LMS/AMC/S13408

Alternatives Analysis Amchitka Island Mud Pit Cap Repair, Amchitka, Alaska

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U.S. DEPARTMENT OF ENERGY | Legacy Management

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Abbreviations

ADEC	Alaska Department of Environmental Conservation
DOE	U.S. Department of Energy
DRO	diesel-range organics
EPA	U.S. Environmental Protection Agency
LM	Office of Legacy Management
USFWS	U.S. Fish and Wildlife Service

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1.0 Introduction

The U.S. Department of Energy (DOE) Office of Legacy Management (LM) manages the Nevada Offsites program, which includes a series of reclaimed drilling mud impoundments on Amchitka Island, Alaska (Figure 1). Navarro Research and Engineering, Inc. is the Legacy Management Support contractor (the Contractor) for LM. The Contractor has procured Tetra Tech, Inc. to provide engineering support to the Amchitka mud pit reclamation project.

The mud pit caps were damaged during a 7.9-magnitude earthquake that occurred in 2014. The goals of the current project are to investigate conditions at the mud pit impoundments, identify feasible alternatives for repair of the cover systems and the contents, and estimate relative costs of repair alternatives.

This report presents descriptions of the sites and past investigations, existing conditions, summaries of various repair/mitigation alternatives, and direct, unburdened, order-of-magnitude (−15% to +50%) associated costs.

2.0 Background and History

Amchitka Island is located near the western end of the Aleutian Islands approximately 1,400 miles west-southwest of Anchorage, Alaska, and is part of the Alaska Maritime National Wildlife Refuge. The island is managed by the U.S. Fish & Wildlife Service (USFWS). Three underground nuclear tests were conducted on Amchitka Island between 1965 and 1971. In addition to the three sites used for underground nuclear tests, drilling occurred at three other sites where nuclear testing was considered but not conducted.

Drilling fluids were used in drilling the emplacement and exploratory holes at the three test sites and the three considered test sites. Drilling mud contained additives such as diesel fuel, chrome lignosulfonate, and chrome lignite to control viscosity and mitigate loss of drilling mud in the emplacement and exploratory boreholes. The composition of the drilling mud used at Amchitka included water, oil, cement, bentonite, paper, sodium bicarbonate, and other additives. The drilling mud was commonly stored near the drill sites in bermed pits, which were excavated into the native soils to hold large quantities of drilling fluid and cuttings produced from drilling the boreholes. The pits were closed by de-watering, mixing clean native soil with the drilling fluids, grading and placing an intermediate cover on the pits, constructing perimeter berms, adding a 30-mil (0.03-inch) geomembrane, a 1-foot soil layer, an 18-inch soil layer, and a 6-inch vegetation support layer. All soil used for construction of the mud pits came from on-island borrow areas.

DOE conducted site investigations on Amchitka Island between 1993 and 2000. In a 1998 investigation, chemical analysis of the drilling mud indicated that all the drilling mud pits contained varying concentrations of diesel-range organics (DRO), polycyclic aromatic hydrocarbons, low levels of polychlorinated biphenyls (PCBs), and chromium. However, DRO was the only contaminant of concern that was detected above Alaska Department of Environmental Conservation (ADEC) cleanup levels. Average concentrations of contaminants in ponded water overlying the drilling mud were well below applicable ecological criteria in all drilling mud pits. In 2001, all mud pits with contaminants above ADEC cleanup levels were stabilized and capped (DOE 2005).

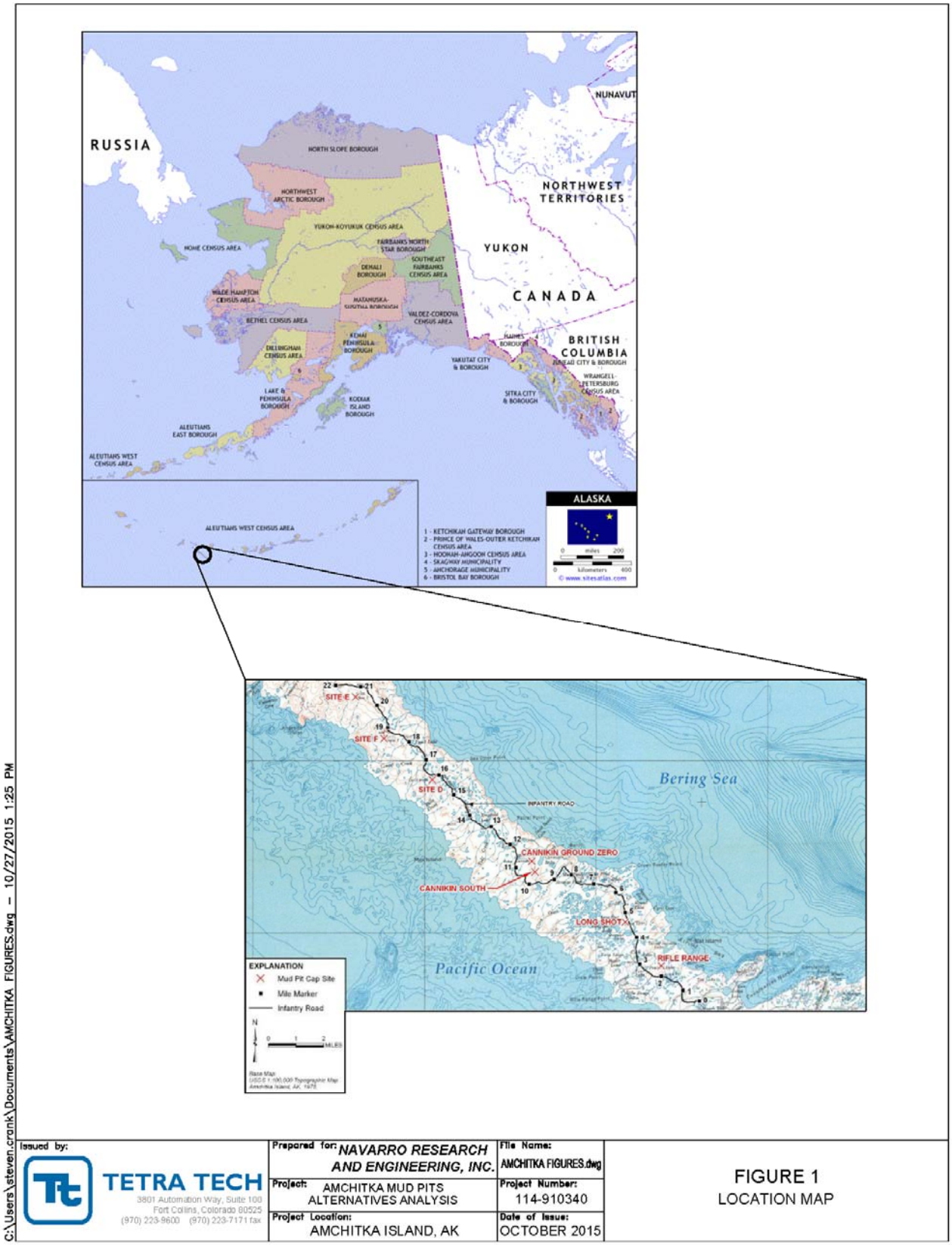

Figure 1. Location Map

On June 23, 2014, a 7.9-magnitude earthquake occurred 11 miles north of Amchitka Island (AEIC 2015). This earthquake was followed by several aftershocks with magnitudes ranging from 6.0 to 6.9 within a 100-mile radius. The intensity of these earthquakes prompted LM to send an inspection team to the island to view the mud pit cap sites. On August 26 and 27, 2014, the Contractor inspection team, along with a representative from USFWS, viewed all seven of the mud pit sites. Of the seven mud pit caps inspected, two showed no sign of damage (Cannikin Ground Zero and Cannikin South), three had minor cracks along the edge of the mud pit caps (Rifle Range, Long Shot, and Site F), and two had moderate damage (Site D and Site E). The moderate damage observed on one of the mud pit caps (Site D) was where the soil cover had slumped away from the side of the mud pit cap, exposing the geomembrane. The other mud pit cap (Site E) with moderate damage had a significant crack along the uphill side of the mud pit, and the land surface downgradient of the mud pit cap had slumped away. The cap was still intact, but native soils upgradient and downgradient of the cap have cracked or slumped. No release or exposure from any of the mud pit caps was observed (DOE 2014).

3.0 Site and Condition Descriptions

In early June 2015, a Tetra Tech field team conducted a site visit to Amchitka Island accompanied by representatives of the Contractor, DOE, and USFWS. Investigators conducted field reconnaissance, drilled exploratory borings with a hand auger, and collected geotechnical and environmental samples. On July 15, 2015, Tetra Tech issued a technical memorandum that presented detailed descriptions of the site visit and conditions observed. That document is included as Appendix A, "Trip Report," of this Alternatives Analysis; the following Sections 3.1 through 3.7 present a summary of those observations.

3.1 Rifle Range

The Rifle Range site is east of Infantry Road between mile markers 2 and 3. The mud pit and cap generally range in height from 2 to 4 feet above grade and have 3 (horizontal) to 1 (vertical) (3H:1V) side slopes. The total area of the mud pit is approximately 1.2 acres.

A minor scarp was observed on the north side of the pit. Longitudinal cracks approximately 20 feet long and similar to those shown in Figure 4 of the November 2014 report (DOE 2014) were observed. This scarp appeared to be in better condition than when it was observed during the 2014 visit. No exposed liner was visible, and no new cracks or scarps were observed during the June 2015 visit. Surface water had collected at the edge of the cap in the designed toe drain on the north side of the pit. The top of the cap appeared to be flat with small depressions on the surface where water could collect. Sparse vegetation covered the ground, estimated at 30%–40% of cover. The mud pit cap soils were visually characterized as fine-grained material (silty sand) with some rock fragments. No sampling was conducted at this site.

3.2 Long Shot

The Long Shot site is located on the west side of Infantry Road between mile markers 4 and 5. The mud pit and cap range in height from 9 to 11 feet. The total area of the mud pit is approximately 1.6 acres. Slopes on the north, south, and east sides are approximately 2H:1V to 3H:1V. Slopes on the west side are estimated at 3H:1V.

A scarp was observed on the southwest corner that was approximately 15 feet in length; a scarp approximately 20 feet in length and 2–3 additional cracks were observed on the north side toward the east slope, and a crack/scarp was observed near the southeast corner. Parallel cracks were visible adjacent to each main crack location, particularly near the southeast corner. Some sloughing was observed near the southeast corner. Longitudinal and transverse cracking ranged from about 1 to 6 inches in width and 4 to 12 inches in depth. In general, cracks appeared deeper than those at the Rifle Range site.

A drainage channel was observed at the toe of the slope. No new scarps or cracks were observed since the Contractor's 2014 inspection; existing scarps appeared to be healing with no continued or fresh damage. The geomembrane was not visible during our observations. Vegetation cover was estimated at 25%–35%. No sampling was conducted.

3.3 Cannikin South

Cannikin South is a mounded site located off a spur road near mile marker 10 of Infantry Road. The site is approximately 0.7 acre in size and located 300 feet from the Cannikin Ground Zero site. All side slopes appear to be consistently sloped generally at 3H:1V.

Little to no soil distress was observed at this site. Small cracks were visible but appear to have naturally healed. Vegetation cover appeared to be about 30% to 40%. Surface drainage at this location appeared to be to the southeast. No sampling was conducted.

3.4 Cannikin Ground Zero

Cannikin Ground Zero is located 300 feet from Cannikin South off a spur road near mile marker 10 of Infantry Road. Cannikin Ground Zero is relatively small at approximately half an acre in size. Cannikin Ground Zero has been referred to as Cannikin North in other documents.

Little to no soil distress was observed at this site. Small cracks were visible but appear to have healed by natural processes. Slopes were generally 2H:1V to 3H:1V. A drain was observed at the toe of the mud pit cap. Standing water was observed in the drainage, which appeared flat. A drainage area with cobble-sized rock was observed on the west side of the pit and appeared to be an intended drain channel. No standing water was observed in that area. Surface features at this site appeared to slope down to the south. No sampling was conducted.

3.5 Site D

Site D is an approximately 7.5-acre site located near mile marker 16 of Infantry Road. The north and east slopes are approximately 2H:1V to 3H:1V; the slopes on the south, southeast, and southwest sides were estimated at 1.5H:1V to 2H:1V. On the south side of the pit, a lake exists at the immediate toe of the slope retaining the pit. The pit slope appeared to bulge at the lake's edge.

The north side of Site D showed sloughing and large scarps with associated cracking, as shown in photographs in Appendix A. Sloughing/movement appears to be fresh and ongoing. The geomembrane was exposed on the southeast side, but it appears to be intact. Soils exposed in

slopes were sand and gravel. The pit appeared flat on top with areas of depression that would result in ponded water during rain events. A slight swale exists between an east and a west pit cap. Minor to no water was observed in the swale during the June 2015 visit. Topography and surface drainage at Site D appeared to slope toward the lake. Vegetation cover was estimated at 35% to 50%. Geotechnical and environmental sampling was conducted at Site D.

3.6 Site E

Site E is a relatively small pit (approximately 0.3 acre) with gentle side slopes estimated at 3H:1V, except the south slope, which was estimated at 2H:1V or steeper. Site E is located near mile marker 20 of Infantry Road and is the farthest north of the mud pits.

Isolated areas south of the mud pit have sloughed off (30 feet from the nearest toe edge of the mud pit cap). The sloughed area has steep side walls with exposed sand and gravel. This area appears to be actively eroding or sloughing. Two small drainage channels on both sides of the pit converge on the south side and adjacent to the distressed zone. Visible soils consisted of sandy silt with rock cover and sparse vegetation. Vegetation cover was estimated at 30%–40%. Surface topography and drainage at Site E appeared to slope down toward the south. Geotechnical and environmental sampling was conducted at Site E.

3.7 Site F

Site F is located near mile marker 19 of Infantry Road and is approximately 0.6 acre in size. Slopes were estimated at 1.5H:1V on the south side (the edges are estimated to be closer to 2H:1V); slopes on the north side are approximately 4H:1V, and slopes on the east and west sides are approximately 3H:1V to 4H:1V. Visible soils consisted of sandy silt with rock cover and sparse vegetation.

The mud pit cap exhibited longitudinal cracking as shown in the photos presented in Appendix A. Cracking was observed in areas noted in Figure 8 of the Options Analysis report (DOE 2014), which has been included as Figure 2 to this report. The south side of the impoundment had sloughed, and no vegetation was evident on the slope. In other areas, vegetation cover was estimated at 35% to 45%. The geomembrane was not exposed. Ponded water was observed on top of the geomembrane liner during the sampling effort. No new or continued damage was observed. Areas of potential damage and future failure zones were observed upgradient to the north and east of the mud pit cap. Geotechnical and environmental sampling was conducted at Site F.

4.0 Repair Alternatives

4.1 General

This section provides a range of alternatives for further discussion in selecting an appropriate path forward for repair of the mud pit caps on Amchitka Island. The alternatives range from passive observation and monitoring to active, large-scale construction projects. Depending on the alternative selected, further analysis will be required to develop a design.

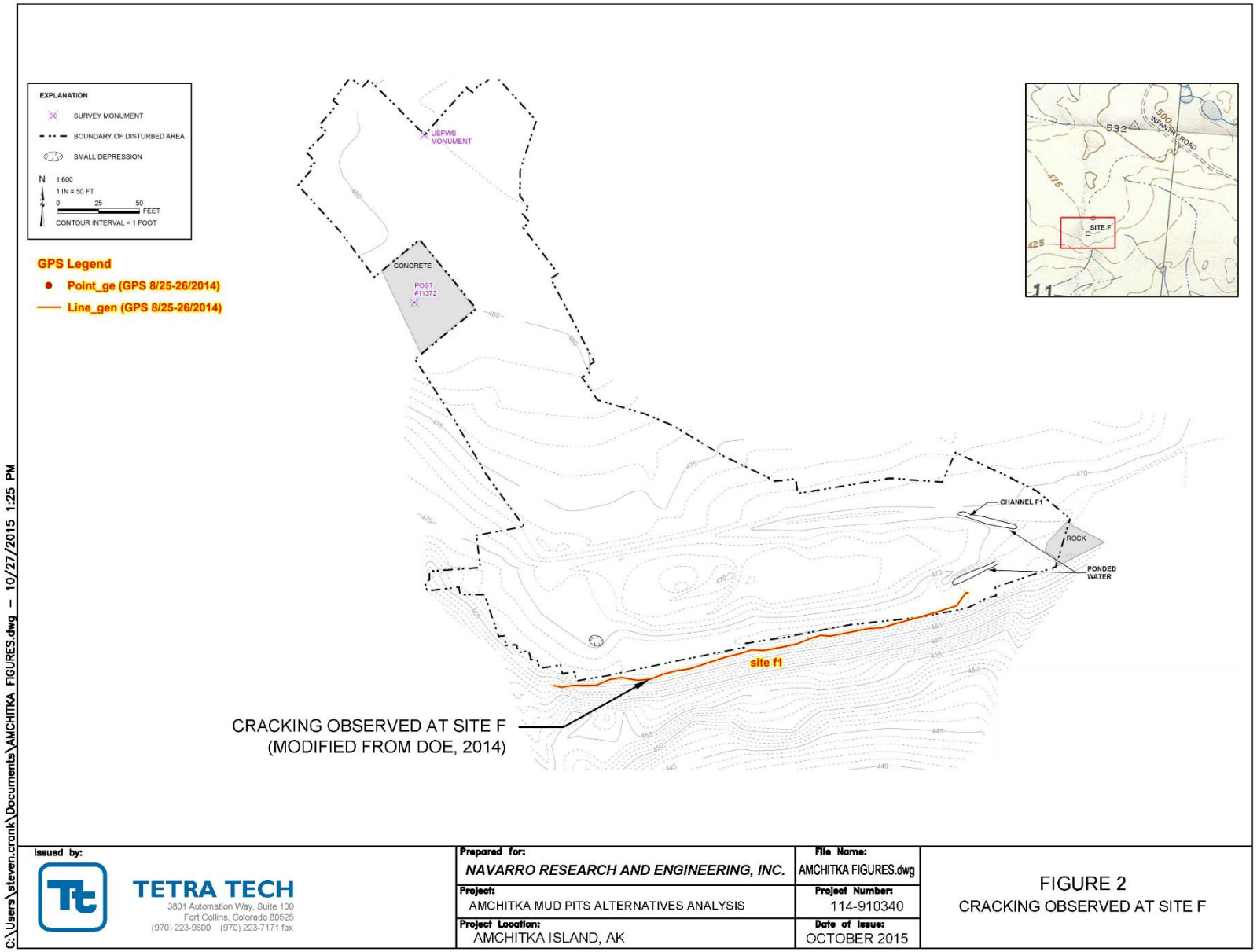

Figure 2. Cracking Observed at Site F

4.2 Passive Alternative

In 2001 DOE stabilized and capped the drilling mud pits on the island. As part of this effort, DOE conducted a human health and ecological risk assessment to evaluate the possible hazards from remaining drilling mud constituents to potentially exposed human and ecological receptors. The results are intended to facilitate risk management decisions regarding the mud pit release sites. Based upon the results of the human health risk assessment, all of the calculated carcinogenic risks are within or below the U.S. Environmental Protection Agency's (EPA's) recommended risk range of 1.0×10^{-6} to 1.0×10^{-4}. Additionally, all of the calculated noncarcinogenic hazards are less than EPA's recommended target hazard index of 1.0. Therefore, site-related constituents do not pose significant risks/hazards to USFWS workers or part-time subsistence users. Furthermore, petroleum hydrocarbons (i.e., DRO and gasoline-range organics) do not pose significant hazards to USFWS workers or part-time subsistence users (DOE 2002).

An ecological risk assessment was also performed on the mud pit release sites to evaluate the potential risks to ecological receptors. The risks posed to ecological receptors, as evaluated in the ecological risk assessment, are not substantial and will diminish over time. In addition, the birds, fish, and other biota of Amchitka appear to currently be thriving, and the disturbance and habitat disruption that would result from further remediation is not warranted by the potential reduction of risk levels (DOE 2002).

The Record of Decision (ROD) for the Amchitka Surface Closure (DOE 2008) provides guidance for remedial action after site closure. As part of the long-term surveillance monitoring of the sites, the ROD describes that "an inspection will be conducted at a minimum of every 5 years for 30 years and may be performed following significant seismic events or volcanic eruptions on the island." The mud pits are currently being visually monitored on a 5-year schedule (2006 and 2011), but since the June 2014 earthquake, the Contractor has monitored them annually (2014 and 2015). The passive alternative would continue monitoring on the previously established 5-year schedule with the next inspection to be in 2016. The Passive Alternative total cost estimate for inspections in 2016, 2021, 2026, and 2031 is $525,408. The itemized cost estimate is included in Appendix B.

This passive alternative is consistent with the "no-build" or "no action" alternative required by EPA under 40 CFR 1502.14(d) for an Environmental Impact Statement, although the site is not regulated by EPA. The passive alternative continues to be protective of human health, safety, and welfare of the environment, as all the mud pits with contaminants above ADEC cleanup levels remain intact.

