevation measurements.

Groundwater samples were analyzed for DRO, GRO, RRO, BTEX, PAH, EPH, and VPH. Due to insufficient water during the 2009 SI, groundwater samples could not be collected from MW-16, and final groundwater parameters and PAHs were not obtainable from MW-17.

Casing elevations, total well depth, and depth to water measured during the 2009 SI and 2010 groundwater monitoring events. Since only two monitoring wells were installed in this AOC, groundwater flow direction was estimated based on surface topography. However, low groundwater yield characterized the monitoring wells in this AOC, which indicates that groundwater is likely discontinuous, and an actual gradient or flow direction may not be representative.

During the 2009 SI, MW-16 had insufficient water to collect groundwater quality parameters and analytical samples. During the June 2010 sampling event MW-16 was purged dry after approximately 0.3 liters, and during the October 2010 sampling event MW-16 was purged dry after approximately 3.5 liters. The recharge rate was relatively slow.

MW-17 was purged dry during the 2009 SI after approximately 0.7 liters, approximately 0.3 liters during the June 2010 sampling event, and approximately 3.75 liters during the October 2010 sampling event.

Sufficient water was not available in MW-16 during the 2009 SI to collect analytical samples. During the June 2010 sampling event, DRO was detected at 1.26 mg/L, less than the ADEC groundwater cleanup level. During the October 2010 event, DRO was detected at a concentration of 2.32 mg/L and Benzo(a)pyrene was detected at a concentration of 0.0002 mg/L in MW-16, greater than the ADEC 18 AAC 75 Table C groundwater cleanup levels. All other reported analytical results were less than the ADEC 18 AAC 75 Table C groundwater cleanup levels in MW-16.

During all three events, DRO was detected at concentrations greater than the ADEC groundwater cleanup level in MW-17. DRO was detected at concentrations of 2.37 mg/L, 4.53 mg/L, and 5.32 mg/L, respectively. All other reported analytical results were less than the ADEC 18 AAC 75 Table C groundwater cleanup levels.

The analytical DRO results compared to the effective solubilities calculated in the HRC indicate that a significant amount of the DRO mass was present as NAPL and was not in dissolved phase. The HRC calculated the effective solubility of DRO aromatics to be 0.734 mg/L and the effective solubility of DRO aliphatics to be 0.00409 mg/L for the Pump House area.

Groundwater Summary: In MW-16, DRO and the PAH compound, Benzo(a)pyrene, were detected at concentrations greater than the ADEC 18 AAC 75 Table C groundwater cleanup levels during the October 2010 sampling event, but less than the groundwater cleanup levels during the June 2010 sampling event. Sufficient water was not available during the 2009 SI to collect analytical samples from MW-16. During all three sampling events, DRO was detected at concentrations greater than the ADEC groundwater cleanup level in MW- 17. In addition, RRO was detected at a concentration greater than the ADEC groundwater cleanup level in MW-17 during the October 2010 sampling event. Based on a comparison between the analytical DRO results and the effective solubilities calculated in the HRC, it appears that a significant amount of the DRO mass in the analytical samples was present as NAPL and was not in dissolved phase. All other reported analytical results were less than the ADEC 18 AAC 75 Table C groundwater cleanup levels.

2011 Hydrocarbon Risk Calculator

The ADEC approved Hydrocarbon Risk Calculator (HRC) was used to assess the human health risks associated with petroleum hydrocarbon contaminated sites.

The HRC can be used to calculate human health risk and alternative cleanup levels and to help support Cleanup Complete determinations with or without Institutional Controls (ICs). To determine alternative cleanup levels, if the site is found to present acceptable risks with existing concentrations, then the existing concentrations would become the site "alternative cleanup levels" and the site would be eligible for a "cleanup complete" determination by ADEC per 18 AAC 75.380. The HRC report was prepared assessing two scenarios for groundwater use, potable and non-potable. After the completion of the HRC Report, the ADEC approved the "350 determination" which documents groundwater is "non-potable" (to use the terminology in the HRC report).

The HRC calculations were performed using data collected during the site investigation (SI) conducted in October 2009 and subsequent groundwater monitoring events in June and October 2010.

Soil 2009 BTEX, GRO, DRO and RRO Data (mg/kg)

	Benzene	Toluene	Ethylbenzene	Xylene	GRO	DRO	RRO
95% UCL	0.0022	0.1714	0.0890	1.1605	59.9943	2,009.5250	55.5066
Maximum	0.0073	0.1800	0.1990	1.4100	48.0000	1,690.0000	48.8000

The HRC results for pump house area, assuming groundwater is non potable, indicate that site conditions meet the ADEC human health risk standard established in 18 AAC 75.325. Based on the HRC results, all exposure pathways, including soil direct contact, outdoor air vapor inhalation, indoor air vapor inhalation, migration to groundwater, and groundwater ingestion, posed acceptable risk or were incomplete.

2012 Correspondence and Decommissioning Monitoring Wells

MW-16 and MW-17 were decommissioned in accordance with the ADEC approved workplan.

FAA sent a letter to ADEC dated 15 October 2012, Subject; Final Report, Decommissioning Monitoring Wells, Sisters Island, Alaska. The letter requests a "cleanup complete with institutional controls" determination be issued by ADEC for the AOCs covered by the HRC report dated 22 August 2011.

Cumulative Risk Evaluation

Pursuant to 18 AAC 75.325(g), when detectable contamination remains on-site following a cleanup, a cumulative risk determination must be made that the risk from hazardous substances does not exceed a cumulative carcinogenic risk standard of 1 in 100,000 across all exposure pathways and does not exceed a cumulative noncarcinogenic risk standard at a hazard index of one across all exposure pathways.

Based on a review of the environmental record, ADEC has determined that residual contaminant concentrations meet the human health cumulative risk criteria for residential land use.

Exposure Pathway Evaluation

Soil Ingestion and Direct Contact Pathways: Subsurface soil ingestion and direct contact pathways are considered complete but de minimis since contamination is greater than 2 feet bgs but below direct contact CULs.

Vapor Intrusion Pathway: The vapor intrusion pathway is considered complete if petroleum contamination in soil or groundwater is expected to be present within 30 horizontal or vertical feet of buildings. There are no buildings within 30 feet of the contamination, therefore the vapor intrusion pathway is considered incomplete.

Outdoor Air Pathway: The outdoor air exposure pathway is complete but is not considered significant for petroleum hydrocarbons.

Biota Pathway: The wild plant ingestion route is interpreted to be incomplete (or is insignificant) for petroleum hydrocarbons because plants do not significantly take up fuel hydrocarbons into their tissues. Similarly, the wild meat ingestion route is interpreted to be incomplete (or is insignificant) for petroleum hydrocarbons because the plants do not significantly take up the fuel hydrocarbons and hence, the animals feeding on the plants are not significantly exposed. Furthermore, the remote location of the Sisters Island FAA Station deters the ingestion of plants and wildlife.

Surface Water Pathway: Surface water is not considered a medium impacted by petroleum contamination. Sheen was not detected on the Icy Strait surface water during visual monitoring conducted during the 2009 SI and June and October 2010 groundwater sampling events. Petroleum contamination is generally present in subsurface soils (greater than 2 feet bgs) so surface water runoff is not likely to be a transport mechanism for transporting petroleum contamination into surface water. The software, BIOSCREEN (EPA model), was used to assess dissolved phase transport and plume areal extent through time and to estimate natural attenuation rates. BIOSCREEN simulations indicate that potential contaminant migration through the discontinuous groundwater perched above bedrock would not impact the Icy Straight, which is the nearest surface water body.

Groundwater Pathway: Groundwater does not represent a potentially complete exposure pathway. ADEC approved a determination that groundwater at Sisters Island does not meet the criteria to be considered a current or future drinking water source.

Exposure Pathway Conclusion:
All exposure pathways, including soil direct contact, outdoor air vapor inhalation, indoor air vapor inhalation, migration to groundwater, and groundwater ingestion, pose acceptable risk or are incomplete. Therefore the remaining contamination is de minimis for all complete exposure pathways. Site conditions are protective of human health under an unrestricted (residential) land use scenario, and they may be used to support a Cleanup Complete determination in accordance with 18 AAC 75.

ADEC Decision

Remaining petroleum contamination in soil is below method 2 Tables B1 and B2 human health, ingestion, and inhalation cleanup levels. Migration to groundwater soil cleanup levels are not applicable at this site because ADEC determined that groundwater at the site is not a current or likely potential future drinking water source, per 18 AAC 75.350, and that contamination in the shallow groundwater will not be transported to either surface water or groundwater that is a reasonably expected future source of drinking water. Additionally, site characterization data demonstrate that the groundwater contaminant

plumes are steady state or shrinking and contaminants do not pose a migration to surface water concern. However, petroleum contamination remains in groundwater above Table C cleanup levels, and is not suitable for *unrestricted* future use; therefore, ADEC has approved the use of institutional controls to limit potential future exposure and risk to human health or the environment.

Institutional controls necessary to support this closure determination include:

2. A restriction on using groundwater from the site without prior DEC review. Figures attached for this site indicate the areal extent where the groundwater ICs apply.

Standard site closure conditions that apply to all sites include:

6. Any proposal to transport soil or groundwater off-site requires ADEC approval in accordance with 18 AAC 75.325(i). A "site" as defined by 18 AAC 75.990 (115) means an area that is contaminated, including areas contaminated by the migration of hazardous substances from a source area, regardless of property ownership.

7. Movement or use of contaminated material in a manner that results in a violation of 18 AAC 70 water quality standards is prohibited.

8. Groundwater throughout Alaska is protected for use as a water supply for drinking, culinary and food processing, agriculture including irrigation and stock watering, aquaculture, and industrial use. Contaminated site cleanup complete determinations are based on groundwater being considered a potential drinking water source. In the event that groundwater from this site is to be used for other purposes in the future, such as aquaculture, additional testing and treatment may be required to ensure the water is suitable for its intended use.

ADEC has determined the cleanup is complete as long as the institutional controls are properly implemented and no new information becomes available that indicates residual contamination may pose an unacceptable risk.

The ADEC Contaminated Sites Database will be updated to reflect the change in site status to "Cleanup Complete with Institutional Controls" and will include a description of the contamination remaining at the site.

The institutional controls will be removed in the future if documentation is provided that shows concentrations of all residual hazardous substances remaining at the site are below the levels that allow for unrestricted exposure to, and use of, the contaminated media and that the site does not pose a potential unacceptable risk to human health, safety or welfare, or to the environment. Standard conditions 1-3 above will remain in effect after ICs are removed.

This determination is in accordance with 18 AAC 75.380 and does not preclude ADEC from requiring additional assessment and/or cleanup action if the institutional controls are determined to be ineffective or if new information indicates that contaminants at this site may pose an unacceptable risk to human health or the environment.

Appeal

Any person who disagrees with this decision may request an adjudicatory hearing in accordance with 18 AAC 15.195 – 18 AAC 15.340 or an informal review by the Division Director in accordance with 18 AAC 15.185. Informal review requests must be delivered to the Division Director, 555 Cordova Street, Anchorage, Alaska 99501-2617, within 15 days after receiving the department's decision reviewable under this section. Adjudicatory hearing requests must be delivered to the Commissioner of the Department of Environmental Conservation, 410 Willoughby Avenue, Suite 303, P.O. Box 111800, Juneau, Alaska 99811-1800, within 30 days after the date of issuance of this letter, or within 30 days after the department issues a final decision under 18 AAC 15.185. If a hearing is not requested within 30 days, the right to appeal is waived.

Standby Generator Facility

Site Description and Background

The Standby Generator Facility (Building 617), located south of the Quarters Facility (Building 102), was a cement block structure which housed a engine/generator set that provided standby power for the housing area prior to 1986. An inactive 1,000-gallon diesel regulated underground storage tank was located at the facility and identified in the ECIR. The FAA tank number is 41-C-001 and there is no ADEC regulated tank ID. UST 41-C-1 and UST 41-B-1 (formerly part of the VORTAC AOC) comprise a separate Sisters Island site in the ADEC database under file number 1510.26.001: "FAA-Sisters Island".

Contaminants of Concern

GRO, DRO, RRO, BTEX, PAH.

Characterization and Cleanup Activities

Characterization and cleanup activities conducted under the regulatory authority of the Contaminated Sites Program began in 1991. These activities are described below and are listed in the years the field work was performed.

1991 ECIR

The ECIR shows *"no action"* for CERCLA concerns, *"further action"* for POL concerns, and *"further investigation"* for Other Regulatory Compliance/Management Practice Concerns.

The POL concerns include an inactive 1,000 gallon diesel regulated underground storage tank, with no ADEC registration number assigned. Further action concerning other regulatory compliance/management practices is related to asbestos containing material

The transformers were removed during the island wide hazardous waste removal actions that took place in September 1991. No staining near the transformers was noted in the documentation.

1997-1999 Remedial Activity and Correspondence

The removal of the 1,000-gallon diesel UST (41-C-1) was conducted 9-12 October 1997, using ADEC's UST Guidance Manual amended September 22, 1995, and ADEC 18 AAC 78, amended November 3, 1995.

The depth of the excavation extended to seven feet vertically. Bedrock was not encountered during excavation. The source of surface water is from precipitation. Due to the high permeability of the soils, the surface water runoff percolates vertically through the soils, until it reaches an impermeable layer of sands or bedrock. The soils excavated were very wet due to this percolation; however, the water table was not encountered.

Field Screening was performed throughout the entire excavation activity. There were no obvious signs of surface stains before excavation began. There were no obvious signs of leakage from the associated pipe or tank. Contaminated soils were not encountered during field screening. Field screening results indicated that the tank pit was free of volatile organic compounds. All other readings were 0.0 ppm. Analytical results indicate that there is no hydrocarbon contamination present in the soil. GRO levels are low to non-detect. Soil Benzene levels are low to non-detect. Since the PID did not detect any significant levels

of hydrocarbons in the soil and no surface stains were apparent, only clean soils were stockpiled on a 10 - mil. liner.

Four soil samples were collected and analyzed in accordance with ADEC approved plans. Laboratory analytical methods include the following; Diesel Range Organics by AK 102 (DRO), Gasoline Range Organics (GRO) by AK 101 combined with EPA 8020, a method used for detecting benzene, toluene, xylene, ethyl benzene (BTEX).

Sample number SSR97ST41-C-1-S-19 was collected approximately 9 feet below ground surface, on the south end of the tank pit. This sample had a TOV reading of 0.0 ppm, a DRO result of non-detect.a GRO result of non-detect, a Benzene result of non-detect, and total BTEX results of non-detect. Theanalytical results are below ADEC's clean up level "C".

Sample number SSR97ST41-C-1-S-20 was collected approximately 9 feet below ground surface, along the middle of the bottom of the tank pit. This sample had a TOV reading of 0.0 ppm, a DRO result of non-detect, a GRO result of non-detect, a Benzene result of non-detect, and a total BTEX results of non- detect. The analytical results are below ADEC's clean up level "C".

Sample number SSR97ST41-C-1-S-21 is a duplicate sample of SSR97ST41-C-1-S-20. This sample had a TOV reading of 0.0 ppm, a DRO result of non-detect, a non-detect GRO result, a non detect Benzene result, and a non-detect result for total BTEX. The analytical results are below ADEC's cleanup level "C".

Sample number SSR97ST41-C-1-S-22 was collected approximately 9 feet below ground surface, at the north end of the bottom of the tank. This sample had a TOV reading of 0.0 ppm, a DRO result of non- detect, a GRO result of 8.93 ppm, a Benzene result of 0.0809 ppm, and a total BTEX results of 0.077418 ppm. The analytical results are below ADEC's clean up level "C".

The report recommends that the FAA request a clean closure from the ADEC.

Correspondence: The Regulated UST Tank Closure Report was transmitted to ADEC in a 15 December 1999 letter. The letter requested clean closure for this tank site. See Appendix B.

2006 Correspondence

In a letter from ADEC to FAA, dated 5 December 2006, (See Appendix B) addressing the status of all AOCs on the island, the letter states the department has determined that "*no action is requested"* at this potential area of concern as no contamination was found. The letter states: Generator Building 617, Tank 41-C-1: This 1,000 gallon UST was removed in 1999. Four (4) samples were collected and none of the analytes were found to be present above applicable cleanup levels.

The ADEC contaminated sites (CS) database includes the following notation: Tank 41-C-1: 1000 gallon UST removed in 1999. Four samples were collected and met the method 2 cleanup level.

Cumulative Risk Evaluation

N/A since there was no release to the environment.

Exposure Pathway Evaluation

N/A since there was no release to the environment.

ADEC Decision

In a letter from ADEC to FAA, dated 5 December 2006, addressing the status of all AOCs on the island, the letter states the department has determined that "*no action is requested*" at this potential area of concern as no contamination was found. The letter states: Generator Building 617, Tank 41-C-1: This 1000 gallon UST was removed in 1999. Four (4) samples were collected and none of the analytes were found to be present above applicable cleanup levels. This site was closed with a "cleanup complete" determination on 12/5/2006.

Building 412 Area

Site Description and Background

Building 412 is referred to as the VHF Quarters Facility and was located south of the Standby Engine Generator Building/Building 617. A 1,000 gallon heating oil UST (41-D-2) and associated piping lines, and two 1,500 gallon water cisterns and associated three inch piping, were located on the west side of Building 412.

Cleanup Levels & Contaminants of Concern

Contaminants of Concern

The following contaminants of concern were identified above approved cleanup levels during the course of the site investigations summarized in the Characterization and Cleanup Activities section of this decision letter: GRO, DRO, RRO, BTEX, and PAHs.

Cleanup Levels

ADEC determined that groundwater at Sisters Island does not meet the criteria to be considered a current or future drinking water source per 18 AAC 75.350. ADEC also determined that contamination in the groundwater will not be transported to either surface water or to a current or reasonably expected future source of drinking water. Therefore, pursuant to 18 AAC 75.345(b)(1), it is not required that groundwater meet Table C cleanup levels. Migration to groundwater soil cleanup levels are no longer requirements for cleanup. The migration to groundwater pathway is no longer of concern at this site if the soil remains undisturbed.

Under 18 AAC 75.340 Method Two, the applicable cleanup levels are those in the "Over 40 Inch Zone" under the "Human Health", "Ingestion", and "Inhalation" columns of Tables B1 and B2 in 18 AAC 75.341. The "Over 40 Inch Zone" refers to the number of inches of rainwater the area receives each year.

Modeling to determine alternative cleanup levels was done using the approved Hydrocarbon Risk Calculator (HRC), an alternative cleanup levels and risk calculator developed in accordance with Method 3 under 18 AAC 75.340. The HRC is no longer consistent with how site-specific cleanup levels are calculated under 18 AAC 75, due to the promulgation of new regulations on November 6, 2016. Following a review of the site data, the Department has determined the HRC-derived ACLs do not need to be applied for site closure at this AOC, as final confirmation samples meet Method 2 table B1 and B2 cleanup values. The final confirmation sample concentrations for each COC are detailed in the Table below ("Soil 2009 BTEX, GRO, DRO and RRO Data (mg/kg)").

Characterization and Cleanup Activities

Characterization and cleanup activities conducted under the regulatory authority of the Contaminated Sites Program began in 1991. These activities are described below and are listed in the years the field work was performed.

1991 ECIR and Hazardous Waste Removal

The ECIR shows *"no action"* for CERCLA concerns, *"no action"* for POL concerns, and *"further action"* for Other Regulatory Compliance/Management Practice Concerns.

Further action for Other Regulatory Compliance/Management Practice Concerns is related to asbestos containing material and inactive and sealed electrical equipment.

The sealed electrical equipment was removed during the island wide hazardous waste removal actions that took place in September 1991. No staining was noted in the documentation.

1997-1999 Remedial Activity

The 1,000-gallon heating oil UST was removed 9-12 October 1997. Approximately 85 gallons of fuel was removed from the tank, containerized, and transported to Delta Western for recycling. The tank was supplied through approximately 55 feet of 3/4-inch-diameter steel pipe connected to the main fuel line along the island road. Fuel piping lines were also drained and removed.

Subsurface soil encountered during excavation of the UST consisted of approximately 4-6 feet of beach fill material overlying approximately 2 feet of rust colored beach sand. Gray, well graded, medium grained sand was encountered from approximately 8 feet bgs to the top of bedrock at 14 feet bgs. A total of 93 cubic yards of DRO contaminated soil was removed from the site associated with this tank in two separate events, one during tank removal in October and another in November 1997. The soil was temporarily stored adjacent to the excavation in stockpiles awaiting sample results. After lab analysis confirmed contamination, the excavated soil was moved to the long-term stockpile location in February 1998, and then taken off island in December 1999 for remediation. While completing the excavation, it was noted that standing water was present in the excavation at an approximate depth of 10 to 12 feet bgs. and the excavated area was backfilled with clean material.

Forty-seven soil samples were field screened for petroleum vapors by during closure of UST 41-D-2. Soil vapors detected in soil were greatest directly below the UST and in the gray, medium-grained sand found to the west and south of the tank. Soil vapors were as high as 160 ppm in soil samples collected from just above bedrock near the west and south margin of the excavation.

Soil field screening was also performed beneath 55 feet of tank supply pipeline. This pipeline was buried approximately 8 inches bgs and was situated on the west and south side of Building 412. No soil vapors were detected in field screen samples of soil from beneath the pipeline.

