US Army Corps of Engineers
Alaska District

WORK PLAN ADDENDUM

Revision 1

2014 Northeast Cape HTRW Remedial Actions
Northeast Cape, St. Lawrence Island, Alaska

Contract No. W911KB-14-D-0006
Task Order 0002

FUDS Nos. F10AK0969-03 and F10AK0969-05

August 2015

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Prepared for

US Army Corps of Engineers Alaska District
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ACRONYMS AND ABBREVIATIONS

′	minutes
°	degrees
°F	degrees Fahrenheit
AC&WS	Aircraft Control and Warning Station
ADEC	Alaska Department of Environmental Conservation
APP	Accident Prevention Plan
AST	aboveground storage tank
bgs	below ground surface
Bristol	Bristol Environmental Remediation Services, LLC
BTEX	benzene, toluene, ethylbenzene, and xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	contaminant of concern
DoD	U.S. Department of Defense
DRO	diesel range organics
ELAP	Environmental Laboratory Accreditation Program
EM	Engineer Manual
GRO	gasoline range organics
HSM	Health and Safety Manager
HTRW	hazardous, toxic, and radioactive waste
HWAP	hazardous waste accumulation point
IDW	investigation-derived waste
mg/kg	milligrams per kilogram
MNA	monitored natural attenuation
MOC	Main Operations Complex
NE Cape	Northeast Cape
ORP	oxygen-reduction potential
OSHA	Occupational Safety & Health Administration

ACRONYMS AND ABBREVIATIONS (continued)

PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PM	Project Manager
POL	petroleum, oil, and lubricants
PPE	personal protective equipment
PVC	polyvinyl chloride
QAR	Quality Assurance Representative
QC	quality control
RA	remedial action
RCRA	Resource Conservation and Recovery Act
RI	remedial investigation
RRO	residual range organics
SOW	Scope of Work
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
TestAmerica	TestAmerica Laboratories, Inc.
UFP-QAPP	Uniform Federal Policy-Quality Assurance Project Plan
USACE	US Army Corps of Engineers
UST	underground storage tank
UTV	utility terrain vehicle
UVOST	Ultra-Violet Optical Screening Tool
WP	Work Plan

1.0 INTRODUCTION

This work plan addendum to the 2014 Northeast Cape HTRW Remedial Actions Work Plan (Revision 1) has been developed for acceptance by the US Army Corps of Engineers (USACE), Alaska District, as a control mechanism for the work to be performed under Contract No. W911KB-14-D-0006, Task order 0002, modification P0003, for Hazardous, Toxic, and Radioactive Waste (HTRW) remedial actions (RAs) at Northeast Cape (NE Cape), Saint Lawrence Island, Alaska (Attachment 1, Figures 1 and 2). All quality control procedures described in detail in the 2014 NE Cape Work Plan (WP) and UFP-QAPP will be followed for this task. The USACE has awarded the contract to Bristol Environmental Remediation Services, LLC (Bristol). This WP addendum describes three specific activities to be performed at sites 7, 9 and the MOC located at the former NE Cape installation (Attachment 1, Figure 3). Three surface water samples will be collected at Site 9 from previously sampled locations, groundwater will be sampled at 15 monitoring wells at the Main Operations Complex (MOC) and the landfill caps will be visually inspected at Site 7 and Site 9.

1.1 FIELD TECHNICAL APPROACH SUMMARY

Bristol will utilize three field staff to complete the tasks required for Modification P0003. The crew will spend one day mobilizing to Nome from Anchorage prior to the start of field work and one day demobilizing from Nome back to Anchorage upon completion of field activities. The crew will overnight in Nome and charter two daily round-trip flights (Navajo aircraft) to/from NE Cape during sampling activities and visual inspections. A utility terrain vehicle (UTV) will be flown to NE Cape to transport the crew and equipment from the airstrip to the work locations at the MOC, Site 7 and Site 9. A safety container will be shipped to NE Cape with all supplies necessary to house/support the field crew for three days should weather conditions necessitate. Bristol anticipates field work will be completed in six days.

The three main objectives of this task are:

- Visually inspect the Site 7 Landfill Cap and complete landfill cap inspection checklist and photograph current site conditions.
- Visual inspection of the Site 9 Landfill Cap and complete landfill cap inspection checklist and photograph current site conditions. Collect three surface water analytical samples from previously established locations and submit them for analyses
- Collect 15 primary groundwater samples from monitoring wells at the MOC and field analyze the samples for monitored natural attenuation (MNA) parameters.

2.0 LOGISTICS AND AIR SUPPORT

Most of the items to support field activities will be air-freighted to Nome on Alaska Airlines or Northern Air Cargo. Field crew and sampling equipment transport will be accomplished using charter flights out of Nome. Bristol will use Bering Air for chartered aircraft flights between NE Cape and Nome. A CASA 212 chartered out of Nome will be used to transport large items such as the UTV. Communications from the site with the air carrier will be via satellite telephone for scheduling and weather conditions.

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3.0 SCOPE OF WORK

Section 3.0 outlines the SOW for this project:

- Visually inspect the Site 7 Landfill Cap and complete landfill cap inspection checklist and photograph current site conditions.
- Visual inspection of the Site 9 Landfill Cap and complete landfill cap inspection checklist and photograph current site conditions. Collect three surface water analytical samples from previously established locations and submit them to the fixed laboratory for analyses.
- Collect 15 primary groundwater samples from monitoring wells at the MOC and field analyze the samples for monitored natural attenuation (MNA) parameters. The MNA parameters that will be collected are temperature, pH, dissolved oxygen (DO), conductivity, and oxygen reduction potential
- Prepare a *2015 Annual Groundwater MNA Sampling Report* that describes the field effort and the groundwater sampling results, interpretations and conclusions.
- Prepare a *Landfill Periodic Visual Inspection Report* that summarizes previous inspections; details the 2015 field inspections, observations and recommendations for future maintenance activities, if any.

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4.0 PREVIOUS ACTIVITIES

4.1 PREVIOUS LANDFILL CAPPING ACTIVITIES AT SITE 7

A geophysical investigation was performed in 2007 at the Site 7 Landfill by R&M for the USACE. Bristol was awarded a contract in 2009 for drum and debris removal at Site 7 along with completing a landfill cap and revegetation. Bristol was furnished the geophysical investigation results and incorporated it into a Global Positioning System (GPS) unit. Using the GPS unit, Bristol was able to navigate to the magnetically anomalous locations indicated on the geophysical investigation. These were the areas demonstrating the highest probability of containing drums. Additionally, these were the areas in which Bristol focused its debris exposure, trenching, and excavation activities. Prior to debris exposure activities, Bristol made the decision to use a potholing method to provide information, in addition to the magnetic survey, on where the debris and drums were located within the landfill. The potholes were dug in areas both within and outside of the magnetic anomaly areas. The pothole locations were surveyed during the pre-construction survey. The initial step in locating drums involved shallow excavations in the areas containing the magnetic anomalies. Bristol uncovered the top 1 foot of material in all of these areas. The next step involved digging "potholes" in areas with high anolomous readings. Most drums were identified along the perimeter of the landfill area both by magnetic survey and visual observation of partially exposed drums. This initial excavation helped to define the locations that would require further excavation/trenching and aided in excluding areas which would require no further excavation activity. Empty drums were washed and disposed of as solid waste. Drums containing liquids were carefully exposed, field tested for hazardous characteristics, liquid contents were removed and the empty drums were exposed and moved to a waste accumulation point. Most drums encountered were in poor condition, containing holes, rust, and bends and creases

in the metal. The condition of the drums was such that, occasionally, product was leaked onto the soil. Consequently, this soil was removed and disposed of off-site.

A significant portion of the fieldwork performed by Bristol in 2009 focused on the construction of a gravel landfill cap at Site 7. Material was hauled from a local source and a cap was constructed across the surface of the landfill following drum removal activities. Appropriate grading was set to ensure minimal erosion of the cap. Grade was set by the dozer operator with oversight from the foreman and site superintendent. Grade played an important role in determining the thickness of the cap. As stated above, the minimum thickness of material overlying trash and debris was set at 24 inches; however, some of these areas required more material in order to set grade. In the locations of the landfill where no debris was encountered, such as the areas not corresponding to magnetic anomalies, material thickness may be less than 24 inches. The thickness in these areas was again dependent on grade, but Bristol was not concerned with maintaining a minimum thickness of 24 inches in non-debris containing locations.

Bristol performed reseeding upon completion of the landfill cap. The landfill cap was revegetated based on recommendations provided by the Alaska Plant Materials Center. The seed mixture consisted of two different native grass species, both of which are adapted to the St. Lawrence Island environment. The seed mixture a mixture by weight consisting of 70% Tufted Hairgrass and 30% Red Fescue

Seed was applied at a uniform rate of one pound per 100 square feet. Fertilizer was applied at a rate of 450 pounds per acre, and had a nitrogen-phosphorus-potassium ratio of 20 percent nitrogen; 20 percent phosphorus; and 10 percent potassium. Bristol did not apply water to seeded areas; however, seeding was conducted during days of light precipitation.

4.2 PREVIOUS ACTIVITIES AT SITE 9

In 2010, surface debris, abandoned vehicles and empty drum carcasses were removed from the Site 9 Housing and Operations Landfill. The landfill was capped with a minimum 2 feet local gravel fill material and graded and completed to assure no water pooling or excessive runoff. Site 9 was reseeded and fertilized to facilitate site stabilization. A seed mixture was utilized consisting of 70 percent Tufted Hairgrass and 30 percent Red Fescue and planted at a rate of 1 pound per 1,000 ft^2. Fertilizer was applied at a rate of 500 pounds per acre.

Three surface water samples were collected from three locations (Shown on Figure A-5 located in Attachment 1) from two ponds adjacent to Site 9 and from a drainage that flowed along the edge of Site 9. Samples were collected in three events; before, during and after the Site 9 removal and capping operations were completed. The nine primary samples and QC were analyzed for gasoline range organics (GRO), volatile organic compounds (VOCs), diesel and residual range organics (DRO/RRO), polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and RCRA 8 metals plus zinc. During the final sampling event conducted following completion of the landfill cap, samples were submitted to the laboratory for full VOC analyses, but due to laboratory error, the samples were only analyzed for benzene, toluene, ethylbenzene and total xylenes (BTEX) within holding times (the remaining VOC analyses were analyzed outside of holding times). To fill the data gaps, Bristol collected surface water samples in 2011 for VOCs from the same locations as those collected in 2010. No analytical samples have been collected since 2011 at Site 9. None of the surface water samples collected during the 2010 and 2011 field seasons contained contaminant concentrations above cleanup levels.

4.3 PREVIOUS GROUNDWATER MONITORING AT THE MOC

Groundwater has been monitored at the MOC for over two decades at various intervals. Groundwater at the MOC has been continually sampled and monitored for contaminant

concentrations and for MNA evaluation since 2010 in accordance with the 2009 Decision Document (USACE 2009). Analytes not in accordance with the 2009 decision document, which include glycols, nickel vanadium and zinc, were added to the suite of analytes for wells at the request of the Corps due to evolving onsite conditions. Remedial activities including removal of large amounts of contaminated soil have occurred at the MOC since the current monitoring program began. Removal of source contamination has likely decreased concentrations of contaminants in groundwater since 2010 (Bristol, 2014) with source removal operations completed in 2014. The 2015 sampling event will be the first sampling event in recent history where no excavation or other ground disturbance has occurred during the sampling event. It is anticipated that MNA parameter and contaminant reduction trends can be more accurately determined since the removal actions are complete. The locations of the monitoring wells currently present at the MOC are shown in Attachment 1, Figure 7.

5.0 2015 FIELD ACTIVITIES

The following subsections describe the fieldwork to be performed at Site 7, Site 9 and the groundwater sampling to be conducted at the MOC.

5.1 LANDFILL CAP VISUAL INSPECTION AT SITE 7

Bristol will visually inspect the Site 7 landfill cap in accordance with the 2009 Northeast Cape Decision Document (USACE 2009). The cap will be observed for evidence of cap settlement, cracks, erosion, penetrations, exposed debris, or chemical odors. The cap slopes will be visually inspected for instability and the amount (percent coverage) and quality of vegetative cover. The presence or absence of ponded water within, against, or on the surface of each landfill will be recorded, as well as the presence/absence of petroleum sheen on these surface waters. The condition of access roads within the immediate vicinity of the landfill will also be noted. Special attention will be given to the additional fill placed near the top of the Site 7 Landfill cap in 2014 with regard to whether or not positive drainage exists and the amount (percent coverage) and quality of vegetative cover on the filled area and the overall cap. Observations will be recorded on field forms (Attachment 2) and photographs will be taken from viewpoints similar to previous inspections and used for comparison. Examples of previous landfill inspection forms are included in Attachment 3.

5.2 LANDFILL CAP VISUAL INSPECTION AT SITE 9

Bristol will visually inspect the Site 9 landfill cap in accordance with the 2009 Northeast Cape Decision Document (USACE, 2009). The cap will be observed for evidence of cap settlement, cracks, erosion, penetrations, exposed debris, or chemical odors. The cap slopes will be visually inspected for instability and the amount (percent coverage) and quality of vegetative cover. The presence or absence of ponded water within, against, or on the surface of the landfill will be recorded, as well as the presence/absence of petroleum sheen on these surface waters. The Site 9 drainage ditch will be inspected to

ensure it continues to provide an effective outflow for the pond adjacent to the landfill cap and therefore minimizes the flow of water through the landfill. The condition of access roads within the immediate vicinity of the landfill will also be noted. Special attention will be given to whether or not positive drainage exists and the amount (percent coverage) and quality of vegetative cover on the cap. Observations will be recorded on field forms and photographs will be taken from viewpoints similar to those previously utilized.

5.3 SURFACE WATER SAMPLING AT SITE 9

Surface water samples will be collected at three locations near Site 9 Landfill. The locations of the surface water samples are shown on Figure A-5 in Attachment 1. Surface water from two ponds and one stream location downgradient from the landfill will be sampled and analyzed for DRO/RRO, GRO/BTEX, PAHs, PCBs, 8 RCRA metals, and zinc. Laboratory QA samples will also be collected along with a field duplicate. Turbidity will also be measured in the field at the time the samples are collected. Surface water sample locations at Site 9 will be re-established using a Trimble GPS with the former sample locations pre-loaded on the GPS. Samples will be collected in the order of volatility with GRO/BTEX collected first followed by semi-volatile and non-volatile containers for analyses.

5.4 GROUNDWATER SAMPLING AT THE MOC

Bristol will collect groundwater samples at the MOC from the fifteen monitoring wells of which seven were newly installed and sampled in 2014. The monitoring well locations that have been selected for the 2015 sampling event include previously existing wells MW 88-1, MW88-3, MW88-10, MW 10-1, 17MW1, 22MW2, 20MW1, and 26MW1 as well as the wells installed in 2014. The new wells are 14MW01, 14MW02, 14MW03, 14MW04, 14MW05, 14MW06 and 14MW07. Depth to water will be measured in the monitoring wells and samples will be collected starting with upgradient wells proceeding

from cleanest to the most contaminated wells based on 2014 groundwater sampling results. Field forms are located in Attachment 2.

Depth to water level measurements will be taken from all 15 wells within a single 4 hour period prior to any purging or sampling. The monitoring wells will be purged at a rate of 0.1 to 0.5 liters per minute using a variable speed submersible pump. A minimal drawdown of less than 0.1 meters (approximately 4 inches) is required. Newly installed wells 14MW03 and 14MW07 have a documented slow recharge and were purged dry at low flow rates in 2014. Samples were collected from these two wells after the wells reached 80% recharge. The samples also had high turbidity (>1000 NTU). If such conditions are encountered in 2015 the wells will be sampled in the same fashion for data consistency.

Groundwater samples will be collected using a Monsoon submersible pump or similar submersible pump with disposable high-density polyethylene tubing and following a low-flow sampling protocol, as described in the Bristol *Groundwater Sampling Standard Operating Procedure* BERS-02, and in accordance with Section IV of the ADEC *Draft Field Sampling Guidance* (ADEC, 2010).

Groundwater field parameters will be monitored and recorded at time and volume intervals during purging for stabilization on a groundwater purge form for each well. A copy of the low flow purging form is provided in Attachment 2. Groundwater samples will be collected when parameters (oxidation reduction potential (ORP), turbidity, temperature, pH, conductivity and dissolved oxygen) have stabilized (+/- 10%) or when three casing volumes have been purged in accordance with Section IV of the ADEC *Draft Field Sampling Guidance* (2010). Temperature, pH, dissolved oxygen, conductivity, and ORP, will be collected in the field using a YSI 556 water quality meter with flow-through cell. Turbidity measurements will be taken using a Hach 2100P field turbidimeter, and water level measurements will be taken using a water level meter. Once field parameters

have stabilized, samples will be collected in the appropriate containers are shown on Table 5-1 in the order of volatility starting with GRO/BTEX followed by semi-volatile, non-volatile and finally MNA sample containers.

Two (2) field duplicates and at least one set of MS/MSD samples will be collected as part of the field quality control for the groundwater sampling. A trip blank will also be placed in any cooler containing volatile samples (GRO/BTEX).

Table 5-1 Sample Containers, Preservation, and Holding Times

Parameter	Matrix	Container	Preservation/Holding Times
BTEX/VOCs SW 8260C	Water	(3) 40-mL VOA , Teflon®-lined septumated lid	HCL to pH less than 2, 4°± 2°C / 14 days
Methane/RSK-175	Water	(3) 40-mL VOA , Teflon®-lined septumated lid	HCL to pH less than 2, 4°± 2°C / 14 days
RCRA 8 Metals + nickel, vanadium and zinc (total and dissolved) SW 6020/7470	Water	(1) 250mL, 500 mL or 1-L HDPE each for total and dissolved metals	HNO_3 to pH less than 2, 4°± 2°C / 180 days, 28 days for mercury
DRO AK 102	Water	(2) 1-L amber glass with Teflon-lined screw caps or low-volume containers if approved (125 mL)	HCL to pH less than 2, 4°± 2°C / 14 days to extract, 40 days to analysis of extract
GRO AK 101	Water	(3) 40-mL VOA, Teflon-lined septumated lid	HCL to pH less than 2, 4°± 2°C / 14 days
Glycols SW 8015C	Water	(1) 250 mL amber glass with Teflon-lined screw caps	Unpreserved, 4°± 2°C / 7 days to extract, 40 days to analysis of extract
PAHs SW 8270C SIM	Water	(2) 1-L amber glass with Teflon-lined screw caps or low-volume containers if approved (125 mL)	Unpreserved, 4°± 2°C / 7 days to extract, 40 days to analysis of extract

Notes:

BTEX = benzene, toluene, ethylbenzene and total xylenes
DRO = diesel range organics
GRO = gasoline range organics
HCL = hydrochloric acid
HDPE = high density polyethylene
PAHs = polynuclear aromatic hydrocarbons
RCRA = resource conservation and recovery act
VOCs = volatile organic compounds

All groundwater samples will be analyzed at a fixed-based laboratory for several parameters:

- Methane
- Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX)
- Gasoline Range Organics (GRO)
- Diesel Range Organics (DRO)
- Residual Range Organics (RRO)
- Polynuclear Aromatic Hydrocarbons (PAHs), including naphthalene
- Polychlorinated Biphenyls (PCBs)
- Total and dissolved RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver) plus nickel, vanadium, and zinc

Additional analyses will be requested for MW10-1:

- Volatile organic compounds (VOCs)
- Glycols

Groundwater samples will be analyzed in the field for MNA parameters within 24 hours of collection using Hach kits for nitrate, sulfate, ferrous iron, alkalinity, and dissolved manganese. Groundwater samples will be analyzed by a fixed-base laboratory for methane. Decontamination efforts will be implemented to prevent cross-contamination and will be conducted according to Section VIII E of the ADEC *Draft Field Sampling Guidance* (2010). Crew will decontaminate non-disposable sampling equipment such as groundwater pumps and water levels with an Alconox wash solution followed by a fresh water rinse and a successive deionized water rinse. The wash and the rinse water generated during decontamination procedures will be treated through a granular activated treatment system before being discharged to the ground. Ground discharge will occur at the same site from which the sample was collected. Purge water from wells with historical concentrations above site-specific cleanup levels will also be treated through the GAC system and discharged to the ground near the respective well. Solid investigation derived

waste such as tubing and personal protective equipment will be transported back to Nome and disposed of at the Nome solid waste facility.

5.5 SAMPLE PACKING AND SHIPPING

The sample bottles will be placed in coolers with frozen gel-ice to maintain a temperature of 4°± 2°C. Bristol personnel or a third-party courier (Bering Air) will transport the sample coolers to the Alaska Airlines Goldstreak counter with a completed airway bill for shipment to TestAmerica-Tacoma, an ADEC CS and DoD/ELAP accredited laboratory. Custody seals will be placed on the coolers before release to the third party. A temperature blank (minimum volume of 500 mL) will be included in every sample cooler delivered to the laboratory.

When packing samples, the following guidelines will be followed:

- Place tape over the drain hole inside and outside of the cooler.
- Line the cooler bottom with bubble wrap.
- Tighten all lids and place them with cushion packing in an upright position
- Ensure each cooler contains a labeled temperature blank (greater than or equal to 500 mL).
- Ensure appropriate trip blank is in cooler and are indicated on CoC forms. If both soil and water samples are shipped in the same cooler, two separate trip blanks and MS/MSDs will be placed in the cooler. The trip blank should have a unique sample ID with date prepared.
- Place one layer of bubble wrap over glass jars and place frozen gel-ice on top of the bubble wrap. Do not over pack coolers or over-tighten lids, as this will cause breakage.
- Fill any void space in the cooler with bubble wrap or cardboard and make sure sample containers will not shift during shipment.
- Verify the contents of the cooler are the same as information on the CoC form.
- Place the CoC form in a plastic re-sealable bag and tape it to the underside of the cooler lid.
- Close and latch the cooler cover. Ensure the closure of the cover by the use of tape wraps (filamentous packaging tape) around each end of the cooler.

- Seal the cooler body and lid connection with one wrap of filamentous tape along the upper and lower contact surfaces.
- The person relinquishing cooler custody or sampler will sign and date two cooler custody seals placed across the seam where the lid meets the cooler, one in front and one in back.
- Place "Keep Cool Do Not Freeze," "This End Up," "Fragile," or other applicable stickers on the cooler's exterior top and side surfaces.
- Affix a label with both Bristol and the project laboratory's addresses and phone numbers to each cooler for tracking purposes.
- Notify laboratory of sample delivery after transferring custody and provide shipping document number so that the shipment can be tracked.
- Place CoC documentation in project file with shipping record.