4.3 Active Alternatives

Active alternatives require various small and large pieces of construction equipment and include field fit repairs, redesign, relocating, and treatment options. The existing harbor was assumed to be capable of handling construction loading for purposes of this report.

Mobilization/demobilization of construction equipment to and from the remote site represents a significant effort that is common to all active alternatives. A contractor in Anchorage familiar with construction projects in the western Aleutian Islands provided a cost estimate for this effort. The cost estimate for construction equipment mobilization/demobilization is $1,124,000. The

itemized cost estimate for mobilization/demobilization is included in the appendix associated with each of the action alternatives described in Sections 4.3.1 through 4.3.7.

Improving access to the sites is a requirement that applies to all the active alternatives. Infantry Road is the primary access road to the mud pits on Amchitka Island and currently has a gravel surface. The road starts at mile marker 0 toward the southeast end of the island near Constantine Harbor and extends to the northwest end of the island near Bird Cape. The mud pits are located adjacent to unnamed spur roads between mile markers 2 and 22 of Infantry Road. Figure 1 shows the general road alignment and the locations of the mud pit sites. Infantry Road has significant erosion that will deter vehicles at three locations (near mile markers 4, 8, and 18). Surface water erosion across the road has formed steep channels up to 8 feet deep. A low-water crossing (Figure 3) would be installed at each eroded area to enable vehicles to cross the erosion channels. Starting from the current channel invert, the banks would be flattened to 10H:1V slopes for 10 feet in each direction, and the road would transition to a 5H:1V slope until it meets the existing road elevation. Cobbles would be placed along the 10H:1V section, and road surfacing gravel would be replaced along the 5H:1V section. Mile marker 18 would require fill placement and compaction of cracks. An itemized cost estimate for access road repairs is included with the appendix associated with each active alternative. The access road repairs are estimated to cost $145,000.

Appendix C provides an itemized cost estimate for mobilization/demobilization and access road repair for all of the active alternatives. Appendixes D through I provide itemized cost estimates for the alternatives presented in Sections 4.3.1 through 4.3.5.

4.3.1 Field Fit Repairs

Field fit repairs are intended to restore the cover to near its as-constructed conditions at all mud pit locations. Some locations would only require minimal repairs; others (Sites D, E, and F) would require a larger restoration effort. Cover soils at Sites D, E, and F would be temporarily stripped to allow access to the geomembrane and mud pit materials. Regrading of the mud pit materials would be “field-fit” to the as-constructed gradients and, where feasible, flattened in areas where slope failures have occurred. Geomembrane locations with defects would be repaired using materials compatible with the existing geomembrane. Finally, the cover soil would be replaced, and the disturbed areas would be revegetated. A new as-constructed survey is recommended to provide a new baseline for any future reviews or designs. A work plan, technical details, specifications, and general conceptual designs would be prepared.

The estimated total cost for the Field Fit Repairs alternative is $1,797,000; Appendix D provides a supporting itemized cost breakdown. No design will be provided with this alternative at this time.

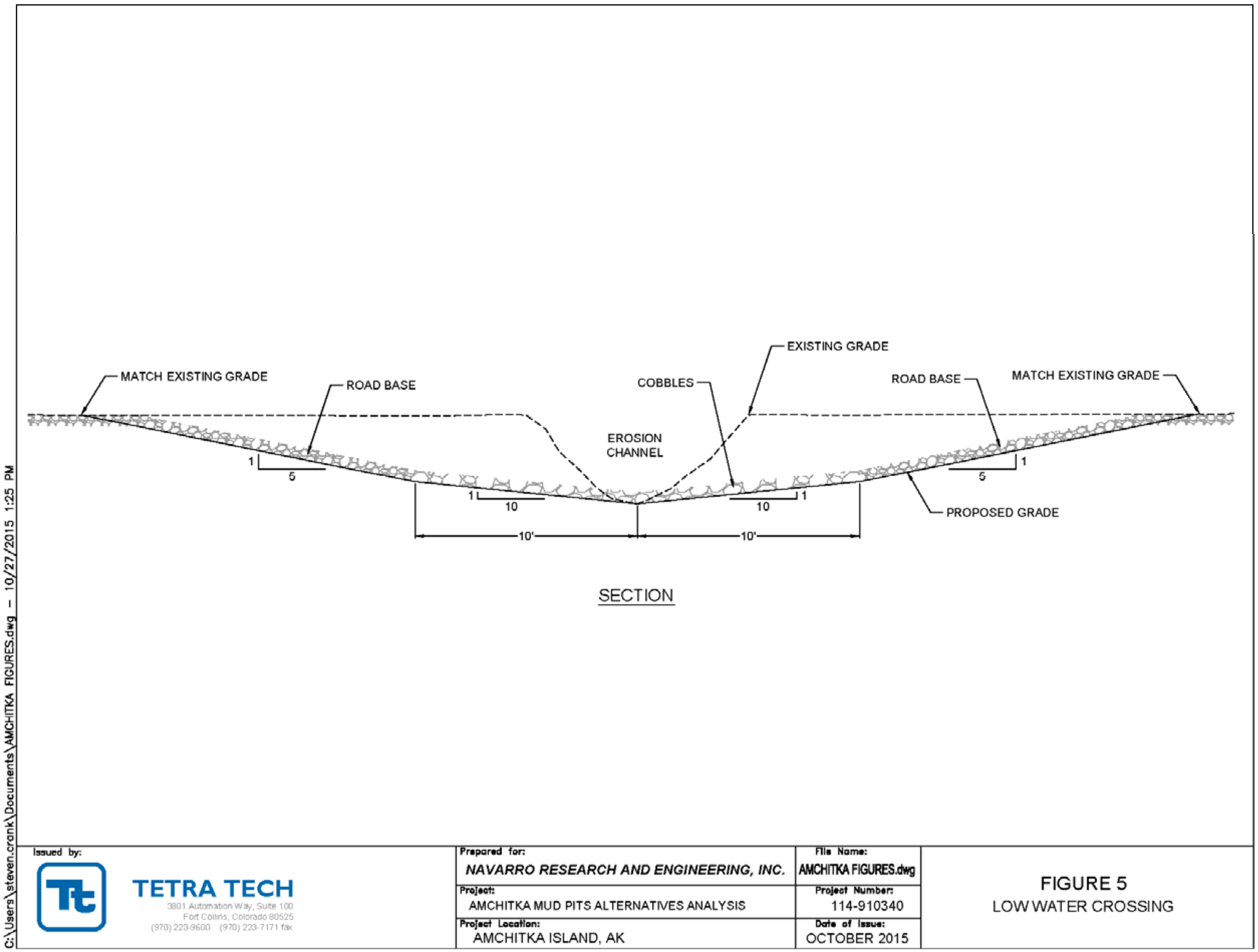

Figure 3. Low-Water Crossing

4.3.2 Redesign

Redesign of the existing mud pit caps at Sites D, E, and F would incorporate geotechnical analyses to improve cover performance to further isolate the mud pit materials from the environment. A geotechnical investigation to support the geotechnical analyses would be necessary prior to any design work. Likely geotechnical analyses include seepage, slope stability, and settlement analyses based on static and pseudo-static loading conditions. The results of the geotechnical analyses would be incorporated into a civil design construction package, which would also include construction drawings and specifications to enable construction to match the intent of the engineered design.

Construction would include stripping the topsoil and cover soils from the design footprint for temporary stockpiling. The existing geomembrane would be removed to allow access to the mud pit materials. Regrading of the mud pit materials would match the design grades and features such as ditches, berms, and buttresses. A geomembrane would then be installed above the mud pit materials. Reusing the existing geomembrane is assumed to not be an option because of uncertainties regarding its installation and because of likely degradation of the existing geomembrane. The existing geomembrane materials would be hauled to Constantine Harbor and transported by ship to an ADEC-approved landfill. The previously stockpiled topsoil and cover soils would be placed on top of the geomembrane. Disturbed areas would be revegetated. Erosion control materials would be installed if required by the design.

The estimated total cost for the Redesign alternative is $2,538,000; Appendix E provides an itemized cost breakdown. Five months was assumed for design, which includes 2-week reviews at 30%, 60%, 90%, and final designs.

4.3.3 Onsite Relocation of Material from Sites E and F to Site D and Site D Improvements

The Onsite Relocation alternative would relocate the mud pit material from Sites E and F to a combined repository location at Site D. Sites E and F appear to be the least stable of the existing mud pits, and this relocation/consolidation would reduce the risk of mud pit material releases. As part of this alternative, Site D would be redesigned and regraded based on the results of a geotechnical investigation and analysis. Geotechnical analyses would support the development of construction drawings and specifications.

The Onsite Relocation alternative construction would begin with preparation of the Site D vicinity to accommodate the additional mud pit materials from Sites E and F and the Site D regrading. The area immediately to the north of Site D is the anticipated storage location of the relocated Sites E and F soils. Cover soils in construction areas would be stripped and stockpiled adjacent to Site D. Where construction is to take place in geomembrane-covered areas, the geomembrane would be cut into pieces and folded into smaller areas for placement within the fill. The geomembrane is assumed to not be salvageable after earthwork is completed. External slopes, especially those that have had past slope failures, would be flattened in accordance with the geotechnical recommendations. In particular, the bulge and slope toes along the south side of the impoundment would be excavated away from the ponded water that is presently adjacent to Site D.

Decommissioning of Sites E and F would start by removal of the cover soils, which would be temporarily stockpiled adjacent to the sites. The geomembrane and mud pit materials would be excavated and hauled to Site D, which would have been prepared for receiving the materials as described above. Excavation would continue until visual examination indicates that the mud pit materials have been removed. The concentrations of contaminants remaining in the excavations would be determined by laboratory analysis of soil samples collected at the final excavation depth. Field detection equipment is assumed to be inadequate because contaminant values measured in June 2015 were below field equipment detection limits. An onsite laboratory may be constructed to assist in determining the required extent of excavation and is included in the cost estimate.

Excavated mud pit materials would be loaded onto haul trucks and driven to Site D and emplaced according to the construction specifications for lift thickness and compaction. The mud pit materials would be graded to the design elevations, and a geomembrane cover would be installed. Cover soils would be placed above the geomembrane and seeded. Erosion control materials would be installed if required by the design.

The estimated total cost for the Onsite Relocation alternative is $2,513,000; Appendix F provides a supporting itemized cost breakdown. Five months will be required for design, which includes 2-week reviews at 30%, 60%, 90%, and final designs.

4.3.4 Haul Material from Amchitka to an Offsite Repository

The Offsite Repository alternative involves excavating and relocating the mud pit materials from Sites E and F to an ADEC-approved landfill or soil recycling facility. The cost estimate assumes disposal at Alaska Soil Recycling, Inc. in Anchorage.

Improvements to the Constantine Harbor pier may be necessary to allow direct access from land to the barge as the first part of construction for this alternative, although it is not included in the cost estimate. Cover soils would be removed and temporarily stockpiled adjacent to the mud pit cap areas. The geomembrane and mud pit materials would be excavated and hauled to Constantine Harbor, where they would be loaded onto a barge. Loading the barge would take place either by directly driving equipment onto the barge or by a hopper and conveyor system. Excavation would continue until visual examination indicates that the mud pit materials are completely removed from each site. Laboratory analysis of soil samples collected at the final excavation depth would verify removal of the mud pit materials. Field detection equipment is assumed to be inadequate because contaminant values measured in June 2015 were below field equipment detection limits. An onsite laboratory may be constructed to assist in determining the required extent of excavation and is included in the cost estimate. Following excavation, the cover soils would be spread over the disturbed area and seeded.

The estimated total cost for the Offsite Relocation alternative is $2,845,000; Appendix G provides supporting itemized cost breakdown. Five months would be required for design, which includes 2-week reviews at 30%, 60%, 90%, and final designs.

4.3.5 Thermal Desorption Mitigation

Thermal desorption removes DRO from the host medium by increasing the volatility of the hydrocarbons. The soil is heated to 400 °F or greater using a portable burner system.

Cover soils would be removed and stockpiled adjacent to the mud pit areas. The exposed geomembrane would be brought up to a staging area that would eventually host the Thermal Desorption Unit (TDU) and stockpile areas. Mud pit materials would be excavated, hauled, and stockpiled at the TDU staging area on the reused geomembrane. Excavation limits would be determined by visual observation and confirmed by laboratory analysis of soil samples collected at the final excavation depth. Field detection equipment is assumed to be inadequate because contaminant values measured in June 2015 were below field equipment detection limits. An onsite laboratory may be constructed to assist in determining the required extent of excavation. The TDU would be brought to the site after a significant stockpile has been constructed to aid in continuous TDU operations. Based on a preliminary conversation with a thermal desorption contractor, a feed rate of 300 tons per day by crews working 24 hours per day and 7 days per week was assumed for the cost estimate. Following treatment by the TDU, the mud pit materials would be stockpiled at the staging area and sampled for laboratory testing. Upon confirmation of acceptable contamination levels within the mud pit materials and the exposed excavation surface at the mud pit areas, the treated mud pit materials would be placed back into the disturbed area. Mud pit materials would be graded to a new design condition and covered with the previously removed cover soils, which would then be revegetated.

The TDU staging area would be decommissioned by cutting the geomembrane into pieces and hauling them away for disposal at a commercial landfill or ADEC-approved facility. Soil sampling at the staging area would confirm that no soil contamination is present, and revegetation will take place as needed.

This alternative evaluated two thermal desorption mitigation scenarios. The first option involves thermal desorption at Sites D, E, and F only. The estimated total cost for this option is $14,676,000; Appendix H provides supporting itemized cost breakdown. The onsite construction time associated with this option is approximately 80 consecutive 12-hour days. The second option is a more extensive thermal desorption scenario and includes mitigation at all of the mud pit sites on the island. The estimated total cost for this option is $23,922,000; Appendix I provides supporting itemized cost breakdown. Five months would be required for either design option, which includes 2-week reviews at 30%, 60%, 90%, and final designs.

4.3.6 Land-Farming Mitigation

Land-farming mitigation was evaluated as an alternative to remove DRO from all of the mud pits. Land-farming soil treatment for hydrocarbons involves increasing the available oxygen to contaminated soil, which increases the rate of aerobic digestion by microbes and volatilization through passive or active methods, either in situ or ex situ. Passive in situ methods involve a network of perforated piping installed throughout the mud pits to introduce air through atmospheric pressure gradients. This method relies on interconnected soil pore spaces filled with air, a condition that is not expected within any of the mud pit disposal cells because of the high moisture content, degree of saturation, and compaction of the drilling mud. Active in situ aeration increases the rate of digestion and volatilization by introducing pressurized air into the

pipe network. Active treatment was not considered for any of the mud pits because it would involve a constant source of electricity for the duration of the treatment, which would be expected to extend multiple years, and electricity is not available at the island. Ex situ treatment of the mud pit materials would involve excavating and spreading a thin layer of soil over a lined area, but this is not considered feasible due to the year-round climate (cool temperatures and high humidity) of the island.

Because of site constraints, land farming mitigation is not considered a feasible alternative, and therefore a cost estimate was not prepared.

4.3.7 Microbial Mitigation

Microbial mitigation was evaluated as an alternative to remove the DRO from all of the mud pits. Microbial mitigation consists of the addition of microbes and nutrients to contaminated soil to increase the rate of aerobic digestion by microbes. The island's cool climate is prohibitive to microbes, as stated by the U.S. Forest Service (USFS 2002): "Conventional wisdom is that the temperature must be higher than 10 °C for microorganisms to reduce the mass of petroleum hydrocarbons in the soil." The average maximum temperature at Amchitka is 5.5 °C, and August is the only month in which the temperature exceeds 10 °C, based on average temperatures from 1949 through 1993 (WRCC 2015). The high moisture content of the mud pit materials is also problematic for this mitigation alternative because soil pore spaces are filled with water rather than air.

Because of constraints on the island, microbial mitigation is not considered a feasible alternative, and therefore a cost estimate was not prepared.

5.0 Summary and Conclusions

Current and previous studies and observations of the mud pit caps and appurtenant areas indicate that the sites were generally not severely affected by the earthquake of June 2014. Significant distress occurred at some of the mud pit caps, but the caps did not rupture or expose contaminated soils to the environment. Therefore, this report analyzed a range of alternatives from continued monitoring to repair of the sites and mitigation of the damage that did occur. The repair alternatives have been developed to a level of detail to support path forward discussions between the Contractor and DOE.

Table 1 below summarizes the alternatives that were examined and provides an estimated direct, unburdened cost for each alternative. At this conceptual level evaluation, all the options that include a design element were assumed to require a similar amount of design time based on a design set that includes 30%, 60%, 90%, and final design documents and associated review and comment. A more precise timeline for each design alternative can be determined during preliminary work.

Table 1. Summary of Feasible Mitigation Alternatives

Mitigation Alternative	Time to Complete (Onsite)	Mobilization/ Demobilization ROM Cost ($)	Road Repairs ROM Cost ($)	Task ROM Cost ($)	Total Cost ($)
Passive Alternative [a]	4 days	NA[b]	NA	525,408	525,408
Field Fit Repairs	13 days [c]	1,124,000	145,000	528,000	1,797,000
Redesign	18 days [c]	1,124,000	145,000	1,269,000	2,538,000
Onsite Relocation of Material from Sites E and F to Site D and Site D Improvements	18 days [c]	1,124,000	145,000	1,244,000	2,513,000
Haul Material from Sites E and F to an Offsite Repository	10 days [c]	1, 124,000	145,000	1,576,000	2,845,000
Thermal Desorption Sites D, E, and F	83 days [c]	1,124,000	145,000	13,407,000	14,676,000
Thermal Desorption All Sites	136 days [c]	1,124,000	145,000	22,653,000	23,922,000

[a] 5-year Inspection (2016–2031)
[b] Cost included in Task ROM cost
[c] Includes three days for access road repairs
ROM = rough order-of-magnitude, −15% to +50%
NA = not applicable

6.0 References

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Appendix A

Trip Report

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TETRA TECH

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Technical Memorandum

To:	Stephen Pitton Paul Darr	**From:**	Jeff DeTienne Tom Chapel
Company:	Stoller Newport News Nuclear	**Date:**	August 5, 2015
Re:	Amchitka Mud Pit Cap Repair Trip	**Project #:**	114-910340
CC:	Caleb Stock		

This memorandum summarizes Tetra Tech's site visit to Amchitka Island with personnel from Stoller Newport News Nuclear (SN3) on June 3rd through June 15, 2015. The site visit was conducted to investigate surface and subsurface conditions at several drilling mud pits which exhibited distress following seismic activity near the site which occurred in June 2014.

CHRONOLOGY

From Tetra Tech, Jeff DeTienne, Dana Ramquist, and Bridget LaPenter joined Paul Darr and Stephen Pitton of SN3, Merry Maxwell from U.S. Fish and Wildlife, and Mark Kautzky from Department of Energy for this work. Field reconnaissance, hand augered exploratory borings, and geotechnical and environmental samples were collected during the trip. The trip was conducted according to the following chronology:

- **Wednesday June 3, 2015**
  - Traveled from Denver to Anchorage, Alaska via commercial airline.
  - Met Stephen Pitton and Paul Darr with SN3 in Anchorage.

- **Thursday June 4, 2015**
  - Gathered last minute field equipment and food in Anchorage, Alaska
  - Met Bridget LaPenter and Dana Ramquist at the airport and traveled to Adak Island, AK via commercial airline.
  - Arrived in Adak and secured accommodations.

- **Friday June 5, 2015**
  - Went to Tetra Tech facility on Adak Island to inventory and review equipment that was previously shipped.
  - Some equipment was missing, contacted TTT in Anchorage (or Seattle) to arrange shipment of missing drilling equipment.
  - Conducted additional project planning and coordination.

- **Saturday June 6, 2015**
  - Prepared for travel to Amchitka and conducted additional project planning and coordination.

- **Sunday June 7, 2015**
  - Loaded up field equipment and gear aboard the US Fish and Wildlife (USFW) vessel Tiglax.
  - Participated in on-board orientation and safety procedures training and review.
  - Departed for Amchitka Island at approximately 1700.

- **Monday June 8, 2015**
  - Arrived on Amchitka Island at approximately 1400.
  - Unloaded field equipment onto the pier.
  - Participated in a Tailgate safety meeting and reviewed the Job Safety Analysis (JSA) with SN3.
  - Drove to Rifle Range and Long Shot sites to investigate and characterize the mud pit caps.

- **Tuesday June 9, 2015**
  - Tailgate meeting. Depart at 0800 and travel to Site F.

- **Wednesday June 10, 2015**
  - Tailgate meeting. Depart at 0815 and travel to Site D.
  - Travel to Cannikin North and South sites.

- **Thursday June 11, 2015**
  - Tailgate meeting. Depart at 0800 and travel to Site E.

- **Friday June 12, 2015**
  - Depart Amchitka and travel aboard Tiglax to Rat Island.
  - Stand by during U.S. Fish and Wildlife business on Rat Island, AK.
  - Begin travel back to Adak Island.

- **Saturday June 13, 2015**
  - Arrive on Adak Island.
  - Unload gear.
  - Inventory gear, samples, and other equipment.

- **Sunday June 14, 2015**
  - Ship field equipment and samples to respective destinations.
  - Depart from Adak to Anchorage.
  - Depart from Anchorage for home offices.