Two soil confirmation samples were collected from the excavation. One sample (SSR97SS41D2Q07) was collected from the bottom of the south end of the excavation. Sample SSR97SS41D2Q08 was collected from approximately 8 feet bgs along the north wall of the excavation. Confirmation samples were analyzed for DRO and BTEX. Sample SSR97SS41D2Q07, collected from the south margin of the excavation, contained DRO at a concentration of 432 mg/kg. This sample did not contain benzene, however total BTEX concentration was 1.3209 mg/kg. Sample SSR97SS41D2Q08 from the northern margin of the excavation did not contain DRO or BTEX compounds. Confirmation sample SSR97SS412Q01AA, collected from the southwest corner of the excavation by GeoEngineers during November 1997 was analyzed for DRO, BTEX, PAHs, and aliphatic/aromatic fractions of DRO and RRO. This sample did not contain benzene, however total BTEX was detected at a concentration of 0.672 mg/kg and DRO was detected at a concentration of 4,000 mg/kg. Aliphatic and aromatic fractions of RRO were not detected in the sample, however for DRO they were 5,700 mg/kg and 530 mg/kg, respectively. Five PAH compounds were detected in this sample. The compounds included naphthalene,

acenaphthene, fluorene, phenanthrene and anthracene. The maximum PAH concentration detected was 1,200 mg/kg phenanthrene.

ADEC Category A cleanup standards have been applied to this site. DRO concentrations remaining in soil along the south and west margins of the excavation exceed the Category A cleanup standard of 200 mg/kg. The extent of soil contamination in these down gradient directions is unknown. Soil collected from the RI test pits and north margin of the excavation did not contain DRO contamination. A total of 93 cubic yards of contaminated soil was removed from the UST 41-0-2 excavation.

2006 Correspondence

In a letter from ADEC to FAA, dated 5 December 2006, (See Appendix B) addressing the status of all AOCs on the island, the letter requests "*additional characterization or cleanup occur"* at the "Quarters Building 412: Elevated levels of diesel-range organics were left in place during the tank removal."

2009 Site Investigation

Residual diesel-contaminated soil associated with the former 1,000 gallon UST 41-D-2 located on the west side of Building 412 was investigated during the SI. Previous sample locations with elevated DRO concentrations and areas around the perimeter of the previous remedial excavation were targeted for additional soil investigation. Historic photographs and site plans from previous reports were reviewed to determine the approximate locations of former Building 412, UST 41-D-2, and the limits of the remedial excavation.

A total of 27 UVOST probes were advanced in this area of concern. Potential petroleum-contaminated soil was detected in 11 of the 27 UVOST probes advanced. The maximum LIF response was 56.1%RE at UVOST probe UV-09. Depths of contamination ranged from 6.4 to 9.5 feet bgs. Based on the UVOST/LIF responses and analytical results, it appears that an isolated area of DRO contamination is present in subsurface soil just above bedrock at depths of 6 to 9 feet bgs. Contamination appears to extend in an irregular shaped area measuring approximately 40 feet north to south, and 20 feet east to west. Based on the LIF responses, it is likely that the contaminated area was fully delineated in the Building 412 area during SI activities.

Six borings were advanced to verify UVOST screening results and to further characterize the extent of contamination in this area. A total of seven soil samples were collected and analyzed as follows: seven for DRO/RRO and GRO/BTEX analyses, four for EPH/VPH analyses, and three for PAH analysis. Soil samples for TOC, bulk density, sieve, specific gravity, and moisture content analyses were also collected from this area of concern. DRO was detected at concentrations greater than the MRLs in three soil samples collected in the Building 412 area, and two results were greater than the most stringent ADEC Method Two cleanup level of 230 mg/kg DRO. DRO concentrations ranged from 60.4 mg/kg to 1100 mg/kg. All reported GRO, BTEX, and PAH results were less than the most stringent, ADEC Method Two, Over 40 Inch Zone, Migration to Groundwater cleanup levels.

Three monitoring wells were installed. MW-21, MW-22, and MW-23 were installed in borings B44, B45, and B46, respectively, to depths of approximately 9 feet bgs. Due to insufficient water, analytical samples could not be collected from MW-21. Groundwater samples collected from MW-22 and MW- 23 were analyzed for DRO/RRO, GRO/BTEX, and VPH/EPH. A groundwater sample collected from MW-23 was also analyzed for PAH.

Groundwater was detected in three of the six borings advanced and was present in two of the three monitoring wells installed in the Building 412 area. The approximate depth to water in monitoring wells MW-22 and MW-23 was 6.3 feet bgs. Bedrock was encountered at depths of 9 to 10 feet bgs. MW-22 and MW-23 were purged dry after less than one gallon, so analytical samples were collected without stable parameters and/or turbid water.

DRO was detected at concentrations greater than the ADEC 18 AAC 75 Table C groundwater cleanup level in monitoring well MW-23. MW-22 and MW-23 had DRO concentrations of 1.1 mg/l and 2.5 mg/l, respectively. All other reported analytical results were less than the ADEC 18 AAC 75 Table C groundwater cleanup levels.

Analytical groundwater samples indicate that DRO contamination has impacted the shallow perched groundwater in this area of concern. The perched groundwater aquifer appears to be discontinuous in this area since MW-21 was dry during 2009 SI activities. DRO was detected at concentrations of 1.1 mg/l and 2.5 mg/l in MW22 and MW-23, respectively, which is greater than the ADEC 18 AAC 75 Table C groundwater cleanup level for DRO. All other reported analytes were detected at concentrations less than the groundwater cleanup levels.

The vapor intrusion pathway is not a concern in this area and requires no further assessment because there are no buildings located within 100 feet of this area of concern. In addition, DRO is the only contaminant of concern and DRO is not listed as a compound of concern for vapor migration in ADEC's CSM Guidance.

2009-2010 Groundwater Sampling

Groundwater samples were collected from monitoring wells during three sampling events conducted in 2009 and 2010: These sampling events occurred in October during the 2009 SI, in June 2010, and in October 2010. June was chosen to represent the low groundwater condition, and October was chosen to represent the high groundwater condition. Both conditions were supported by groundwater elevation measurements.

During the 2009 SI, DRO was detected at concentrations greater than the ADEC Method Two cleanup level of 230 mg/kg in two soil samples collected in the Building 412 area. DRO was detected at a maximum concentration of 1100 mg/kg in a soil sample collected near the south end of the 1997 excavation. All reported GRO, BTEX, and PAH results were less than the most stringent, ADEC Method Two, Over 40 Inch Zone, Migration to Groundwater cleanup levels.

Three monitoring wells, MW-21, MW-22, and MW-23, were installed to depths of approximately 8.3 feet bgs, 9.35 feet bgs, and 8.35 feet bgs, respectively, near former Building 412. Groundwater samples were analyzed for DRO, GRO, RRO, BTEX, PAH, EPH, and VPH. Due to insufficient water during the 2009 SI, analytical samples could not be collected from MW-21 and a PAH sample was not collected from MW-22. Due to insufficient water during the June 2010 sampling event, PAH, EPH, and VPH samples could not be collected from MW-21.

During the 2009 SI, MW-21 did not have sufficient water to collect groundwater quality parameters or analytical samples. During the June 2010 sampling event, MW-21 was purged dry after 0.35 liters and during the October 2010 sampling event MW-21 was purged dry after approximately 3.0 liters. The recharge rate was relatively slow.

MW-22 purged dry during the 2009 SI after approximately 0.4 liters and during the June 2010 sampling event after approximately 0.5 liters. The recharge rate was relatively slow. Sufficient water volume was available during the October 2010 sampling event and the well did not run dry.

MW-23 purged dry during the 2009 SI after approximately 0.6 liters, after approximately 0.3 liters during the June 2010 sampling event, and after approximately 2.5 liters during the October 2010 sampling event. The recharge rate was relatively slow.

Groundwater Summary:
Three monitoring wells, MW-21, MW-22, and MW-23, were installed in the Building 412 area during the 2009 SI. Groundwater samples were collected from these monitoring wells during three different sampling events in 2009 and 2010 and analyzed for DRO, GRO, RRO, BTEX, PAH, EPH, and VPH. Due to insufficient water, analytical samples could not be collected from MW-21 during the 2009 SI and EPH, VPH, and PAH samples could not be collected from MW-21 during the June 2010 sampling event. In addition, a PAH groundwater sample could not be collected from MW-22 during the 2009 SI.

During all sampling events, DRO was detected in monitoring wells MW-21 and MW-22 at concentrations less than the ADEC 18 AAC 75 Table C groundwater cleanup level. In MW-23, DRO was detected at concentrations greater than the ADEC groundwater cleanup level during all three sampling events. Based on a comparison between the analytical DRO results and the effective solubilities calculated in the HRC, it appears that a significant amount of the DRO mass in the analytical samples was present as NAPL and was not in dissolved phase. The HRC calculated the effective solubility of DRO aromatics to be 0.728 mg/L and the effective solubility of DRO aliphatics to be 0.00429 mg/L All other reported analytical results were less than the ADEC 18 AAC 75 Table C groundwater cleanup levels.

Bedrock was encountered at depths of 9 to 10 feet bgs. Casing elevations, total well depth, and depth to water measured during the 2009 SI and 2010 groundwater sampling events. Based on groundwater flow direction calculations using groundwater elevations measured in the three monitoring wells during each of the sampling events, it appears that groundwater flow direction is inconsistent in this AOC. In addition, low groundwater yield characterized the monitoring wells installed in this AOC, which indicates that groundwater is likely discontinuous.

2011 Hydrocarbon Risk Calculator

The ADEC approved Hydrocarbon Risk Calculator (HRC) was used to assess the human health risks associated with petroleum hydrocarbon contaminated sites.

The HRC can be used to calculate human health risk and alternative cleanup levels and to help support Cleanup Complete determinations with or without Institutional Controls (ICs). To determine alternative cleanup levels, if the site is found to present acceptable risks with existing concentrations, then the existing concentrations would become the site "alternative cleanup levels" and the site would be eligible for a "cleanup complete" determination by ADEC per 18 AAC 75.380. The HRC report was prepared assessing two scenarios for groundwater use, potable and non-potable. After the completion of the HRC Report, the ADEC approved the "350 determination" which documents groundwater is "non-potable" (to use the terminology in the HRC report).

The HRC calculations were performed using data collected during the site investigation (SI) conducted in October 2009 and subsequent groundwater monitoring events in June and October 2010.

Soil 2009 BTEX, GRO, DRO and RRO Data (mg/kg)

	Benzene	Toluene	Ethylbenzene	Xylene	GRO	DRO	RRO
95% UCL	0.0286	0.5216	3.2225	3.5383	119.1242	1,112.8971	46.9504
Maximum	0.0225	0.4710	2.4700	3.3900	109.0000	1,100.0000	36.6000

The HRC results for the former building 412 area, assuming groundwater is non potable, indicate that site conditions meet the ADEC human health risk standard established in 18 AAC 75.325. Based on the HRC results, all exposure pathways, including soil direct contact, outdoor air vapor inhalation, indoor air vapor inhalation, migration to groundwater, and groundwater ingestion, posed acceptable risk or were incomplete.

HRC work is documented in the report titled: Draft, Hydrocarbon Risk Calculator Report, FAA, Sisters Island, Alaska, dated August 22, 2011 prepared by AHTNA Government Services.

2012 Correspondence and Decommissioning Monitoring Wells

MW-21, MW-22 and MW-23 were decommissioned in accordance with the ADEC approved workplan.

FAA sent a letter to ADEC dated 15 October 2012, Subject; Final Report, Decommissioning Monitoring Wells, Sisters Island, Alaska. The letter requests a "cleanup complete with institutional controls" determination be issued by ADEC for the AOCs covered by the HRC report dated 22 August 2011.

Cumulative Risk Evaluation

Pursuant to 18 AAC 75.325(g), when detectable contamination remains on-site following a cleanup, a cumulative risk determination must be made that the risk from hazardous substances does not exceed a cumulative carcinogenic risk standard of 1 in 100,000 across all exposure pathways and does not exceed a cumulative noncarcinogenic risk standard at a hazard index of one across all exposure pathways.

Based on a review of the environmental record, ADEC has determined that residual contaminant concentrations meet the human health cumulative risk criteria for residential land use.

Exposure Pathway Evaluation

Soil Ingestion and Direct Contact Pathways: Subsurface soil ingestion and direct contact pathways are considered complete but de minimis since contamination is greater than 2 feet bgs but below direct contact CULs.

Vapor Intrusion Pathway: The vapor intrusion pathway is considered complete if petroleum contamination in soil or groundwater is expected to be present within 30 horizontal or vertical feet of buildings. There are no buildings within 30 feet of the contamination, therefore the vapor intrusion pathway is considered incomplete.

Outdoor Air Pathway: The outdoor air exposure pathway is complete but is not considered significant for petroleum hydrocarbons.

Biota Pathway: The wild plant ingestion route is interpreted to be incomplete (or is insignificant) for petroleum hydrocarbons because plants do not significantly take up fuel hydrocarbons into their tissues. Similarly, the wild meat ingestion route is interpreted to be incomplete (or is insignificant) for petroleum hydrocarbons because the plants do not significantly take up the fuel hydrocarbons and hence, the animals feeding on the plants are not significantly exposed. Furthermore, the remote location of the Sisters Island FAA Station deters the ingestion of plants and wildlife.

Surface Water Pathway: Surface water is not considered a medium impacted by petroleum contamination. Sheen was not detected on the Icy Strait surface water during visual monitoring conducted during the 2009 SI and June and October 2010 groundwater sampling events. Petroleum contamination is generally present in subsurface soils (greater than 2 feet bgs) so surface water runoff is not likely to be a transport mechanism for transporting petroleum contamination into surface water. The software, BIOSCREEN (EPA model), was used to assess dissolved phase transport and plume areal extent through time and to estimate natural attenuation rates. BIOSCREEN simulations indicate that potential contaminant migration through the discontinuous groundwater perched above bedrock would not impact the Icy Straight, which is the nearest surface water body.

Groundwater Pathway: Groundwater does not represent a potentially complete exposure pathway. ADEC approved a determination that groundwater at Sisters Island does not meet the criteria to be considered a current or future drinking water source.

Exposure Pathway Conclusion:
All exposure pathways, including soil direct contact, outdoor air vapor inhalation, indoor air vapor inhalation, migration to groundwater, and groundwater ingestion, pose acceptable risk or are incomplete. Therefore the remaining contamination is de minimis for all complete exposure pathways. Site conditions are protective of human health under an unrestricted (residential) land use scenario, and they may be used to support a Cleanup Complete determination in accordance with 18 AAC 75.

ADEC Decision

Remaining petroleum contamination in soil is below method 2 Tables B1 and B2 human health, ingestion, and inhalation cleanup levels. Migration to groundwater soil cleanup levels are not applicable at this site because ADEC determined that groundwater at the site is not a current or likely potential future drinking water source, per 18 AAC 75.350, and that contamination in the shallow groundwater will not be transported to either surface water or groundwater that is a reasonably expected future source of drinking water. Additionally, site characterization data demonstrate that the groundwater contaminant plumes are steady state or shrinking and contaminants do not pose a migration to surface water concern. However, petroleum contamination remains in groundwater above Table C cleanup levels, and is not suitable for *unrestricted* future use; therefore, ADEC has approved the use of institutional controls to limit potential future exposure and risk to human health or the environment.

Institutional controls necessary to support this closure determination include:

3. A restriction on using groundwater from the site without prior DEC review. Figures attached for this site indicate the areal extent where the groundwater ICs apply.

Standard site closure conditions that apply to all sites include:

9. Any proposal to transport soil or groundwater off-site requires ADEC approval in accordance with 18 AAC 75.325(i). A "site" as defined by 18 AAC 75.990 (115) means an area that is contaminated, including areas contaminated by the migration of hazardous substances from a source area, regardless of property ownership.

10. Movement or use of contaminated material in a manner that results in a violation of 18 AAC 70 water quality standards is prohibited.

11. Groundwater throughout Alaska is protected for use as a water supply for drinking, culinary and food processing, agriculture including irrigation and stock watering, aquaculture, and industrial use. Contaminated site cleanup complete determinations are based on groundwater being considered a potential drinking water source. In the event that groundwater from this site is to be used for other purposes in the future, such as aquaculture, additional testing and treatment may be required to ensure the water is suitable for its intended use.

ADEC has determined the cleanup is complete as long as the institutional controls are properly implemented and no new information becomes available that indicates residual contamination may pose an unacceptable risk.

The ADEC Contaminated Sites Database will be updated to reflect the change in site status to "Cleanup Complete with Institutional Controls" and will include a description of the contamination remaining at the site.

The institutional controls will be removed in the future if documentation is provided that shows concentrations of all residual hazardous substances remaining at the site are below the levels that allow for unrestricted exposure to, and use of, the contaminated media and that the site does not pose a potential unacceptable risk to human health, safety or welfare, or to the environment. Standard conditions 1-3 above will remain in effect after ICs are removed.

This determination is in accordance with 18 AAC 75.380 and does not preclude ADEC from requiring additional assessment and/or cleanup action if the institutional controls are determined to be ineffective or if new information indicates that contaminants at this site may pose an unacceptable risk to human health or the environment.

Appeal

Any person who disagrees with this decision may request an adjudicatory hearing in accordance with 18 AAC 15.195 – 18 AAC 15.340 or an informal review by the Division Director in accordance with 18 AAC 15.185. Informal review requests must be delivered to the Division Director, 555 Cordova Street, Anchorage, Alaska 99501-2617, within 15 days after receiving the department's decision reviewable under this section. Adjudicatory hearing requests must be delivered to the Commissioner of the Department of Environmental Conservation, 410 Willoughby Avenue, Suite 303, P.O. Box 111800, Juneau, Alaska 99811-1800, within 30 days after the date of issuance of this letter, or within 30 days after the department issues a final decision under 18 AAC 15.185. If a hearing is not requested within 30 days, the right to appeal is waived.

Building 632 Area

Site Description and Background

The Water Facility (Building 632), was a single story, wood framed metal sided structure that was used for water distribution in the housing area prior to 1986. An inactive 500 gallon heating oil AST (41-A-8) was located at this site which was connected to the building by two sections of piping: one above ground surface and one below ground surface.

Contaminants of Concern

GRO, DRO, RRO, BTEX and PAH's.

Characterization and Cleanup Activities

Characterization and cleanup activities conducted under the regulatory authority of the Contaminated Sites Program began in 1991. These activities are described below and are listed in the years the field work was performed.

1991 ECIR and Hazardous Waste Removal

In August 1991, field work for the Sisters Island FAA station was conducted, with the final ECIR report dated May 1992. The report's primary purpose was to conduct a preliminary assessment/site investigation for each site included in the report and to make a recommendation regarding if there is a need for further remedial action. The secondary purpose of an ECI is to identify other potential environmental compliance issues at the station and observe hazardous material housekeeping and management practices. A toxic and hazardous materials (THM) inventory was also prepared.

The ECIR indicates *"no action"* for CERCLA concerns, *"further action"* for POL concerns and *"further investigation"* for Other Regulatory Compliance/Management Practice Concerns.

The "further action" for POL concerns includes incorporating tank 41-A-8 in the tank management program. The "further investigation" for Other Regulatory Compliance/Management Practice Concerns includes asbestos containing material.

The materials identified during the THM inventory were removed during the island wide hazardous waste removal actions that took place in Sept 1991.

1997-1999 Remedial Activity

AST 41-A-8, a 500-gallon non-regulated aboveground heating oil tank, located on the west side of Building 632, was closed on October 9 and 11, 1998 (appears to be a typo, should be 1997 to be consistent with the other information in the report), with additional excavation in November 1997. The tank was situated horizontally on a wooden cradle. Approximately 75 gallons of diesel fuel was transferred from the tank into 55-gallon drums. Copper piping, approximately 15 feet, connected the tank to the building. The tank was supplied from the secondary 1 1/4" fuel line through approximately 42 feet of l-inch diameter buried pipe. All piping was removed, the tank cut, cleaned and staged with other metal for recycling. The fuel was transported with other residual fuel to Delta Western in Juneau, Alaska for recycling.

Soil in the vicinity of AST41-A-8 was investigated during excavation to remove contaminated soil in the vicinity of the tank. Organic rich soil was observed from the ground surface to a depth of 1.5 to 2 feet bgs. A thin zone of shaley beach rock with medium sand was encountered beneath the organic surface soil but above orange, medium-grained sand at depths of 4 to 6 feet bgs. Subsurface contamination was most prominent in gray, poorly sorted, medium grained sand found between the orange sand and bedrock, which was located from 10 to 14 feet bgs.

Thirty-seven soil samples were field screened for hydrocarbon vapors during excavation of contaminated soil. PID readings ranged from 0.2 to 19.7 ppm in shallow soil immediately surrounding the tank. PID readings ranged from 27 to 78 ppm in soil found at depths greater than 4 feet bgs.

At the end of October 1997 tank closure activities, the excavation measured approximately 14 feet by 21 feet by 10 feet deep. Three laboratory confirmation samples were from the excavation on October 11, 1997. The samples included one from the north end of the excavation at a depth of 10 feet bgs (SSR97SS41A8M21), one from the south end of the excavation at a depth of 10 feet (SSR97SS41 A8M22) and one from the north wall at a depth of 6 feet bgs (SSR97SS41A8M23). All of these October 1997 samples were analyzed for BTEX and DRO. During November 1997 GeoEngineers performed soil field screening and monitored the removal of an additional 35 cubic yards of contaminated soil. The soil was removed from the northern margin and the northwest corner of the excavation. At the end of November 1997, the excavation measured approximately 31 feet along the east and west margins, 26 feet along the north margin and 14 feet along the south margin. Two soil samples were collected from the excavation for laboratory analysis on November 18, 1997. These samples were collected from the north (SSR97SS632Q01N) and west (SSR97SS632Q01W) walls of the excavation.