It is critical that the laboratory is notified that samples are being shipped, provided with shipping document number, and number of coolers. The shipper or designated responsible party will verify that samples have arrived at the laboratory in acceptable condition. It is also critical to verify that method of shipment guarantees samples will be stored in a refrigerated area until laboratory can pick them up.

The point of contact at TestAmerica is Rob Greer (Robert.Greer@TestAmericain.com) (253)-922-2310.

5.5.1 Sample Custody

Bristol personnel will maintain standard CoC procedures for all samples collected for laboratory analysis. The project team will keep all samples within their line of sight during the field sampling or within a locked room or vehicle. Custody seals will be used to verify that the CoC was maintained.

Field personnel will use blank CoC forms provided by the laboratory, or CoC forms printed on site from an electronic file.

Each CoC form will have the following information at a minimum:

- Sampling contractor's name, address, telephone number, fax number, and e-mail address
- Project name and number
- Quote number
- USACE North Pacific Division Laboratory (NPDL) Work Order Number (**15-061**)
- Name or identification given to cooler
- Project laboratory, Point of Contact, and address
- Sample information:
  - Unique sample number (ID)
  - Date and time each sample was collected
  - Preservation type
  - Matrix (SW – Surface Water, GW- Groundwater)
  - Analytical methods requested
  - Clearly identified MS/MSD samples with additional volume as required
- Collector's name, signature, date, and time
- Custody seal conditions (upon receipt by lab)
- Custody transfer signatures, dates, and times
- Any special notifications to the laboratory
- Requested turnaround time, deliverable level, and electronic data deliverable requested

The designated field-sampling personnel will sign (with date and time) the CoC forms upon relinquishing to the laboratory, or when sealing coolers for shipment.

Any individual opening the sealed coolers throughout the transportation process must sign each opened cooler's respective CoC form and attach new custody seals.

The name of the receiving person, laboratory sample number, date of sample receipt, sample condition, and temperature will be placed on the CoC forms at the time the sample coolers are received at the project laboratory. The laboratory will scan the CoC form,

cooler receipt form, air bill information (if any), and photocopies of the custody seals within 24 hours of receipt at the project laboratory to:

- Receipt.cooler@.usace.army.mil
- USACE Chemist, Sean Benjamin (Sean.P.Benjamin@usace.army.mil)
- Bristol CQCSM, Russell James (rjames@bristol-companies.com)
- Bristol PM, Greg Jarrell (gjarrell@bristol-companies.com)
- Bristol Project Chemist, Marty Hannah (mhannah@bristol-companies.com)

Field sampling personnel will retain a copy of each CoC form for project records and will coordinate transport of samples. In addition, field personnel will collect and retain any other transportation or shipment records for each project sample shipment in the project files. Original CoC forms and shipping documents will be emailed to the PM. This information will be clearly and accurately documented in the field logbook.

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6.0 REPORTING

Reports will be prepared and submitted to the USACE detailing groundwater sample results from the MOC and the inspections and sampling, where applicable, at Site 7 and Site 9 Landfills.

6.1 MOC GROUNDWATER MONITORING REPORT

A draft 2015 Annual Groundwater MNA Sampling Report will be prepared and submitted to USACE within 90 days of completion of field activities. The report will describe mobilization and demobilization, groundwater MNA monitoring methods and results as well as comparison with data from previous years including graphical presentation of contaminant concentrations and groundwater elevations (y-axis) over time (x-axis) for all analytes above established cleanup levels for wells with three or more sets of sampling data. Tables including all historic water level and sample results, and figures including a potentiometric surface (showing groundwater elevation for each well, general groundwater flow direction, and ground surface topography), and laboratory detections above established cleanup levels will be included. Scanned copies of field books and field forms will be included as appendices to the report. An ADEC laboratory data checklist will be completed for each work order submitted for analysis. A chemical quality data review will also be completed and submitted as a section of the report. Electronic data deliverables (COELT and SEDD 5.2A) that match the hardcopy laboratory reports will be submitted electronically along with electronic PDF copies of the laboratory reports.

6.3 LANDFILL INSPECTION REPORTS

A draft Landfill Periodic Visual Inspection Report will be prepared that includes a description of mobilization and demobilization, and all previous visual inspections (i.e., previous reports included in an appendix) and maintenance performed as a result of the inspections, as well as pertinent observations and recommendations for potential future maintenance activities during the next 5-year periodic review. Surface water sample locations and historic and current results will also be included.

7.0 REFERENCES

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USACE. (2009). Decision Document: Hazardous, Toxic, and Radioactive Waste (HTRW) Project #F10AK096903, Northeast Cape Formerly Used Defense Site (FUDS) St. Lawrence Island, Alaska. Prepared by U.S. Army Corps of Engineers-Alaska District, January.

USACE (2009) Site 7 Cargo Beach Road Landfill Containerized Hazardous, Toxic, and Radioactive Waste (CON-HTRW) Project # F10AK096905 Northeast Cape Formerly Used Defense Site (FUDS) St. Lawrence Island, Alaska, June

USACE. (2014). 2013 Sampling Conducted in Conjunction with the 2013 Five-Year Review at Northeast Cape, Northeast Cape, St. Lawrence Island, Alaska. February.

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ATTACHMENT 1

Figures from Historical Reports

01 – Figure 1, Vicinity Map

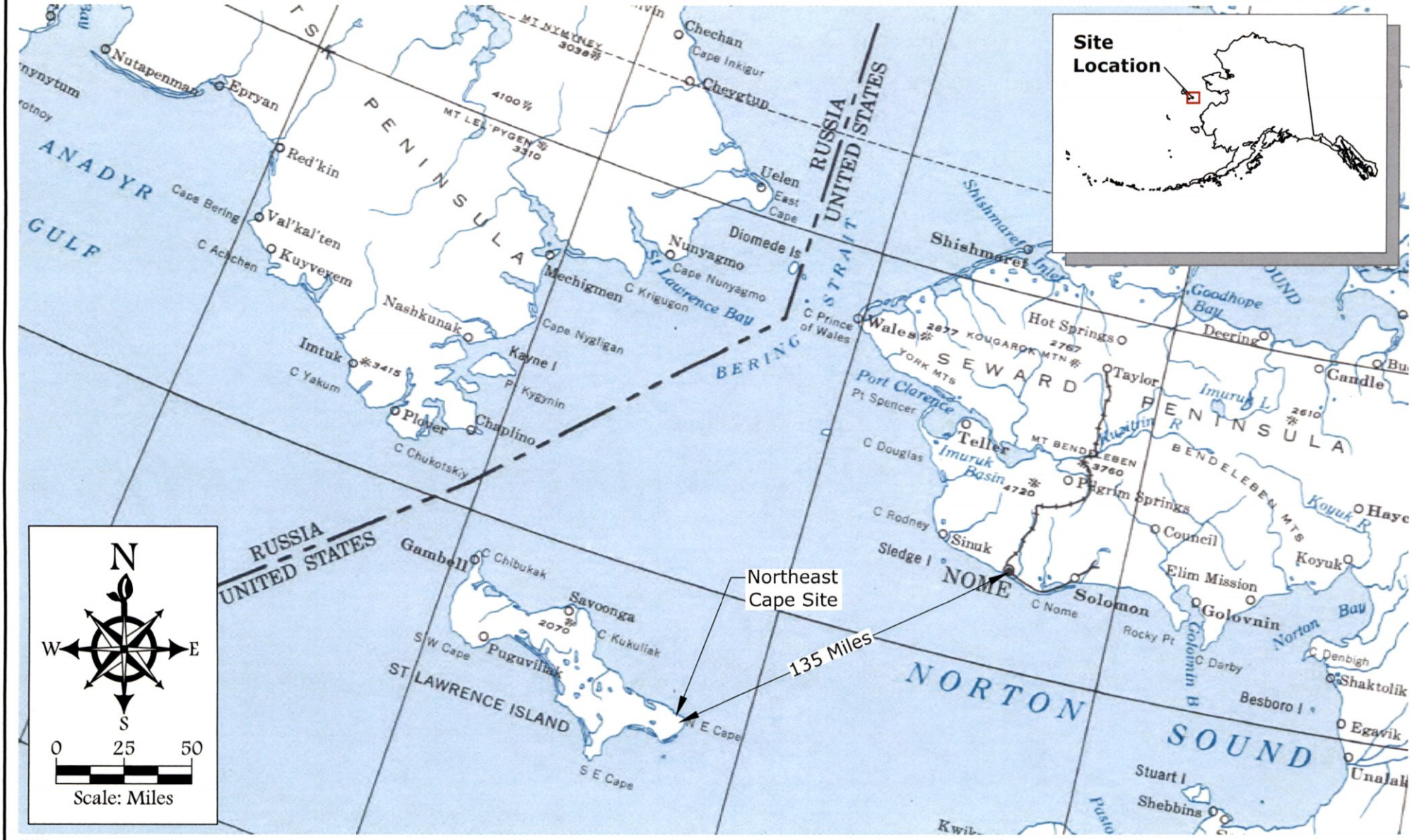
02 – Figure 2, Location Map

03 – Figure 3, Project Work Sites

04 – Figure A-5, Site 9 Housing and Operations Landfill

05 – Figure 7, MOC Monitoring Wells

Drawing: O:\JOBS\34140087 NE CAPE 2014\ACAD-ENVIRO\REPORTV2\DWGS\FIGURE1.DWG - Layout: 8.5 X 11
User: NPEACOCK Mar 19, 2015 - 4:02pm Xrefs: - Images: NECAPE.JPG

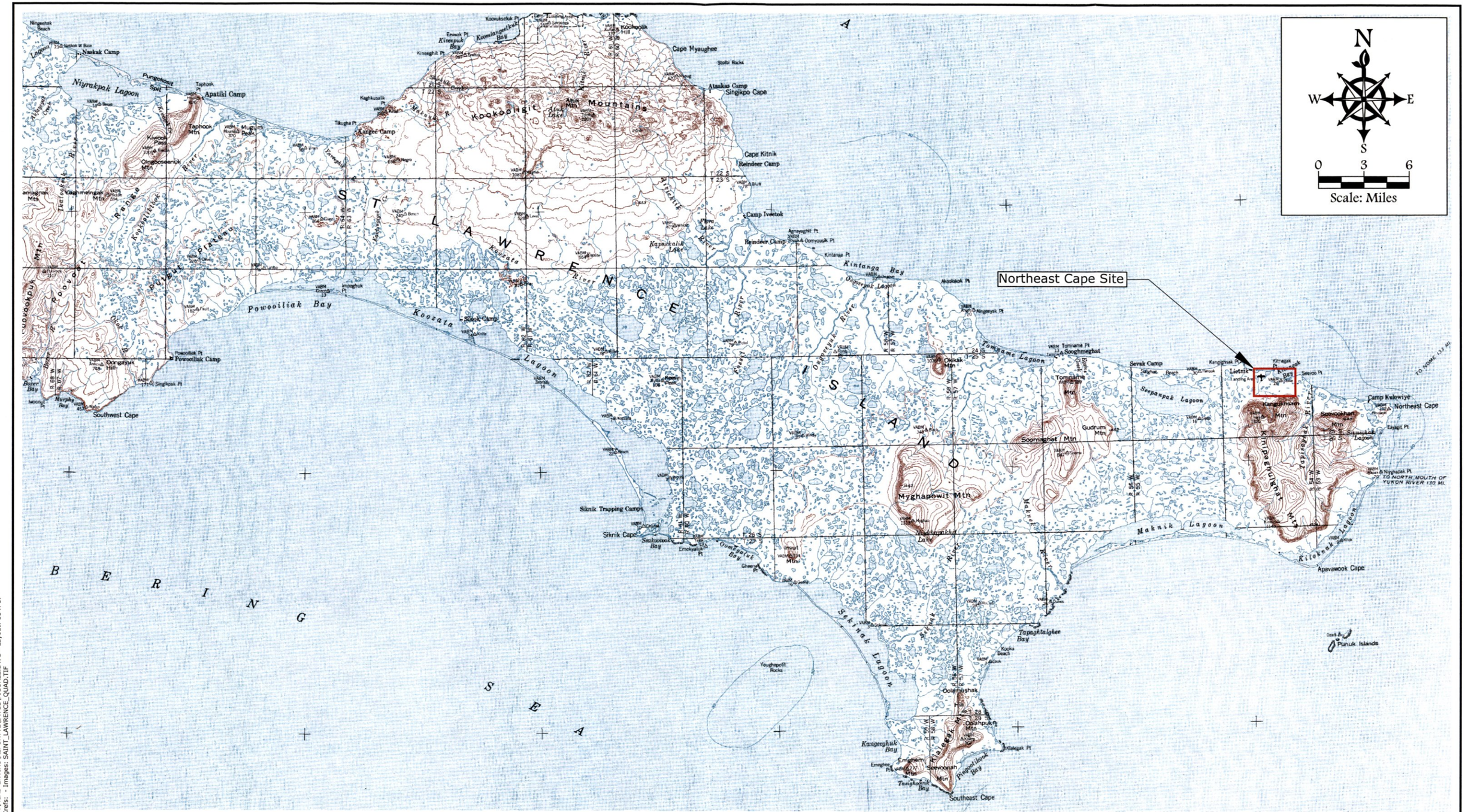


Note:
HTRW hazardous, toxic, and radioactive waste

Source:
USGS National Atlas Sheet Number 42-43

FIGURE 1
NORTHEAST CAPE, ST. LAWRENCE ISLAND, ALASKA
NORTHEAST CAPE HTRW REMEDIAL ACTIONS
VICINITY MAP

	DATUM: N/A PROJECTION: N/A Project No. 34140087	DATE 02/13/2014 DWN. NAP SCALE 1" = 50 mi APPRVD. RJ



Note:
HTRW hazardous, toxic, and radioactive waste

FIGURE 2
NORTHEAST CAPE, ST. LAWRENCE ISLAND, ALASKA
NORTHEAST CAPE HTRW REMEDIAL ACTIONS
LOCATION MAP

DATUM: NAD 27	DATE 02/13/2014
PROJECTION: UTM 2N M	DWN. NAP
Project No. 34140087	SCALE 1" = 6 mi
	APPRVD. RJ

Drawing: O:\JOBS\34140087 NE CAPE 2014\ACAD-ENVIRO\REPORTV2\DWGS\FIGURE2.DWG - Layout: 11 X 17
User: NPEACOCK Mar 19, 2015 - 4:04pm Xrefs: - Images: SAINT_LAWRENCE_QUAD.TIF

Bering Sea

Site 7-Cargo Beach Landfill

Suqitughneq River

Site 9-Housing and
Operations Landfill

MOC

N
W E
S

0 750 1500
Scale: Feet

Notes:

HTRW	hazardous, toxic, and radioactive waste
MOC	main operations complex
POL	petroleum, oil, and lubricants

Drawing Adapted From Montgomery Watson
File Titled NECAPE.DWG, Date 05 June 2001. Based on Resurvey Performed by ECO-LAND, LLC, July 2009.

Legend

Surface Water

General Site Locations

FIGURE 3
NORTHEAST CAPE, ST. LAWRENCE ISLAND, ALASKA
NORTHEAST CAPE HTRW REMEDIAL ACTIONS
PROJECT WORK SITES

DATUM:	NAD 83
PROJECTION:	SP AK Z9 Feet
PROJECT NO.	34140087
DATE	02/13/2014
DWN.	NAP
SCALE	1" = 1,500'
APPRVD.	RJ

Drawing: O:\JOBS\34140087 NE CAPE 2014\ACAD-ENVIRO\2015GWWORKPLAN\DWG'S\FIGURE3.DWG - Layout: 11X17
User: NPEACOCK Jul 29, 2015 - 9:45am Xrefs: - Images: MOC_SITES.TIFF

N
W E
S
0 60 120
Scale: Feet

14MW04	8/23/2014	Cleanup Level
DRO	**2.5 mg/L**	1.5 mg/L

14MW05	8/23/2014	Cleanup Level
DRO	**4.9 mg/L**	1.5 mg/L

14MW06	8/23/2014	Cleanup Level
DRO	**5.2 Q/L**	1.5 mg/L

14MW03	8/23/2014	Cleanup Level
DRO	**2.4 mg/L**	1.5 mg/L
RRO	**0.062 mg/L**	0.015 mg/L

MW88-3	8/19/2002	9/7/2004	8/22/2014	Cleanup Level
DRO	**34 mg/L**	0.768 B	0.46	1.5 mg/L

MW88-1	8/17/2002	9/6/2004	8/15/2010	7/17/2011	7/10/2012	7/21/2013	8/22/2014	Cleanup Level
Benzene	0.00058	ND(0.0004)	ND(0.00015)	ND(0.00045)	ND(0.00045)	ND(0.00045)	ND(0.0004)	0.005 mg/L
DRO	1.2	ND(0.341) B	0.75 mg/L	0.74 mg/L	**1.9 mg/L**	0.22	0.21	1.5 mg/L
RRO	0.43	0.168 J	0.037 mg/L	0.26 mg/L	0.15 mg/L	0.05 J	0.043 J	1.1 mg/L

MW88-10	8/21/2002	9/11/2004	8/15/2010	7/17/2011	7/10/2012	7/21/2013	8/21/2014	Cleanup Level
Benzene	0.0027 mg/L	ND(0.0004)	0.00015 mg/L	ND(0.00045)	ND(0.00045)	ND(0.00045)	ND(0.0004)	0.005 mg/L
DRO	**55 mg/L**	1.38	**1.6 mg/L**	0.54 mg/L	0.50 mg/L	0.97	0.66	1.5 mg/L
RRO	**1.3 mg/L**	ND(0.549) B	0.036 J mg/L	0.15 mg/L	0.064 J mg/L	0.043 J	0.041 J	1.1 mg/L

14MW07	8/21/2014	Cleanup Level
Total Lead	**0.13 mg/L**	0.015 mg/L

14MW01
14MW02
17MW1
18MW1
20MW-1
22MW2
22MW3
26MW1
MW10-1
Access Road
Former AST Locations
POL Overburden Stockpile Location
Concrete Pad
Concrete Pad 98
Mechanic Shop Area

Legend

- Monitoring Well Sample Location
- Secondary Topographic Contours
- Primary Topographic Contours and Ground Elevation

Notes:

mg/kg	milligrams per kilogram
AST	aboveground storage tank
B	analyte detected in method blank, estimated with potential high bias or false positive
HTRW	hazardous, toxic, and radioactive waste
J	laboratory result is an estimate
ND	non detect at concentration exceeding quantitiation
POL	petroleum, oil, and lubricants

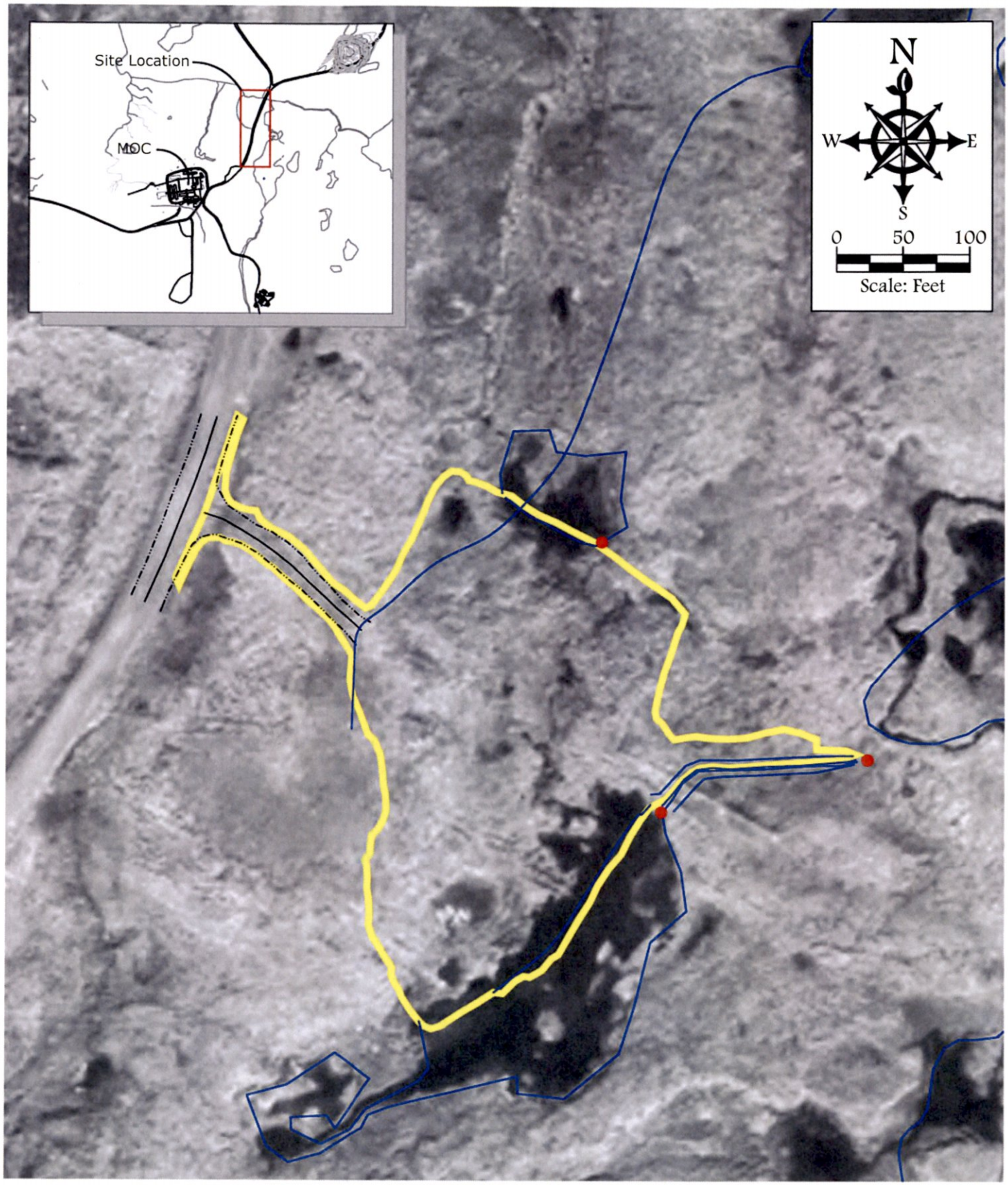
Topo units are in feet, elevations are based on the North American Vertical Datum of 1988.