- **Monday June 15, 2015**
  - Arrive in Denver
  - Travel to Fort Collins

OBSERVATIONS

Descriptions of activities at each site are presented below. Selected photographs illustrating the sites are included in Attachment A.

Rifle Range

A minor scarp was observed on the north side of the pit (see photographs). Longitudinal cracks estimated at approximately 20 feet long and was similar to that shown in Figure 4 of the S.M. Stoller report from 11/2014.This scarp appeared in better condition than when observed during the 2014 visit. No exposed liner was visible. Surface water was collecting at the edge of the cap in the designed toe drain (north side). The ground was covered by sparse vegetation (estimated at 30-40% coverage). A soil stockpile on

west side (silty sand, fine “beach sand”, little rock ~75’x50’x15’ high), gentle side slopes (~5%), SM w/gravel, <6" to pebble size for cover material (no new damage). No sampling was conducted.

Long Shot

Observed a scarp on SW corner (15' in length), a scarp (20’ in length) and 2-3 additional cracks on the north side towards the east slope, and a crack/scarp near the southeast corner. Parallel cracks are visible adjacent to each main crack location, particularly in the vicinity of the southeast corner. Some sloughing was observed near the southeast corner. Longitudinal and traverse cracking ranged from ~1inch to ~6 inches in width and 4 inches to12 inches in depth, In general, cracks appeared deeper than those at the Rifle Range site.

Slopes on N, S, and E side are ~2:1-3:1, W side is ~3:1. A drainage channel was observed at the toe of the slope. No new scarps or cracks were observed; existing scarps are healing (no continued or fresh damage). The geomembrane was not visible. Vegetative coverage was estimated at 25-35%. No sampling was conducted.

Site F

The mud pit cap exhibited longitudinal cracking as shown in photos. Cracking was observed in areas noted in Figure 8, Stoller Options Analysis dated November 2014. The south side sloughed; no vegetation was evident on the slope. In other areas, vegetative cover was estimated at 35 to 45%. The geomembrane was not exposed. Visible soils included rock, sand, and cobbles. Slopes were estimated at 1.5:1 on the south side (edges are closer to 2:1); slopes on the north side are approximately 4:1; slopes on th3e east and west sides are approximately 3:1 to 4:1. Visible soils consisted of sandy silt with rock cover and sparse vegetation. Three to four inches of perched water was trapped on top of the geomembrane (30 mil liner). No new or continued damage was observed. Areas of potential damage and future failure zones were observed upgradient to the north and east of the mud pit cap.

Site D

The north side of Site D showed sloughing and large scarps with associated cracking, as shown in photographs. Sloughing/movement appears to be fresh and on-going. The geomembrane was exposed on the south side, but it appears to be intact. Soils exposed in slopes were sand and gravel. The north and east slopes are approximately 2:1 to 3:1; the slopes on the south and west sides were estimated at 1.5:1 to 2:1. On the south side of the pit, a pond/lake exists at the immediate toe of the slope retaining the pit. The pit appeared to bulge at the lake’s edge. A slight swale exists between an east and a west pit cap. Vegetative coverage was estimated at 35-50%.

Cannikin North and South

Little to no distress was observed at these sites. Small cracks were visible, but appear to have “healed”. Slopes were generally 2:1 to 3:1. No sampling was conducted.

Site E

Site E is a small pit with gentle side slopes estimated at 3:1, except the south slope, which was estimated at 2:1 or steeper. Isolated areas south of the mud pit have caved off (30’ from the nearest toe edge of the mud pit cap). Two small drain channels on both sides of the pit converge on the south side. Visible soils consisted of sandy silt with rock cover and sparse vegetation.

SAMPLING AND TESTING

A portable hand or power driven auger system was used to drill 1.5 inch diameter holes in the cap, liner and mud pit soils at Sites D, E, and F. A total of nine locations were investigated using the auger system.

Holes were drilled to depths ranging from 5.0 to 6.3 feet, where refusal occurred in dense soil or rock fragments that would not permit additional penetration.

Soils encountered consisted of an approximately 6 inch thick layer of silty sand topsoil with gravel and vegetative matter overlying 3.8 to 4.5 feet of mud pit cap material (moist to wet, brown or brown gray silty sand and sandy silt with gravel). Below the soil cover, a synthetic geomembrane was encountered. The membrane appeared to be consistent with the liner specified on design drawings: a 30 mil thickness, smooth HDPE geomembrane. Below the liner, mud pit material was encountered to the maximum depth drilled in each boring. The mud pit material consisted of light brown, wet silt with sand and clay. Occasional clay lenses were encountered.

Free water was encountered in all the borings and ranged from 3.5 to 4.4 feet below the ground surface. In general, water collected in the 4 to 6 inches of soil immediately overlying the synthetic geomembrane liner. Logs of the exploratory auger holes and approximate locations are presented in Attachment B.

***Geotechnical Samples*.** Nineteen samples were collected from the auger borings at sites D, E, and F, and were tested to determine their engineering properties. Tests included in-situ dry density, water content, fines content (percent passing the number 200 sieve), and Atterberg limits. Samples were classified in accordance with the Unified Soil Classification System (USCS); all samples tested were classified as sandy silt (SM). All samples but one (from MPCD-B1 at 5 feet) were non-plastic, with water content ranging from 19 to 40 percent. Sample disturbance precluded density determinations, with the exception of a sample of the mud pit cap material from MPCD-B3 at 4 feet, which had a dry density of 96.4 pcf. A sample of the mud pit material (from MPCD-B1 at 6.5 feet) with evidence of disturbance was tested, and results confirmed the disturbance, with a density measurement of 58 pcf. The samples had a silt and clay content (passing the number 200 sieve) that ranged from 12 to 51 percent. A summary of laboratory test results is included in Attachment C.

***Environmental Samples*.** Eight samples were collected and tested by SGS laboratories in Anchorage Alaska to determine the content of Diesel Range Organics. Testing was conducted in accordance with Alaska Method AK102. Clean up levels for Diesel Range Organic (DRO) contaminated soils are described in Alaska 18 AAC 75.340 and 18 AAC 75.341. Based on site characteristics the level for the Amchitka site is 100 mg/kg. Results of all tests on field samples were well below the action limit. A summary of results of the analytical laboratory tests are presented in Table 1 below; complete results are included in Attachment C.

Table 1. Analytical Laboratory Results

Lab ID	1152819001	1152819002	1152819003	1152819004	1152819005	1152819006	1152819007	1152819008
Date Sampled	6/9/15	6/9/15	6/10/15	6/10/15	6/10/15	6/10/15	6/11/15	6/11/15
Sample Source	MPCF-B2	MPCF-B3	MPCD-B1	MPCD-B2	MPCD-B3	MPCD-B4	MPCE-B1	MPCE-B2
Depth (ft)	4.0	4.3	6.5	6.0	4.8	5.3	6.4	5.6
DRO (mg/kg)	<50.5	49.3	<12.55	19.6	<11.65	<12.4	41.8	<12.8
% Solids	78.6	77.1	79.1	86	85.4	80.5	80.3	81.8

According to construction details prepared by IT Corporation and dated 8/9/2000 for the design of the mud pit caps, the general subsurface sequence consists of 6 inches of vegetated soil over 18 inches of soil cover, over 12 inch protective soil cover and a 30 mil geomembrane, all underlain by 12 inches of intermediate cover, then the “solidified drilling mud” or fill. The samples we collected and tested for DRO were from depths ranging from 0.2 feet to 2.4 feet below the geomembrane. Therefore results are indicative of DRO concentration in both the intermediate cover and the drilling mud at the locations sampled.

Attachments:

Attachment A: Photographic Log
Attachment B: Locations and Logs of Exploratory borings
Attachment C: Laboratory Test Results

ATTACHMENT A

PHOTOGRAPHIC LOG

ATTACHMENT A - PHOTOGRAPHIC LOG

Rifle Range – North side looking south

Rifle Range – North side looking west

Rifle Range – North side looking east

Rifle Range – Vegetative cover

Rifle Range – Saturated soil

Rifle Range

Rifle Range

Rifle Range

Rifle Range

Rifle Range

Rifle Range

Rifle Range

Rifle Range

Rifle Range

Rifle Range

Rifle Range

Rifle Range

Rifle Range

Cannikin South

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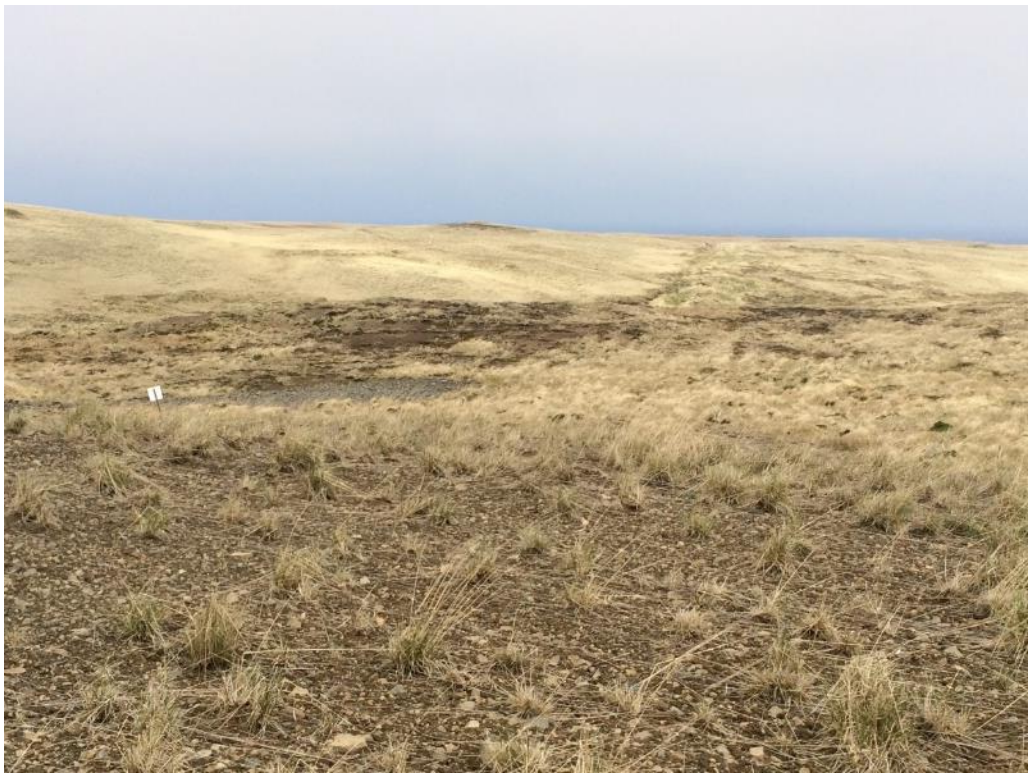

Cannikin North

Cannikin North

Cannikin North

Cannikin North

Site E

Site E

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Site E

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Site E

Site E

Site E

Site E

Site E – South edge

Site E

Site E – South edge

Site E – 30’ south of toe

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Site E

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Site E

Site E

Site E

Site E

Site E

Site F

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Site F – South slope

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Site F – South slope

Site F

Site F

Site D – east slope

Site D – east slope

Site D – east slope

Site D – east slope

Site D – east slope

Site D – east slope

Site D

Site D – east slope

Site D – east slope

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Site D

Site D

Site D

Site D

Site D

Site D

Site D

Site D – southeast side, bulge

Site D

Site D

Long Shot

Long Shot


(UNITED) STATES
DEPARTMENT OF DEFENSE
ADVANCED RESEARCH PROJECTS AGENCY
PROJECT DOVE SHOT
DECEMBER 29, 1963

Long Shot

Long Shot

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ATTACHMENT B

LOCATIONS AND LOGS OF EXPLORATORY BORINGS

Tetra Tech Inc
3801 Automation Way, Suite 100
Fort Collins, CO, 80525
Telephone: 970-223-9600
Fax: 970-223-7171

BOREHOLE ID: MPCD-B1

CLIENT Stoller Newport News Nuclear **PROJECT NAME** Amchitka Mud Pit Cap Investigation

PROJECT NUMBER 114-910340 **PROJECT LOCATION** Amchitka Island, AK

DATE(S) OF DRILLING: 06/10/2015 **GROUND ELEVATION: NA** **METHOD: 2" OD solid stem**

CONSULTANT: Tetra Tech **LATITUDE: 00.000000 N** **LOGGED BY: Jeff DeTienne**

DRILLING CONTRACTOR: N/A **LONGITUDE: 000.000000 W** **DRILLED BY: Jeff DeTienne**

DRILL RIG: Bosch Hammer Drill **HAMMER TYPE: N/A** **LOCATION: Mud Pit Cap Site D**

DEPTH (ft)	SAMPLE TYPE	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0				**VEGETATIVE COVER** pre-seeded cover, topsoil, silty sand with gravel
			0.5	**MUD PIT CAP** cover material, Silty Sand, moist, brownish gray
		MC = 21.6% LL = NP PI = NP Fines = 37.4%	2.5	**MUD PIT CAP** cover material, Silty Sand with gravel, occasional Clayey Sand lenses, moist, brown
			4.0 ▽	
			4.1	**LINER**
5		MC = 30.2% LL = 32 PI = 5 Fines = 43.5%		**MUD PIT** Silt with sand and clay, wet, light brown
		MC = 28.0% LL = NP PI = NP Fines = 41.8%		
		MC = 40.1% DD = 58.0 pcf Fines = 32.4%	6.3	
				Bottom of Bore Hole at 6.5 feet.

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BOREHOLE ID: MPCD-B2

CLIENT Stoller Newport News Nuclear **PROJECT NAME** Amchitka Mud Pit Cap Investigation

PROJECT NUMBER 114-910340 **PROJECT LOCATION** Amchitka Island, AK

DATE(S) OF DRILLING: 06/10/2015 **GROUND ELEVATION: NA** **METHOD: 2" OD solid stem**

CONSULTANT: Tetra Tech **LATITUDE: 00.000000 N** **LOGGED BY: Jeff DeTienne**

DRILLING CONTRACTOR: N/A **LONGITUDE: 000.000000 W** **DRILLED BY: Jeff DeTienne**

DRILL RIG: Bosch Hammer Drill **HAMMER TYPE: N/A** **LOCATION: Mud Pit Cap Site D**

DEPTH (ft)	SAMPLE TYPE	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0		MC = 20.5% LL = NP PI = NP Fines = 29.0%		**VEGETATIVE COVER** pre-seeded cover, topsoil, silty sand with gravel
				0.5 **MUD PIT CAP** cover material, Silty Sand, Clayey Sand lenses, moist, brownish gray
				4.0 ▽ 4.1 **LINER**
5		MC = 18.2% LL = NP PI = NP Fines = 44.7%		**MUD PIT** Silt with sand, minor clay lenses, wet, light brown
				6.0 Bottom of Bore Hole at 6.0 feet.

Tetra Tech Inc
3801 Automation Way, Suite 100
Fort Collins, CO, 80525
Telephone: 970-223-9600
Fax: 970-223-7171

BOREHOLE ID: MPCD-B3

CLIENT Stoller Newport News Nuclear **PROJECT NAME** Amchitka Mud Pit Cap Investigation

PROJECT NUMBER 114-910340 **PROJECT LOCATION** Amchitka Island, AK

DATE(S) OF DRILLING: 06/10/2015 **GROUND ELEVATION: NA** **METHOD: 2" OD solid stem**

CONSULTANT: Tetra Tech **LATITUDE: 00.000000 N** **LOGGED BY: Jeff DeTienne**

DRILLING CONTRACTOR: N/A **LONGITUDE: 000.000000 W** **DRILLED BY: Jeff DeTienne**

DRILL RIG: Bosch Hammer Drill **HAMMER TYPE: N/A** **LOCATION: Mud Pit Cap Site D**

DEPTH (ft)	SAMPLE TYPE	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0				**VEGETATIVE COVER** pre-seeded cover, topsoil, silty sand with gravel
			0.5	**MUD PIT CAP** cover material, Silty Sand with gravel, moist, brown
		MC = 15.7% DD = 96.4 pcf Fines = 50.9%		
		MC = 14.6% Fines = 36.8%	4.5	
			4.6	**LINER**
5			5.0	**MUD PIT** Silty Sand with gravel, wet, light brown
				Bottom of Bore Hole at 5.0 feet.

Tetra Tech Inc
3801 Automation Way, Suite 100
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Telephone: 970-223-9600
Fax: 970-223-7171

BOREHOLE ID: MPCD-B4

CLIENT Stoller Newport News Nuclear **PROJECT NAME** Amchitka Mud Pit Cap Investigation

PROJECT NUMBER 114-910340 **PROJECT LOCATION** Amchitka Island, AK

DATE(S) OF DRILLING: 06/10/2015 **GROUND ELEVATION: NA** **METHOD: 2" OD solid stem**

CONSULTANT: Tetra Tech **LATITUDE: 00.000000 N** **LOGGED BY: Jeff DeTienne**

DRILLING CONTRACTOR: N/A **LONGITUDE: 000.000000 W** **DRILLED BY: Jeff DeTienne**

DRILL RIG: Bosch Hammer Drill **HAMMER TYPE: N/A** **LOCATION: Mud Pit Cap Site D**

DEPTH (ft)	SAMPLE TYPE	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0				**VEGETATIVE COVER** pre-seeded cover, topsoil, silty sand with gravel
0.5				**MUD PIT CAP** cover material, Silty Sand with gravel, moist, brown
4.5				
4.6				**LINER**
5		MC = 24.9% LL = NP PI = NP Fines = 12.4%		**MUD PIT** Silty Sand with gravel, wet, light brown
5.5				Bottom of Bore Hole at 5.5 feet.

Tetra Tech Inc
3801 Automation Way, Suite 100
Fort Collins, CO, 80525
Telephone: 970-223-9600
Fax: 970-223-7171

BOREHOLE ID: MPCE-B1

CLIENT Stoller Newport News Nuclear **PROJECT NAME** Amchitka Mud Pit Cap Investigation

PROJECT NUMBER 114-910340 **PROJECT LOCATION** Amchitka Island, AK

DATE(S) OF DRILLING: 06/11/2015 **GROUND ELEVATION: NA** **METHOD: 2" OD solid stem**

CONSULTANT: Tetra Tech **LATITUDE: 00.000000 N** **LOGGED BY: Jeff DeTienne**

DRILLING CONTRACTOR: N/A **LONGITUDE: 000.000000 W** **DRILLED BY: Jeff DeTienne**

DRILL RIG: Bosch Hammer Drill **HAMMER TYPE: N/A** **LOCATION: Mud Pit Cap Site E**

DEPTH (ft)	SAMPLE TYPE	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0				**VEGETATIVE COVER** pre-seeded cover, topsoil, silty sand with gravel
		MC = 29.1% LL = NP PI = NP Fines = 33.2%		0.5 **MUD PIT CAP** cover material, Silty Sand with Gravel, moist, grayish brown
				2.5 **MUD PIT CAP** cover material, Silt with Sand, moist, brown
		MC = 20.8% LL = NP PI = NP Fines = 41.2%		▽ 4.0
				4.1 **LINER**
5				**MUD PIT** Silt with some sand, wet, light brown
		MC = 27.6% Fines = 39.1%		6.3 Bottom of Bore Hole at 6.5 feet.

Tetra Tech Inc
3801 Automation Way, Suite 100
Fort Collins, CO, 80525
Telephone: 970-223-9600
Fax: 970-223-7171

BOREHOLE ID: MPCE-B2

CLIENT Stoller Newport News Nuclear **PROJECT NAME** Amchitka Mud Pit Cap Investigation

PROJECT NUMBER 114-910340 **PROJECT LOCATION** Amchitka Island, AK

DATE(S) OF DRILLING: 06/11/2015 **GROUND ELEVATION: NA** **METHOD: 2" OD solid stem**

CONSULTANT: Tetra Tech **LATITUDE: 00.000000 N** **LOGGED BY: Jeff DeTienne**

DRILLING CONTRACTOR: N/A **LONGITUDE: 000.000000 W** **DRILLED BY: Jeff DeTienne**

DRILL RIG: Bosch Hammer Drill **HAMMER TYPE: N/A** **LOCATION: Mud Pit Cap Site E**

DEPTH (ft)	SAMPLE TYPE	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0				**VEGETATIVE COVER** pre-seeded cover, topsoil, silty sand with gravel
0.5				**MUD PIT CAP** cover material, Silty Sand with Gravel, moist, grayish brown
4.5				
4.6				**LINER**
5		MC = 19.3% Fines = 43.2% MC = 19.5% LL = NP PI = NP Fines = 37.5%		**MUD PIT** Silt with some sand, wet, light brown
6.0				Bottom of Bore Hole at 6.0 feet.