GeoEngineers collected soil samples for field screen analysis using a field immunoassay kit. One sample from approximately 6 feet bgs near the center of the east excavation wall resulted in an estimated DRO concentration of 750-2,500 mg/kg. The PID reading for this sample was 39.4 ppm.

Ground water was encountered in the Building 632 excavation at an approximate depth of 6 feet bgs. Ground water samples were not collected for analysis during this phase of the investigation.

Soil conditions beneath approximately 42 feet of buried fuel delivery pipeline were investigated. The pipeline connected AST41-A-8 to the main fuel line situated on the east side of the road. The pipeline was approximately 1 foot below the ground surface and ran along the north side of Building 632. The pipeline was exposed by hand digging and seven soil samples were collected from one inch below each pipe joint. The samples were field screened for organic vapors and had PID readings ranging from 0 to 0.1 ppm. The soil did not exhibit visual signs of fuel contamination.

A total of five laboratory confirmation samples were collected from the AST41-A-8 excavation. Soil from the south end of the excavation contained DRO at a concentration of 35.3 mg/kg. The soil samples from the north wall and north floor of the excavation contained DRO at concentrations of 5,200 mg/kg and 478 mg/kg, respectively. Additional soil was removed from the north and west margins of the excavation on November 15, 1997. Two soil confirmation samples were collected for laboratory analysis on November 18, 1997. These samples, collected from the north wall (SSR97SS632Q0IN) and from the west wall (SSR97SS632Q0IW) of the excavation, were analyzed for BTEX and DRO. The DRO concentration in the samples was 49 mg/kg and 600 mg/kg, respectively. The maximum total BTEX concentration detected in the October and November samples was 5.65 mg/kg in sample

SSR97SS41A8M23. Benzene was not detected in any of the samples collected from this location.

ADEC Category A cleanup standards have been applied to this site. Soil confirmation sample results indicate that DRO contamination remains above ADEC Category A cleanup standards along the western margin of the 1997 tank excavation. The contamination exists primarily within a layer of well-graded gray sand found from a depth of approximately 6 feet bgs to the top of bedrock. Bedrock was encountered approximately 10 feet bgs in this area. The soil sample collected from the north margin of the excavation contained a low concentration of DRO, less than the Category A cleanup standard. Soil field screening results for a sample collected from the eastern margin of the excavation suggests DRO contamination may remain in this area. Soil located to the east of the excavation is beneath the new Hazmat building but is also positioned up-gradient of the former fuel tank (AST41-A-8).

2006 Correspondence

In a letter from ADEC to FAA, dated 5 December 2006, (See Appendix B)addressing the status of all AOCs on the island, the letter requests "*additional characterization or cleanup occur*" at the "Former Water Tank Building 632, Tank 4l-A-8: Elevated levels of diesel-range organics were left in place during the tank removal. Subsequently, another tank has been installed on the concrete foundation of the former building. Additional characterization is needed to verify the extent of contamination."

2009 Site Investigation

During the SI, the extent of previously reported from former AST 41-A-8 on the west side of former Building 632 was investigated. The concrete foundation of Building 632 was still present during the SI. A relatively steep grade was also present approximately three feet west of the concrete foundation, which limited Geoprobe® access to the area just west of former Building 632. Previous sample locations with elevated DRO concentrations and areas around the perimeter of the previous remedial excavation were targeted for additional soil investigation. Soil adjacent to the concrete foundation was also investigated to determine if petroleum contamination had migrated beneath the foundation. Historic photographs and site plans from previous reports were reviewed to determine the approximate location of former AST 41-A-8 and the limits of the remedial excavation. A total of 12 UVOST probes were advanced in this area of concern. Bedrock was encountered at depths ranging from 1.5 to 12.6 feet bgs in this area of concern.

Results from the UVOST/LIF probes indicted potential petroleum contamination in soil in 2 of the 12 UVOST probes completed at the Building 632 area as shown on Figure 14. The maximum LIF response was 11.0%RE at UVOST probe UV-01.

To verify the results of the UVOST system and to further investigate the area for petroleum-contaminated soil, five borings were advanced and five analytical soil samples were collected. Borings were advanced near UVOST locations that indicated the highest potential for petroleum-contaminated soil based on the LIF signal response. Analytical samples included: five for DRO/RRO and GRO/BTEX analyses, two for EPH/VPH analysis and one for PAH analysis. Soil samples for TOC, bulk density, sieve, specific gravity, and moisture content analyses were also collected in this area of concern.

DRO and GRO were detected at concentrations greater than the MRLs in only one analytical soil sample collected from the former Building 632 area. DRO and GRO were detected at concentrations of 109 mg/kg and 9.27 mg/kg, respectively, in sample SSR09SSB03632Q03 (9'-11'), which was collected

approximately 2 feet west of the Building 632 concrete slab foundation. All reported DRO, GRO, and PAH results for samples collected in this area of concern were less than the most stringent, ADEC Method Two, Over 40 Inch Zone, Migration to Groundwater cleanup levels.

Due to the presence of the concrete foundation, additional investigation south and east of UVOST probe UV-01 and boring B03 could not be conducted. However, because petroleum contamination was detected at a concentration less than the most stringent, ADEC Method Two, Over 40 Inch Zone, Migration to Groundwater cleanup levels at the western edge of the foundation it is unlikely that petroleum contamination migrated into soil beneath the former building location at concentrations greater than the most stringent ADEC cleanup levels.

Two monitoring wells were installed near former Building 632. Monitoring wells MW-1 and MW-2 were installed in borings B01 and B03 to depths of approximately 7 and 11 feet bgs, respectively. Analytical samples could not be collected from MW-1 due to insufficient water. A groundwater sample was collected from MW-2 and analyzed for DRO/RRO, GRO/BTEX, and VPH/EPH. MW-2 had insufficient groundwater recharge to collect a PAH sample.

Groundwater was present in one of the two monitoring wells installed in the Building 632 area. The approximate depth to water in monitoring well MW-2 was 10.3 feet bgs. MW-2 was purged dry after less than one gallon so water quality parameter readings could not be collected using low flow sampling techniques. Analytical samples were collected from MW-2 without stable parameters and/or turbid water.

DRO was detected at a concentration of 0.718 mg/l in MW-2, which is less than the ADEC 18 AAC 75 Table C groundwater cleanup level. All other reported analytical results were less than ADEC 18 AAC 75 Table C groundwater cleanup levels.

Soil summary: The UVOST screening indicated potential low levels of petroleum contamination soil in two out of the 12 UVOST probes advanced at the former Building 632 area at depths just above bedrock at 7.5 to 9 feet bgs. The highest LIF signal response was elicited in a UVOST point advanced approximately 2 feet west of the Building 632 concrete foundation. An analytical soil sample collected at the same depth interval in a boring advanced adjacent to this UVOST point indicated a DRO concentration of 109 mg/kg, which is less than the ADEC Method Two cleanup level of 230 mg/kg. Based on this result, it appears that petroleum contamination has not migrated into soil beneath the former building footprint at concentrations greater than the ADEC Method Two, Over 40 Inch Zone, Migration to Groundwater cleanup levels. All other reported analytical results for DRO, RRO, GRO, BTEX and PAH analytes in soil were also less than the applicable cleanup levels.

Groundwater summary: Analytical groundwater samples indicate that petroleum contamination has not impacted the shallow perched groundwater in this area of concern. The perched groundwater aquifer appears to be discontinuous in this area since MW-1 was dry during 2009 SI activities. DRO was detected at a concentration of 0.718 mg/l in MW-2, which is less than the ADEC 18 AAC 75 Table C groundwater cleanup level of 1.5 mg/l. All other reported analytical results were detected at concentrations less than the applicable groundwater cleanup levels.

Based on the previous remedial excavations and recent investigation findings, it appears that the former Building 632 area meets all criteria for "Cleanup Complete" designation based on the most stringent

ADEC Method Two, Over 40 Inch Zone, Migration to Groundwater cleanup levels and the ADEC 18 AAC 75 Table C cleanup levels for the applicable contaminants of concern in soil and groundwater. AGSC recommends that ADEC review the submitted data and consider the former Building 632 area for "Cleanup Complete" designation in accordance with 18 AAC 75.380 (d)(1).

2009-2010 Groundwater Sampling and Correspondence

Groundwater samples were collected from monitoring wells during three sampling events conducted in 2009 and 2010: These sampling events occurred in October during the 2009 SI, in June 2010, and in October 2010. June was chosen to represent the low groundwater condition, and October was chosen to represent the high groundwater condition. Both conditions were supported by groundwater elevation measurements.

During the 2009 SI, all reported DRO, RRO, GRO, and PAH results for soil samples collected in the former Building 632 area were less than the ADEC Method Two, Over 40 Inch Zone, Migration to Groundwater cleanup levels (AGSC, 2010a). Two monitoring wells, MW-1 and MW-2, were installed to depths of approximately 7 and 11 feet bgs, respectively. Groundwater samples were analyzed for DRO, GRO, RRO, BTEX, PAH, EPH, and VPH. MW-1 had insufficient water yield to collect analytical samples during the 2009 SI and June 2010 sampling event. In addition, MW-2 had insufficient water yield to collect a PAH sample during the 2009 SI and no analytical samples could be collected from MW-2 during the June 2010 sampling event.

During the 2009 SI, bedrock was encountered at depths ranging from 1.5 to 12.6 feet bgs, and groundwater was present in one of the two monitoring wells installed in the Building 632 area. Casing elevations, total well depth, and depth to water measured during the 2009 SI and 2010 groundwater sampling events are summarized in the SI report. Groundwater flow direction was estimated based on calculations using groundwater elevations measured in MW-2, MW-5, and MW-11 during each of the sampling events. Based on the calculations, it appears that groundwater flow direction is somewhat inconsistent in this AOC. In addition, low groundwater yield characterized the monitoring wells installed in this AOC, which indicates that groundwater is likely discontinuous.

Groundwater quality parameters were not collected from MW-1 during the 2009 SI due to insufficient water. During the June 2010 sampling event, insufficient water was available to collect groundwater quality parameters and analytical samples from MW-1. MW-1 did not purge dry during the October 2010 sampling event and sufficient water was available for groundwater quality parameters and analytical samples.

During the 2009 SI, MW-2 was purged dry after less than one gallon so water quality parameter readings could not be collected using low flow sampling techniques. Analytical samples were collected from MW-2 without stable parameters and/or turbid water during the 2009 SI. During the June 2010 sampling event, insufficient water was available to collect groundwater quality parameters and analytical samples. MW-2 did not purge dry during the October 2010 sampling event and sufficient water was available for groundwater quality parameters and analytical samples.

Summary of contaminant findings:

DRO was detected at a concentration of 1.96 mg/L in MW-2 during the October 2010 sampling event, which is greater than the ADEC 18 AAC 75 Table C groundwater cleanup level. All other reported analytical results were less than ADEC 18 AAC 75 Table C groundwater cleanup levels. Final

groundwater parameter results are summarized in Tables 10-2. Analytical results for samples collected from the Building 632 area are shown in Tables 10-3, 10-4, 10-5, and 10-6 and on Figure 5. Laboratory results are presented in Appendix B.

The analytical DRO results for the sample collected from MW-2 during the October 2010 sampling event compared to the effective solubility of DRO aromatics and aliphatics calculated in the HRC indicate that a significant amount of the DRO mass in MW-2 was present as NAPL and was not in dissolved phase. The HRC calculated the effective solubility of DRO aromatics to be 0.271 mg/L and the effective solubility of DRO aliphatics to be 0.00371 mg/L for the Building 412 area. The HRC pages showing the effective solubility are included in Appendix C.

Correspondence: FAA received a letter from ADEC, "Re: FAA Sisters Island, near Juneau, Alaska", dated November 19, 2010. The letter references ADEC review and approval of the Final Site Investigation Report from the 2009 field work. FAA requested closure of the VORTAC-Former Burn Barrel Area and Building 632 Area in a 26 March 2010 letter, and requested closure for the Beach Battery Debris Area in a 1 July 2010 letter. The November 19, 2010 letter from ADEC to FAA states *"closure complete status is approved for the VORTAC-area Former Burn Barrel, Building 632 and Beach Battery Debris areas of concern…"*

2012 Decommissioning Monitoring Wells
MW-1 and MW-2 were decommissioned in accordance with the ADEC approved workplan.

Cumulative Risk Evaluation
N/A as closure granted

Exposure Pathway Evaluation
N/A as closure granted.

ADEC Decision
In a 19 November 2010, letter from ADEC to FAA, ADEC approved *"closure complete"* status for this AOC.

Boat House Facility

Site Description and Background
The Boat House Facility (Building 206), located south of the Water Facility (Building 632) is a cement and metal structure that was used for maintenance in the housing area prior to 1986.

Cleanup Levels & Contaminants of Concern
N/A

Characterization and Cleanup Activities
Characterization and cleanup activities conducted under the regulatory authority of the Contaminated Sites Program began in 1991. These activities are described below and are listed in the years the field work was performed.

1991 ECIR
The ECIR noted no Toxic and Hazardous Material in this facility during the August 1991survey.

The ECIR did not identify contaminants associated with this facility. The ECIR table ES-1 indicates *"no action"* required for CERCLA concerns, POL concerns and Other Regulatory Compliance/Management Practice concerns.

1997-1999 Remedial Activity
The boathouse was demolished. Lead batteries were removed prior to demolition. The demolition is documented in "Sisters Island Asbestos Abatement/ Environmental Upgrade; Remedial Action Report, Final May 31, 2001".

Cumulative Risk Evaluation
N/A

Exposure Pathway Evaluation
N/A

ADEC Decision
The spreadsheet attached to the 5 December 2006, Letter from ADEC to FAA indicates *"no action required"*. No violations of 18AAC 75.

Battery Disposal Area

Site Description and Background

This site is located along the beach on the west side of the island and northwest of Building 616. In September 1991 battery casings were observed along the beach and the batteries were removed in 1991. During the 2009 SI, this area was investigated for battery debris and potential lead-contaminated sediment associated with battery casings deposited on the beach.

Cleanup Levels & Contaminants of Concern

Lead in soil; Lead cleanup levels are based on land use; for residential land use, the soil cleanup level is 400 mg/kg.

Characterization and Cleanup Activities

Characterization and cleanup activities conducted under the regulatory authority of the Contaminated Sites Program began in 1991. These activities are described below and are listed in the years the field work was performed.

1991 ECIR

A survey of this area was not conducted during the ECIR because its presence was unknown at the time of the site visit. During the removal of toxic and hazardous materials (THM) from the Sisters Island FAA Station in September 1991, more than 20 battery casings were observed strewn along the beach southwest of the Boat House Facility.

The ECIR table ES-1 indicates *"no action"* required for CERCLA concerns, *"no action"* for POL concerns and *"further investigation"* for other regulatory compliance/management practice concerns. Further investigation recommended is to evaluate the site for potential soil contamination.

The documentation is not clear on exactly when the batteries were removed. The most likely removal is in September 1991, when 1540 pounds of batteries were removed from the island. The October 1992 removal, which was to remove additional wastes identified since the 1991 removal and collect soil samples at another AOC, did not identify battery removal.

2006 Correspondence

In a letter from ADEC to FAA, dated 5 December 2006, (See Appendix B) addressing the status of all AOCs on the island, the letter requests "*additional characterization or cleanup occur"* at the Battery Casing Debris Area. No samples were collected in this location following the 1994 removal action. The department requested that FAA attempt to determine the original location of the batteries and, if this location can be found, that FAA conduct sampling for lead.

2009 Site Investigation

Historic photographs and site plans from previous reports were reviewed to determine the approximate location of the battery disposal area on the beach. A visual inspection of the beach was conducted to investigate for battery debris. Several remnants from battery casings were found in an approximately 60 foot by 40 foot (2400 ft2) area on the beach. A sampling grid was established across this 2400 ft^2 area. Grid nodes were established every 5 feet along the vertical and horizontal grid lines so that the individual grid spaces were 5-foot by 5-foot square. Grid nodes were labeled sequentially using a letter and number

designation, starting at A1. The four outside corners of the sampling grid were surveyed to allow for the grid to be relocated if necessary.

Each grid space was visually inspected for battery debris. Grid spaces containing visible battery debris were marked on the field drawing. Approximately 500 grams of surface sediment was then gathered from each grid space and placed in Ziploc bags labeled with the corresponding grid space. Field screening for lead in sediment was conducted using a field portable x-ray fluorescence (XRF) instrument. Field screening readings were collected from the sediment by placing the XRF instrument directly on the Ziploc bag surface and collecting an XRF reading from the sediment through the Ziploc bag. To maintain consistency, the XRF instrument analyzed each sample for approximately 90 seconds. The XRF instrument was a self-calibrating unit, which recalibrated each time the instrument was powered-on and once for every hour while the instrument was in use.

The soil matrix in the battery disposal area grid consisted of wet beach sand and sediment, varying in grain size from med to coarse sand, gravel, fractured bedrock and shell fragments. Representative samples of the sediment matrices were collected in baggies prior to completing XRF field screening readings. Analytical sediment samples were collected from the baggies with the highest XRF field screening results for laboratory analysis by EPA method 6020.

After sediment sampling activities were complete, all visible battery debris in the battery disposal area was picked up, placed in a 5-gallon bucket and stored in the existing hazmat storage conex located on the concrete foundation of former Building 632 for future FAA disposal.

A total of 93 XRF field screening samples for lead were collected from the grid established in the battery disposal area. Field screening results ranged from 246.1 (+/- 28.7) parts per million (ppm) to 684 (+/- 47.8) ppm.

Twenty analytical samples and one duplicate were collected from 20 grid spaces with the highest XRF field screening readings. Analytical results indicated lead concentrations ranged from 86 mg/kg to 120,000 mg/kg in the sediment collected from the battery disposal area on the beach. Lead was detected at concentrations greater than the ADEC Method Two cleanup level of 400 mg/kg for residential areas in nine grid spaces.

The XRF field screening readings appeared to have a relatively poor correlation with the analytical sample results for total lead. This variability between XRF field screening and total lead results could be attributed to physical matrix effects (NITON, 2007). Physical matrix effects result from variations in moisture content, particle size, uniformity, homogeneity, and surface condition of the soil sample (EPA, 2007). It appeared that heterogeneity of the sample and uneven distribution of lead particles throughout the sampling unit potentially impacted comparability of the XRF field screening with analytical sample results.

Analytical sample SSR09SLBDH5 indicated a lead concentration of 120,000 mg/kg, which appeared to be a significant outlier relative to the other sample results in this area. The laboratory completed a second extraction and re-analyzed sample SSR09SLBDH5. The lead concentration detected in the second sample extraction was 180 mg/kg. Due to the significant discrepancy between the first and second results, the laboratory completed a third extraction. Analysis of the third extraction indicated a lead concentration of 89 mg/kg. Based on these laboratory results it appears that the lead data has several

inconsistencies in its representation, largely as result of the uniqueness and heterogeneity of the sample matrix.

Analytical results indicated that nine grid locations contained lead contamination at concentrations greater than the ADEC Method Two cleanup level of 400 mg/kg.

2010 Correspondence

Based on the work completed in 2009, and discussions with ADEC concerning the negative environmental impact of excavation of possible lead contaminated soil, FAA requests "Cleanup Complete" designation in a 1 July 2010, letter to ADEC. The basis of the request is; (1) The vast majority of source material has been removed, (2) FAA will conduct semi-annual monitoring for additional source material and remove it accordingly, (3) relatively low levels of lead existed, (4) human exposure is very limited, (5) ecological receptors are limited, (6) site is inundated by high tides and dry at low tides, (7) high cost of mobilization coupled with damage to beach environment from excavation.

Correspondence: FAA received a letter from ADEC, "Re: FAA Sisters Island, near Juneau, Alaska", dated November 19, 2010. The letter references ADEC review and approval of the Final Site Investigation Report from the 2009 field work. FAA requested closure of the VORTAC-Former Burn Barrel Area and Building 632 Area in a 26 March 2010, letter, and requested closure for the Beach Battery Debris Area in a 1 July 2010, letter. The November 19, 2010, letter from ADEC to FAA states *"closure complete status is approved for the VORTAC-area Former Burn Barrel, Building 632 and Beach Battery Debris areas of concern…"*

Cumulative Risk and Exposure Pathway Evaluation

The risk evaluation was provided in a 1 July 2010, letter from FAA to ADEC, subject; Request for Cleanup Complete Designation, Former Battery Area, Sisters Island, Alaska.

Human health risk was believed to be very low, due to; (1) lead is relatively immobile and the total surface area with possible contamination is small, (2) Sisters Island is leased to FAA and is not easily accessible to the public, (3) the site is a beach not normally used by FAA personnel, (4) the beach is submerged at high tide effectively limiting exposure.

Ecological risk was believed to be very low, due to; (1) beach is rock with no vegetation, (2) currently no established shellfish colonies or invertebrates on the site, (3) site is dry at low tide, effectively limiting exposure time to fish, (4) lead is relatively immobile and the site is relatively small compared to the total beach area.

