Final

Work Plan for Interim Removal Action at Sites SS005, SS014, SS016, SS017, and AST1569 at Former Galena Forward Operating Location, Alaska

Prepared for

Air Force Center for Engineering and the Environment

Contract No: FA8903-08-D-8769
Task Order 0259

September 2011

Prepared by

CH2MHILL
949 E. 36th Avenue
Suite 500
Anchorage, Alaska 99508

Contents

Contents, Continued

Contents, Continued

Page

Figures
(figures are located at the end of their respective sections)

Acronyms and Abbreviations

°F	degrees Fahrenheit
AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
ADOT&PF	Alaska Department of Transportation & Public Facilities
AECOM	AECOM Technical Services, Inc.
AST	aboveground storage tank
bgs	below ground surface
BLA	Barge Loading Area
CSM	conceptual site model
DFA	Arctic diesel fuel
DRO	diesel-range organics
FAA	Federal Aviation Administration
FOL	Forward Operating Location
GRO	gasoline-range organics
hr	hour
IRA	interim removal action
IRA Work Plan	Work Plan for Interim Removal Action
JP-4	jet-propulsion fuel, grade 4
JP-8	jet-propulsion fuel, grade 8
LEL	lower explosive limit
LNAPL	light nonaqueous phase liquid
mg/kg	milligrams per kilogram
msl	mean sea level
NAPL	nonaqueous phase liquid
OWS	oil/water separator
PID	photoionization detector
POL	petroleum, oils, and lubricants
RAPCON	Radar Approach Control

RCRA	Resource Conservation and Recovery Act
Sites 14/17	Sites SS014 and SS017
SOP	Standard Operating Procedure
SWPPP	stormwater pollution prevention plan
USAF	U.S. Air Force
UST	underground storage tank
yd^3	cubic yards

SECTION 1.0

Introduction

1.1 Interim Removal Action Work Plan Objective

This Work Plan for Interim Removal Action (IRA Work Plan) describes the activities associated with performing an interim removal action (IRA) for five sites contaminated with petroleum, oils, and lubricants (POL) at the former Galena Forward Operating Location (FOL) in Galena, Alaska (see Figure 1-1; figures are located at the end of their respective sections). The five sites are SS005, SS014, SS016, SS017, and Aboveground Storage Tank (AST) 1569. Sites SS014 and SS017 (Sites 14/17) are adjacent to one another. Soil at the five sites is contaminated with petroleum hydrocarbons that exceed the Alaska Department of Environmental Conservation's (ADEC) cleanup levels listed in Table B2 of 18 Alaska Administrative Code (AAC) 75. Because the IRA is only addressing POL-contaminated soil, it is being performed under 18 AAC 75.

This IRA Work Plan constitutes the planning document for this project and includes the overall management and implementation strategy for design and construction activities associated with the actual removal of the contaminated soil. The following four companion documents augment this IRA Work Plan:

- *Attachment D-39: Birchwood Hangar (SS014), Truck Fill Stands (SS017), and Building 1549 – Old Fire Station (SS021) to the Work Plan for Site Inspection, Remedial Investigation, and Site Characterization Former Galena Forward Operating Location, Alaska* (CH2M HILL, in preparation)
- *Attachment D-40: Former Building 2541 – Fuels Laboratory (SS016) to the Work Plan for Site Inspection, Remedial Investigation, and Site Characterization Former Galena Forward Operating Location, Alaska* (CH2M HILL, in preparation)
- *Attachment D-5: Wilderness Hall, Former Building 1872 (Site SS005) to the Work Plan for Site Inspection, Remedial Investigation, and Site Characterization, Former Galena Forward Operating Location, Alaska* (CH2M HILL, August 2010)
- *Attachment D-8: Aboveground Storage Tank ST1569 – Electric Power Station (Site AST1569) to the Work Plan for Site Inspection, Remedial Investigation, and Site Characterization, Former Galena Forward Operating Location, Alaska* (CH2M HILL, September 2010)

Attachments D-39 and D-40 are field sampling plans that present the approach for collecting (1) additional soil and groundwater samples to further define the nature and extent of contamination in the area and (2) additional soil samples to further define the source of the POL contamination. Soil data collected as part of field sampling plans will be used to refine the conceptual site model (CSM) for the POL source areas at the four sites. The CSM will serve as the basis for designing and executing the IRA. Together, the five documents fully describe the background, CSM, analytical basis, excavation plan, and treatment approach for remediating the POL-contaminated soil to a level suitable for landfill cover.

During a meeting on June 21, 2011, the U.S. Air Force (USAF) and ADEC's Contaminated Sites and Solid Waste Divisions concluded additional documents will be written. Meeting participants discussed the requirements that need to be met for ADEC to accept the POL-contaminated soil from the IRA excavations for use as landfill cover at the City of Galena's landfill. The following topics were covered:

- Acceptable contamination levels of the soil
- Revising the City's operations and maintenance plan, and submitting it with a new application
- Using a screening method during excavation to segregate the soil being excavated

It was determined that soil contamination concentrations must meet the requirements of 18 AAC 75.341 Method Two Table B1 and B2 for Under 40-inch Zone Direct Contact and Outdoor Inhalation cleanup levels. Additionally, results will be input into the hydrocarbon risk calculator to verify that the soil meets the ADEC human health risk standard for cumulative carcinogenic risk of less than or equal to 1×10^{-5}, and a noncarcinogenic hazard index of less than or equal to 1 under 18 AAC 75.325(h). A technical memorandum is being prepared summarizing this and using results from the source delineation sampling at Sites 14/17 and SS016 to demonstrate how excavated soil stockpile sampling results will be compared to the Table B1/B2 values and input into the hydrocarbon risk calculator to show acceptable risk.

USAF and the City of Galena will revise the City's landfill operation and maintenance plan and generate a permit application to allow use of the contaminated soil that meets the above criteria.

Headspace photoionization detector (PID) readings are being collected from Sites 14/17 and SS016 source delineation samples to derive a correlation between PID readings and laboratory results of benzene, gasoline-range organics (GRO), and diesel-range organics (DRO) concentrations. A separate technical memorandum will be written and submitted for ADEC approval showing whether this or some other field screening method can be used to accurately segregate soil as it is excavated. The chosen field screening method will identify the contaminated soil that is conservatively expected to meet the ADEC solid waste requirements and can be taken directly to the City landfill as described in more detail in Section 2.6. All contaminated soil excavated from Sites SS005 and AST1569 will be taken to the Campion airstrip stockpile.

A separate landfill cover field sampling plan will be written and submitted for ADEC approval to sample the soil placed at the landfill at the completion of excavation activities to verify soil meets the landfill cover criteria as describe above. Any soil not meeting the landfill cover criteria will be excavated and transported back to the Campion airstrip stockpile.

The following IRA-specific Standard Operating Procedures (SOP) have been written for this project:

- SOP-33 (*Soil Transport*) provides the programmatic criteria for the transport of contaminated soil.
- SOP-34 (*Soil Storage*) provides the requirements for designing, building, and maintaining a lined and covered contaminated soil storage stockpile.

Both are described in more detail and included in this IRA Work Plan.

This IRA Work Plan was prepared in accordance with CH2M HILL's contract with the Air Force Center for Engineering and the Environment, Contract FA8903-08-D-8769, Task Order 0259.

1.2 Interim Removal Action Goal

The goal of the IRA is to excavate up to 20,000 cubic yards (yd^3) of POL-contaminated soil from the five identified locations, and transport that material to two offsite storage locations. The more-contaminated soil will be taken to a lined stockpile to be built on the Campion airstrip this year, then transferred to a landfarm to be built in 2012, for treatment and eventual beneficial use as landfill cover. The less-contaminated soil can be taken directly to the City of Galena landfill to be used as landfill cover. As discussed in Section 3.0, significant physical and logistical constraints affect the remediation approach. Therefore, the plan for Sites 14/17 and SS016 is to remove as much of the most-contaminated material as is practicable under these constraints, realizing that the current effort is an interim action and additional future remediation will likely be required. Contaminated soil will removed from SS005 and AST1569, and confirmation samples collected to take these sites to clean closure.

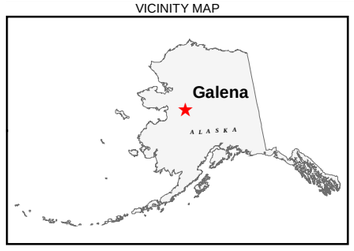
1.3 Interim Removal Action Work Plan Organization

This IRA Work Plan was developed to provide background information and the technical approach for the project. It presents an overview of the activities proposed for the IRA design, construction, and operation, and is organized as follows:

- **Section 1.0, Introduction.** Describes the objective and organization of this IRA Work Plan.
- **Section 2.0, Project Setting and Conceptual Site Model.** Describes the site setting, including climatic conditions, site geology, and site history, and presents the CSM that will guide the IRA.
- **Section 3.0, Interim Removal Action Approach.** Describes the permitting process, proposed excavation limits and constraints, site preparation, excavation of contaminated soil, post-excavation documentation, site restoration, sample analysis and data evaluation, and data management and reporting.
- **Section 4.0, Schedule.** Presents the proposed schedule for design and implementation of the IRA.

- **Section 5.0, References.** Lists the supporting sources of information used to prepare this IRA Work Plan.
- **Appendix A, Boring Logs**
- **Appendix B, Reference Tables and Figure**
- **Appendix C, IRA Design Drawings**
- **Appendix D, Standard Operating Procedures**
- **Appendix E, IRA Field Sampling Plan**

VICINITY MAP



LEGEND

- Approximate Boundary of FOL
- Site Boundary

Note:
1. Orthorectified Ikonos Imagery. July 5, 2005. Pixel size 1 meter.

N

0 750 1,500
Feet

FIGURE 1-1
Galena Vicinity
Interim Removal Action Work Plan
Former Galena Forward Operating Location, Alaska

RDD V:\GALENATO184_394439\MAPFILES\IRA_WORKPLAN\FIG_1-1_VICINITY_GALENA_IRA.MXD ECLARK1 7/12/2011 3:24:35 PM

CH2MHILL

SECTION 2.0

Project Setting and Conceptual Site Model

2.1 Overview of the Former Galena Forward Operating Location Facility

The City of Galena is located along the Yukon River in west-central Alaska, approximately 230 miles west of Fairbanks. An airfield was constructed north of the City of Galena in the early 1940s, initially serving as a civilian facility, then as a military facility. The locations of the City of Galena and Galena Air Station are shown on Figure 1-1. Within the last several years, the military has withdrawn its permanent personnel and aircraft, transferring the majority of the facility to federal, state, and local entities for their use.

Energy and power needs at the Former Galena FOL, including facility heating and aircraft refueling, were met using petroleum-based fuels that arrived via barge. The primary routing of the fuels was from barge to storage tanks to fill stands via underground and above-ground pipeline. Some fuels were trucked from the barge to tanks. Historically, fuel was stored in aboveground saddle tanks and underground storage tanks (UST). Most of the USTs have now been removed from service. The main fuels used at the Former Galena FOL are Arctic diesel fuel (DFA); aviation gasoline; jet-propulsion fuel, grade 4 (JP-4); jet-propulsion fuel, grade 8 (JP-8); and lesser quantities of motor gasoline. Various oils, lubricants, solvents, and antifreezes were used to maintain aircraft and other vehicles.

Sites 14/17 are located in the southern portion of the cantonment "triangle" of Former Galena FOL. The sites are bounded by open gravel and grassy areas to the north, a vehicle maintenance building to the west (Site ST009), a fire station to the east, a runway to the south, and paved areas to the southeast and southwest. Site SS016 is located approximately 0.5 mile to the east of Sites 14/17 and is bounded by open grassy areas to the north, west, and east, and a runway to the south. Site AST1569 is located adjacent to the northern edge of Site SS017 and is bounded by the Radar Approach Control (RAPCON) facility storage yard to the north and east, Airport Road to the south, and Birchwood Avenue to the west. Site SS005 is located in the northern portion of the cantonment "triangle," and is bounded by Keskund Dining Hall to the north, Environmental Restoration Program Site ST005 (POL Tank Yard) to the east/southeast, a Petroleum Operations Building to the south, and Birchwood Avenue to the west.

2.2 Climate

The area experiences a cold, continental climate with extreme temperature variations. The average daily high temperature during July is in the low 70 degrees Fahrenheit (°F). The average daily low temperature during January ranges from 10°F to below 0°F. Sustained temperatures of -40°F are common during winter. Extreme temperatures have been measured from -64 to 92°F. Annual rainfall is 12.7 inches, and annual snowfall is 60 inches. The Yukon River is ice-free from mid-May through mid-October. It is anticipated that the

IRA excavation will occur in August and September 2011, when the daytime temperatures typically range from a high of 63°F to a low of 48°F (August) and a high of 51°F to a low of 37°F (September).

2.3 Geology and Hydrology

The geology of the Former Galena FOL and surrounding area is dominated by undifferentiated fluvial Quaternary sediments deposited by the Yukon River to a depth greater than 200 feet. These sediments consist of unconsolidated stratified layers of silt and sand near the top of the sequence, underlain by gravel, sandy gravel, silty sand, and sand.

2.3.1 Sites 14/17

Over the years, several borings have been installed near the proposed excavations for Sites 14/17 (Area A and Area B), as shown on Figure 2-1. Boring logs for many of the installations could not be found in the historical reports. Available boring logs are provided in Appendix A. Figures 2-2 and 2-3 are cross sections through portions of Sites SS017 (Area A) and SS014 (Area B), respectively, based on the available boring logs. The cross section locations are shown on Figure 2-1. Additional borings are being drilled in summer 2011, and the cross sections will be revised on the basis of the new boring logs.

In general, the native soils consist of varying thicknesses of silt, sandy silt, and silty sand underlain by sands and gravels that contain varying amounts of silt. Some surficial zones of sandy gravel are present and are presumed to be river-dredged material placed as excavation backfill. Figures 2-2 and 2-3 show the preliminary excavation limits and the DRO concentrations determined from the soil boring samples. Section 3.2 discusses the factors influencing the excavation limits. Figures 2-2 and 2-3 indicate that the preliminary excavation limits extend through the upper silt zones and penetrate several feet into the underlying silty sand zone.

The depth to the water table fluctuates considerably during the year. Figure 2-4 is a groundwater hydrograph for late 2004 through mid-2010 that is based on data from monitoring well BRWELL. Monitoring well BRWELL is located in the boiler room of the Galena Aviation Vocational Technical Center Building, approximately 1,100 feet east of Sites 14/17. Of the wells equipped with data logging pressure transducers, this well is considered to be the most representative of groundwater conditions at these sites because of the similar ground surface elevation (approximately 143 to 146 feet mean sea level [msl]) and proximity to the Yukon River.

The water table typically reaches its lowest level in late April or early May (approximately 25 to 30 feet below ground surface [bgs]), and then rises rapidly (as much as 15 to 25 feet) within a 1-month period during spring break-up. Figure 2-4 indicates that the timing of the maximum high groundwater level varies considerably. In 2005, the groundwater level peaked in mid-June, and then declined rapidly. In 2006 and 2007, the groundwater level remained fairly high from mid-June through the end of August. The highest groundwater level typically occurs in the July through August period.

Several monitoring wells are located within the IRA area. These include 05-MW-18, ST021-MW66, ST021-MW67, ST021-MW68, ST021-MW69, ST021-MW72, and ST021-MW71

(see Figure 2-1). These monitoring wells are not equipped with data logging pressure transducers, so no continuous hydrographic data are available. However, as stated above, groundwater levels in these monitoring wells will be recorded manually during the IRA, as excavation proceeds. Historical records indicate that the groundwater table is typically only 15 to 20 feet bgs at that time of year; see Table B-1 in Appendix B.

2.3.2 Site SS016

Over the years, several borings and monitoring wells have been installed at Site SS016, as shown on Figure 2-5. As with Sites 14/17, boring logs were only available for a few of the installations. Available logs for five test borings are provided in Appendix A. Figure 2-6 is a cross section through Site SS016 at the location shown on Figure 2-5. The cross section indicates that silt and sandy silt are typically encountered from the ground surface to a depth of approximately 20 feet, at which point the soils transition to sand and silty sand. An exception to this typical profile appears to occur at the north end of the site where the sand and silty sand zone is encountered from about 10 to 26 feet deep, at which point the soil transitions back to silt and sandy silt.

Figure 2-6 shows the preliminary excavation limits and the DRO concentrations determined from the soil boring samples. Section 3.3 discusses the factors influencing the excavation limits. Figure 2-6 indicates that the preliminary excavation limits will typically remain within the upper silt and sandy silt zone.

Groundwater fluctuations at Site SS016 are expected to be similar to those at Sites 14/17. The log for boring SS016-MC570 (installed on September 28, 2009) indicates dry conditions to the 40-foot depth. The log for boring SS016-MC571 indicates moist to wet conditions in the medium-grained sand encountered at 22 feet bgs. Boring SS016-MC571 was installed on September 29, 2009, and was located approximately 50 feet away from boring SS016-MC570 at about the same relative elevation. Considering that both borings were installed in late September and SS016-MC571 is similar to other groundwater elevations, it is more likely indicative of the groundwater conditions during boring installation. Historical records indicate that the groundwater table is typically only 15 to 20 feet bgs at that time of year, see 2541-MW-01, 2541-MW-02, 2541-MW-03, 2541-MW-04, 2541-MW-05, and SS016-MW001 in Table B-1 in Appendix B.

Several monitoring wells are located within and adjacent to the excavation area at Site SS016. Four of these monitoring wells (2541-MW-02, 2541-MW-03, 2541-MW-04, and SS016-MW001) are currently located outside of the planned excavation, and an attempt will be made to keep these wells in service. These monitoring wells are not equipped with data logging pressure transducers, so no continuous hydrographic data are available. However, as stated above, groundwater levels in these monitoring wells will be recorded manually during the IRA, as excavation proceeds. Two monitoring wells (2541-MW-01 and 2541-MW-05) are within the planned excavation limits. These monitoring wells will be abandoned in accordance with SOP-21 (*Well Decommissioning and Abandonment*) if the results of the source delineation testing confirm that sufficient contamination exists in the area of the former UST 2541 to require excavation.

2.3.3 Site AST1569

Five soil borings were advanced at Site AST1569 in 2010, as shown on Figure 2-7. Boring logs are provided in Appendix A. Figure 2-8 is a cross section through Site AST1569 at the location shown on Figure 2-7. The cross section indicates that gravel, silt, and sand are typically encountered from the ground surface to a depth of approximately 20 feet (total depth of the borings).

Figure 2-8 shows the preliminary excavation limits and the DRO concentrations observed in soil boring samples. Section 3.4 discusses the factors influencing the excavation limits. Figure 2-8 indicates that the preliminary excavation limits will typically remain within the upper gravel and sand zone or silt and sandy silt zone.

Groundwater fluctuations at Site AST1569 are expected to be similar to those at Sites 14/17 because the site is located adjacent to the northern edge of Site SS017. The groundwater table was observed at 15.5 feet bgs at AST1569GP001 (advanced on August 13, 2010). Historical records confirm those observed typical depth to water bgs in soil borings, which indicate that the groundwater table is typically observed at 15 to 20 feet bgs in August and September.

No monitoring wells are located within or adjacent to the excavation area at Site AST1569. However, groundwater levels at nearby monitoring wells 05-MW-06R and 05-MW-13 will be recorded manually as excavation proceeds. Historical records indicate that the groundwater table is typically only 15 to 20 feet bgs at that time of year; see Table B-1 in Appendix B.

2.3.4 Site SS005

Several borings and monitoring wells have been installed at Site SS005, as shown on Figure 2-9. Available logs for 16 borings are provided in Appendix A. Figures 2-10 and 2-11 show cross sections through Site SS005 at the locations shown on Figure 2-9. The cross sections indicate that sandy gravel and sandy silt are typically encountered from the ground surface to a depth of approximately 15 to 20 feet, at which point the soils transition to sand. Sand extends to depths greater than 40 feet bgs. The boring log for SS005GP005 indicates a layer of silty clay at approximately 10 to 15 feet bgs; this boring is located 30 feet east of SS005GP004 (northern excavation area).

Figure 2-9 shows the preliminary excavation limits and the DRO concentrations determined from the soil boring samples. Section 3.5 discusses the factors influencing the excavation limits.

Groundwater fluctuations at Site SS005 are expected to be similar to those at Sites 14/17, but the water table will be slightly deeper. The logs for borings SS005GP002 and SS005GP004 located in the northern preliminary excavation area indicate moist to wet conditions in the sand and gravel encountered at 20 feet bgs (advanced on July 11, 2010 and July 10, 2010, respectively). A month later, the observed groundwater table was at 16 feet bgs (SS005GP013 on August 8, 2010).

The logs for boring SS005GP009, located in the southern excavation area, indicate moist to wet conditions in the sand and gravel encountered at 20 to 25 feet bgs (advanced on July 14, 2010). Historical records confirm those observed in soil borings, which indicate that the

groundwater table is typically observed at 15 to 25 feet bgs during the summer. See 05-MW-11, 1837-MW-01, and 1837-MW-02 in Table B-1 and Figure B-1 in Appendix B.

No monitoring wells are located within or adjacent to the excavation areas at Site SS005. However, groundwater levels at nearby monitoring wells 05-MW-11, 1837-MW-01, and 1837-MW-02 will be recorded manually during the IRA, as excavation proceeds.

2.4 Site History

The following sections present a brief history of Sites SS014, SS017, SS016, AST1569, and SS005, as well as various utilities that cross the sites within the potential IRA excavations. More detailed site history information can be found in the following documents:

- AECOM Technical Services, Inc. (AECOM). June 2010. *Draft Final Technical Memorandum for Sites: CG001, CG002, FT001, SS006, SS015, SS016, SS017, SS019, ST005, ST014, ST020, ST021, and TU001 at Galena Airport, Alaska*. Prepared for the Air Force Real Property Agency and Air Force Center for Engineering and the Environment.
- Earth Tech, Inc. May 2007. *Final Remedial Investigation/Feasibility Study Report for United States Air Force Sites at Galena Airport and Campion Air Station, Alaska*. Prepared for the United States Air Force, 611th Civil Engineer Squadron/Environmental Restoration Element (CES/CEVR), Elmendorf Air Force Base, Alaska.
- Earth Tech, Inc. June 2008. *Draft Final Work Plan for Site Investigations at Galena Airport, Alaska*. Prepared for the United States Air Force, 611th Civil Engineer Squadron/Environmental Restoration Element, Elmendorf Air Force Base, Alaska.
- U.S. Air Force (USAF). March 1996. *Remedial Investigation Report for Galena Airport and Campion Air Station*.
- U.S. Air Force (USAF). February 2010. *Final Environmental Baseline Survey, Air Force Property at Galena Airport, Alaska*.

2.4.1 Site SS014

Site SS014 (shown on Figure 2-1) is the previous location of Building 1551 (Birchwood Hangar). Building 1551 was constructed in 1945, and housed aircraft and maintenance facilities until 1957. Past activities potentially resulted in the uncontrolled release of solvent- and fuel-related contaminants onto the surface of the hangar's concrete floor, and possibly into the subsurface (Earth Tech, Inc., June 2008). From 1957 to the 1980s, Building 1551 housed various non-maintenance activities. The building was demolished in 2001, although the concrete slab foundation was left in place.

An oil/water separator (OWS) was located in the northeast corner of the building, and a UST that held diesel fuel (UST 1551) was located along the north edge of the building. The OWS had a capacity of 100 gallons (USAF, February 2010). UST 1551-1, installed in 1968, was used to store DFA, and had a capacity of 500 to 700 gallons (USAF, February 2010). DRO and benzene-contaminated soil was found at the bottom of the excavation when the tank was removed in 1997 (Earth Tech, Inc., June 2008). It is inconclusive at this time whether clean or contaminated soil was placed back in the excavation.

An aboveground fuel storage tank may have historically been present northeast of Building 1551 (USAF, February 2010; Figure 2-11). A historical drawing, dated 1944, shows an aboveground oil tank located 75 feet east of the former power plant building (Building 1558). A historical aerial photograph from 1963 shows two unidentified features near this location. No additional information was found for this tank.

2.4.2 Site SS017

Site SS017 is shown on Figure 2-1 and included truck fuel fill stands since about the 1960s. Historical drawings indicate that the "POL fill stands" were supplied by a 3-inch-diameter pipeline from the Barge Loading Area (BLA) located at the southeast end of the airport. Valve Pit B, located west of the fill stands, was used to control fuel supply to the truck fill stands, Building 1558 to the southwest, five fuel storage tanks to the west, and a UST at Building 1859 to the north. Valve Pit B was subsequently reconfigured and renamed Valve Pit #3. Valve Pit #3 was used to control fuel to the truck fill stands, Building 1558, a DFA line to the POL tank farm to the east, a DFA line to Million Gallon Hill to the west (through Site SS021), and a ground fill connection. The fill stands and valve pit were decommissioned prior to 1993 (AECOM, June 2010).

USTs 1558-1 through 1558-5 were located north of Site B1558 and west of Valve Pit #3. The five diesel USTs included three 27,000-gallon and two 10,000-gallon tanks (AECOM, June 2010). The tanks were believed to have been installed on the ground surface and subsequently buried in place, forming an aboveground mound. The tanks are visible on an aerial photograph from 1963. No decommissioning or removal records have been found for USTs 1558-1 through 1558-5. A geophysical survey conducted in 2010 found no evidence of the tanks. UST 1556-2 (also referred to in reports as OWS1556) was a 300-gallon waste-oil tank located at the Fire Department (Building 1556), southeast of Site SS017. Contaminated soil was found in the excavation when the UST was decommissioned in 1997 (Earth Tech, Inc., May 2007, Table 1-2).

2.4.3 Sites 14/17 Utilities

Historical drawings provided by USAF indicate the presence of several utilities near Sites 14/17, as shown on Figure 2-12. They include buried and aboveground pipelines, buried communication cables, and overhead power and communication lines. The predominant pipelines shown on Figure 2-12 include the 1952 fuel lines, the 1962 fuel lines, the current active and adjacent inactive fuel lines, and the stormwater line. Water, steam, and sanitary sewer lines are housed in the aboveground and underground utilidors.

Several of the old buried utilities, such as the 1952 and 1962 fuel lines, have been removed as verified by geophysical surveys of the area conducted by Sage Earth Science in 2010. The geophysical surveys also located several buried features that appear to be old pipelines or conduits that were not previously identified on the available historical drawings. Figures 2-13 and 2-14 are plots of the geophysical records for Sites 14/17. Figure 2-13 is based on electromagnetic geophysical methods, and Figure 2-14 is based on magnetic field mapping techniques. In most cases, the electromagnetic survey appears to show a clearer representation of the subsurface features than the magnetic field survey. However, both surveys are included for completeness. The following sections discuss the buried and

aboveground utilities and geophysical features. The locations of these items with respect to the planned excavation areas (Area A and Area B) are shown on Figure 2-10.