Tetra Tech Inc
3801 Automation Way, Suite 100
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Telephone: 970-223-9600
Fax: 970-223-7171

BOREHOLE ID: MPCF-B1

CLIENT Stoller Newport News Nuclear **PROJECT NAME** Amchitka Mud Pit Cap Investigation

PROJECT NUMBER 114-910340 **PROJECT LOCATION** Amchitka Island, AK

DATE(S) OF DRILLING: 06/09/2015 **GROUND ELEVATION: NA** **METHOD: 2" OD solid stem**

CONSULTANT: Tetra Tech **LATITUDE: 00.000000 N** **LOGGED BY: Jeff DeTienne**

DRILLING CONTRACTOR: N/A **LONGITUDE: 000.000000 W** **DRILLED BY: Jeff DeTienne**

DRILL RIG: Bosch Hammer Drill **HAMMER TYPE: N/A** **LOCATION: Mud Pit Cap Site F**

DEPTH (ft)	SAMPLE TYPE	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0		MC = 38.7% LL = NP PI = NP Fines = 21.2%		**VEGETATIVE COVER** pre-seeded cover, topsoil, silty sand with gravel
0.5				**MUD PIT CAP** cover material, Silty Sand with occasional gravel, moist, brown
		MC = 26.1% Fines = 30.5%		
3.8 ▽				
		MC = 20.9% LL = NP PI = NP Fines = 36.3%		
3.9				**LINER**
				MUD PIT Silt with sand and gravel, wet, light brown
5				
5.0				Bottom of Bore Hole at 5.0 feet.

Tetra Tech Inc
3801 Automation Way, Suite 100
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Telephone: 970-223-9600
Fax: 970-223-7171

BOREHOLE ID: MPCF-B2

CLIENT Stoller Newport News Nuclear **PROJECT NAME** Amchitka Mud Pit Cap Investigation

PROJECT NUMBER 114-910340 **PROJECT LOCATION** Amchitka Island, AK

DATE(S) OF DRILLING: 06/09/2015 **GROUND ELEVATION: NA** **METHOD: 2" OD solid stem**

CONSULTANT: Tetra Tech **LATITUDE: 00.000000 N** **LOGGED BY: Jeff DeTienne**

DRILLING CONTRACTOR: N/A **LONGITUDE: 000.000000 W** **DRILLED BY: Jeff DeTienne**

DRILL RIG: Bosch Hammer Drill **HAMMER TYPE: N/A** **LOCATION: Mud Pit Cap Site F**

DEPTH (ft)	SAMPLE TYPE	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0				**VEGETATIVE COVER** pre-seeded cover, topsoil, silty sand with gravel
			0.5	**MUD PIT CAP** cover material, Silty Sand with occasional gravel, moist, brown
			3.8	
			3.9	**LINER**
		MC = 32.1% LL = NP PI = NP Fines = 29.8%		**MUD PIT** Silt with sand and gravel, wet, light brown
5			5.0	DRO Sample taken at 13:30pm
				Bottom of Bore Hole at 5.0 feet.

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3801 Automation Way, Suite 100
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Telephone: 970-223-9600
Fax: 970-223-7171

BOREHOLE ID: MPCF-B3

CLIENT Stoller Newport News Nuclear **PROJECT NAME** Amchitka Mud Pit Cap Investigation

PROJECT NUMBER 114-910340 **PROJECT LOCATION** Amchitka Island, AK

DATE(S) OF DRILLING: 06/09/2015 **GROUND ELEVATION: NA** **METHOD: 2" OD solid stem**

CONSULTANT: Tetra Tech **LATITUDE: 00.000000 N** **LOGGED BY: Jeff DeTienne**

DRILLING CONTRACTOR: N/A **LONGITUDE: 000.000000 W** **DRILLED BY: Jeff DeTienne**

DRILL RIG: Bosch Hammer Drill **HAMMER TYPE: N/A** **LOCATION: Mud Pit Cap Site F**

DEPTH (ft)	SAMPLE TYPE	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0				**VEGETATIVE COVER** pre-seeded cover, topsoil, silty sand with gravel
0.5				**MUD PIT CAP** cover material, Silty Sand with occasional gravel, moist, brown
		MC = 38.7% LL = NP PI = NP Fines = 26.2%		▽
4.0				
4.1				**LINER**
				MUD PIT Silty Sand/Poorly Graded Sand with gravel, wet, light brown, hard
5				
5.0				DRO Sample taken at 14:20pm
				Bottom of Bore Hole at 5.0 feet.

Tetra Tech Inc
3801 Automation Way, Suite 100
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Fax: 970-223-7171

BOREHOLE ID: MPCF-B4

CLIENT Stoller Newport News Nuclear **PROJECT NAME** Amchitka Mud Pit Cap Investigation

PROJECT NUMBER 114-910340 **PROJECT LOCATION** Amchitka Island, AK

DATE(S) OF DRILLING: 06/09/2015 **GROUND ELEVATION: NA** **METHOD: 2" OD solid stem**

CONSULTANT: Tetra Tech **LATITUDE: 00.000000 N** **LOGGED BY: Jeff DeTienne**

DRILLING CONTRACTOR: N/A **LONGITUDE: 000.000000 W** **DRILLED BY: Jeff DeTienne**

DRILL RIG: Bosch Hammer Drill **HAMMER TYPE: N/A** **LOCATION: Mud Pit Cap Site F**

DEPTH (ft)	SAMPLE TYPE	GRAPHIC LOG	MATERIAL DESCRIPTION
0			**VEGETATIVE COVER** pre-seeded cover, topsoil, silty sand with gravel
0.5			**MUD PIT CAP** cover material, Silty Sand with occasional gravel, moist, brown
3.9			
4.0			**LINER**
4.2			**MUD PIT** Silty Sand/Poorly Graded Sand with gravel, wet, light brown, hard Refusal at 4.2'
5			Bottom of Bore Hole at 5.0 feet.

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EXPLANATION

- D-1 NW — END OF TRANSECT/PHOTOPOINT AND NUMBER
- D-1 — TRANSECT LINE AND NUMBER
- SURVEY MONUMENT
- VISUAL INSPECTION ROUTE
- 151 — PHOTO NUMBER AND VIEW DIRECTION
- BOUNDARY OF DISTURBED AREA

N

1:1,200

1 IN = 100 FT

0 25 50 100 150 FEET

CONTOUR INTERVAL = 1 FOOT

GPS Legend

- Monitoring Stations (6/2015)
- Point_ge (GPS 8/25-26/2014)
- Line_gen (GPS 8/25-26/2014)

NAME	STATE PLANE ALASKA ZONE 10 NAD83 (FEET)		GEOGRAPHIC WGS84	
	EASTING	NORTHING	LATITUDE	LONGITUDE
D-1 NW	2147400.194	226816.156	51.513712	179.020016
D-1 SE	2147707.776	226368.079	51.512546	179.021499
D-2 NE	2147498.665	226771.331	51.513608	179.020461
D-2 SW	2147377.552	226679.663	51.513335	179.019958
D-3 NE	2147652.666	226619.949	51.513224	179.021181
D-3 SW	2147522.685	226544.283	51.512992	179.020635
D-4 NE	2147806.324	226463.687	51.512826	179.021902
D-4 SW	2147656.522	226391.834	51.512601	179.021267
D-5 NW	2147472.509	226929.601	51.514036	179.020298
D-5 SE	2148079.23	226434.912	51.512799	179.023105
D-6 NE	2147623.543	226951.442	51.514124	179.020953
D-6 SW	2147503.177	226790.827	51.513662	179.020474
D-7 NE	2147722.998	226854.59	51.513878	179.021418
D-7 SW	2147602.778	226716.976	51.51348	179.020933
D-8 NE	2147814.387	226755.755	51.513626	179.021848
D-8 SW	2147672.275	226646.181	51.513299	179.021259
D-9 NE	2147895.578	226680.648	51.513436	179.022227
D-9 SW	2147770.335	226547.708	51.513049	179.021718
D-10 NE	2147995.712	226666.765	51.513417	179.022669
D-10 SW	2147896.975	226445.442	51.512793	179.022304
D-11 NE	2148065.088	226627.224	51.513322	179.022985
D-11 SW	2148033.808	226436.268	51.512794	179.022906
USFWS MON	2147772.85	226896.76	51.514003	179.021623

U.S. DEPARTMENT OF ENERGY
GRAND JUNCTION, COLORADO

Work Performed by
Stoller Newport News Nuclear, Inc.
Under DOE Contract Number DE-LM0000415

Site D: Monitoring Stations (6/2015)

DATE PREPARED: June 30, 2015

FILENAME: S0848500_Site_D_20150623

\\lm\gis\Data\Sites\AK\Amchitka\GPS\RoverFiles\20150623_Mud_Site_D_E_F\Site_D\S0848500_Site_D_20150623.mxd HyattT 06/30/2015 10:18:13 AM

DETAIL
1 IN = 30 FT

RED SEEP
203
202
sign 4
E-1 NW
ROCK
site e 1
sign 3
sample pt 2
sign 2
E-2 NE
E-2
E-2 SW
sample pt 1
site e 2
sign 1
rock1
E-1 SE
site e slide

EXPLANATION

E-1 NW — END OF TRANSECT/PHOTOPOINT AND NUMBER

E-1 — TRANSECT LINE AND NUMBER

SURVEY MONUMENT

VISUAL INSPECTION ROUTE

202 — PHOTO NUMBER AND VIEW DIRECTION

BOUNDARY OF DISTURBED AREA

N

1:1,200
1 IN = 100 FT
0 30 60 120 180 FEET

CONTOUR INTERVAL = 1 FOOT

GPS Legend

- Monitoring Stations (6/2015)
- Point_ge (GPS 8/25-26/2014)
- Line_gen (GPS 8/25-26/2014)

CP-105
UA-7 (POST #16480)
USFWS MONUMENT
171
RED SEEP
203
202
E-1 NW
ROCK
site e 1
E-2 NE
E-2 SW
E-2
E-1 SE
site e 2
site e slide

INFANTRY ROAD
SITE E

NAME	STATE PLANE ALASKA ZONE 10 NAD83 (FEET)		GEOGRAPHIC WGS84	
	EASTING	NORTHING	LATITUDE	LONGITUDE
E-1 NW	2134545.49	243985.8781	51.558179	178.958438
E-1 SE	2134558.477	243835.9061	51.557771	178.958541
E-2 NE	2134605.591	243915.4771	51.557998	178.958723
E-2 SW	2134513.427	243902.2551	51.557944	178.958323

U.S. DEPARTMENT OF ENERGY
GRAND JUNCTION, COLORADO

Work Performed by
Stoller Newport News Nuclear, Inc.
Under DOE Contract Number DE-LM0000415

Site E: Monitoring Stations (6/2015)

DATE PREPARED: June 30, 2015

FILENAME: S0848600_Site_E_20150629

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EXPLANATION

- F-1 W — END OF TRANSECT/PHOTOPOINT AND NUMBER
- F-1 — TRANSECT LINE AND NUMBER
- SURVEY MONUMENT
- VISUAL INSPECTION ROUTE
- 169 — PHOTO NUMBER AND VIEW DIRECTION
- BOUNDARY OF DISTURBED AREA
- SMALL DEPRESSION

N

1:514

1 IN = 43 FT

0 20 40 FEET

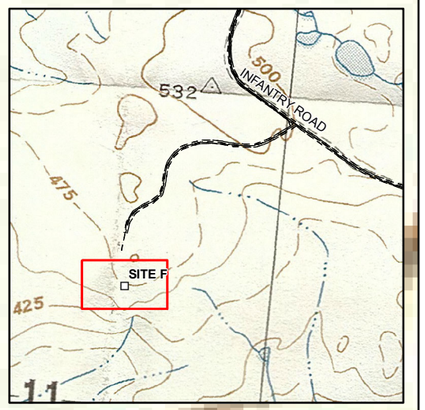
CONTOUR INTERVAL = 1 FOOT

USFWS MONUMENT

CONCRETE

POST #11372

480 475 470 465 460 455 450



GPS Legend

- Monitoring Station (6/2015)
- Point_ge (GPS 8/25-26/2014)
- Line_gen (GPS 8/25-26/2014)

169

168

170

sign 1

sign 2

sign 3

sign 4

N PHOTO

S PHOTO

F-1 W

F-1 E

F-2 N

F-2 S

F-3 N

F-3 S

F-1

F-2

F-3

sample pt 1

hole 1

sample pt 2

hole 2

sample pt 3

hole 3

sample pt 4

hole 4

site f1

CHANNEL F1

ROCK

PONDED WATER

NAME	STATE PLANE ALASKA ZONE 10 NAD83 (FEET)		GEOGRAPHIC WGS84	
	EASTING	NORTHING	LATITUDE	LONGITUDE
F-1 E	2139548.9	235548	51.53608	178.981764
F-1 W	2139272.7	235498.2	51.535891	178.981764
F-2 N	2139349.868	235548.174	51.536042	178.982086
F-2 S	2139362.985	235479.801	51.535857	178.982164
F-3 N	2139448.973	235564.178	51.536104	178.982515
F-3 S	2139458.6	235498.48	51.535927	178.982577
PHOTO	2139402.965	235554.947	51.53607	178.982316
PHOTO	2139409.14	235488.077	51.535889	178.982364
USFWS MON	2139216.9	235803.5	51.536714	178.981425

U.S. DEPARTMENT OF ENERGY
GRAND JUNCTION, COLORADO

Work Performed by
Stoller Newport News Nuclear, Inc.
Under DOE Contract Number DE-LM000415

Site F: Monitoring Station (6/2015)

DATE PREPARED: June 30, 2015

FILENAME: S0848700_Site_F_20150629_B

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ATTACHMENT C

LABORATORY TEST RESULTS

Tetra Tech Inc
3801 Automation Way, Suite 100
Fort Collins, CO, 80525
Telephone: 970-223-9600
Fax: 970-223-7171

SUMMARY OF LABORATORY RESULTS

CLIENT Stoller Newport News Nuclear

PROJECT NAME Amchitka Mud Pit Cap Investigation

PROJECT NUMBER 114-910340

PROJECT LOCATION Amchitka Island, AK

Borehole Identification	Depth	Water Content (%)	Dry Density (pcf)	Atterberg's Limits (LL/PL/PI)	Sp. Gravity, Degree of Saturation (%)	Fines Content (%)	USCS Classi-fication	Max Dry Density (pcf)/ OMC(%)	Triaxial Shear Strength c'(psf), phi'	Swell (%), Swell pressure (psf)	Cc, Cs	Permeability (cm/s)	pH	Sulfate/ Chloride Content (ppm)
MPCD-B1	2.5	21.6		NP		37	SM							
MPCD-B1	5.0	30.2		32/27/5		44	SM							
MPCD-B1	6.0	28.0		NP		42	SM							
MPCD-B1	6.5	40.1	58.0			32								
MPCD-B2	0.0	20.5		NP		29	SM							
MPCD-B2	5.5	18.2		NP		45	SM							
MPCD-B3	4.0	15.7	96.4			51								
MPCD-B3	4.5	14.6				37								
MPCD-B4	5.0	24.9		NP		12	SM							
MPCE-B1	1.0	29.1		NP		33	SM							
MPCE-B1	3.5	20.8		NP		41	SM							
MPCE-B1	6.4	27.6				39								
MPCE-B2	5.6	19.3				43								
MPCE-B2	5.9	19.5		NP		38	SM							
MPCF-B1	0.0	38.7		NP		21	SM							
MPCF-B1	3.0	26.1				31								
MPCF-B1	4.0	20.9		NP		36	SM							
MPCF-B2	4.5	32.1		NP		30	SM							
MPCF-B3	4.0	38.7		NP		26	SM							

Laboratory Report of Analysis

To: Tetra Tech Mining & Minerals-Colorado
3801 Automation Way Suite 100
Fort Collins, CO 80525
(970)206-4237

Report Number: **1152819**

Client Project: **Amchitka**

Dear Tom Chapel,

Enclosed are the results of the analytical services performed under the referenced project for the received samples and associated QC as applicable. The samples are certified to meet the requirements of the National Environmental Laboratory Accreditation Conference Standards. Copies of this report and supporting data will be retained in our files for a period of ten years in the event they are required for future reference. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. Any samples submitted to our laboratory will be retained for a maximum of fourteen (14) days from the date of this report unless other archiving requirements were included in the quote.

If there are any questions about the report or services performed during this project, please call Chuck at (907) 562-2343. We will be happy to answer any questions or concerns which you may have.

Thank you for using SGS North America Inc. for your analytical services. We look forward to working with you again on any additional analytical needs.

Sincerely,
SGS North America Inc.

_____

Chuck Homestead Date
Project Manager
Charles.Homestead@sgs.com

SGS North America Inc. 200 West Potter Drive, Anchorage, AK 99518
t 907.562.2343 f 907.561.5301 www.us.sgs.com

Case Narrative

SGS Client: **Tetra Tech Mining & Minerals-Colorado**
SGS Project: **1152819**
Project Name/Site: **Amchitka**
Project Contact: **Tom Chapel**

Refer to sample receipt form for information on sample condition.

114-190340-MPCF-B2-4 (1152819001) PS

AK102 - Sample was diluted due to dark color of extract; therefore the LOQ was elevated.

114-190340-MPCF-B3-4.3 (1152819002) PS

AK102 - Sample was diluted due to dark color of extract; therefore the LOQ was elevated.

*QC comments may be associated with the field samples found in this report. When applicable, comments will be applied to associated field samples.

SGS North America Inc.
200 West Potter Drive, Anchorage, AK 99518
t 907.562.2343 **f** 907.561.5301 www.us.sgs.com

Laboratory Qualifiers

Enclosed are the analytical results associated with the above work order. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. This document is issued by the Company under its General Conditions of Service accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>. Attention is drawn to the limitation of liability, indenmification and jurisdiction issues defined therein.

Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. Any unauthorized alteration, forgery or falsification of the context or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS maintains a formal Quality Assurance/Quality Control (QA/QC) program. A copy of our Quality Assurance Plan (QAP), which outlines this program, is available at your request. The laboratory certification numbers are AK00971 (DW Chemistry & Microbiology) & UST-005 (CS) for ADEC and 2944.01 for DOD ELAP/ISO17025 (RCRA methods: 1020B, 1311, 3010A, 3050B, 3520C, 3550C, 5030B, 5035A, 6020A, 7470A, 7471B, 8021B, 8082A, 8260B, 8270D, 8270D-SIM, 9040C, 9045D, 9056A, 9060A, AK101 and AK102/103). Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth by the SGS QAP and, when applicable, other regulatory authorities.

The following descriptors or qualifiers may be found in your report:

*	The analyte has exceeded allowable regulatory or control limits.
!	Surrogate out of control limits.
B	Indicates the analyte is found in a blank associated with the sample.
CCV/CVA/CVB	Continuing Calibration Verification
CCCV/CVC/CVCA/CVCB	Closing Continuing Calibration Verification
CL	Control Limit
D	The analyte concentration is the result of a dilution.
DF	Dilution Factor
DL	Detection Limit (i.e., maximum method detection limit)
E	The analyte result is above the calibrated range.
F	Indicates value that is greater than or equal to the DL
GT	Greater Than
IB	Instrument Blank
ICV	Initial Calibration Verification
J	The quantitation is an estimation.
JL	The analyte was positively identified, but the quantitation is a low estimation.
LCS(D)	Laboratory Control Spike (Duplicate)
LOD	Limit of Detection (i.e., 1/2 of the LOQ)
LOQ	Limit of Quantitation (i.e., reporting or practical quantitation limit)
LT	Less Than
M	A matrix effect was present.
MB	Method Blank
MS(D)	Matrix Spike (Duplicate)
ND	Indicates the analyte is not detected.
Q	QC parameter out of acceptance range.
R	Rejected
RPD	Relative Percent Difference
U	Indicates the analyte was analyzed for but not detected.

Note: Sample summaries which include a result for "Total Solids" have already been adjusted for moisture content. All DRO/RRO analyses are integrated per SOP.