FIGURE 4
NORTHEAST CAPE, ST. LAWRENCE ISLAND, ALASKA
NORTHEAST CAPE HTRW REMEDIAL ACTIONS
2015 GROUNDWATER SAMPLING

DATUM: NAD 83
PROJECTION: STATE PLANE AK 9
PROJECT NO. 34140087

DATE 01/23/2015
DWN. NAP
SCALE 1"=120'
APPRVD. RJ

Drawing: O:\OBS\34140087 NE CAPE 2014\ACAD-ENVIRO\2015GWWORKPLAN\DWG'S\FIGURE4.DWG - Layout: 11X17
User: NPEACOCK Jul 20, 2015 - 12:56pm Xrefs: TOPO-XREF-2014-AS-BUILT.DWG - Images: EASTCAPE-STLAWRENCE_ORTHO_MOSAIC_AK83-9F.TIF



Legend

MOC	Main Operations Complex
HTRW	Hazardous, Toxic, and Radioactive Waste
●	Proposed Surface Water Sample Location
———	Hydrology
———	Cap Boundary
———	Road Centerline
·—·—·	Road Edge

FIGURE 5
Northeast Cape, St. Lawrence Island, Alaska
Northeast Cape HTRW Remedial Actions
SITE 9 SURFACE WATER SAMPLE LOCATIONS

Bristol
ENVIRONMENTAL REMEDIATION SERVICES, LLC
Phone (907) 563-0013 Fax (907) 563-6713

DATUM:	NAD 83
PROJECTION:	STATE PLANE AK 9
Project No.	34140087
DATE	12/20/11
DWN.	NAP
SCALE	SHOWN
APPRVD.	MW

Drawing: O:\JOBS\34140087 NE CAPE 2014\ACAD-ENVIRO\2015GWWORKPLAN\DWGS\FIGURE5.DWG - Layout: 34110008-FIG15-DEC10
User: NPEACOCK Jul 20, 2015 - 4:36pm Xrefs: - Images: EASTCAPE-STLAWRENCE_ORTHO_MOSAIC_AK83-9F.TIF

LEGEND

EXTENT OF CAP

N

0 50 100

Scale: FEET

FIGURE 6
NORTHEAST CAPE, ST. LAWRENCE ISLAND, ALASKA
IN-SITU CHEMICAL OXIDATION AND INTRUSIVE
DRUM REMOVAL/LANDFILL CAP
EXTENT OF SITE 7 CAP

Bristol
ENVIRONMENTAL REMEDIATION SERVICES, LLC
Phone (907) 563-0013 Fax (907) 563-6713
CONTRACT NO: W911KB-09-C-0013

DATUM:	NA
PROJECTION:	NA
PROJECT NO.	49028
DATE	12/09/09
DWN.	MTG
SCALE	SHOWN
APPRVD.	MW

ATTACHMENT 2

Field Forms

Visual Inspection Checklist (Post-Closure)
[Insert Name] Landfill

This form is to be filled out annually for 5 years after landfill closure.

Name of Inspector: _____ Date: _____

Weather conditions: _____ Precipitation ☐ Yes ☐ No

Temperature: ____ °F ____ Prevailing Wind Direction: _____ Speed: _____

Photographs Taken: _____

Landfill Post-Closure Monitoring Items	Y	N	COMMENTS
Evidence of settlement or frost jacking within or on surface of landfill?			
Ponded water within, against, or on surface of landfill?			
Evidence of surface erosion on disposal area walls or on exterior berms?			
Erosion of access roads?			
Discoloring of vegetation downslope?			
Any evidence of leakage or escape of waste from cells?			
Airborne ash or dust particles?			
Evidence of wildlife or birds present? Include number and type of birds on site.			
Windblown litter in cells or along access roads or adjacent ponds?			
Landfill odors?			
Fire or combustion in the waste?			
Damage to the structural integrity of a dike wall, culvert, or erosion control feature, if present?			
Is revegetation occurring?			
Estimated Percent Vegetative Cover: On Cap Surface ____ On Sideslopes: _____			
Comments:			

General Comments: _____

_____

_____

Corrective Actions Taken: _____

_____

(Use additional pages if necessary)

Bristol

ENVIRONMENTAL REMEDIATION SERVICES, LLC

GROUNDWATER LOW-FLOW PURGING FORM

Job Name NE Cape HTRW RAs Well No.: _____

Job Number 34140087 Well Type: ☐ Monitor ☐ Extraction ☐ Other _____

Casing Height: _____

Company Bristol Well Material ☐ PVC ☐ St. Steel ☐ Other _____

_____ Date _____ Time: _____

Purged by _____ _____

(Signature)

WELL PURGING

PURGE VOLUME

Casing Diameter (D in inches):

☐ 2-inch ☐ 4-inch ☐ 6-inch ☐ Other _____

Total Depth of Casing (TD in feet BTOC): _____

Water Level Depth (WL in feet BTOC): _____

PURGE METHOD

☐ Pump – Type: _____

☐ Submersible ☐ Centrifugal ☐ Bladder ☐ Peristaltic

☐ Other – Type: _____

PUMP INTAKE SETTING

☐ Near Bottom ☐ Near Top ☐ Other

Depth in feet (BTOC): _____ Screen Interval in Feet (BTOC)

Tubing Type/Size: _____

PURGE TIME

_____ Start _____ Stop _____ Elapsed

PURGE RATE

Initial _____ gpm Final _____ gpm

ACTUAL PURGE VOLUME

_____ gallons

FIELD PARAMETER MEASUREMENT

Minutes Since Pumping Began	Water Depth below MP	Pump Dial	Purge Rate (ml/min)	T ☐ °C ☐ °F	Specific Cond. (µS/cm)	pH	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Cumulative Volume Purged

GROUNDWATER LOW-FLOW PURGING FORM (continued)

FIELD PARAMETER MEASUREMENT (Continued)

Minutes Since Pumping Began	Water Depth below MP	Pump Dial	Purge Rate (ml/min)	T ☐ °C ☐ °F	Specific Cond. (µS/cm)	pH	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Cumulative Volume Purged

GROUNDWATER SAMPLING FORM
(To Accompany Low-Flow Purging Form)

Bristol
ENVIRONMENTAL REMEDIATION SERVICES, LLC

Job Name NE Cape HTRW RAs

Job Number 34140087 Date _____ Time: _____

Recorded by _____ Sampled by _____
(Signature)

WELL INFORMATION

Well Number _____ **Well Location** _____

Casing Diameter (D in inches): Total Depth of Casing (TD in feet BTOC): _____

☐ 2-inch ☐ 4-inch ☐ 6-inch ☐ Other _____ Water Level Depth (WL in feet BTOC): _____

WELL SAMPLING

SAMPLING METHOD

☐ Bailer – Type: _____ ☐ Grab – Type _____

☐ Submersible ☐ Centrifugal ☐ Bladder _____ ☐ Other – Type: _____

SAMPLING DISTRIBUTION

Sample No.	Volume	Analysis Requested	Preservatives	Lab	Comments

QUALITY CONTROL SAMPLES

Duplicate Samples

Original Sample No.	Duplicate Sample No.

Blank Samples

Type	Sample No.

Other Samples

Type	Sample No.

Bristol

ENVIRONMENTAL
REMEDIATION SERVICES, LLC

WATER LEVEL FORM

Project: NE Cape HTRW RAs

Date: _____

Personnel: _____

Water Level Instrument: _____

Well Name	Measurement Time	Measuring Point	Depth to Water	Elevation of Measuring Point	Water Level Elevation	Comments

Bristol

ENVIRONMENTAL
REMEDIATION SERVICES, LLC

WATER LEVEL FORM

Well Name	Measurement Time	Measuring Point	Depth to Water	Elevation of Measuring Point	Water Level Elevation	Comments

Bristol

ENVIRONMENTAL
REMEDIATION SERVICES, LLC

WATER LEVEL FORM

Well Name	Measurement Time	Measuring Point	Depth to Water	Elevation of Measuring Point	Water Level Elevation	Comments

ATTACHMENT 3

Previous Landfill Cap Inspection Forms

Visual Inspection Checklist (Post-Closure)
Site 7 Landfill

This form is to be filled out annually for 5 years after landfill closure.

Name of Inspector: ___Lisa Geist_____ Date: ____August 7, 2013_____

Weather conditions: ___Partly sunny, overcast skies_____ Precipitation ☐ Yes ☒ No

Temperature: _54_°**F** Prevailing Wind Direction: ___E____ Speed: __10-15 mph__

Photographs Taken: ___Yes_____

Landfill Post-Closure Monitoring Items	**Y**	**N**	**COMMENTS**
Evidence of settlement or frost jacking within or on surface of landfill?		X	
Ponded water within, against, or on surface of landfill?	X		Tundra ponds close to toe of landfill on west and north sides.
Evidence of surface erosion on disposal area walls or on exterior berms?		X	
Erosion of access roads?		X	
Discoloring of vegetation downslope?		X	
Any evidence of leakage or escape of waste from cells?		X	
Airborne ash or dust particles?		X	
Evidence of wildlife or birds present? Include number and type of birds on site.	X		One fox sighted on west side of landfill, animal droppings scattered around landfill. Three cranes in nearby tundra. Two Tundra voles on landfill cap.
Windblown litter in cells or along access roads or adjacent ponds?		X	
Landfill odors?		X	
Fire or combustion in the waste?		X	
Damage to the structural integrity of a dike wall, culvert, or erosion control feature, if present?		X	Culvert by gravel access road is clear.
Is revegetation occurring?	X		Grass growing well, areas of moss beginning to appear, but landfill surface still very cobbly with rocks.
Estimated Percent Vegetative Cover: On Cap Surface ___70_____ On Sideslopes: ___70___ Comments: Grasses growing well, but only moss is establishing itself on very rocky surfaces.			

General Comments: __ Landfill cover appears very stable and unchanged. Vegetation on landfill surface appears brownish/yellow/green with surrounding tundra very green, lush, and moist_____

Corrective Actions Taken: __None_____

_____

_____

(Use additional pages if necessary)

Visual Inspection Checklist (Post-Closure)
Site 9 Landfill

This form is to be filled out annually for 5 years after landfill closure.

Name of Inspector: _____Lisa Geist_____Date: ___August 7, 2013___

Weather conditions: ___Partly sunny, overcast skies_____ Precipitation ☐ Yes ☒ No

Temperature: _54_°**F** Prevailing Wind Direction: ____E_____ Speed: _10-15 mph__

Photographs Taken: ____Yes_____

Landfill Post-Closure Monitoring Items	**Y**	**N**	**COMMENTS**
Evidence of settlement or frost jacking within or on surface of landfill?		X	
Ponded water within, against, or on surface of landfill?	X		Tundra ponds close to toe of landfill on east and north sides
Evidence of surface erosion on disposal area walls or on exterior berms?		X	
Erosion of access roads?		X	
Discoloring of vegetation downslope?		X	
Any evidence of leakage or escape of waste from cells?		X	
Airborne ash or dust particles?		X	
Evidence of wildlife or birds present? Include number and type of birds on site.	X		2 cranes in nearby tundra.
Windblown litter in cells or along access roads or adjacent ponds?		X	
Landfill odors?		X	
Fire or combustion in the waste?		X	
Damage to the structural integrity of a dike wall, culvert, or erosion control feature, if present?		X	
Is revegetation occurring?	X		
Estimated Percent Vegetative Cover: On Cap Surface ___80_____ On Sideslopes: __70_____ Comments: Grasses growing well with moss establishing on more rocky areas.			

General Comments: _Landfill cover appears very stable and unchanged. Vegetation on landfill surface appears brown/yellow/green with surrounding tundra green, lush, and moist

_____

_____

Corrective Actions Taken: ___None_____

_____

_____

(Use additional pages if necessary)

Photo 1: Site 7 Landfill - Overview of landfill area, facing SW.

Photo 2: Site 7 Landfill - View of south side of landfill from Cargo Beach Road, facing SW.

Photo 3: Site 7 Landfill - View of west side of landfill area, facing south.

Photo 4: Site 7 Landfill – Southeast side of landfill from Cargo Beach Road, facing NW.

Photo 5: Site 7 Landfill – Surface of landfill, note both newer (green) and older (brown) grass tufts, facing east.

Photo 6: Site 7 Landfill – North slope of landfill, note tall grass tufts with seed, facing NW.

Photo 7: Site 9 Landfill – Overview of entire landfill area from site access road, facing south.

Photo 8: Site 9 Landfill – View of landfill facing west, MOC in background.

Photo 9: Site 9 Landfill – North end of landfill, facing NE.

Photo 10: Site 9 Landfill – Close-up view of landfill vegetation.

Photo 11: Site 9 Landfill – Pond along SE side of landfill, facing SW.

Photo 12: Site 9 Landfill – Diversion ditch that drain pond shown in Photo 11, operating sufficiently, facing NE.

Visual Inspection Checklist (Post-Closure)
Site 7 Landfill

furthest from MOC

This form is to be filled out annually for 5 years after landfill closure.

Name of Inspector: Jeremy Craner Date: 9-17-11

Weather conditions: foggy/cloudy Precipitation ☒ Yes ☐ No

Temperature: 45 °F Prevailing Wind Direction: north Speed: 10-20 mph

Photographs Taken: None today, taken previously on sunny day.

Landfill Post-Closure Monitoring Items	Y	N	COMMENTS
Evidence of settlement or frost jacking within or on surface of landfill?		X	Stable, level surface.
Ponded water within (against) or on surface of landfill?	X		Natural tundra ponds adjacent to landfill on S, W, N sides.
Evidence of surface erosion on disposal area walls or on exterior berms?		X	
Erosion of access roads?		X	
Discoloring of vegetation downslope?		X	
Any evidence of leakage or escape of waste from cells?		X	
Airborne ash or dust particles?		X	
Evidence of wildlife or birds present? Include number and type of birds on site.	X		Small white/black birds in covey of 15-20 eating bird seed.
Windblown litter in cells or along access roads or adjacent ponds?		X	No visible debris
Landfill odors?		X	
Fire or combustion in the waste?		X	
Damage to the structural integrity of a dike wall, culvert, or erosion control feature, if present?		X	N/A
Is revegetation occurring?	X		Grass is up to 3 ft tall and healty in areas

Estimated Percent Vegetative Cover: On Cap Surface 70% On Sideslopes: 60%

Comments: South + ~~East~~ WEST sideslopes less vegetated. Very rocky and wind likely blew off seed when initially applied last year.

General Comments: No visible erosion, Leakage, debris. Appears very structurally sound + stable. Grass not growing well in rocky areas, however, these areas VERY stable.

Corrective Actions Taken: ~~None.~~ Seed was spread by Bristol Environmental on 9-13-11 at bare areas. Hope to promote vegetation in these areas even though rocky.

(Use additional pages if necessary)

F10AK096903_07.11_0500_p
F10AK096905_07.11_0500_p

Visual Inspection Checklist (Post-Closure)
Site 9 Landfill
close to MOC

This form is to be filled out annually for 5 years after landfill closure.

Name of Inspector: Jeremy Craner Date: 9-17-11

Weather conditions: Cloudy/foggy Precipitation ☒ Yes ☐ No

Temperature: 45 °F Prevailing Wind Direction: NORTH Speed: 10-20 mph

Photographs Taken: No, taken previously on a nice clear sunny day.

Landfill Post-Closure Monitoring Items	Y	N	COMMENTS
Evidence of settlement or frost jacking within or on surface of landfill?		X	Very stable in appearance
Ponded water within, against, or on surface of landfill?	X		Natural tundra ponds to north + east. Ditch drains to NE.
Evidence of surface erosion on disposal area walls or on exterior berms?		X	
Erosion of access roads?		X	
Discoloring of vegetation downslope?		X	
Any evidence of leakage or escape of waste from cells?		X	
Airborne ash or dust particles?		X	
Evidence of wildlife or birds present? Include number and type of birds on site.		X	
Windblown litter in cells or along access roads or adjacent ponds?		X	No visible debris.
Landfill odors?		X	
Fire or combustion in the waste?		X	
Damage to the structural integrity of a dike wall, culvert, or erosion control feature, if present?		X	Manmade ditch in excellent condition + functioning properly.
Is revegetation occurring?	X		Grass is short, however, appears to be revegging.

Estimated Percent Vegetative Cover: On Cap Surface 70 % On Sideslopes: 70 %

Comments: Grass/vegetation not growing well in rocky areas.

General Comments: Landfill appears structurally sound + stable. No visible erosion. Grass is short but coverage is good. Overall in great shape. No evidence of leachate.

Corrective Actions Taken: ~~None~~ JC Spread seed on bare areas on 9-13-11, conducted by Bristol Environmental. Hope to promote veg. in rocky areas.

(Use additional pages if necessary)

Photo 1: Site 7 Landfill – North slope of landfill, facing east.

Photo 2: Site 7 Landfill – East slope of landfill, facing northeast.

Photographs taken on 20 August 2011

Photo 3: Site 7 Landfill – View from approximate center of landfill, facing northeast.

Photo 4: Site 7 Landfill – South slope of landfill, facing west.

Photographs taken on 20 August 2011

Photo 5: Site 7 Landfill – View of top of landfill from south end, facing north.

Photo 6: Site 7 Landfill – South slope of landfill, facing west.

Photographs taken on 20 August 2011

Photo 7: Site 7 Landfill - West slope of landfill, facing south.

Photo 8: Site 7 Landfill - View of top of landfill from northeast corner, facing southwest.

Photographs taken on 20 August 2011

Photo 9: Site 7 Landfill – View of top of landfill from east side (from road), facing west.

Photo 10: Site 7 Landfill – South slope of landfill, facing northwest with camp in background.

Photographs taken on 20 August 2011

Photo 11: Site 7 Landfill – Surface water pond on northwest side of landfill, facing northwest with camp in background.

Photo 12: Site 9 Landfill – Drainage ditch operating well and in good condition, facing northeast.

Photographs taken on 20 August 2011

Photo 13: Site 9 Landfill – East side of landfill, facing north.

Photo 14: Site 9 Landfill – North side of landfill, facing east.

Photographs taken on 20 August 2011

Photo 15: Site 9 Landfill – North side of landfill, facing northwest.

Photo 16: Site 9 Landfill – Southeast side of landfill, facing northwest.

Photographs taken on 20 August 2011

Photo 17: Site 9 Landfill –West side of landfill, facing southwest.

Photo 18: Site 9 Landfill – East side of landfill, facing southwest.

Photographs taken on 20 August 2011

Photo 19: Site 9 Landfill – View of landfill from east side, facing west.

Photographs taken on 20 August 2011

Visual Inspection Checklist (Post-Closure)
Site 7 Landfill

This form is to be filled out annually for 5 years after landfill closure.

Name of Inspector: ____Aaron Shewman_____Date: ___26 July 2012_____

Weather conditions: __Cloudy, Windy, Rainy_____ Precipitation X Yes ☐ No

Temperature: _50_°F Prevailing Wind Direction: __West__ Speed: _15-20 mph_____

Photographs Taken: __Yes_____

Landfill Post-Closure Monitoring Items	Y	N	COMMENTS
Evidence of settlement or frost jacking within or on surface of landfill?		X	Stable, level surface
Ponded water within, against, or on surface of landfill?	X		Yes, tundra ponds are against the N, W, and S sides of the landfill cap
Evidence of surface erosion on disposal area walls or on exterior berms?		X	
Erosion of access roads?		X	
Discoloring of vegetation downslope?		X	
Any evidence of leakage or escape of waste from cells?		X	
Airborne ash or dust particles?		X	
Evidence of wildlife or birds present? Include number and type of birds on site.		X	
Windblown litter in cells or along access roads or adjacent ponds?		X	
Landfill odors?		X	
Fire or combustion in the waste?		X	
Damage to the structural integrity of a dike wall, culvert, or erosion control feature, if present?		X	
Is revegetation occurring?	X		
Estimated Percent Vegetative Cover: On Cap Surface _70_____ On Sideslopes: ___60___ Comments: S and W sideslopes have less vegetation. These slopes are rocky and subject to high winds.			

General Comments: The landfill cap appears structurally sound and stable, Vegetation is not growing in rocky areas, but these areas remain stable due to the rocky nature of the slope(s).

Corrective Actions Taken: __None_____

(Use additional pages if necessary)

F10AK096903_07.11_0501_p
F10AK096905_07.11_0501_p
200-1f

Visual Inspection Checklist (Post-Closure)
Site 9 Landfill

This form is to be filled out annually for 5 years after landfill closure.

Name of Inspector: ____Aaron Shewman_____Date: ___26 July 2012_____

Weather conditions: __Cloudy, Windy, Rainy_____ Precipitation X Yes ☐ No

Temperature: _50_°F Prevailing Wind Direction: __West__ Speed: _15-20 mph_____

Photographs Taken: __Yes_____

Landfill Post-Closure Monitoring Items	Y	N	COMMENTS
Evidence of settlement or frost jacking within or on surface of landfill?		X	Stable, level surface
Ponded water within, against, or on surface of landfill?	X		Yes, tundra ponds are against the N and E sides of the landfill cap
Evidence of surface erosion on disposal area walls or on exterior berms?		X	
Erosion of access roads?		X	
Discoloring of vegetation downslope?		X	
Any evidence of leakage or escape of waste from cells?		X	
Airborne ash or dust particles?		X	
Evidence of wildlife or birds present? Include number and type of birds on site.		X	
Windblown litter in cells or along access roads or adjacent ponds?		X	None
Landfill odors?		X	
Fire or combustion in the waste?		X	
Damage to the structural integrity of a dike wall, culvert, or erosion control feature, if present?		X	Ditch from tundra pond in excellent condition and functioning very well
Is revegetation occurring?	X		
Estimated Percent Vegetative Cover: On Cap Surface _70_____ On Sideslopes: ___70____ Comments: Vegetation is sparse in rocky areas.			

General Comments: The cap appears structurally sound and stable. Vegetation is either sparse or not growing in very rocky areas, but these areas remain stable due to the rocky nature of the slope(s).

Corrective Actions Taken: __None_____

_____

_____

(Use additional pages if necessary)

Photo 1: Site 7 Landfill – Pond on west side of landfill, facing north.

Photo 2: Site 7 Landfill – View of landfill cap from north side, facing southwest.

Photo 3: Site 7 Landfill – Panorama view from south side of landfill, facing north, road on right.

Photo 4: Site 7 Landfill – View of landfill cap, facing east.

Photo 5: Site 7 Landfill – East side of landfill, facing northeast.

Photo 6: Site 7 Landfill – East side of landfill, facing south.

Photo 7: Site 7 Landfill – East side of landfill, facing southwest.

Photo 8: Site 7 Landfill – East side of landfill, facing west.

Photo 9: Site 9 Landfill – View of landfill cap surface, facing west with MOC in background.

Photo 10: Site 9 Landfill – Pond outlet ditch in good condition and operating efficiently, facing northeast.

Photo 11: Site 9 Landfill – Diversion ditch in good condition, facing northeast.