2.4.3.1 Power Poles

Figure 2-12 shows the existing power poles near Sites 14/17. These poles support the City of Galena electrical power lines as well as TelAlaska communication cables. These power poles and lines may need to be relocated if the results of the remedial investigation sampling indicate high concentrations of POL contaminants between the power poles and the aboveground utilidor. If contaminant concentrations are found to be relatively low (less than about 10,000 milligrams per kilogram [mg/kg]), then the power poles will be left in place and the excavation footprint reduced accordingly. Discussions held with representatives of the City of Galena and TelAlaska indicate that, if necessary, the City will relocate their power poles and electrical service lines prior to the start of excavation in the area, and TelAlaska will then place new communication cables on the relocated poles.

2.4.3.2 Fiber Optics Cable

TelAlaska has an active buried fiber optics line located in the gravel road as shown on Figure 2-12. This line has been temporarily rerouted overhead by TelAlaska. The existing line will be abandoned and removed during the excavation. A new conduit will be installed as backfill is being placed. After completion of the backfill, TelAlaska will re-install new fiber optic cable through the new buried conduit and remove the temporary overhead bypass cable.

2.4.3.3 Buried Telecommunication Lines

Figure 2-12 shows the approximate location of buried TelAlaska and City of Galena telecommunication lines, which are in conduits in the planned excavation area. The TelAlaska line is an inactive direct-buried multi-pair cable that connects to the pedestal at the northwest corner of the intersection of Birchwood Avenue and Airport Road, and extends south to the chain-link fence that runs east/west along the north edge of the airport property. Because the line is anticipated to remain inactive for some time into the future, agreement has been reached with TelAlaska that the line will be handled in one of the following two ways:

- The line will be disconnected from the pedestal and carefully removed and "peeled back" to the south as the excavation proceeds, and then put back in place as the excavation is backfilled, or
- The line will be cut and removed during excavation, and a new conduit (without cable) will be installed in its place. The new conduit will extend from the pedestal to the chain-link fence. TelAlaska will install a new cable in the new conduit in the future if necessary.

The City of Galena telecommunication lines run north/south along Birchwood Avenue and can be seen in the manhole near the TelAlaska pedestal. The City lines are reported to be in conduits that are concrete-encased. Prior to excavation, the City will investigate and determine how many of the City lines are actually active and will need to remain active. The active lines will then be temporarily rerouted by the City prior to excavation. The abandoned conduits and inactive lines will be removed by CH2M HILL's subcontractor

during the excavation. New conduits will be placed in the excavation backfill to allow replacement of those lines that need to remain in service.

2.4.3.4 Diesel Fuel Pipeline, 4-inch-diameter Steel (Abandoned)

A 4-inch-diameter steel diesel-fuel pipeline originated at the BLA near the southeast end of the airfield and terminated at Valve Pit #2 near the northwest portion of the Former Galena FOL. The portion of the pipeline that traversed Sites 14/17 is labeled "Abandoned Fuel Line (1952)" on Figure 2-12. The alignment of this pipeline, constructed in 1952, is based on USAF documents. Figure 2-16 is a 1963 aerial photograph that indicates that the portion of this pipeline near Sites 14/17 was constructed above ground except for road crossings. The pipeline was later abandoned and the aboveground portion removed (date unknown). As discussed below, there is some geophysical evidence of a potential remnant of the pipeline at a depth of about 3 to 4 feet. No other evidence was observed for the majority of the pipeline alignment or the associated valve box or fill station shown on the Figure 2-16 aerial photograph. Section 3.7.3 discusses abandonment procedures for utilities, including remnant pipelines.

2.4.3.5 Fuel Pipeline, 6-inch-diameter Steel (Abandoned)

In 1962, a 6-inch-diameter steel pipeline was constructed from the BLA to Valve Pit #2 for conveyance of other fuel products. The portion of the pipeline that traversed Sites 14/17 is shown on Figure 2-12 and labeled "Abandoned Fuel Line (1962)." The alignment of this pipeline constructed in 1962 is based on USAF documents. The 1963 aerial photograph (Figure 2-16) indicates that at least the eastern portion of this pipeline was constructed above ground. However, it is not evident whether the portion near Sites 14/17 was above grade or buried. The pipeline was later abandoned (date unknown). No documentation was found to indicate whether the pipeline was abandoned in place, or drained and removed. The geophysical results on Figures 2-13 and 2-14 indicate that the pipeline and the associated fill station shown on Figure 2-12 must have been removed. Section 3.7.3 discusses abandonment procedures for utilities, including remnant pipelines.

2.4.3.6 Diesel Fuel Pipeline, 4-inch-diameter Steel (Abandoned) and Jet Fuel Pipeline, 6-inch-diameter Steel (In Service)

The approximate locations of a third abandoned pipeline and the adjacent in-service jet fuel line are shown on Figure 2-12. These locations are based on available USAF records. These pipelines ran from Million Gallon Hill east across the airport cantonment area to Tank 44, Building 1499, and filling stands near Building 1572. No records were found to determine when the pipelines were installed and when or how the 4-inch-diameter line was abandoned. Markers for the in-service jet fuel pipeline were observed in the field during the 2010 geophysical survey. The location of the pipeline at each marked location was verified, and then a transmitter was set up over the pipe to induce a current to allow mapping of the actual line location. That location is shown on Figure 2-13. The pipeline shown adjacent to the in-service line on Figure 2-13 is assumed to be the abandoned 4-inch-diameter diesel line. The actual pipelines locations are approximately 30 to 50 feet away from the location recorded by USAF. According to geophysical data, both pipelines appear to be approximately 4 feet deep. The active jet fuel pipeline was pressure tested in 2008. No signs of leakage were observed. Excavation limits will be set so that the existing 6-inch-diameter

active jet fuel line will be protected and remain in service. The abandoned 4-inch-diameter diesel line will not be disturbed because of its proximity to the active 6-inch-diameter fuel line.

2.4.3.7 Stormwater Pipe (In Service)

Figure 2-12 shows the location of the 24-inch-diameter corrugated metal pipe stormwater pipe. This location was confirmed by the 2010 geophysical survey as shown on Figure 2-13. Stormwater manholes and inlet/outlet structures were visible in the field. The location of the stormwater line between these known features was visually verified by confirming alignment of the pipe entering and exiting the features. The gravity pipeline is thought to be approximately 4 to 6 feet bgs in the vicinity of Sites 14/17. Excavation limits will be set so that the existing stormwater system will be protected and remain in service.

2.4.3.8 Aboveground and Belowground Utilidors (In Service)

Figure 2-12 shows the location of abovegrade and belowgrade utilidors. The utilidors typically contain a combination of water, steam, sanitary sewer, and condensate return lines. According to 1970 U.S. Army Corps of Engineers drawings for the Fire Department (Building 1556), the buried utilidors are typically 4 to 6 feet wide and 3 feet high in cross section. The top of the buried utilidors appears to be about 6 feet bgs.

The aboveground utilidor previously serviced the old power plant (Building 1558) with steam, water, and condensate return. A separate sanitary sewer line serviced the building from the west side. It is not known whether the pipelines within the aboveground utilidor were capped at Building 1558 when the building was demolished, or if the lines were capped and abandoned at manhole 20C or farther to the north. Excavation limits will be set so that the existing aboveground and buried utilidors will be protected and remain in service.

2.4.3.9 Unknown Features from the Geophysical Survey

Figures 2-13, 2-14, and 2-15 show the features identified in the geophysical survey as well as the approximate locations of the old abandoned pipelines provided by USAF. Several of the features have been discussed above on the basis of available historical drawings or reports. Several other features were not identified during review of available historical USAF records. Linear features that appear to be buried pipes or conduits are numbered on Figures 2-134, 2-14, and 2- 15. Other non-linear features are also shown on Figures 2-13 and 2-14 and are interpreted to be isolated, smaller, unknown metallic objects. Linear and non-linear features include the following:

- Features 1 and 2 – These items appear to be remnants of old pipelines, particularly Feature 2, which appears to be in alignment with the 4-inch-diameter steel diesel fuel old abandoned pipeline installed in 1952. It is thought that the 1952 line was constructed above grade except for road crossings. Review of the 1963 aerial photograph does not show signs of a road crossing near Features 1 and 2. Both features resulted in strong electromagnetic responses, indicative of a significant buried metallic object or objects. The features appear to be about 60 feet long and are located about 3 to 4 feet bgs.
- Feature 3 – This feature also appears to be a remnant of an old pipeline. The feature is defined more clearly on the magnetic survey (Figure 2-14). The draft final technical

memorandum prepared by AECOM in June 2010 references a historical pipeline running northwest from the five buried fuel tanks to Building 1812 (Mess Hall) and shows the line hand-drawn on AECOM Figure 2-16. The pipeline alignment appears to be similar to that indicated on the magnetic survey. No other references to this potential pipeline were found during review of USAF's historical drawings or reports. The geophysical survey indicates that the pipeline appears to only be a couple feet bgs.

- Feature 4 – This feature appears to be a section of old pipe approximately 50 feet long. This feature is likely a remnant of the piping that connected to the five buried fuel tanks. Historical drawings indicate a north/south arrangement of interconnected piping running along the west side of the fuel tanks. It is possible that this piping was left in place when the tanks were removed. This feature appears to be about 3 to 4 feet bgs.
- Features 5 and 6 – These features are thought to be the abandoned fuel supply piping that ran north/south from the five fuel tanks to the east side of the old power plant (Building 1558). This pipeline appears to be located about 3 to 4 feet bgs.
- Features 7, 8, and 9 – These features appear to be segments of a pipeline that ran from the Valve Pit B (also referred to as Valve Pit #3) to the east side of the old power plant. It is likely that this line was constructed in segments. Drawing G-7 from the January 1974 Master Plan Liquid Fuel System shows a 4-inch-diameter diesel fuel line "spur" running from the main 4-inch-diameter diesel fuel line (discussed in Section 2.4.3.6 above) in a northeast direction to Valve Pit B. This segment aligns with Feature 8. Although it is thought that Feature 8 is connected to the abandoned 4-inch-diameter diesel line, it is possible that it is connected to the active 6-inch-diameter jet fuel pipeline that parallels the abandoned diesel line. The pipeline "spur" (Feature 8) will be carefully exposed using an air knife or other suitable equipment prior to mass excavation to verify that it is a remnant of the diesel line and not the active jet fuel line. The status of this line will be verified in the field in accordance with Section 3.7.3. If determine to be active, the excavation limits will be revised to avoid disturbing the pipeline spur. Feature 9 is likely either a continuation of the 4-inch-diameter diesel line or a remnant of Valve Pit B. Feature 7 appears to be a pipeline extension of Feature 8 that ties into the Features 5 and 6 pipeline.
- Feature 10 – This feature appears to be a shallow pipeline (approximately 2 feet deep) that ties into Feature 7 and continues to the southeast corner of the old power plant.
- Features 11 and 12 – These features are thought to be old electrical conduits approximately 2 feet deep. The conduits may have been connected to equipment located on the transformer pad at the southeast corner of the old power building.
- Feature 13 – This feature is thought to be an old electrical or communications conduit that may have serviced Building 1556. The conduit is expected to only be 1 to 2 feet bgs.
- Feature 14 – This feature appears to be a remnant of an old fuel line that may have run south from the five storage tanks to the east side of the old power plant (Building 1558).

None of these features is believed to be in service; however, during excavation, these features will be treated as potentially still in service and handled accordingly, as discussed in Section 3.7.3.

2.4.3.10 Former Building B1558 Foundation

The former Building B1558 was the old power plant. The near-surface reinforced concrete slab designated on Figures 2-13, 2-14, and 2-15 is the remnant of the building.

2.4.4 Site SS016 and Utilities

Site SS016 (shown on Figure 2-5) is the previous location of Building 2541 (Fuels Laboratory). The building included booster pumps for the fuel lines that ran from the BLA to various locations in the main airport triangle. These pumps were in service from the 1950s to the 1980s. In addition to the booster pumps, Building 2541 contained a surge tank, a floor drain, and a 2,000-gallon collection UST (UST 2541). The drain lines from the surge tank and floor drain were connected to the UST. UST 2541 was removed in 1998.

Fuel pipelines were located approximately 20 feet south of Building 2541. Figure 2-5 shows the approximate location of Building 2541 and the associated fuel lines. A low-point drain and an expansion loop were located to the east of Building 2541 where the pipelines transition from a north-south orientation to an east-west orientation. Evidence that the buried lines located south of the low-point drain are still in place was found during the 2010 geophysical survey (see Figures 2-17 and 2-18). These existing pipes are estimated to be approximately 1 to 2 feet bgs. No evidence was found for the east-west pipelines, the piping connections to the UST, or the temporary north/south pipelines located north of the low-point drain.

2.4.5 Site AST1569 and Utilities

Site AST1569 (shown on Figure 2-7) is the location of an aboveground storage tank located on the western side of Building 1569 that held diesel for the emergency generator. The generator had been in use since the early 1980s, but was removed by the City of Galena in May 2011.

Fuel pipelines were historically located approximately 20 feet west of Site AST1569, but utility locates performed in 2010 did not find any evidence of this fuel pipeline. Figure 2-19 shows the approximate location of Site AST1569 and the fuel lines. Other utilities in the vicinity of the excavation include the following:

- Two power poles with overhead electrical lines approximately 20 feet south of the preliminary excavation area
- An underground electrical line and transformer approximately 20 feet south of the preliminary excavation area
- Two underground water and/or sewer lines approximately 50 feet south of the preliminary excavation area

2.4.6 Site SS005 and Utilities

Site SS005 (shown on Figure 2-20) is the previous location of Building 1872 (Wilderness Hall). Prior to the construction of the Wilderness Hall dormitory, the site included aboveground fuel storage tanks and aboveground fuel pipelines that were in service from approximately the 1950s to the 1970s. Fuel pipelines were located in the central-southern

portion of Site SS005 and trended from northwest to southeast. Figure 2-20 shows the approximate location of the former tanks and their associated fuel lines.

The dormitory building was demolished in 2007, but the concrete slab foundation remains in place.

A utilidor extends from an existing manhole into the west side of the foundation as shown on Figure 2-9. The utilidor contains steam and water lines that were terminated just outside the manhole when the building was demolished in 2007. Samples of the pipe insulation under the foundation were collected and tested for asbestos-containing material. None was detected. The top of the utilidor east of the manhole and the abandoned pipes will be removed during excavation activities. The utilidor will be backfilled with gravel.

In the 2010 utility survey, one buried active communications line was identified in the southern excavation area. All other utilities are located approximately 50 feet away from the excavation areas. Section 3.5 describes how the active communication line will be temporarily rerouted and then reinstalled to accommodate the excavation activities.

2.5 Conceptual Site Model

The CSM for several leak and spill scenarios is described in Worksheet #10 of the *Work Plan for Site Inspection, Remedial Investigation, and Site Characterization, Former Galena Forward Operating Location, Alaska* (CH2M HILL, August 2010). Most of these scenarios exist at Sites 14/17, SS016, AST1569, and SS005; these scenarios are summarized and the potential soil categories within the CSM are described in this section.

The CSM integrates existing information and working assumptions about the physical site conditions; the nature, occurrence, and distribution of chemicals; and fate and transport processes at the sites. The CSM is based on the current understanding of site history and conditions, and will be updated using ongoing input from field investigations.

The majority of contaminant releases at Sites 14/17, SS016, AST1569, and SS005 were petroleum hydrocarbons. To a much lesser extent, there are low concentrations of chlorinated hydrocarbon co-located with the POL. As a pure product, petroleum hydrocarbons are less dense than water and are referred to as light nonaqueous phase liquid (LNAPL). In sufficient quantities, LNAPL product will accumulate at the groundwater table surface. When the petroleum products dissolve in groundwater, the specific gravity of the aqueous plumes is nearly the same as uncontaminated groundwater, and the plumes will move with the groundwater flow.

When a hydrocarbon release occurs from a UST or buried pipeline, the product will initially tend to spread in response to a pressure gradient around the leak. Outside the pressure gradient, the infiltrating product primarily tends to flow vertically downward under the influence of gravity through larger air-filled soil pores in the vadose zone, although capillary forces may cause some lateral spreading.

If a sufficient quantity of product is spilled, the infiltrating product will reach the saturated capillary fringe and displace some water from the saturated soil pores. Petroleum hydrocarbons tend to migrate laterally, as a mound of LNAPL free product develops near the water table. As the water table rises and falls, the mobile free product near the water table

encounters uncontaminated soil and tends to be smeared or trapped as immobile residual product.

Because some years have higher or lower water tables than other years, and because many contaminated sites are several years to a few decades old, product will likely be trapped or smeared both above and below the zone of water table fluctuation that was observed in only a few years of study. The releases from several tanks or piping leaks may coalesce into a complex contiguous source area.

Gravity drainage and flow of the hydrocarbon nonaqueous phase liquid (NAPL) to a point of immobility probably occurs relatively quickly (in a period of weeks or months) at sources caused by a discrete spill event, but may occur over a period of years at sources with long-term leaks. However, after the long-term leak has been stopped, any mobile hydrocarbon NAPL will likely be immobilized in a period of weeks or months (Geosphere and CH2M HILL, 2006). Infiltrating precipitation that encounters vadose-zone hydrocarbon will tend to carry dissolved hydrocarbon toward the water table. There, the precipitation containing the dissolved hydrocarbon will mix with the groundwater and be transported downgradient. Similarly, NAPL in the saturated zone will tend to partition directly into the groundwater and be transported downgradient.

The initial CSM has been developed to predict expected soil contamination levels within the IRA excavation limits. The CSM will be revised prior to excavation based on the source delineation samples that are being collected in summer 2011, and further revised as the excavated soil is sampled and tested daily. To determine the sequence of soil excavation and disposition of the excavated soil, the current CSM includes four soil categories within the excavation as described below. A simplified schematic of the CSM showing soil categories is presented on Figure 2-21.

2.5.1 Clean

Soil above source areas and above the high groundwater elevation is expected to be below the most stringent ADEC Method Two cleanup levels listed in Table B2 of 18 AAC 75. It is anticipated that these clean areas will extend from the ground surface down to 2 feet bgs in non-source areas. This material will be stockpiled within the work area limits or in the RAPCON yard. Soil anticipated being clean on the basis of source delineation results will be screened every 10 yd^3 using headspace readings in accordance with SOP-04 (*Organic Vapor Monitoring and Air Monitoring*). If the PID reading is less than 20 parts per million, the soil will be considered clean and will eventually be reused as backfill in the IRA excavations as described in Section 3.6.5. If the PID reading is greater than 20 parts per million, then the material will be loaded into dump trucks and segregated as described in Section 2.6.

2.5.2 Low-contamination Soil in the Top of the Smear Zone

Soil in the top of the smear zone that has not been directly affected by source spills might have been lightly contaminated from soil gas or groundwater in the smear zone during extraordinarily high groundwater events. Typical high groundwater levels recorded near the IRA area are 6 to 8 feet bgs at Sites 14/17 and SS016. Anecdotal information indicates that some flooding of Sites 14/17 may have occurred in the past. Because no data exists for these extraordinarily high groundwater events, it can only be estimated that this zone

extends from approximately 2 feet bgs down to 6 to 8 feet bgs. This area is anticipated to have low DRO contamination levels and low variability in those concentrations.

2.5.3 Source-contaminated Soil in the Vadose Zone

Soil from the source of POL spills will have the highest contamination levels and will be located in the vadose zone at the spill sites and below. This zone will extend from the ground surface for aboveground spills or at the pipeline elevation for pipeline spills down to the smear zone at the top of the typical high groundwater elevation (6 to 8 feet bgs).

2.5.4 Smear-zone-contaminated Soil

The smear zone is defined as the area between the highest and lowest groundwater elevation at the site. Soil in the smear zone below the normal high water level (6 to 8 feet bgs) is anticipated to have moderate variability in DRO concentration levels.

2.6 Excavated Soil Segregation

The approach for determining if contaminated soil can be sent to the landfill to be used as cover is to compare the soil contaminant concentrations to 18 AAC 75.341 Method Two Table B1 and B2 values for Under 40-inch Zone Direct Contact and Outdoor Inhalation cleanup levels. According to discussion with ADEC on the large thickness of permafrost (approximately 400 feet thick) at the landfarm and landfill site in Campion, the Migration to Groundwater Pathway can be eliminated as a cleanup-level requirement.

Once this approach is approved, a field screening procedure will be used to provide a quick and conservative method for evaluating if the excavated soil is above or below the Table B1/B2 criteria for Ingestion, Direct Contact, and Outdoor Inhalation. Contaminated soil will be transported to two offsite locations. The more contaminated soil will be taken to a lined stockpile to be built on the Campion airstrip this year, then transferred to a landfarm to be built in 2012 for treatment and eventual beneficial use as landfill cover. The less contaminated soil can be taken directly to the City of Galena landfill to be used as landfill cover.

Samples will be collected for each dump truck load of contaminated soil from representative backhoe or excavator buckets during the loading activities. The field screening results will be determined while the truck is traveling to the Campion airstrip and will be radioed to the field engineer there so he can designate where the truck will place the contaminated soil.

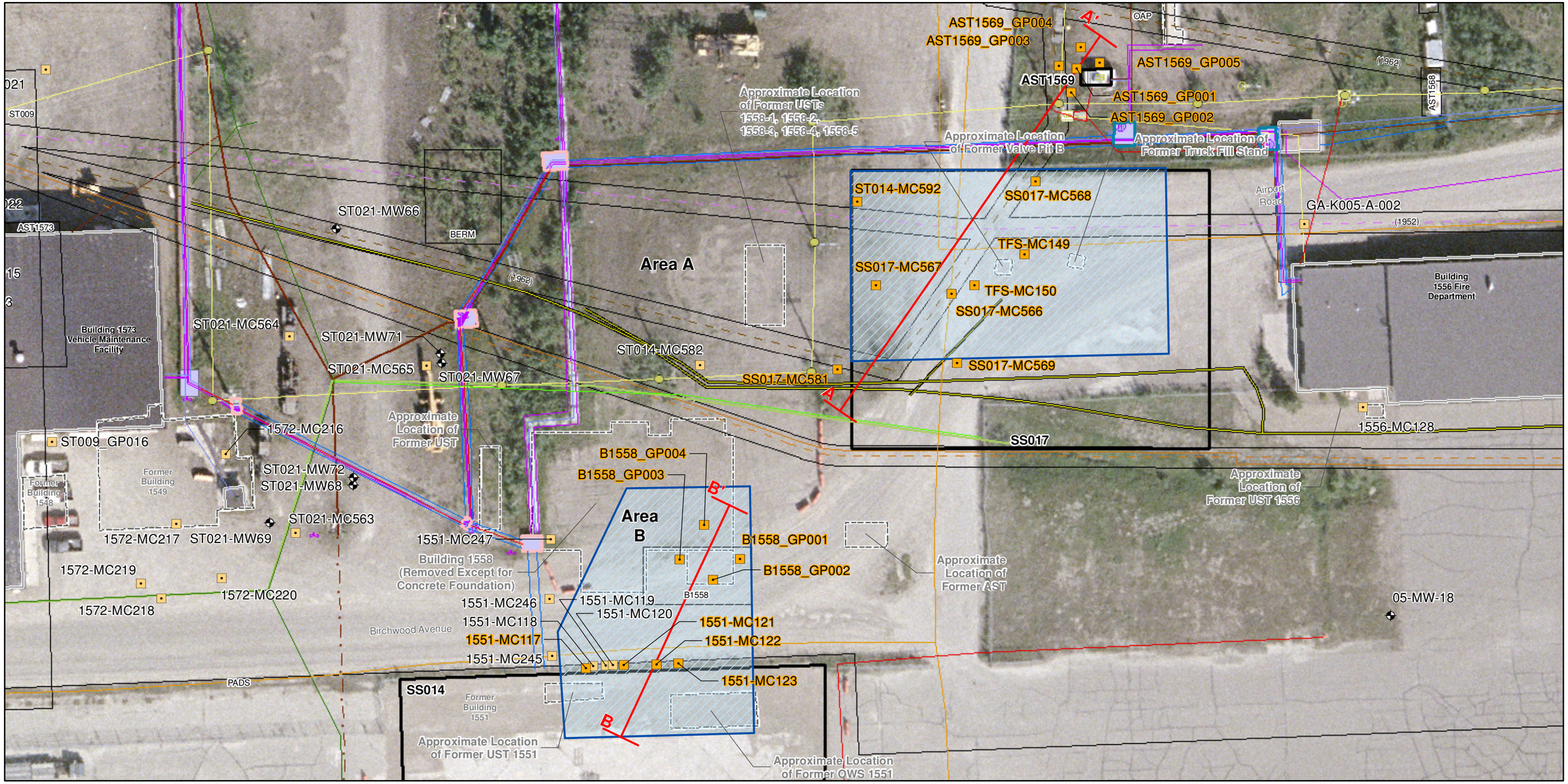
One method currently being evaluated is using headspace PID readings to correlate to the level of fuel contamination in soil. Currently, headspace PID readings are being collected from source delineation samples to derive a correlation between PID readings and laboratory results of benzene, GRO, and DRO concentrations. A conservative PID limit will be determined and used during excavation to segregate the soil between highly contaminated soil that needs to be taken to the stockpile for landfarming or less-contaminated soil that is acceptable for taking directly to the landfill for use as cover material. For example, the Table B2 value for Ingestion of DRO is 10,250 mg/kg and Inhalation is 12,500 mg/kg. Headspace PID readings of soil core samples will be evaluated to determine if they can reliably identify soil with DRO concentrations of 5,000 mg/kg or less (which would provide

a 2x safety factor for soil up to 10,250 mg/kg). Soil with PID readings less than the corresponding value for 5,000 mg/kg or less would be taken directly to the landfill, and soil greater than this value would be taken to the lined stockpile for future landfarming treatment.

If the headspace PID readings are not found to have a strong correlation with soil contamination concentrations, then other field screening methods such as ultraviolet fluorescence will be evaluated.

As an added precaution, soil taken directly to the landfill for use as cover material will be sampled from the landfill stockpile, and any soil exceeding the landfill cover criteria will be moved to the lined Campion airstrip stockpile for future landfarm treatment.

This page intentionally left blank.