SGS North America Inc. 200 West Potter Drive, Anchorage, AK 99518
t 907.562.2343 **f** 907.561.5301 www.us.sgs.com

Sample Summary

Client Sample ID	Lab Sample ID	Collected	Received	Matrix
114-190340-MPCF-B2-4	1152819001	06/09/2015	06/15/2015	Soil/Solid (dry weight)
114-190340-MPCF-B3-4.3	1152819002	06/09/2015	06/15/2015	Soil/Solid (dry weight)
114-190340-MPCD-B1-6.5	1152819003	06/10/2015	06/15/2015	Soil/Solid (dry weight)
114-190340-MPCD-B2-6	1152819004	06/10/2015	06/15/2015	Soil/Solid (dry weight)
114-190340-MPCD-B3-4.8	1152819005	06/10/2015	06/15/2015	Soil/Solid (dry weight)
114-190340-MPCD-B4-5.3	1152819006	06/10/2015	06/15/2015	Soil/Solid (dry weight)
114-190340-MPCE-B1-6.4	1152819007	06/11/2015	06/15/2015	Soil/Solid (dry weight)
114-190340-MPCE-B2-5.6	1152819008	06/11/2015	06/15/2015	Soil/Solid (dry weight)

Method	Method Description
AK102	Diesel Range Organics (S)
SM21 2540G	Percent Solids SM2540G

SGS North America Inc.
200 West Potter Drive, Anchorage, AK 99518
t 907.562.2343 f 907.561.5301 www.us.sgs.com

Detectable Results Summary

Client Sample ID: **114-190340-MPCF-B3-4.3**
Lab Sample ID: 1152819002
Semivolatile Organic Fuels

Parameter	Result	Units
Diesel Range Organics	49.3J	mg/Kg

Client Sample ID: **114-190340-MPCD-B2-6**
Lab Sample ID: 1152819004
Semivolatile Organic Fuels

Parameter	Result	Units
Diesel Range Organics	19.6J	mg/Kg

Client Sample ID: **114-190340-MPCE-B1-6.4**
Lab Sample ID: 1152819007
Semivolatile Organic Fuels

Parameter	Result	Units
Diesel Range Organics	41.8	mg/Kg

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t 907.562.2343 **f** 907.561.5301 www.us.sgs.com

Results of **114-190340-MPCF-B2-4**

Client Sample ID: **114-190340-MPCF-B2-4**
Client Project ID: **Amchitka**
Lab Sample ID: 1152819001
Lab Project ID: 1152819

Collection Date: 06/09/15 13:30
Received Date: 06/15/15 10:50
Matrix: Soil/Solid (dry weight)
Solids (%):78.6
Location:

Results by **Semivolatile Organic Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	50.5	U	101	31.2	mg/Kg	4		06/19/15 05:01
Surrogates								
5a Androstane (surr)	101		50-150		%	4		06/19/15 05:01

Batch Information

Analytical Batch: XFC11895
Analytical Method: AK102
Analyst: AYC
Analytical Date/Time: 06/19/15 05:01
Container ID: 1152819001-A

Prep Batch: XXX33320
Prep Method: SW3550C
Prep Date/Time: 06/17/15 20:33
Prep Initial Wt./Vol.: 30.361 g
Prep Extract Vol: 1 mL

Print Date: 07/23/2015 12:32:39PM

J flagging is activated

Results of **114-190340-MPCF-B3-4.3**

Client Sample ID: **114-190340-MPCF-B3-4.3**
Client Project ID: **Amchitka**
Lab Sample ID: 1152819002
Lab Project ID: 1152819

Collection Date: 06/09/15 14:20
Received Date: 06/15/15 10:50
Matrix: Soil/Solid (dry weight)
Solids (%):77.1
Location:

Results by **Semivolatile Organic Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	49.3	J	102	31.7	mg/Kg	4		06/19/15 05:11
Surrogates								
5a Androstane (surr)	103		50-150		%	4		06/19/15 05:11

Batch Information

Analytical Batch: XFC11895
Analytical Method: AK102
Analyst: AYC
Analytical Date/Time: 06/19/15 05:11
Container ID: 1152819002-A

Prep Batch: XXX33320
Prep Method: SW3550C
Prep Date/Time: 06/17/15 20:33
Prep Initial Wt./Vol.: 30.412 g
Prep Extract Vol: 1 mL

Print Date: 07/23/2015 12:32:39PM

J flagging is activated

Results of **114-190340-MPCD-B1-6.5**

Client Sample ID: **114-190340-MPCD-B1-6.5**
Client Project ID: **Amchitka**
Lab Sample ID: 1152819003
Lab Project ID: 1152819

Collection Date: 06/10/15 14:10
Received Date: 06/15/15 10:50
Matrix: Soil/Solid (dry weight)
Solids (%):79.1
Location:

Results by **Semivolatile Organic Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	12.6	U	25.1	7.79	mg/Kg	1		06/19/15 03:02
Surrogates								
5a Androstane (surr)	92.1		50-150		%	1		06/19/15 03:02

Batch Information

Analytical Batch: XFC11895
Analytical Method: AK102
Analyst: AYC
Analytical Date/Time: 06/19/15 03:02
Container ID: 1152819003-A

Prep Batch: XXX33320
Prep Method: SW3550C
Prep Date/Time: 06/17/15 20:33
Prep Initial Wt./Vol.: 30.186 g
Prep Extract Vol: 1 mL

Print Date: 07/23/2015 12:32:39PM

J flagging is activated

Results of **114-190340-MPCD-B2-6**

Client Sample ID: **114-190340-MPCD-B2-6**
Client Project ID: **Amchitka**
Lab Sample ID: 1152819004
Lab Project ID: 1152819

Collection Date: 06/10/15 13:15
Received Date: 06/15/15 10:50
Matrix: Soil/Solid (dry weight)
Solids (%):86.0
Location:

Results by **Semivolatile Organic Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	19.6	J	23.2	7.19	mg/Kg	1		06/19/15 03:12
Surrogates								
5a Androstane (surr)	90		50-150		%	1		06/19/15 03:12

Batch Information

Analytical Batch: XFC11895
Analytical Method: AK102
Analyst: AYC
Analytical Date/Time: 06/19/15 03:12
Container ID: 1152819004-A

Prep Batch: XXX33320
Prep Method: SW3550C
Prep Date/Time: 06/17/15 20:33
Prep Initial Wt./Vol.: 30.112 g
Prep Extract Vol: 1 mL

Print Date: 07/23/2015 12:32:39PM

J flagging is activated

SGS

Results of **114-190340-MPCD-B3-4.8**

Client Sample ID: **114-190340-MPCD-B3-4.8**
Client Project ID: **Amchitka**
Lab Sample ID: 1152819005
Lab Project ID: 1152819

Collection Date: 06/10/15 13:10
Received Date: 06/15/15 10:50
Matrix: Soil/Solid (dry weight)
Solids (%):85.4
Location:

Results by **Semivolatile Organic Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	11.7	U	23.3	7.22	mg/Kg	1		06/19/15 03:22
Surrogates								
5a Androstane (surr)	97.5		50-150		%	1		06/19/15 03:22

Batch Information

Analytical Batch: XFC11895
Analytical Method: AK102
Analyst: AYC
Analytical Date/Time: 06/19/15 03:22
Container ID: 1152819005-A

Prep Batch: XXX33320
Prep Method: SW3550C
Prep Date/Time: 06/17/15 20:33
Prep Initial Wt./Vol.: 30.189 g
Prep Extract Vol: 1 mL

Print Date: 07/23/2015 12:32:39PM

J flagging is activated

SGS

Results of **114-190340-MPCD-B4-5.3**

Client Sample ID: **114-190340-MPCD-B4-5.3**
Client Project ID: **Amchitka**
Lab Sample ID: 1152819006
Lab Project ID: 1152819

Collection Date: 06/10/15 13:45
Received Date: 06/15/15 10:50
Matrix: Soil/Solid (dry weight)
Solids (%):80.5
Location:

Results by **Semivolatile Organic Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	12.4	U	24.8	7.70	mg/Kg	1		06/19/15 03:32
Surrogates								
5a Androstane (surr)	82.6		50-150		%	1		06/19/15 03:32

Batch Information

Analytical Batch: XFC11895
Analytical Method: AK102
Analyst: AYC
Analytical Date/Time: 06/19/15 03:32
Container ID: 1152819006-A

Prep Batch: XXX33320
Prep Method: SW3550C
Prep Date/Time: 06/17/15 20:33
Prep Initial Wt./Vol.: 30.023 g
Prep Extract Vol: 1 mL

Print Date: 07/23/2015 12:32:39PM

J flagging is activated

Results of **114-190340-MPCE-B1-6.4**

Client Sample ID: **114-190340-MPCE-B1-6.4**
Client Project ID: **Amchitka**
Lab Sample ID: 1152819007
Lab Project ID: 1152819

Collection Date: 06/11/15 10:00
Received Date: 06/15/15 10:50
Matrix: Soil/Solid (dry weight)
Solids (%):80.3
Location:

Results by **Semivolatile Organic Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	41.8		24.7	7.65	mg/Kg	1		06/19/15 03:42
Surrogates								
5a Androstane (surr)	96.3		50-150		%	1		06/19/15 03:42

Batch Information

Analytical Batch: XFC11895
Analytical Method: AK102
Analyst: AYC
Analytical Date/Time: 06/19/15 03:42
Container ID: 1152819007-A

Prep Batch: XXX33320
Prep Method: SW3550C
Prep Date/Time: 06/17/15 20:33
Prep Initial Wt./Vol.: 30.296 g
Prep Extract Vol: 1 mL

Print Date: 07/23/2015 12:32:39PM

J flagging is activated

SGS

Results of **114-190340-MPCE-B2-5.6**

Client Sample ID: **114-190340-MPCE-B2-5.6**
Client Project ID: **Amchitka**
Lab Sample ID: 1152819008
Lab Project ID: 1152819

Collection Date: 06/11/15 10:30
Received Date: 06/15/15 10:50
Matrix: Soil/Solid (dry weight)
Solids (%):81.8
Location:

Results by **Semivolatile Organic Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	12.1	U	24.2	7.50	mg/Kg	1		06/19/15 03:52
Surrogates								
5a Androstane (surr)	94.2		50-150		%	1		06/19/15 03:52

Batch Information

Analytical Batch: XFC11895
Analytical Method: AK102
Analyst: AYC
Analytical Date/Time: 06/19/15 03:52
Container ID: 1152819008-A

Prep Batch: XXX33320
Prep Method: SW3550C
Prep Date/Time: 06/17/15 20:33
Prep Initial Wt./Vol.: 30.323 g
Prep Extract Vol: 1 mL

Print Date: 07/23/2015 12:32:39PM

J flagging is activated

Method Blank

Blank ID: MB for HBN 1711168 [SPT/9633]
Blank Lab ID: 1271506

Matrix: Soil/Solid (dry weight)

QC for Samples:
1152819001, 1152819002, 1152819003, 1152819004, 1152819005, 1152819006, 1152819007, 1152819008

Results by **SM21 2540G**

Parameter	Results	LOQ/CL	DL	Units
Total Solids	100			%

Batch Information

Analytical Batch: SPT9633
Analytical Method: SM21 2540G
Instrument:
Analyst: A.R
Analytical Date/Time: 6/16/2015 5:40:00PM

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200 West Potter Drive Anchorage, AK 95518
t 907.562.2343 **f** 907.561.5301 www.us.sgs.com

Duplicate Sample Summary

Original Sample ID: 1152816001
Duplicate Sample ID: 1271508
QC for Samples:

Analysis Date: 06/16/2015 17:40
Matrix: Soil/Solid (dry weight)

Results by **SM21 2540G**

NAME	Original	Duplicate	Units	RPD (%)	RPD CL
Total Solids	95.1	94.9	%	0.14	(< 5)

Batch Information

Analytical Batch: SPT9633
Analytical Method: SM21 2540G
Instrument:
Analyst: A.R

Print Date: 07/23/2015 12:32:42PM

Duplicate Sample Summary

Original Sample ID: 1152816002
Duplicate Sample ID: 1271509
QC for Samples:
1152819001, 1152819002, 1152819003, 1152819004

Analysis Date: 06/16/2015 17:40
Matrix: Soil/Solid (dry weight)

Results by **SM21 2540G**

NAME	Original	Duplicate	Units	RPD (%)	RPD CL
Total Solids	95.3	95.1	%	0.17	(< 5)

Batch Information

Analytical Batch: SPT9633
Analytical Method: SM21 2540G
Instrument:
Analyst: A.R

Print Date: 07/23/2015 12:32:42PM

Duplicate Sample Summary

Original Sample ID: 1152819004
Duplicate Sample ID: 1271510
Analysis Date: 06/16/2015 17:40
Matrix: Soil/Solid (dry weight)

QC for Samples:

1152819001, 1152819002, 1152819003, 1152819004, 1152819005, 1152819006, 1152819007, 1152819008

Results by **SM21 2540G**

NAME	Original	Duplicate	Units	RPD (%)	RPD CL
Total Solids	86.0	85.5	%	0.55	(< 5)

Batch Information

Analytical Batch: SPT9633
Analytical Method: SM21 2540G
Instrument:
Analyst: A.R

Print Date: 07/23/2015 12:32:42PM

Duplicate Sample Summary

Original Sample ID: 1158072001
Duplicate Sample ID: 1271511
QC for Samples:
1152819005, 1152819006, 1152819007, 1152819008

Analysis Date: 06/16/2015 17:40
Matrix: Soil/Solid (dry weight)

Results by **SM21 2540G**

NAME	Original	Duplicate	Units	RPD (%)	RPD CL
Total Solids	77.2	77.1	%	0.06	(< 5)

Batch Information

Analytical Batch: SPT9633
Analytical Method: SM21 2540G
Instrument:
Analyst: A.R

Print Date: 07/23/2015 12:32:42PM

Method Blank

Blank ID: MB for HBN 1711262 [XXX/33320]
Blank Lab ID: 1271706

Matrix: Soil/Solid (dry weight)

QC for Samples:
1152819001, 1152819002, 1152819003, 1152819004, 1152819005, 1152819006, 1152819007, 1152819008

Results by **AK102**

Parameter	Results	LOQ/CL	DL	Units
Diesel Range Organics	10.0U	20.0	6.20	mg/Kg
Surrogates				
5a Androstane (surr)	82.9	60-120		%

Batch Information

Analytical Batch: XFC11895
Analytical Method: AK102
Instrument: HP 6890 Series II FID SV D R
Analyst: AYC
Analytical Date/Time: 6/19/2015 2:33:00AM

Prep Batch: XXX33320
Prep Method: SW3550C
Prep Date/Time: 6/17/2015 8:33:56PM
Prep Initial Wt./Vol.: 30 g
Prep Extract Vol: 1 mL

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200 West Potter Drive Anchorage, AK 95518
t 907.562.2343 **f** 907.561.5301 www.us.sgs.com

Blank Spike Summary

Blank Spike ID: LCS for HBN 1152819 [XXX33320]
Blank Spike Lab ID: 1271707
Date Analyzed: 06/19/2015 02:42

Spike Duplicate ID: LCSD for HBN 1152819 [XXX33320]
Spike Duplicate Lab ID: 1271708
Matrix: Soil/Solid (dry weight)

QC for Samples: 1152819001, 1152819002, 1152819003, 1152819004, 1152819005, 1152819006, 1152819007, 1152819008

Results by **AK102**

	Blank Spike (mg/Kg)			Spike Duplicate (mg/Kg)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Diesel Range Organics	167	165	99	167	143	86	(75-125)	14.70	(< 20)
Surrogates									
5a Androstane (surr)	3.33	107	107	3.33	93.8	94	(60-120)	13.10	

Batch Information

Analytical Batch: **XFC11895**
Analytical Method: **AK102**
Instrument: **HP 6890 Series II FID SV D R**
Analyst: **AYC**

Prep Batch: **XXX33320**
Prep Method: **SW3550C**
Prep Date/Time: **06/17/2015 20:33**
Spike Init Wt./Vol.: 167 mg/Kg Extract Vol: 1 mL
Dupe Init Wt./Vol.: 167 mg/Kg Extract Vol: 1 mL

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1152819

Instructions: Sections 1 - 5 must be filled out. Omissions may delay the onset of analysis.

Page ___ of ___

Section 1

CLIENT: TetraTech

CONTACT: Tom Chapel PHONE NO: 970.206.4237

PROJECT NAME: Amcwitka PROJECT/ PWSID/ PERMIT#: 114-190340

REPORTS TO: Tom Chapel E-MAIL: tom.chapel@tetratech.com

INVOICE TO: QUOTE #:

P.O. #:

Section 2

RESERVED for lab use	SAMPLE IDENTIFICATION	DATE mm/dd/yy	TIME HH:MM	MATRIX/ MATRIX CODE	Section 3 # CONTAINERS	Type C = COMP G = GRAB MI = Multi Incre-mental Soils	Preservative AL102-D20	REMARKS/ LOC ID
(1) A	114-190340-MPCF-B2-4	6.9.15	1330	S	1		X	MPCF-B2 4'
(2) A	114-190340-MPCF-B3-4.3	6.9.15	1420	S	1		X	MPCF-B3 4.3'
(3) A	114-190340-MPCD-B1-6.5	6.10.15	1416	S	1		X	MPCD-B1 6.5'
(4) A	114-190340-MPCD-B2-6	6.10.15	1315	S	1		X	MPCD-B2 6'
(5) A	114-190340-MPCD-B3-4.8	6.10.15	1310	S	1		X	MPCD-B3 4.8'
(6) A	114-190340-MPCD-B4-5.3	6.10.15	1345	S	1		X	MPCD-B4 5.3'
(7) A	114-190340-MPCE-B1-6.4	6.11.15	1000	S	1		X	MPCE-B1 6.4'
(8) A	114-190340-MPCE-B2-5.6	6.11.15	1030	S	1		X	MPCE-B2 5.6'

Section 5

	Date	Time	
Relinquished By: (1) Dan Rak	6/15/15	1050	Received By:
Relinquished By: (2)	Date	Time	Received By:
Relinquished By: (3)	Date	Time	Received By:
Relinquished By: (4)	6/15/15	1050	Received For Laboratory By:

Section 4 DOD Project? Yes No

Cooler ID: ___

Data Deliverable Requirements:

Requested Turnaround Time and/or Special Instructions:

Standard

Temp Blank °C: 4.0 #240 or Ambient [ ]

(See attached Sample Receipt Form)

Chain of Custody Seal: (Circle) INTACT BROKEN ABSENT

(See attached Sample Receipt Form)

[ ] 200 W. Potter Drive Anchorage, AK 99518 Tel: (907) 562-2343 Fax: (907) 561-5301
[ ] 5500 Business Drive Wilmington, NC 28405 Tel: (910) 350-1903 Fax: (910) 350-1557

TETRA Tech
NO

JHS 6/15/15
ND

SGS North America Inc.
200 W. Potter Dr., Anchorage, AK 99518 (ph) 907-562-2343, (fax) 907-561-5301
3180 Peger Rd. Ste 190, Fairbanks, AK 99701 (ph) 907-474-8656, (fax) 907-474-9685

Sample Kit Request

Client Code: TETRAMM **Does a Profile exist in LIMS?** ☐ Yes ☐ No
Client Name: Tetra Tech 3801 Automation Way Suite100 Fort Collins, CO 80525
Ordered By: Tom Chapel **Phone #:** 970-206-4237
Email: tom.chapel@tetratech.com **Deliverables:**
Project Name: **Project/Permit#:** 114-910340
Quote #: **Profile #:**
Delivery: Tetra Tech-Dana Ramquist c/o Jerrett Patterson
PO Box 2000
Adak, Alaska 99546

☐ **Client pickup Date:** **Time:**
Be sure to ask if client will ship by ground (DOT) or air carrier (IATA)
☐ **Deliver to client:**
☐ **Ship by/Air Carrier:** Alaska Airlines Gold Streak
Airbill Number:
Date to ship by: before 5/30/15
Notes:
Kit request taken by: SCE **Date:** 5/20/2015
Kit prepared by: JHS **Date:** 24 May 15
Kit (*including lid tightness for pres'd bottles*) checked by: NEG **Date:** 24May15
Kit packed & shipped by: NEG **Date:** 26May15

No. Samples	Matrix	Analysis	Container Size & Type		Pres.	Bottle Lot #	Preservative Lot #	Hold Time	# QC Bottles	Total Bottles
10	soil	AK102 DRO	1 x 4-oz	amber glass	4 Deg C			14 days		10

☐ Pack for Shipping via *ground* (DOT)
☑ Pack for Shipping via *air carrier* (IATA)
☑ Temperature Blank (*circle one:* 120-mL OR 500-mL)
☐ Soil VOA Trip Blank - Lot#:
☐ Water VOA Trip Blank - Lot#:
☐ 524 VOA Trip Blank - Lot#:
☐ Low Level Mercury Trip Blank- Lot#:
☑ Coolers
☑ Gel Ice (*circle one:* in each cooler OR in a separate cooler)
☑ Bubble Wrap
☑ Labels
☑ Custody Seals
☑ SGS COCs - *Circle req'd format:* ☐ Blank COC ☐ DW COC ☐ COC initiated by PM (attached)
☐ Send additional instructions/documents (*Note to PM: Be sure to attach copy of requested form.*)

☐ Total # includes bottles for % Solids
☐ Track all Lot#s
☐ Foreign Soil
☐ Pack similar bottles together OR custom packing (*circle one*)

Other Notes/Reminders for Kit Prep:

Attention Client/Sampler:

1. Do not rinse container before filling and be aware of any acid preservative in container.
2. Fill container to top, but do not overfill (except volatiles which should be headspace free).
3. Label the container with your sample/site ID, as well as the date & time of collection.
4. Fill in the Chain of Custody.
5. Add frozen gel packs or ice to your cooler & pack to prevent breakage.

Charges may be invoiced for bottles which are unused or improperly used.
If you have any questions concerning this sample kit,
please contact your Project Manager for assistance. ***Thank you.***

SGS

SGS North America Inc.
CHAIN OF CUSTODY RECORD

Locations Nationwide

Alaska	Maryland
New Jersey	New York
North Carolina	Indiana
West Virgina	Kentucky

www.us.sgs.com

Instructions: Sections 1 - 5 must be filled out. Omissions may delay the onset of analysis.