Photo 12: Site 9 Landfill – Northeast side of landfill and adjacent pond, facing northwest.

Photo 13: Site 9 Landfill – Diversion ditch outfall area into wetland, facing north.

Photo 14: Site 9 Landfill – East side of landfill and adjacent pond, facing southwest.

Photo 15: Site 9 Landfill – Drive point well on east corner of landfill (removed in 2012) facing southwest.

Photo 16: Site 9 Landfill – Drive point well (removed in 2012) and PVC monitoring well on east side of landfill, facing west.

Visual Inspection Checklist (Post-Closure)
Site 7 Landfill

This form is to be filled out annually for 5 years after landfill closure.

Name of Inspector: ___Lisa Geist_____ Date: ____August 7, 2013_____

Weather conditions: ___Partly sunny, overcast skies_____ Precipitation ☐ Yes ☒ No

Temperature: _54_°F Prevailing Wind Direction: ___E____ Speed: __10-15 mph__

Photographs Taken: ___Yes_____

Landfill Post-Closure Monitoring Items	Y	N	COMMENTS
Evidence of settlement or frost jacking within or on surface of landfill?		X	
Ponded water within, against, or on surface of landfill?	X		Tundra ponds close to toe of landfill on west and north sides.
Evidence of surface erosion on disposal area walls or on exterior berms?		X	
Erosion of access roads?		X	
Discoloring of vegetation downslope?		X	
Any evidence of leakage or escape of waste from cells?		X	
Airborne ash or dust particles?		X	
Evidence of wildlife or birds present? Include number and type of birds on site.	X		One fox sighted on west side of landfill, animal droppings scattered around landfill. Three cranes in nearby tundra. Two Tundra voles on landfill cap.
Windblown litter in cells or along access roads or adjacent ponds?		X	
Landfill odors?		X	
Fire or combustion in the waste?		X	
Damage to the structural integrity of a dike wall, culvert, or erosion control feature, if present?		X	Culvert by gravel access road is clear.
Is revegetation occurring?	X		Grass growing well, areas of moss beginning to appear, but landfill surface still very cobbly with rocks.
Estimated Percent Vegetative Cover: On Cap Surface ___70_____ On Sideslopes: ___70__ Comments: Grasses growing well, but only moss is establishing itself on very rocky surfaces.			

General Comments: __ Landfill cover appears very stable and unchanged. Vegetation on landfill surface appears brownish/yellow/green with surrounding tundra very green, lush, and moist_____

Corrective Actions Taken: __None_____

_____

_____

(Use additional pages if necessary)

Visual Inspection Checklist (Post-Closure)
Site 9 Landfill

This form is to be filled out annually for 5 years after landfill closure.

Name of Inspector: _____Lisa Geist_____Date: ___August 7, 2013___

Weather conditions: ___Partly sunny, overcast skies_____ Precipitation ☐ Yes ☒ No

Temperature: _54_°F Prevailing Wind Direction: ____E_____ Speed: _10-15 mph__

Photographs Taken: ____Yes_____

Landfill Post-Closure Monitoring Items	Y	N	COMMENTS
Evidence of settlement or frost jacking within or on surface of landfill?		X	
Ponded water within, against, or on surface of landfill?	X		Tundra ponds close to toe of landfill on east and north sides
Evidence of surface erosion on disposal area walls or on exterior berms?		X	
Erosion of access roads?		X	
Discoloring of vegetation downslope?		X	
Any evidence of leakage or escape of waste from cells?		X	
Airborne ash or dust particles?		X	
Evidence of wildlife or birds present? Include number and type of birds on site.	X		2 cranes in nearby tundra.
Windblown litter in cells or along access roads or adjacent ponds?		X	
Landfill odors?		X	
Fire or combustion in the waste?		X	
Damage to the structural integrity of a dike wall, culvert, or erosion control feature, if present?		X	
Is revegetation occurring?	X		
Estimated Percent Vegetative Cover: On Cap Surface ___80_____ On Sideslopes: __70_____ Comments: Grasses growing well with moss establishing on more rocky areas.			

General Comments: _Landfill cover appears very stable and unchanged. Vegetation on landfill surface appears brown/yellow/green with surrounding tundra green, lush, and moist

Corrective Actions Taken: ___None_____

(Use additional pages if necessary)

Photo 1: Site 7 Landfill - Overview of landfill area, facing SW.

Photo 2: Site 7 Landfill - View of south side of landfill from Cargo Beach Road, facing SW.

Photo 3: Site 7 Landfill - View of west side of landfill area, facing south.

Photo 4: Site 7 Landfill – Southeast side of landfill from Cargo Beach Road, facing NW.

Photo 5: Site 7 Landfill – Surface of landfill, note both newer (green) and older (brown) grass tufts, facing east.

Photo 6: Site 7 Landfill – North slope of landfill, note tall grass tufts with seed, facing NW.

Photo 7: Site 9 Landfill – Overview of entire landfill area from site access road, facing south.

Photo 8: Site 9 Landfill – View of landfill facing west, MOC in background.

Photo 9: Site 9 Landfill – North end of landfill, facing NE.

Photo 10: Site 9 Landfill – Close-up view of landfill vegetation.

Photo 11: Site 9 Landfill – Pond along SE side of landfill, facing SW.

Photo 12: Site 9 Landfill – Diversion ditch that drain pond shown in Photo 11, operating sufficiently, facing NE.

U.S. Army Corps of Engineers
Alaska District

2013 SAMPLING CONDUCTED IN CONJUNCTION WITH THE 2013 FIVE-YEAR REVIEW AT NORTHEAST CAPE

NORTHEAST CAPE
ST. LAWRENCE ISLAND, ALASKA

FUDS No. F10AK0969-05

Final
February 2014

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ACRONYMS AND ABBREVIATIONS

ADEC	Alaska Department of Environmental Conservation
BERS	Bristol Environmental Remediation Services, LLC.
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
COC	contaminant of concern
DRO	diesel-range organics
EPA	U.S. Environmental Protection Agency
FUDS	Formerly Used Defense Site
GRO	gasoline-range organics
HTRW	hazardous, toxic, or radioactive waste
Jacobs	Jacobs Engineering Group
KMS	Kangukhsam Mountain Spring
mL	milliliter
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyls
QAPP	Quality Assurance Project Plan
QC	quality control
RCRA	Resource Conservation and Recovery Act
RRO	residual-range organics
USACE	U.S. Army Corps of Engineers
µm	micron

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EXECUTIVE SUMMARY

This Report describes sample collection activities conducted at three Northeast Cape sites on St. Lawrence Island, Alaska, which were performed in order to facilitate the first five-year review. Although the five-year review site inspections coincided with the September sample collection, those activities will be described in a separate report.

Sampling activities occurred on 11 and 12 September 2013 at approved locations, as identified in the *Supplement to the Northeast Cape HTRW Remedial Actions Quality Assurance Project Plan* (U. S. Army Corps of Engineers [USACE] 2013b). A summary of the collection activities are listed below:

- At Cargo Beach Road Landfill (Site 7), surface water was collected from three locations and submitted to an offsite analytical laboratory for analysis. Groundwater grab sampling was attempted at four locations downgradient of the landfill. Drive point refusal was encountered at depths ranging from 6 to 30 inches below ground surface, due to large rocks. Groundwater was not encountered during the attempts and sampling was discontinued following consultation with USACE.
- At Housing and Operations Landfill (Site 9), surface water was collected from three locations and submitted to an offsite analytical laboratory for analysis. A single groundwater grab sample was collected from Site 9. Limited water production of 2.5 milliliters (mL) per minute from the drive point screened interval was less than the work plan-specified rate of 250 mL per minute. Sufficient volume was obtained for gasoline-range organics (GRO); benzene, toluene, ethylbenzene, and xylenes (BTEX); and dissolved (field filtered) Resource Conservation and Recovery Act (RCRA) metals with zinc analysis. Groundwater collection was halted following consultation with USACE.
- At Kangukhsam Mountain Spring, surface water was collected from one location and submitted to an offsite analytical laboratory for analysis.

All sample results were compared to the project cleanup level and no exceedances were identified.

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1.0 INTRODUCTION

The Northeast Cape site is located on St. Lawrence Island, Alaska approximately 135 air miles southwest of Nome (Figure A-1). The Village of Savoonga is the closest community, and is located 60 miles northwest of the site (Figure A-2). The Northeast Cape site was constructed as an Aircraft Control and Warning Station during 1950 and 1951, and provided radar coverage and surveillance as part of the Alaska Early Warning System until 1972. The site encompasses approximately 4,800 acres (7.5 square miles) and is bounded by Kitnagak Bay to the northeast, Kangighsak Point to the northwest, and the Kinipaghulghat Mountains to the south. The Northeast Cape site, classified as a Formerly Used Defense Site (FUDS), is comprised of 34 individual sites. These individual sites have previously been subject to several phased remedial investigations and/or removal actions.

Site-specific sampling was requested by community members at the two landfill sites and the seasonal drinking water source, Kangukhsam Mountain Spring (Figure A-3). Sampling activities coincided with five-year review site inspections.

1.1 OBJECTIVES

The purpose of this sampling effort is to determine if site-specific contaminants of concern (COC) are present in groundwater and/or surface water at the Cargo Beach Road Landfill (Site 7), the Housing and Operations Landfill (Site 9), or Kangukhsam Mountain Spring.

1.2 SCOPE OF WORK

The definable features of work include the following:

- Collection of one surface water sample from Kangukhsam Mountain Spring
- Collection of one surface water sample from three locations within Cargo Beach Road Landfill (Site 7)
- Attempt collection of one groundwater grab sample from Cargo Beach Road Landfill (Site 7)
- Collection of one surface water sample from three locations within Housing and Operations Landfill (Site 9)

- Collection of one groundwater grab sample from Housing and Operations Landfill (Site 9)
- Management of investigation-derived waste

1.3 FIELD CHANGE FORMS

Work described in this report was conducted in accordance with the *Supplement to the Northeast Cape HTRW Remedial Actions Quality Assurance Project Plan* (USACE 2013b). Deviations from the Work Plan and/or approved field changes were not generated from this sampling effort.

2.0 FIELD INVESTIGATION ACTIVITIES

Surface water and/or groundwater samples were collected from three Northeast Cape sites between 11 September 2013 and 12 September 2013. Jacobs personnel travelled from Anchorage to Nome via commercial airline, and from Nome to the Northeast Cape site via charter aircraft. While onsite, personnel were housed within a temporary camp maintained by Bristol Environmental Remediation Services, LLC (BERS). Throughout the duration of the sampling activities, BERS was onsite completing work described in the *Northeast Cape HTRW Remedial Actions Work Plan, Revision 1* (USACE 2013a). Ambient temperatures ranged from 35 to 40 degrees Fahrenheit (°F) during the sampling effort.

2.1 SAMPLING AND ANALYTICAL APPROACH

Individual sites within the Northeast Cape site were accessed via existing site roads. Sampling locations were identified using existing landmarks and verified with the onsite USACE Quality Assurance Representative prior to sampling.

Sampling at the Northeast Cape site included the collection of both unfiltered and filtered water samples. Unfiltered water samples were used for analysis of gasoline-range organics (GRO) by Alaska Method 101 (AK101), diesel-range organics (DRO) by AK102, residual-range organics (RRO) by AK103, benzene, toluene, ethylbenzene, and xylenes (BTEX) by U.S. Environmental Protection Agency (EPA) Method SW8260C, polycyclic aromatic hydrocarbons (PAH) by EPA Method SW8270-SIM, polychlorinated biphenyls (PCB) by EPA Method SW8082, eight Resources Conservation and Recovery Act (RCRA) metals, and zinc by EPA Method SW6020A/SW7471. Filtered water samples were collected for analysis of dissolved metals, which was performed using a disposable 0.45-micron (µm) in-line water filter attached to a peristaltic pump. Filtered water was transferred to sample containers provided by the laboratory and used for analysis of eight RCRA metals and zinc by EPA Method SW6020A/SW7471. In addition, filtered and unfiltered water samples collected from Cargo Beach Road Landfill (Site 7) were also analyzed for nickel using EPA Method SW6020A.

A pin flag or lathe was placed at the sampling location to allow for later identification during surveying. Observations, sampling information, and field parameter readings were recorded in the field logbook and/or field sampling forms provided in Appendix C. Photographs relevant to this sampling effort are included in the photograph log (Appendix D). The logbook (Appendix C) was shared between two field teams during this field effort and includes additional photographs and field activities not related to site-specific sampling efforts.

2.2 SURFACE WATER SAMPLING

Surface water samples were collected from Cargo Beach Road Landfill (Site 7), Housing and Operations Landfill (Site 9), and Kangukhsam Mountain Spring. Samples were collected near the shoreline, slightly below the surface of the water. A disposable Teflon® dipper was used to retrieve the surface water at each location in accordance with the procedures detailed in the *Supplement to the Northeast Cape HTRW Remedial Actions Quality Assurance Project Plan* (USACE 2013b). Sampling locations are shown in Figures A-4, A-5, and A-6.

2.3 GROUNDWATER GRAB SAMPLING

Groundwater grab sampling was attempted downgradient of Cargo Beach Road Landfill (Site 7) and Housing and Operations Landfill (Site 9). A 30-inch screened drive point was attached to a 36-inch drive rod (totaling 66 inches in length) and advanced into the subsurface using hand tools until groundwater was encountered or refusal was met.

At Cargo Beach Road Landfill (Site 7), large rocks were visible at the surface near the proposed groundwater grab sample location north of the landfill cap. The first attempt to advance the drive point resulted in a ground penetration of 6 inches before refusal was met. The onsite USACE Quality Assurance Representative was consulted along with the USACE Project Manager and a decision was made to step out from the planned groundwater grab sampling location. The drive point was advanced at three additional locations and met with refusal each time. The greatest depth reached during these attempts was 30 inches below ground surface (bgs) and recoverable water was not observed; therefore, groundwater grab

sampling was halted. Figure A-4 displays the attempted groundwater grab sample locations at Cargo Beach Road Landfill (Site 7).

At Housing and Operations Landfill (Site 9), the terrain near the groundwater grab sample location appeared to be tundra with little exposed rock. The drive point was advanced and achieved a ground penetration of 48 inches before resistance – possibly due to permafrost – was noticed. Water was found in the drive point and eventually stabilized at 33 inches bgs as measured by a water level probe.

An unused ¼-inch inside diameter polyethylene tube was inserted through the drive rod (until it was below the water surface) and attached to a peristaltic pump. The pump was set to the lowest speed and water was removed from the drive point into a graduated beaker to determine the flow. The flow rate was found to be 2.5 mL per minute, which is far below the minimum acceptable flow rate of 250 mL per minute, as established in the work plan. Although groundwater production from the well point was low, sufficient volume was collected over a two-hour period for field parameter measurements and to fill sample containers for BTEX, GRO, and dissolved (field filtered) RCRA metals with zinc analysis. The onsite USACE Quality Assurance Representative was consulted along with the USACE Project Manager regarding the limited water production, and groundwater sampling was discontinued. Figure A-5 displays the Housing and Operations Landfill (Site 9) groundwater grab sample location.

2.4 LAND SURVEYING

An optical survey was performed in order to record the sampling and attempted sampling locations. Surveying was conducted by Eco-Land, LLC, a professional land surveyor, subcontracted by BERS. Horizontal data are presented in feet, using the Alaska State Plane Zone 9 projection and the North American Datum of 1983. Survey data tables relevant to sampling locations, and compliant with the *Manual for Electronic Deliverables* (USACE 2011), will be included with the Remedial Actions Report prepared by BERS. An abbreviated survey data table is included in Appendix F.

2.5 WASTE MANAGEMENT

Waste was transported and disposed of in accordance with all applicable local, state, and federal regulations. Investigation-derived waste included used personal protective equipment, disposable filters and bailers, calibration and decontamination water, and general refuse. Solid waste was stored in a contractor bag, co-mingled with BERS waste onsite, and disposed of by BERS in accordance with the *Northeast Cape HTRW Remedial Actions Work Plan, Revision 1* (USACE 2013a). Liquid waste was stored in a 5-gallon bucket and transported to Anchorage, Alaska by Jacobs personnel, then transferred to Emerald Waste Services in Palmer, Alaska for disposal. Liquid waste quantities are summarized in Table 2-1; the liquid waste manifest and certificate of disposal are included in Appendix E.

Table 2-1
Liquid Waste Quantities

Waste Type	Number of Containers	Disposal Quantity
Non-hazardous Wastewater	1	5-gallon bucket

3.0 INVESTIGATION RESULTS

This section summarizes the field and analytical results for the 2013 sampling activities, which were conducted at the Northeast Cape site by Jacobs. The sample summary table, complete analytical results, and assessment of data quality are included in Appendix B.

3.1 SURFACE WATER SAMPLING RESULTS

Prior to sampling, field parameters were recorded directly from the water source using a YSI water quality meter and a Micro turbidimeter. Surface water parameters measured prior to sampling are provided in Table 3-1.

Table 3-1
Surface Water Parameters Prior to Sampling

Site ID	Sampling Location	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (NTU)
KMS	KMS-WS01	4.26	32	17.713	6.31	186.2	0.56
Site 7	7LF-WS01	11.42	42	10.767	6.06	179.9	166.2
Site 7	7LF-WS02	12.77	45	10.251	6.1	160.0	33.44
Site 7	7LF-WS03	11.59	35	11.99	6.64	127.3	2.67
Site 9	9LF-WS01 9LF-WS02[1]	6.09	36	11.19	5.4	203.8	19.27
Site 9	9LF-WS03	6.07	38	20.022	6.02	172.2	0.54
Site 9	9LF-WS04	7.96	66	10.286	6.34	150.9	210.2

Notes:
[1]Sampling locations 9LF-WS01 and 9LF-WS02 are a duplicate pair
°C = Degrees Celsius
DO = dissolved oxygen
KMS = Kangukhsam Mountain Spring
µS/cm = microSiemens per centimeter
mg/L = milligrams per liter
mV = millivolts
NTU = nephelometric turbidity units
ORP = oxidation reduction potential

Turbidity readings for sampling locations 7LF-WS01 and 9LF-WS04 were found to be much greater than other nearby sampling locations. Sampling locations 7LF-WS01 and 9LF-WS04 are located immediately adjacent to the landfill caps for each site and were noted as being turbid with no apparent odor or sheen. Field observations by Jacobs personnel did not identify

any recent disturbances or possible landfill cap erosion that could have contributed to the high turbidity readings.

Seven primary surface water samples and one duplicate sample were collected and sent to ALS Environmental, Inc. (ALS) for analysis. Analytical results were compared to project cleanup levels obtained from Table 15-3 of the *Northeast Cape HTRW Remedial Actions Work Plan, Revision 1* (USACE 2013a), using the cleanup levels from the "Cleanup levels from 2009 Decision Document" column (USACE 2009). Surface water analytical results are presented in the following subsections.

Cargo Beach Road Landfill (Site 7)

Three primary surface water samples were collected for analysis of GRO, DRO, RRO, BTEX, PAHs, PCBs, eight RCRA metals, nickel, and zinc. Sampling locations are shown in Figure A-4.

Analytes did not exceed project cleanup levels in surface water samples collected from this site. The complete analytical results table is provided in Appendix B.

Housing and Operations Landfill (Site 9)

Three primary surface water samples and one duplicate sample were collected for analysis of GRO, DRO, RRO, BTEX, PAHs, PCBs, eight RCRA metals and zinc. Sampling locations are shown in Figure A-5.

Analytes did not exceed project cleanup levels in surface water samples collected from this site. The complete analytical results table is provided in Appendix B.

Kangukhsam Mountain Spring

One surface water sample was collected and analyzed for GRO, DRO, RRO, BTEX, PAHs, PCBs, eight RCRA metals, and zinc. This sampling location is shown in Figure A-6.

Analytes did not exceed project cleanup levels in surface water samples collected from this site. The complete analytical results table is provided in Appendix B.

3.2 GROUNDWATER GRAB SAMPLING RESULTS

Groundwater grab sampling was attempted at locations downgradient from Cargo Beach Road Landfill (Site 7) and Housing and Operations Landfill (Site 9). Due to the limitations described in Section 2.3, only one primary groundwater grab sample was collected from Housing and Operations Landfill (Site 9); it was sent to ALS for analysis. Analytical results were compared to the project cleanup levels obtained from Table 15-3 of the *Northeast Cape HTRW Remedial Actions Work Plan, Revision 1* (USACE 2013a), using the cleanup levels from the "Cleanup levels from 2009 Decision Document" column (USACE 2009).

Prior to sampling, field parameters including: temperature, pH, dissolved oxygen, conductivity, oxidation-reduction potential, and turbidity, were recorded using a YSI water quality meter and a Micro turbidimeter. Groundwater parameters measured at the time of sampling are provided in Table 3-2.

Table 3-2
Groundwater Parameters Prior to Sampling

Site ID	Sampling Location	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (NTU)
Site 9	9LF-WG01-2	6.22	132	0.73	5.44	177	9999[1]

Notes:
[1] A reading of "9999" indicates an over range error code.
°C = Degrees Celsius
DO = dissolved oxygen
µS/cm = microSiemens per centimeter
mg/L = milligrams per liter
mV = millivolts
NTU = nephelometric turbidity units
ORP = oxidation reduction potential

Cargo Beach Road Landfill (Site 7)

Groundwater grab samples were not collected from Cargo Beach Road Landfill (Site 7).

Housing and Operations Landfill (Site 9)

One primary groundwater grab sample was collected from this site. Sediment and organics in the groundwater continually blocked the flow of groundwater through the screen, resulting in a groundwater production rate of approximately 2.5 milliliters per minute (mL/min). The

groundwater production rate resulted in a limited quantity of groundwater available for analysis. A sufficient volume of groundwater was collected for the analysis of GRO by AK101, BTEX by SW8260C, and dissolved (field filtered) RCRA metals with zinc by SW6020A/SW7471.

Although the analysis of DRO by AK102, RRO by AK103, PAHs by SW8270-SIM, and PCBs by SW8082 were planned, insufficient water production from the well point and the volume of water required to fill the sample containers (six liters) made collection impractical. An unfiltered sample volume for RCRA metals with zinc by SW6020A/SW7471 analysis was not collected due to high turbidity.

GRO, BTEX, and dissolved metals (RCRA metals with zinc) did not exceed project cleanup levels in groundwater obtained from Site 9. The complete analytical results table is provided in Appendix B.

3.3 DATA EVALUATION

Data quality was assessed through the review of the laboratory case narrative, laboratory data deliverables, and completion of ADEC checklists. A review of the analytical results and associated QC samples was performed by the Jacobs Project Chemist, as per the *Work Plan* (USAF 2013b).