LEGEND

- SS014, SS017
- Adjacent Site
- Approximate Location of Former Feature
- Structure
- Cross Section
- Approximate Excavation Limits

Historical Sample Location

- Soil Boring
- Monitoring Well
- Soil Boring on Cross Section (**SS017-MC150**)

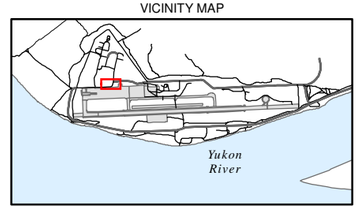
- Water Line
- Electrical Line
- Heating/Cooling Line
- Main Storm Sewer Line
- Abandoned Wastewater Line
- Main Wastewater Line
- Service Wastewater Line
- Main Fuel Line
- Abandoned Fuel Line
- Abandoned Fuel Line (1952)
- Abandoned Fuel Line (1962)
- Valve Pit
- Fuel Tank

Active Utilities Located in 2010 Survey

- Electrical Line
- Communications Line
- Sanitary Sewer Main
- Storm Drain
- Potable Water Main
- Fuel/Gas Line
- Electrical Transformer
- Utility Vault
- Concrete Pad

Note:
1. Aerial photography courtesy Alaska Department of Commerce, Community and Economic Development, Division of Community and Regional Affairs. July 7, 2009. Pixel size 6 inch.

VICINITY MAP



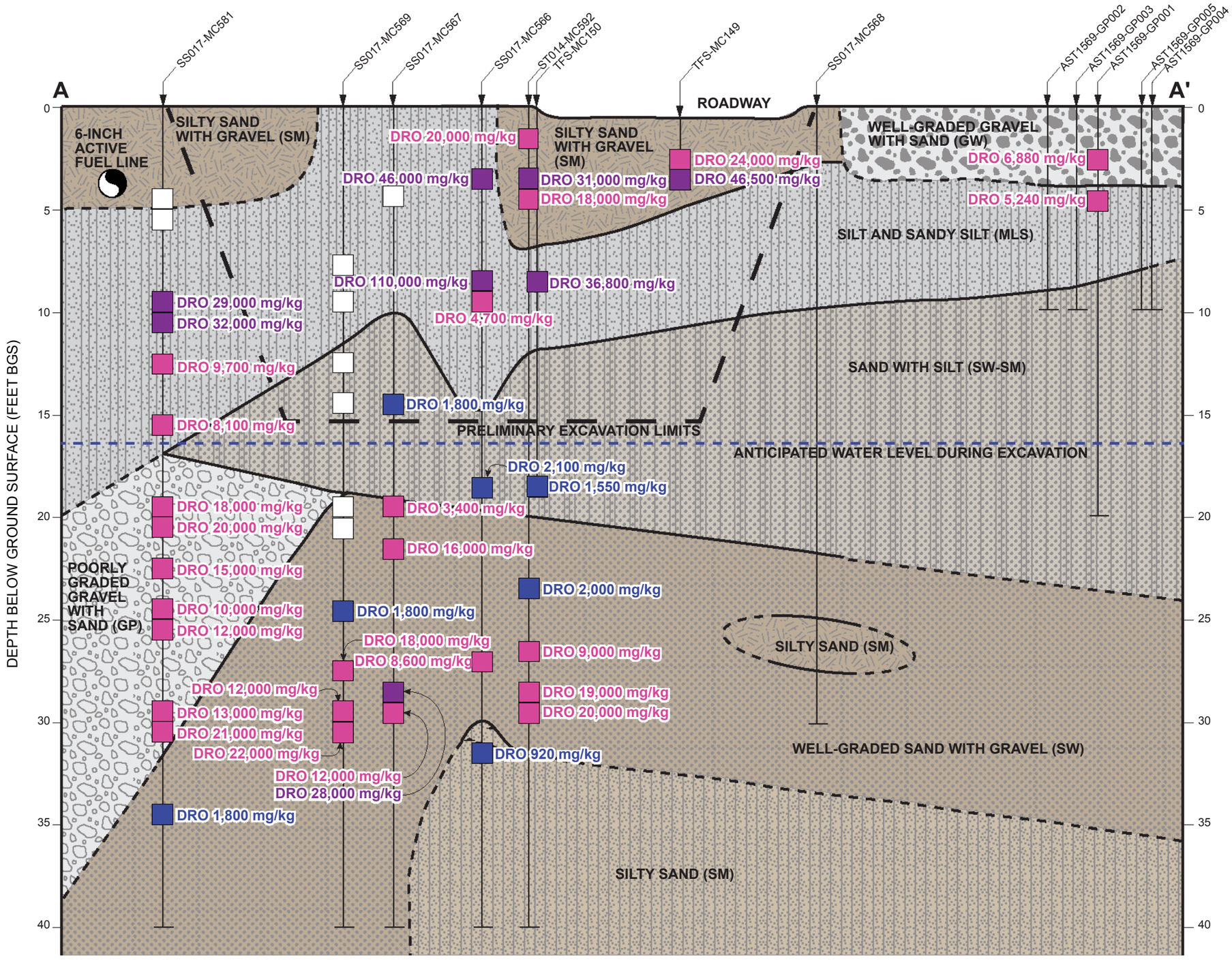
0 25 50
Feet

N

FIGURE 2-1
Sites AST1569, SS014 and SS017 Historical Soil Boring and Monitoring Well Locations
Interim Removal Action Work Plan
Former Galena Forward Operating Location, Alaska

CH2MHILL

RDD \\BALDUR\PROJ\GALENATO184_394439\MAPFILES\IRA_WORKPLAN\FIG_2-1_SS014_17_21_SAMP_IRA.MXD SRUDOLPH 3/31/2011 17:40:30



LEGEND

- WELL-GRADED SAND WITH GRAVEL (SW)
- SILTY SAND WITH GRAVEL (SM)
- WELL-GRADED GRAVEL WITH SAND (GW)
- SILT AND SANDY SILT (MLS)
- SAND WITH SILT (SW-SM)
- SILTY SAND (SM)
- POORLY GRADED GRAVEL WITH SAND (GP)
- ESTIMATED LITHOLOGIC INTERFACE
- SAMPLE EXCEEDS SCREENING LEVEL (GREATER THAN 100X ANALYTE SL)
- SAMPLE EXCEEDS SCREENING LEVEL (GREATER THAN 10X ANALYTE SL)
- SAMPLE EXCEEDS SCREENING LEVEL (1 TO 10X ANALYTE SL)
- SAMPLE DOES NOT EXCEED SCREENING LEVELS (<1X ANALYTE SL)

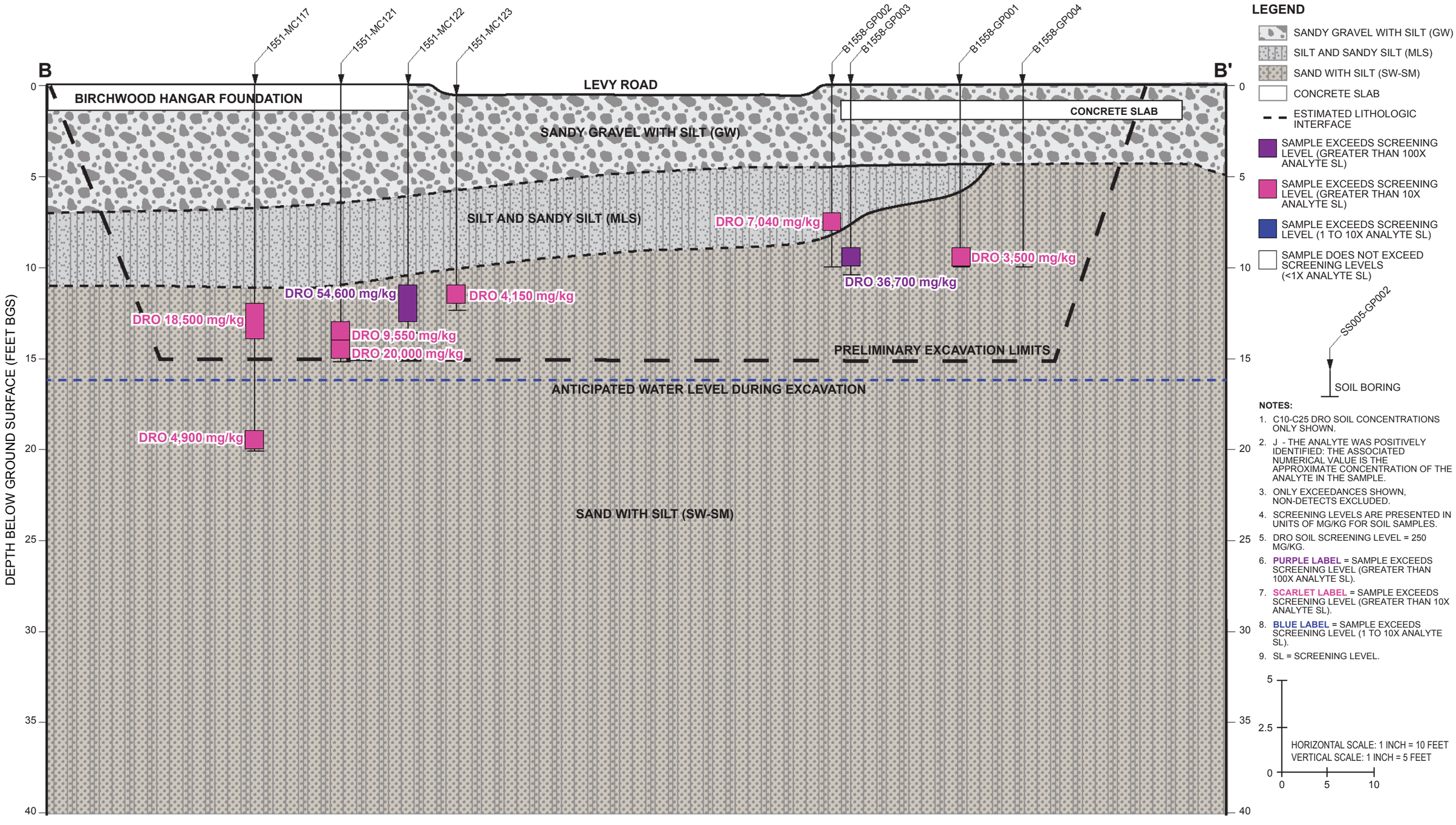
SS005-GP002
SOIL BORING

NOTES:

1. C10-C25 DRO SOIL CONCENTRATIONS ONLY SHOWN.
2. J - THE ANALYTE WAS POSITIVELY IDENTIFIED: THE ASSOCIATED NUMERICAL VALUE IS THE APPROXIMATE CONCENTRATION OF THE ANALYTE IN THE SAMPLE.
3. ONLY EXCEEDANCES SHOWN, NON-DETECTS EXCLUDED.
4. SCREENING LEVELS ARE PRESENTED IN UNITS OF MG/KG FOR SOIL SAMPLES.
5. DRO SOIL SCREENING LEVEL = 250 MG/KG.
6. **PURPLE LABEL** = SAMPLE EXCEEDS SCREENING LEVEL (GREATER THAN 100X ANALYTE SL).
7. **SCARLET LABEL** = SAMPLE EXCEEDS SCREENING LEVEL (GREATER THAN 10X ANALYTE SL).
8. **BLUE LABEL** = SAMPLE EXCEEDS SCREENING LEVEL (1 TO 10X ANALYTE SL).
9. SL = SCREENING LEVEL.

5
2.5
0
HORIZONTAL SCALE: 1 INCH = 20 FEET
VERTICAL SCALE: 1 INCH = 5 FEET
0
10
20

FIGURE 2-2
Site SS017
Cross Section Through Area A
Interim Removal Action Work Plan
Former Galena Forward Operating Location, Alaskaka



LEGEND

- SANDY GRAVEL WITH SILT (GW)
- SILT AND SANDY SILT (MLS)
- SAND WITH SILT (SW-SM)
- CONCRETE SLAB
- ESTIMATED LITHOLOGIC INTERFACE
- SAMPLE EXCEEDS SCREENING LEVEL (GREATER THAN 100X ANALYTE SL)
- SAMPLE EXCEEDS SCREENING LEVEL (GREATER THAN 10X ANALYTE SL)
- SAMPLE EXCEEDS SCREENING LEVEL (1 TO 10X ANALYTE SL)
- SAMPLE DOES NOT EXCEED SCREENING LEVELS (<1X ANALYTE SL)

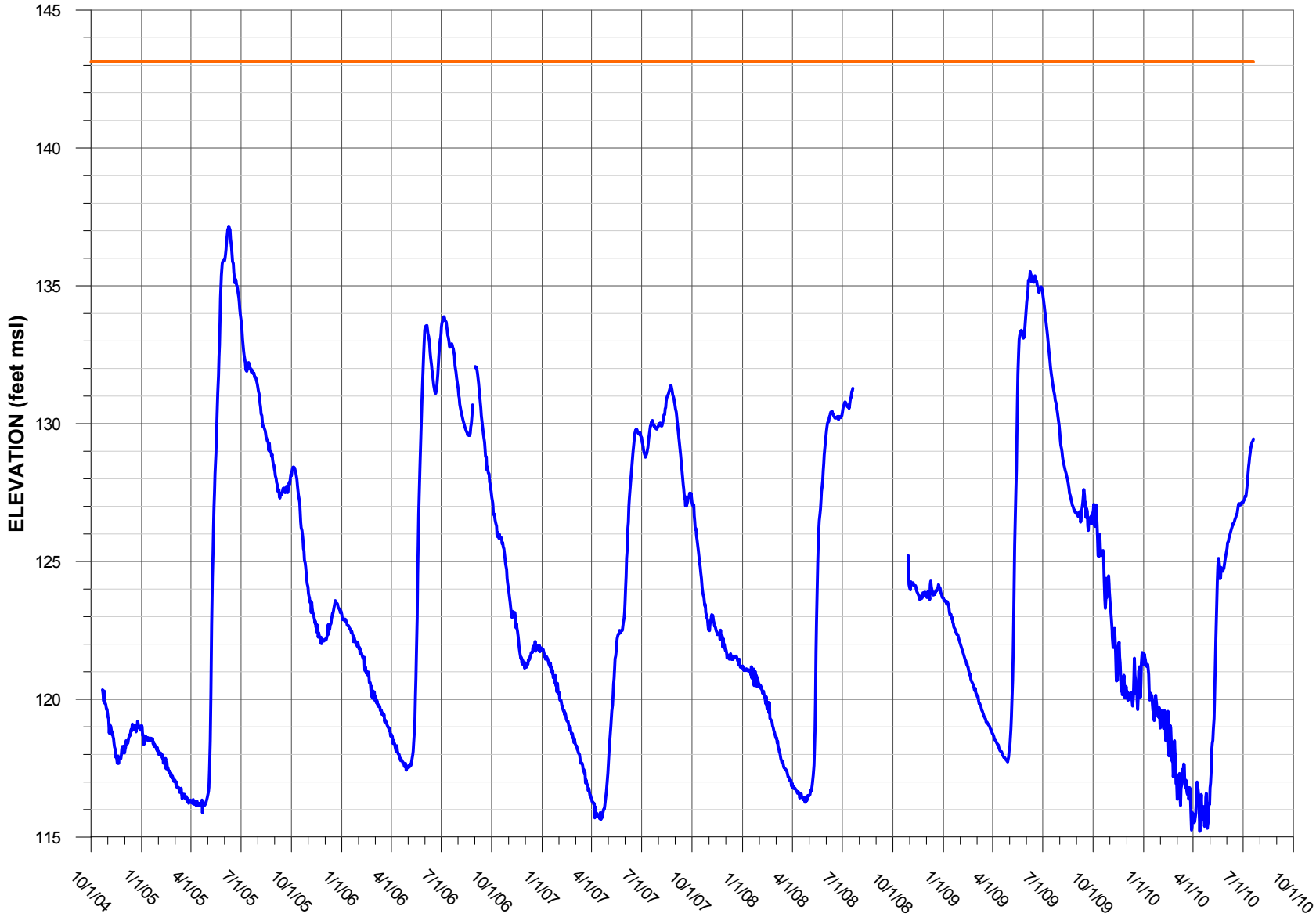
SS005-GP002
SOIL BORING

NOTES:

1. C10-C25 DRO SOIL CONCENTRATIONS ONLY SHOWN.
2. J - THE ANALYTE WAS POSITIVELY IDENTIFIED: THE ASSOCIATED NUMERICAL VALUE IS THE APPROXIMATE CONCENTRATION OF THE ANALYTE IN THE SAMPLE.
3. ONLY EXCEEDANCES SHOWN, NON-DETECTS EXCLUDED.
4. SCREENING LEVELS ARE PRESENTED IN UNITS OF MG/KG FOR SOIL SAMPLES.
5. DRO SOIL SCREENING LEVEL = 250 MG/KG.
6. **PURPLE LABEL** = SAMPLE EXCEEDS SCREENING LEVEL (GREATER THAN 100X ANALYTE SL).
7. **SCARLET LABEL** = SAMPLE EXCEEDS SCREENING LEVEL (GREATER THAN 10X ANALYTE SL).
8. **BLUE LABEL** = SAMPLE EXCEEDS SCREENING LEVEL (1 TO 10X ANALYTE SL).
9. SL = SCREENING LEVEL.

5
2.5
0
HORIZONTAL SCALE: 1 INCH = 10 FEET
VERTICAL SCALE: 1 INCH = 5 FEET
0
5
10

FIGURE 2-3
Site SS014
Cross Section Through Area B
Interim Removal Action Work Plan
Former Galena Forward Operating Location, Alaska



LEGEND

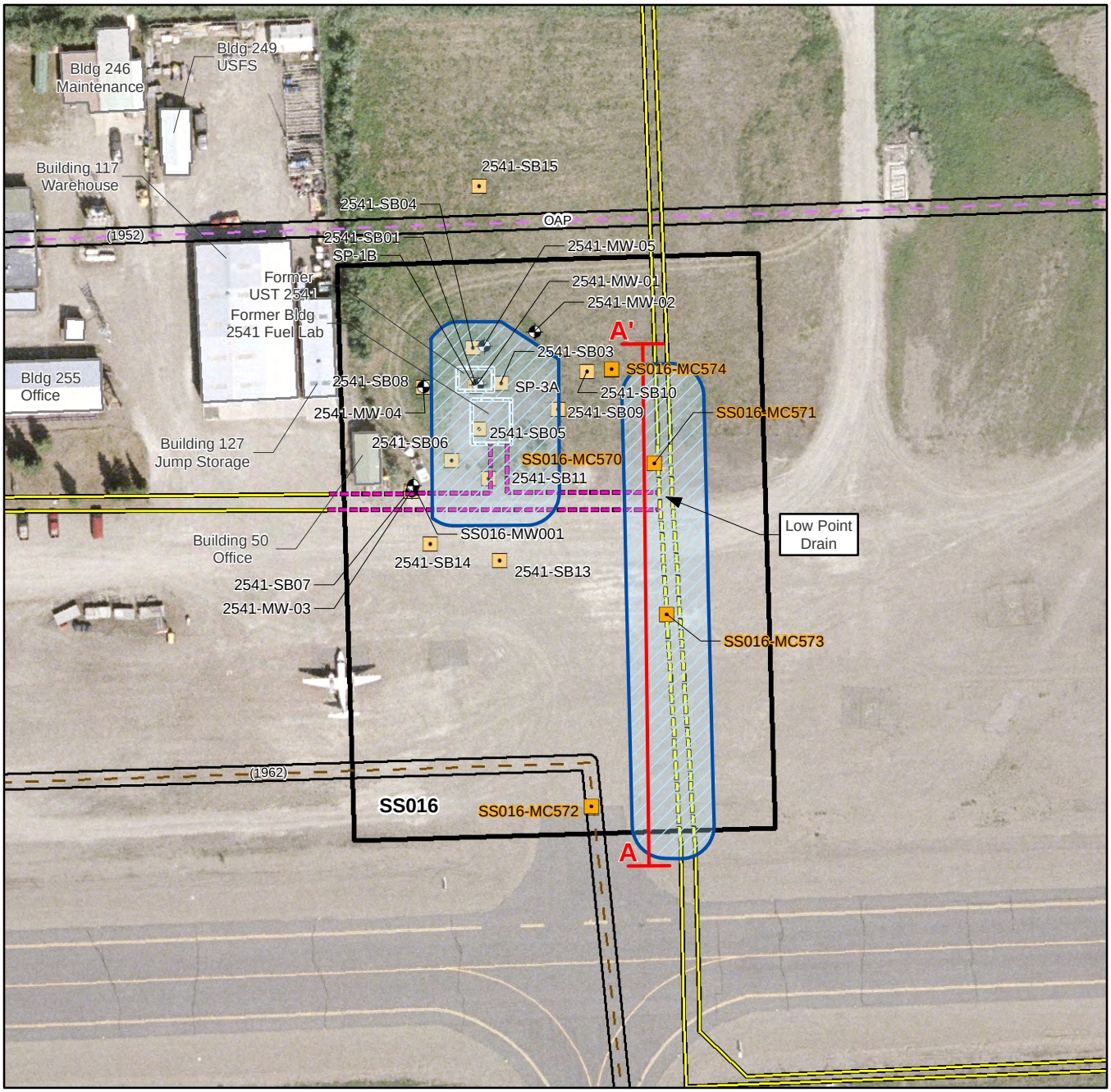
Groundwater Elevation

Ground Surface Elevation

Note: Well BRWELL is located in the boiler room of the Galena Aviation Vocational Technical Center (GAVTC) Building, approximately 1,100 feet east of Sites SS014/SS017/SS021.

FIGURE 2-4
Hydrograph of Groundwater Elevation versus Time; BRWELL
Interim Removal Action Work Plan
Former Galena Forward Operating Location, Alaska

CH2MHILL®



LEGEND

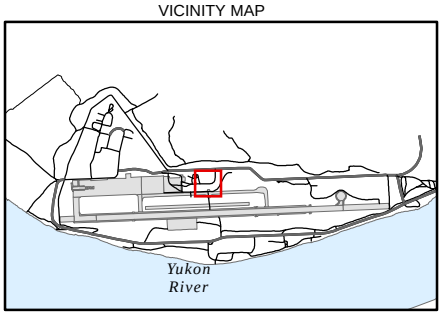
- SS016
- Adjacent Site
- Approximate Location of Former Feature
- Structure
- Abandoned Fuel Line (1952)
- Abandoned Fuel Line (1962)

Utilities Identified from Geophysical Survey and Other Studies

- Aboveground Fuel Line, Removed
- Underground Fuel Line, Inactive
- Underground Fuel Line, Removed

- Cross Section
- Approximate Excavation Limits
- Soil Boring
- Soil Boring on Cross Section
- Monitoring Well (SS016-MC570)

VICINITY MAP



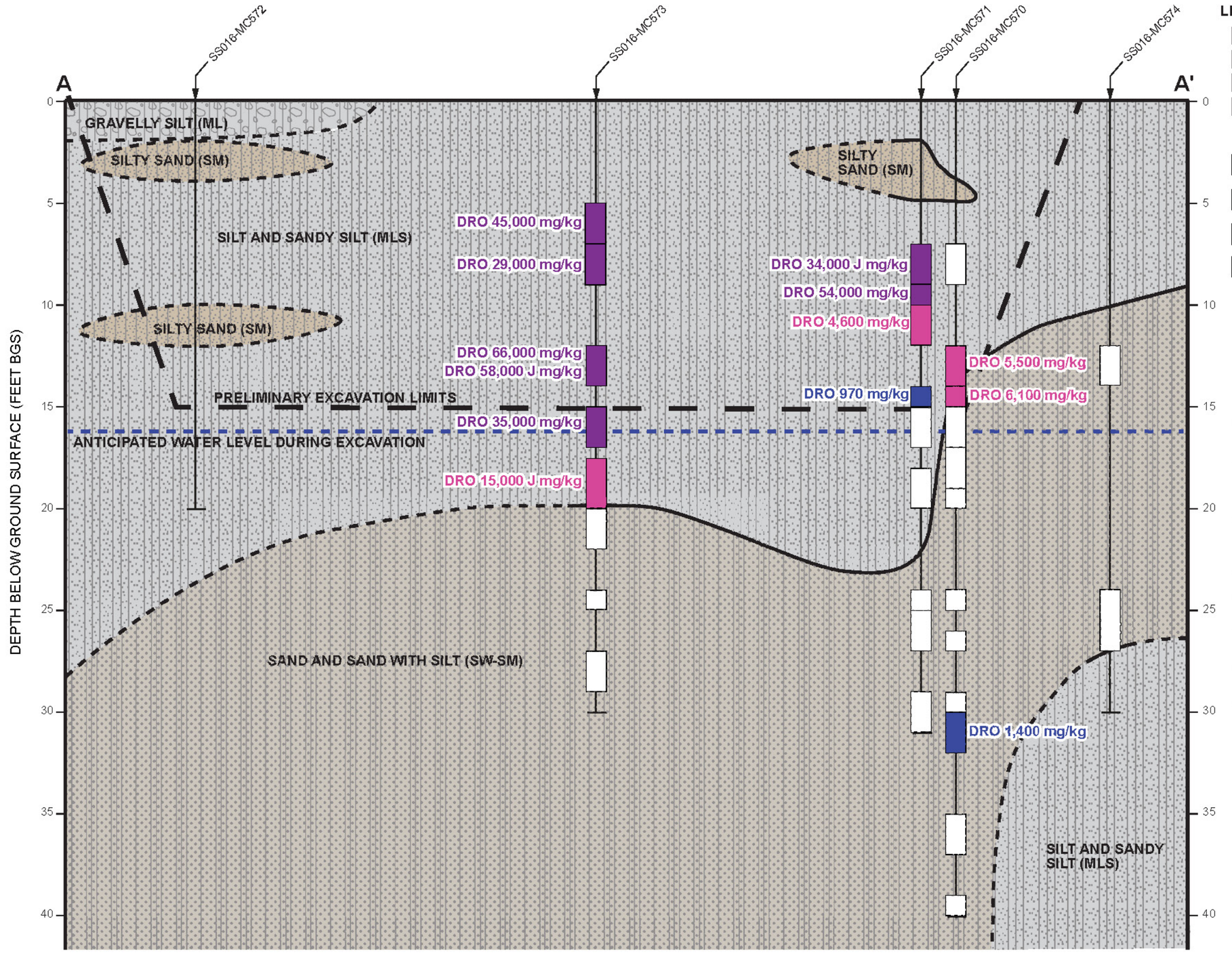
0 50 100
Feet

N

Notes:
1. No 2010 utility locate data for this site
2. Aerial photography courtesy Alaska Department of Commerce, Community and Economic Development, Division of Community and Regional Affairs. July 7, 2009. Pixel size 6 inch.