ADEC Decision

ADEC granted *"Closure Complete"* status for this site in a 19 November 2010, letter to FAA. (See Appendix B)

Abandoned Pump House Facility

Site Description and Background

The Abandoned Pump House Facility is a cement structure located south of Boat House Facility (Building 206), which was used for water distribution in the housing area prior to 1986.

Cleanup Levels & Contaminants of Concern

N/A

Characterization and Cleanup Activities

Characterization and cleanup activities conducted under the regulatory authority of the Contaminated Sites Program began in 1991. These activities are described below and are listed in the years the field work was performed.

1991 ECIR

The ECIR noted no Toxic and Hazardous Material in this facility during the August 1991 survey.

The ECIR did not identify contaminants associated with this facility. The ECIR table ES-1 indicates *"no action"* required for "CERCLA concerns", "POL concerns" and "other regulatory compliance/management practice concerns".

1997-1999 Remedial Activity

This 7-foot by 7-foot concrete block structure was demolished. The demolition is documented in "Sisters Island Asbestos Abatement/ Environmental Upgrade; Remedial Action Report, Final May 31, 2001"

Cumulative Risk Evaluation

N/A

Exposure Pathway Evaluation

N/A

ADEC Decision

The spreadsheet attached to the 5 December 2006, Letter from ADEC to FAA indicates *"no action required"*. No violations of 18 AAC 75.

First Tank Farm/Building 207 Area

Site Description and Background

Building 207 was originally used as a prime power generation facility, and was later converted into living quarters. A 500-gallon heating oil AST (41-A-7) was formerly located on the north side of Building 207. The FAA's First Tank Farm was located west of Building 207, and northwest of the Former Tank Farm area. The first Tank Farm was in operation from 1945 to 1980 and consisted of a 10,000 and a 20,000 gallon AST located on the hill south of building 207. Building 207 was situated down-gradient of Building 616 and the Former Tank Farm.

Cleanup Levels & Contaminants of Concern

The following contaminants of concern were identified above approved cleanup levels during the course of the site investigations summarized in the Characterization and Cleanup Activities section of this decision letter: GRO, DRO, RRO, BTEX, and PAHs.

Modeling to determine alternative cleanup levels was done using the approved Hydrocarbon Risk Calculator (HRC), an alternative cleanup levels and risk calculator developed in accordance with Method 3 under 18 AAC 75.340. The HRC is no longer consistent with how site-specific cleanup levels are calculated under 18 AAC 75, due to the promulgation of new regulations on November 6, 2016. Following a review of the site data, the Department has determined the HRC-derived ACLs do not need to be applied for site closure at this AOC, as final confirmation samples meet Method 2 table B1 and B2 cleanup values. The final confirmation sample concentrations for each COC are detailed in the Table below "Soil 2009 BTEX, GRO, DRO and RRO Data (mg/kg)".

Characterization and Cleanup Activities

Characterization and cleanup activities conducted under the regulatory authority of the Contaminated Sites Program began in 1991. These activities are described below and are listed in the years the field work was performed.

1991 ECIR

For the quarters building 207, the ECIR indicates *"no action"* for CERCLA concerns, *"further action"* for POL concerns and *"further investigation"* for Other Regulatory Compliance/Management Practice Concerns.

The "further action" for POL concerns includes incorporating tank 41-A-7 in the tank management program. The "further investigation" for Other Regulatory Compliance/Management Practice Concerns includes asbestos containing material.

The ECIR identifies this tank farm as the "former tank farm site", which is an accurate description at the time of the ECIR since the active tank farm (which contained tanks 41-A-1 through 5 etc) was titled the "tank farm facility" in the ECIR. For the former tank farm site the ECIR indicates *"no action"* for CERCLA concerns, *"no action"* for POL concerns and *"no action"* for Other Regulatory Compliance/Management Practice Concerns.

The materials identified during the THM inventory were removed during the island wide hazardous waste removal actions that took place in September 1991.

1997-1999 Remedial Activity

AST 41-A-7, a 500-gallon non-regulated tank, used to store heating oil, was closed on October 8, 1997. The tank was supported by a creosote-treated wooden cradle, and was supplied through a l-inch diameter shallow-buried pipeline connected to the secondary 1 ¼ inch fuel line on the East Side of the main access road. Approximately 140 gallon of fuel was transferred from the tank into 55-gallon drums. The fuel was transported to Delta Western for recycling. The tank was connected to the building by approximately 3.5 feet of copper pipe, and connected to the secondary 1 1/4 inch pipeline with about 35 feet of l-inch steel pipe. The exterior of the tank was rusty but intact. Prior to cutting, the tank atmosphere was tested by LEL and confirmed to be below explosive limits. The tank bottoms were removed and consolidated with similar product from other closures, the tank interior was then cleaned, and the sections staged for recycling.

The ADEC Method I Category A Action Level was applied to the AST 41-A-7 site. A total of *5* cubic yards of DRO contaminated soil was excavated during the 1997 field season and the sample results show that ADEC Clean Closure was not attained. This soil was temporarily stockpiled adjacent to the excavation awaiting sample results. When lab analysis confirmed the excavated soil to be contaminated it was moved to the long-term stockpile in February 1998, and ultimately to Juneau fur thermal treatment in November 1999

Eleven field screen samples were collected to characterize soil conditions beneath the tank and along approximately 35 feet of buried fuel supply line. Soil vapor concentrations detected in soil samples from beneath the tank ranged from 0 to 2.5 ppm using a PID. Soil vapors were not detected under buried pipeline joints. Soil samples were collected from depths of 2 inches beneath the pipeline to 2.5 feet beneath the tank. The final AST41-A-7 excavation limits measured 4 feet by 9 feet and were approximately 2.5 feet deep. Two confirmation soil samples were collected from a depth of 4.5 feet bgs in the excavation. One was collected from the east end of the excavation (SSR97SS41A 7Q13) and one from the west end of the excavation (SSR97SS41A7Ql4).

One soil sample was collected for field immunoassay analysis of DRO. The sample was collected from an approximate depth of 2 feet bgs and exhibited headspace vapors less than 2.5 ppm. The DRO concentration detected through immunoassay screening was approximately 10-50 ppm.

Ground water was not encountered during the AST41-A-7 tank closure. The maximum depth of excavation was 2.5 feet bgs.

Two confirmation soil samples were collected from the AST41-A-7 excavation for laboratory analysis of DRO and BTEX. Neither sample contained BTEX. Sample SSR97SS41A7Ql3 (east end of excavation) contained DRO at a concentration of 567 mg/kg while SSR97SS41A7Ql4 (west end of excavation) contained DRO at a concentration of 1,010 mg/kg.

During building 207 demolition, two concrete generator pads measuring approximately 10 feet long, five feet wide and two feet thick were discovered under the building footprint. The discovery of these generator pads confirmed that building 207 was once used as a prime power generator facility, and was later converted to a housing unit. The generator pads were to be buried on-site and during the excavation of a deep hole next to the pads, contaminated soil was discovered.

Nine test pits were advanced in the vicinity of Building 207 and the First Tank Farm during a RI conducted in November 1997. Bedrock depths vary across the site, ranging from 1.5 feet bgs near Building 616 to 12 feet bgs at TP207-9. Subsurface materials beneath the study area generally consisted of interbedded layers of gravelly sand or sandy gravel overlying a well sorted, gray medium sand. The brown sandy gravel or gravelly sand ranged in thickness from 1.5 to 7.5 feet. The gray sand was encountered at thicknesses ranging from 1 to 6.5 feet. The gray sand was found immediately above bedrock in all test pits near Building 207 except TP207-2. TP207-3, TP207-5 and TP207-7. Conditions at these test pits where the gray sand was absent included a variety of deposits, such as dark brown organic silt and peat deposits, and beach cobbles with sand. A dark brown viscous liquid with sheen was observed in thin zones of coarse material, 0.5 and 1.0 feet thick, in test pits TP207-3, TP207-7 and TP207-8. The soil sample collected from test pit TP207-7 (SSR97SS207Q7TP) is representative of this material.

A total of 19 field screening samples were collected from nine test pits. One soil sample was collected for chemical analysis from each of the nine test pits (except TP207 due to shallow depth of 1.5 ft bgs)

Benzene was not detected in any of the soil samples collected. However, the other BTEX compounds were detected at concentrations ranging from 0.048 mg/kg toluene to 9. 7 mg/kg xylenes. DRO compounds were detected in all soil samples collected in this area at concentrations ranging from 1,900 mg/kg to 18",000 mg/kg. An extra soil sample was collected from test pit TP207-8 for additional chemical analyses of PAHs and aromatic/aliphatic fraction analyses. DRO and RRO were detected in the aromatic fraction of sample SSR97SS207Q8TP at concentrations of 220 mg/kg and 480 mg/kg, respectively. In addition, DRO and RRO were detected in the aliphatic fraction of the same sample at concentrations of 1,600 mg/kg and 3,700 mg/kg, respectively. Eight PAH compounds were also detected in this sample at concentrations ranging from 20 ug/kg anthracene to 440 ug/kg phenanthrene.,

Analytical results for soil samples collected during the RI indicated that approximately 1,400 yds3 of petroleum-contaminated soil remained above the bedrock at depths ranging from two to 11.5 feet bgs.

A GeoProbe® implant well (GP-2) was installed at a depth of 6.5 feet bgs in the corner of test pit TP207-6. A ground water sample, SSR970W207Q01, was collected from GP-2 on November 25, 1997. Of the BTEX compounds, only xylene was detected in this ground water sample at a concentration of 2.4 micrograms per liter (ug/l). DRO was detected in this sample at a concentration of 7.4 mg/1

2006 Correspondence

In a letter from ADEC to FAA, dated 5 December 2006, (See Appendix B) addressing the status of all AOCs on the island, the letter requests "*additional characterization or cleanup occur"* at the (1) Quarters Building 207 Tank 4l-A-7: Elevated levels of diesel-range organics were left in place during the tank removal. (2) Former Tank Farm: No sampling has been conducted in this area which is up-gradient of a large volume of contamination near Quarters Building 207. Characterization is requested.

2009 Site Investigation

Previously reported contamination associated with the First Tank Farm, the First Tank Farm piping formerly located west of Building 207, and the former AST 41-A-7 located adjacent to former Building 207 was investigated during the SI.

A relatively steep up-sloping hill was located southwest of former Building 207 and in the former locations of the First Tank Farm ASTs. The Geoprobe® could not access this area of concern, so hand auger borings were advanced to collect analytical soil samples near the First Tank Farm ASTs and associated piping. A down-sloping grade was also present on the west side of former Buildings 207 and 206. The Geoprobe® was able access to this area west of former Building 207, however access near and/or the beach was limited. Previous sample locations with elevated DRO concentrations and areas around the perimeter of the previous remedial excavation were targeted for additional soil investigation. Historic photographs and site plans from previous reports were reviewed to determine the approximate locations of former Buildings 207 and 206, AST 41-A-7, and the limits of the remedial excavation.

A total of 41 UVOST probes and four hand auger borings were advanced in this area of concern. Based on the LIF signal response, 24 UVOST probes advanced at the First Tank Farm and Former Building 207 areas indicated the potential presence of petroleum contaminated soil. The maximum LIF response was 228.1%RE at UVOST probe UV-01. . A visual survey of the water along the beach was performed at various times during high and low tides to inspect for sheen or other evidence of contamination seeping into the ocean.

To verify the results of the UVOST system and to further investigate the area for petroleum-contaminated soil, ten borings were advanced and 12 analytical soil samples, including two duplicates, were collected. Borings were advanced near UVOST locations that indicated the highest potential for petroleum contaminated soil based on the LIF signal response. Analytical samples included: 12 for DRO/RRO and GRO/BTEX analyses, three for EPH/VPH analyses, and three for PAH analysis. Soil samples for TOC, bulk density, sieve, specific gravity, and moisture content analyses were also collected in this area of concern. An additional four analytical soil samples were collected from the four hand auger borings advanced near the First Tank Farm ASTs and piping. Hand auger analytical samples were analyzed for DRO/RRO, GRO/BTEX, and PAH analyses.

Field screening and analytical results for soil samples collected from the hand auger borings advanced in the vicinity of the First Tank Farm ASTs indicated that a potential isolated area of DRO-contaminated soil was present at 1 foot bgs near the 2-inch fill port piping at the former 10,000 gallon AST concrete pad. DRO concentrations in soil at this location were detected at 576 mg/kg. However, field screening results did not indicate the presence of DRO contamination. This analytical soil sample was collected from an area of above average organic content, and the result may have been biased high due to biogenic interference.

Seven monitoring wells were installed near the First Tank Farm/Building 207 area. Monitoring wells MW-5, MW-6, MW-7, MW-8, MW-9, MW-10, and MW-11 were installed in borings B12, B13, B14, B15, B16, B17, and B18, respectively. Groundwater was present in all seven monitoring wells. Monitoring wells were installed to the depth of bedrock ranging from 6.1 to 16.8 feet bgs. Monitoring wells MW-5, MW-6, MW-7, and MW-9 were installed at the top of the grade and had depths to water of 9.9 to 11.6 feet bgs. Monitoring well MW-8 was installed downgrade approximately four feet lower in elevation than the top of the grade. Depth to water in MW-8 was approximately 6.4 feet bgs. Monitoring wells MW-10 and MW-11 were installed downgrade of the Building 207 area near the beach. These two wells had depths to water of approximately 4 to 5 feet bgs. MW-11 was purged dry almost immediately after beginning low flow sampling procedures, so water quality parameter readings could not be collected. Analytical samples were collected from MW-11 without stable parameters and/or turbid water. All other wells located in this area produced sufficient water to collect analytical samples with relatively stable

water quality parameter readings. Groundwater samples collected from all other monitoring wells installed in the First Tank Farm/Building 207 area were analyzed for DRO/RRO and GRO/BTEX. Groundwater samples collected from monitoring wells MW-7, MW-8, and MW-9 were also analyzed for EPH/VPH and PAH.

Analytical groundwater samples indicate that DRO contamination has impacted the shallow perched groundwater in the former Building 207 area. DRO was detected at concentrations greater than the ADEC 18 AAC 75 Table C groundwater cleanup level of 1.5 mg/l in 5 out of the 7 monitoring wells installed in this area of concern. DRO concentrations ranged from 2.34 mg/kg to 6.26 mg/kg in these monitoring wells. All other reported analytical results were detected at concentrations less than the ADEC 18 AAC 75 Table C groundwater cleanup levels.

Contamination appears to extend in an irregular shaped area encompassing the former Building 207 footprint, former AST 41-A-7, and the 1997 remedial excavation. Contamination also appears to extend into soil east of the former Building 207 beneath the road, but UVOST screening confirms that the contamination does not extend beneath the existing fuel pipeline east of the road. The contaminated area extends approximately 100 feet at its widest point north to south and approximately 90 feet at its widest point east to west. DRO was detected at a maximum concentration of 12,700 mg/kg at a depth interval of 9 to 11 feet bgs in a boring advanced just east of the road near the former 1¼ inch fuel pipeline that supplied fuel to former AST 41-A-7 and Building 207.

2009-2010 Groundwater Sampling

Groundwater samples were collected from monitoring wells during three sampling events conducted in 2009 and 2010: These sampling events occurred in October during the 2009 SI, in June 2010, and in October 2010. June was chosen to represent the low groundwater condition, and October was chosen to represent the high groundwater condition. Both conditions were supported by groundwater elevation measurements.

During the 2009 SI, DRO was detected at concentrations greater than the ADEC 18 AAC 75 Table C groundwater cleanup level in MW-6, MW-7, MW-8, MW-9, and MW-10. MW-8 and MW-9 also detected RRO at 1.13 and 1.14 mg/L, respectively, which was greater than the ADEC groundwater cleanup level for RRO. All other reported analytical results from October 2009 were less than the ADEC groundwater cleanup levels.

During the June 2010 sampling event, DRO was detected at concentrations greater than the ADEC groundwater cleanup level in MW-7, MW-8, MW-9, and MW-10. In addition, MW-7 detected additional contaminants at concentrations greater than the ADEC groundwater cleanup levels including RRO at 35.3 mg/L, 1-Methylnaphthalene at 0.26 mg/L, 2-Methylnapthalene at 0.24 mg/L, and Benzo(a)pyrene at 0.00038 mg/L. Benz(a)pyrene is not a typical contaminant at petroleum-contaminated sites, so the source of this contaminant may be associated with the septic system buried on the west side of transient quarters building and approximately 50 feet south of the MW-7. All other reported analytical results from June 2010 were less than the ADEC groundwater cleanup levels.

During the October 2010 sampling event, DRO was detected at concentrations greater than the ADEC groundwater cleanup level in monitoring wells MW-6, MW-7, and MW- 9. In addition, RRO was detected in MW-7 at 1.11 mg/L, a concentration greater than the ADEC groundwater cleanup level. All

other reported analytical results from the October 2010 sampling event were less than the ADEC groundwater cleanup levels.

The analytical DRO results compared to the effective solubilities of DRO aromatics and aliphatics calculated in the HRC indicate that a significant amount of the DRO mass was present as NAPL and was not in dissolved phase. The HRC calculated the effective solubility of DRO aromatics to be 1.76 mg/L and the effective solubility of DRO aliphatics to be 0.0117 mg/L for the First Tank Farm/Building 207 area. The HRC pages showing the effective solubilities are included in Appendix C.

Groundwater flow direction was estimated using groundwater elevations measured during each of the sampling events. Based on the calculations, it appears that groundwater flow direction is inconsistent in this AOC as shown on Figure 5. In addition, low groundwater yield characterized many of the monitoring wells installed in this AOC, which indicates that groundwater is likely discontinuous.

2011 Hydrocarbon Risk Calculator

The ADEC approved Hydrocarbon Risk Calculator (HRC) was used to assess the human health risks associated with petroleum hydrocarbon contaminated sites.

The HRC can be used to calculate human health risk and alternative cleanup levels and to help support Cleanup Complete determinations with or without Institutional Controls (ICs). The HRC report was prepared assessing two scenarios for groundwater use, potable and non-potable. After the completion of the HRC Report, the ADEC approved the "350 determination" which documents groundwater is "non-potable" (to use the terminology in the HRC report).

The HRC calculations were performed using data collected during the site investigation (SI) conducted in October 2009 and subsequent groundwater monitoring events in June and October 2010.

Soil 2009 BTEX, GRO, DRO and RRO Data (mg/kg)

	Benzene	Toluene	Ethylbenzene	Xylene	GRO	DRO	RRO
95% UCL	0.0013	0.0144	0.0615	0.1349	77.9418	7,731.2063	386.0092
Maximum	0.0013	0.0216	0.1240	0.2730	139.0000	12,700.0000	638.0000

During the June 2010 sampling event, DRO was detected at a concentration of 2,780 mg/L in MW-7. The October 2009 and 2010 DRO results from this same monitoring well were 5.55 mg/L and 8.54 mg/L. The analytical DRO results compared to the effective solubilities of DRO aromatics and aliphatics calculated in the HRC indicate that a significant amount of the DRO mass in the June 2010 sample was likely present as NAPL and was not in dissolved phase. This DRO concentration was likely a direct result of the NAPL observed in the sample and is not considered representative of the groundwater. The RRO analytical result was also elevated at a concentration of 35.3 mg/L.

The HRC results for the First Tank Farm/Building 207 area with the June MW-7 data and assuming groundwater is non-potable indicate site conditions meet the ADEC human health risk standard established in 18 AAC 75.325. Based on the HRC results, all exposure pathways, including soil direct contact, outdoor air vapor inhalation, indoor air vapor inhalation, migration to groundwater, and groundwater ingestion, posed acceptable risk or were incomplete.

2012 Correspondence and Decommissioning Monitoring wells

MW-5, MW-6, MW-7, MW-8, MW-9, MW-10, and MW-11 were decommissioned in accordance with the ADEC approved workplan.

FAA sent a letter to ADEC dated 15 October 2012, Subject; Final Report, Decommissioning Monitoring Wells, Sisters Island, Alaska. The letter requests a "cleanup complete with institutional controls" determination be issued by ADEC for the AOCs covered by the HRC report dated 22 August 2011.

Cumulative Risk Evaluation

Pursuant to 18 AAC 75.325(g), when detectable contamination remains on-site following a cleanup, a cumulative risk determination must be made that the risk from hazardous substances does not exceed a cumulative carcinogenic risk standard of 1 in 100,000 across all exposure pathways and does not exceed a cumulative noncarcinogenic risk standard at a hazard index of one across all exposure pathways.

Based on a review of the environmental record, ADEC has determined that residual contaminant concentrations meet the human health cumulative risk criteria for residential land use.

Exposure Pathway Evaluation

Soil Ingestion and Direct Contact Pathways: Subsurface soil ingestion and direct contact pathways are considered complete but de minimis since contamination is greater than 2 feet bgs but below direct contact CULs.

Vapor Intrusion Pathway: The vapor intrusion pathway is considered complete if petroleum contamination in soil or groundwater is expected to be present within 30 horizontal or vertical feet of buildings. The contaminated area is located approximately 40 feet north of Building 616 which serves as the FAA quarters building. However, the vapor intrusion pathway is not a concern in this area because DRO is the only contaminant of concern and DRO is not listed as a compound of concern for vapor migration in ADEC's CSM Guidance.

Outdoor Air Pathway: The outdoor air exposure pathway is complete but is not considered significant for petroleum hydrocarbons.