Data quality was evaluated against the following requirements: U.S. Department of Defense *Quality Systems Manual for Environmental Laboratories*, version 4.2 (U.S. Department of Defense 2010); ADEC and EPA analytical methods (ADEC 2008; EPA 2007); and laboratory limits. Qualifiers were applied to sample results that did not meet the project data quality objectives. Qualified results are considered estimated and, whenever possible, indicated as biased high or low.

The data assessment found the overall quality of the project data to be acceptable and no results were rejected. The complete dataset, in addition to details of the data validation, is provided in the Data Quality Assessment (Appendix B).

4.0 CONCLUSIONS

Surface water and groundwater results collected during the 2013 sampling effort did not detect analytes greater than the project cleanup levels.

4.1 CARGO BEACH ROAD LANDFILL (SITE 7)

This site has been subject to several remedial efforts, including: investigation of metallic anomalies, removal of approximately 50 drums and 50 cubic yards of severely stained soils, placement of a minimum 2-foot thick, gravel landfill cap in 2009, and revegetation.

Previously identified COCs in surface water include DRO, which was detected in one surface water sample at a concentration of 8.9 mg/L in 1994 (USACE 2007). Groundwater grab samples collected in 2001, approximately 200 feet downgradient of the surface water exceedance, did not contain DRO greater than cleanup levels. Alternatively, lead and RRO were detected at concentrations exceeding cleanup levels (USACE 2007).

The 1994 surface water sampling location was not available for resampling in 2013 because the area had previously been covered by the landfill cap in 2009. As an alternative, site surface water was collected from three ponds located near the base of the landfill cap. The locations were selected as a representative subset of site surface water. Surface water sampling locations are shown in Figure A-4. Surface water samples were analyzed for DRO, RRO, GRO, BTEX, PAHs, PCBs, RCRA metals, nickel, and zinc. Analytical results did not exceed project cleanup levels in surface water samples from this site.

The 2013 groundwater grab sampling was attempted near the 2001 groundwater grab sampling locations; however, as described previously in Section 2.3, groundwater grab samples could not be collected because refusal was met at 30 inches bgs and groundwater was not present. Historically, sampling groundwater at this site has been quite difficult. Previous efforts to install temporary well points were successful at location WP 7-1 in 2001, yet required approximately three days before sampling could take place due to a low groundwater production rate. In some cases, the sampling points purged dry after 48 hours, without producing the required sampling volume (USACE 2007). Two groundwater grab samples

(WP7-2 and WP7-3) collected in 2001 were obtained by digging 'pits' to 36 to 40 inches bgs and allowing them to fill with water prior to sampling.

Significant effort will be required to install and maintain permanent monitoring wells at Cargo Beach Road Landfill (Site 7). The use of a tracked drill rig in addition to air rotary or sonic drilling methods would likely be needed for the successful installation of a monitoring well at this location. Walking the needed the drill rig to boring locations would subject the fragile tundra and surface vegetation to disturbance. Additionally, any monitoring wells would likely be subject to frost jacking due the extreme variability of seasonal conditions.

4.2 HOUSING AND OPERATIONS LANDFILL (SITE 9)

This site has been subject to several remedial actions, including placement of a minimum 2-foot thick, gravel landfill cap in 2010, removal of debris from nearby streams, construction of a diversion trench, and revegetation.

Sampling of groundwater in 2001 identified lead, RRO, beryllium, and antimony above cleanup levels at locations downgradient, to the north, east, and west of the landfill (USACE 2007). Figure A-5 shows historical sampling locations from 2001 that exceed cleanup levels. Groundwater sampling in 2013 was located at a downgradient location east of the landfill cap, and did not detect GRO, BTEX, filtered RCRA metals, or zinc above project cleanup levels. Future sampling efforts at this site may benefit from sampling near the 2001 locations that produced sufficient quantities of groundwater and contained contaminants at levels greater than cleanup levels.

Historical analysis of surface water samples did not detect contaminants greater than cleanup levels (USACE 2009). In 2013, surface water samples were collected from a pond located immediately north of the landfill cap and at the northern and southern extents of the constructed diversion trench, located downgradient and immediately adjacent to the landfill cap. Sampling locations are shown in Figure A-5. Analytical results indicate that contaminants did not exceed project cleanup levels.

4.3 KANGUKHSAM MOUNTAIN SPRING

This site was added as a sampling location at the Northeast Cape site after a request from a local community member. The spring is located to the south of the Northeast Cape site, near the Lower Tramway (Site 32), and is used as a seasonal drinking water source. Surface water samples were collected from an area likely to be used for drinking water, upgradient from many of the Northeast Cape sites. Analysis of these samples did not detect contaminants exceeding project cleanup levels.

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5.0 REFERENCES

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U.S. Department of Defense. 2010.

U.S. Environmental Protection Agency (EPA). 2007.

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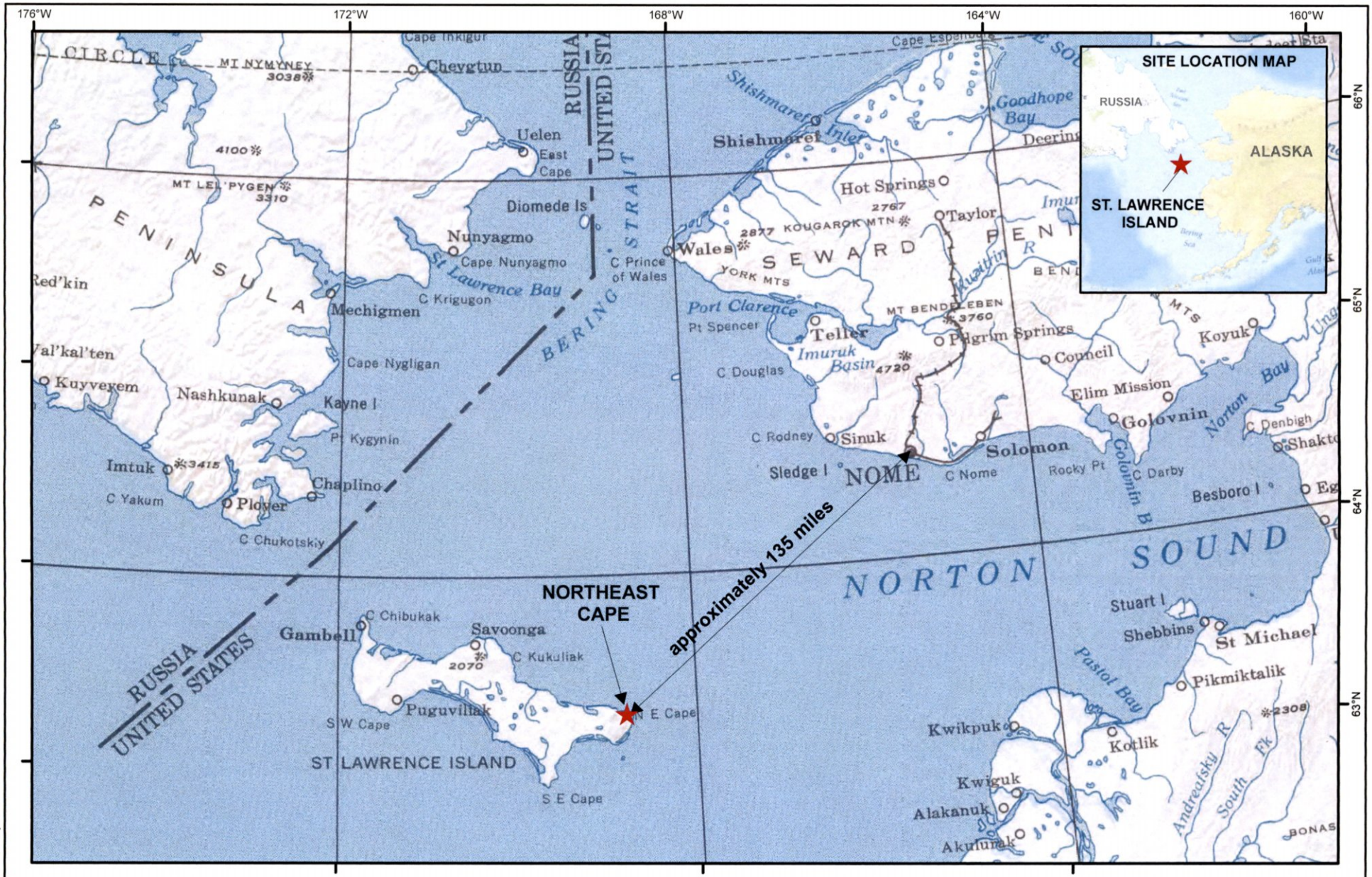
APPENDIX A

Figures



★ Northeast Cape (Site Location)

N

All Locations Are Approximate

0 20 40 60 80

Miles

WGS 1984 UTM Zone 2N

NORTHEAST CAPE REMEDIAL ACTIONS VICINITY MAP

ST. LAWRENCE ISLAND, ALASKA

JACOBS	DATE:	PROJECT MANAGER:	FIGURE NO:
	12 NOV 2013	K. MAHER	A-1

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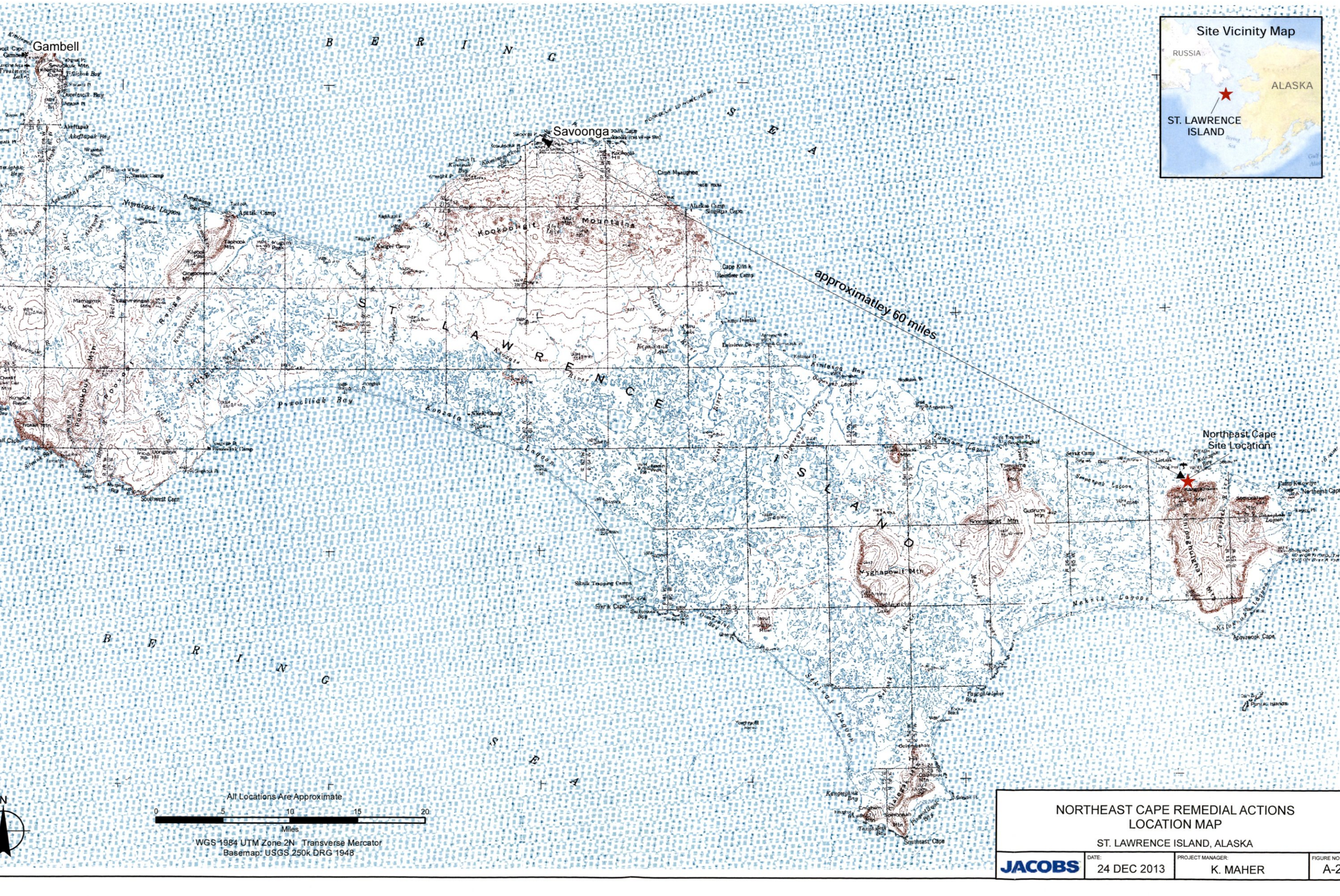

NORTHEAST CAPE REMEDIAL ACTIONS LOCATION MAP

ST. LAWRENCE ISLAND, ALASKA

JACOBS	DATE: 24 DEC 2013	PROJECT MANAGER: K. MAHER	FIGURE NO: A-2

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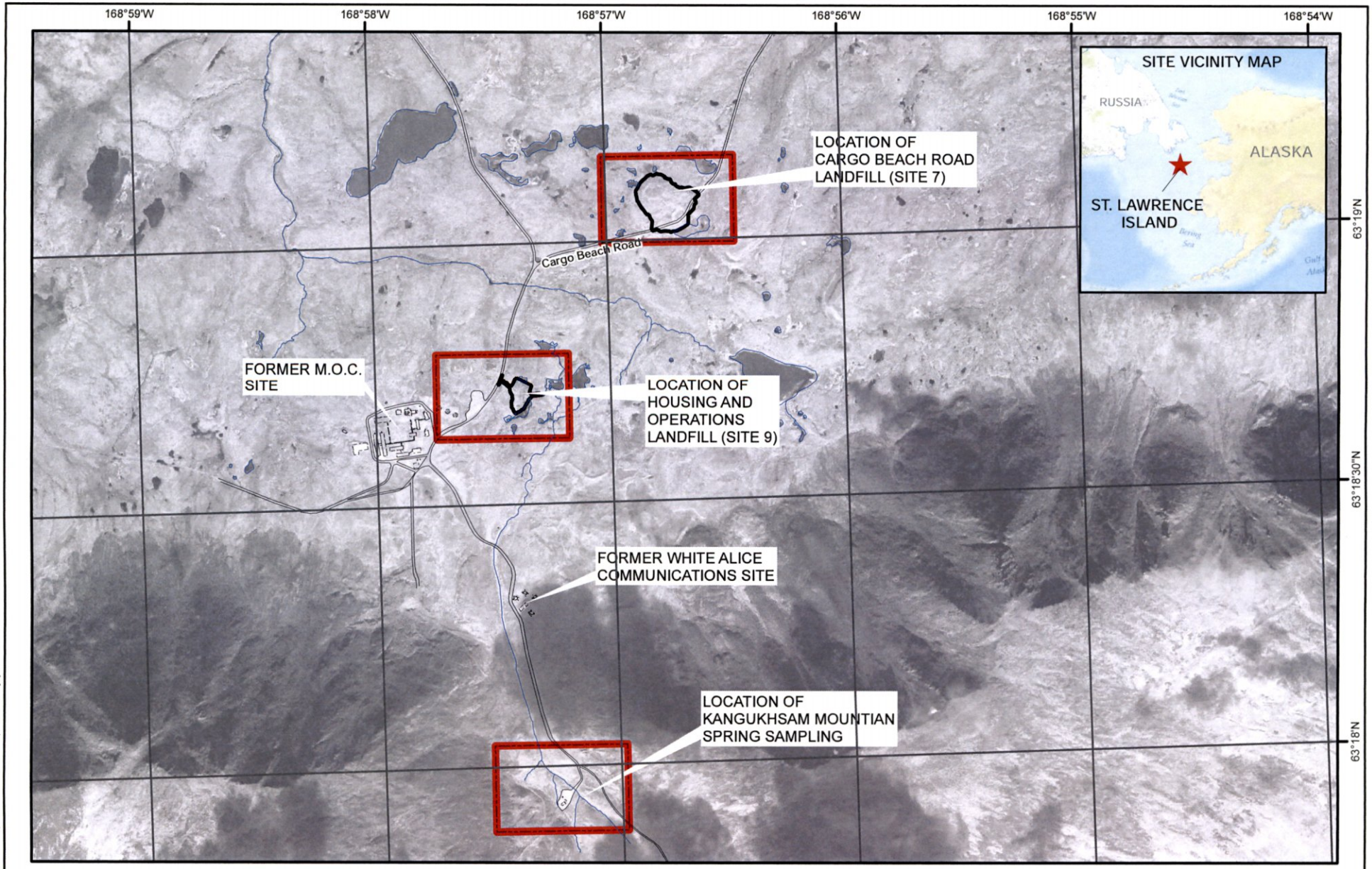

Site Vicinity
Landfill Cap Boundary
Hydrologic Feature
Road
Former Structure

N

All Locations Are Approximate

0 500 1,000 1,500 2,000
Feet

WGS 1984 UTM Zone 2N

NORTHEAST CAPE REMEDIAL ACTIONS VICINITY MAP

ST. LAWRENCE ISLAND, ALASKA

JACOBS	DATE:	PROJECT MANAGER:	FIGURE NO:
	31 DEC 2013	K. MAHER	A-3

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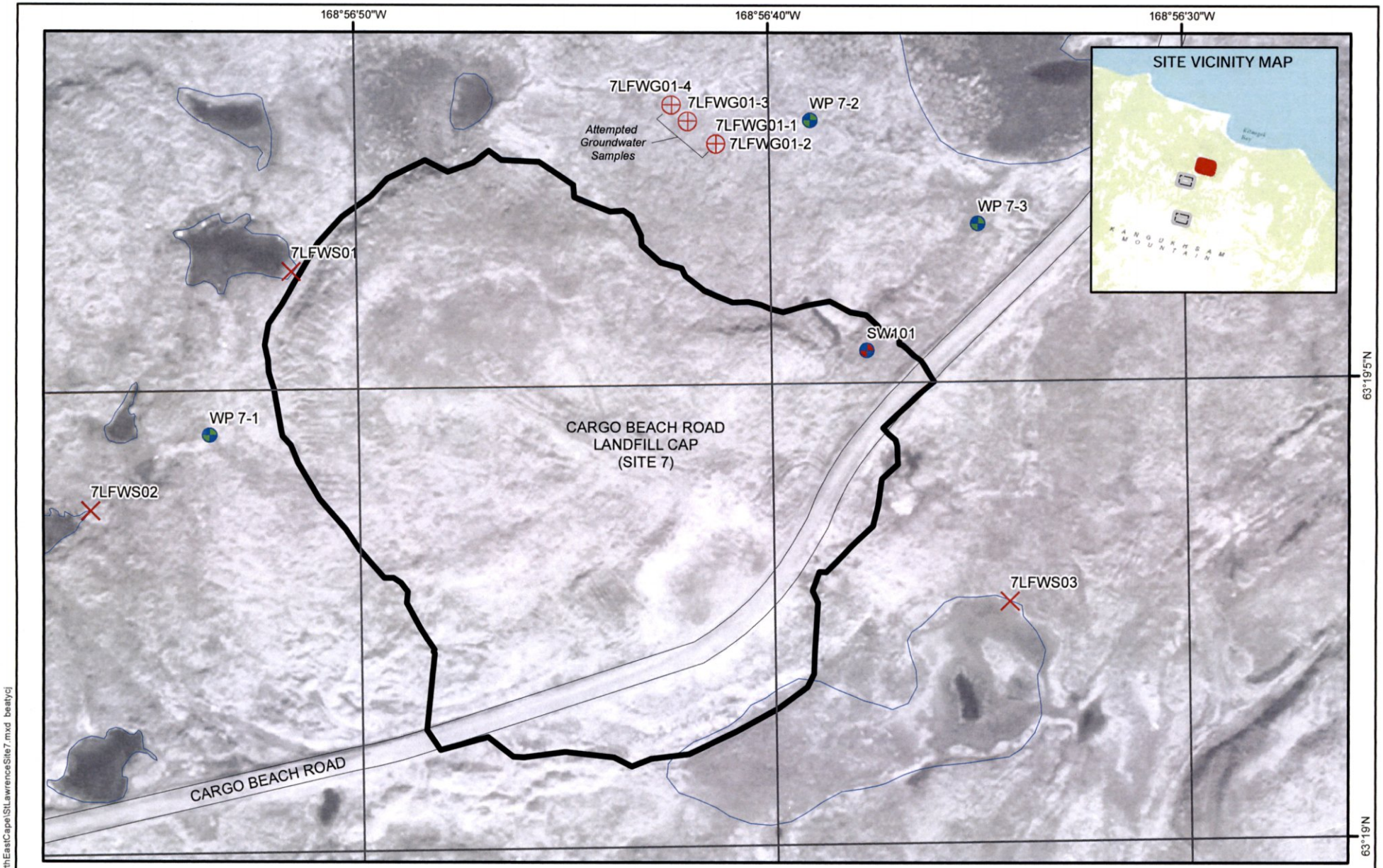