FIGURE 2-5
Site SS016
Historical Soil Boring and Monitoring Well Locations

Interim Removal Action Work Plan
Former Galena Forward Operating Location, Alaska



LEGEND

- GRAVELLY SILT (ML)
- SILTY SAND (SM)
- SILT AND SANDY SILT (MLS)
- SAND AND SAND WITH SILT (SW-SM)
- ESTIMATED LITHOLOGIC INTERFACE
- SAMPLE EXCEEDS SCREENING LEVEL (GREATER THAN 100X ANALYTE SL)
- SAMPLE EXCEEDS SCREENING LEVEL (GREATER THAN 10X ANALYTE SL)
- SAMPLE EXCEEDS SCREENING LEVEL (1 TO 10X ANALYTE SL)
- SAMPLE DOES NOT EXCEED SCREENING LEVELS (<1X ANALYTE SL)

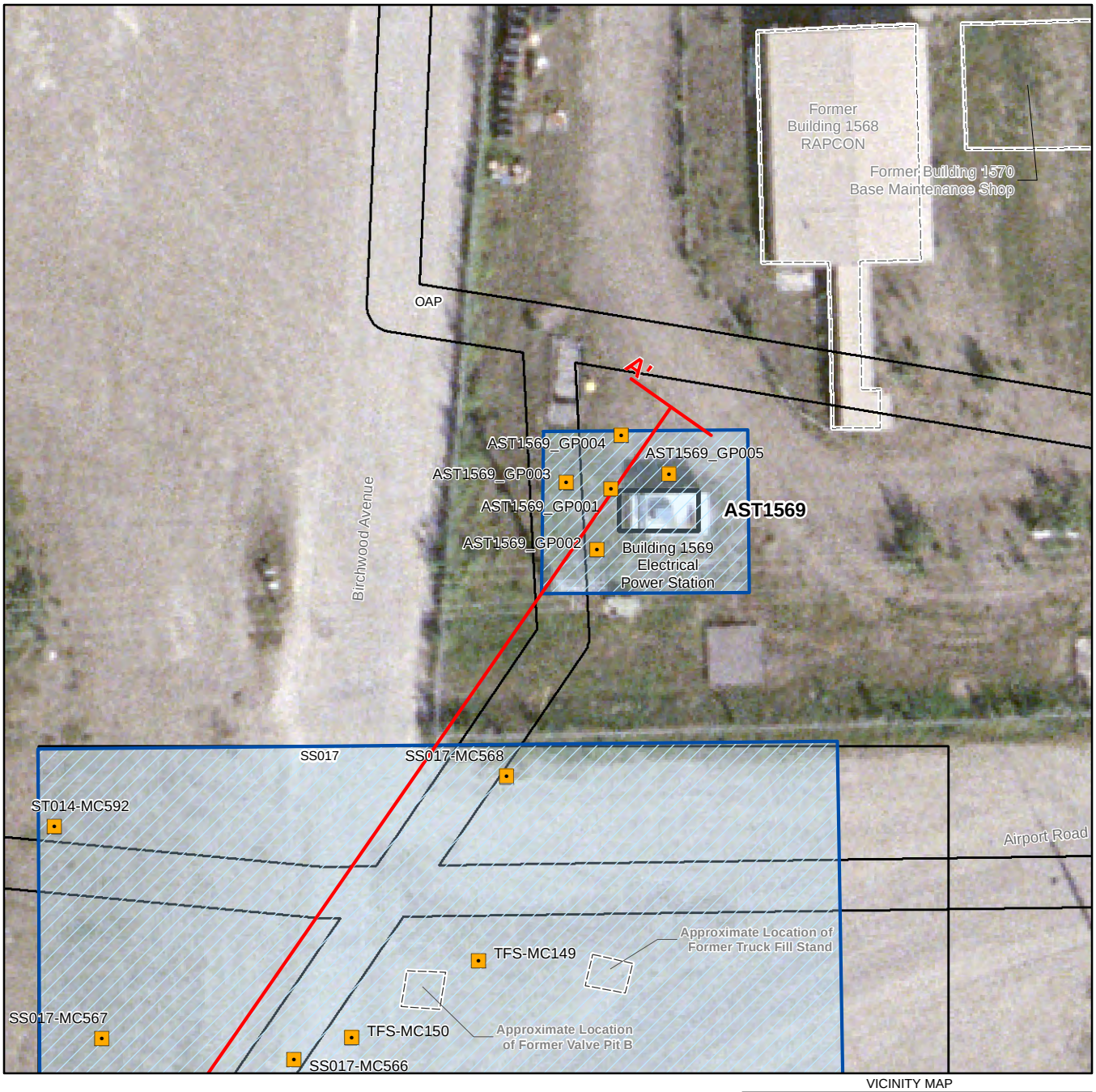
SS005-GP002
SOIL BORING

NOTES:

1. C10-C25 DRO SOIL CONCENTRATIONS ONLY SHOWN.
2. J - THE ANALYTE WAS POSITIVELY IDENTIFIED: THE ASSOCIATED NUMERICAL VALUE IS THE APPROXIMATE CONCENTRATION OF THE ANALYTE IN THE SAMPLE.
3. ONLY EXCEEDANCES SHOWN, NON-DETECTS EXCLUDED.
4. SCREENING LEVELS ARE PRESENTED IN UNITS OF MG/KG FOR SOIL SAMPLES.
5. DRO SOIL SCREENING LEVEL = 250 MG/KG.
6. **PURPLE LABEL** = SAMPLE EXCEEDS SCREENING LEVEL (GREATER THAN 100X ANALYTE SL).
7. **SCARLET LABEL** = SAMPLE EXCEEDS SCREENING LEVEL (GREATER THAN 10X ANALYTE SL).
8. **BLUE LABEL** = SAMPLE EXCEEDS SCREENING LEVEL (1 TO 10X ANALYTE SL).
9. SL = SCREENING LEVEL.

5
2.5
0
HORIZONTAL SCALE: 1 INCH = 10 FEET
VERTICAL SCALE: 1 INCH = 5 FEET
0 5 10

FIGURE 2-6
Cross Section Through Site SS016
Interim Removal Action Work Plan
Former Galena Forward Operating Location, Alaska



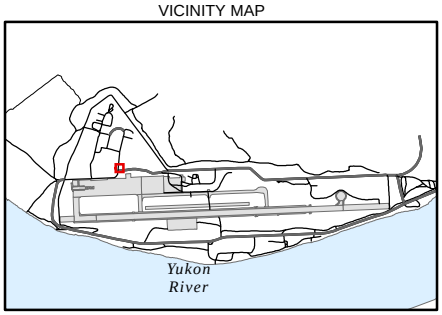
LEGEND

- AST1569
- Adjacent Site
- Approximate Location of Former Feature
- Structure
- Cross Section
- Approximate Excavation Limits

Historical Sample Location

- Soil Boring on Cross Section (SS016-MC570)

VICINITY MAP

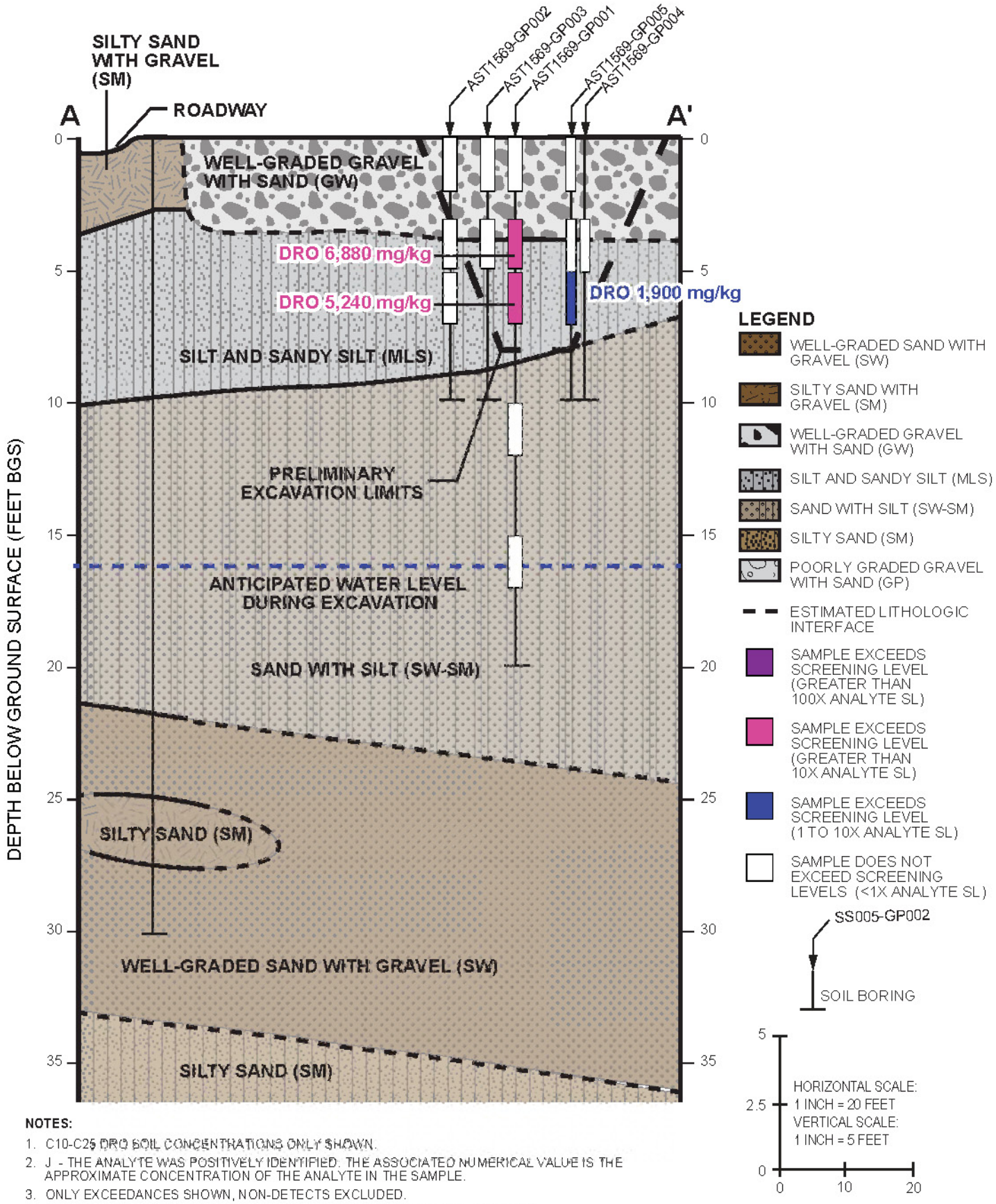


0 15 30
Feet

N

Note:
1. Aerial photography courtesy Alaska Department of Commerce, Community and Economic Development, Division of Community and Regional Affairs. July 7, 2009. Pixel size 6 inch.

FIGURE 2-7
Site AST1569 Excavation Area and Limits
Interim Removal Action Work Plan
Former Galena Forward Operating Location, Alaska



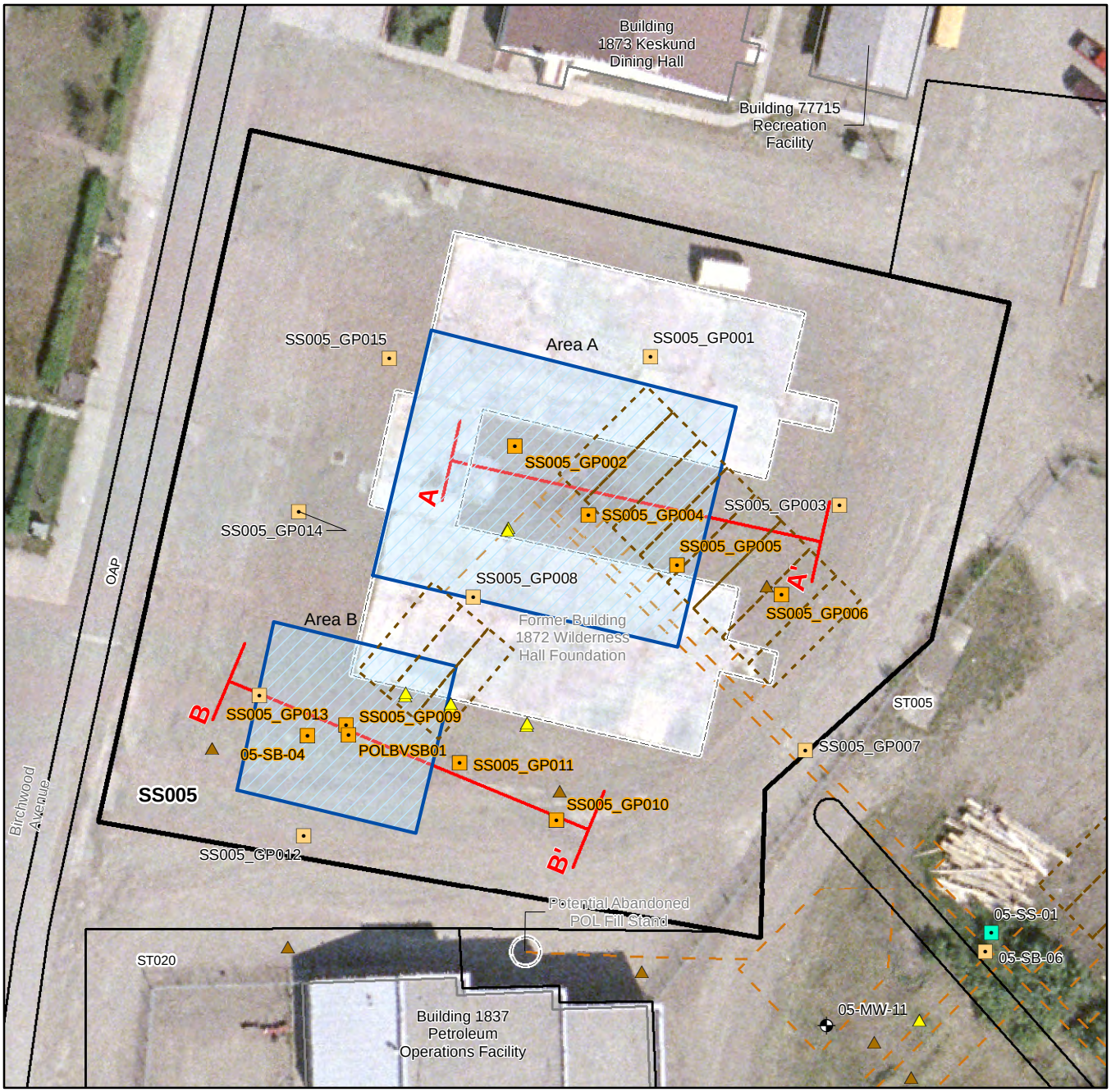
NOTES:

1. C10-C25 DRO SOIL CONCENTRATIONS ONLY SHOWN.
2. J - THE ANALYTE WAS POSITIVELY IDENTIFIED. THE ASSOCIATED NUMERICAL VALUE IS THE APPROXIMATE CONCENTRATION OF THE ANALYTE IN THE SAMPLE.
3. ONLY EXCEEDANCES SHOWN, NON-DETECTS EXCLUDED.
4. SCREENING LEVELS ARE PRESENTED IN UNITS OF MG/KG FOR SOIL SAMPLES.
5. DRO SOIL SCREENING LEVEL = 250 MG/KG.
6. **PURPLE LABEL** = SAMPLE EXCEEDS SCREENING LEVEL (GREATER THAN 100X ANALYTE SL).
7. **SCARLET LABEL** = SAMPLE EXCEEDS SCREENING LEVEL (GREATER THAN 10X ANALYTE SL).
8. **BLUE LABEL** = SAMPLE EXCEEDS SCREENING LEVEL (1 TO 10X ANALYTE SL).
9. SL = SCREENING LEVEL.

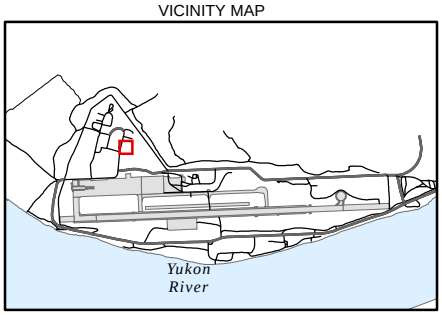
ES020811222349RDD_2-08_AST1569_A-A'

FIGURE 2-8
Site AST1569 Cross Section through Excavation
Interim Removal Action Work Plan
Former Galena Forward Operating Location, Alaska

CH2MHILL®



VICINITY MAP



LEGEND

- SS016
- Adjacent Site
- Approximate Location of Former Feature
- Structure
- Former Aboveground Storage Tank
- Removed Fuel Pipeline
- Cross Section
- Approximate Excavation Limits

Historical Sample Location

- Monitoring Well
- Surface Soil Sample
- Soil Boring
- Soil Boring on Cross Section (SS016-MC570)

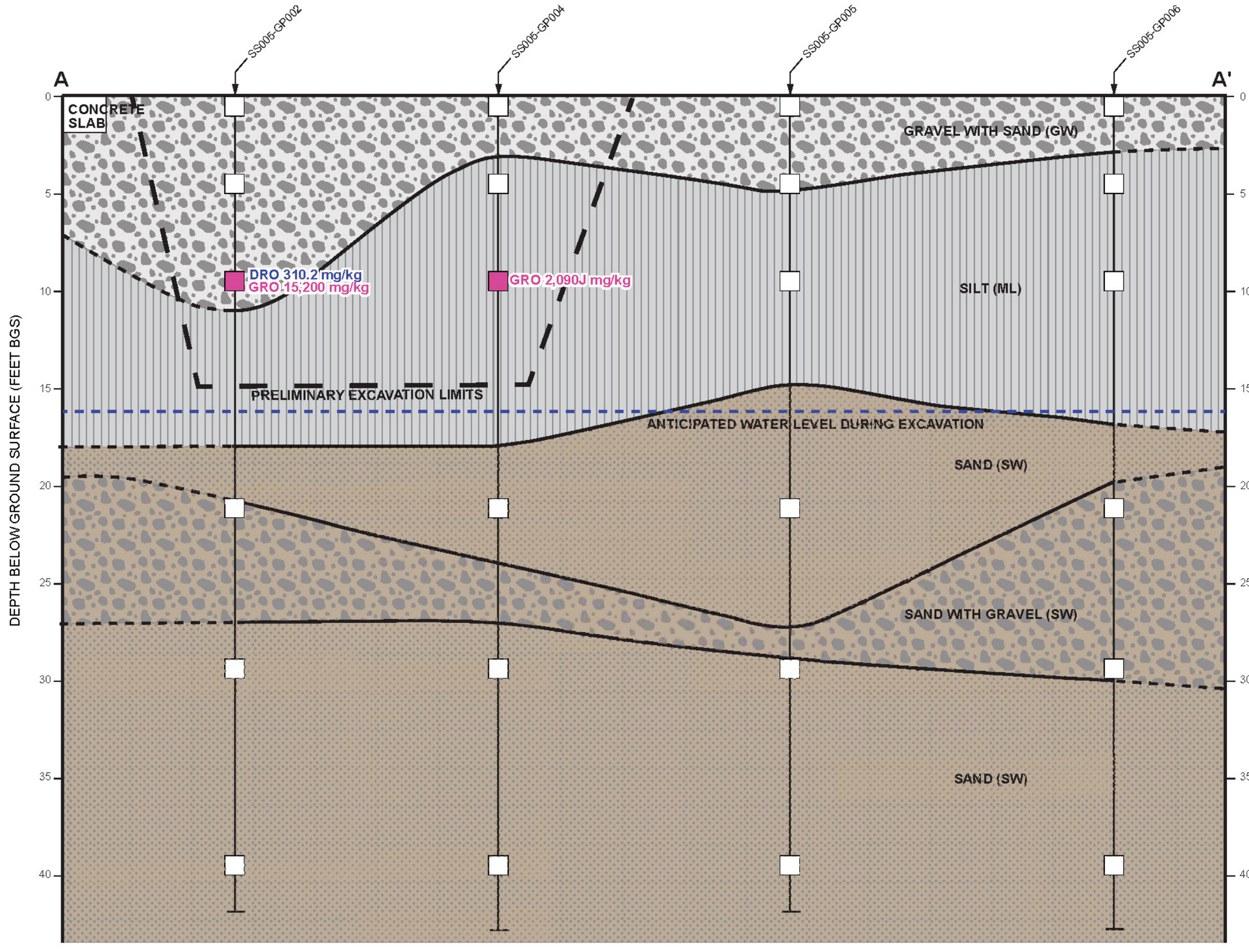
0 25 50
Feet

N

Note:
1. Aerial photography courtesy Alaska Department of Commerce, Community and Economic Development, Division of Community and Regional Affairs. July 7, 2009. Pixel size 6 inch.

FIGURE 2-9
Site SS005 Excavation Areas and Limits

Interim Removal Action Work Plan
Former Galena Forward Operating Location, Alaska



LEGEND

- GRAVEL WITH SAND (GW)
- SILT (ML)
- SAND (SW)
- SAND WITH GRAVEL (SW)
- CONCRETE SLAB
- ESTIMATED LITHOLOGIC INTERFACE
- SAMPLE EXCEEDS SCREENING LEVEL (GREATER THAN 100X ANALYTE SL)
- SAMPLE EXCEEDS SCREENING LEVEL (GREATER THAN 10X ANALYTE SL)
- SAMPLE EXCEEDS SCREENING LEVEL (1 TO 10X ANALYTE SL)
- SAMPLE DOES NOT EXCEED SCREENING LEVELS (<1X ANALYTE SL)

SS005-GP002
SOIL BORING

NOTES:

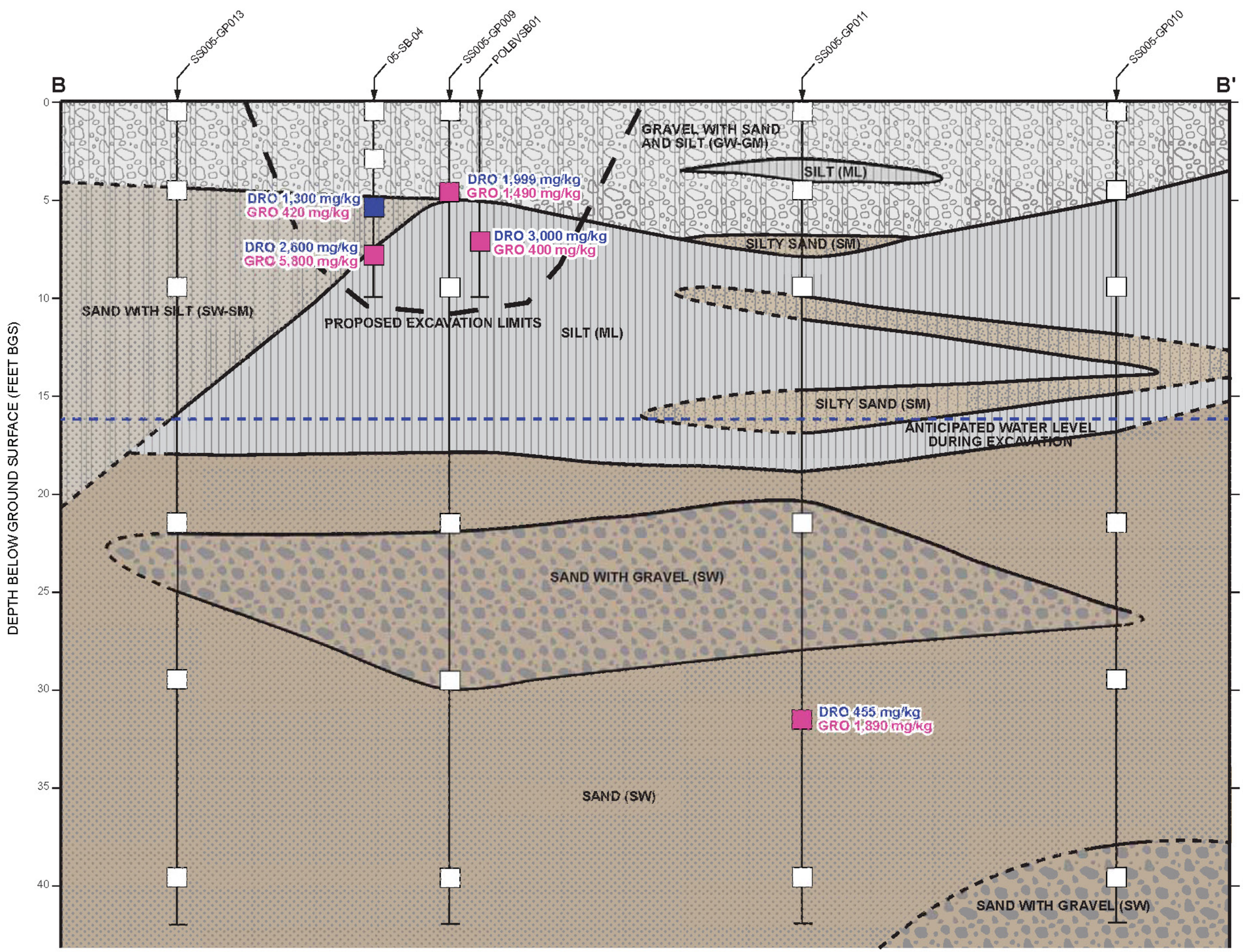
1. C10-C25 DRO AND CG-C10 GRO SOIL CONCENTRATIONS ONLY SHOWN.
2. J - THE ANALYTE WAS POSITIVELY IDENTIFIED: THE ASSOCIATED NUMERICAL VALUE IS THE APPROXIMATE CONCENTRATION OF THE ANALYTE IN THE SAMPLE.
3. ONLY EXCEEDANCES SHOWN, NON-DETECTS EXCLUDED.
4. SCREENING LEVELS ARE PRESENTED IN UNITS OF MG/KG FOR SOIL SAMPLES.
5. DRO SOIL SCREENING LEVEL = 250 MG/KG.
6. GRO SOIL SCREENING LEVEL = 140 MG/KG.
7. **PURPLE LABEL** = SAMPLE EXCEEDS SCREENING LEVEL (GREATER THAN 100X ANALYTE SL).
8. **SCARLET LABEL** = SAMPLE EXCEEDS SCREENING LEVEL (GREATER THAN 10X ANALYTE SL).
9. **BLUE LABEL** = SAMPLE EXCEEDS SCREENING LEVEL (1 TO 10X ANALYTE SL).
10. SL = SCREENING LEVEL.