Biota Pathway: The wild plant ingestion route is interpreted to be incomplete (or is insignificant) for petroleum hydrocarbons because plants do not significantly take up fuel hydrocarbons into their tissues. Similarly, the wild meat ingestion route is interpreted to be incomplete (or is insignificant) for petroleum hydrocarbons because the plants do not significantly take up the fuel hydrocarbons and hence, the animals feeding on the plants are not significantly exposed. Furthermore, the remote location of the Sisters Island FAA Station deters the ingestion of plants and wildlife.

Surface Water Pathway: Surface water is not considered a medium impacted by petroleum contamination. Sheen was not detected on the Icy Strait surface water during visual monitoring conducted during the 2009 SI and June and October 2010 groundwater sampling events. Petroleum contamination is generally present in subsurface soils (greater than 2 feet bgs) so surface water runoff is not likely to be a transport mechanism for transporting petroleum contamination into surface water. The software, BIOSCREEN (EPA model), was used to assess dissolved phase transport and plume areal extent through time and to estimate natural attenuation rates. BIOSCREEN simulations indicate that potential contaminant

migration through the discontinuous groundwater perched above bedrock would not impact the Icy Straight, which is the nearest surface water body.

Groundwater Pathway: Groundwater does not represent a potentially complete exposure pathway. ADEC approved a determination that groundwater at Sisters Island does not meet the criteria to be considered a current or future drinking water source.

Exposure Pathway Conclusion:
All exposure pathways, including soil direct contact, outdoor air vapor inhalation, indoor air vapor inhalation, migration to groundwater, and groundwater ingestion, pose acceptable risk or are incomplete. Therefore the remaining contamination is de minimis for all complete exposure pathways. Site conditions are protective of human health under an unrestricted (residential) land use scenario, and they may be used to support a Cleanup Complete determination in accordance with 18 AAC 75.

ADEC Decision

Remaining petroleum contamination in soil is below method 2 Tables B1 and B2 human health, ingestion, and inhalation cleanup levels. Migration to groundwater soil cleanup levels are not applicable at this site because ADEC determined that groundwater at the site is not a current or likely potential future drinking water source, per 18 AAC 75.350, and that contamination in the shallow groundwater will not be transported to either surface water or groundwater that is a reasonably expected future source of drinking water. Additionally, site characterization data demonstrate that the groundwater contaminant plumes are steady state or shrinking and contaminants do not pose a migration to surface water concern. However, petroleum contamination remains in groundwater above Table C cleanup levels, and is not suitable for *unrestricted* future use; therefore, ADEC has approved the use of institutional controls to limit potential future exposure and risk to human health or the environment.

Institutional controls necessary to support this closure determination include:

4. A restriction on using groundwater from the site without prior DEC review. Figures attached for this site indicate the areal extent where the groundwater ICs apply.

Standard site closure conditions that apply to all sites include:

12. Any proposal to transport soil or groundwater off-site requires ADEC approval in accordance with 18 AAC 75.325(i). A "site" as defined by 18 AAC 75.990 (115) means an area that is contaminated, including areas contaminated by the migration of hazardous substances from a source area, regardless of property ownership.

13. Movement or use of contaminated material in a manner that results in a violation of 18 AAC 70 water quality standards is prohibited.

14. Groundwater throughout Alaska is protected for use as a water supply for drinking, culinary and food processing, agriculture including irrigation and stock watering, aquaculture, and industrial use. Contaminated site cleanup complete determinations are based on groundwater being considered a potential drinking water source. In the event that groundwater from this site is to be used for other purposes in the future, such as aquaculture, additional testing and treatment may be required to ensure the water is suitable for its intended use.

ADEC has determined the cleanup is complete as long as the institutional controls are properly implemented and no new information becomes available that indicates residual contamination may pose an unacceptable risk.

The ADEC Contaminated Sites Database will be updated to reflect the change in site status to "Cleanup Complete with Institutional Controls" and will include a description of the contamination remaining at the site.

The institutional controls will be removed in the future if documentation is provided that shows concentrations of all residual hazardous substances remaining at the site are below the levels that allow for unrestricted exposure to, and use of, the contaminated media and that the site does not pose a potential unacceptable risk to human health, safety or welfare, or to the environment. Standard conditions 1-3 above will remain in effect after ICs are removed.

This determination is in accordance with 18 AAC 75.380 and does not preclude ADEC from requiring additional assessment and/or cleanup action if the institutional controls are determined to be ineffective or if new information indicates that contaminants at this site may pose an unacceptable risk to human health or the environment.

Appeal

Any person who disagrees with this decision may request an adjudicatory hearing in accordance with 18 AAC 15.195 – 18 AAC 15.340 or an informal review by the Division Director in accordance with 18 AAC 15.185. Informal review requests must be delivered to the Division Director, 555 Cordova Street, Anchorage, Alaska 99501-2617, within 15 days after receiving the department's decision reviewable under this section. Adjudicatory hearing requests must be delivered to the Commissioner of the Department of Environmental Conservation, 410 Willoughby Avenue, Suite 303, P.O. Box 111800, Juneau, Alaska 99811-1800, within 30 days after the date of issuance of this letter, or within 30 days after the department issues a final decision under 18 AAC 15.185. If a hearing is not requested within 30 days, the right to appeal is waived.

Former Tank Farm Area

Site Description and Background

The Former Tank Farm consisted of five diesel ASTs (41-A-1, 41-A-2, 41-A-3, 41-A-4 and 41-A-5) and a widespread piping system. The five diesel ASTs were located in a 72 foot X 28 foot lined containment dike with four foot wooden sidewalls. Two heating oil ASTs, 41-B-4 and 41-A-6, were located north of the Former Tank Farm. This AOC is a combination of two locations identified in the ECIR. The two locations are the "Engine Generator Facility (Building 616) and the "tank farm facility". The ECIR shows this as the "tank farm facility" as it was the active tank farm during the time the ECIR was conducted.

Cleanup Levels & Contaminants of Concern

Contaminants of Concern

The following contaminants of concern were identified above approved cleanup levels during the course of the site investigations summarized in the Characterization and Cleanup Activities section of this decision letter: GRO, DRO, RRO, BTEX, and PAHs.

Cleanup Levels

ADEC determined that groundwater at Sisters Island does not meet the criteria to be considered a current or future drinking water source per 18 AAC 75.350. ADEC also determined that contamination in the groundwater will not be transported to either surface water or to a current or reasonably expected future source of drinking water. Therefore, pursuant to 18 AAC 75.345(b)(1), it is not required that groundwater meet Table C cleanup levels. Migration to groundwater soil cleanup levels are no longer requirements for cleanup. The migration to groundwater pathway is no longer of concern at this site if the soil remains undisturbed.

Under 18 AAC 75.340 Method Two, the applicable cleanup levels are those in the "Over 40 Inch Zone" under the "Human Health", "Ingestion", and "Inhalation" columns of Tables B1 and B2 in 18 AAC 75.341. The "Over 40 Inch Zone" refers to the number of inches of rainwater the area receives each year.

Modeling to determine alternative cleanup levels was done using the approved Hydrocarbon Risk Calculator (HRC), an alternative cleanup levels and risk calculator developed in accordance with Method 3 under 18 AAC 75.340. The HRC is no longer consistent with how site-specific cleanup levels are calculated under 18 AAC 75, due to the promulgation of new regulations on November 6, 2016. Following a review of the site data, the Department has determined the HRC-derived ACLs do not need to be applied for site closure at this AOC, as final confirmation samples meet Method 2 table B1 and B2 cleanup values. The final confirmation sample concentrations for each COC are detailed in the Table below ("Soil 2009 BTEX, GRO, DRO and RRO Data (mg/kg)").

Characterization and Cleanup Activities

Characterization and cleanup activities conducted under the regulatory authority of the Contaminated Sites Program began in 1992. These activities are described below and are listed in the years the field work was performed.

1991 ECIR

For the "Engine Generator Facility (Building 616)" the ECIR indicates *"no action"* for CERCLA concerns, *"no action"* for POL concerns and *"further investigation"* for Other Regulatory Compliance/Management Practice Concerns. The further investigation is related to active electrical equipment.

For the "tank farm facility"the ECIR indicates *"no action"* for CERCLA concerns, *"further action and further investigation"* for POL concerns and *"no action"* for Other Regulatory Compliance/Management Practice Concerns. The "further action" for POL concerns includes incorporating the tank farm tanks in the tank management program. The "further investigation" for POL concerns is based on the results of a composite soil sample from within the diked area exceeding evaluation criteria (see following paragraph).

Composite soil sample FAA-SSR-SV-009 was collected from sandy soil protecting the liner inside the dike area at the Tank Farm. Analytes detected in sample FAA-SSR-SV-009 at concentrations greater than evaluation criteria include: chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene and EPH.

Soil sample FAA-SSR-SV-005 was collected next to transformers on the south side of building 616. Results are below evaluation criteria.

1997-1999 Remedial Activity

Tanks 41-B-4 and 41-A-6:

In October 1997 tanks 41-B-4 and 41-A-6 were lying horizontally on the ground approximately two feet apart, appeared structurally intact and were positioned with fill ports on top and drainage ports on the bottom of the tanks. Fill caps for 41-B-4 were not in place. It is believed that the tanks were previously used at another location.

Surface soil conditions in the vicinity of the two tanks were visually inspected and were field screened for vapors. The ground surface beneath AST41-A-6 did not appear to be stained and shallow field screening samples exhibited PID readings ranging from 0.4 ppm to 3. 7 ppm. Soil was excavated to a depth of 8-15 inches below the area formerly occupied by AST41-A-6. Ground water was not encountered in this shallow excavation which measured approximately 4 feet by 5 feet. No evidence of soil contamination was observed beneath the tank and no laboratory analytical samples were collected from the area immediately below this tank.

A surface stain was observed beneath a drain plug on the bottom of AST41-B-4 and soil collected from a depth of about 0.5 feet below ground surface (bgs) appeared oily. PID readings in the shallow, organic-rich soil encountered to a depth of 8 inches bgs ranged from 6.4 to 8.3 parts per million (ppm). Soil was ultimately excavated to the top of bedrock, which was encountered at depths ranging from 18 to 26 inches in the vicinity of AST41-B-4 during the October 1997 tank closure. Medium-grained sand was found beneath the surface soil and directly over bedrock. Field screening results indicated petroleum contamination in the medium sand with PID readings ranging from 0 to 18.1 ppm. Final excavation dimensions were approximately 13 feet by 15 feet. Two laboratory analytical samples were collected from the field screen locations along the excavation walls, exhibiting the greatest concentration of residual hydrocarbons as measured by headspace vapors. Sample SSR97SS41A6M12 was collected from the north margin of the excavation and sample SSR97SS41A6Ml0 was collected from the southeast corner of the excavation. It should be noted that laboratory analytical sample identification indicates tank 41-A-6, however the samples were in fact collected in association with AST 41-B-4.

Two test pit explorations were performed on October 13, 1997, to investigate soil conditions east and north of the excavation. Test Pit #1, located approximately 10 feet north of the excavation, did not contain soil vapors in a field screen sample collected just above bedrock. Test Pit #2, located adjacent to the east side of the excavation, also did not contain soil vapors in a field screen sample collected from just above the bedrock surface.

A soil sample, collected from just above bedrock in the vicinity of lab sample SSR97SS41A6M12, was field screened for DRO on October 9, 1997, using the Hanby immunoassay kit. The PID reading for this sample was 2.7 ppm. The immunoassay reading for the sample was approximately 250 to 500 ppm.

Ground water was encountered in soil immediately above the bedrock, at depths as shallow as 16 inches bgs. Ground water samples were not collected for analysis during this investigation.

Approximately 22 cubic yards of contaminated soil and 5 cubic yards of clean surface soil were removed from the AST41-B-4 excavation and placed in two separate, temporary stockpiles. All soil was temporarily stockpiled adjacent to the excavation until sample results were received and assessed. Once the excavated soil was identified as PCS, it was placed into the long-term stockpile during February 1998, and during November 1999 transported to Juneau for thermal treatment.

Two confirmation soil samples were collected from the AST41-B-4 excavation and analyzed for DRO and BTEX. SSR97SS41A6M10 was collected near the southeast corner of the excavation and SSR97SS41A6M12 was collected from the north wall of the excavation. The samples were collected just above bedrock at approximate depths of 24 inches and 10 inches bgs, respectively. DRO contamination was detected in sample SSR97SS41A6M10 at a concentration of 71.4 mg/kg and in SSR97SS41A6M12 at a concentration of 2,730 mg/kg. BTEX compounds were not detected in the samples. Laboratory analytical sample SSR97S041 A6M27 was collected from the stockpile of contaminated soil removed from the AST41-B-4 excavation and analyzed for DRO, RRO and the aromatic and aliphatic fractions of DRO and RRO. DRO compounds were detected at a concentration of 4,290 mg/kg. The aliphatic and aromatic fractions of DRO were detected at concentrations of 3, 100 mg/kg and 250 mg/kg, respectively. RRO compounds were not detected in the sample, nor in the aliphatic and aromatic fractions of RRO.

Summary: ADEC Category A cleanup standards have been applied to this site. DRO concentrations detected in laboratory analysis of soil exceed Category A cleanup standards in the vicinity of the northern limits of the excavation, but are below cleanup standards along the southern margin. Test pit explorations performed to the north and east of the excavation did not exhibit residual hydrocarbon vapors, suggesting that soil contamination remains less than 10 feet north of the October 1997 excavation limits. Bedrock was encountered at depths of 3 feet bgs or less in the vicinity of the excavation and was shallowest (less than I foot bgs) on the west side. Approximately 22 cubic yards of contaminated soil were excavated from the vicinity of AST41-B-4.

Aboveground Storage Tanks 41-A-1, 41-A-2, 41-A-3, 41-A-4, and 41-A-5

Aboveground Storage Tanks 41-A-1, 41-A-2, 41-A-3, 41-A-4, and 41·A·5 were positioned within the tank farm enclosure. The five tanks ranged in size from 3,000 gallon to 20,000 gallons. All tanks appeared structurally intact and were positioned with fill ports on top and drainage ports on the bottom of each tank. Fill caps and piping for the tanks were in place at the time of closure. Approximately 8,200 gallons of diesel fuel was removed from the five tanks. All fuel was transferred into a fuel truck and transported

by barge to Delta Western in Juneau, Alaska for recycling. The tanks were decommissioned between August 15, and 17, 1998. Prior to the commencement of tank demolition, approximately 5,000 gallons of water within the enclosure was pumped through a carbon filter system and into drums. One water sample was taken from within the enclosure; a second was taken from the carbon treated water. Results were below ADEC groundwater cleanup levels and the water was discharged on site.

Approximately 62 cubic yards of sandy soil contained within the containment area above the liner were removed and transferred to a long-term stockpile. This excavated soil was not field screened for segregation or characterization purposes. After the containment liner was removed, a 10-foot-square field screening grid was established.

Soil vapor and visual monitoring were used to field screen soil within each cell of the grid. The ground surface beneath the tank farm appeared to be stained only in the southern-most grid areas. PID readings in the shallow, sandy soil encountered to a depth of 1.5 feet bgs ranged from 10.2 ppm to 47.9 ppm. Eight laboratory analytical samples were collected from the field screen locations within the tank farm footprint, exhibiting the greatest concentration of residual hydrocarbons as measured by headspace vapors.

A soil sample collected from the vicinity of lab sample SSR98SS048T0I, was field screened for DRO on August 17, 1998, using the D-TECH immunoassay kit. The PID reading for this sample was 14.9 ppm. The immunoassay reading for the sample was less than 40 ppm. Ground water was not encountered in soil from any of the shallow excavations within the tank farm grid area.

Approximately 62 cubic yards of petroleum-contaminated soil were removed from above the containment liner at the former tank farm and placed in a long-term stockpile. The stockpile was placed on a 20-mil-thick liner, and the contaminated soil was covered with a 10-mil-thick liner. One composite soil sample (SSR98SL042M0I) was collected from a depth of 6 inches prior to placement of the liner and soil stockpile to establish baseline conditions. The excavated soil was placed into the long-term stockpile after sample analysis confirmed that the soil was contaminated above cleanup levels. It was later transported to Juneau during November 1999 and thermally treated.

Eight confirmation soil samples plus a duplicate were collected from the former tank farm area and analyzed for BTEX, ORO and PAHs. Generally, most of the samples were collected just below the liner at a depth of 0.5 feet bgs. However, two samples were collected at the southern-end of the former tank farm at a depth of approximately 1.5 feet bgs.

BTEX compounds were detected in six of the nine laboratory soil samples collected from the tank farm grid area. Benzene was not detected in any of nine samples. Other BTEX compounds, however, were detected at concentrations ranging from 0.010 mg/kg xylenes in sample SSR98SS046T0I to 0.38 mg/kg xylenes in sample SSR98SS047T0I. Additionally, DRO compounds were detected in all nine samples at concentrations ranging from 10 mglkg in sample SSR98SS048T0I to 1,400 mg/kg in sample SSR98SS046T0I.

PAHs were also analyzed for the nine soil samples collected from the former tank farm grid area. PAHs were detected at concentrations ranging from 2.8 mglkg indeno(l,2,3-cd)pyrene in sample SSR98SS048T0I to 340 mg/kg phenanthrene in sample SSR98SS046T01

A baseline soil sample (SSR98SL042M0I) was collected from beneath the long-term stockpile of contaminated soil removed from above the tank farm liner and analyzed for BTEX and DRO. BTEX compounds were detected in the sample at concentrations of 0.014 mg/kg xylenes and 0.036 mg/kg toluene, respectively. DRO compounds were also detected in the sample at a concentration of 16 mg/kg.

Summary: ADEC Method 2, Table B-2 cleanup standards have been applied to the former tank farm site. BTEX and DRO concentrations detected in laboratory analysis of soil were below Method 2, Table B-2 cleanup standards in all areas except the northwest and southwest corners. Subsurface explorations near the northwest comer of the tank farm grid area suggest that elevated DRO contamination in the soil remains near the west perimeter of the former tank farm enclosure. Additionally, subsurface explorations near the southwest comer of the tank farm grid area suggest that elevated DRO contamination in the soil remains near the south perimeter of the former tank farm enclosure. Bedrock was reported at depths of 3 feet bgs or less in the vicinity of the tank farm area. Approximately 62 cubic yards of contaminated soil were excavated from above the containment liner at the former tank farm.

Five test pits were excavated in the vicinity of the Tank Farm on November 13 and 14, 1997. Subsurface conditions in the tank farm area were fairly uniform. Bedrock was encountered at depths of 1.5 to 3.5 feet bgs. However, bedrock was 4.5 feet bgs in the open excavation, beneath the former tank farm. Soil overlying bedrock consisted of peat or organic silt above a medium-gray sand. Ground water was not encountered in any of the test pits, with the possible exception of TP616-4 at a depth of 2 feet.

Nine field screening samples were collected from the five test pits. One soil sample was collected from each of the five test pits, except TP616-2 which encountered bedrock at 1.5 feet bgs.
BTEX compounds were not detected in any of the soil samples collected from the vicinity of the tank farm. DRO compounds were detected in all soil samples collected in this area, except TP616-4, at concentrations ranging from 25 mg/kg to 77 mg/kg.

Because significant soil contamination was not encountered in any of the Release Investigation test pits, a separate soil sample was collected from the AST excavation wall for additional chemical analyses. Sample SSR97SS616T01AA was collected from the west wall of the excavation using a backhoe to expose a fresh surface. The sample was collected from an approximate depth of 2.0 feet bgs and was analyzed for PAHs and fraction analyses of DRO and RRO. Laboratory analysis detected DRO and RRO in the aromatic fraction of this sample at concentrations of 41 mg/kg and 63 mg/kg, respectively. In addition, DRO and RRO were detected in the aliphatic fraction of this sample at concentrations of 980 mg/kg and 290 mg/kg, respectively. PAH compounds were not detected in this soil sample.

DRO-contaminated soil at appears to be limited to the area north of the AST closure excavation. Shallow bedrock limits the potential depth and lateral extent of contamination in this area. The lateral extent of contamination at this location is also constrained by the test pit results. The volume of in-place soil containing DRO contamination in excess of ADEC Level A cleanup standards is estimated to be less than 15 in-place cubic yards. The contamination predominantly exists within gray, medium sand found approximately 1.5 feet bgs and extending to the top of bedrock, 2.5 to 4.0 feet bgs in this area.

A GeoProbe® implant well (GP-3) was installed near the open excavation at the former tank farm to facilitate collection of a ground water sample for laboratory analysis. At the time of the release investigation, the excavation contained approximately 3 feet of water. The well screen was placed at a depth of approximately 1.5 feet bgs, at a location, 3.5 feet from the open excavation. Ground water

sample SSR970W616T01 did not contain BTEX contaminants. The sample did exhibit DRO contamination at a concentration of 2.2 mg/1.

The presence of ground water is limited in the vicinity of the tank farm. Ground water, sampled very close to the open excavation from a shallow depth, contained ORO at a concentration of 2.2 mg/1.

2006 Correspondence

In a letter from ADEC to FAA, dated 5 December 2006, (See Appendix B) addressing the status of all AOCs on the island, the letter requests "*additional characterization or cleanup occur"* at "Tank Farm Tanks 41-A-1, 2, 3, 4, and 5: Elevated levels of diesel-range organics were left in place on the northwest and southwest sides of the tank farm during the removal of the tanks and liner."