Page ____ of ____

Section 1

CLIENT: Tetra Tech 3801 Automation Way Suite100 Fort Collins, CO 80525

CONTACT: Tom Chapel — PHONE #: 970-206-4237

PROJECT NAME: 114-910340 — Project/ PWSID/ PERMIT#:

REPORTS TO: Tom Chapel — E-MAIL: tom.chapel@tetratech.com

INVOICE TO: Tetra Tech 3801 Automation Way — QUOTE #: — P.O. #:

Section 2

RESERVED for lab use	SAMPLE IDENTIFICATION	DATE mm/dd/yy	TIME HH:MM	MATRIX/ MATRIX CODE	# CONTAINERS	Pres: Type: Comp Grab MI (Multi-Incre-mental)	Section 3 Preservative: 4 Deg C	AK102 DRO									REMARKS/ LOC ID
				soil													

Section 5

	Date	Time	
Relinquished By: (1)			Received By:
Relinquished By: (2)			Received By:
Relinquished By: (3)			Received By:
Relinquished By: (4)			Received For Laboratory By:

Section 4

DOD Project? Yes No

Cooler ID: _____

Data Deliverable Requirements:

Requested Turnaround Time and/or Special Instructions:

Temp Blank °C: _____

or Ambient [ ]

(See attached Sample Receipt Form)

Chain of Custody Seal: (Circle)

INTACT BROKEN ABSENT

(See attached Sample Receipt Form)

[ ] 200 W. Potter Drive Anchorage, AK 99518 Tel: (907) 562-2343 Fax: (907) 561-5301
[ ] 5500 Business Drive Wilmington, NC 28405 Tel: (910) 350-1903 Fax: (910) 350-1557

1152819

SAMPLE RECEIPT FORM

Review Criteria:	Yes	N/A	No	Comments/Action Taken:
Were **custody seals** intact? Note # & location, if applicable. COC accompanied samples?	☑ ☑	☐ ☐	☐ ☐	***Exemption permitted if sampler hand carries/delivers.*** 1F, 1B
Temperature blank compliant* (i.e., 0-6°C after CF)? *If >6 °C, were samples collected <8 hours ago?* *If <0 °C, were all sample containers ice free?* Cooler ID: [1] _____ @ 4.0 _____ w/ Therm.ID: #240 _____ Cooler ID: _____ @ _____ w/ Therm.ID: _____ Cooler ID: _____ @ _____ w/ Therm.ID: _____ Cooler ID: _____ @ _____ w/ Therm.ID: _____ Cooler ID: _____ @ _____ w/ Therm.ID: _____ If samples are received without a temperature blank, the "cooler temperature" will be documented in lieu of the temperature blank & "**COOLER TEMP**" will be noted to the right. In cases where neither a temp blank nor cooler temp can be obtained, note "ambient" or "chilled."	☑ ☐ ☐	☐ ☑ ☑	☐ ☐ ☐	***Exemption permitted if chilled & collected <8 hrs ago.*** ***Note: Identify containers received at non-compliant temperature. Use form FS-0029 if more space is needed.***
Delivery method (specify all that apply): ☑Client (hand carried) ☐USPS ☐Lynden ☐AK Air ☐Alert Courier ☐UPS ☐FedEx ☐RAVN ☐C&D Delivery ☐Carlile ☐Pen Air ☐Warp Speed ☐Other: _____ → *For WO# with airbills, was the WO# & airbill info recorded in the Front Counter eLog?*		☑	☐	
	Yes	N/A	No	
Were samples received within hold time? Do samples **match COC*** (i.e., sample IDs, dates/times collected)? Were analyses requested unambiguous?	☑ ☑ ☑	☐ ☐ ☐	☐ ☐ ☐	***Note: Refer to form F-083 "Sample Guide" for hold times.*** ***Note: If times differ <1hr, record details and login per COC.***
Were samples in **good condition** (no leaks/cracks/breakage)? Packing material used (specify all that apply): ☑Bubble Wrap ☑Separate plastic bags ☐Vermiculite ☐Other:	☑	☐	☐	
Were **proper containers** (type/mass/volume/preservative*) used? Were **Trip Blanks** (i.e., VOAs, LL-Hg) in cooler with samples? Were all VOA vials **free of headspace** (i.e., bubbles ≤6 mm)? Were all soil VOAs **field extracted** with MeOH+BFB?	☑ ☐ ☐ ☐	☐ ☑ ☑ ☑	☐ ☐ ☐ ☐	☐ ***Exemption permitted for metals (e.g., 200.8/6020A).***
For preserved waters (other than VOA vials, LL-Mercury or microbiological analyses), was **pH verified and compliant**? If pH was adjusted, were bottles flagged (i.e., stickers)?	☐ ☐	☑ ☑	☐ ☐	
For **special handling** (e.g., "MI" soils, foreign soils, lab filter for dissolved…, lab extract for volatiles, Ref Lab, limited volume), were bottles/paperwork flagged (e.g., sticker)?	☐	☑	☐	
For **RUSH/SHORT Hold Time**, were COC/Bottles flagged accordingly? Was Rush/Short HT email sent, if applicable?	☐	☑	☐	
For **SITE-SPECIFIC QC, e.g. BMS/BMSD/BDUP**, were containers / paperwork flagged accordingly?	☐	☑	☐	
For any question answered "No," has the PM been notified and the problem resolved (or paperwork put in their bin)?	☐	☑	☐	SRF Completed by: D.C 06/15/2015 PM notified:
Was **PEER REVIEW** of ***sample numbering/labeling completed?***	☑	☐	☐	Peer Reviewed by: KPV
Additional notes (if applicable):				

Note to Client: *Any "no" answer above indicates non-compliance with standard procedures and may impact data quality.*

Sample Containers and Preservatives

Container Id	Preservative	Container Condition	Container Id	Preservative	Container Condition
1152819001-A	No Preservative Required	OK			
1152819002-A	No Preservative Required	OK			
1152819003-A	No Preservative Required	OK			
1152819004-A	No Preservative Required	OK			
1152819005-A	No Preservative Required	OK			
1152819006-A	No Preservative Required	OK			
1152819007-A	No Preservative Required	OK			
1152819008-A	No Preservative Required	OK			

Container Condition Glossary

Containers for bacteriological, low level mercury and VOA vials are not opened prior to analysis and will be assigned condition code OK unless evidence indicates than an inappropriate container was submitted.

OK - The container was received at an acceptable pH for the analysis requested.
PA - The container was received outside of the acceptable pH for the analysis requested. Preservative was added upon receipt and the container is now at the correct pH. See the Sample Receipt Form for details on the amount and lot # of the preservative added.
PH - The container was received outside of the acceptable pH for the analysis requested. Preservative was added upon receipt, but was insufficient to bring the container to the correct pH for the analysis requested. See the Sample Receipt Form for details on the amount and lot # of the preservative added.
BU - The container was received with headspace greater than 6mm.

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Appendix B

Passive Alternative Itemized Cost Estimate

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Itemized Cost Schedule									2016 Inspection		2021 Inspection		2026 Inspection		2031 Inspection	
Number	Item Description	Base Year + 1 Rate	Base Year + 2 Rate	Base Year + 3 Rate	Base Year + 4 Rate	Base Year + 9 Rate*	Base Year + 14 Rate*	Unit	Units	Cost	Units	Cost	Units	Cost	Units	Cost
Contractor and Subcontractor Professional Labor (Inspection):																
	Project Manager	$ 206	$ 212	$ 219	$ 225	$ 261	$ 294	hour	20	$ 4,120	20	$ 4,500	20	$ 5,216.73	20	$ 5,871.48
	Project Engineer 4	$ 167	$ 172	$ 177	$ 182	$ 211	$ 237	hour	8	$ 1,336	8	$ 1,456	8	$ 1,687.90	8	$ 1,899.75
2	Contractor Personnel (assumed rates)	$ 150	$ 155	$ 160	$ 165	$ 191	$ 215	hour	180	$ 27,000	180	$ 29,700	180	$ 34,430.44	180	$ 38,751.76
	Civil/Geotechnical Engineer	$ 146	$ 151	$ 155	$ 160	$ 185	$ 209	hour	30	$ 4,380	30	$ 4,800	30	$ 5,564.52	30	$ 6,262.91
	Geologist	$ 116	$ 120	$ 123	$ 127	$ 147	$ 166	hour	90	$ 10,440	90	$ 11,430	90	$ 13,250.50	90	$ 14,913.56
	CADD Designer	$ 96	$ 99	$ 102	$ 105	$ 122	$ 137	hour	4	$ 384	4	$ 420	4	$ 486.90	4	$ 548.00
	Project Assistant	$ 81	$ 84	$ 86	$ 89	$ 103	$ 116	hour	4	$ 324	4	$ 356	4	$ 412.70	4	$ 464.50
	Inspection Subtotal									**$ 47,984**		**$ 52,662**		**$ 61,050**		**$ 68,712**
Subcontractor(s)/Vendors:																
3	ATV/UTV Rental	$					100	day	12	$ 1,200	12	$ 1,200	12	$ 1,200	12	$ 1,200
	One-way charter vessel Adak to/from Amchitka	$					11,000	day	2	$ 22,000	2	$ 22,000	2	$ 22,000	2	$ 22,000
	Subcontractor/Vendor Subtotal									**$ 23,200**		**$ 23,200**		**$ 23,200**		**$ 23,200**
Travel:																
	Airfare for 3 person crew	$					6,000	RT	1	$ 6,000	1	$ 6,000	1	$ 6,000	1	$ 6,000
3	Lodging at Anchorage	$					150	day	3	$ 450	3	$ 450	3	$ 450	3	$ 450
1	Vehicle at Anchorage	$					100	day	1	$ 100	1	$ 100	1	$ 100	1	$ 100
	Lodging for Crew on Charter Vessel during Inspections	$					11,000	day	4	$ 44,000	4	$ 44,000	4	$ 44,000	4	$ 44,000
	Travel Subtotal									**$ 50,550**		**$ 50,550**		**$ 50,550**		**$ 50,550**
							TOTALS without markup			$ 121,734		$ 126,412		$ 134,800		$ 142,462

*** increase factor on labor rates= 3.00% for years 5 through 14**

Assumptions: Cost estimate based on direct, unburdened costs in 2015 dollars. Source of unit rates include current contractual rates, contractor's quotes, and professional judgment based on previous experience

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Appendix C

Overall Itemized Cost Estimate

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Itemized Cost Schedule				Mobilization/ Demobilization		Road Repairs		4.3.1 Field Fit Repairs		4.3.2 Redesign		4.3.3 Consolidate E and F to D and Improve D		4.3.4.a Excavate and Haul E and F to Beach		4.3.4.b Load Barge of E and F Soils for Disposal		4.3.4.c Barge and Dispose of E and F Soils		4.3.5.a Thermal Desorption D, E, and F		4.3.5.b Thermal Desorption All Sites	
Number	Item Description	Rate	Unit	Units	Cost	Units	Cost	Units	Cost	Units	Cost	Units	Cost	Units	Cost	Units	Cost	Units	Cost	Units	Cost	Units	Cost
Design Engineering:																							
	Principal Engineer	$ 206	hour	0	$ -	30	$ 6,180	6	$ 1,236	50	$ 10,300	50	$ 10,300	40	$ 8,240	10	$ 2,060	5	$ 1,030	40	$ 8,240	40	$ 8,240
	Project Engineer 4	$ 167	hour	0	$ -	4	$ 584	4	$ 584	16	$ 2,336	16	$ 2,336	8	$ 1,168	8	$ 1,168	2	$ 292	12	$ 1,752	16	$ 2,336
	Project Engineer 2	$ 146	hour	0	$ -	60	$ 8,760	20	$ 2,920	95	$ 13,870	95	$ 13,870	40	$ 5,840	40	$ 5,840	10	$ 1,460	40	$ 5,840	60	$ 8,760
	Engineer/Scientist 2	$ 116	hour	0	$ -	84	$ 9,744	168	$ 19,488	348	$ 40,368	348	$ 40,368	84	$ 9,744	48	$ 5,568	0	$ -	1008	$ 116,928	1648	$ 191,168
	CADD Designer 1	$ 96	hour	0	$ -	120	$ 11,520	20	$ 1,920	200	$ 19,200	200	$ 19,200	100	$ 9,600	60	$ 5,760	0	$ -	100	$ 9,600	100	$ 9,600
	Project Assistant	$ 81	hour	0	$ -	10	$ 810	4	$ 324	10	$ 810	10	$ 810	10	$ 810	10	$ 810	0	$ -	10	$ 810	10	$ 810
	Design Engineering Subtotal				**$ -**		**$ 37,598**		**$ 26,472**		**$ 86,884**		**$ 86,884**		**$ 35,402**		**$ 21,206**		**$ 2,782**		**$ 143,170**		**$ 220,914**
Earthwork Subcontractor Professional Labor:																							
	Program Manager	$ 185	hour	4	$ 740	0	$ -	1	$ 185	1	$ 185	1	$ 185	1	$ 185	1	$ 185	0	$ -	1	$ 185	1	$ 185
	Project Manager	$ 144	hour	24	$ 3,456	24	$ 3,456	24	$ 3,456	24	$ 3,456	24	$ 3,456	24	$ 3,456	24	$ 3,456	0	$ -	60	$ 8,640	80	$ 11,520
	Contract Manager	$ 115	hour	2	$ 230	1	$ 115	1	$ 115	1	$ 115	1	$ 115	1	$ 115	1	$ 115	0	$ -	1	$ 115	1	$ 115
	Administrative Assistant	$ 62	hour	24	$ 1,488	2	$ 124	2	$ 124	2	$ 124	2	$ 124	2	$ 124	2	$ 124	0	$ -	2	$ 124	2	$ 124
	Material Expeditor	$ 62	hour	40	$ 2,480	6	$ 372	6	$ 372	6	$ 372	6	$ 372	6	$ 372	6	$ 372	0	$ -	25	$ 1,550	25	$ 1,550
	Geospatial Specialist	$ 77	hour	18	$ 1,386	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -
	Engineer 2	$ 99	hour	56	$ 5,544	4	$ 396	24	$ 2,376	24	$ 2,376	24	$ 2,376	24	$ 2,376	24	$ 2,376	4	$ 396	24	$ 2,376	24	$ 2,376
1	Scientist 3/superintendent	$ 128	hour	36	$ 4,608	36	$ 4,608	120	$ 15,360	180	$ 23,040	180	$ 23,040	60	$ 7,680	24	$ 3,072	0	$ -	960	$ 122,880	1600	$ 204,800
	Regulatory Specialist	$ 132	hour	4	$ 528	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -
	Safety Officer	$ 98	hour	8	$ 784	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -
	Professional Labor Subtotal				**$ 21,244**		**$ 9,071**		**$ 21,988**		**$ 29,668**		**$ 29,668**		**$ 14,308**		**$ 9,700**		**$ 396**		**$ 135,870**		**$ 220,670**
Craft Labor:																							
2	Operator	$ 103	hour	36	$ 3,708	36	$ 3,708	240	$ 24,720	360	$ 37,080	360	$ 37,080	120	$ 12,360	48	$ 4,944	0	$ -	1,920	$ 197,760	3,200	$ 329,600
4	Truck Driver	$ 96	hour	36	$ 3,456	36	$ 3,456	480	$ 46,080	720	$ 69,120	720	$ 69,120	240	$ 23,040	96	$ 9,216	0	$ -	3,840	$ 368,640	6,400	$ 614,400
4	Laborer	$ 87	hour	36	$ 3,132	36	$ 3,132	480	$ 41,760	720	$ 62,640	720	$ 62,640	240	$ 20,880	96	$ 8,352	0	$ -	3,840	$ 334,080	6,400	$ 556,800
	Craft Subtotal				**$ 10,296**		**$ 10,296**		**$ 112,560**		**$ 168,840**		**$ 168,840**		**$ 56,280**		**$ 22,512**		**$ -**		**$ 900,480**		**$ 1,500,800**
Supplies:																							
	Fuel (Underway)	$ 3.15	gal	37,587	$ 118,399	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	37,587	$ 118,399	0	$ -	0	$ -
	Fuel (standing by)	$ 3.15	gal	75	$ 236	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	75	$ 236	0	$ -	0	$ -
	Poly/sorbents/silt fence/wattles/seed/etc.	$ 5,000	LS	0	$ -	0.5	$ 2,500	2	$ 10,000	2	$ 10,000	2	$ 10,000	2	$ 10,000	0	$ -	0	$ -	5	$ 25,000	7	$ 35,000
	Geosynthetics/supersacks/etc.	$ 5,000		0	$ -	0	$ -	10	$ 50,000	15	$ 75,000	2	$ 10,000	2	$ 10,000	0	$ -	0	$ -	5	$ 25,000	7	$ 35,000
	Expendables/Small Tools	$ 4.00	MH	0	$ -	1200	$ 4,800	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -
	Supplies Subtotal				**$ 118,635**		**$ 7,300**		**$ 60,000**		**$ 85,000**		**$ 20,000**		**$ 20,000**		**$ -**		**$ 118,635**		**$ 50,000**		**$ 70,000**
Equipment:																							
4	End Dump	$ 16,850	month	4	$ 67,400	0.1	$ 1,685	1.3	$ 22,467	2	$ 33,700	2	$ 33,700	0.7	$ 14,042	4	$ 67,400	0	$ -	10.7	$ 179,733	17.8	$ 299,556
2	Excavator	$ 16,180	month	2	$ 32,360	0.1	$ 1,618	0.7	$ 10,787	1	$ 16,180	1	$ 16,180	0.3	$ 6,742	2	$ 32,360	0	$ -	5.3	$ 86,293	8.9	$ 143,822
1	Dozer	$ 10,100	month	1	$ 10,100	0.1	$ 1,010	0.3	$ 3,367	0.5	$ 5,050	0.5	$ 5,050	0.2	$ 2,104	1	$ 10,100	0	$ -	2.7	$ 26,933	4.4	$ 44,889
2	Loader	$ 15,500	month	2	$ 31,000	0.1	$ 1,550	0.7	$ 10,333	1	$ 15,500	1	$ 15,500	0.3	$ 5,167	2	$ 31,000	0	$ -	5.3	$ 82,667	8.9	$ 137,778
3	Crew Vehicle	$ 1,750	month	3	$ 5,250	0.1	$ 175	1.0	$ 1,750	1.5	$ 2,625	1.5	$ 2,625	0.5	$ 1,094	3	$ 5,250	0	$ -	8.0	$ 14,000	13.3	$ 23,333
2	Light Plant(s)	$ 600	month	2	$ 1,200	0.1	$ 60	0.7	$ 400	1	$ 600	1	$ 600	0.3	$ 250	2	$ 1,200	0	$ -	5.3	$ 3,200	8.9	$ 5,333
1	Barge (mob)	$ 295,000	LS	1	$ 295,000	0.0	$ -	0.0	$ -	0	$ -	0	$ -	0.0	$ -	0	$ -	1	$ 295,000	0.0	$ -	0.0	$ -
1	Barge(demob)	$ 392,000	LS	1	$ 392,000	0.0	$ -	0.0	$ -	0	$ -	0	$ -	0.0	$ -	0	$ -	1	$ 392,000	0.0	$ -	0.0	$ -
2	skid steer	$ 9,850	month		$ -	0.1	$ 985	0.7	$ 6,567	1	$ 9,850	1	$ 9,850	0.3	$ 4,104	2	$ 19,700		$ -	5.3	$ 52,533	8.9	$ 87,556
	Equipment Subtotal				**$ 834,310**		**$ 7,083**		**$ 55,670**		**$ 83,505**		**$ 83,505**		**$ 33,502**		**$ 167,010**		**$ 687,000**		**$ 445,360**		**$ 742,267**
Subcontractor(s)/Vendors:																							
	Camp (mobilization/demobilization)	$ 115,000	LS	1	$ 115,000	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -
	Camp (daily rate < 25 person)	$ 15,000	day	0	$ -	3	$ 45,000	10	$ 150,000	15	$ 225,000	15	$ 225,000	5	$ 75,000	2	$ 30,000	0	$ -	80	$ 1,200,000	133	$ 2,000,000
	Fuel tanks (10,000 to 20,000 gal)	$ 20,000	t/m	0	$ -	0.2	$ 4,000	0.7	$ 13,333	1.5	$ 30,000	1.5	$ 30,000	0.3	$ 6,667	0.1	$ 1,333	0	$ -	13	$ 266,667	40	$ 800,000
	Drill rig mob/demob and lodging vessel	$ 17,000	day	0	$ -	0	$ -	0	$ -	24	$ 408,000	24	$ 408,000	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -
	Driller and driller helper	$ 3,000	day	0	$ -	0	$ -	0	$ -	10	$ 30,000	10	$ 30,000	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -
	Disposal tipping fee	$ 95	ton	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	1500	$ 142,500	0	$ -	0	$ -
	Surveying crew	$ 2,460	day	0	$ -	3	$ 7,380	10	$ 24,600	15	$ 36,900	15	$ 36,900	5	$ 12,300	2	$ 4,920	0	$ -	80	$ 196,800	133	$ 328,000
	Environmental Laboratory Testing	$ 40,000	LS	0	$ -	0	$ -	0	$ -	0	$ -	1	$ 40,000	1	$ 40,000	0	$ -	0	$ -	1	$ 40,000	1	$ 40,000
	On-site Thermal Desoprtion Unit and Crew	$ 400	ton	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	24,000	$ 9,600,000	40,000	$ 16,000,000
	Subcontractor/Vendor Subtotal				**$ 115,000**		**$ 56,380**		**$ 187,933**		**$ 729,900**		**$ 769,900**		**$ 133,967**		**$ 36,253**		**$ 142,500**		**$ 11,303,467**		**$ 19,168,000**
Other Direct Costs:																							
	Fuel - gasoline	$ 4.00	gal		$ -	1,000	$ 4,000	5,000	$ 20,000	5,000	$ 20,000	5,000	$ 20,000	3,500	$ 17,500	1,500	$ 6,000		$ -	25,000	$ 100,000	35,000	$ 140,000
	Fuel - diesel	$ 4.25	gal		$ -	3,000	$ 12,750	10,000	$ 42,500	15,000	$ 63,750	15,000	$ 63,750	7,500	$ 39,844	2,500	$ 10,625		$ -	75,000	$ 318,750	135,000	$ 573,750
	Other Direct Costs Subtotal				**$ -**		**$ 16,750**		**$ 62,500**		**$ 83,750**		**$ 83,750**		**$ 57,344**		**$ 16,625**		**$ -**		**$ 418,750**		**$ 713,750**
Travel:																							
	Airfare crew Anchorage to Adak	$ 25,000	RT	1	$ 25,000	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -
	per diem (incidentals only)	$ 11.00	m/day	0	$ -	33	$ 363	110	$ 1,210	165	$ 1,815	165	$ 1,815	55	$ 605	22	$ 242	0	$ -	880	$ 9,680	1467	$ 16,133
	Travel Subtotal				**$ 25,000**		**$ 363**		**$ 1,210**		**$ 1,815**		**$ 1,815**		**$ 605**		**$ 242**		**$ -**		**$ 9,680**		**$ 16,133**
	TOTALS without markup				$ 1,124,485		$ 144,841		$ 528,333		$ 1,269,362		$ 1,244,362		$ 351,408		$ 273,548		$ 951,313		$ 13,406,777		$ 22,652,534