5
2.5
0
HORIZONTAL SCALE: 1 INCH = 10 FEET
VERTICAL SCALE: 1 INCH = 5 FEET
0 5 10

FIGURE 2-10
Northern Cross Section through Site SS005
Interim Removal Action Work Plan
Former Galena Forward Operating Location, Alaska

ES020811222349RDD_2-10_SS005_A-A'

CH2MHILL®



LEGEND

- GRAVEL WITH SAND AND SILT (GW-GM)
- SAND WITH SILT (SW-SM)
- SILT (ML)
- SAND (SW)
- SAND WITH GRAVEL (SW)
- SILTY SAND (SM)
- ESTIMATED LITHOLOGIC INTERFACE
- SAMPLE EXCEEDS SCREENING LEVEL (GREATER THAN 100X ANALYTE SL)
- SAMPLE EXCEEDS SCREENING LEVEL (GREATER THAN 10X ANALYTE SL)
- SAMPLE EXCEEDS SCREENING LEVEL (1 TO 10X ANALYTE SL)
- SAMPLE DOES NOT EXCEED SCREENING LEVELS (<1X ANALYTE SL)

SS005-GP002
SOIL BORING

NOTES:

1. C10-C25 DRO AND CG-C10 GRO SOIL CONCENTRATIONS ONLY SHOWN.
2. J - THE ANALYTE WAS POSITIVELY IDENTIFIED. THE ASSOCIATED NUMERICAL VALUE IS THE APPROXIMATE CONCENTRATION OF THE ANALYTE IN THE SAMPLE.
3. ONLY EXCEEDANCES SHOWN, NON-DETECTS EXCLUDED.
4. SCREENING LEVELS ARE PRESENTED IN UNITS OF MG/KG FOR SOIL SAMPLES.
5. DRO SOIL SCREENING LEVEL = 250 MG/KG.
6. GRO SOIL SCREENING LEVEL = 140 MG/KG.
7. **PURPLE LABEL** = SAMPLE EXCEEDS SCREENING LEVEL (GREATER THAN 100X ANALYTE SL).
8. **SCARLET LABEL** = SAMPLE EXCEEDS SCREENING LEVEL (GREATER THAN 10X ANALYTE SL).
9. **BLUE LABEL** = SAMPLE EXCEEDS SCREENING LEVEL (1 TO 10X ANALYTE SL).
10. SL = SCREENING LEVEL.

5
2.5
0
HORIZONTAL SCALE: 1 INCH = 10 FEET
VERTICAL SCALE: 1 INCH = 5 FEET
0 5 10

FIGURE 2-11
Southern Cross Section through Site SS005
Interim Removal Action Work Plan
Former Galena Forward Operating Location, Alaska

ST009
OAP
(1962)
AST1573
BERM
Approximate Location of Former USTs 1558-1, 1558-2, 1558-3, 1558-4, 1558-5
Approximate Location of Former Valve Pit B
Approximate Location of Former Truck Fill Stand
AST1568
SS017
Airport Road
(1952)
Area A
Building 1573 Vehicle Maintenance Facility
Building 1556 Fire Department
Approximate Location of Former UST 1556
Approximate Location of Former UST
OWS1573
Former Building 1549
Former Building 1548
Area B
B1558
Building 1558 (Removed Except for Concrete Foundation)
Birchwood Avenue
Approximate Location of Former AST
PADS
SS014
Former Building 1551
Approximate Location of Former UST 1551
Approximate Location of Former OWS 1551

LEGEND

- SS014, SS017
- Adjacent Site
- Approximate Location of Former Feature
- Structure
- Approximate Excavation Limits

Historical Utility Locates

- Fire Hydrant
- Water Junction
- Water Valve
- Utility Pole
- Transformer
- Electric Generator
- Electrical Junction
- Heating/Cooling Manhole
- Heating/Cooling Valve
- Fuel Valve
- Water Line
- Electrical Line
- Heating/Cooling Line
- Main Storm Sewer Line
- Abandoned Wastewater Line
- Main Wastewater Line
- Service Wastewater Line
- Main Fuel Line
- Abandoned Fuel Line
- Abandoned Fuel Line (1952)
- Abandoned Fuel Line (1962)
- Valve Pit
- Fuel Tank

Utilidor Type

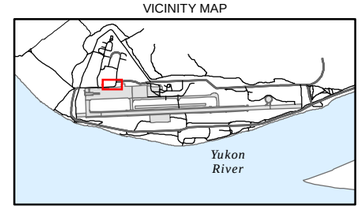
- Aboveground Utility
- Buried Utility

Active Utilities Located in 2010 Survey

- Electrical Line
- Communications Line
- Sanitary Sewer Main
- Storm Drain
- Potable Water Main
- Fuel/Gas Line
- Electrical Transformer
- Utility Vault
- Concrete Pad

Note:
1. Aerial photography courtesy Alaska Department of Commerce, Community and Economic Development, Division of Community and Regional Affairs. July 7, 2009. Pixel size 6 inch.

VICINITY MAP



0 25 50
Feet

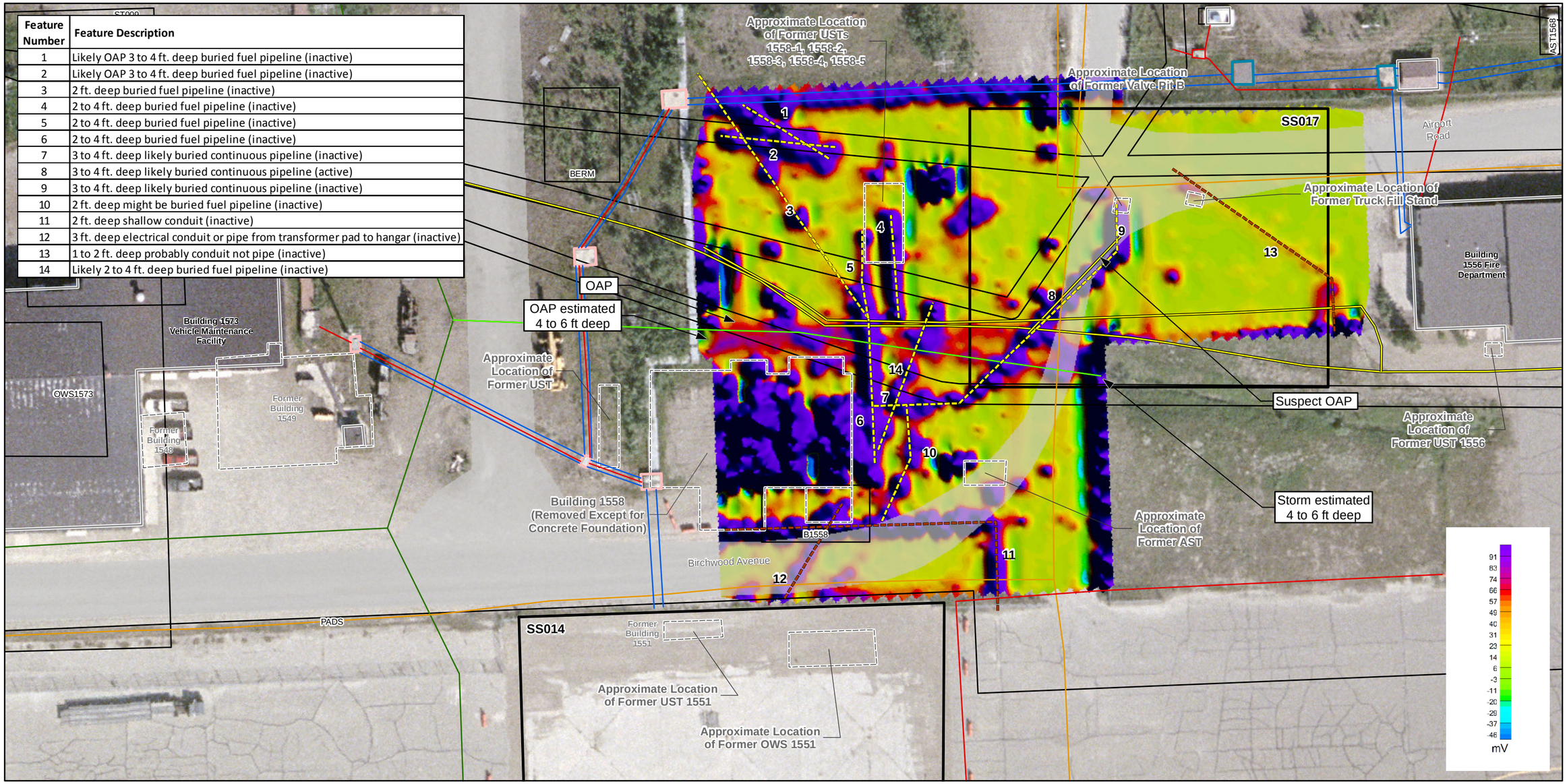
N

FIGURE 2-12
Sites SS014 and SS017
Historical Utilities
Interim Removal Action Work Plan
Former Galena Forward Operating Location, Alaska

RDD V:\GALENATO184_394439\MAPFILES\IRA_WORKPLAN\FIG_2-12_SS014_17_21_UTILS_IRA.MXD ECLARK1 7/12/2011 3:32:53 PM

CH2MHILL

Feature Number	Feature Description
1	Likely OAP 3 to 4 ft. deep buried fuel pipeline (inactive)
2	Likely OAP 3 to 4 ft. deep buried fuel pipeline (inactive)
3	2 ft. deep buried fuel pipeline (inactive)
4	2 to 4 ft. deep buried fuel pipeline (inactive)
5	2 to 4 ft. deep buried fuel pipeline (inactive)
6	2 to 4 ft. deep buried fuel pipeline (inactive)
7	3 to 4 ft. deep likely buried continuous pipeline (inactive)
8	3 to 4 ft. deep likely buried continuous pipeline (active)
9	3 to 4 ft. deep likely buried continuous pipeline (inactive)
10	2 ft. deep might be buried fuel pipeline (inactive)
11	2 ft. deep shallow conduit (inactive)
12	3 ft. deep electrical conduit or pipe from transformer pad to hangar (inactive)
13	1 to 2 ft. deep probably conduit not pipe (inactive)
14	Likely 2 to 4 ft. deep buried fuel pipeline (inactive)



LEGEND

- SS014, SS017
- Adjacent Site
- Approximate Location of Former Feature
- Structure
- Road

Active Utilities Located in 2010 Survey

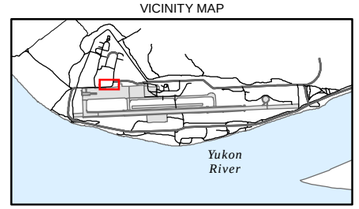
- Electrical Line
- Communications Line
- Sanitary Sewer Main
- Storm Drain
- Potable Water Main
- Fuel/Gas Line
- Electrical Transformer
- Utility Vault
- Concrete Pad

Other Utilities Identified from Geophysical Survey

- Underground Pipe, Inactive
- Underground Conduit, Inactive

Notes:
1. 2010 geophysical survey data is provided by SageEarth, Inc.
2. Aerial photography courtesy Alaska Department of Commerce, Community and Economic Development, Division of Community and Regional Affairs. July 7, 2009. Pixel size 6 inch.

VICINITY MAP

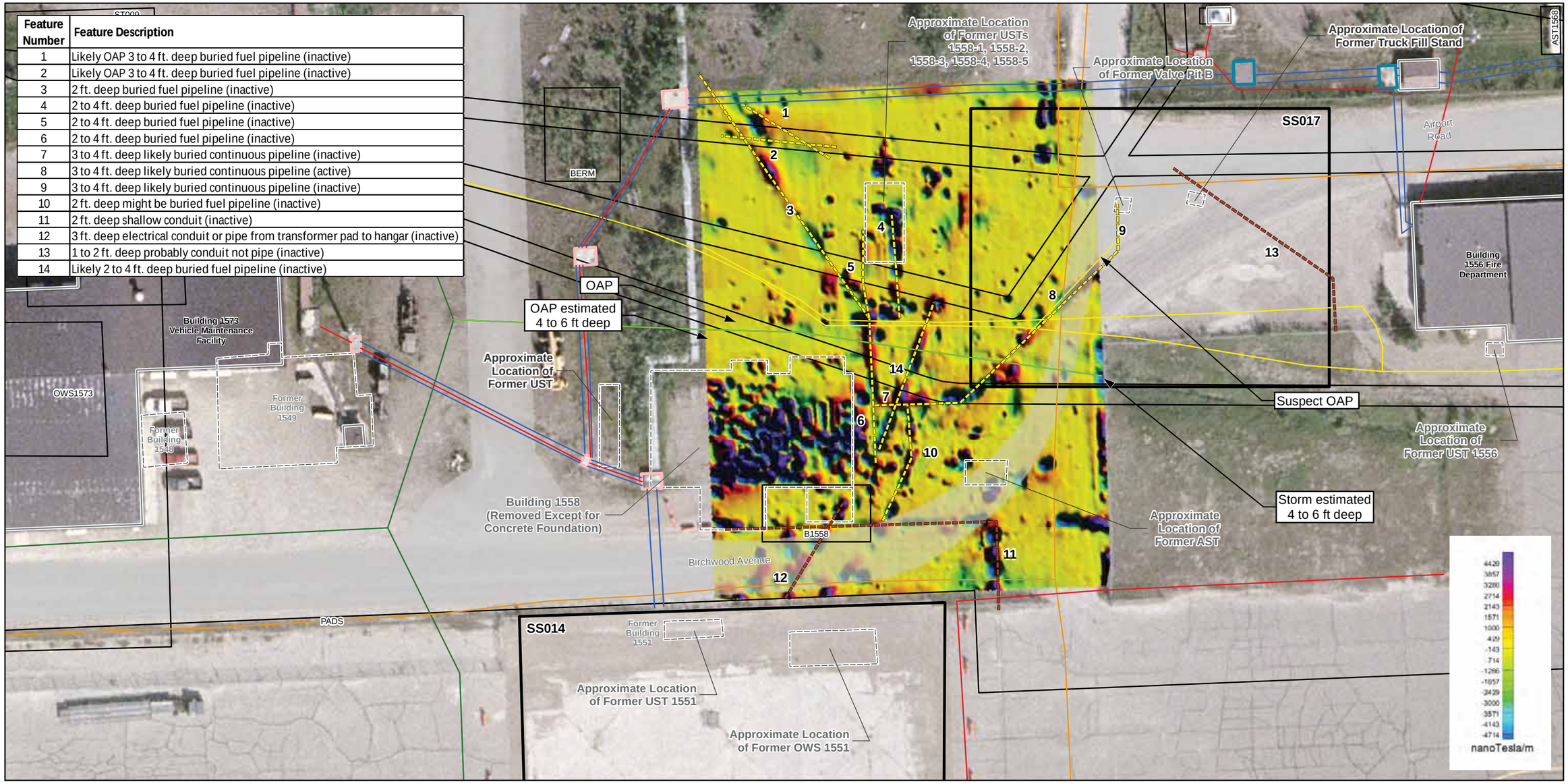


0 25 50
Feet

N

FIGURE 2-13
Sites SS014 and SS017
Geophysical Survey – EM61
Interim Removal Action Work Plan
Former Galena Forward Operating Location, Alaska

Feature Number	Feature Description
1	Likely OAP 3 to 4 ft. deep buried fuel pipeline (inactive)
2	Likely OAP 3 to 4 ft. deep buried fuel pipeline (inactive)
3	2 ft. deep buried fuel pipeline (inactive)
4	2 to 4 ft. deep buried fuel pipeline (inactive)
5	2 to 4 ft. deep buried fuel pipeline (inactive)
6	2 to 4 ft. deep buried fuel pipeline (inactive)
7	3 to 4 ft. deep likely buried continuous pipeline (inactive)
8	3 to 4 ft. deep likely buried continuous pipeline (active)
9	3 to 4 ft. deep likely buried continuous pipeline (inactive)
10	2 ft. deep might be buried fuel pipeline (inactive)
11	2 ft. deep shallow conduit (inactive)
12	3 ft. deep electrical conduit or pipe from transformer pad to hangar (inactive)
13	1 to 2 ft. deep probably conduit not pipe (inactive)
14	Likely 2 to 4 ft. deep buried fuel pipeline (inactive)



LEGEND

- SS014, SS017
- Adjacent Site
- Approximate Location of Former Feature
- Structure
- Road

Active Utilities Located in 2010 Survey

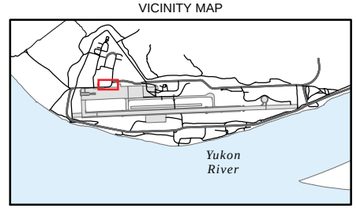
- Electrical Line
- Communications Line
- Sanitary Sewer Main
- Storm Drain
- Potable Water Main
- Fuel/Gas Line
- Electrical Transformer
- Utility Vault
- Concrete Pad

Other Utilities Identified from Geophysical Survey

- Underground Pipe, Inactive
- Underground Conduit, Inactive

Notes:
1. 2010 geophysical survey data is provided by SageEarth, Inc.
2. Aerial photography courtesy Alaska Department of Commerce, Community and Economic Development, Division of Community and Regional Affairs. July 7, 2009. Pixel size 6 inch.

VICINITY MAP

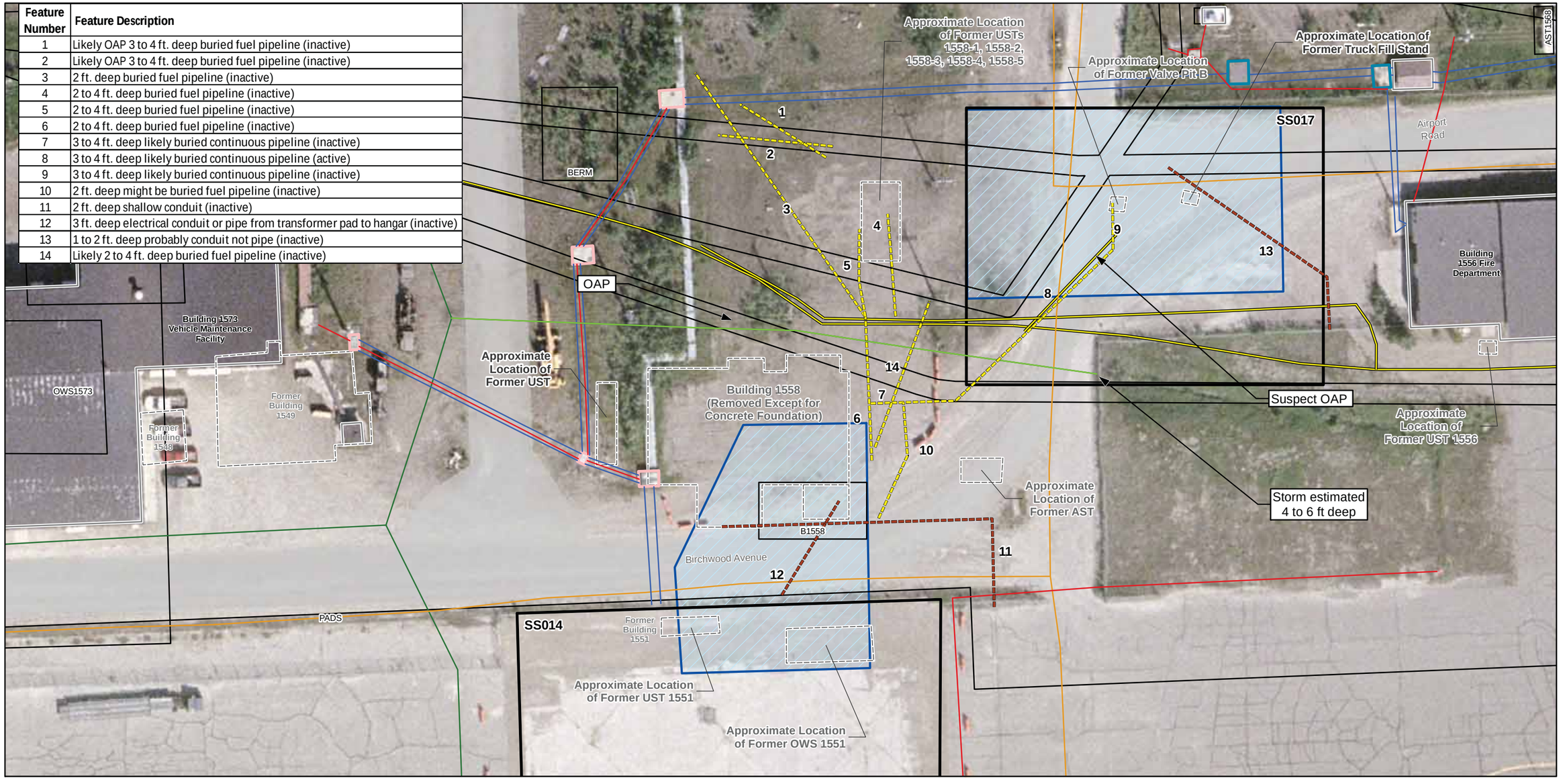


0 25 50
Feet

FIGURE 2-14
Sites SS014 and SS017
Geophysical Survey – Magnetic Field Plot
Interim Removal Action Work Plan
Former Galena Forward Operating Location, Alaska

CH2MHILL

Feature Number	Feature Description
1	Likely OAP 3 to 4 ft. deep buried fuel pipeline (inactive)
2	Likely OAP 3 to 4 ft. deep buried fuel pipeline (inactive)
3	2 ft. deep buried fuel pipeline (inactive)
4	2 to 4 ft. deep buried fuel pipeline (inactive)
5	2 to 4 ft. deep buried fuel pipeline (inactive)
6	2 to 4 ft. deep buried fuel pipeline (inactive)
7	3 to 4 ft. deep likely buried continuous pipeline (inactive)
8	3 to 4 ft. deep likely buried continuous pipeline (active)
9	3 to 4 ft. deep likely buried continuous pipeline (inactive)
10	2 ft. deep might be buried fuel pipeline (inactive)
11	2 ft. deep shallow conduit (inactive)
12	3 ft. deep electrical conduit or pipe from transformer pad to hangar (inactive)
13	1 to 2 ft. deep probably conduit not pipe (inactive)
14	Likely 2 to 4 ft. deep buried fuel pipeline (inactive)



LEGEND

- SS014, SS017
- Adjacent Site
- Approximate Location of Former Feature
- Structure
- Road
- Approximate Excavation Limits

Active Utilities Located in 2010 Survey

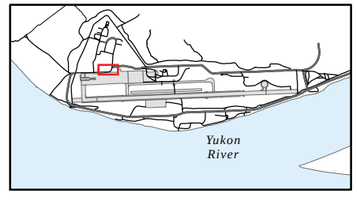
- Electrical Line
- Communications Line
- Sanitary Sewer Main
- Storm Drain
- Potable Water Main
- Fuel/Gas Line
- Electrical Transformer
- Utility Vault
- Concrete Pad

Other Utilities Identified from Geophysical Survey

- Underground Pipe, Inactive
- Underground Conduit, Inactive

Note:
1. Aerial photography courtesy Alaska Department of Commerce, Community and Economic Development, Division of Community and Regional Affairs. July 7, 2009. Pixel size 6 inch.

VICINITY MAP



0 25 50
Feet

FIGURE 2-15
Sites SS014 and SS017
Known Utilities and Unknown Features
Interim Removal Action Work Plan
Former Galena Forward Operating Location, Alaska

CH2MHILL

RDD V:\GALENATO184_394439\MAPFILES\IRA_WORKPLAN\FIG_2-15_SS014_17_21_UNKNOWN_FEATURES_IRA.MXD TMCBROOM 7/12/2011 3:35:36 PM

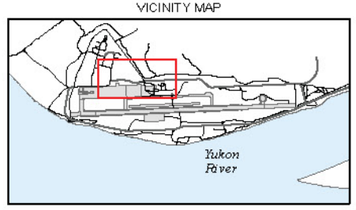
LEGEND

AST1569, SS005, SS014, SS016, and SS017

Approximate Location of Former Feature

Notes:
1. Photography date 9-4-1963, georeferenced.