In a letter from ADEC to FAA, dated 5 December 2006, addressing the status of all AOCs on the island, the letter requests "*additional characterization or cleanup occur"* at "Engine Generator Building 616 Tank 4l-B-4: Elevated levels of diesel-range organics were left in place during the tank removal."

In a letter from ADEC to FAA, dated 5 December 2006, addressing the status of all AOCs on the island, the letter states the department has determined that "*no action is requested"* at this potential area of concern as no contamination was found. The letter states: Engine Generator Building 616, Tank 41-A-6: This 500 gallon AST was removed in 1998. No contamination was observed below the tank and no samples were collected.

2009 Site Investigation

During the SI, the extent of previously reported contamination from leaks and/or spills from former AST 41-B-4 located north of the Former Tank Farm and from the five diesel ASTs located within the Former Tank Farm was investigated. Previous sample locations with elevated DRO concentrations and areas around the perimeter of the previous remedial excavations were targeted for additional soil investigation. AGSC reviewed historic photographs and site plans from previous reports to determine the approximate locations of former AST 41-B-4, the Former Tank Farm ASTs, the containment dike, and the limits of the remedial excavations.

A total of 24 UVOST probes were advanced in this area of concern. To verify the results of the UVOST system and to further investigate the area for petroleum-contaminated soil, six borings were advanced and eight analytical soil samples were collected. Borings were advanced near UVOST locations that indicated the highest potential for petroleum-contaminated soil based on the LIF signal response. Analytical samples included: eight for DRO/RRO analyses, six for GRO/BTEX analyses, two for EPH/VPH analyses, and one for PAH analysis. Soil samples for TOC, bulk density, sieve, specific gravity, and moisture content analyses were also collected in this area of concern.

Eight UVOST probes advanced in the Former Tank Farm area indicated the potential presence of petroleum-contaminated soil based on the LIF signal response as shown on Figure 21. All eight of these probes were advanced in the area near former AST 41-A-6. UVOST probes advanced in the Former Tank Farm footprint indicated no potential POL contamination. Maximum LIF responses were 22.0%RE at 41A-6 UV09 and 20.0%RE at 41-A-6 UV10.

DRO was detected at concentrations greater than the MRLs in four analytical soil samples, and three results were greater than the most stringent ADEC Method Two cleanup level of 230 mg/kg DRO.

DRO concentrations ranged from 22.8 mg/kg to 3,610 mg/kg. All reported RRO, GRO, BTEX, and PAH results were less than the most stringent, ADEC Method Two, Over 40 Inch Zone, Migration to Groundwater cleanup levels.

Two monitoring wells were installed in the Former Tank Farm area. Monitoring wells MW-3 and MW-4 were installed in borings B08 and B10, respectively. Due to the shallow depth to bedrock, MW-3 and MW-4 were advanced to depths of approximately 4.5 feet bgs, and the five foot screens had to be installed slightly above the ground surface. Groundwater samples collected from MW-3 and MW-4 installed in the Former Tank Farm area were analyzed for DRO/RRO, GRO/BTEX, and EPH/VPH. One groundwater sample collected from MW-3 was also analyzed for PAH.

Groundwater was present in both monitoring wells installed in the Former Tank Farm area. The approximate depth to water in monitoring wells MW-3 and MW-4 was 0.4 feet bgs. Shallow bedrock was prevalent in this area. Depth to bedrock varied from 1.5 feet to 4.4 feet bgs in borings advanced in the Former Tank Farm area. Monitoring wells MW-3 and MW-4 produced sufficient water to collect analytical samples with stable water quality parameter readings, except turbidity.

DRO was detected at concentrations greater than the ADEC 18 AAC 75 Table C groundwater cleanup levels in both monitoring wells installed in the Former Tank Farm area. DRO concentrations were 1.57 mg/l and 7.42 mg/l in MW-3 and MW-4, respectively. RRO was detected at a concentration of 2.49 mg/l in MW-4, which is greater than the ADEC 18 AAC 75 Table groundwater cleanup level for RRO. All other reported analytical results were less than the ADEC 18 AAC 75 Table C groundwater cleanup levels.

The UVOST screening indicated potential petroleum-contaminated soil in eight out of the 22 UVOST probes advanced at the Former Tank Farm area. Based on the UVOST/LIF responses and analytical results, it appears that DRO contamination is present in subsurface soil just above bedrock at depths of 0.7 to 3.7 feet bgs in an area located north of the Former Tank Farm footprint. Contamination appears to extend in an irregular shaped area measuring approximately 25 feet at its widest points north to south and east to west. This residual contamination is located beneath former AST 41-B-4 and the southern portion of the 1997 remedial excavation. DRO was detected at a maximum concentration of 3,610 mg/kg in a boring advanced just south of the 1997 remedial excavation. In the Former Tank Farm footprint UVOST/LIF signal responses and analytical results indicated that DRO concentrations in soil were less than the most stringent ADEC Method Two cleanup levels near previous samples SSR98SS046T01 and SSR98SS047T01 that had previously indicated elevated DRO concentrations. All other reported analytical results for DRO, RRO, GRO, BTEX and PAH analytes in soil were less than the ADEC Method Two, Over 40 Inch Zone, Migration to Groundwater cleanup levels. Based on the continuous clean probe locations just beyond the contaminated area, it appears that contamination in soil is stable and is not migrating offsite.

Analytical groundwater samples indicate that petroleum contamination has impacted the shallow perched groundwater in the Former Tank Farm area. DRO was detected in groundwater near former AST 41-B-4 at concentrations of 1.57 mg/l and 7.24 mg/l, which is greater than the ADEC 18 AAC 75 Table C groundwater cleanup level of 1.5 mg/l. GRO was detected in groundwater in MW-4 at a concentration of 2.49 mg/l, which is greater than the ADEC 18 AAC 75 Table C groundwater cleanup level of 2.2 mg/l. All other reported analytical results were detected at concentrations less than the applicable groundwater cleanup levels.

The soil contaminated area is located approximately 40 feet south of Building 616. However the vapor intrusion pathway is not a concern in this area because DRO and GRO are the only contaminants of concern and these are not listed as compounds of concern for vapor migration in ADEC's CSM Guidance.

2009-2010 Groundwater Sampling

Groundwater samples were collected from monitoring wells during three sampling events conducted in 2009 and 2010: These sampling events occurred in October during the 2009 SI, in June 2010, and in October 2010. June was chosen to represent the low groundwater condition, and October was chosen to represent the high groundwater condition. Both conditions were supported by groundwater elevation measurements.

During the 2009 SI, DRO was detected at concentrations greater than the ADEC Method Two cleanup level of 230 mg/kg in three soil samples collected near former AST 41-B-4 at the Former Tank Farm area. All reported RRO, GRO, BTEX, and PAH results were less than ADEC Method Two, Over 40 Inch Zone, Migration to Groundwater cleanup levels.

Two monitoring wells, MW-3 and MW-4, were installed at the Former Tank Farm area during the 2009 SI. Due to the shallow depth to bedrock, MW-3 and MW-4 were advanced to depths of approximately 4.5 feet bgs, and the five foot screens had to be installed slightly above the ground surface. Groundwater samples collected from MW-3 and MW-4 installed in the Former Tank Farm area were analyzed for DRO, GRO, RRO, BTEX, PAH, EPH, and VPH. PAH groundwater samples were not collected from MW-4 during the 2009 SI.

Shallow bedrock was prevalent in this area. Depth to bedrock varied from 1.5 feet to 4.4 feet bgs in borings advanced in the Former Tank Farm area. Groundwater was present in both monitoring wells installed in the Former Tank Farm area.

During all three sampling events monitoring wells MW-3 and MW-4 produced sufficient water to collect the analytical samples required and water quality parameter readings. Casing elevations, total well depth, and depth to water were measured during the 2009 SI and 2010 sampling events.

Since only two monitoring wells were installed in this AOC, groundwater flow direction was estimated based on surface topography. However, based on observations of the other monitoring wells on Sisters Island, it appears that groundwater is likely discontinuous.

Groundwater summary:

During the 2009 SI, DRO was detected at concentrations greater than the ADEC 18 AAC 75 Table C groundwater cleanup levels in both monitoring wells installed in the Former Tank Farm area. DRO concentrations were 1.57 mg/L and 7.42 mg/ L in MW-3 and MW-4, respectively. In addition, RRO was detected at a concentration of 2.49 mg/l in MW-4, which was greater than the ADEC 18 AAC 75 Table groundwater cleanup level for RRO. All other reported analytical results were less than the ADEC 18 AAC 75 Table C groundwater cleanup levels.

During the June 2010 sampling event, DRO was detected at concentrations greater than the ADEC 18 AAC 75 Table C groundwater cleanup levels in MW-3 and MW-4. DRO concentrations were 5.4 mg/L

and 6.48 mg/L in MW-3 and MW-4, respectively. In addition, RRO was detected at a concentration of 1.98 mg/L in MW-3 and 2.44 mg/l in MW-4, which was greater than the ADEC 18 AAC 75 Table groundwater cleanup level for RRO. All other reported analytical results were less than the ADEC 18 AAC 75 Table C groundwater cleanup levels.

During the October 2010 sampling event, DRO was detected at a concentration of 3.1 mg/L in MW-3, which was greater than the ADEC 18 AAC 75 Table C groundwater cleanup level. All other reported analytical results in MW-3 and MW-4 were less than the ADEC 18 AAC 75 Table C groundwater cleanup levels.

The analytical DRO results compared to the effective solubilities of DRO aromatics and aliphatics calculated in the HRC indicate that a significant amount of the DRO mass was present as NAPL and was not in dissolved phase. The HRC calculated the effective solubility of DRO aromatics to be 2.68 mg/L and the effective solubility of DRO aliphatics to be 0.000321 mg/L for the Former Tank Farm area. The HRC pages showing the effective solubilities are included in Appendix C.

2011 Hydrocarbon Risk Calculator

The ADEC approved Hydrocarbon Risk Calculator (HRC) was used to assess the human health risks associated with petroleum hydrocarbon contaminated sites.

The HRC can be used to calculate human health risk and alternative cleanup levels and to help support Cleanup Complete determinations with or without Institutional Controls (ICs). To determine alternative cleanup levels, if the site is found to present acceptable risks with existing concentrations, then the existing concentrations would become the site "alternative cleanup levels" and the site would be eligible for a "cleanup complete" determination by ADEC per 18 AAC 75.380. The HRC report was prepared assessing two scenarios for groundwater use, potable and non-potable. After the completion of the HRC Report, the ADEC approved the "350 determination" which documents groundwater is "non-potable" (to use the terminology in the HRC report).

The HRC calculations were performed using data collected during the site investigation (SI) conducted in October 2009 and subsequent groundwater monitoring events in June and October 2010.

Soil 2009 BTEX, GRO, DRO and RRO Data (mg/kg)

	Benzene	Toluene	Ethylbenzene	Xylene	GRO	DRO	RRO
95% UCL	0.0011	0.0555	0.3639	0.7710	63.9120	3,290.0333	2,948.5443
Maximum	0.0011	0.0604	0.4120	0.8720	66.2000	3,610.0000	3,300.0000

For both the DRO and RRO source areas, the HRC results for the Former Tank Farm area assuming groundwater is non-potable indicate that site conditions meet the ADEC human health risk standard established in 18 AAC 75.325. Since a Groundwater Use Determination was approved in accordance with 18 AAC 75.350, risks associated with the groundwater ingestion pathway are eliminated. Based on the HRC results, all exposure pathways, including soil direct contact, outdoor air vapor inhalation, indoor air vapor inhalation, migration to groundwater, and groundwater ingestion, posed acceptable risk or were incomplete.

2012 Correspondence and Decommissioning Monitoring Wells

MW-3 and MW-4 were decommissioned in accordance with the ADEC approved workplan.

FAA sent a letter to ADEC dated 15 October 2012, Subject; Final Report, Decommissioning Monitoring Wells, Sisters Island, Alaska. The letter requests a "cleanup complete with institutional controls" determination be issued by ADEC for the AOCs covered by the HRC report dated 22 August 2011.

Cumulative Risk Evaluation

Pursuant to 18 AAC 75.325(g), when detectable contamination remains on-site following a cleanup, a cumulative risk determination must be made that the risk from hazardous substances does not exceed a cumulative carcinogenic risk standard of 1 in 100,000 across all exposure pathways and does not exceed a cumulative noncarcinogenic risk standard at a hazard index of one across all exposure pathways.

Based on a review of the environmental record, ADEC has determined that residual contaminant concentrations meet the human health cumulative risk criteria for residential land use.

Exposure Pathway Evaluation

Soil Ingestion and Direct Contact Pathways: Subsurface soil ingestion and direct contact pathways are considered complete but de minimis since contamination is greater than 2 feet bgs but below direct contact CULs.

Vapor Intrusion Pathway: The vapor intrusion pathway is considered complete if petroleum contamination in soil or groundwater is expected to be present within 30 horizontal or vertical feet of buildings. The contaminated area is located approximately 40 feet south of Building 616 which serves as the FAA quarters building. However, the vapor intrusion pathway is not a concern in this area because DRO is the only contaminant of concern and DRO is not listed as a compound of concern for vapor migration in ADEC's CSM Guidance.

Outdoor Air Pathway: The outdoor air exposure pathway is complete but is not considered significant for petroleum hydrocarbons.

Biota Pathway: The wild plant ingestion route is interpreted to be incomplete (or is insignificant) for petroleum hydrocarbons because plants do not significantly take up fuel hydrocarbons into their tissues. Similarly, the wild meat ingestion route is interpreted to be incomplete (or is insignificant) for petroleum hydrocarbons because the plants do not significantly take up the fuel hydrocarbons and hence, the animals feeding on the plants are not significantly exposed. Furthermore, the remote location of the Sisters Island FAA Station deters the ingestion of plants and wildlife.

Surface Water Pathway: Surface water is not considered a medium impacted by petroleum contamination. Sheen was not detected on the Icy Strait surface water during visual monitoring conducted during the 2009 SI and June and October 2010 groundwater sampling events. Petroleum contamination is generally present in subsurface soils (greater than 2 feet bgs) so surface water runoff is not likely to be a transport mechanism for transporting petroleum contamination into surface water. The software, BIOSCREEN (EPA model), was used to assess dissolved phase transport and plume areal extent through time and to estimate natural attenuation rates. BIOSCREEN simulations indicate that potential contaminant migration through the discontinuous groundwater perched above bedrock would not impact the Icy Straight, which is the nearest surface water body.

Groundwater Pathway: Groundwater does not represent a potentially complete exposure pathway. ADEC approved a determination that groundwater at Sisters Island does not meet the criteria to be considered a current or future drinking water source.

Exposure Pathway Conclusion: All exposure pathways, including soil direct contact, outdoor air vapor inhalation, indoor air vapor inhalation, migration to groundwater, and groundwater ingestion, pose acceptable risk or are incomplete. Therefore the remaining contamination is de minimis for all complete exposure pathways. Site conditions are protective of human health under an unrestricted (residential) land use scenario, and they may be used to support a Cleanup Complete determination in accordance with 18 AAC 75.

ADEC Decision

Remaining petroleum contamination in soil is below method 2 Tables B1 and B2 human health, ingestion, and inhalation cleanup levels. Migration to groundwater soil cleanup levels are not applicable at this site because ADEC determined that groundwater at the site is not a current or likely potential future drinking water source, per 18 AAC 75.350, and that contamination in the shallow groundwater will not be transported to either surface water or groundwater that is a reasonably expected future source of drinking water. Additionally, site characterization data demonstrate that the groundwater contaminant plumes are steady state or shrinking and contaminants do not pose a migration to surface water concern. However, petroleum contamination remains in groundwater above Table C cleanup levels, and is not suitable for *unrestricted* future use; therefore, ADEC has approved the use of institutional controls to limit potential future exposure and risk to human health or the environment.

Institutional controls necessary to support this closure determination include:

5. A restriction on using groundwater from the site without prior DEC review. Figures attached for this site indicate the areal extent where the groundwater ICs apply.

Standard site closure conditions that apply to all sites include:

15. Any proposal to transport soil or groundwater off-site requires ADEC approval in accordance with 18 AAC 75.325(i). A "site" as defined by 18 AAC 75.990 (115) means an area that is contaminated, including areas contaminated by the migration of hazardous substances from a source area, regardless of property ownership.

16. Movement or use of contaminated material in a manner that results in a violation of 18 AAC 70 water quality standards is prohibited.

17. Groundwater throughout Alaska is protected for use as a water supply for drinking, culinary and food processing, agriculture including irrigation and stock watering, aquaculture, and industrial use. Contaminated site cleanup complete determinations are based on groundwater being considered a potential drinking water source. In the event that groundwater from this site is to be used for other purposes in the future, such as aquaculture, additional testing and treatment may be required to ensure the water is suitable for its intended use.

ADEC has determined the cleanup is complete as long as the institutional controls are properly implemented and no new information becomes available that indicates residual contamination may pose an unacceptable risk.

The ADEC Contaminated Sites Database will be updated to reflect the change in site status to "Cleanup Complete with Institutional Controls" and will include a description of the contamination remaining at the site.

The institutional controls will be removed in the future if documentation is provided that shows concentrations of all residual hazardous substances remaining at the site are below the levels that allow for unrestricted exposure to, and use of, the contaminated media and that the site does not pose a potential unacceptable risk to human health, safety or welfare, or to the environment. Standard conditions 1-3 above will remain in effect after ICs are removed.

This determination is in accordance with 18 AAC 75.380 and does not preclude ADEC from requiring additional assessment and/or cleanup action if the institutional controls are determined to be ineffective or if new information indicates that contaminants at this site may pose an unacceptable risk to human health or the environment.

Appeal

Any person who disagrees with this decision may request an adjudicatory hearing in accordance with 18 AAC 15.195 – 18 AAC 15.340 or an informal review by the Division Director in accordance with 18 AAC 15.185. Informal review requests must be delivered to the Division Director, 555 Cordova Street, Anchorage, Alaska 99501-2617, within 15 days after receiving the department's decision reviewable under this section. Adjudicatory hearing requests must be delivered to the Commissioner of the Department of Environmental Conservation, 410 Willoughby Avenue, Suite 303, P.O. Box 111800, Juneau, Alaska 99811-1800, within 30 days after the date of issuance of this letter, or within 30 days after the department issues a final decision under 18 AAC 15.185. If a hearing is not requested within 30 days, the right to appeal is waived.

H-Marker Facility

Site Description and Background

The active H-Marker Facility is located south of the Tank Farm Facility (see Figure 3-5). This facility consists of an H-Marker antenna, two transmitters, a live transformer, and H-Marker Building 413. The transformer was not inspected because the power could not be shut down at the time of the survey.

Cleanup Levels & Contaminants of Concern

N/A

Characterization and Cleanup Activities

Characterization and cleanup activities conducted under the regulatory authority of the Contaminated Sites Program began in 1991. These activities are described below and are listed in the years the field work was performed.

1991 ECIR

The ECIR did not identify contaminants associated with this facility. The ECIR table ES-1 indicates *"no action"* required for "CERCLA concerns", "POL concerns" and *"further investigation"* for "other regulatory compliance/management practice concerns".

The ECIR recommended further action concerning asbestos containing material (ACM), and electrical transformers that were energized and couldn't be sampled.

1997-2000

The ACM was removed and the building burned. The ash was collected and disposed of properly.

Cumulative Risk Evaluation

N/A

Exposure Pathway Evaluation

N/A

ADEC Decision

The spreadsheet attached to the 5 December 2006, Letter from ADEC to FAA indicates *"no action needed"*. No violations of 18 AAC 75.

Metal Shed Facility

Site Description and Background
The Metal Shed Facility is a wood and metal structure located on the southern end of Sisters Island.

Cleanup Levels & Contaminants of Concern
N/A

Characterization and Cleanup Activities
Characterization and cleanup activities conducted under the regulatory authority of the Contaminated Sites Program began in 1991. These activities are described below and are listed in the years the field work was performed.

1991 ECIR
Two cans of General Electric insulating oil and one can of Tracol lubricating oil were identified and removed. A sample of oil was taken (FAA-SSR-SV-008) and analyzed for PCB. The results were ND for all parameters. The oil was properly disposed.

The ECIR did not identify contaminants associated with this facility. The ECIR table ES-1 indicates *"no action"* required for "CERCLA concerns", "POL concerns" and "other regulatory compliance/management practice concerns".

1997-1999 Remedial Activity
The building was burned and the ash collected and disposed of properly.

Cumulative Risk Evaluation
N/A

Exposure Pathway Evaluation
N/A

ADEC Decision
The spreadsheet attached to the 5 December 2006, Letter from ADEC to FAA indicates *"no action needed"*. No violations of 18 AAC 75.

Fuel Delivery Line Site

Site Description and Background

The Fuel Delivery Line is located on the beach at the south end of the island and west of the H-Marker Facility. The line was in operation from 1945-1998 and was used to transfer fuel from ships to the Tank Farm. It consisted of an aboveground three inch fuel line and a small catch basin approximately 4 feet by 4 feet. This fuel line is referred to as "3 inch pipeline" in some reports.

Cleanup Levels & Contaminants of Concern

N/A

Characterization and Cleanup Activities

Characterization and cleanup activities conducted under the regulatory authority of the Contaminated Sites Program began in 1991. These activities are described below and are listed in the years the field work was performed.

1991 ECIR

The ECIR table ES-1 indicates "*no action*" required for "CERCLA concerns", "POL concerns" and "Other Regulatory Compliance/Management Practice Concerns".