1994 Historic Monitoring Well (Approx. Location)

2001 Historic Monitoring Well (Approx. Location)

Attempted Groundwater Sample

Surface Water Sample

Area 7 Landfill Cap Boundary

N

All Locations Are Approximate

0 50 100 150 200

Feet

NAD 1983 StatePlane Alaska 9 FIPS 5009 Feet

NORTHEAST CAPE REMEDIAL ACTIONS
SITE 7 - CARGO BEACH LANDFILL

ST. LAWRENCE ISLAND, ALASKA

JACOBS	DATE: 31 DEC 2013	PROJECT MANAGER: K. MAHER	FIGURE NO: A-4

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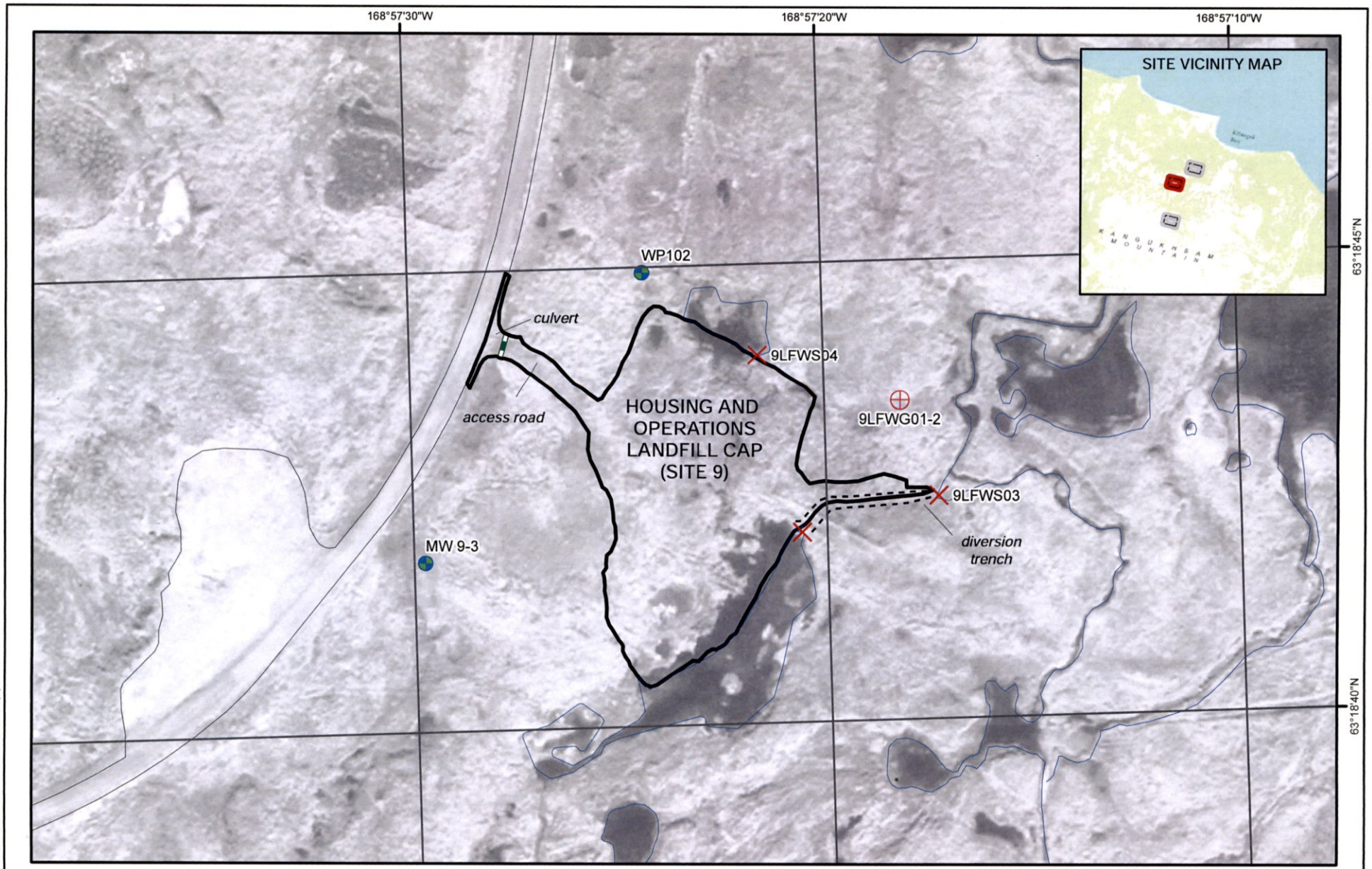

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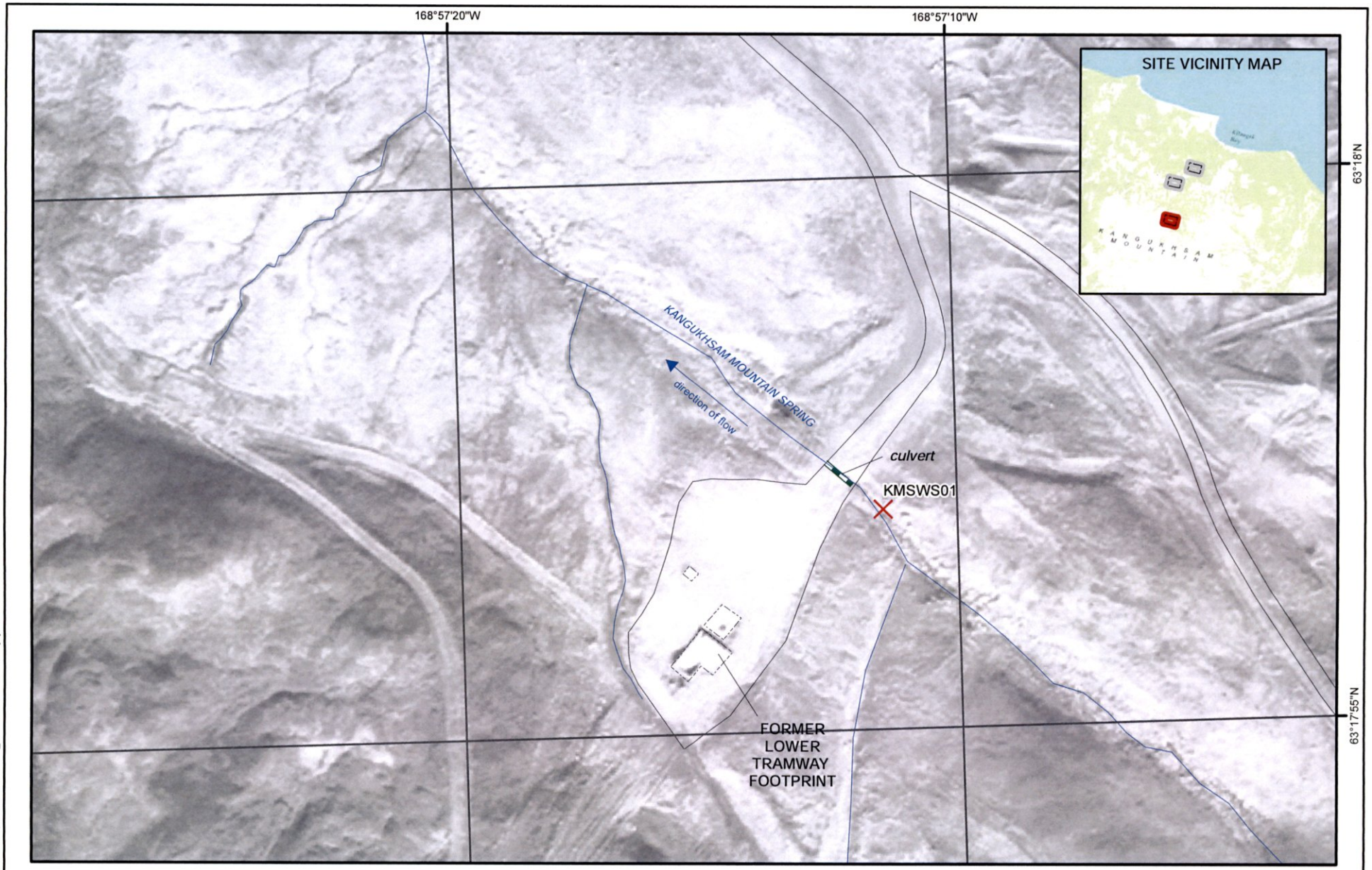
NORTHEAST CAPE REMEDIAL ACTIONS
SITE 9 - HOUSING AND OPERATIONS LANDFILL

ST. LAWRENCE ISLAND, ALASKA

JACOBS	DATE:	PROJECT MANAGER:	FIGURE NO:
	31 DEC 2013	K. MAHER	A-5



Surface Water Sample
Culvert
Hydrologic Feature
Road
Former Structure

N

All Locations Are Approximate

0 50 100 150 200
Feet

WGS 1984 UTM Zone 2N

NORTHEAST CAPE REMEDIAL ACTIONS
KANGUKHSAM MOUNTAIN SPRING
SAMPLE LOCATIONS

ST. LAWRENCE ISLAND, ALASKA

JACOBS	DATE:	PROJECT MANAGER:	FIGURE NO:
	31 DEC 2013	K. MAHER	A-6

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APPENDIX B

Data Quality Assessment, ADEC Checklists, and Supporting Documentation

1.0 INTRODUCTION

A Data Quality Assessment and ADEC laboratory data review checklists were completed to assess the overall quality and usability of data from the 2013 NE Cape surface water and groundwater activities. The Jacobs Project Chemist performed a data quality review using the 2013 Supplement to the Northeast Cape HTRW Remedial Actions Work Plan (QAPP 2013).

This DQA, which appears as an appendix to the 2013 Sampling Report, contains analytical data tables, sample summary tables, and Alaska Department of Environmental Conservation (ADEC) Laboratory Data Review Checklists, organized into the following attachments:

- **Attachment B-1** contains the sample summary and analytical data tables.
- **Attachment B-2** presents tables of sample results that did not meet the project data quality objectives (DQO).
- **Attachment B-3** includes the ADEC Laboratory Data Review Checklists for each sample delivery group.
- **Attachment B-4** provides laboratory data in electronic format.

Seven primary water samples and one duplicate sample were submitted for gasoline-range organics (GRO); diesel-range organics (DRO); residual-range organics (RRO); polychlorinated biphenyls (PCBs); benzene, toluene, ethylbenzene, and xylene (BTEX); polycyclic aromatic hydrocarbons (PAH); dissolved metals; and total metals analysis. One primary sample was submitted for GRO, BTEX, and dissolved metals; there was insufficient sample volume for further analysis. One trip blank was submitted for GRO and BTEX. ALS Laboratories of Kelso, Washington, provided primary analytical support for these water samples.

2.0 DATA QUALITY SUMMARY

This evaluation consisted of a review of chain-of-custody (CoC) and sample receipt records; laboratory case narratives; and laboratory data, which includes analytical methodology, sample holding times, laboratory blanks, detection limit (DL), limit of detection (LOD), limit of quantitation (LOQ), surrogate recoveries, laboratory control sample (LCS) recoveries, matrix spike (MS) recoveries, and precision. Analytical data quality objectives (DQOs) were considered met when the quality of the sample data met precision, accuracy, representativeness,

completeness, comparability, and sensitivity requirements, as specified in the project Work Plan (QAPP 2013). Results were categorized as acceptable, estimated, or rejected (flagged R). Data was qualified according to the definitions at the bottom of the analytical data table (Attachment B-1). A completeness check of the laboratory data was performed to verify that the data packages and electronic files included all information requested.

The overall quality of the data was acceptable, as qualified with the anomalies below and described in the ADEC laboratory data review checklist.

- AK103 method blank (QC batch KWG1310602) had RRO concentrations above the detection limit. Associated samples that have a concentration within a factor of 10 of the method blank contamination are qualified B and are presented in Table B-2-1 (Attachment B-2). There is no impact on the data since results are biased high and less than the Project Action Limit of 1.1 mg/L.
- AK102/AK103 method blank (QC batch KWG1311318) extract was lost during the initial extraction. Samples were re-extracted within the holding time. During the re-extraction the extraction vial for sample 13-9LF-WS03-0 broke. There was insufficient sample for a third re-extraction. The results from the initial extraction were reported and qualified QN; they are presented in Table B-2-2 (Attachment B-2). The impact is minimal since results were less than the Project Action Limits and there is no bias.
- AK102 MS and MSD recoveries for DRO were less than AK series method criteria at 72% and 74%, respectively. Parent sample 13-9LF-WS01-0 was qualified ML, indicating a low bias due to matrix effects. Impacts are minimal since the DRO result was significantly less than the Project Action Limit. Qualified results are presented in Table B-2-3 (Attachment B-2).
- Field duplicate precision was evaluated by calculating the RPD between the primary sample 13-9LF-WS01-0 and duplicate sample 13-9LF-WS02-0. Multiple analytes had RPDs greater than 30% and were qualified QN. These results are presented in Table B-2-4 (Attachment B-2). The impact is minimal since in all cases the primary and duplicate were less than Project Action Limit.

ATTACHMENT B-1

Sample Summary and Analytical Data Tables

2013 Northeast Cape
Sample Summary

Sample ID	Location ID	Collection Date	Collection Time	Sampler	Quantity	ContainerType	ContainerVolume	Preservative	Matrix	Analytical Method Requested	QC Type	TAT	Notes	COC Number	Cooler Name	Laboratory	SDG Number	Start Sample Depth (feet)	End Sample Depth (feet)
13-9LF-WS01-0	9LF-WS01	12-Sep-13	1000	CF/KM/JO	12	VOA	40 mL	HCl, 4 ± 2 °C	WS	AK101 (GRO) BTEX (SW8260)	MS/MSD	14		13NECAPE-01	Kilo	ALS	K1309641	0.00	0.50
13-9LF-WS02-0	9LF-WS02	12-Sep-13	1000	CF/KM/JO	4	VOA	40 mL	HCl, 4 ± 2 °C	WS	AK101 (GRO) BTEX (SW8260)	Dup	14		13NECAPE-01	Kilo	ALS	K1309641	0.00	0.50
13-9LF-WS03-0	9LF-WS03	12-Sep-13	1155	CF/KM/JO	4	VOA	40 mL	HCl, 4 ± 2 °C	WS	AK101 (GRO) BTEX (SW8260)		14		13NECAPE-01	Kilo	ALS	K1309641	0.00	0.50
13-9LF-WS04-0	9LF-WS04	12-Sep-13	1350	CF/KM/JO	4	VOA	40 mL	HCl, 4 ± 2 °C	WS	AK101 (GRO) BTEX (SW8260)		14		13NECAPE-01	Kilo	ALS	K1309641	0.00	0.50
13-9LF-WG01-2	9LF-WG01	12-Sep-13	1351	CF/KM/JO	4	VOA	40 mL	HCl, 4 ± 2 °C	WS	AK101 (GRO) BTEX (SW8260)		14		13NECAPE-01	Kilo	ALS	K1309641	2.00	2.50
13-KMS-WS01-0	KMS-WS01	12-Sep-13	1521	CF/KM/JO	4	VOA	40 mL	HCl, 4 ± 2 °C	WS	AK101 (GRO) BTEX (SW8260)		14		13NECAPE-01	Kilo	ALS	K1309641	0.00	0.50
13-7LF-WS01-0	7LF-WS01	12-Sep-13	1630	CF/KM/JO	4	VOA	40 mL	HCl, 4 ± 2 °C	WS	AK101 (GRO) BTEX (SW8260)		14		13NECAPE-01	Kilo	ALS	K1309641	0.00	0.50
13-7LF-WS02-0	7LF-WS02	12-Sep-13	1644	CF/KM/JO	4	VOA	40 mL	HCl, 4 ± 2 °C	WS	AK101 (GRO) BTEX (SW8260)		14		13NECAPE-01	Kilo	ALS	K1309641	0.00	0.50
13-7LF-WS03-0	7LF-WS03	12-Sep-13	1654	CF/KM/JO	4	VOA	40 mL	HCl, 4 ± 2 °C	WS	AK101 (GRO) BTEX (SW8260)		14		13NECAPE-01	Kilo	ALS	K1309641	0.00	0.50
13-TB01		12-Sep-13	0800		4	VOA	40 mL	HCl, 4 ± 2 °C	WS	AK101 (GRO) BTEX (SW8260)	Trip Blank			13NECAPE-01	Kilo	ALS	K1309641		
13-7LF-WS03-0	7LF-WS03	12-Sep-13	1654	CF/KM/JO	2	Amber	1 L	HCl, 4 ± 2 °C	WS	AK102 (DRO) AK103 (RRO)		14		13NECAPE-02	Juliett	ALS	K1309641	0.00	0.50
13-9LF-WS01-0	9LF-WS01	12-Sep-13	1000	CF/KM/JO	3	Poly	250 mL	HNO3, 4 ± 2 °C	WS	SW6020 (RCRA Metals, Zn) SW7471 (Mercury)	MS/MSD	14	Filtered (0.45 µm)	13NECAPE-02	Juliett	ALS	K1309641	0.00	0.50
13-9LF-WS01-0	9LF-WS01	12-Sep-13	1000	CF/KM/JO	3	Poly	250 mL	HNO3, 4 ± 2 °C	WS	SW6020 (RCRA Metals, Zn) SW7471 (Mercury)	MS/MSD	14	Unfiltered	13NECAPE-02	Juliett	ALS	K1309641	0.00	0.50
13-9LF-WS02-0	9LF-WS02	12-Sep-13	1000	CF/KM/JO	1	Poly	250 mL	HNO3, 4 ± 2 °C	WS	SW6020 (RCRA Metals, Zn) SW7471 (Mercury)	Dup	14	Filtered (0.45 µm)	13NECAPE-02	Juliett	ALS	K1309641	0.00	0.50
13-9LF-WS02-0	9LF-WS02	12-Sep-13	1000	CF/KM/JO	1	Poly	250 mL	HNO3, 4 ± 2 °C	WS	SW6020 (RCRA Metals, Zn) SW7471 (Mercury)	Dup	14	Unfiltered	13NECAPE-02	Juliett	ALS	K1309641	0.00	0.50
13-9LF-WS03-0	9LF-WS03	12-Sep-13	1155	CF/KM/JO	1	Poly	250 mL	HNO3, 4 ± 2 °C	WS	SW6020 (RCRA Metals, Zn) SW7471 (Mercury)		14	Filtered (0.45 µm)	13NECAPE-02	Juliett	ALS	K1309641	0.00	0.50
13-9LF-WS03-0	9LF-WS03	12-Sep-13	1155	CF/KM/JO	1	Poly	250 mL	HNO3, 4 ± 2 °C	WS	SW6020 (RCRA Metals, Zn) SW7471 (Mercury)		14	Unfiltered	13NECAPE-02	Juliett	ALS	K1309641	0.00	0.50
13-9LF-WS04-0	9LF-WS04	12-Sep-13	1350	CF/KM/JO	1	Poly	250 mL	HNO3, 4 ± 2 °C	WS	SW6020 (RCRA Metals, Zn) SW7471 (Mercury)		14	Filtered (0.45 µm)	13NECAPE-02	Juliett	ALS	K1309641	0.00	0.50
13-9LF-WS04-0	9LF-WS04	12-Sep-13	1350	CF/KM/JO	1	Poly	250 mL	HNO3, 4 ± 2 °C	WS	SW6020 (RCRA Metals, Zn) SW7471 (Mercury)		14	Unfiltered	13NECAPE-02	Juliett	ALS	K1309641	0.00	0.50
13-9LF-WG01-2	9LF-WG01	12-Sep-13	1351	CF/KM/JO	1	Poly	250 mL	HNO3, 4 ± 2 °C	WS	SW6020 (RCRA Metals, Zn) SW7471 (Mercury)		14	Low Volume Filtered (0.45 µm)	13NECAPE-02	Juliett	ALS	K1309641	2.00	2.50
13-KMS-WS01-0	KMS-WS01	12-Sep-13	1521	CF/KM/JO	1	Poly	250 mL	HNO3, 4 ± 2 °C	WS	SW6020 (RCRA Metals, Zn) SW7471 (Mercury)		14	Filtered (0.45 µm)	13NECAPE-02	Juliett	ALS	K1309641	0.00	0.50
13-KMS-WS01-0	KMS-WS01	12-Sep-13	1521	CF/KM/JO	1	Poly	250 mL	HNO3, 4 ± 2 °C	WS	SW6020 (RCRA Metals, Zn) SW7471 (Mercury)		14	Unfiltered	13NECAPE-02	Juliett	ALS	K1309641	0.00	0.50
13-7LF-WS01-0	7LF-WS01	12-Sep-13	1630	CF/KM/JO	1	Poly	250 mL	HNO3, 4 ± 2 °C	WS	SW6020 (RCRA Metals, Zn, Ni) SW7471 (Mercury)		14	Filtered (0.45 µm)	13NECAPE-02	Juliett	ALS	K1309641	0.00	0.50
13-7LF-WS01-0	7LF-WS01	12-Sep-13	1630	CF/KM/JO	1	Poly	250 mL	HNO3, 4 ± 2 °C	WS	SW6020 (RCRA Metals, Zn, Ni) SW7471 (Mercury)		14	Unfiltered	13NECAPE-02	Juliett	ALS	K1309641	0.00	0.50
13-7LF-WS02-0	7LF-WS02	12-Sep-13	1644	CF/KM/JO	1	Poly	250 mL	HNO3, 4 ± 2 °C	WS	SW6020 (RCRA Metals, Zn, Ni) SW7471 (Mercury)		14	Filtered (0.45 µm)	13NECAPE-02	Juliett	ALS	K1309641	0.00	0.50
13-7LF-WS02-0	7LF-WS02	12-Sep-13	1644	CF/KM/JO	1	Poly	250 mL	HNO3, 4 ± 2 °C	WS	SW6020 (RCRA Metals, Zn, Ni) SW7471 (Mercury)		14	Unfiltered	13NECAPE-02	Juliett	ALS	K1309641	0.00	0.50
13-7LF-WS03-0	7LF-WS03	12-Sep-13	1654	CF/KM/JO	1	Poly	250 mL	HNO3, 4 ± 2 °C	WS	SW6020 (RCRA Metals, Zn, Ni) SW7471 (Mercury)		14	Filtered (0.45 µm)	13NECAPE-02	Juliett	ALS	K1309641	0.00	0.50
13-7LF-WS03-0	7LF-WS03	12-Sep-13	1654	CF/KM/JO	1	Poly	250 mL	HNO3, 4 ± 2 °C	WS	SW6020 (RCRA Metals, Zn, Ni) SW7471 (Mercury)		14	Unfiltered	13NECAPE-02	Juliett	ALS	K1309641	0.00	0.50
13-9LF-WS01-0	9LF- WS01	12-Sep-13	1000	CF/KM/JO	8	Amber	1 L	4 ± 2 °C	WS	SW8270 SIM (PAH) SW8082 (PCBs)	MS/MSD	14	1 additional container in 13NECAPE-04	13NECAPE-03	Charlie	ALS	K1309641	0.00	0.50
13-9LF-WS01-0	9LF-WS01	12-Sep-13	1000	CF/KM/JO	1	Amber	1 L	4 ± 2 °C	WS	SW8270 SIM (PAH) SW8082 (PCBs)	MS/MSD	14	8 additional container in 13NECAPE-03	13NECAPE-04	Mike	ALS	K1309641	0.00	0.50
13-9LF-WS01-0	9LF-WS01	12-Sep-13	1000	CF/KM/JO	6	Amber	1 L	HCl, 4 ± 2 °C	WS	AK102 (DRO) AK103 (RRO)	MS/MSD	14		13NECAPE-04	Mike	ALS	K1309641	0.00	0.50
13-9LF-WS02-0	9LF-WS02	12-Sep-13	1000	CF/KM/JO	1	Amber	1 L	HCl, 4 ± 2 °C	WS	AK102 (DRO) AK103 (RRO)	Dup	14		13NECAPE-04	Mike	ALS	K1309641	0.00	0.50
13-9LF-WS02-0	9LF-WS02	12-Sep-13	1000	CF/KM/JO	1	Amber	1 L	HCl, 4 ± 2 °C	WS	AK102 (DRO) AK103 (RRO)	Dup	14		13NECAPE-05	Alfa	ALS	K1309641	0.00	0.50
13-9LF-WS02-0	9LF-WS02	12-Sep-13	1000	CF/KM/JO	3	Amber	1 L	4 ± 2 °C	WS	SW8270 SIM (PAH) SW8082 (PCBs)	Dup	14		13NECAPE-05	Alfa	ALS	K1309641	0.00	0.50
13-9LF-WS03-0	9LF-WS03	12-Sep-13	1155	CF/KM/JO	3	Amber	1 L	4 ± 2 °C	WS	SW8270 SIM (PAH) SW8082 (PCBs)		14		13NECAPE-05	Alfa	ALS	K1309641	0.00	0.50
13-9LF-WS03-0	9LF-WS03	12-Sep-13	1155	CF/KM/JO	1	Amber	1 L	HCl, 4 ± 2 °C	WS	AK102 (DRO) AK103 (RRO)		14		13NECAPE-05	Alfa	ALS	K1309641	0.00	0.50
13-9LF-WS03-0	9LF-WS03	12-Sep-13	1155	CF/KM/JO	1	Amber	1 L	HCl, 4 ± 2 °C	WS	AK102 (DRO) AK103 (RRO)		14		13NECAPE-06	Hotel	ALS	K1309641	0.00	0.50
13-9LF-WS04-0	9LF-WS04	12-Sep-13	1350	CF/KM/JO	3	Amber	1 L	4 ± 2 °C	WS	SW8270 SIM (PAH) SW8082 (PCBs)		14		13NECAPE-06	Hotel	ALS	K1309641	0.00	0.50
13-9LF-WS04-0	9LF-WS04	12-Sep-13	1350	CF/KM/JO	2	Amber	1 L	HCl, 4 ± 2 °C	WS	AK102 (DRO) AK103 (RRO)		14		13NECAPE-06	Hotel	ALS	K1309641	0.00	0.50
13-KMS-WS01-0	KMS-WS01	12-Sep-13	1521	CF/KM/JO	2	Amber	1 L	HCl, 4 ± 2 °C	WS	AK102 (DRO) AK103 (RRO)		14		13NECAPE-06	Hotel	ALS	K1309641	0.00	0.50
13-KMS-WS01-0	KMS-WS01	12-Sep-13	1521	CF/KM/JO	3	Amber	1 L	4 ± 2 °C	WS	SW8270 SIM (PAH) SW8082 (PCBs)		14		13NECAPE-07	Echo	ALS	K1309641	0.00	0.50
13-7LF-WS01-0	7LF-WS01	12-Sep-13	1630	CF/KM/JO	2	Amber	1 L	HCl, 4 ± 2 °C	WS	AK102 (DRO) AK103 (RRO)		14		13NECAPE-07	Echo	ALS	K1309641	0.00	0.50
13-7LF-WS01-0	7LF-WS01	12-Sep-13	1630	CF/KM/JO	3	Amber	1 L	4 ± 2 °C	WS	SW8270 SIM (PAH) SW8082 (PCBs)		14		13NECAPE-07	Echo	ALS	K1309641	0.00	0.50
13-7LF-WS02-0	7LF-WS02	12-Sep-13	1644	CF/KM/JO	3	Amber	1 L	4 ± 2 °C	WS	SW8270 SIM (PAH) SW8082 (PCBs)		14		13NECAPE-08	Romeo	ALS	K1309641	0.00	0.50
13-7LF-WS02-0	7LF-WS02	12-Sep-13	1644	CF/KM/JO	2	Amber	1 L	HCl, 4 ± 2 °C	WS	AK102 (DRO) AK103 (RRO)		14		13NECAPE-08	Romeo	ALS	K1309641	0.00	0.50
13-7LF-WS03-0	7LF-WS03	12-Sep-13	1654	CF/KM/JO	3	Amber	1 L	4 ± 2 °C	WS	SW8270 SIM (PAH) SW8082 (PCBs)		14		13NECAPE-08	Romeo	ALS	K1309641	0.00	0.50