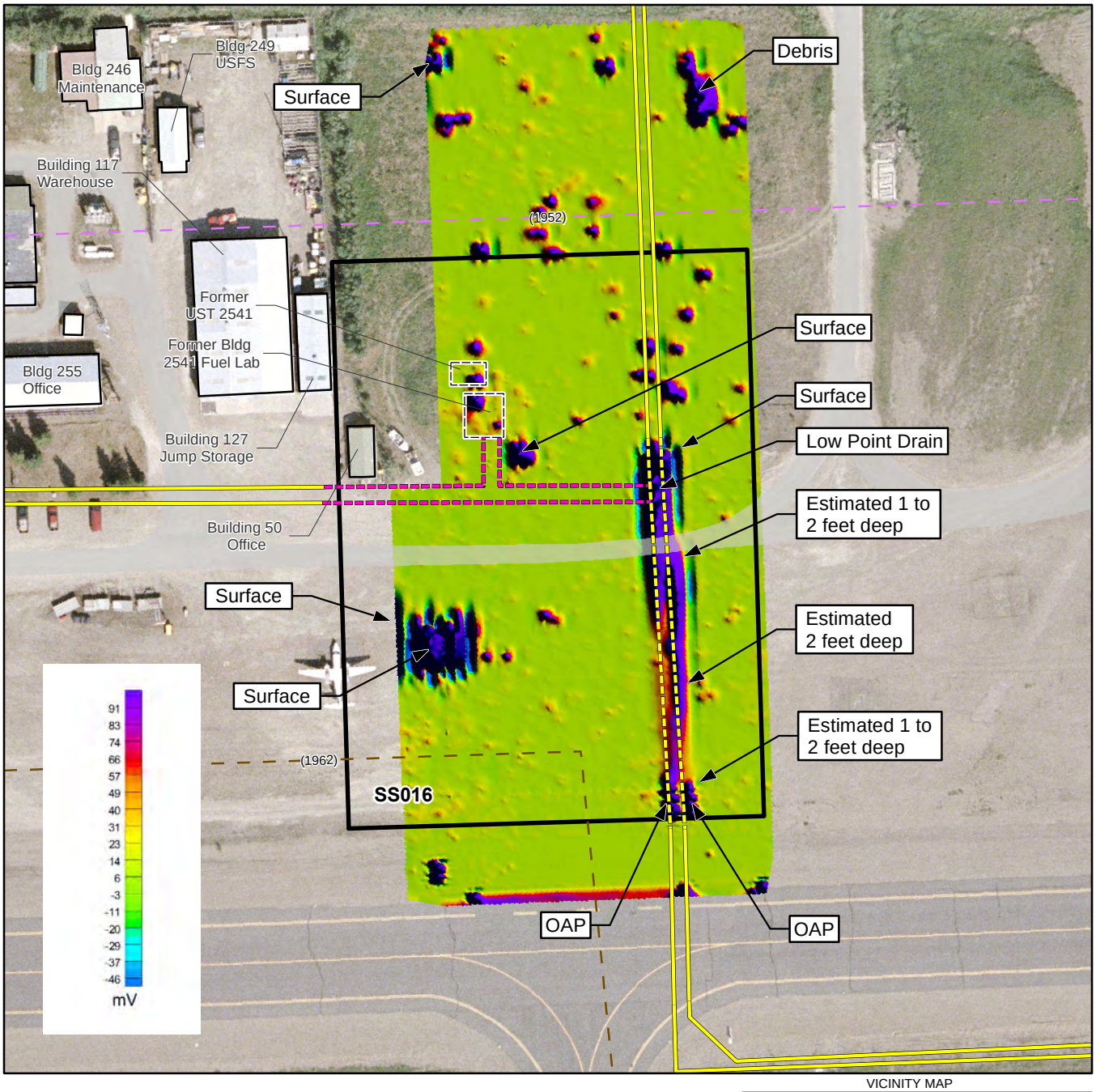
VICINITY MAP



0 100 200
Feet

N

FIGURE 2-16
Historical Aerial Photography
Interim Removal Action Work Plan
Former Galena Forward Operating Location, Alaska



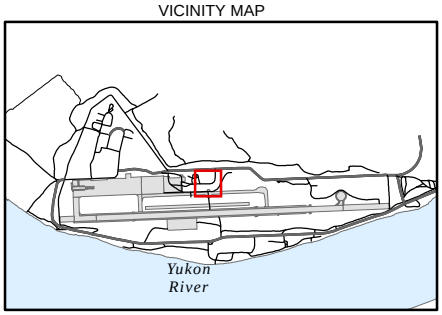
LEGEND

- SS016
- Adjacent Site
- Road
- Approximate Location of Former Feature
- Structure
- Abandoned Fuel Line (1952)
- Abandoned Fuel Line (1962)

Utilities Identified from Geophysical Survey and Other Studies

- Aboveground Fuel Line, Removed
- Underground Fuel Line, Inactive
- Underground Fuel Line, Removed

VICINITY MAP

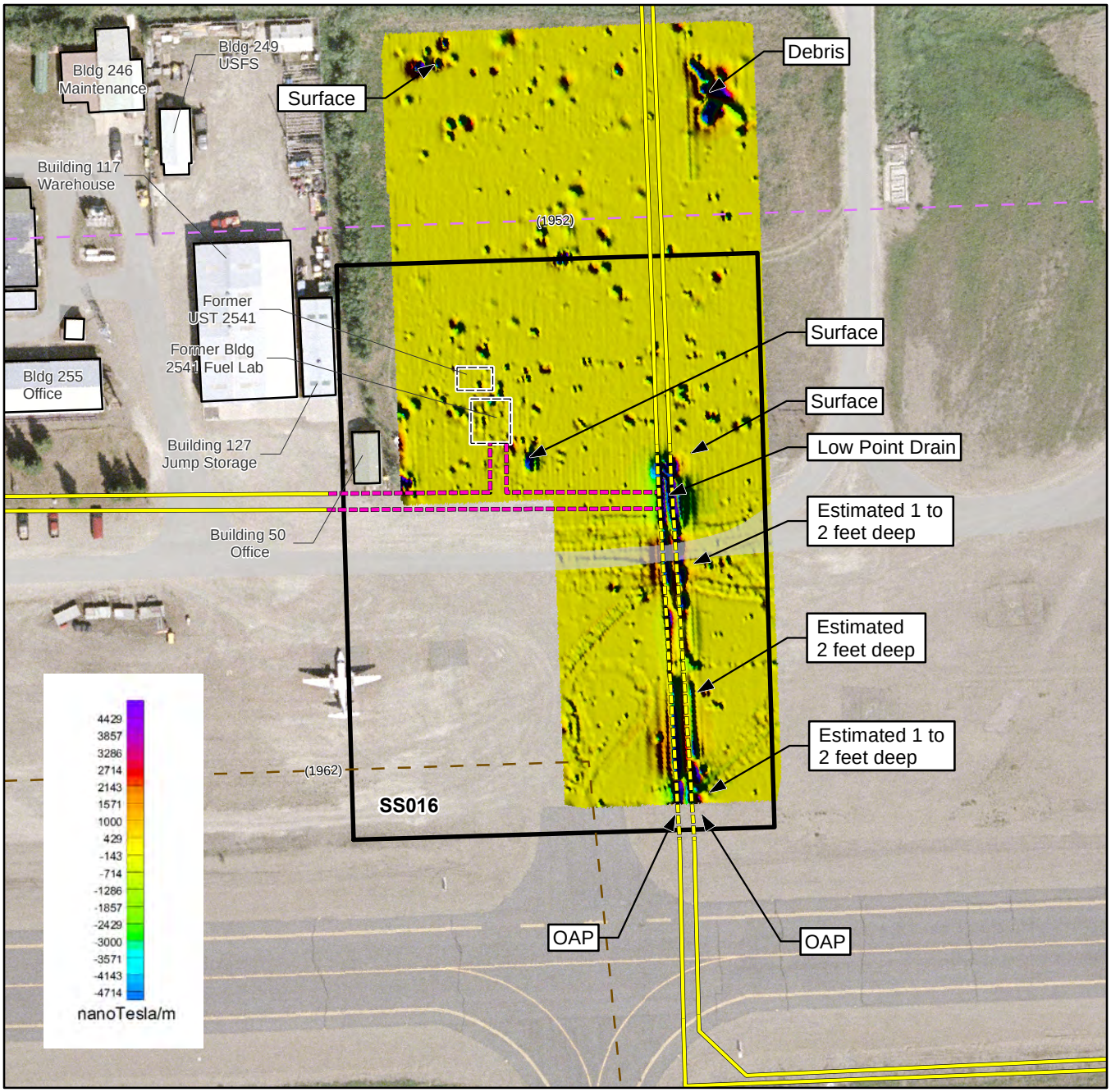


0 50 100
Feet

N

Notes:
1. No 2010 utility locate data for this site
2. 2010 GPR data is provided by SageEarth, Inc.
3. Aerial photography courtesy Alaska Department of Commerce, Community and Economic Development, Division of Community and Regional Affairs. July 7, 2009. Pixel size 6 inch.

FIGURE 2-17
Site SS016
Geophysical Survey – EM61
Interim Removal Action Work Plan
Former Galena Forward Operating Location, Alaska



LEGEND

- SS016
- Adjacent Site
- Road
- Approximate Location of Former Feature
- Structure
- Abandoned Fuel Line (1952)
- Abandoned Fuel Line (1962)

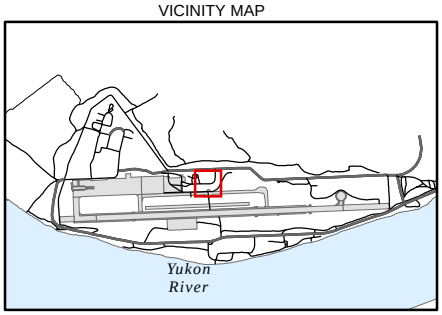
Utilities Identified from Geophysical Survey and Other Studies

- Aboveground Fuel Line, Removed
- Underground Fuel Line, Inactive
- Underground Fuel Line, Removed

0 50 100
Feet

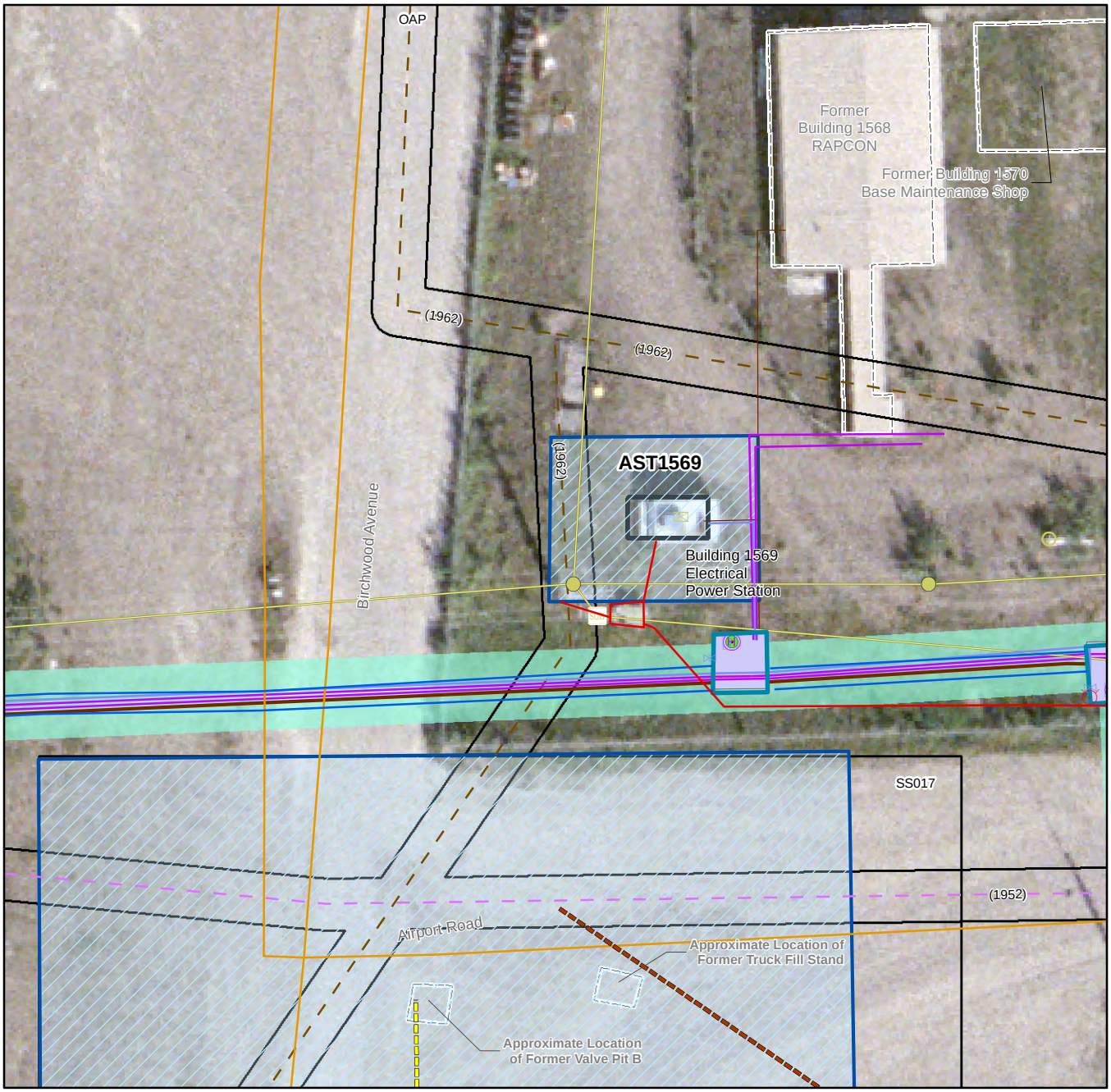
N

VICINITY MAP



Notes:
1. No 2010 utility locate data for this site
2. 2010 GPR data is provided by SageEarth, Inc.
3. Aerial photography courtesy Alaska Department of Commerce, Community and Economic Development, Division of Community and Regional Affairs. July 7, 2009. Pixel size 6 inch.

FIGURE 2-18
Site SS016
Geophysical Survey – Magnetic Field Plot
Interim Removal Action Work Plan
Former Galena Forward Operating Location, Alaska



LEGEND

- AST1569
- Adjacent Site
- Approximate Location of Former Feature
- Structure
- Approximate Excavation Limits

Historical Utility Locates

- Fire Hydrant
- Water Junction
- Water Valve
- Utility Pole
- Transformer
- Electric Generator
- Electrical Junction
- Wastewater Junction
- Heating/Cooling Valve
- Heating/Cooling Manhole
- Water Line
- Electrical Line
- Heating/Cooling Line
- Main Wastewater Line
- Service Wastewater Line
- Abandoned Fuel Line (1962)
- Abandoned Fuel Line (1952)
- Valve Pit

Other Utilities Identified from Geophysical Survey

- Underground Pipe, Inactive
- Underground Conduit, Inactive
- Buried Utility

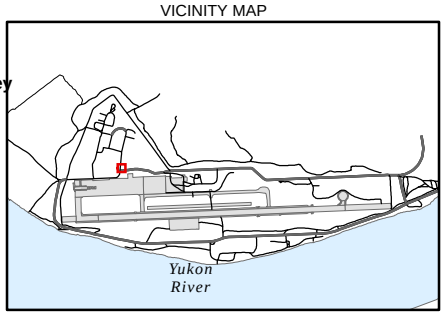
Active Utilities Located in 2010 Survey

- Electrical Line
- Communications Line
- Potable Water Main
- Electrical Transformer
- Utility Vault

0 15 30
Feet

N

VICINITY MAP



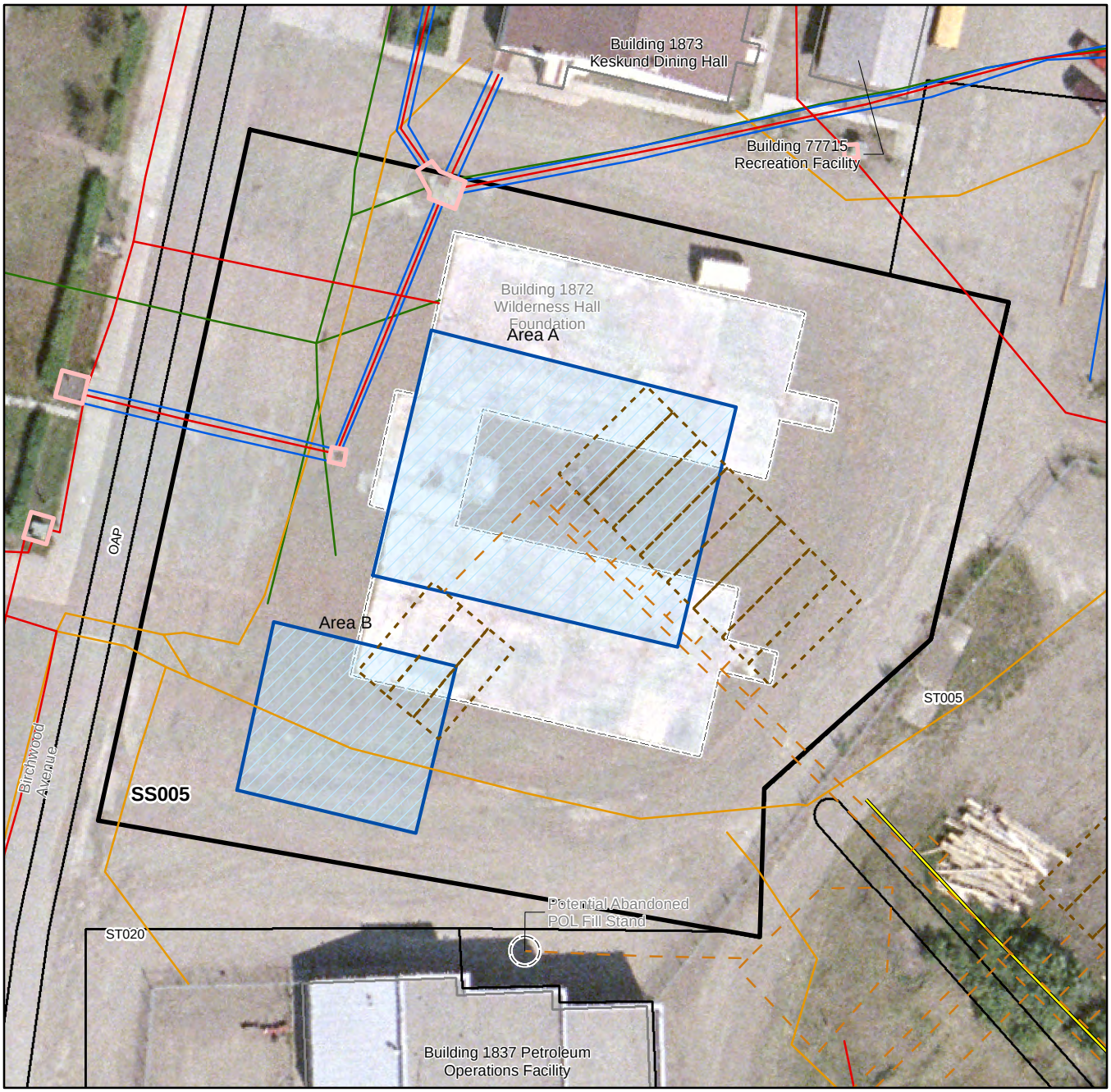
Note:
1. Aerial photography courtesy Alaska Department of Commerce, Community and Economic Development, Division of Community and Regional Affairs. July 7, 2009. Pixel size 6 inch.

FIGURE 2-19
Site AST1569
Historical Utilities

Interim Removal Action Work Plan
Former Galena Forward Operating Location, Alaska

CH2MHILL

V:\GALENATO184_394439\MAPFILES\IRA_WORKPLAN\FIG_2-19_AST1569_UTILS_IRA.MXD TMCBROOM 7/3/2011 11:23:13 AM



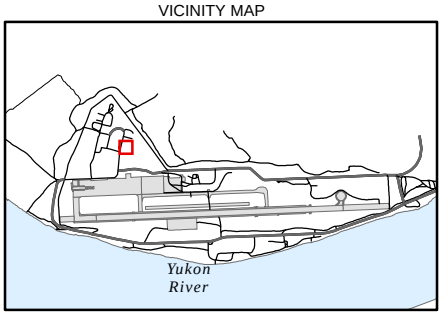
LEGEND

- SS016
- Adjacent Site
- Approximate Location of Former Feature
- Structure
- Approximate Excavation Limits
- Former Aboveground Storage Tank
- Removed Fuel Pipeline

Active Utilities Located in 2010 Survey

- Electrical Line
- Communications Line
- Potable Water Main
- Storm Drain
- Fuel/Gas Line
- Concrete Pad

VICINITY MAP



0 25 50
Feet

N

Note:
1. Aerial photography courtesy Alaska Department of Commerce, Community and Economic Development, Division of Community and Regional Affairs. July 7, 2009. Pixel size 6 inch.

FIGURE 2-20
Site SS005
Historical Utilities
Interim Removal Action Work Plan
Former Galena Forward Operating Location, Alaska

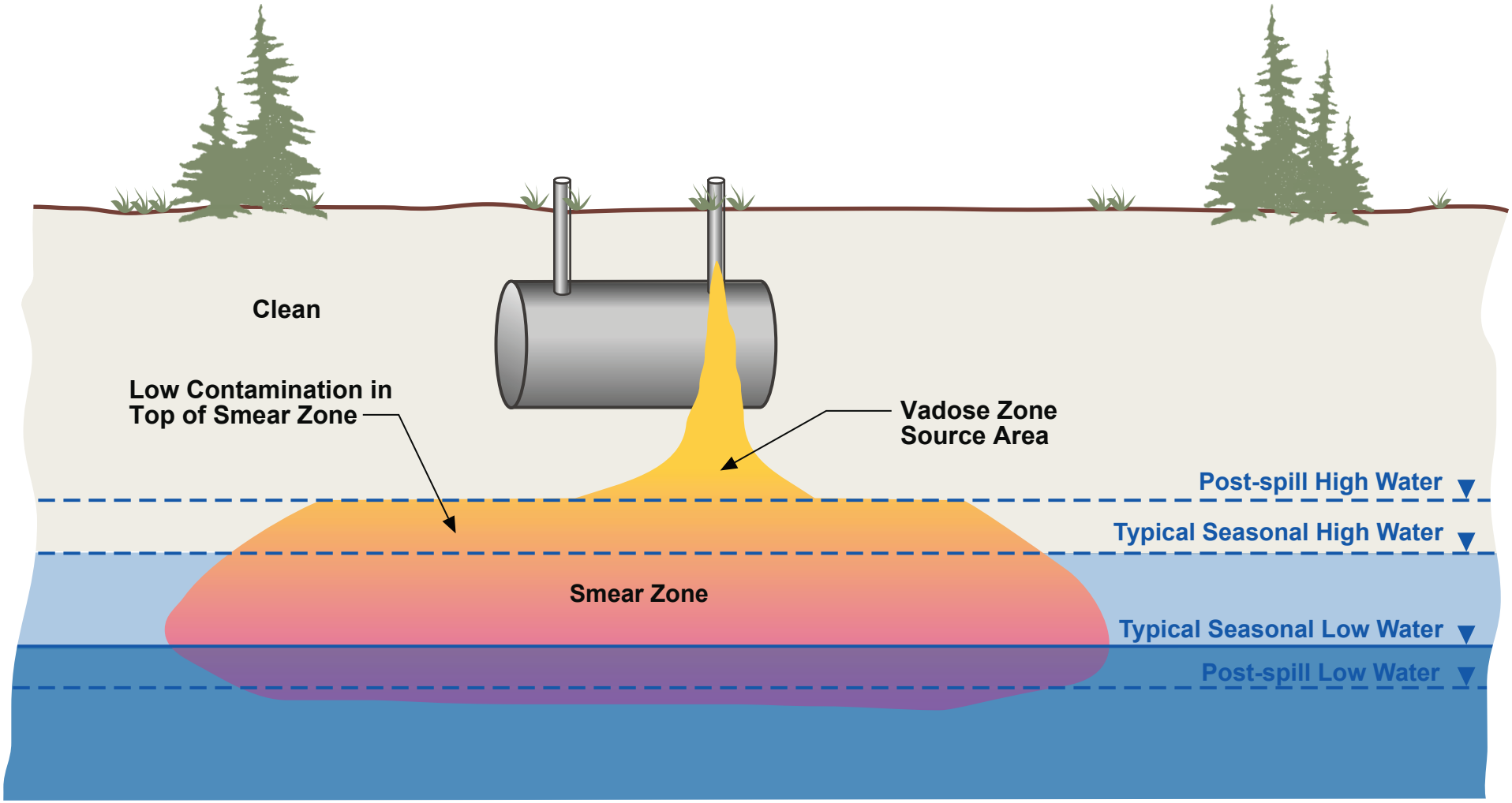


FIGURE 2-21
Conceptual Site Model
Interim Removal Action Work Plan
Former Galena Forward Operating Location, Alaska

SECTION 3.0

Interim Removal Action Approach

This section describes the permitting process, proposed excavation limits and constraints, site preparation, excavation of contaminated soil, post-excavation documentation, and site restoration.

3.1 Permitting

Before implementing the IRA, required permits will be obtained through the applicable regulatory agencies. The permitting process for the proposed excavation follows the requirements outlined in the Right of Access (ADA-71752) signed July 8, 2010. The permitting process consists of submitting applications for "proposed improvements" and a lane closure permit to the Alaska Department of Transportation & Public Facilities (ADOT&PF) and "proposed obstruction or alteration" to the Federal Aviation Administration (FAA).

The ADOT&PF permits will be submitted through ADOT&PF's online building permit application process and lane closure permit application process. As part of the ADOT&PF permits, the following items will be submitted: site plan and construction drawings with traffic control plan drawings, ADEC approval, National Pollutant Discharge Elimination System notice of intent and stormwater pollution prevention plan, and Division of Governmental Coordination approval. Because this project is being executed under the State of Alaska regulations, the Comprehensive Environmental Response Compensation, and Liability Act exemption for National Pollutant Discharge Elimination System permitting is not applicable. The FAA permit submittal notifies the FAA of construction or alteration that might affect navigable airspace, which is required by 49 Code of Federal Regulations Part 77. The FAA permit will be submitted using FAA Form 7460-1, *Notice of Proposed Construction or Alteration (05/07)*.

Notification of field activities, site access, and security will be coordinated as necessary with the entities listed in Table 3-1. Public meetings will be held with project stakeholders to discuss the proposed project components and answer any questions.

3.2 Excavation at Sites 14/17

Two excavation areas are tentatively proposed for the Sites 14/17/area based on the current CSM. These areas (A and B) are shown on Figure 2-1. Note that the excavations do not extend into the Site SS021 area. Although remediation within Site SS021 was originally included in the project scope, subsequent review of available laboratory data indicates the POL contaminant concentrations in soil are considerably lower at this site than the adjacent Sites SS014 and SS017. For example, the highest measured DRO soil concentration at Site SS021 is less than 9,000 mg/kg, and this concentration was observed at a depth of 19 feet, which is below the planned remediation excavation depth of 15 feet. Conversely,

DRO concentrations at the adjacent sites exceed 50,000 mg/kg within the planned 15-foot excavation depth. Therefore, excavation of contaminated soils at Site SS021 is not being considered at this time.

TABLE 3-1
Notification List
Work Plan for Interim Removal Action at Sites SS005, SS014, SS016, SS017, and AST1569 at Former Galena Forward Operating Location, Alaska

Notification of Field Activities	Permits for Airfield Access	Security
ADEC Fred Vreeman Remedial Project Manager (907) 451-2181	**ADOT&PF Leasing Officer** Collette Foster (907) 451-5201	**City of Galena Public Department** (907) 656-2177 (non-emergency)
ADOT&PF Bill O'Halloran, Airport Director (907) 656-1236 Sam Myers, Environmental (907) 451-5291		**Alaska State Troopers** (907) 656-1233
City of Galena Russ Sweetsir, Mayor (907) 656-1223 Tom Corrigan, City Manager (907) 656-1301		
Galena School District Jim Smith, Superintendent (907) 656-1883		
Louden Tribal Council March Runner, Chief Executive Officer (907) 656-1711		
KIYU Radio for Public Notice Shadow (Shadow@KIYU.com) (907) 656-1488		

Notes:
ADEC = Alaska Department of Environmental Conservation
ADOT&PF = Alaska Department of Transportation & Public Facilities

3.2.1 Sites 14/17 Excavation Constraints

Several factors will affect the ability to excavate the POL-contaminated soil. Factors that are common to both the Area A and Area B excavations include the following:

- Excavation cannot proceed until construction of the lined soil stockpile at the Campion airstrip has been substantially completed. Substantial completion includes construction of at least the following items:
  - Site clearing/grubbing and initial grading
  - Liner placed as needed before soil is placed in stockpile area

  - Installation of best management practices according to the stormwater pollution prevention plan (SWPPP)
  - Assurance that the remaining liner can be constructed ahead of the excavation schedule
  - Decontamination area

- Construction of the lined stockpile is planned to occur from late-June through August 2011. Excavation of the POL-contaminated soil at Sites 14/17 is planned to begin in late-August following substantial completion of the lined stockpile and continue into early October 2011. By mid-October, the daily temperature typically remains below freezing, snowfall is imminent, and daylight hours are decreasing. This leaves less than 2 months to complete the excavation. Normally, this period would be adequate to complete a 20,000-yd^3 excavation and backfill project. However, because of the many known and unknown utilities within the excavation footprint, and the time it will take to safely expose, assess, and disposition those lines, it may not be possible to remove as much of the contaminated soil as initially planned. The excavation areas will be prioritized to remove the most-contaminated soil to the maximum extent possible.