A soil sample (FAA-SSR-SV-007) was taken near the connection point of the fuel barge hose and the shore based pipeline. Results were below action levels.

1997-1999 Remedial Activity

The 3-inch fuel delivery line was lying horizontally atop wooden blocks and/or A-frame beams, approximately 10-15 feet apart and 1-2.5 feet above the ground. The pipeline appeared structurally intact. The pipeline was removed on July 3 and 4, 1998, cleaned/cut up and was transported with other general debris to a nearby common area for temporary storage until disposal could be secured. Less than five gallons of diesel fuel were found in the pipeline and were transferred to a fuel truck for re-use at Delta Western in Juneau.

GeoEngineers investigated soil conditions beneath approximately 350 feet of aboveground 3-inch-diameter fuel delivery pipeline during field activities conducted in July and August 1998. The main fuel line connected the tank farm to the barge off-loading area located near the sandy beach at the south-end of Sisters Island. The pipeline was generally located in a densely forested area. Field screen soil samples were collected from below each pipe joint (one sample per 20 linear feet). The samples were field screened for organic vapors and had PID readings ranging from 0.0 ppm to 0.1 ppm. The soil did not exhibit visual signs of fuel contamination. Ground water was not encountered during the pipeline investigation. A soil sample, collected from the vicinity of lab sample SSR98SL007M01 was field screened for DRO on July 3, 1998, using the D-TECH immunoassay kit. The PID reading for this sample was 40.2 ppm. The immunoassay reading for the sample was less than 40 ppm.

Based on the field screening results, three confirmation soil samples were collected from beneath the 3-inch fuel delivery line for laboratory analysis. Two samples were analyzed for BTEX and DRO compounds and the remaining sample was analyzed for PAHs. Generally, the samples were collected just below the pipeline at a depth of 0.5 feet bgs. BTEX compounds were detected in one of the two

laboratory soil samples at a concentration of 0.18 mglkg xylenes in sample SSR98SL007M01. DRO compounds were also detected in the two samples at concentrations of 17 mg/kg in sample SSR98SL008M0 1 to 250 mg/kg in sample SSR98SL007M0I. Additionally, PAH compounds were detected in sample SSR98SL033M01 at concentrations ranging from 7.5 mg/kg anthracene to 280 mglkg pyrene.

Laboratory analytical results indicate that soil with DRO concentrations exceeding ADEC Method 2, Table B-2 cleanup standards remains at the barge off-loading area near the sandy beach at the southern pipeline terminus.

2006 Correspondence

In a letter from ADEC to FAA, dated 5 December 2006, (See Appendix B) addressing the status of all AOCs on the island, the letter states the department has determined that *"no action is requested"* at this potential area of concern as no contamination was found. The letter states: Fuel Line: Two (2) fuel lines were removed in 1999; a 600 foot long underground line and a 350 foot aboveground line. Field screening was conducted along the lines and samples were collected at the joints as the most likely locations of contamination. Five samples were collected on the underground line with the highest result being 230 milligrams per kilogram (mg/kg) diesel-range organics and three samples were collected on the aboveground line with a high result of 250 mg/kg diesel-range organics.

Cumulative Risk Evaluation

N/A

Exposure Pathway Evaluation

N/A

ADEC Decision

In a letter from ADEC to FAA, dated 5 December 2006, addressing the status of all AOCs on the island, the letter states the department has determined that *"no action is requested"* at this potential area of concern as no contamination was found.

1.25 Inch Fuel Line Site

Site Description and Background

The main fuel line connected the tank farm to former and/or existing buildings supplied heating fuel to each of the tanks at the individual buildings. The pipeline was approximately one foot below the ground surface and was generally located on the east side of the road. A smaller line, connecting this line to the individual fuel tank at a building, is covered in each AOC.

Cleanup Levels & Contaminants of Concern

N/A

Characterization and Cleanup Activities

Characterization and cleanup activities conducted under the regulatory authority of the Contaminated Sites Program began in 1991. These activities are described below and are listed in the years the field work was performed.

1991 ECIR

The existence of this fuel line was unknown during the ECIR. It was discovered during the 1997 tank removal work.

1997-1999 Remedial Activity

GeoEngineers investigated soil conditions beneath approximately 600 feet of buried 1.25-inch-diameter fuel delivery pipeline during field activities conducted in November 1997. The pipeline was exposed by hand digging and soil samples were collected from below pipe joints. The samples were field screened for organic vapors and had PID readings ranging from 0.0 to 0.1 ppm. The soil did not exhibit visual signs of fuel contamination. Ground water was not encountered during the pipeline investigation.

Five confirmation soil samples were collected from beneath the 1.25-inch fuel delivery line and analyzed for BTEX and DRO. The soil sample locations are shown in Figure 3. Generally, the samples were collected just below the pipeline at depths of 1.0 to 2.0 feet bgs. BTEX compounds were not detected in four of the five laboratory soil samples collected from the fuel pipeline. Benzene was not detected in any of five samples. Another BTEX compound, however, was detected at a concentration of 0.045 mg/kg xylenes in sample SSR97SS485M2PL. Additionally, DRO compounds were detected in two of the five samples at concentrations of 90 mg/kg in sample SSR97SS222M02PL to 230 mg/kg in sample SSR97SS422M02PL.

Laboratory analytical results indicate that soil with DRO concentrations exceeding ADEC Method I Category B cleanup standards remains near Building No. 632 within this shallow excavation.

2006 Correspondence

In a letter from ADEC to FAA, dated 5 December 2006, (See Appendix B) addressing the status of all AOCs on the island, the letter states the department has determined that "no action is requested" at this potential area of concern as no contamination was found. The letter states: Fuel Line: Two (2) fuel lines were removed in 1999; a 600 foot long underground line and a 350 foot aboveground line. Field screening was conducted along the lines and samples were collected at the joints as the most likely locations of contamination. Five samples were collected on the underground line with the highest result

being 230 milligrams per kilogram (mg/kg) diesel-range organics and three samples were collected on the aboveground line with a high result of 250 mg/kg diesel-range organics.

Cumulative Risk Evaluation

N/A

Exposure Pathway Evaluation

N/A

ADEC Decision

In a letter from ADEC to FAA, dated 5 December 2006, addressing the status of all AOCs on the island, the letter states the department has determined that *"no action is requested"* at these potential areas of concern as no contamination was found.

If you have any questions, please do not hesitate to contact me at (907) 451-2131, or by email at monte.garroutte@alaska.gov.

Sincerely,

Monte Garroutte

Digitally signed by Monte Garroutte
DN: cn=Monte Garroutte, o=Alaska Department of Environmental Conservation, ou=Contaminated Sites Program, email=monte.garroutte@alaska.gov, c=US
Date: 2017.06.13 15:06:10 -08'00'

Monte Garroutte
Environmental Program Specialist

Enclosures: Attachment A: Decision Document: FAA Sisters Island Station Cleanup Complete-ICs
Landowner and Responsible Party Agreement and Signature Page
Site Figures – Contaminated Groundwater Areas

Signature of Authorized Representative, Title
United States Federal Aviation Administration

Date

Printed Name of Authorized Representative, Title
United States Federal Aviation Administration

Signature of Authorized Representative, Title
United States Forest Service

5/23/17
Date

Chad VanOrmer, District Ranger
Printed Name of Authorized Representative, Title
United States Forest Service

Note to Responsible Person (RP):
After making a copy for your records, please return a signed copy of this form to the ADEC project manager at the address on this correspondence within 30 days of receipt of this letter.

U.S. Department
of Transportation

**Federal Aviation
Administration**

FAA Alaska Region
222 W. 7th Avenue, Box 14
Anchorage, Alaska
99513-7587

June 2, 2017

Monte Garroutte
Alaska Department of Environmental Conservation
610 University Avenue
Fairbanks, AK 99709-3643

Dear Mr. Garroutte:

The Federal Aviation Administration (FAA) has signed the Sisters Island Decision Document's Attachment A (Landowner and Responsible Party Agreement). The signature page is attached and will also be mailed.

The internal procedure the FAA uses to prevent future disturbance of the remaining in-situ contaminated soil involves the use of the FAA's AOC tracking database named FEATS. FEATS contains all the information for each AOC including future remediation requirements as well as historical actions and correspondence. When any FAA project – environmental, structural, civil, electrical, etc. is planned it must initially be reviewed by internal FAA safety and environmental engineers prior to finalizing the project requirements. Their review includes reviewing the FEATS database to determine if any AOCs will be impacted by the upcoming project. If an AOC might be encountered, the reviewing engineer checks with the environmental project engineer for that site (for example that would be me for Sisters Island) and discusses the extent of the existing AOC and the upcoming project work. If the contamination would be impacted the environmental project engineer would contact the new project planner and explain the AOC to be impacted and allow the new project planner to incorporate requirements for dealing with the contamination including DEC requirements.

If you have any questions please contact me at 271-5225 or dave.hanneman@faa.gov.

Sincerely,

Dave Hanneman

Dave Hanneman
Project Engineer
Infrastructure Support Center – Anchorage
Engineering Services – Operations Engineering

Attachment A: Decision Document: FAA Sisters Island Station Cleanup Complete-ICs Landowner and Responsible Party Agreement and Signature Page

As the landowners and/or operators of the FAA Sisters Island Station, the Forest Service (current landholder) and the Federal Aviation Administration (current operator) agree with the Cleanup Complete with ICs determination and its terms and conditions, as stated in the decision letter referenced above, and listed below. A failure to accept this determination by either party may result in ADEC reopening this site and requiring further remedial action in accordance with 18 AAC 75.380.

Institutional controls necessary to support this closure determination include:

1. A restriction on using groundwater from the site without prior ADEC review.

Standard site closure conditions that apply to all sites include:

1. Any proposal to transport soil or groundwater off-site requires ADEC approval in accordance with 18 AAC 75.325(i). A "site" as defined by 18 AAC 75.990 (115) means an area that is contaminated, including areas contaminated by the migration of hazardous substances from a source area, regardless of property ownership.

2. Movement or use of contaminated material in a manner that results in a violation of 18 AAC 70 water quality standards is prohibited.

3. Groundwater throughout Alaska is protected for use as a water supply for drinking, culinary and food processing, agriculture including irrigation and stock watering, aquaculture, and industrial use. Contaminated site cleanup complete determinations are based on groundwater being considered a potential drinking water source. In the event that groundwater from this site is to be used for other purposes in the future, such as aquaculture, additional testing and treatment may be required to ensure the water is suitable for its intended use.

ADEC has determined the cleanup is complete as long as the institutional controls are properly implemented and no new information becomes available that indicates residual contamination may pose an unacceptable risk. Attached are diagrams drawn to scale that shows the locations of existing and former structures, and the approximate extent of remaining groundwater contamination which is subject to the institutional controls described.

In the event that new information becomes available which indicates that the site may pose an unacceptable risk to human health, safety, welfare or the environment, further site characterization and cleanup may be necessary under (18 AAC 75.325-.390).

The institutional controls remain in effect until a written determination from ADEC is recorded that documents contaminants remaining at the site have been shown to meet the groundwater cleanup levels in Table C within 18 AAC 75.345 and that off-site transportation of soil and/or groundwater are no longer a potential concern.

Alice L Salzman

Signature of Authorized Representative, Title
United States Federal Aviation Administration

6-2-17

Date

Alice L. Salzman
Real Estate Contracting Officer

Printed Name of Authorized Representative, Title
United States Federal Aviation Administration

_____

Signature of Authorized Representative, Title
United States Forest Service

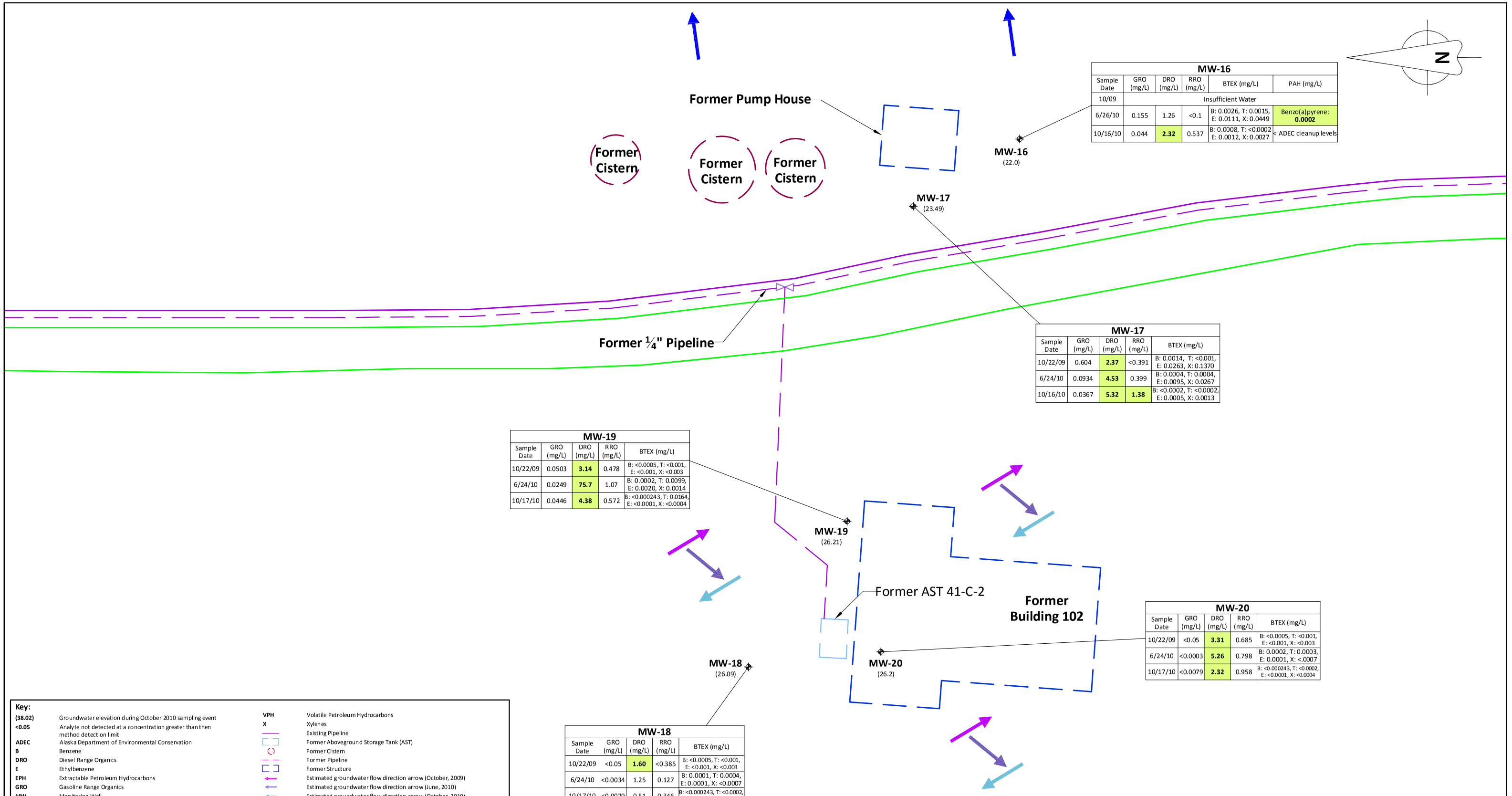
_____

Date

_____

Printed Name of Authorized Representative, Title
United States Forest Service

Note to Responsible Person (RP):
After making a copy for your records, please return a signed copy of this form to the ADEC project manager at the address on this correspondence within 30 days of receipt of this letter.



MW-16

Sample Date	GRO (mg/L)	DRO (mg/L)	RRO (mg/L)	BTEX (mg/L)	PAH (mg/L)
10/09	Insufficient Water				
6/26/10	0.155	1.26	<0.1	B: 0.0026, T: 0.0015, E: 0.0111, X: 0.0449	Benzo(a)pyrene: **0.0002**
10/16/10	0.044	**2.32**	0.537	B: 0.0008, T: <0.0002 E: 0.0012, X: 0.0027	< ADEC cleanup levels

MW-17

Sample Date	GRO (mg/L)	DRO (mg/L)	RRO (mg/L)	BTEX (mg/L)
10/22/09	0.604	**2.37**	<0.391	B: 0.0014, T: <0.001, E: 0.0263, X: 0.1370
6/24/10	0.0934	**4.53**	0.399	B: 0.0004, T: 0.0004, E: 0.0095, X: 0.0267
10/16/10	0.0367	**5.32**	**1.38**	B: <0.0002, T: <0.0002, E: 0.0005, X: 0.0013

MW-19

Sample Date	GRO (mg/L)	DRO (mg/L)	RRO (mg/L)	BTEX (mg/L)
10/22/09	0.0503	**3.14**	0.478	B: <0.0005, T: <0.001, E: <0.001, X: <0.003
6/24/10	0.0249	**75.7**	1.07	B: 0.0002, T: 0.0099, E: 0.0020, X: 0.0014
10/17/10	0.0446	**4.38**	0.572	B: <0.000243, T: 0.0164, E: <0.0001, X: <0.0004

MW-20

Sample Date	GRO (mg/L)	DRO (mg/L)	RRO (mg/L)	BTEX (mg/L)
10/22/09	<0.05	**3.31**	0.685	B: <0.0005, T: <0.001, E: <0.001, X: <0.003
6/24/10	<0.0003	**5.26**	0.798	B: 0.0002, T: 0.0003, E: 0.0001, X: <.0007
10/17/10	<0.0079	**2.32**	0.958	B: <0.000243, T: <0.0002, E: <0.0001, X: <0.0004

MW-18

Sample Date	GRO (mg/L)	DRO (mg/L)	RRO (mg/L)	BTEX (mg/L)
10/22/09	<0.05	**1.60**	<0.385	B: <0.0005, T: <0.001, E: <0.001, X: <0.003
6/24/10	<0.0034	1.25	0.127	B: 0.0001, T: 0.0004, E: 0.0001, X: <0.0007
10/17/10	<0.0079	0.51	0.346	B: <0.000243, T: <0.0002, E: <0.0001, X: <0.0004

Key:

(38.02)	Groundwater elevation during October 2010 sampling event
<0.05	Analyte not detected at a concentration greater than then method detection limit
ADEC	Alaska Department of Environmental Conservation
B	Benzene
DRO	Diesel Range Organics
E	Ethylbenzene
EPH	Extractable Petroleum Hydrocarbons
GRO	Gasoline Range Organics
MW	Monitoring Well
mg/L	Milligrams per Liter
PAH	Polynuclear Aromatic Hydrocarbons
RRO	Residual Range Organics
T	Toluene
VPH	Volatile Petroleum Hydrocarbons
X	Xylenes
	Existing Pipeline
	Former Aboveground Storage Tank (AST)
	Former Cistern
	Former Pipeline
	Former Structure
	Estimated groundwater flow direction arrow (October, 2009)
	Estimated groundwater flow direction arrow (June, 2010)
	Estimated groundwater flow direction arrow (October, 2010)
	Estimated groundwater flow direction arrow (based on surface topography)
	Monitoring Well Location
	Road

Notes:

1. All locations are approximate. Site Investigation MW locations are based on GPS survey data [Alaska Zone 1, NAD83] provided by DOWL HKM and Hammer Environmental in October 2009.
2. Laboratory qualifiers are not provided on this figure but are available in the Data Validation Summary Report located in Appendix B-2.
3. Bolded and highlighted results exceed ADEC groundwater cleanup levels when groundwater is considered a current or potential future drinking water source.
5. PAH analytes detected at concentrations greater than the ADEC groundwater cleanup levels are shown on this figure.
6. EPH and VPH results are provided in Tables 7-4 and 7-5 (Building 102 Area) and Tables 8-4 and 8-5 (Pump House Area).