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Groundwater Analytical Data Table

			Location ID	9LF-WG01	9LF-WG01
			Sample ID	13-9LF-WG01-2	13-9LF-WG01-2
			Lab Sample ID	130964106F	K130964106
			SDG	K1309641	K1309641
			Sample Date	9/12/2013	9/12/2013
			Matrix	WS	WS
			Laboratory	CASK	CASK
Method	Analyte	Units	Project Action Limit[1]		
AK101	Gasoline Range Organics (C6-C10)	mg/L	1.3	–	ND [0.025]
SW6020A	Arsenic	mg/L	0.01	0.00037 [0.00013] J	–
SW6020A	Barium	mg/L	2	0.00936 [0.00003]	–
SW6020A	Cadmium	mg/L	0.005	0.000032 [0.00001]	–
SW6020A	Chromium	mg/L	0.1	0.00109 [0.00005]	–
SW6020A	Lead	mg/L	0.015	0.000501 [0.00001]	–
SW6020A	Nickel	mg/L	0.1	–	–
SW6020A	Selenium	mg/L	0.05	ND [0.0005]	–
SW6020A	Silver	mg/L	0.1	0.00001 [0.00001] J	–
SW6020A	Zinc	mg/L	5	0.00906 [0.00025]	–
SW7470A	Mercury	mg/L	0.002	ND [0.00005]	–
SW8260C	Benzene	mg/L	0.005	–	0.00016 [0.0001] J
SW8260C	Ethylbenzene	mg/L	0.7	–	ND [0.0001]
SW8260C	o-Xylene	mg/L	10	–	ND [0.0002]
SW8260C	Toluene	mg/L	1	–	0.00032 [0.0001] J
SW8260C	Xylene, Isomers m & p	mg/L	10	–	ND [0.0002]

[1] Project action limit from 2013 QAPP (USACE 2013) and 18 AAC 75, Table C Groundwater Cleanup Levels (ADEC 2012)

– = No criteria/ Not analyzed

ND [LOD] = The analyte result is less than the limit of detection [value in brackets].

mg/L = milligram per liter

J = The analyte result is considered an estimated value because the reported result is below the limit of quantitation but above the detection limit (formerly the method detection limit.

SDG = sample delivery group

CASK = ALS Laboratories formerly known as Columbia Analytical Services of Kelso, WA

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Surface Water Analytical Data Table

			Location ID	7LF-WS01	7LF-WS01	7LF-WS02	7LF-WS02	7LF-WS03	7LF-WS03	9LF-WS01
			Sample ID	13-7LF-WS01-0	13-7LF-WS01-0	13-7LF-WS02-0	13-7LF-WS02-0	13-7LF-WS03-0	13-7LF-WS03-0	13-9LF-WS01-0
			Lab Sample ID	130964108F	K130964108	130964109F	K130964109	130964101F	K130964101	130964102F
			SDG	K1309641	K1309641	K1309641	K1309641	K1309641	K1309641	K1309641
			Sample Date	9/12/2013	9/12/2013	9/12/2013	9/12/2013	9/12/2013	9/12/2013	9/12/2013
			Matrix	WS	WS	WS	WS	WS	WS	WS
			Laboratory	CASK	CASK	CASK	CASK	CASK	CASK	CASK
Method	**Analyte**	**Units**	**Project Action Limit[1]**							
8270SIM	1-Methylnaphthalene	mg/L	–	–	0.0000041 [0.000005]	–	0.0000044 [0.000005]	–	0.0000066 [0.000005]	–
8270SIM	2-Methylnaphthalene	mg/L	–	–	ND [0.000005]	–	ND [0.000005]	–	0.0000025 [0.000005] J	–
8270SIM	Acenaphthene	mg/L	–	–	ND [0.000005]	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Acenaphthylene	mg/L	–	–	ND [0.000005]	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Anthracene	mg/L	–	–	ND [0.000005]	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Benzo(a)anthracene	mg/L	–	–	ND [0.000005]	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Benzo(a)pyrene	mg/L	0.0002	–	ND [0.000005]	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Benzo(b)fluoranthene	mg/L	–	–	ND [0.000005]	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Benzo(g,h,i)perylene	mg/L	–	–	ND [0.000005]	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Benzo(k)fluoranthene	mg/L	–	–	ND [0.000005]	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Chrysene	mg/L	–	–	ND [0.000005]	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Dibenzo(a,h)anthracene	mg/L	–	–	ND [0.000005]	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Fluoranthene	mg/L	–	–	ND [0.000005]	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Fluorene	mg/L	–	–	ND [0.000005]	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Indeno(1,2,3-cd)pyrene	mg/L	–	–	ND [0.000005]	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Naphthalene	mg/L	–	–	0.000016 [0.000005] J	–	0.000047 [0.000005]	–	0.000022 [0.000005]	–
8270SIM	Phenanthrene	mg/L	–	–	ND [0.000005]	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Pyrene	mg/L	–	–	ND [0.000005]	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Total Aqueous Hydrocarbons (Sum of PAHs)	mg/L	0.015	–	0.0001001	–	0.0001314	–	0.0001061	–
AK101	Gasoline Range Organics (C6-C10)	mg/L	1.3	–	ND [0.025]	–	ND [0.025]	–	ND [0.025]	–
AK102	Diesel Range Organics (C10-C25)	mg/L	1.5	–	0.058 [0.02] J	–	0.07 [0.02] J	–	0.063 [0.02] J	–
AK103	Residual Range Organics (C25-C36)	mg/L	1.1	–	0.12 [0.05] J, B	–	0.21 [0.05] J, B	–	0.12 [0.05] J, B	–
SW6020A	Arsenic	mg/L	0.01	0.0003 [0.00013] J	0.00031 [0.00013] J	0.00039 [0.00013] J	0.00059 [0.00013]	0.00034 [0.00013] J	0.00046 [0.00013] J	ND [0.00013]
SW6020A	Barium	mg/L	2	0.00962 [0.00003]	0.00927 [0.00003]	0.0079 [0.00003]	0.0088 [0.00003]	0.00378 [0.00003]	0.0045 [0.00003]	0.0065 [0.00003]
SW6020A	Cadmium	mg/L	0.005	0.000013 [0.00001] J	0.00002 [0.00001] J	ND [0.00001]	0.000005 [0.00001] J	0.000015 [0.00001] J	0.000012 [0.00001] J	0.000012 [0.00001] J, QN
SW6020A	Chromium	mg/L	0.1	0.00032 [0.00005]	0.00039 [0.00005]	0.00033 [0.00005]	0.00037 [0.00005]	0.0004 [0.00005]	0.00049 [0.00005]	0.00019 [0.00005] J
SW6020A	Lead	mg/L	–	0.000949 [0.00001]	0.00149 [0.00001]	0.000037 [0.00001]	0.000175 [0.00001]	0.000321 [0.00001]	0.00089 [0.00001]	0.000013 [0.00001] J, QN
SW6020A	Nickel	mg/L	–	0.00121 [0.0001]	0.00095 [0.0001]	0.00069 [0.0001]	0.00062 [0.0001]	0.00075 [0.0001]	0.00082 [0.0001]	–
SW6020A	Selenium	mg/L	0.05	ND [0.0005]	ND [0.0005]	ND [0.0005]	ND [0.0005]	ND [0.0005]	ND [0.0005]	ND [0.0005]
SW6020A	Silver	mg/L	0.1	0.000005 [0.00001] J	0.000007 [0.00001] J	ND [0.00001]	ND [0.00001]	ND [0.00001]	0.000016 [0.00001] J	ND [0.00001]
SW6020A	Zinc	mg/L	–	0.0125 [0.00025]	0.01148 [0.00025]	0.00328 [0.00025]	0.00376 [0.00025]	0.00649 [0.00025]	0.0062 [0.00025]	0.00183 [0.00025]
SW7470A	Mercury	mg/L	0.002	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]
SW8082A	PCB-1016 (Aroclor 1016)	mg/L	0.0005	–	ND [0.000002]	–	ND [0.000002]	–	ND [0.0000021]	–
SW8082A	PCB-1221 (Aroclor 1221)	mg/L	0.0005	–	ND [0.000008]	–	ND [0.000008]	–	ND [0.000008]	–
SW8082A	PCB-1232 (Aroclor 1232)	mg/L	0.0005	–	ND [0.000002]	–	ND [0.000002]	–	ND [0.0000022]	–

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Surface Water Analytical Data Table

			Location ID	7LF-WS01	7LF-WS01	7LF-WS02	7LF-WS02	7LF-WS03	7LF-WS03	9LF-WS01
			Sample ID	13-7LF-WS01-0	13-7LF-WS01-0	13-7LF-WS02-0	13-7LF-WS02-0	13-7LF-WS03-0	13-7LF-WS03-0	13-9LF-WS01-0
			Lab Sample ID	130964108F	K130964108	130964109F	K130964109	130964101F	K130964101	130964102F
			SDG	K1309641	K1309641	K1309641	K1309641	K1309641	K1309641	K1309641
			Sample Date	9/12/2013	9/12/2013	9/12/2013	9/12/2013	9/12/2013	9/12/2013	9/12/2013
			Matrix	WS	WS	WS	WS	WS	WS	WS
			Laboratory	CASK	CASK	CASK	CASK	CASK	CASK	CASK
Method	**Analyte**	**Units**	**Project Action Limit[1]**							
SW8082A	PCB-1242 (Aroclor 1242)	mg/L	0.0005	–	ND [0.000002]	–	ND [0.000002]	–	ND [0.000002]	–
SW8082A	PCB-1248 (Aroclor 1248)	mg/L	0.0005	–	ND [0.000002]	–	ND [0.000002]	–	ND [0.000002]	–
SW8082A	PCB-1254 (Aroclor 1254)	mg/L	0.0005	–	0.0000013 [0.000002] J	–	ND [0.000002]	–	0.0000017 [0.000002] J	–
SW8082A	PCB-1260 (Aroclor 1260)	mg/L	0.0005	–	0.0000023 [0.000002] J	–	ND [0.000002]	–	0.0000018 [0.000002] J	–
SW8082A	PCB-1262 (Aroclor 1262)	mg/L	0.0005	–	ND [0.000002]	–	ND [0.000002]	–	ND [0.000002]	–
SW8082A	PCB-1268 (Aroclor 1268)	mg/L	0.0005	–	ND [0.000002]	–	ND [0.000002]	–	ND [0.000002]	–
SW8260C	Benzene	mg/L	0.005	–	ND [0.0001]	–	ND [0.0001]	–	ND [0.0001]	–
SW8260C	Ethylbenzene	mg/L	0.7	–	ND [0.0001]	–	ND [0.0001]	–	ND [0.0001]	–
SW8260C	o-Xylene	mg/L	10	–	ND [0.0002]	–	ND [0.0002]	–	ND [0.0002]	–
SW8260C	Toluene	mg/L	1	–	0.00032 [0.0001] J	–	0.00023 [0.0001] J	–	0.0002 [0.0001] J	–
SW8260C	Xylene, Isomers m & p	mg/L	10	–	ND [0.0002]	–	ND [0.0002]	–	ND [0.0002]	–

[1] Project action limit from 2013 QAPP (USACE 2013) and 18 AAC 75, Table C Groundwater Cleanup Levels (ADEC 2012)

– = No criteria/ Not analyzed

ND [LOD] = The analyte result is less than the limit of detection [value in brackets].

mg/L = milligram per liter

J = The analyte result is considered an estimated value because the reported result is below the limit of quantitation but above the detection limit (formerly the method detection limit.

B = Analyte result is considered a high biased estimated value due to contamination present in the method blank. Results less than 10 times the reported method blank concentration will be B flagged to indicate bias.

QN = Analyte result is considered estimated value biased uncertain due to due to a laboratory quality control failure.

ML = Analyte result is considered an estimated value biased low due to matrix effects.

SDG = sample delivery group

CASK = ALS Laboratories formerly known as Columbia Analytical Services of Kelso, WA

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Surface Water Analytical Data Table

			Location ID	9LF-WS01	9LF-WS02	9LF-WS02	9LF-WS03	9LF-WS03	9LF-WS04
			Sample ID	13-9LF-WS01-0	13-9LF-WS02-0	13-9LF-WS02-0	13-9LF-WS03-0	13-9LF-WS03-0	13-9LF-WS04-0
			Lab Sample ID	K130964102	130964103F	K130964103	130964104F	K130964104	130964105F
			SDG	K1309641	K1309641	K1309641	K1309641	K1309641	K1309641
			Sample Date	9/12/2013	9/12/2013	9/12/2013	9/12/2013	9/12/2013	9/12/2013
			Matrix	WS	WS	WS	WS	WS	WS
			Laboratory	CASK	CASK	CASK	CASK	CASK	CASK
Method	**Analyte**	**Units**	**Project Action Limit[1]**						
8270SIM	1-Methylnaphthalene	mg/L	–	ND [0.000005]	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	2-Methylnaphthalene	mg/L	–	0.0000026 [0.000005] J, QN	–	ND [0.000005] QN	–	ND [0.000005]	–
8270SIM	Acenaphthene	mg/L	–	0.0000053 [0.000005] J	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Acenaphthylene	mg/L	–	0.0000059 [0.000005] J	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Anthracene	mg/L	–	ND [0.000005]	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Benzo(a)anthracene	mg/L	–	0.0000038 [0.000005] J	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Benzo(a)pyrene	mg/L	0.0002	ND [0.000005]	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Benzo(b)fluoranthene	mg/L	–	0.0000026 [0.000005] J, QN	–	ND [0.000005] QN	–	ND [0.000005]	–
8270SIM	Benzo(g,h,i)perylene	mg/L	–	0.0000059 [0.000005] J	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Benzo(k)fluoranthene	mg/L	–	ND [0.000005]	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Chrysene	mg/L	–	ND [0.000005]	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Dibenzo(a,h)anthracene	mg/L	–	0.0000027 [0.000005] J, QN	–	ND [0.000005] QN	–	ND [0.000005]	–
8270SIM	Fluoranthene	mg/L	–	ND [0.000005]	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Fluorene	mg/L	–	0.0000087 [0.000005] J, QN	–	ND [0.000005] QN	–	ND [0.000005]	–
8270SIM	Indeno(1,2,3-cd)pyrene	mg/L	–	0.0000052 [0.000005] J	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Naphthalene	mg/L	–	0.000031 [0.000005] QN	–	0.000094 [0.000005] QN	–	0.000027 [0.000005]	–
8270SIM	Phenanthrene	mg/L	–	0.0000087 [0.000005] J, QN	–	ND [0.000005] QN	–	ND [0.000005]	–
8270SIM	Pyrene	mg/L	–	ND [0.000005]	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Total Aqueous Hydrocarbons (Sum of PAHs)	mg/L	0.015	0.0001174	–	0.000179	–	0.000112	–
AK101	Gasoline Range Organics (C6-C10)	mg/L	1.3	ND [0.025]	–	ND [0.025]	–	ND [0.025]	–
AK102	Diesel Range Organics (C10-C25)	mg/L	1.5	0.016 [0.02] J, ML	–	0.014 [0.02] J	–	0.014 [0.02] J, QN	–
AK103	Residual Range Organics (C25-C36)	mg/L	1.1	0.036 [0.05] J, B, QN	–	0.024 [0.05] J, B, QN	–	0.03 [0.05] J, QN	–
SW6020A	Arsenic	mg/L	0.01	0.00011 [0.00013] J	0.0001 [0.00013] J	0.00009 [0.00013] J	0.00011 [0.00013] J	0.00009 [0.00013] J	0.00018 [0.00013] J
SW6020A	Barium	mg/L	2	0.00662 [0.00003]	0.00645 [0.00003]	0.00651 [0.00003]	0.00652 [0.00003]	0.0066 [0.00003]	0.0132 [0.00003]
SW6020A	Cadmium	mg/L	0.005	0.000005 [0.00001] J, QN	0.00004 [0.00001] QN	0.00001 [0.00001] J, QN	0.000014 [0.00001] J	0.000009 [0.00001] J	0.000101 [0.00001]
SW6020A	Chromium	mg/L	0.1	0.00015 [0.00005] J	0.00017 [0.00005] J	0.00019 [0.00005] J	0.00013 [0.00005] J	0.00015 [0.00005] J	0.0002 [0.00005]
SW6020A	Lead	mg/L	–	0.000031 [0.00001]	0.000051 [0.00001] QN	0.000027 [0.00001] J	0.000031 [0.00001]	0.000026 [0.00001] J	0.000027 [0.00001] J
SW6020A	Nickel	mg/L	–	–	–	–	–	–	–
SW6020A	Selenium	mg/L	0.05	ND [0.0005]	ND [0.0005]	ND [0.0005]	ND [0.0005]	ND [0.0005]	ND [0.0005]
SW6020A	Silver	mg/L	0.1	0.000009 [0.00001] J	0.00001 [0.00001] J	ND [0.00001]	ND [0.00001]	ND [0.00001]	ND [0.00001]
SW6020A	Zinc	mg/L	–	0.00178 [0.00025] QN	0.00219 [0.00025]	0.00131 [0.00025] QN	0.00157 [0.00025]	0.0013 [0.00025]	0.02157 [0.00025]
SW7470A	Mercury	mg/L	0.002	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]	ND [0.00005]
SW8082A	PCB-1016 (Aroclor 1016)	mg/L	0.0005	ND [0.000002]	–	ND [0.000002]	–	ND [0.000002]	–
SW8082A	PCB-1221 (Aroclor 1221)	mg/L	0.0005	ND [0.000008]	–	ND [0.000008]	–	ND [0.000008]	–
SW8082A	PCB-1232 (Aroclor 1232)	mg/L	0.0005	ND [0.0000023]	–	ND [0.0000021]	–	ND [0.000002]	–

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Surface Water Analytical Data Table

			Location ID	9LF-WS01	9LF-WS02	9LF-WS02	9LF-WS03	9LF-WS03	9LF-WS04
			Sample ID	13-9LF-WS01-0	13-9LF-WS02-0	13-9LF-WS02-0	13-9LF-WS03-0	13-9LF-WS03-0	13-9LF-WS04-0
			Lab Sample ID	K130964102	130964103F	K130964103	130964104F	K130964104	130964105F
			SDG	K1309641	K1309641	K1309641	K1309641	K1309641	K1309641
			Sample Date	9/12/2013	9/12/2013	9/12/2013	9/12/2013	9/12/2013	9/12/2013
			Matrix	WS	WS	WS	WS	WS	WS
			Laboratory	CASK	CASK	CASK	CASK	CASK	CASK
Method	**Analyte**	**Units**	**Project Action Limit[1]**						
SW8082A	PCB-1242 (Aroclor 1242)	mg/L	0.0005	ND [0.000002]	–	ND [0.000002]	–	ND [0.000002]	–
SW8082A	PCB-1248 (Aroclor 1248)	mg/L	0.0005	ND [0.0000022]	–	ND [0.000002]	–	ND [0.000002]	–
SW8082A	PCB-1254 (Aroclor 1254)	mg/L	0.0005	ND [0.000002]	–	ND [0.000002]	–	ND [0.000002]	–
SW8082A	PCB-1260 (Aroclor 1260)	mg/L	0.0005	0.0000015 [0.000002] J	–	ND [0.000002]	–	ND [0.000002]	–
SW8082A	PCB-1262 (Aroclor 1262)	mg/L	0.0005	ND [0.000002]	–	ND [0.000002]	–	ND [0.000002]	–
SW8082A	PCB-1268 (Aroclor 1268)	mg/L	0.0005	ND [0.000002]	–	ND [0.000002]	–	ND [0.000002]	–
SW8260C	Benzene	mg/L	0.005	ND [0.0001]	–	ND [0.0001]	–	ND [0.0001]	–
SW8260C	Ethylbenzene	mg/L	0.7	ND [0.0001]	–	ND [0.0001]	–	ND [0.0001]	–
SW8260C	o-Xylene	mg/L	10	ND [0.0002]	–	ND [0.0002]	–	ND [0.0002]	–
SW8260C	Toluene	mg/L	1	ND [0.0001]	–	0.00008 [0.0001] J	–	0.00007 [0.0001] J	–
SW8260C	Xylene, Isomers m & p	mg/L	10	ND [0.0002]	–	ND [0.0002]	–	ND [0.0002]	–

[1] Project action limit from 2013 QAPP (USACE 2013) and 18 AAC 75, Table C Groundwater Cleanup Levels (AD

– = No criteria/ Not analyzed

ND [LOD] = The analyte result is less than the limit of detection [value in brackets].

mg/L = milligram per liter

J = The analyte result is considered an estimated value because the reported result is below the limit of quantitat

B = Analyte result is considered a high biased estimated value due to contamination present in the method blank

QN = Analyte result is considered estimated value biased uncertain due to due to a laboratory quality control failu

ML = Analyte result is considered an estimated value biased low due to matrix effects.