- The subsurface conditions at Sites 14/17 typically consist of varying thicknesses and combinations of silt, clay, and sand overlying relatively thick deposits of clean sand and silty sand, as discussed in Section 2.3.1 and shown on Figures 2-2 and 2-3. The transition to clean sand and silty sand typically occurs at about 10 feet bgs. The depth to the clean sand layer is critical in determining the horizontal and vertical excavation limits. This was observed during the September 2010 excavation for the bioreactor at Site SS015, where the fine sand layer was encountered at a depth of approximately 11 feet. The total excavation depth was 15 feet, and the water table was observed to be approximately 16 feet bgs, as indicated by a nearby monitoring well. During the excavation, the overlying sandy silt layer was excavated with very steep side slopes. The underlying sand layer was initially observed to be moist and supporting the overlying silt. However, the sand on the edges of the excavation began to dry out and ravel. Had the excavation and backfill operation required more than 1 day to be completed, the sand would have continued to ravel and would have undermined the overlying silt, causing overall sloughing of the side slopes. Because the IRA excavations will be open for days, and are planned to penetrate several feet into the fine sand layer, excavation limits must protect against slope raveling and sloughing to allow utilities to be protected and remain in service. Raveling is the surficial movement of soil particles on the face of cuts or fills. It can occur when surficial material dries, thus reducing soil cohesion. Raveling may also occur from vibratory disturbances of nearby construction equipment. If it appears that the sides of the excavation are raveling or sloughing, documentation samples will be collected, and clean material will be placed at the toe of the excavation wall and extended up the side of the wall until it is apparent major raveling will not occur.

- No geotechnical field or laboratory data are available to describe the strength characteristics of the soils to be excavated. The boring logs include various descriptors such as “firm,” “stiff,” or “very dense” for the fine-grained soils and “medium dense,” “dense,” or “very dense” for the granular soils. Without correlation to physical soil tests, those descriptors can only be used to approximate the likely behavior of the soil during

excavation. The recommended horizontal distance between the toe of the excavation and the edge of the facilities to remain in service is based on the following assumptions:

- The maximum excavation depth is 15 feet bgs.
- The excavation does not extend to, or below, the groundwater table.
- The soils drain relatively rapidly as the water table drops.
- The underlying fine- to medium-grained sand and silty sand are dense with a corresponding angle of internal friction (angle of repose) of about 34 degrees (Peck et al., 1974).
- The soil above the fine- to medium-grained sand and silty sand consists of stiff, non-plastic silt and sandy silt with strength characteristics similar to the sand layer.

On the basis of the criteria listed above, it is assumed that the excavation slope could ravel and slough to an approximate 1.5 (horizontal) to 1 (vertical) slope (the angle of repose). For a 15-foot-deep excavation, the resulting top of the slope would be located approximately 22.5 feet horizontally away from the toe of the slope. This is the minimum distance the toe of the excavation should be located away from facilities to remain. Because of the limited amount of geotechnical soils data and the significance and unknown condition of the facilities to remain (buried fuel line[s], buried utilidor, aboveground utilidor), an additional 8 feet of setback (for a total distance of 30.5 feet) has been included between the toe of the excavation and the adjacent facility.

The criteria and recommendations presented above will be adjusted in accordance with actual site conditions, soils data, and slope stability observations made during the excavations. Particle size analysis and Atterberg limits will be performed during the source delineation sampling to provide index properties. Historical records are being reviewed for standard penetration test (American Society for Testing and Materials D 1586) data to provide soil shear strength correlations.

- As discussed previously, the groundwater elevation fluctuates considerably during the year. Excavation is planned for the late summer and early fall prior to the onset of winter to take advantage of the lowering groundwater table. On the basis of historical data, it is anticipated that the groundwater will be approximately 15 to 18 feet bgs at Sites 14/17 during the excavation period. Historical groundwater data show considerable variation in the fall as demonstrated on the Figure 2-4 hydrograph. Groundwater levels in nearby monitoring wells will be recorded prior to and during excavation to ensure groundwater levels are not within 2 feet of planned excavation bottom and to track the seasonal changes. Section 2.3 discusses groundwater elevation monitoring during the excavation activities. The depth to groundwater is a key factor in determining the safe depth and extent of excavation. After the excavation extends into the underlying fine sand layer and is near the groundwater level, it will be very difficult and risky to attempt to excavate any deeper without significant shoring or dewatering. On the basis of the observed rapid groundwater response to changes in the Yukon River level, the clean, uniform sand is anticipated to have a relatively high coefficient of permeability, on the order of $1x10^{-1}$ to $1x10^{-2}$ centimeters per second (Cedergren, 1977).

Dewatering would need to be conducted with well points and would require the expensive treatment of large quantities of groundwater.

- Without dewatering, excavation below the water table will result in a surging action, which will cause the fine sand to flow into the excavation and undermine the overlying soil. The overlying soil will then slough into the excavation and potentially jeopardize the adjacent facilities that are intended to remain in service. Therefore, the plan is to attempt to excavate to approximately 15 feet bgs, but to terminate the excavation above that depth if groundwater is encountered.

3.2.2 Areas A and B Proposed Excavation

Design drawings are provided in Appendix C. These drawings represent a 90 percent design completion.

Figure 2-1 shows the planned excavation limits for Areas A and B. These limits are based on the CSM and the excavation criteria presented above. For Area A, the outer limits of the excavation are controlled by the buried utilidors to the north, the active fuel line to the south, the overhead power lines to the west, and the expected limits of contamination to the east (to be adjusted based on source delineation results). The excavation limits have been set so that the utilidors, power lines, and active fuel line can remain in service during the excavation and backfilling. Figure 2-2 shows a cross section through the Area A excavation. Figure 2-1 shows the location of the following key features that influenced the location of the Area A excavation, which includes utilities located west of the overhead power lines:

- Five buried USTs were located west of the proposed excavation. However, based on available historical data, it is anticipated that the upcoming site characterization program will not show significant levels of hydrocarbon contamination in this area. If necessary, excavation limits will be adjusted based on the source delineation results and utility constraints.

- Soil boring ST014-MC582 – This boring is located adjacent to the active jet fuel line and abandoned diesel fuel line. DRO concentrations in excess of 10,000 mg/kg were encountered in the upper 17 feet at this location. The highest measured concentration was 120,000 mg/kg at a depth of 9 feet. This boring is downgradient from the five buried USTs.

- Soil boring SS017-MC581 – This boring is also located adjacent to the active jet fuel line and abandoned diesel fuel line. DRO concentrations of 29,000 and 32,000 mg/kg were detected at depths of 9 and 10 feet, respectively. This boring is also downgradient from the five buried USTs.

- Soil boring SS014-MC592 – This boring is located on the north edge of the excavation. DRO concentrations ranging from 18,000 to 31,000 mg/kg were encountered in the upper 5 feet of soil samples from this boring.

- Valve Pit B and diesel fueling stand – These features were previously identified as likely hot spots. Borings SS017-MC566, TFS-MC150, and TFS-MC149 are located near these features. Several soil samples from these borings within the upper 10 feet contained DRO concentrations ranging from 24,000 to 110,000 mg/kg.

Figure 2-3 shows a cross section through the Area B excavation. The excavation limits for Area B, shown on Figure 2-1, are based on the following key features:

- Soil borings 1551-MC117 through 1551-MC122 – These borings are located immediately north of the old storage tank that was removed in 1997. Soil samples from these borings include several locations within the upper 15 feet where the DRO concentrations exceed 10,000 mg/kg. The highest concentration (54,600 mg/kg) was found in boring 1551-MC122 at a depth of 11 feet. The southern limit of the Area B excavation was positioned to allow excavation of the soil adjacent to these borings. New soil borings will be installed to the south of the excavation limits during the additional site characterization program. The Area B excavation limits will be reviewed and revised if necessary because of the new data.
- Soil borings 1551-MC247 and 1551-MC246 – These borings are located on the western limits of Area B. The soil sample at 15 feet from 1551-MC247 had a DRO concentration of 19,300 mg/kg. The soil sample at 13 feet from 1551-MC246 had a DRO concentration of 14,600 mg/kg.
- The southwestern excavation limits are controlled by the location of the existing buried utilidor that previously serviced Building 1551. This utilidor is planned to remain intact.
- Soil boring B1558 GP003 – This boring located south of the Building B1558 foundation was used to locate the northern limits of the bottom of Area B excavation. A DRO concentration of 36,700 mg/kg was detected at a depth of 9 feet.

The excavation limits for Areas A and B assume that excavation is completed to a depth of 15 feet bgs. With this assumption, it is estimated that approximately 5,200 yd^3 of soil will be excavated from Area A and 2,800 yd^3 from Area B, for a combined total of 8,000 yd^3. The estimated quantities is based on assumed excavation side slopes of 1.5:1 (horizontal:vertical). Final side slopes, excavation depths, and resulting excavation quantities will be determined in the field on the basis of actual site conditions. Both Areas A and B will be backfilled with compacted sand and gravel.

3.3 Excavation at Site SS016

The planned Site SS016 excavation areas are shown on Figure 2-5. Figure 2-6 shows a cross section through the main trench excavation.

As with Sites 14/17, several general factors affect the ability to excavate the POL-contaminated soil. These factors include the following:

- Excavation cannot proceed until construction of the lined stockpile has been substantially completed as discussed above for Sites 14/17.
- The subsurface conditions at Site SS016 consist of varying thicknesses and combinations of silt, and sandy silt overlying relatively thick deposits of silty sand, similar to Sites 14/17. The transition to silty sand typically occurs about 20 feet bgs rather than 10 feet at Sites 14/17. The boring logs for Site SS016 show some variation. For example, the log for boring SS016-MC574 indicates the top of the loose sandy silt layer was encountered at a depth of 10 feet rather than the typical 20-foot depth. As with

Sites 14/17, the depth to the silty sand layer will greatly influence the necessary excavation setbacks and temporary excavation side slopes.

- The location of the groundwater table will directly influence the excavation depth as presented above for Sites 14/17. However, at Site SS016, the fine sand layer appears to typically be about 10 feet bgs deeper than at Sites 14/17. Also, the predominant material above the sand appears to have considerably more clay than at Sites 14/17. The consistency of the clay is typically shown as "soft" on the boring logs. Excavation of the soft clayey soil beneath the water table will also present slope stability issues. As the excavation proceeds with depth, pore pressure may build up in the soft clay because of slow groundwater drainage through the clay. Eventually, the strength of the soft clay will be exceeded, and the saturated clay section will fail, causing the overlying soil to slough into the excavation. Therefore, as with Sites 14/17, the plan is to attempt to excavate to approximately 15 feet bgs, but to terminate the excavation above that depth if groundwater is encountered or if the overlying soft clay shows signs of slumping.

Figure 2-5 shows the planned excavation limits for Site SS016 based on the CSM and the excavation criteria presented above. Figure 2-5 shows the location of the following key features that influenced the excavation area:

- Soil boring SS016-MC571 – This boring is located immediately north of the intersection of the north/south and east/west legs of the abandoned fuel lines. DRO concentrations in excess of 10,000 mg/kg were encountered at two depths in this boring: 34,000 mg/kg at 7 feet and 54,000 mg/kg at 9 feet.
- Soil boring SS016-MC573 – This boring is located along the north/south leg of the abandoned fuel lines. Several soil samples from this boring exceeded DRO concentrations of 10,000 mg/kg. They include the following:
  - 45,000 mg/kg at 5-foot depth
  - 29,000 mg/kg at 7-foot depth
  - 66,000 mg/kg at 12-foot depth
  - 58,000 mg/kg at 14-foot depth
  - 35,000 mg/kg at 15-foot depth
  - 15,000 mg/kg at 17.5-foot depth
- Geophysical mapping – Geophysical mapping performed in 2010 by Sage Earth, Inc. (see Figures 2-15 and 2-16) indicates that approximately 250 feet of the old buried fuel lines are still in place. This pipe segment extends southerly from the low-point drain at the intersection of the north/south and east/west pipes. The trench backfill may have served as a conduit for leakage that may have historically occurred at the low-point drain.
- Building 2541 and adjacent UST – Building 2541 and the adjacent UST have been previously identified as potential source areas. The geophysical survey indicates that the UST has been removed.

No aboveground or buried active utilities or other facilities are known to exist at Site SS016 that would affect the excavation limits. Therefore, it is assumed that the excavation can extend to the 15-foot target depth without encroaching on facilities that are to remain in

service. It is further assumed that temporary construction excavation slopes will be 1.5:1 and the excavation will not extend into the groundwater. On the basis of these assumptions, it is estimated that approximately 8,700 yd^3 of soil will be excavated. Data collected during source delineation borings planned to be installed in June and July 2011 will assist in further determination of the extent of contamination. Excavation limits will be adjusted as necessary based on the data. Final side slopes, excavation depths, and resulting excavation quantities will be determined in the field on the basis of actual site conditions. The excavations will be backfilled with compacted sand and gravel.

3.4 Excavation at Site AST1569

The planned Site AST1569 excavation area is shown on Figure 2-7. Figure 2-8 shows a cross section through the excavation. Building 1569 was removed from the site in May 2011. As with the previous sites, several general factors affect the ability to excavate the POL-contaminated soil. These factors include the following:

- Excavation cannot proceed until construction of the lined stockpile has been substantially completed as discussed above.
- The subsurface conditions at Site AST1569 consist of varying thicknesses and combinations of gravel overlain by silt and sandy silt. The transition to silt and sandy silt typically occurs at about 4 feet similar to Sites 14/17.
- Because of the shallow nature of this excavation, the location of the groundwater table is not anticipated to directly influence the excavation depth.

Figure 2-7 shows the planned excavation limits for Site AST1569 based on the CSM and the excavation criteria presented above. Figure 2-7 shows the location of the following key features that influenced the excavation area:

- Soil boring AST1569_GP001 – This boring is located on the northwest corner of former Building AST1569. DRO concentrations in excess of 1,000 mg/kg were encountered at two depths in this boring: 6,880 mg/kg at 3 feet and 5,240 mg/kg at 5 feet.
- Soil boring AST1569_GP005 – This boring is located north of former Building AST1569. DRO concentrations in excess of 1,000 mg/kg were encountered at only one depth in this boring: 1,190 mg/kg at 5 feet.

Overhead power lines are located above the excavation on the west and south side. They are approximately 30 feet above ground level, and precautions will be taken to maintain a safe work distance away from these power lines when working with heavy equipment; therefore, no impact is anticipated from these power lines. It is assumed that the excavation can extend to the 8-foot target depth without encroaching on facilities that are to remain in service. It is further assumed that temporary construction excavation slopes will be 1.5:1 and the excavation will not extend into the groundwater. On the basis of these assumptions, it is estimated that approximately 140 yd^3 of soil will be removed. Final side slopes, excavation depths, and resulting excavation quantities will be determined in the field on the basis of actual site conditions. To ensure construction activities are completed at this site before the start of school on August 22, all contaminated soil will be transported to the lined stockpile

and will not be segregated as described in Section 2.6. The excavation will be backfilled with compacted sand and gravel.

3.5 Excavation at Site SS005

The planned Site SS005 excavation areas are shown on Figure 2-9. Figures 2-10 and 2-11 show cross sections through the northern and southern excavations, respectively. As with the previous sites, several general factors affect the ability to excavate the POL-contaminated soil. These factors include the following:

- Excavation cannot proceed until construction of the lined stockpile has been substantially completed as discussed above.
- The subsurface conditions at Site SS005 consist of varying thicknesses and combinations of gravel overlaying silt intermixed with sand. The transition from gravel to silt and sandy silt typically occurs at about 5 to 10 feet, similar to Sites 14/17. Sand and sand with gravel is observed at 15 to 40 feet bgs.
- Because of the higher ground elevation at these excavations, the location of the groundwater table is not anticipated to directly influence the excavation depth.

Figure 2-9 shows the planned excavation limits for Site SS005 based on the CSM and the excavation criteria presented above. Figure 2-9 shows the location of the following key features that influenced the excavation area:

Northern Excavation Area

- Soil boring SS005_GP002 – This boring is located in the central (gravel) portion of the Building 1872 foundation. GRO and DRO concentrations in excess of 1,000 mg/kg were encountered at one depth in this boring: GRO was 15,200 mg/kg and DRO was 310.2 mg/kg at 10 feet bgs.
- Soil boring SS005_GP004 – This boring is located in the central (gravel) portion of the Building 1872 foundation. GRO concentrations in excess of 1,000 mg/kg were encountered at only one depth in this boring: 2,090 mg/kg at 10 feet bgs.

Southern Excavation Area

- Soil boring SS005_GP009 – This boring is located south of the Building 1872 foundation. GRO and DRO concentrations in excess of 1,000 mg/kg were encountered at only one depth in this boring: GRO was 1,490 mg/kg and DRO was 1,999 mg/kg at 5 feet bgs.
- Soil boring 05-SB-04 – This historical boring is located south of the Building 1872 foundation. GRO and DRO concentrations in excess of 1,000 mg/kg were encountered at two depths in this boring:
  - DRO was 1,300 mg/kg (5 feet bgs)
  - DRO was 2,600 mg/kg (7.5 feet bgs)
  - GRO was 5,800 mg/kg (7.5 feet bgs)

- Soil boring POLBVSB01 – This boring is located south of the Building 1872 foundation. DRO concentrations in excess of 1,000 mg/kg were encountered at only one depth in this boring: DRO was 3,000 mg/kg at 7.5 feet bgs.

Inactive steam and water lines in a utilidor enter the west side of the foundation at the northern excavation of Site SS005. These lines were previously capped outside the manhole located approximately 20 feet west of the foundation; the pipes will be removed during excavation and the utilidor backfilled. Therefore, it is assumed that the excavation can extend to the 15-foot target depth without encroaching on facilities that are to remain in service.

An active communication line runs through the proposed limits of the southern excavation. This buried communication line will be temporarily relocated by the City of Galena prior to excavation activities. The conduit will be removed during excavation activities, and then replaced during backfilling. The City will reconnect the communication line after the site is restored.

It is assumed that temporary construction excavation slopes will be 1.5:1 and the excavation will not extend into the groundwater. On the basis of these assumptions, it is estimated that approximately 2,400 yd^3 of soil will be removed from the northern excavation. The target depth of the southern excavation is 10 feet; it is estimated that approximately 700 yd^3 of soil will be removed from the southern excavation. Final side slopes, excavation depths, and resulting excavation quantities will be determined in the field on the basis of actual site conditions. To ensure construction activities are completed at this site before the start of school on August 22, all contaminated soil will be transported to the lined stockpile and will not be segregated as described in Section 2.6. Confirmation sampling will be performed as described in Section 3.8. The excavations will be backfilled with compacted sand and gravel.

3.6 Site Preparation

This section describes site preparation activities that include fence removal, temporary fence installation, traffic rerouting and signage, clearing and grubbing, implementation of best management practices, and establishing soil stock pile areas and a decontamination area.

3.6.1 Temporary Fencing

Fencing in certain areas of the site will need to be temporarily removed during construction. Temporary chain-link fencing and signage will be placed around the excavation areas to prevent unauthorized personnel from entering the work areas. Gates will remain locked during non-work hours.

3.6.2 Traffic Rerouting

Traffic will be temporarily rerouted during the remediation at Sites 14/17. The excavation will block the intersection of Levy Road, Birchwood Avenue, and Airport Road. Barricades and signage will be provided to reroute traffic to Perimeter Road or Eagle Road. The proposed rerouting will be coordinated with the City of Galena, ADOT&PF, and the Galena City School District. It is anticipated that rerouting will be required from mid-August through mid-October.

No traffic rerouting will be required for the remediation work at Site SS016. However, signage will be provided to alert motorists that construction equipment might be entering or leaving Airport Road adjacent to Site SS016. A detailed traffic control plan is being prepared and will be submitted with a Lane Closure Permit to ADOT&PF for approval. See the current draft in the design drawings in Appendix C.

Traffic will not need to be rerouted during the remediation at Sites AST1569 and SS005. The excavations are currently located greater than 50 feet from the edge of Birchwood Avenue. Signage will be provided to alert motorists that construction equipment might be entering or leaving Birchwood Avenue and Airport Road adjacent to Sites AST1569 and SS005. A detailed traffic control plan has been prepared and submitted with a Lane Closure Permit to ADOT&PF for approval. See design drawings in Appendix C.

Currently, signage exists at both entrances to the washout areas on the haul road east of Galena. Signage will be added to alert motorists of the restricted lane width and reduced speed limit. A Lane Closure Permit will be submitted to ADOT&PF for approval.

3.6.3 Clearing and Grubbing

Clearing and grubbing will occur prior to and during construction at the work sites and adjacent areas. Clearing and grubbing will consist of clearing the ground surface of the excavation areas of grass or weeds, structures, concrete foundations, asphalt pavement and gravel road base, debris, and rubbish. Material from the clearing and grubbing operation will be transported to the City of Galena's landfill for disposal.

Clearing at the Campion airstrip stockpile area will consist of cutting trees to within a few inches of the ground surface, grubbing the roots, and then smooth-grading the resulting ground surface. Cleared and grubbed material will be transported to the City of Galena landfill for disposal.

3.6.4 Surface Water Control

The Sites 14/17, AST1569, and SS005 areas are relatively flat; whereas, the ground surface at Site SS016 slopes gently to the south within the planned excavation area. Currently, surface water control in both areas appears to be via sheet flow to existing stormwater systems. During construction, the existing stormwater system will be protected and will remain in service. Measures will be taken to preclude surface water from entering or leaving the construction site. These measures may include sand bag berms to direct water around the construction site and into the existing stormwater system. Other measures will be identified in the SWPPP. CH2M HILL will generate and submit to the ADEC Division of Water a SWPPP as part of the Construction General Permit. The construction subcontractor will be required to adhere to and revise the SWPPP.

Erosion control measures will be developed during the design of the project and incorporated into the site work while construction activities are taking place. These measures will consist of sediment fences or wattles at the toe of new slopes and stockpiles, and downhill of disturbed areas. There will also be gravel construction entrances at the limits of construction to minimize soil being transported away from the construction site.

3.6.5 Soil Stockpile and Decontamination Areas

Soil from the excavations will be stockpiled at several locations depending on the contaminant concentration of the material. Clean soil is anticipated to be located within the upper few feet of the excavation areas. This soil will be stockpiled onsite for reuse as backfill. Two temporary clean soil stockpile areas have been identified for Sites 14/17, one in the RAPCON area to the north of Sites 14/17 and the other on the southern portion of the Birchwood Hangar concrete pad. The temporary clean soil stockpile area for work at Site SS016 is located in the grassy area north of the excavations. The temporary clean soil stockpile area for work at Site SS005 is located in the gravel area north and east of the northern excavation. It is anticipated that approximately 5,800 yd^3 of clean soil will be generated from the required excavations. Because the soil to be stockpiled onsite is clean, no bottom liner is required. It will be verified clean as described in Section 2.6. Clean soil stockpiles will be moistened as necessary to control dust and the stockpile covered if inclement weather is forecast. Soil in the clean onsite stockpiles will be reused as excavation backfill after verification by a geotechnical engineer or engineering geologist as being suitable for use as structural backfill at the excavation bottom. The material will generally be placed at depths of 10 feet or greater and consolidated after placement by the weight of the overlying backfill. Dedicated dump trucks will be used to transport the clean soil to avoid cross contamination with POL soils.

Soil that meets the criteria for landfill cover material as described in Section 2.6 will be transported to the City of Galena landfill and placed in a stockpile on the previously covered portion of the landfill for future use as landfill cover material, as shown of Figure 3-1. The stockpile does not need to be lined but will be covered with a minimum 6-mil, reinforced-polyethylene liner or equivalent, in accordance with 18 AAC 75.370. It is anticipated that approximately 5,800 yd^3 of excavated soil will meet the criteria for use as landfill cover material.

Soil that exceeds the criteria for landfill cover material will be transported to the long-term soil stockpile area located on the old Campion airstrip. Approximately 12,000 yd^3 of soil are expected to exceed the criteria for landfill cover material and will be placed at the Campion airstrip stockpile. The airstrip will be cleared of trees and brush, grubbed, and then finish-graded. If necessary, a thin layer of sand will be placed on the finished grade to fill in any depressions or rough spots. The stockpile will be constructed in accordance with the requirements of SOP-34 (*Soil Storage*) (see Appendix D). A 20-mil high-density polyethylene liner in accordance with 18 AAC 75.370 will be placed on the prepared subgrade and covered with a 12-ounce-per-square-yard nonwoven geotextile. The bottom liner panels will be overlapped (shingled) in the downslope direction to prevent water within the soil stockpile from penetrating the bottom liner. Contaminated soil will be placed on the liner and spread with a dozer. At least 6 inches of soil must be in place before the dozer can operate on the liner/geotextile. A 10-mil high-density polyethylene cover will be placed over the stockpile and held in place with sandbags. The stockpile will remain covered if inclement weather is forecast. The stockpile areas will be returned to their preconstruction condition when no longer required.

A decontamination area will be located at exits from the work areas. Loaded dump trucks and other vehicles leaving the excavation work areas will be routed through the decontam-

ination areas. Trucks returning from the lined stockpile or landfill will have been decontaminated at those sites.

3.7 Excavation Activities

This section describes excavation of the contaminated soil; the excavated soil sampling plan; the ADEC approval process for transporting the soil; and the process for abandoning utilities within excavation limits, controlling water within the excavation, and monitoring and controlling air emissions.

The execution of the actual excavation activities will be established by the selected subcontractor in their work plan that will be submitted to and reviewed by CH2M HILL prior to the start of any work activities. The subcontractor's work plan must comply with the criteria, schedule, and general requirements of the bid documents drafted by CH2M HILL. The subcontractor must demonstrate in their work plan the means and methods for performing the work, including the numbers and types of major equipment, sequencing of the work, schedule for completing work within the allotted timeframe, number of personnel and their roles, and health and safety considerations including activity hazard analysis.