Assumptions: Cost estimate based on direct, unburdened costs in 2015 dollars. Source of unit rates include current contractual rates, contractor's quotes, and professional judgment based on previous experience

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Appendix D

Field Fit Repairs Itemized Cost Estimate

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Itemized Cost Schedule				Mobilization/ Demobilization		Road Repairs		4.3.1 Field Fit Repairs	
Number	**Item Description**	**Rate**	**Unit**	**Units**	**Cost**	**Units**	**Cost**	**Units**	**Cost**
Design Engineering:									
	Principal Engineer	$ 206	hour	0	$ -	30	$ 6,180	6	$ 1,236
	Project Engineer 4	$ 167	hour	0	$ -	4	$ 584	4	$ 584
	Project Engineer 2	$ 146	hour	0	$ -	60	$ 8,760	20	$ 2,920
	Engineer/Scientist 2	$ 116	hour	0	$ -	84	$ 9,744	168	$ 19,488
	CADD Designer 1	$ 96	hour	0	$ -	120	$ 11,520	20	$ 1,920
	Project Assistant	$ 81	hour	0	$ -	10	$ 810	4	$ 324
	Design Engineering Subtotal				**$ -**		**$ 37,598**		**$ 26,472**
Earthwork Subcontractor Professional Labor:									
	Program Manager	$ 185	hour	4	$ 740	0	$ -	1	$ 185
	Project Manager	$ 144	hour	24	$ 3,456	24	$ 3,456	24	$ 3,456
	Contract Manager	$ 115	hour	2	$ 230	1	$ 115	1	$ 115
	Administrative Assistant	$ 62	hour	24	$ 1,488	2	$ 124	2	$ 124
	Material Expeditor	$ 62	hour	40	$ 2,480	6	$ 372	6	$ 372
	Geospatial Specialist	$ 77	hour	18	$ 1,386	0	$ -	0	$ -
	Engineer 2	$ 99	hour	56	$ 5,544	4	$ 396	24	$ 2,376
1	Scientist 3/superintendent	$ 128	hour	36	$ 4,608	36	$ 4,608	120	$ 15,360
	Regulatory Specialist	$ 132	hour	4	$ 528	0	$ -	0	$ -
	Safety Officer	$ 98	hour	8	$ 784	0	$ -	0	$ -
	Professional Labor Subtotal				**$ 21,244**		**$ 9,071**		**$ 21,988**
Craft Labor:									
2	Operator	$ 103	hour	36	$ 3,708	36	$ 3,708	240	$ 24,720
4	Truck Driver	$ 96	hour	36	$ 3,456	36	$ 3,456	480	$ 46,080
4	Laborer	$ 87	hour	36	$ 3,132	36	$ 3,132	480	$ 41,760
	Craft Subtotal				**$ 10,296**		**$ 10,296**		**$ 112,560**
Supplies:									
	Fuel (Underway)	$ 3.15	gal	37,587	$ 118,399	0	$ -	0	$ -
	Fuel (standing by)	$ 3.15	gal	75	$ 236	0	$ -	0	$ -
	Poly/sorbents/silt fence/wattles/seed/etc.	$ 5,000	LS	0	$ -	0.5	$ 2,500	2	$ 10,000
	Geosynthetics/supersacks/etc.	$ 5,000		0	$ -	0	$ -	10	$ 50,000
	Expendables/Small Tools	$ 4.00	MH	0	$ -	1200	$ 4,800	0	$ -
	Supplies Subtotal				**$ 118,635**		**$ 7,300**		**$ 60,000**
Equipment:									
4	End Dump	$ 16,850	month	4	$ 67,400	0.1	$ 1,685	1.3	$ 22,467
2	Excavator	$ 16,180	month	2	$ 32,360	0.1	$ 1,618	0.7	$ 10,787
1	Dozer	$ 10,100	month	1	$ 10,100	0.1	$ 1,010	0.3	$ 3,367
2	Loader	$ 15,500	month	2	$ 31,000	0.1	$ 1,550	0.7	$ 10,333
3	Crew Vehicle	$ 1,750	month	3	$ 5,250	0.1	$ 175	1.0	$ 1,750
2	Light Plant(s)	$ 600	month	2	$ 1,200	0.1	$ 60	0.7	$ 400
1	Barge (mob)	$ 295,000	LS	1	$ 295,000	0.0	$ -	0.0	$ -
1	Barge(demob)	$ 392,000	LS	1	$ 392,000	0.0	$ -	0.0	$ -
2	skid steer	$ 9,850	month		$ -	0.1	$ 985	0.7	$ 6,567
	Equipment Subtotal				**$ 834,310**		**$ 7,083**		**$ 55,670**
Subcontractor(s)/Vendors:									
	Camp (mobilization/demobilization)	$ 115,000	LS	1	$ 115,000	0	$ -	0	$ -
	Camp (daily rate < 25 person)	$ 15,000	day	0	$ -	3	$ 45,000	10	$ 150,000
	Fuel tanks (10,000 to 20,000 gal)	$ 20,000	t/m	0	$ -	0.2	$ 4,000	0.7	$ 13,333
	Drill rig mob/demob and lodging vessel	$ 17,000	day	0	$ -	0	$ -	0	$ -
	Driller and driller helper	$ 3,000	day	0	$ -	0	$ -	0	$ -
	Disposal tipping fee	$ 95	ton	0	$ -	0	$ -	0	$ -
	Surveying crew	$ 2,460	day	0	$ -	3	$ 7,380	10	$ 24,600
	Environmental Laboratory Testing	$ 40,000	LS	0	$ -	0	$ -	0	$ -
	On-site Thermal Desoprtion Unit and Crew	$ 400	ton	0	$ -	0	$ -	0	$ -
	Subcontractor/Vendor Subtotal				**$ 115,000**		**$ 56,380**		**$ 187,933**
Other Direct Costs:									
	Fuel - gasoline	$ 4.00	gal		$ -	1,000	$ 4,000	5,000	$ 20,000
	Fuel - diesel	$ 4.25	gal		$ -	3,000	$ 12,750	10,000	$ 42,500
	Other Direct Costs Subtotal				**$ -**		**$ 16,750**		**$ 62,500**
Travel:									
	Airfare crew Anchorage to Adak	$ 25,000	RT	1	$ 25,000	0	$ -	0	$ -
	per diem (incidentals only)	$ 11.00	m/day	0	$ -	33	$ 363	110	$ 1,210
	Travel Subtotal				**$ 25,000**		**$ 363**		**$ 1,210**
	TOTALS without markup				$ 1,124,485		$ 144,841		$ 528,333

Assumptions: Cost estimate based on direct, unburdened costs in 2015 dollars. Source of unit rates include current contractual rates, contractor's quotes, and professional judgment based on previous experience

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Appendix E

Redesign Itemized Cost Estimate

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Itemized Cost Schedule				Mobilization/ Demobilization		Road Repairs		4.3.2 Redesign	
Number	**Item Description**	**Rate**	**Unit**	**Units**	**Cost**	**Units**	**Cost**	**Units**	**Cost**
Design Engineering:									
	Principal Engineer	$ 206	hour	0	$ -	30	$ 6,180	50	$ 10,300
	Project Engineer 4	$ 167	hour	0	$ -	4	$ 584	16	$ 2,336
	Project Engineer 2	$ 146	hour	0	$ -	60	$ 8,760	95	$ 13,870
	Engineer/Scientist 2	$ 116	hour	0	$ -	84	$ 9,744	348	$ 40,368
	CADD Designer 1	$ 96	hour	0	$ -	120	$ 11,520	200	$ 19,200
	Project Assistant	$ 81	hour	0	$ -	10	$ 810	10	$ 810
	Design Engineering Subtotal				**$ -**		**$ 37,598**		**$ 86,884**
Earthwork Subcontractor Professional Labor:									
	Program Manager	$ 185	hour	4	$ 740	0	$ -	1	$ 185
	Project Manager	$ 144	hour	24	$ 3,456	24	$ 3,456	24	$ 3,456
	Contract Manager	$ 115	hour	2	$ 230	1	$ 115	1	$ 115
	Administrative Assistant	$ 62	hour	24	$ 1,488	2	$ 124	2	$ 124
	Material Expeditor	$ 62	hour	40	$ 2,480	6	$ 372	6	$ 372
	Geospatial Specialist	$ 77	hour	18	$ 1,386	0	$ -	0	$ -
	Engineer 2	$ 99	hour	56	$ 5,544	4	$ 396	24	$ 2,376
1	Scientist 3/superintendent	$ 128	hour	36	$ 4,608	36	$ 4,608	180	$ 23,040
	Regulatory Specialist	$ 132	hour	4	$ 528	0	$ -	0	$ -
	Safety Officer	$ 98	hour	8	$ 784	0	$ -	0	$ -
	Professional Labor Subtotal				**$ 21,244**		**$ 9,071**		**$ 29,668**
Craft Labor:									
2	Operator	$ 103	hour	36	$ 3,708	36	$ 3,708	360	$ 37,080
4	Truck Driver	$ 96	hour	36	$ 3,456	36	$ 3,456	720	$ 69,120
4	Laborer	$ 87	hour	36	$ 3,132	36	$ 3,132	720	$ 62,640
	Craft Subtotal				**$ 10,296**		**$ 10,296**		**$ 168,840**
Supplies:									
	Fuel (Underway)	$ 3.15	gal	37,587	$ 118,399	0	$ -	0	$ -
	Fuel (standing by)	$ 3.15	gal	75	$ 236	0	$ -	0	$ -
	Poly/sorbents/silt fence/wattles/seed/etc.	$ 5,000	LS	0	$ -	0.5	$ 2,500	2	$ 10,000
	Geosynthetics/supersacks/etc.	$ 5,000		0	$ -	0	$ -	15	$ 75,000
	Expendables/Small Tools	$ 4.00	MH	0	$ -	1200	$ 4,800	0	$ -
	Supplies Subtotal				**$ 118,635**		**$ 7,300**		**$ 85,000**
Equipment:									
4	End Dump	$ 16,850	month	4	$ 67,400	0.1	$ 1,685	2	$ 33,700
2	Excavator	$ 16,180	month	2	$ 32,360	0.1	$ 1,618	1	$ 16,180
1	Dozer	$ 10,100	month	1	$ 10,100	0.1	$ 1,010	0.5	$ 5,050
2	Loader	$ 15,500	month	2	$ 31,000	0.1	$ 1,550	1	$ 15,500
3	Crew Vehicle	$ 1,750	month	3	$ 5,250	0.1	$ 175	1.5	$ 2,625
2	Light Plant(s)	$ 600	month	2	$ 1,200	0.1	$ 60	1	$ 600
1	Barge (mob)	$ 295,000	LS	1	$ 295,000	0.0	$ -	0	$ -
1	Barge(demob)	$ 392,000	LS	1	$ 392,000	0.0	$ -	0	$ -
2	skid steer	$ 9,850	month		$ -	0.1	$ 985	1	$ 9,850
	Equipment Subtotal				**$ 834,310**		**$ 7,083**		**$ 83,505**
Subcontractor(s)/Vendors:									
	Camp (mobilization/demobilization)	$ 115,000	LS	1	$ 115,000	0	$ -	0	$ -
	Camp (daily rate < 25 person)	$ 15,000	day	0	$ -	3	$ 45,000	15	$ 225,000
	Fuel tanks (10,000 to 20,000 gal)	$ 20,000	t/m	0	$ -	0.2	$ 4,000	1.5	$ 30,000
	Drill rig mob/demob and lodging vessel	$ 17,000	day	0	$ -	0	$ -	24	$ 408,000
	Driller and driller helper	$ 3,000	day	0	$ -	0	$ -	10	$ 30,000
	Disposal tipping fee	$ 95	ton	0	$ -	0	$ -	0	$ -
	Surveying crew	$ 2,460	day	0	$ -	3	$ 7,380	15	$ 36,900
	Environmental Laboratory Testing	$ 40,000	LS	0	$ -	0	$ -	0	$ -
	On-site Thermal Desoprtion Unit and Crew	$ 400	ton	0	$ -	0	$ -	0	$ -
	Subcontractor/Vendor Subtotal				**$ 115,000**		**$ 56,380**		**$ 729,900**
Other Direct Costs:									
	Fuel - gasoline	$ 4.00	gal		$ -	1,000	$ 4,000	5,000	$ 20,000
	Fuel - diesel	$ 4.25	gal		$ -	3,000	$ 12,750	15,000	$ 63,750
	Other Direct Costs Subtotal				**$ -**		**$ 16,750**		**$ 83,750**
Travel:									
	Airfare crew Anchorage to Adak	$ 25,000	RT	1	$ 25,000	0	$ -	0	$ -
	per diem (incidentals only)	$ 11.00	m/day	0	$ -	33	$ 363	165	$ 1,815
	Travel Subtotal				**$ 25,000**		**$ 363**		**$ 1,815**
	TOTALS without markup				$ 1,124,485		$ 144,841		$ 1,269,362

Assumptions: Cost estimate based on direct, unburdened costs in 2015 dollars. Source of unit rates include current contractual rates, contractor's quotes, and professional judgment based on previous experience

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Appendix F

Onsite Relocation of Material from Sites E and F to Site D
Itemized Cost Estimate

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Itemized Cost Schedule				Mobilization/ Demobilization		Road Repairs		4.3.3 Consolidate E and F to D and Improve D	
Number	**Item Description**	**Rate**	**Unit**	**Units**	**Cost**	**Units**	**Cost**	**Units**	**Cost**
Design Engineering:									
	Principal Engineer	$ 206	hour	0	$ -	30	$ 6,180	50	$ 10,300
	Project Engineer 4	$ 167	hour	0	$ -	4	$ 584	16	$ 2,336
	Project Engineer 2	$ 146	hour	0	$ -	60	$ 8,760	95	$ 13,870
	Engineer/Scientist 2	$ 116	hour	0	$ -	84	$ 9,744	348	$ 40,368
	CADD Designer 1	$ 96	hour	0	$ -	120	$ 11,520	200	$ 19,200
	Project Assistant	$ 81	hour	0	$ -	10	$ 810	10	$ 810
	Design Engineering Subtotal				**$ -**		**$ 37,598**		**$ 86,884**
Earthwork Subcontractor Professional Labor:									
	Program Manager	$ 185	hour	4	$ 740	0	$ -	1	$ 185
	Project Manager	$ 144	hour	24	$ 3,456	24	$ 3,456	24	$ 3,456
	Contract Manager	$ 115	hour	2	$ 230	1	$ 115	1	$ 115
	Administrative Assistant	$ 62	hour	24	$ 1,488	2	$ 124	2	$ 124
	Material Expeditor	$ 62	hour	40	$ 2,480	6	$ 372	6	$ 372
	Geospatial Specialist	$ 77	hour	18	$ 1,386	0	$ -	0	$ -
	Engineer 2	$ 99	hour	56	$ 5,544	4	$ 396	24	$ 2,376
1	Scientist 3/superintendent	$ 128	hour	36	$ 4,608	36	$ 4,608	180	$ 23,040
	Regulatory Specialist	$ 132	hour	4	$ 528	0	$ -	0	$ -
	Safety Officer	$ 98	hour	8	$ 784	0	$ -	0	$ -
	Professional Labor Subtotal				**$ 21,244**		**$ 9,071**		**$ 29,668**
Craft Labor:									
2	Operator	$ 103	hour	36	$ 3,708	36	$ 3,708	360	$ 37,080
4	Truck Driver	$ 96	hour	36	$ 3,456	36	$ 3,456	720	$ 69,120
4	Laborer	$ 87	hour	36	$ 3,132	36	$ 3,132	720	$ 62,640
	Craft Subtotal				**$ 10,296**		**$ 10,296**		**$ 168,840**
Supplies:									
	Fuel (Underway)	$ 3.15	gal	37,587	$ 118,399	0	$ -	0	$ -
	Fuel (standing by)	$ 3.15	gal	75	$ 236	0	$ -	0	$ -
	Poly/sorbents/silt fence/wattles/seed/etc.	$ 5,000	LS	0	$ -	0.5	$ 2,500	2	$ 10,000
	Geosynthetics/supersacks/etc.	$ 5,000		0	$ -	0	$ -	2	$ 10,000
	Expendables/Small Tools	$ 4.00	MH	0	$ -	1200	$ 4,800	0	$ -
	Supplies Subtotal				**$ 118,635**		**$ 7,300**		**$ 20,000**
Equipment:									
4	End Dump	$ 16,850	month	4	$ 67,400	0.1	$ 1,685	2	$ 33,700
2	Excavator	$ 16,180	month	2	$ 32,360	0.1	$ 1,618	1	$ 16,180
1	Dozer	$ 10,100	month	1	$ 10,100	0.1	$ 1,010	0.5	$ 5,050
2	Loader	$ 15,500	month	2	$ 31,000	0.1	$ 1,550	1	$ 15,500
3	Crew Vehicle	$ 1,750	month	3	$ 5,250	0.1	$ 175	1.5	$ 2,625
2	Light Plant(s)	$ 600	month	2	$ 1,200	0.1	$ 60	1	$ 600
1	Barge (mob)	$ 295,000	LS	1	$ 295,000	0.0	$ -	0	$ -
1	Barge(demob)	$ 392,000	LS	1	$ 392,000	0.0	$ -	0	$ -
2	skid steer	$ 9,850	month		$ -	0.1	$ 985	1	$ 9,850
	Equipment Subtotal				**$ 834,310**		**$ 7,083**		**$ 83,505**
Subcontractor(s)/Vendors:									
	Camp (mobilization/demobilization)	$ 115,000	LS	1	$ 115,000	0	$ -	0	$ -
	Camp (daily rate < 25 person)	$ 15,000	day	0	$ -	3	$ 45,000	15	$ 225,000
	Fuel tanks (10,000 to 20,000 gal)	$ 20,000	t/m	0	$ -	0.2	$ 4,000	1.5	$ 30,000
	Drill rig mob/demob and lodging vessel	$ 17,000	day	0	$ -	0	$ -	24	$ 408,000
	Driller and driller helper	$ 3,000	day	0	$ -	0	$ -	10	$ 30,000
	Disposal tipping fee	$ 95	ton	0	$ -	0	$ -	0	$ -
	Surveying crew	$ 2,460	day	0	$ -	3	$ 7,380	15	$ 36,900
	Environmental Laboratory Testing	$ 40,000	LS	0	$ -	0	$ -	1	$ 40,000
	On-site Thermal Desoprtion Unit and Crew	$ 400	ton	0	$ -	0	$ -	0	$ -
	Subcontractor/Vendor Subtotal				**$ 115,000**		**$ 56,380**		**$ 769,900**
Other Direct Costs:									
	Fuel - gasoline	$ 4.00	gal		$ -	1,000	$ 4,000	5,000	$ 20,000
	Fuel - diesel	$ 4.25	gal		$ -	3,000	$ 12,750	15,000	$ 63,750
	Other Direct Costs Subtotal				**$ -**		**$ 16,750**		**$ 83,750**
Travel:									
	Airfare crew Anchorage to Adak	$ 25,000	RT	1	$ 25,000	0	$ -	0	$ -
	per diem (incidentals only)	$ 11.00	m/day	0	$ -	33	$ 363	165	$ 1,815
	Travel Subtotal				**$ 25,000**		**$ 363**		**$ 1,815**
	TOTALS without markup				$ 1,124,485		$ 144,841		$ 1,244,362

Assumptions: Cost estimate based on direct, unburdened costs in 2015 dollars. Source of unit rates include current contractual rates, contractor's quotes, and professional judgment based on previous experience