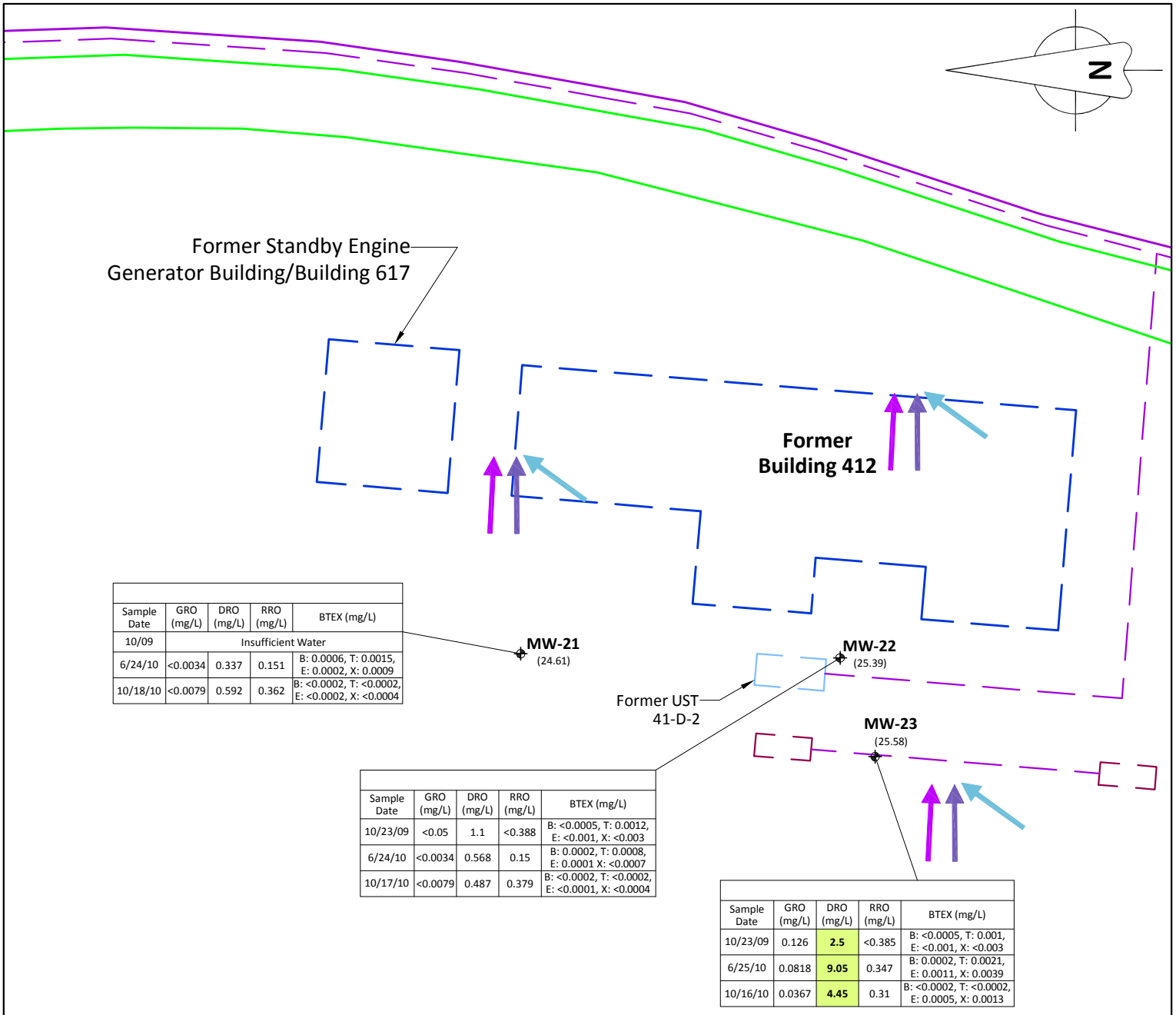
DRAFT Groundwater Sampling Report,
Federal Aviation Administration, Sisters Island, Alaska

AHTNA Government Services Corporation

Building 102 and Former Pump House Areas Monitoring Well Locations and Analytical Sample Results

Date: 04-10-2011
Project Number: 10002.058
Drafted By: L.B.

Figure Number: 3



Sample Date	GRO (mg/L)	DRO (mg/L)	RRO (mg/L)	BTEX (mg/L)
10/09	Insufficient Water			
6/24/10	<0.0034	0.337	0.151	B: 0.0006, T: 0.0015, E: 0.0002, X: 0.0009
10/18/10	<0.0079	0.592	0.362	B: <0.0002, T: <0.0002, E: <0.0002, X: <0.0004

Sample Date	GRO (mg/L)	DRO (mg/L)	RRO (mg/L)	BTEX (mg/L)
10/23/09	<0.05	1.1	<0.388	B: <0.0005, T: 0.0012, E: <0.001, X: <0.003
6/24/10	<0.0034	0.568	0.15	B: 0.0002, T: 0.0008, E: 0.0001 X: <0.0007
10/17/10	<0.0079	0.487	0.379	B: <0.0002, T: <0.0002, E: <0.0001, X: <0.0004

Sample Date	GRO (mg/L)	DRO (mg/L)	RRO (mg/L)	BTEX (mg/L)
10/23/09	0.126	**2.5**	<0.385	B: <0.0005, T: 0.001, E: <0.001, X: <0.003
6/25/10	0.0818	**9.05**	0.347	B: 0.0002, T: 0.0021, E: 0.0011, X: 0.0039
10/16/10	0.0367	**4.45**	0.31	B: <0.0002, T: <0.0002, E: 0.0005, X: 0.0013

Key:

(38.02)	Groundwater elevation during October 2010 sampling event	**T**	Toluene
<0.05	Analyte not detected at a concentration greater than then method detection limit	**VPH**	Volatile Petroleum Hydrocarbons
ADEC	Alaska Department of Environmental Conservation	**X**	Xylenes
B	Benzene		Existing Pipeline
DRO	Diesel Range Organics		Former Cistern
E	Ethylbenzene		Former Pipeline
EPH	Extractable Petroleum Hydrocarbons		Former Structure
GRO	Gasoline Range Organics		Former Underground Storage Tank (UST)
MW	Monitoring Well		Estimated groundwater flow direction arrow (October, 2009)
mg/L	Milligrams per Liter		Estimated groundwater flow direction arrow (June, 2010)
PAH	Polynuclear Aromatic Hydrocarbons		Estimated groundwater flow direction arrow (October, 2010)
RRO	Residual Range Organics		Monitoring Well Location
			Road

Notes:

1. All locations are approximate. Site Investigation MW locations are based on GPS survey data [Alaska Zone 1, NAD83] provided by DOWL HKM and Hammer Environmental in October 2009.
2. Laboratory qualifiers are not provided on this figure but are available in the Data Validation Summary Report located in Appendix B-2.
3. Bolded and highlighted results exceed ADEC groundwater cleanup levels when groundwater is considered a current or potential future drinking water source.
4. PAH analytes were not detected at concentrations greater than the ADEC groundwater cleanup levels and are not shown on this figure.
5. EPH and VPH results are provided in Tables 9-4 and 9-5.

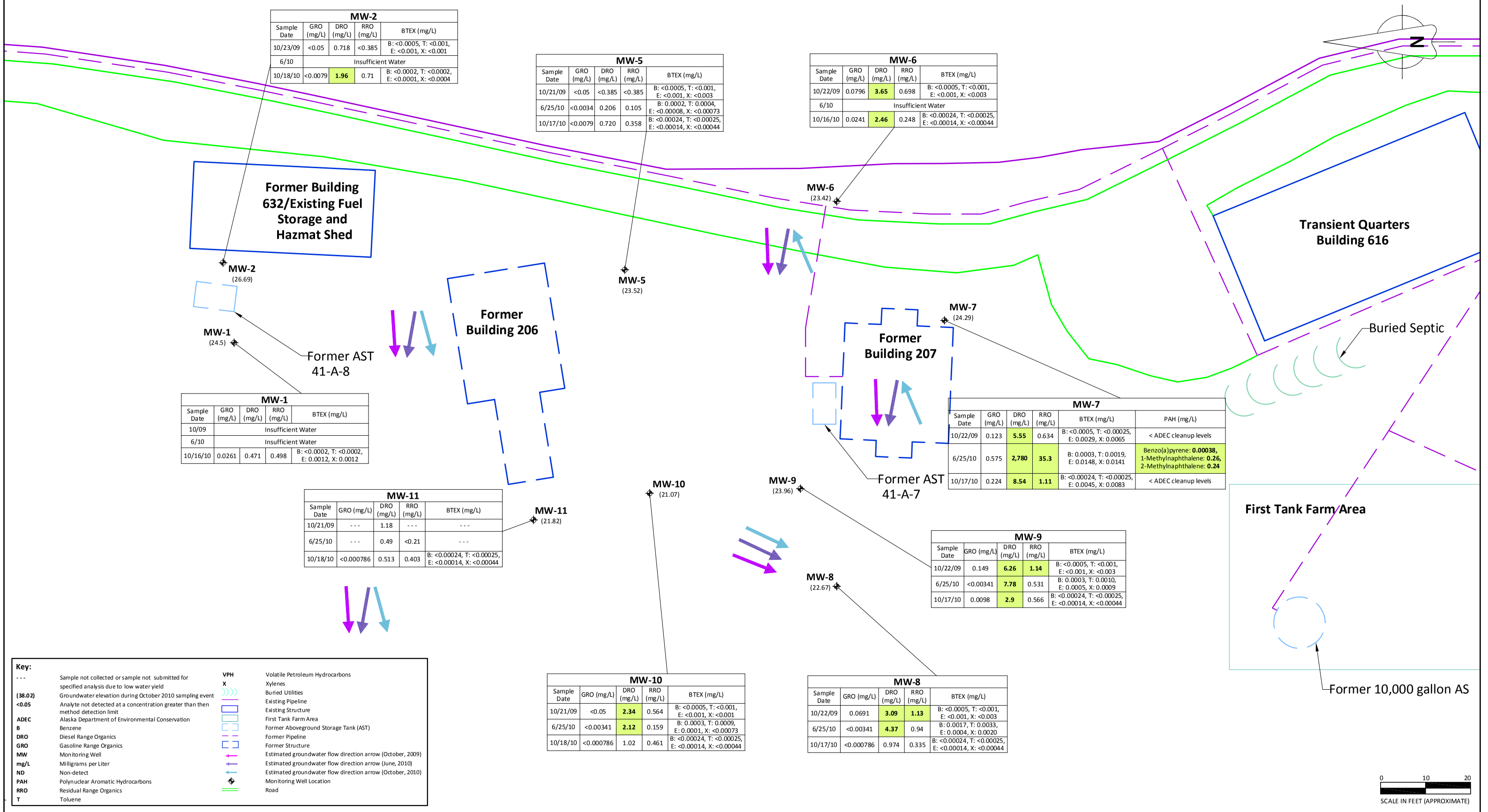
0 10 20
SCALE IN FEET (APPROXIMATE)

DRAFT Groundwater Sampling Report,
Federal Aviation Administration, Sisters Island, Alaska

AHTNA Government Services Corporation

Building 412 Area Monitoring Well Locations and Analytical Sample Results

Date: 04-11-2011
Project Number: 10002.058
Drafted By: L.B.
Figure Number: 4



MW-2

Sample Date	GRO (mg/L)	DRO (mg/L)	RRO (mg/L)	BTEX (mg/L)
10/23/09	<0.05	0.718	<0.385	B: <0.0005, T: <0.001, E: <0.001, X: <0.001
6/10	Insufficient Water			
10/18/10	<0.0079	**1.96**	0.71	B: <0.0002, T: <0.0002, E: <0.0001, X: <0.0004

MW-5

Sample Date	GRO (mg/L)	DRO (mg/L)	RRO (mg/L)	BTEX (mg/L)
10/21/09	<0.05	<0.385	<0.385	B: <0.0005, T: <0.001, E: <0.001, X: <0.003
6/25/10	<0.0034	0.206	0.105	B: 0.0002, T: 0.0004, E: <0.00008, X: <0.00073
10/17/10	<0.0079	0.720	0.358	B: <0.00024, T: <0.00025, E: <0.00014, X: <0.00044

MW-6

Sample Date	GRO (mg/L)	DRO (mg/L)	RRO (mg/L)	BTEX (mg/L)
10/22/09	0.0796	**3.65**	0.698	B: <0.0005, T: <0.001, E: <0.001, X: <0.003
6/10	Insufficient Water			
10/16/10	0.0241	**2.46**	0.248	B: <0.00024, T: <0.00025, E: <0.00014, X: <0.00044

MW-1

Sample Date	GRO (mg/L)	DRO (mg/L)	RRO (mg/L)	BTEX (mg/L)
10/09	Insufficient Water			
6/10	Insufficient Water			
10/16/10	0.0261	0.471	0.498	B: <0.0002, T: <0.0002, E: 0.0012, X: 0.0012

MW-7

Sample Date	GRO (mg/L)	DRO (mg/L)	RRO (mg/L)	BTEX (mg/L)	PAH (mg/L)
10/22/09	0.123	**5.55**	0.634	B: <0.0005, T: <0.00025, E: 0.0029, X: 0.0065	< ADEC cleanup levels
6/25/10	0.575	**2,780**	**35.3**	B: 0.0003, T: 0.0019, E: 0.0148, X: 0.0141	Benzo(a)pyrene: **0.00038,** 1-Methylnaphthalene: **0.26,** 2-Methylnaphthalene: **0.24**
10/17/10	0.224	**8.54**	**1.11**	B: <0.00024, T: <0.00025, E: 0.0045, X: 0.0083	< ADEC cleanup levels

MW-11

Sample Date	GRO (mg/L)	DRO (mg/L)	RRO (mg/L)	BTEX (mg/L)
10/21/09	- - -	1.18	- - -	- - -
6/25/10	- - -	0.49	<0.21	- - -
10/18/10	<0.000786	0.513	0.403	B: <0.00024, T: <0.00025, E: <0.00014, X: <0.00044

MW-9

Sample Date	GRO (mg/L)	DRO (mg/L)	RRO (mg/L)	BTEX (mg/L)
10/22/09	0.149	**6.26**	**1.14**	B: <0.0005, T: <0.001, E: <0.001, X: <0.003
6/25/10	<0.00341	**7.78**	0.531	B: 0.0003, T: 0.0010, E: 0.0005, X: 0.0009
10/17/10	0.0098	**2.9**	0.566	B: <0.00024, T: <0.00025, E: <0.00014, X: <0.00044

MW-10

Sample Date	GRO (mg/L)	DRO (mg/L)	RRO (mg/L)	BTEX (mg/L)
10/21/09	<0.05	**2.34**	0.564	B: <0.0005, T: <0.001, E: <0.001, X: <0.001
6/25/10	<0.00341	**2.12**	0.159	B: 0.0003, T: 0.0009, E: 0.0001, X: <0.00073
10/18/10	<0.000786	1.02	0.461	B: <0.00024, T: <0.00025, E: <0.00014, X: <0.00044

MW-8

Sample Date	GRO (mg/L)	DRO (mg/L)	RRO (mg/L)	BTEX (mg/L)
10/22/09	0.0691	**3.09**	**1.13**	B: <0.0005, T: <0.001, E: <0.001, X: <0.003
6/25/10	<0.00341	**4.37**	0.94	B: 0.0017, T: 0.0033, E: 0.0004, X: 0.0020
10/17/10	<0.000786	0.974	0.335	B: <0.00024, T: <0.00025, E: <0.00014, X: <0.00044

Key:

- - -	Sample not collected or sample not submitted for specified analysis due to low water yield	VPH	Volatile Petroleum Hydrocarbons
		X	Xylenes
(38.02)	Groundwater elevation during October 2010 sampling event		Buried Utilities
<0.05	Analyte not detected at a concentration greater than then method detection limit		Existing Pipeline
			Existing Structure
ADEC	Alaska Department of Environmental Conservation		First Tank Farm Area
B	Benzene		Former Aboveground Storage Tank (AST)
DRO	Diesel Range Organics		Former Pipeline
GRO	Gasoline Range Organics		Former Structure
MW	Monitoring Well		Estimated groundwater flow direction arrow (October, 2009)
mg/L	Milligrams per Liter		Estimated groundwater flow direction arrow (June, 2010)
ND	Non-detect		Estimated groundwater flow direction arrow (October, 2010)
PAH	Polynuclear Aromatic Hydrocarbons		Monitoring Well Location
RRO	Residual Range Organics		Road
T	Toluene		

Notes:

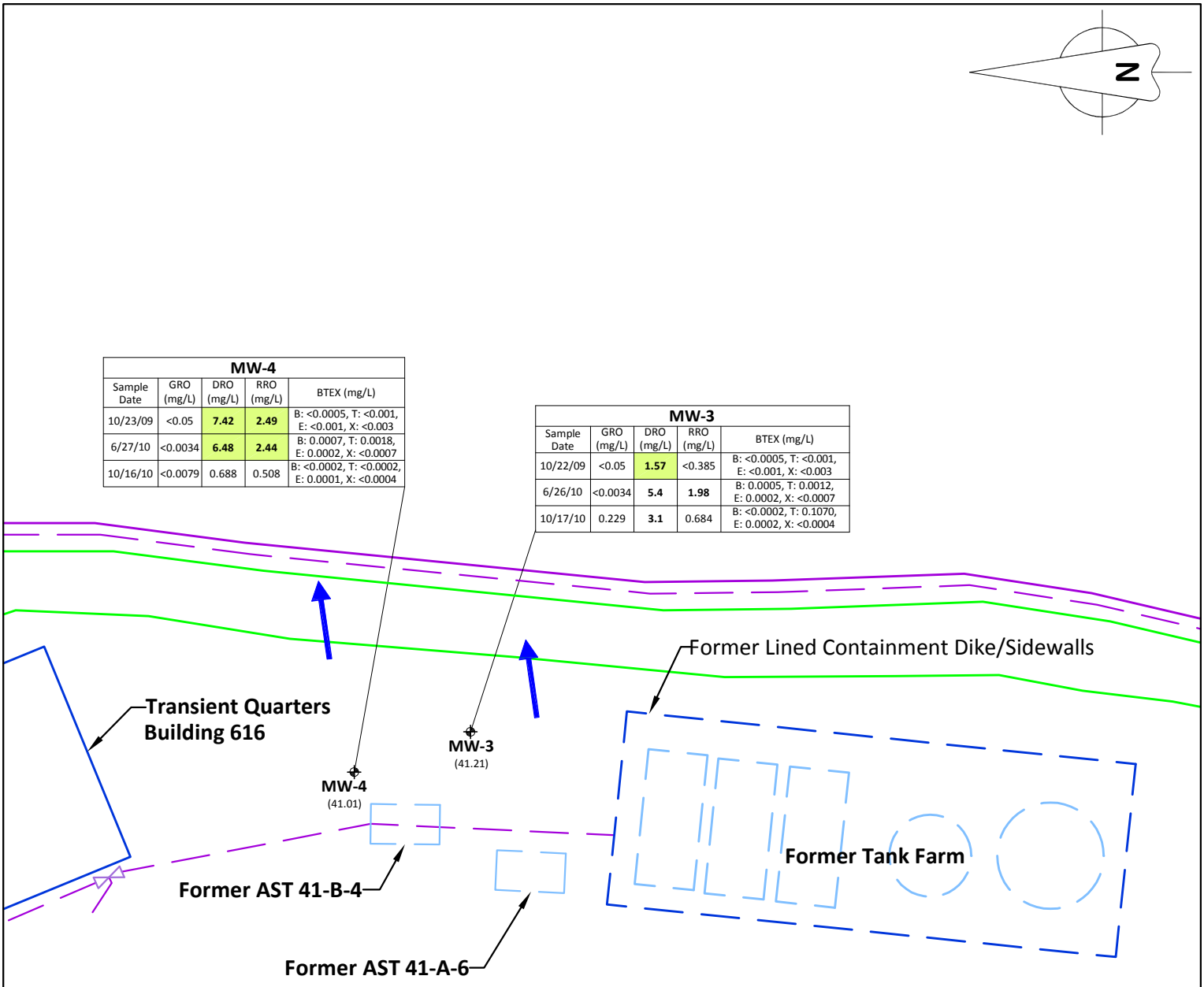
1. All locations are approximate. Site Investigation MW locations are based on GPS survey data [Alaska Zone 1, NAD83] provided by DOWL HKM and Hammer Environmental in October 2009.
2. The Former Building 632 Area was given a closure complete in 2010. ADEC based this decision on the results of the 2009 Site Investigation.
3. Laboratory qualifiers are not provided on this figure but are available in the Data Validation Summary Report located in Appendix B-2.
4. Bolded results exceed ADEC groundwater cleanup levels when groundwater is considered a current or potential future drinking water source.
5. PAH analytes detected at concentrations greater than the ADEC groundwater cleanup levels are shown on this figure.
6. EPH and VPH results are provided in Tables 10-4 and 10-5 (Building 632 Area) and Tables 11-4 and 11-5 (Building 207 Area).

DRAFT Groundwater Sampling Report,
Federal Aviation Administration, Sisters Island, Alaska

AHTNA Government Services Corporation

First Tank Farm/Building 207 and Building 632 Areas Monitoring Well Locations and Analytical Sample Results

Date: 04-09-2011
Project Number: 10002.058
Drafted By: L.B.
Figure Number: 5



Key:

(38.02)	Groundwater elevation during October 2010 sampling event	**RRO**	Residual Range Organics
<0.05	Analyte not detected at a concentration greater than then method detection limit	**T**	Toluene
ADEC	Alaska Department of Environmental Conservation	**VPH**	Volatile Petroleum Hydrocarbons
B	Benzene	**X**	Xylenes
DRO	Diesel Range Organics		Existing Pipeline
E	Ethylbenzene		Existing Structure
EPH	Extractable Petroleum Hydrocarbons		Former Aboveground Storage Tank (AST)
GRO	Gasoline Range Organics		Former Pipeline
MW	Monitoring Well		Former Structure
mg/L	Milligrams per Liter		Estimated groundwater flow direction arrow (based on surface topography
PAH	Polynuclear Aromatic Hydrocarbons		Monitoring Well Location
			Road

Notes:

1. All locations are approximate. Site Investigation MW locations are based on GPS survey data [Alaska Zone 1, NAD83] provided by DOWL HKM and Hammer Environmental in October 2009.
2. Laboratory qualifiers are not provided on this figure but are available in the Data Validation Summary Report located in Appendix B-2.
3. Bolded results exceed ADEC groundwater cleanup levels when groundwater is considered a current or potential future drinking water source.
4. PAH analytes were not detected at concentrations greater than the ADEC groundwater cleanup levels and are not shown on this figure.
5. EPH and VPH results are provided in Tables 12-4 and 12-5.

0 10 20
SCALE IN FEET (APPROXIMATE)

DRAFT Groundwater Sampling Report,
Federal Aviation Administration, Sisters Island, Alaska

AHTNA Government Services Corporation

Former Tank Farm Monitoring Well Locations and Analytical Sample Results

Date: 04-09-2011
Project Number: 10002.058
Drafted By: L.B.
Figure Number: 6