Historical soil data and site operational history were evaluated to determine whether Resource Conservation and Recovery Act (RCRA) hazardous waste will be generated, and whether the RCRA hazardous waste management and corrective action requirements are triggered by the soil removal action. Although trichloroethene and tetrachloroethene have been detected at low levels in this area, USAF performed a due diligence search, and no record of historical trichloroethene or tetrachloroethene use, storage, or releases at the site was found. Therefore, the low-level chlorinated volatile organic compounds are incidental to the petroleum contamination at these sites; and in accordance with U.S. Environmental Protection Agency RCRA guidance, the soil does not contain a listed hazardous waste. Additionally, existing data indicate that the soil does not exhibit a hazardous waste characteristic. Historical concentrations of volatile organic compounds, metals, pesticides, and semivolatile organic compounds do not exceed hazardous waste toxicity characteristic levels. As shown in Table B-1 in Appendix B, the total analytical concentrations are well below 20 times the toxicity characteristic levels. Total analysis may be used in lieu of the toxicity characteristic leaching procedure to determine if an analyte is above a toxicity characteristic level. This is stated in Section 1.2 of toxicity characteristic leaching procedure Method 1311. Because the primary contaminants are petroleum-based, removal of this soil under the State of Alaska regulations for petroleum sites (18 AAC 75) is appropriate.

If roads from the excavation areas to the landfarm become dry, and dust is visible in the air, water will be sprayed on the roads to minimize airborne dust.

3.7.1 Excavation Activities and Excavated Soil Sampling

Excavation activities will be divided into phases as follows: Phase 1 excavations will begin in late July at Sites SS005 and AST1569, and will be completed by mid-August; Phase 2 will include two excavations at Birchwood Avenue and Airport Road starting in mid-August and be completed in September; and Phase 3 will be at two locations at Site SS016 beginning in September and completed in early October. Prior to the start of the Phase 1 activities the

Campion Road soil stockpile construction will be started and expanded as the excavations continue.

Soil expected to be clean will be excavated and placed in a stockpile near the excavation, and tested every 10 yd^3 using the headspace PID readings as described in Section 2.5. Contaminated soil from the IRA will be placed in dump trucks, covered with tarps, and transported to either the lined stockpile at the Campion airstrip or directly to the City of Galena landfill as discussed in Section 2.6. Soil samples will be collected from representative excavator buckets for each truck load and segregated as described in Section 2.6. At the end of excavation, soil placed at the landfill will be sampled to verify no soil exceeding landfill cover criteria has been placed at the landfill. If soil exceeding the landfill cover criteria is identified, that soil will be excavated and taken to the Campion airstrip stockpile.

It is anticipated that approximately 300 to 500 yd^3 of contaminated soil will be excavated and transported to the Campion airstrip stockpile or City landfill each day. This is based on the following assumptions and estimate of production; however, the actual frequency and volumes will be determined by the subcontractor. Several of the potential subcontractors have indicated they intend to use 12-yd^3 dump trucks resulting in the following estimate:

- 500 yd^3/day divided by 12 yd^3/load = 42 loads/day required to meet production
- 42 loads/day divided by 9 hours (hr)/day = 4.7 loads/hour required to meet production
- Assume each truck takes 60 minutes to be loaded, travel to the stockpile, dump the load, and travel back to the excavation = 1 load/hour
- 4.7 loads/hour divided by 1 load/hour/truck = 4.7 trucks, or 5 trucks
- Similarly, 300-yd^3/day production rate would require just over 3 trucks

An additional truck will be devoted to hauling the backfill material from South Dyke Road to the various excavation areas.

To meet this level of production it is assumed the subcontractor will mobilize an excavator, front-end loader, six trucks, and a bulldozer during the Phase 1 excavation activities. During Phase 2, excavation activities the subcontractor is anticipated to mobilize two excavators, two front-end loaders, eight trucks, and a bulldozer. During Phase 3, the activities are assumed to be similar to Phase 1. To maintain efficiency, the subcontractor may excavate two locations at the same time. The subcontractor is also expected to have a bulldozer stationed at the Campion airstrip soil stockpile for stockpile maintenance activities.

In the event of inclement weather, work will continue unless working conditions are determined to be unsafe. Soil stockpiles will be covered to prevent soil erosion.

Prior to beginning excavation, site monitoring wells will be measured to determine the water table elevation. Groundwater levels will be manually collected daily, and as excavation proceeds during the IRA. The onsite construction manager will prepare groundwater elevation trend plots, and compare the current and predicted future groundwater elevation with the current excavation elevation and predicted elevation production rate. Daily briefings shall include review and comparison of groundwater levels to planned excavation depths. A minimum 2-foot distance shall be maintained between

excavation bottom and groundwater level. If the 2-foot minimum distance cannot be met, excavation will be temporarily halted until the groundwater level drops. If continued rising groundwater leads to potential or actual slope instability, backfill will be placed against the affected slopes as a temporary buttress. Subsequent to groundwater elevation level dropping, the decision will be made to remove the buttress or leave it in place.

The maximum excavation depth of 15 feet bgs was determined to eliminate the direct exposure pathway and is based on the anticipated depth to groundwater during the excavation period. Because of the surrounding facilities that need to remain in service (utilidors and active fuel line), excavation below the water table could potentially lead to sloughing and slope instability.

3.7.2 ADEC Approval and Contaminated Soil Transportation

Contaminated soil from the IRA will be transported approximately 8 miles offsite to the Campion airstrip stockpile or the City landfill. 18 AAC 75.370 (ADEC, October 2008) requires that approval from ADEC be obtained prior to transporting contaminated soil to the stockpile. Following ADEC's approval of the IRA Work Plan, and prior to excavation, one copy of ADEC's Contaminated Soil Transport and Treatment Form will be completed and submitted for the excavations at Sites SS005 and AST1569 and one copy for the excavations at Sites 14/17 and SS016 to obtain the required concurrence. Revisions to the City of Galena Operation and Maintenance Plan for the landfill to allow use of the contaminated soil as landfill cover are being incorporated and will be submitted to the ADEC Solid Waste Division for their approval prior to transporting any soil to the landfill. SOP-33 (*Soil Transport*) provides the programmatic criteria for the transport of contaminated soil and is provided in Appendix D.

3.7.3 Utility Abandonment

Before starting excavation activities, existing site plans and previously conducted utility searches will be reviewed. Identified utilities will be located and exposed by limited mechanical means including air-knifing or hand-digging to safely loosen and remove the soil to expose the suspect utility line. After the utilities are exposed, additional soil can be excavated using mechanical means, but the bucket of the excavator or backhoe must stay a minimum of 2 feet from the exposed utility. The exposed utility line will be monitored for explosive or harmful vapors during digging operations. If vapors exceed the lower explosive limit (LEL) identified in the site health and safety plan, operations will immediately stop and the area vacated by personnel and equipment. If the utility is deeper than 4 feet below the surface, the sides of the excavation will be properly sloped or an approved shoring system will be employed before any personnel can enter the trench or excavation.

After a utility has been identified and its alignment mapped, measures will be taken to determine whether the utility is active. If a utility is determined to be active, the excavation limits will be modified to avoid that utility. If it is uncertain whether a particular pipeline is active, a 2-inch ball valve will be tapped onto the pipe using a tapping saddle. After the tap is installed, pressure gauges on the pipeline side of the ball valve will indicate the presence of pressure. Lack of pressure will signify that the line is inactive and can be abandoned. Prior to evacuating the pipeline, LEL reading will be taken.

Each pipe will be inspected as it is uncovered in the ground and observed for residual product. Most pipes will be in segments and will typically have at least one open end and, therefore, may not contain residual product. Vacuum trucks or pumps will be used to vacate any remaining fluids from the pipeline. A field determination will be made as to the volume of liquid and how it will need to be collected or contained. Large volumes of free liquids will dictate the need for a vacuum truck onsite to evacuate the pipe and decant the waste into drums onsite for sampling and disposal characterization. Small volumes of residual oil will be managed with a double diaphragm pump and pumped directly to drums.

Once the free product has been removed, the LEL will be verified within the pipeline and the pipe will be cut and removed from the excavation. Plastic end caps will be secured in place to avoid spread or spilling of residual material during removal and placement of pipe into the roll-off bin. Thick (10-mil) plastic sheeting will be taped over the emptied pipe before it is removed from the trench if there is residual product present within the pipe or on the pipe surface. During the excavation process, expandable rubber plugs will be placed into the exposed open end of the pipeline. Unknown abandoned pipes found while excavating will be confirmed empty and removed from the limits of the excavation. Pipe ends will be plugged with acceptable plugging, capping, grout, rubber expansion plug, or approved equivalent.

No USTs have been identified within the excavation areas, but the geophysical surveys performed in 2010 did indicate some anomalies. These were interpreted to be isolated, small, unknown metallic objects, but potentially could be drums or small storage tanks. These will be removed using the same inspection and removal techniques as described above for fuel pipelines.

3.7.4 Water Control within the Excavation

As discussed previously, the excavation is not planned to extend to or below the groundwater table. Also, surface water will be prevented from entering the excavation. Therefore, the only water within the excavation that must be controlled will consist of rainfall, or seepage from fine-grained soil layers or lenses exposed in the excavation side slopes. For both cases, the water will be handled by installing small, temporary ditches within the excavation as needed to drain any ponded water to the underlying sand and gravel zones. In this way, the encountered water will drain down through the soil to the groundwater table as would naturally occur if there were no excavation.

3.7.5 Air Emission

Air monitoring for volatile organic compound emissions to assess worker health and safety in accordance with the requirements of the project health and safety plan (to be submitted prior to construction) will be performed throughout the excavation duration.

Field measurements will be taken using a hand-held PID, and levels will be recorded in the upwind and downwind direction of activities, as well as in the breathing zone. Work in the excavation areas is expected to be performed in Level D personal protective equipment, but the personal protective equipment will be upgraded as necessary on the basis of air monitoring results and in accordance with the health and safety plan.

If conditions become significantly dry and dust is visible in the air, water will be sprayed in the excavation to minimize airborne dust.

3.8 Post-excavation Sampling

3.8.1 Documentation Sampling at Sites 14/17 and SS016

Following excavation at Sites 14/17 and SS016, soil samples will be collected from the floor and walls to determine the contamination remaining in soil at the excavation extent. Documentation samples are not intended to show that all contaminated soil was excavated, because it will not all be excavated. The data collected from the excavation will supplement data previously collected in soil borings below and adjacent to the excavated areas. Because the purpose of the sampling is not to confirm cleanup, and because the source delineation and site characterization sampling will provide additional data, the sampling design (that is, the number of soil samples to be collected and the sample location spacing) was modified from the requirements and recommendations under 18 AAC 78 and the ADEC *Draft Field Sampling Guidance* (ADEC, 2010), to be appropriate for the site.

At a minimum, two soil samples will be collected from the floor of each excavation up to a surface area of 1,000 square feet; then one additional sample will be collected for each additional 1,000 square feet of excavation floor area, or portion thereof over the initial 1,000 square feet, at points where contamination is most likely to be present. For example, assuming the proposed total excavation floor area is 11,100 square feet, a total of 13 samples would be collected. Soil samples will also be collected from the walls of each excavation. At a minimum, one soil sample will be collected from each wall of the excavation or a frequency of one per 50 feet of excavation perimeter (as an excavation "wall" may be difficult to define), whichever is greater. For example, if the excavation has an estimated perimeter of 760 feet, then 16 soil samples will be collected from the excavation walls. The IRA Field Sampling Plan is provided in Appendix E.

Following excavation and before backfilling, each soil sample location and the excavation extent will be determined by survey, as described in Appendix E.

3.8.2 Confirmation Sampling at Sites AST1569 and SS005

Following excavation at Sites AST1569 and SS005, soil samples will be collected from the floor and walls to determine whether there is any contamination remaining in the soil. Confirmation samples are intended to show that all contaminated soil was excavated. The sampling design meets the requirements and recommendations under 18 AAC 78 and the ADEC *Draft Field Sampling Guidance* (ADEC, 2010) for the quantity of excavation samples collected.

In accordance with the ADEC *Draft Field Sampling Guidance* (ADEC, 2010), at a minimum, two soil samples will be collected and analyzed from the floor of each excavation up to a surface area of 250 square feet; then one additional sample will be collected for each additional 250 square feet of excavation floor area, or portion thereof over the initial 250 square feet, at points where contamination is most likely to be present. For example, assuming the proposed total excavation floor area is 1,730 square feet, a total of eight samples would be collected.

Soil samples will also be collected from the walls of each excavation. At a minimum, one soil sample will be collected and analyzed from each wall of the excavation or a frequency of one per 20 feet of excavation perimeter (as an excavation "wall" may be difficult to define), whichever is greater. For example, if the excavation has an estimated perimeter of 270 feet, then 14 soil samples will be collected from the excavation walls. The IRA Field Sampling Plan is provided in Appendix E.

If any sample results indicate contamination at the extent of excavation, additional soil will be excavated in areas that showed contamination and confirmation sampling performed in these areas until all results indicate no contamination above screening levels.

3.9 Site Restoration

After soil samples have been collected from the excavation area and surveyed, the site will be restored as described in this section.

3.9.1 Backfilling

Backfill material will consist of suitable clean soil from a variety of sources. Soil from the upper zone of the excavation that has PID readings below 20 parts per million will be temporarily stockpiled, then placed as backfill at the bottom of the excavation. Other backfill will consist of granular soils from offsite borrow areas. After post-excavation sampling has been completed, backfill material will be placed in lifts and thoroughly compacted. Water will be applied to the backfill during placement as necessary to aid in compaction. Backfill within the upper 2 feet beneath road surfaces will be placed in maximum 12-inch-thick lifts. Each lift will be compacted with a minimum of six passes of a vibratory drum roller or other acceptable means. If raveling or sloughing of excavation sidewalls becomes apparent while the excavation remains open awaiting the confirmation sample results, clean backfill material will be placed along the sides of the excavation and be brought up the sidewall until a field determination is made that a major sidewall release or unsafe condition no longer exists. These sections of the excavation will be monitored throughout the day by a competent person to make sure the excavation remains in a stable condition. If the confirmation samples indicate additional soil needs to be excavated beneath the placed clean material, the clean material will be excavated, monitored, and placed in the clean stockpile. The entire process will be repeated until the desired confirmation sample results are received.

3.9.2 Communication Conduit Replacement

As discussed in Section 2.4.3.3, the active communication conduit adjacent to the west side of Birchwood Avenue will be abandoned by others prior to construction, and then replaced during backfilling. The new 4-inch-diameter schedule 40 polyvinyl chloride conduit will be stubbed out within 5 feet of the TeleAlaska communication pedestal adjacent to the fence on the north side of the Birchwood Hangar concrete slab. In accordance with TelAlaska requirements, pipe bedding will be compacted in 4- to 6-inch lifts, and cable marking tape will be placed 6 inches above the conduit. Backfill will be free of large boulders and compacted in 4- to 6-inch lifts.

As discussed in Section 2.4.6, the active communication conduit inside the southern excavation area will be abandoned by others prior to construction, and then replaced during backfilling. The new 4-inch-diameter schedule 40 polyvinyl chloride conduit will be reconnected to the in-place conduit; pipe bedding and cable marking tape will be installed in accordance with the design specifications in Appendix C.

3.9.3 Road, Asphalt Apron, and Concrete Slab Restoration

Areas where asphalt was removed to complete the excavation will be restored with compacted gravel to match preconstruction grades. Gravel roads will be restored to match existing conditions, and the road surface will be treated with a reapplication of calcium chloride in accordance with ADOT&PF recommendations and requirements. Portions of the Birchwood Hangar concrete slab and the old power plant building slab that were removed during excavation will be patched with compacted gravel.

3.9.4 Fencing, Revegetation, and Site Cleanup

After construction activities have been completed, temporary fences that are no longer needed will be removed. Permanent fencing that was temporarily removed for construction will be reinstalled or replaced in kind. Disturbed areas with soil cover will be graded to drain and will be seeded with grass suitable for the Galena area.

Any remaining debris will be removed and transported to the City of Galena's landfill for disposal.

This page intentionally left blank.

LEGEND

Galena Future Landfill Expansion

Stockpile Area

0 100 200
Feet

N

Note:
1. Aerial photography courtesy Alaska Department of Commerce, Community and Economic Development, Division of Community and Regional Affairs. July 7, 2009. Pixel size 2-foot.

FIGURE 3-1
City Landfill
Soil Stockpile Location
Interim Removal Action Work Plan
Former Galena Forward Operating Location, Alaska

SECTION 4.0

Schedule

The planned schedule is summarized in Table 4-1 and shown on Figure 4-1.

TABLE 4-1
Planned Schedule
Work Plan for Interim Removal Action at Sites SS005, SS014, SS016, SS017, and AST1569 at Former Galena Forward Operating Location, Alaska

Activity	Start (2011)	Finish (2011)
IRA Work Plan Development	February 23	August 12
Submit Working Copy of IRA Work Plan	February 23	February 23
USAF Review/Concurrence	February 23	March 9
Prepare Draft IRA Work Plan	March 10	April 4
ADEC Review/Concurrence	April 5	May 4
Prepare Draft Final IRA Work Plan	May 5	July 8
ADEC Review/Concurrence and Tentative Approval	July 11	July 29
Prepare Final IRA Work Plan	July 25	August 12
Permitting	March 1	July 29
Procure Stockpile Clearing Subcontract	June 1	June 17
Clear and Grub Stockpile Area	June 20	July 15
Procure Sites SS005/AST1569 Subcontract	June 8	July 8
Construction of Sites SS005/AST1569	July 25	August 18
Site Preparation	July 25	July 30
Excavation	August 1	August 15
Confirmation Sampling	August 6	August 15
Site Restoration	August 11	August 18
Procure Sites 14/17 and SS016 Subcontract	July 1	August 1
Construction of Sites 14/17 and SS016	August 15	October 8
Site Preparation	August 15	August 27
Excavation	August 29	October 1
Documentation Sampling	September 5	October 3
Site Restoration	September 26	October 8
Construction Report	November 1	December 16

This page intentionally left blank.

ID	Task Name	Start	Finish
1	**Interim Removal Action**	Wed 2/23/11	Wed 2/23/11
2	**Work Plan Development**	**Wed 2/23/11**	**Fri 8/12/11**
3	Submit Working Copy Work Plan	Wed 2/23/11	Wed 2/23/11
4	AF Review/Concurrence	Wed 2/23/11	Wed 3/9/11
5	Prepare Draft Work Plan	Thu 3/10/11	Mon 4/4/11
6	ADEC Review/Concurrence	Tue 4/5/11	Wed 5/4/11
7	Prepare Draft Final Work Plan	Thu 5/5/11	Fri 7/8/11
8	ADEC Review/Concurrence and Tentative Approval	Mon 7/11/11	Fri 7/29/11
9	Prepare Final Work Plan	Mon 7/25/11	Fri 8/12/11
10	**Permitting**	Tue 3/1/11	Fri 7/29/11
11	**Procure Stockpile Clearing Subcontract**	Wed 6/1/11	Fri 6/17/11
12	**Clear and Grub Stockpile Area**	Mon 6/20/11	Fri 7/15/11
13	**Procure SS005/AST1569 Subcontract**	Wed 6/8/11	Fri 7/8/11
14	**Construction SS005/AST1569**	**Mon 7/25/11**	**Thu 8/18/11**
15	Site Prep	Mon 7/25/11	Sat 7/30/11
16	Excavation	Mon 8/1/11	Mon 8/15/11
17	Confirmation Sampling	Sat 8/6/11	Mon 8/15/11
18	Site Restoration	Thu 8/11/11	Thu 8/18/11
19	**Procure SS14/16/17 Subcontract**	Fri 7/1/11	Mon 8/1/11
20	**Construction SS14/16/17**	**Mon 8/15/11**	**Fri 12/16/11**
21	Site Preparation	Mon 8/15/11	Sat 8/27/11
22	Excavation	Mon 8/29/11	Fri 9/30/11
23	Documentation Sampling	Mon 9/5/11	Fri 9/30/11
24	Site Restoration	Mon 9/26/11	Fri 10/7/11
25	Construction Report	Tue 11/1/11	Fri 12/16/11

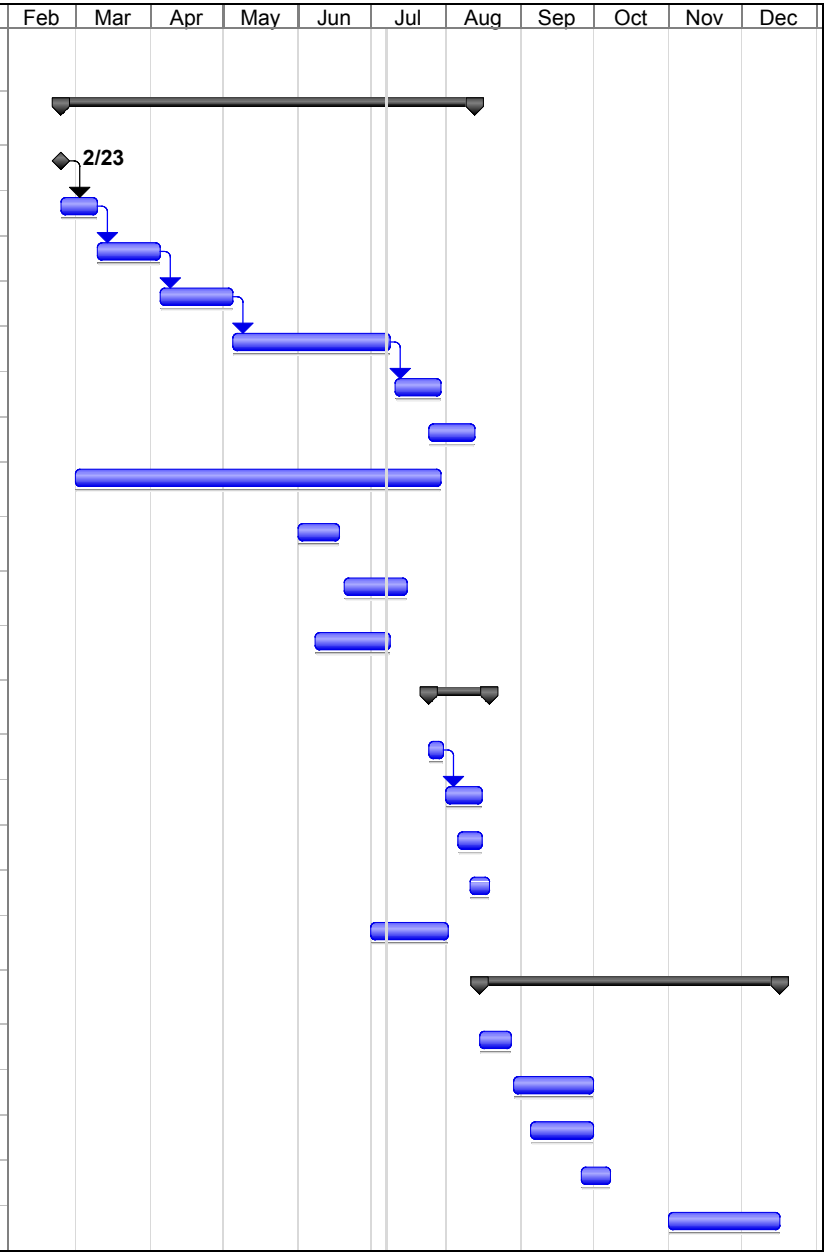


FIGURE 4-1
Planned Schedule
Interim Removal Action Work Plan
Former Galena Forward Operating Location, Alaska

SECTION 5.0

References

AECOM Technical Services, Inc. June 2010. *Draft Final Technical Memorandum for Sites: CG001, CG002, FT001, SS006, SS015, SS016, SS017, SS019, ST005, ST014, ST020, ST021, and TU001 at Galena Airport, Alaska*. Prepared for the Air Force Real Property Agency and Air Force Center for Engineering and the Environment.

Alaska Department of Environmental Conservation (ADEC). 2010. *Draft Field Sampling Guidance*.

Alaska Department of Environmental Conservation (ADEC). October 2008. *Oil and Other Hazardous Substances Pollution Control, 18AAC75.* October 9.

Cedergren, Harry R. 1977. *Seepage, Drainage, and Flow Nets*. John Wiley & Sons.

CH2M HILL. In preparation. *Attachment D-39: Birchwood Hangar (SS014), Truck Fill Stands (SS017), and Building 1549 – Old Fire Station (SS021) to the Work Plan for Site Inspection, Remedial Investigation, and Site Characterization Former Galena Forward Operating Location, Alaska*.

CH2M HILL. In preparation. *Attachment D-40: Former Building 2541 – Fuels Laboratory (SS016) to the Work Plan for Site Inspection, Remedial Investigation, and Site Characterization Former Galena Forward Operating Location, Alaska*.

CH2M HILL. March 2011. *Revised Draft Work plan for Full-scale Landfarming at Former Galena Forward Operating Location, Alaska.*

CH2M HILL. August 2010. *Work Plan for Site Inspection, Remedial Investigation, and Site Characterization, Former Galena Forward Operating Location, Alaska*. Final. Prepared for the Air Force Center for Engineering and the Environment.

CH2M HILL. September 2010. *Work Plan for Site Inspection, Remedial Investigation, and Site Characterization, Former Galena Forward Operating Location, Alaska.* Addendum to Appendix D. Prepared for the Air Force Center for Engineering and the Environment.

Earth Tech, Inc. June 2008. *Draft Final Work Plan for Site Investigations at Galena Airport, Alaska*. Prepared for the United States Air Force, 611th Civil Engineer Squadron/Environmental Restoration Element, Elmendorf Air Force Base, Alaska.

Earth Tech, Inc. May 2007. *Final Remedial Investigation/Feasibility Study Report for United States Air Force Sites at Galena Airport and Campion Air Station, Alaska*. Prepared for the United States Air Force, 611th Civil Engineer Squadron/Environmental Restoration Element, Elmendorf Air Force Base, Alaska.

Geosphere and CH2M HILL September 2006. *Maximum Allowable Concentration, Residual Saturation, and Free-Product Mobility*. Prepared to the Alaska Statement of Cooperation Working Group.

Peck, Ralph B, Walter E. Hanson, and Thomas H. Thornburn. 1974. *Foundation Engineering*. Second edition. Figure 19.5. Wiley.

U.S. Air Force (USAF). February 2010. *Final Environmental Baseline Survey, Air Force Property at Galena Airport, Alaska*.

U.S. Air Force (USAF). March 1996. *Remedial Investigation Report for Galena Airport and Campion Air Station*.