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Appendix G

Haul Material from Amchitka to Offsite Depository
Itemized Cost Estimate

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Itemized Cost Schedule				Mobilization/ Demobilization		Road Repairs		4.3.4.a Excavate and Haul E and F to Beach		4.3.4.b Load Barge of E and F Soils for Disposal		4.3.4.c Barge and Dispose of E and F Soils	
Number	Item Description	Rate	Unit	Units	Cost	Units	Cost	Units	Cost	Units	Cost	Units	Cost
Design Engineering:													
	Principal Engineer	$ 206	hour	0	$ -	30	$ 6,180	40	$ 8,240	10	$ 2,060	5	$ 1,030
	Project Engineer 4	$ 167	hour	0	$ -	4	$ 584	8	$ 1,168	8	$ 1,168	2	$ 292
	Project Engineer 2	$ 146	hour	0	$ -	60	$ 8,760	40	$ 5,840	40	$ 5,840	10	$ 1,460
	Engineer/Scientist 2	$ 116	hour	0	$ -	84	$ 9,744	84	$ 9,744	48	$ 5,568	0	$ -
	CADD Designer 1	$ 96	hour	0	$ -	120	$ 11,520	100	$ 9,600	60	$ 5,760	0	$ -
	Project Assistant	$ 81	hour	0	$ -	10	$ 810	10	$ 810	10	$ 810	0	$ -
	Design Engineering Subtotal				**$ -**		**$ 37,598**		**$ 35,402**		**$ 21,206**		**$ 2,782**
Earthwork Subcontractor Professional Labor:													
	Program Manager	$ 185	hour	4	$ 740	0	$ -	1	$ 185	1	$ 185	0	$ -
	Project Manager	$ 144	hour	24	$ 3,456	24	$ 3,456	24	$ 3,456	24	$ 3,456	0	$ -
	Contract Manager	$ 115	hour	2	$ 230	1	$ 115	1	$ 115	1	$ 115	0	$ -
	Administrative Assistant	$ 62	hour	24	$ 1,488	2	$ 124	2	$ 124	2	$ 124	0	$ -
	Material Expeditor	$ 62	hour	40	$ 2,480	6	$ 372	6	$ 372	6	$ 372	0	$ -
	Geospatial Specialist	$ 77	hour	18	$ 1,386	0	$ -	0	$ -	0	$ -	0	$ -
	Engineer 2	$ 99	hour	56	$ 5,544	4	$ 396	24	$ 2,376	24	$ 2,376	4	$ 396
1	Scientist 3/superintendent	$ 128	hour	36	$ 4,608	36	$ 4,608	60	$ 7,680	24	$ 3,072	0	$ -
	Regulatory Specialist	$ 132	hour	4	$ 528	0	$ -	0	$ -	0	$ -	0	$ -
	Safety Officer	$ 98	hour	8	$ 784	0	$ -	0	$ -	0	$ -	0	$ -
	Professional Labor Subtotal				**$ 21,244**		**$ 9,071**		**$ 14,308**		**$ 9,700**		**$ 396**
Craft Labor:													
2	Operator	$ 103	hour	36	$ 3,708	36	$ 3,708	120	$ 12,360	48	$ 4,944	0	$ -
4	Truck Driver	$ 96	hour	36	$ 3,456	36	$ 3,456	240	$ 23,040	96	$ 9,216	0	$ -
4	Laborer	$ 87	hour	36	$ 3,132	36	$ 3,132	240	$ 20,880	96	$ 8,352	0	$ -
	Craft Subtotal				**$ 10,296**		**$ 10,296**		**$ 56,280**		**$ 22,512**		**$ -**
Supplies:													
	Fuel (Underway)	$ 3.15	gal	37,587	$ 118,399	0	$ -	0	$ -	0	$ -	37,587	$ 118,399
	Fuel (standing by)	$ 3.15	gal	75	$ 236	0	$ -	0	$ -	0	$ -	75	$ 236
	Poly/sorbents/silt fence/wattles/seed/etc.	$ 5,000	LS	0	$ -	0.5	$ 2,500	2	$ 10,000	0	$ -	0	$ -
	Geosynthetics/supersacks/etc.	$ 5,000		0	$ -	0	$ -	2	$ 10,000	0	$ -	0	$ -
	Expendables/Small Tools	$ 4.00	MH	0	$ -	1200	$ 4,800	0	$ -	0	$ -	0	$ -
	Supplies Subtotal				**$ 118,635**		**$ 7,300**		**$ 20,000**		**$ -**		**$ 118,635**
Equipment:													
4	End Dump	$ 16,850	month	4	$ 67,400	0.1	$ 1,685	0.7	$ 14,042	4	$ 67,400	0	$ -
2	Excavator	$ 16,180	month	2	$ 32,360	0.1	$ 1,618	0.3	$ 6,742	2	$ 32,360	0	$ -
1	Dozer	$ 10,100	month	1	$ 10,100	0.1	$ 1,010	0.2	$ 2,104	1	$ 10,100	0	$ -
2	Loader	$ 15,500	month	2	$ 31,000	0.1	$ 1,550	0.3	$ 5,167	2	$ 31,000	0	$ -
3	Crew Vehicle	$ 1,750	month	3	$ 5,250	0.1	$ 175	0.5	$ 1,094	3	$ 5,250	0	$ -
2	Light Plant(s)	$ 600	month	2	$ 1,200	0.1	$ 60	0.3	$ 250	2	$ 1,200	0	$ -
1	Barge (mob)	$ 295,000	LS	1	$ 295,000	0.0	$ -	0.0	$ -	0	$ -	1	$ 295,000
1	Barge(demob)	$ 392,000	LS	1	$ 392,000	0.0	$ -	0.0	$ -	0	$ -	1	$ 392,000
2	skid steer	$ 9,850	month		$ -	0.1	$ 985	0.3	$ 4,104	2	$ 19,700		$ -
	Equipment Subtotal				**$ 834,310**		**$ 7,083**		**$ 33,502**		**$ 167,010**		**$ 687,000**
Subcontractor(s)/Vendors:													
	Camp (mobilization/demobilization)	$ 115,000	LS	1	$ 115,000	0	$ -	0	$ -	0	$ -	0	$ -
	Camp (daily rate < 25 person)	$ 15,000	day	0	$ -	3	$ 45,000	5	$ 75,000	2	$ 30,000	0	$ -
	Fuel tanks (10,000 to 20,000 gal)	$ 20,000	t/m	0	$ -	0.2	$ 4,000	0.3	$ 6,667	0.1	$ 1,333	0	$ -
	Drill rig mob/demob and lodging vessel	$ 17,000	day	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -
	Driller and driller helper	$ 3,000	day	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -
	Disposal tipping fee	$ 95	ton	0	$ -	0	$ -	0	$ -	0	$ -	1500	$ 142,500
	Surveying crew	$ 2,460	day	0	$ -	3	$ 7,380	5	$ 12,300	2	$ 4,920	0	$ -
	Environmental Laboratory Testing	$ 40,000	LS	0	$ -	0	$ -	1	$ 40,000	0	$ -	0	$ -
	On-site Thermal Desoprtion Unit and Crew	$ 400	ton	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -
	Subcontractor/Vendor Subtotal				**$ 115,000**		**$ 56,380**		**$ 133,967**		**$ 36,253**		**$ 142,500**
Other Direct Costs:													
	Fuel - gasoline	$ 4.00	gal		$ -	1,000	$ 4,000	3,500	$ 17,500	1,500	$ 6,000		$ -
	Fuel - diesel	$ 4.25	gal		$ -	3,000	$ 12,750	7,500	$ 39,844	2,500	$ 10,625		$ -
	Other Direct Costs Subtotal				**$ -**		**$ 16,750**		**$ 57,344**		**$ 16,625**		**$ -**
Travel:													
	Airfare crew Anchorage to Adak	$ 25,000	RT	1	$ 25,000	0	$ -	0	$ -	0	$ -	0	$ -
	per diem (incidentals only)	$ 11.00	m/day	0	$ -	33	$ 363	55	$ 605	22	$ 242	0	$ -
	Travel Subtotal				**$ 25,000**		**$ 363**		**$ 605**		**$ 242**		**$ -**
	TOTALS without markup				$ 1,124,485		$ 144,841		$ 351,408		$ 273,548		$ 951,313

Assumptions: Cost estimate based on direct, unburdened costs in 2015 dollars. Source of unit rates include current contractual rates, contractor's quotes, and professional judgment based on previous experience

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Appendix H

Thermal Desorption Mitigation of Sites E and F
Itemized Cost Estimate

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Itemized Cost Schedule				Mobilization/ Demobilization		Road Repairs		4.3.5.a Thermal Desorption D, E, and F	
Number	**Item Description**	**Rate**	**Unit**	**Units**	**Cost**	**Units**	**Cost**	**Units**	**Cost**
Design Engineering:									
	Principal Engineer	$ 206	hour	0	$ -	30	$ 6,180	40	$ 8,240
	Project Engineer 4	$ 167	hour	0	$ -	4	$ 584	12	$ 1,752
	Project Engineer 2	$ 146	hour	0	$ -	60	$ 8,760	40	$ 5,840
	Engineer/Scientist 2	$ 116	hour	0	$ -	84	$ 9,744	1008	$ 116,928
	CADD Designer 1	$ 96	hour	0	$ -	120	$ 11,520	100	$ 9,600
	Project Assistant	$ 81	hour	0	$ -	10	$ 810	10	$ 810
	Design Engineering Subtotal				**$ -**		**$ 37,598**		**$ 143,170**
Earthwork Subcontractor Professional Labor:									
	Program Manager	$ 185	hour	4	$ 740	0	$ -	1	$ 185
	Project Manager	$ 144	hour	24	$ 3,456	24	$ 3,456	60	$ 8,640
	Contract Manager	$ 115	hour	2	$ 230	1	$ 115	1	$ 115
	Administrative Assistant	$ 62	hour	24	$ 1,488	2	$ 124	2	$ 124
	Material Expeditor	$ 62	hour	40	$ 2,480	6	$ 372	25	$ 1,550
	Geospatial Specialist	$ 77	hour	18	$ 1,386	0	$ -	0	$ -
	Engineer 2	$ 99	hour	56	$ 5,544	4	$ 396	24	$ 2,376
1	Scientist 3/superintendent	$ 128	hour	36	$ 4,608	36	$ 4,608	960	$ 122,880
	Regulatory Specialist	$ 132	hour	4	$ 528	0	$ -	0	$ -
	Safety Officer	$ 98	hour	8	$ 784	0	$ -	0	$ -
	Professional Labor Subtotal				**$ 21,244**		**$ 9,071**		**$ 135,870**
Craft Labor:									
2	Operator	$ 103	hour	36	$ 3,708	36	$ 3,708	1,920	$ 197,760
4	Truck Driver	$ 96	hour	36	$ 3,456	36	$ 3,456	3,840	$ 368,640
4	Laborer	$ 87	hour	36	$ 3,132	36	$ 3,132	3,840	$ 334,080
	Craft Subtotal				**$ 10,296**		**$ 10,296**		**$ 900,480**
Supplies:									
	Fuel (Underway)	$ 3.15	gal	37,587	$ 118,399	0	$ -	0	$ -
	Fuel (standing by)	$ 3.15	gal	75	$ 236	0	$ -	0	$ -
	Poly/sorbents/silt fence/wattles/seed/etc.	$ 5,000	LS	0	$ -	0.5	$ 2,500	5	$ 25,000
	Geosynthetics/supersacks/etc.	$ 5,000		0	$ -	0	$ -	5	$ 25,000
	Expendables/Small Tools	$ 4.00	MH	0	$ -	1200	$ 4,800	0	$ -
	Supplies Subtotal				**$ 118,635**		**$ 7,300**		**$ 50,000**
Equipment:									
4	End Dump	$ 16,850	month	4	$ 67,400	0.1	$ 1,685	10.7	$ 179,733
2	Excavator	$ 16,180	month	2	$ 32,360	0.1	$ 1,618	5.3	$ 86,293
1	Dozer	$ 10,100	month	1	$ 10,100	0.1	$ 1,010	2.7	$ 26,933
2	Loader	$ 15,500	month	2	$ 31,000	0.1	$ 1,550	5.3	$ 82,667
3	Crew Vehicle	$ 1,750	month	3	$ 5,250	0.1	$ 175	8.0	$ 14,000
2	Light Plant(s)	$ 600	month	2	$ 1,200	0.1	$ 60	5.3	$ 3,200
1	Barge (mob)	$ 295,000	LS	1	$ 295,000	0.0	$ -	0.0	$ -
1	Barge(demob)	$ 392,000	LS	1	$ 392,000	0.0	$ -	0.0	$ -
2	skid steer	$ 9,850	month		$ -	0.1	$ 985	5.3	$ 52,533
	Equipment Subtotal				**$ 834,310**		**$ 7,083**		**$ 445,360**
Subcontractor(s)/Vendors:									
	Camp (mobilization/demobilization)	$ 115,000	LS	1	$ 115,000	0	$ -	0	$ -
	Camp (daily rate < 25 person)	$ 15,000	day	0	$ -	3	$ 45,000	80	$ 1,200,000
	Fuel tanks (10,000 to 20,000 gal)	$ 20,000	t/m	0	$ -	0.2	$ 4,000	13	$ 266,667
	Drill rig mob/demob and lodging vessel	$ 17,000	day	0	$ -	0	$ -	0	$ -
	Driller and driller helper	$ 3,000	day	0	$ -	0	$ -	0	$ -
	Disposal tipping fee	$ 95	ton	0	$ -	0	$ -	0	$ -
	Surveying crew	$ 2,460	day	0	$ -	3	$ 7,380	80	$ 196,800
	Environmental Laboratory Testing	$ 40,000	LS	0	$ -	0	$ -	1	$ 40,000
	On-site Thermal Desoprtion Unit and Crew	$ 400	ton	0	$ -	0	$ -	24,000	$ 9,600,000
	Subcontractor/Vendor Subtotal				**$ 115,000**		**$ 56,380**		**$ 11,303,467**
Other Direct Costs:									
	Fuel - gasoline	$ 4.00	gal		$ -	1,000	$ 4,000	25,000	$ 100,000
	Fuel - diesel	$ 4.25	gal		$ -	3,000	$ 12,750	75,000	$ 318,750
	Other Direct Costs Subtotal				**$ -**		**$ 16,750**		**$ 418,750**
Travel:									
	Airfare crew Anchorage to Adak	$ 25,000	RT	1	$ 25,000	0	$ -	0	$ -
	per diem (incidentals only)	$ 11.00	m/day	0	$ -	33	$ 363	880	$ 9,680
	Travel Subtotal				**$ 25,000**		**$ 363**		**$ 9,680**
	TOTALS without markup				$ 1,124,485		$ 144,841		$ 13,406,777

Assumptions: Cost estimate based on direct, unburdened costs in 2015 dollars. Source of unit rates include current contractual rates, contractor's quotes, and professional judgment based on previous experience

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Appendix I

Thermal Desorption Mitigation of All Sites Itemized Cost Estimate

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Itemized Cost Schedule				Mobilization/ Demobilization		Road Repairs		4.3.5.b Thermal Desorption All Sites	
Number	Item Description	Rate	Unit	Units	Cost	Units	Cost	Units	Cost
Design Engineering:									
	Principal Engineer	$ 206	hour	0	$ -	30	$ 6,180	40	$ 8,240
	Project Engineer 4	$ 167	hour	0	$ -	4	$ 584	16	$ 2,336
	Project Engineer 2	$ 146	hour	0	$ -	60	$ 8,760	60	$ 8,760
	Engineer/Scientist 2	$ 116	hour	0	$ -	84	$ 9,744	1648	$ 191,168
	CADD Designer 1	$ 96	hour	0	$ -	120	$ 11,520	100	$ 9,600
	Project Assistant	$ 81	hour	0	$ -	10	$ 810	10	$ 810
	Design Engineering Subtotal				**$ -**		**$ 37,598**		**$ 220,914**
Earthwork Subcontractor Professional Labor:									
	Program Manager	$ 185	hour	4	$ 740	0	$ -	1	$ 185
	Project Manager	$ 144	hour	24	$ 3,456	24	$ 3,456	80	$ 11,520
	Contract Manager	$ 115	hour	2	$ 230	1	$ 115	1	$ 115
	Administrative Assistant	$ 62	hour	24	$ 1,488	2	$ 124	2	$ 124
	Material Expeditor	$ 62	hour	40	$ 2,480	6	$ 372	25	$ 1,550
	Geospatial Specialist	$ 77	hour	18	$ 1,386	0	$ -	0	$ -
	Engineer 2	$ 99	hour	56	$ 5,544	4	$ 396	24	$ 2,376
1	Scientist 3/superintendent	$ 128	hour	36	$ 4,608	36	$ 4,608	1600	$ 204,800
	Regulatory Specialist	$ 132	hour	4	$ 528	0	$ -	0	$ -
	Safety Officer	$ 98	hour	8	$ 784	0	$ -	0	$ -
	Professional Labor Subtotal				**$ 21,244**		**$ 9,071**		**$ 220,670**
Craft Labor:									
2	Operator	$ 103	hour	36	$ 3,708	36	$ 3,708	3,200	$ 329,600
4	Truck Driver	$ 96	hour	36	$ 3,456	36	$ 3,456	6,400	$ 614,400
4	Laborer	$ 87	hour	36	$ 3,132	36	$ 3,132	6,400	$ 556,800
	Craft Subtotal				**$ 10,296**		**$ 10,296**		**$ 1,500,800**
Supplies:									
	Fuel (Underway)	$ 3.15	gal	37,587	$ 118,399	0	$ -	0	$ -
	Fuel (standing by)	$ 3.15	gal	75	$ 236	0	$ -	0	$ -
	Poly/sorbents/silt fence/wattles/seed/etc.	$ 5,000	LS	0	$ -	0.5	$ 2,500	7	$ 35,000
	Geosynthetics/supersacks/etc.	$ 5,000		0	$ -	0	$ -	7	$ 35,000
	Expendables/Small Tools	$ 4.00	MH	0	$ -	1200	$ 4,800	0	$ -
	Supplies Subtotal				**$ 118,635**		**$ 7,300**		**$ 70,000**
Equipment:									
4	End Dump	$ 16,850	month	4	$ 67,400	0.1	$ 1,685	17.8	$ 299,556
2	Excavator	$ 16,180	month	2	$ 32,360	0.1	$ 1,618	8.9	$ 143,822
1	Dozer	$ 10,100	month	1	$ 10,100	0.1	$ 1,010	4.4	$ 44,889
2	Loader	$ 15,500	month	2	$ 31,000	0.1	$ 1,550	8.9	$ 137,778
3	Crew Vehicle	$ 1,750	month	3	$ 5,250	0.1	$ 175	13.3	$ 23,333
2	Light Plant(s)	$ 600	month	2	$ 1,200	0.1	$ 60	8.9	$ 5,333
1	Barge (mob)	$ 295,000	LS	1	$ 295,000	0.0	$ -	0.0	$ -
1	Barge(demob)	$ 392,000	LS	1	$ 392,000	0.0	$ -	0.0	$ -
2	skid steer	$ 9,850	month		$ -	0.1	$ 985	8.9	$ 87,556
	Equipment Subtotal				**$ 834,310**		**$ 7,083**		**$ 742,267**
Subcontractor(s)/Vendors:									
	Camp (mobilization/demobilization)	$ 115,000	LS	1	$ 115,000	0	$ -	0	$ -
	Camp (daily rate < 25 person)	$ 15,000	day	0	$ -	3	$ 45,000	133	$ 2,000,000
	Fuel tanks (10,000 to 20,000 gal)	$ 20,000	t/m	0	$ -	0.2	$ 4,000	40	$ 800,000
	Drill rig mob/demob and lodging vessel	$ 17,000	day	0	$ -	0	$ -	0	$ -
	Driller and driller helper	$ 3,000	day	0	$ -	0	$ -	0	$ -
	Disposal tipping fee	$ 95	ton	0	$ -	0	$ -	0	$ -
	Surveying crew	$ 2,460	day	0	$ -	3	$ 7,380	133	$ 328,000
	Environmental Laboratory Testing	$ 40,000	LS	0	$ -	0	$ -	1	$ 40,000
	On-site Thermal Desoprtion Unit and Crew	$ 400	ton	0	$ -	0	$ -	40,000	$ 16,000,000
	Subcontractor/Vendor Subtotal				**$ 115,000**		**$ 56,380**		**$ 19,168,000**
Other Direct Costs:									
	Fuel - gasoline	$ 4.00	gal		$ -	1,000	$ 4,000	35,000	$ 140,000
	Fuel - diesel	$ 4.25	gal		$ -	3,000	$ 12,750	135,000	$ 573,750
	Other Direct Costs Subtotal				**$ -**		**$ 16,750**		**$ 713,750**
Travel:									
	Airfare crew Anchorage to Adak	$ 25,000	RT	1	$ 25,000	0	$ -	0	$ -
	per diem (incidentals only)	$ 11.00	m/day	0	$ -	33	$ 363	1467	$ 16,133
	Travel Subtotal				**$ 25,000**		**$ 363**		**$ 16,133**
	TOTALS without markup				$ 1,124,485		$ 144,841		$ 22,652,534

Assumptions: Cost estimate based on direct, unburdened costs in 2015 dollars. Source of unit rates include current contractual rates, contractor's quotes, and professional judgment based on previous experience

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