SDG = sample delivery group

CASK = ALS Laboratories formerly known as Columbia Analytical Services of Kelso, WA

2013 Northeast Cape
Surface Water Analytical Data Table

			Location ID	9LF-WS04	KMS-WS01	KMS-WS01	QCTB
			Sample ID	13-9LF-WS04-0	13-KMS-WS01-0	13-KMS-WS01-0	13-TB01
			Lab Sample ID	K130964105	130964107F	K130964107	K130964110
			SDG	K1309641	K1309641	K1309641	K1309641
			Sample Date	9/12/2013	9/12/2013	9/12/2013	9/12/2013
			Matrix	WS	WS	WS	WS
			Laboratory	CASK	CASK	CASK	CASK
Method	**Analyte**	**Units**	**Project Action Limit[1]**				
8270SIM	1-Methylnaphthalene	mg/L	–	0.0000048 [0.000005] J	–	ND [0.000005]	–
8270SIM	2-Methylnaphthalene	mg/L	–	0.0000026 [0.000005] J	–	ND [0.000005]	–
8270SIM	Acenaphthene	mg/L	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Acenaphthylene	mg/L	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Anthracene	mg/L	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Benzo(a)anthracene	mg/L	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Benzo(a)pyrene	mg/L	0.0002	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Benzo(b)fluoranthene	mg/L	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Benzo(g,h,i)perylene	mg/L	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Benzo(k)fluoranthene	mg/L	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Chrysene	mg/L	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Dibenzo(a,h)anthracene	mg/L	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Fluoranthene	mg/L	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Fluorene	mg/L	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Indeno(1,2,3-cd)pyrene	mg/L	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Naphthalene	mg/L	–	0.000058 [0.000005]	–	0.00002 [0.000005]	–
8270SIM	Phenanthrene	mg/L	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Pyrene	mg/L	–	ND [0.000005]	–	ND [0.000005]	–
8270SIM	Total Aqueous Hydrocarbons (Sum of PAHs)	mg/L	0.015	0.0001404	–	0.000105	–
AK101	Gasoline Range Organics (C6-C10)	mg/L	1.3	ND [0.025]	–	ND [0.025]	ND [0.025]
AK102	Diesel Range Organics (C10-C25)	mg/L	1.5	0.031 [0.02] J	–	0.015 [0.02] J	–
AK103	Residual Range Organics (C25-C36)	mg/L	1.1	0.057 [0.05] J, B	–	0.027 [0.05] J, B	–
SW6020A	Arsenic	mg/L	0.01	0.00032 [0.00013] J	ND [0.00013]	0.00008 [0.00013] J	–
SW6020A	Barium	mg/L	2	0.0127 [0.00003]	0.0041 [0.00003]	0.0042 [0.00003]	–
SW6020A	Cadmium	mg/L	0.005	0.000042 [0.00001]	0.000012 [0.00001] J	0.000006 [0.00001] J	–
SW6020A	Chromium	mg/L	0.1	0.00022 [0.00005]	0.00015 [0.00005] J	0.00016 [0.00005] J	–
SW6020A	Lead	mg/L	–	0.000211 [0.00001]	0.000026 [0.00001] J	0.000101 [0.00001]	–
SW6020A	Nickel	mg/L	–	–	–	–	–
SW6020A	Selenium	mg/L	0.05	ND [0.0005]	ND [0.0005]	ND [0.0005]	–
SW6020A	Silver	mg/L	0.1	0.000008 [0.00001] J	ND [0.00001]	ND [0.00001]	–
SW6020A	Zinc	mg/L	–	0.01967 [0.00025]	0.00095 [0.00025]	0.00105 [0.00025]	–
SW7470A	Mercury	mg/L	0.002	ND [0.00005]	ND [0.00005]	ND [0.00005]	–
SW8082A	PCB-1016 (Aroclor 1016)	mg/L	0.0005	ND [0.000002]	–	ND [0.000002]	–
SW8082A	PCB-1221 (Aroclor 1221)	mg/L	0.0005	ND [0.000008]	–	ND [0.000008]	–
SW8082A	PCB-1232 (Aroclor 1232)	mg/L	0.0005	ND [0.0000024]	–	ND [0.000002]	–

2013 Northeast Cape
Surface Water Analytical Data Table

			Location ID	9LF-WS04	KMS-WS01	KMS-WS01	QCTB
			Sample ID	13-9LF-WS04-0	13-KMS-WS01-0	13-KMS-WS01-0	13-TB01
			Lab Sample ID	K130964105	130964107F	K130964107	K130964110
			SDG	K1309641	K1309641	K1309641	K1309641
			Sample Date	9/12/2013	9/12/2013	9/12/2013	9/12/2013
			Matrix	WS	WS	WS	WS
			Laboratory	CASK	CASK	CASK	CASK
Method	Analyte	Units	Project Action Limit[1]				
SW8082A	PCB-1242 (Aroclor 1242)	mg/L	0.0005	ND [0.000002]	–	ND [0.000002]	–
SW8082A	PCB-1248 (Aroclor 1248)	mg/L	0.0005	ND [0.000002]	–	ND [0.000002]	–
SW8082A	PCB-1254 (Aroclor 1254)	mg/L	0.0005	ND [0.000002]	–	ND [0.000002]	–
SW8082A	PCB-1260 (Aroclor 1260)	mg/L	0.0005	ND [0.000002]	–	ND [0.000002]	–
SW8082A	PCB-1262 (Aroclor 1262)	mg/L	0.0005	ND [0.000002]	–	ND [0.000002]	–
SW8082A	PCB-1268 (Aroclor 1268)	mg/L	0.0005	ND [0.000002]	–	ND [0.000002]	–
SW8260C	Benzene	mg/L	0.005	ND [0.0001]	–	ND [0.0001]	ND [0.0001]
SW8260C	Ethylbenzene	mg/L	0.7	ND [0.0001]	–	ND [0.0001]	ND [0.0001]
SW8260C	o-Xylene	mg/L	10	ND [0.0002]	–	ND [0.0002]	ND [0.0002]
SW8260C	Toluene	mg/L	1	0.00018 [0.0001] J	–	0.00017 [0.0001] J	ND [0.0001]
SW8260C	Xylene, Isomers m & p	mg/L	10	ND [0.0002]	–	ND [0.0002]	ND [0.0002]

[1] Project action limit from 2013 QAPP (USACE 2013) and 18 AAC 75, Table C Groundwater Cleanup Levels (AD

– = No criteria/ Not analyzed
ND [LOD] = The analyte result is less than the limit of detection [value in brackets].
mg/L = milligram per liter
J = The analyte result is considered an estimated value because the reported result is below the limit of quantitat
B = Analyte result is considered a high biased estimated value due to contamination present in the method blank
QN = Analyte result is considered estimated value biased uncertain due to due to a laboratory quality control failu
ML = Analyte result is considered an estimated value biased low due to matrix effects.
SDG = sample delivery group
CASK = ALS Laboratories formerly known as Columbia Analytical Services of Kelso, WA

ATTACHMENT B-2

Sample Results Below Project Data Quality Objectives (DQO)

Table B-2-1
Sample Results Qualified B due to Method Blank Exceedance

Sample ID	QC Batch	SDG	Lab Sample ID	Method	Analyte	Result (mg/L)	Qualifier
Method Blank	KWG1310602	QCK1309641	KWG13106025	AK103	Residual Range Organics (C25-C36)	0.02	
13-KMS-WS01-0	KWG1310602	K1309641	K130964107	AK103	Residual Range Organics (C25-C36)	0.027	J, B
13-9LF-WS02-0	KWG1310602	K1309641	K130964103	AK103	Residual Range Organics (C25-C36)	0.024	J, B
13-9LF-WS04-0	KWG1310602	K1309641	K130964105	AK103	Residual Range Organics (C25-C36)	0.057	J, B
13-9LF-WS01-0	KWG1310602	K1309641	K130964102	AK103	Residual Range Organics (C25-C36)	0.036	J, B
13-7LF-WS03-0	KWG1310602	K1309641	K130964101	AK103	Residual Range Organics (C25-C36)	0.12	J, B
13-7LF-WS02-0	KWG1310602	K1309641	K130964109	AK103	Residual Range Organics (C25-C36)	0.21	J, B
13-7LF-WS01-0	KWG1310602	K1309641	K130964108	AK103	Residual Range Organics (C25-C36)	0.12	J, B

Table B-2-2
Sample Results Qualified QN due to Missing Method Blank

Sample ID	QC Batch	SDG	Lab Sample ID	Method	Analyte	Result (mg/L)	Qualifier
13-9LF-WS03-0	KWG1311316	K1309641	K130964104	AK102	Diesel Range Organics (C10-C25)	0.014	J, QN
13-9LF-WS03-0	KWG1311318	K1309641	K130964104	AK103	Residual Range Organics (C25-C36)	0.03	J, QN

Table B-2-3
Sample Results Qualified QL due to Matrix Spike Exceedance

Sample ID	QC Batch	SDG	Lab Sample ID	Method	Analyte	Result (mg/L)	Percent Recovery	Qualifier
13-9LF-WS01-0	KWG1310603	K1309641	K130964102	AK102	Diesel Range Organics (C10-C25)	0.016	-	QL
Matrix Spike	KWG1310603	QCK1309641	KWG13106031	AK102	Diesel Range Organics (C10-C25)	1.13	74	
Matrix Spike Dup	KWG1310603	QCK1309641	KWG13106032	AK102	Diesel Range Organics (C10-C25)	1.12	72	

Table B-2-4
Sample Results Qualified QN due to Duplicate RPD Exceeding 30%

Sample ID	Lab Sample ID	Dup Sample ID	Dup Lab Sample ID	Method	Analyte	Result (mg/L)	Duplicate Result (mg/L)	RPD (%)
13-9LF-WS01-0	130964102F	13-9LF-WS02-0	130964103F	SW6020A	Cadmium	0.000012	0.00004	108
13-9LF-WS01-0	130964102F	13-9LF-WS02-0	130964103F	SW6020A	Lead	0.000013	0.000051	119
13-9LF-WS01-0	K130964102	13-9LF-WS02-0	K130964103	8270SIM	2-Methylnaphthalene	0.0000026	0.000005	63
13-9LF-WS01-0	K130964102	13-9LF-WS02-0	K130964103	8270SIM	Benzo(b)fluoranthene	0.0000026	0.000005	63
13-9LF-WS01-0	K130964102	13-9LF-WS02-0	K130964103	SW6020A	Cadmium	0.000005	0.00001	67
13-9LF-WS01-0	K130964102	13-9LF-WS02-0	K130964103	8270SIM	Dibenzo(a,h)anthracene	0.0000027	0.000005	60
13-9LF-WS01-0	K130964102	13-9LF-WS02-0	K130964103	8270SIM	Fluorene	0.0000087	0.000005	54
13-9LF-WS01-0	K130964102	13-9LF-WS02-0	K130964103	8270SIM	Naphthalene	0.000031	0.000094	101
13-9LF-WS01-0	K130964102	13-9LF-WS02-0	K130964103	8270SIM	Phenanthrene	0.0000087	0.000005	54
13-9LF-WS01-0	K130964102	13-9LF-WS02-0	K130964103	AK103	Residual Range Organics (C25-C36)	0.036	0.024	40
13-9LF-WS01-0	K130964102	13-9LF-WS02-0	K130964103	SW6020A	Zinc	0.00178	0.00131	30

ATTACHMENT B-3

ADEC Laboratory Data Review Checklists

Laboratory Data Review Checklist

Completed by:	Angela DiBerardino		
Title:	Project Chemist	**Date:**	October 22, 2013
CS Report Name:	North East Cape	**Report Date:**	November 2013
Consultant Firm:	Jacobs Engineering Group Inc.		
Laboratory Name:	ALS Environmental	**Laboratory Report Number:**	K1309641
ADEC File Number:		**ADEC RecKey Number:**	

1. **Laboratory**
   a. Did an ADEC CS-approved laboratory receive and perform all of the submitted sample analyses?
   ☑ Yes ☐ No ☐ NA (Please explain.) Comments:
   ALS of Kelso, WA performed all analysis.

   b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses ADEC CS approved?
   ☐ Yes ☐ No ☑ NA (Please explain.) Comments:

2. **Chain of Custody (CoC)**
   a. CoC information completed, signed, and dated (including released/received by)?
   ☑ Yes ☐ No ☐ NA (Please explain.) Comments:

   b. Correct Analyses requested?
   ☑ Yes ☐ No ☐ NA (Please explain.) Comments:

3. **Laboratory Sample Receipt Documentation**
   a. Sample/cooler temperature documented and within range at receipt (4° ± 2° C)?
   ☐ Yes ☑ No ☐ NA (Please explain.) Comments:

Cooler Alpha - Temperature Blank 1.8°C, Cooler Temperature 4.2°C
Cooler Mike - Temperature Blank 1.2°C, Cooler Temperature 0.8°C
Cooler Kilo - Temperature Blank NA, Cooler Temperature 0.8°C
Cooler Juliet - Temperature Blank 1.7°C, Cooler Temperature 2.7°C
Cooler Echo - Temperature Blank 2.8°C, Cooler Temperature 4.6°C
Cooler Romeo - Temperature Blank 3.2°C, Cooler Temperature 3.7°C
Cooler Charlie - Temperature Blank 1.2°C, Cooler Temperature 4.6°C
Cooler Hotel - Temperature Blank 2.4°C, Cooler Temperature 5.7°C

b. Sample preservation acceptable – acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

c. Sample condition documented – broken, leaking (Methanol), zero headspace (VOC vials)?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

There were no discrepancies according to the cooler receipt form besides the temperature.

e. Data quality or usability affected? (Please explain.)

Comments:

Data quality and usability was not affected by the low temperature since no samples were frozen upon receipt at the laboratory.

4. Case Narrative

a. Present and understandable?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

b. Discrepancies, errors or QC failures identified by the lab?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

Manual integrations performed by the laboratory are presented in the case narrative for method AK101, AK102, AK103, SW8082 SW8260, and SW8270.
QC failures are discussed in the relevant sections of this checklist.

c. Were all corrective actions documented?

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

d. What is the effect on data quality/usability according to the case narrative?

Comments:

Effects on data quality and usability are discussed in the relevant sections of this checklist.

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

b. All applicable holding times met?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

c. All soils reported on a dry weight basis?

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

Water samples were submitted with this SDG.

d. Are the reported PQLs less than the Cleanup Level or the minimum required detection level for the project?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

e. Data quality or usability affected?

Comments:

Data quality and usability were not affected.

6. QC Samples

a. Method Blank

i. One method blank reported per matrix, analysis and 20 samples?

☐ Yes ☑ No ☐ NA (Please explain.) Comments:

AK102/103 - Sample 13-9LF-WS03-0 was reported without a method blank. During the initial preparation batch KWG1311318, the method blank extract was lost. The samples were re-extracted except for sample 13-9LF-WS03-0 had insufficient sample for re-extraction.

ii. All method blank results less than PQL?

☐ Yes ☑ No ☐ NA (Please explain.) Comments:

AK103 – Method blank (QC batch KWG1310602) had a detection for RRO above the DL at 0.02 mg/L.

iii. If above PQL, what samples are affected?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

Associated samples were 13-KMS-WS01-0, 13-9LF-WS02-0, 13-9LF-WS04-0, 13-9LF-WS01-0, 13-7LF-WS03-0, 13-7LF-WS02-0, and 13-7LF-WS01-0.

iv. Do the affected sample(s) have data flags and if so, are the data flags clearly defined?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

Associated samples were qualified B.
Sample 13-9LF-WS03-0 was qualified QN for AK102/AK103.

v. Data quality or usability affected? (please explain)

Comments:

Data quality is minimally affected for sample results qualified B since they have a high bias and were less than the Project Action Limit.
Sample 13-9LF-WS03-0 was qualified without a bias. The data quality is minimally affected; if there were to be a bias based on the method blank it would be high and the sample result is significantly less than ADEC Cleanup criteria.

b. Laboratory Control Sample/Duplicate (LCS/LCSD)

i. Organics – One LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

ii. Metals/Inorganics – one LCS and one sample duplicate reported per matrix, analysis and 20 samples?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

☐ Yes ☑ No ☐ NA (Please explain.) Comments:

All LCS percent recoveries were within DoD QSM and AK series criteria.

AK102 – MS and MSD recovery for DRO was less than ADEC method criteria at 72% and 74%.
SW8270 – MS recovery for Benzo(a)pyrene was greater than DoD QSM criteria at 113%.

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

v. If %R or RPD is outside of acceptable limits, what samples are affected?

Comments:

AK102 – Parent sample 13-9LF-WS01-0 was affected
SW8270 – Parent sample 13-9LF-WS01-0 was not affected since the bias was high and the parent sample result was nondetect.

vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

AK102 – Parent sample 13-9LF-WS01-0 was qualified ML
SW8270 – Parent sample 13-9LF-WS01-0 was not qualified since the bias was high and the parent sample result was nondetect.

vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

Data quality was minimally affected even though the bias was low; the AK102 sample result 13-9LF-WS01-0 was significantly below the Project Action Limit.

c. Surrogates – Organics Only

i. Are surrogate recoveries reported for organic analyses – field, QC and laboratory samples?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

iv. Data quality or usability affected? (Use the comment box to explain.)

Comments:

Data quality and usability were not affected.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.):
Water and Soil

i. One trip blank reported per matrix, analysis and for each cooler containing volatile samples? (If not, enter explanation below.)

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC? (If not, a comment explaining why must be entered below)

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

iii. All results less than PQL?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

iv. If above PQL, what samples are affected?

Comments:

NA

v. Data quality or usability affected? (Please explain.)

Comments:

Data quality and usability were not affected.

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

ii. Submitted blind to lab?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

Primary 13-9LF-WS01-0 / Duplicate 13-9LF-WS02-0

iii. Precision – All relative percent differences (RPD) less than specified DQOs? (Recommended: 30% water, 50% soil)

$$\text{RPD (\%)} = \text{Absolute value of: } \frac{(R_1-R_2)}{((R_1+R_2)/2)} \times 100$$

Where R_1 = Sample Concentration
R_2 = Field Duplicate Concentration

☐ Yes ☑ No ☐ NA (Please explain.) Comments:

RPDs were greater than 30% for the following analytes and results were qualified QN:
SW6020 Dissolved – cadmium, lead
SW6020 – cadmium, zinc
SW8270 - 2-Methylnaphthalene, Benzo(b)fluoranthene, Dibenzo(a,h)anthracene, Fluorene, Naphthalene, and Phenanthrene
AK103 - Residual Range Organics (C25-C36)
In cases where the result is nondetect, the LOD was used for calculation purposes.

iv. Data quality or usability affected? (Use the comment box to explain why or why not.)

Comments:

Data quality was minimally affected, all results qualified QN were less than the Project Action Limit. The largest value between the primary and duplicate value will be used.

f. Decontamination or Equipment Blank (If not used explain why).

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

Disposable sampling equipment was used.

i. All results less than PQL?

☐ Yes ☐ No ☑ NA (Please explain.) Comments:

ii. If above PQL, what samples are affected?

Comments:

NA

iii. Data quality or usability affected? (Please explain.)

Comments:

Data quality and usability were not affected.

7. **Other Data Flags/Qualifiers (ACOE, AFCEE, Lab-Specific, etc.)**

a. Defined and appropriate?

☑ Yes ☐ No ☐ NA (Please explain.) Comments:

Qualifiers are defined in the Data Quality section of the report.

ATTACHMENT B-4

Laboratory Data

(Available electronically)

APPENDIX C

Field Documentation

Field Logbooks
Groundwater Sampling Forms

INCH

Outdoor writing products
for Outdoor writing people

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LOGBOOK #1 SITE NOTES

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UNIVERSAL
№ 373

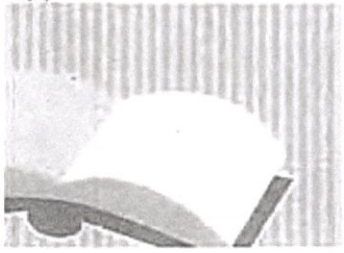
C. FELL
J. ORCZEWSKA
K. MAHER

HTRW-307-05F45902-H04-0001
05F45902

Daily Logbook Checklist

Did you remember ... ???

- ☐ Project name / Site ID / Client
- ☐ Date
- ☐ Weather, site conditions, and other salient observations
- ☐ Level of PPE used
- ☐ Full names of onsite personnel and affiliations (including all visitors)
- ☐ Daily objectives
- ☐ Field measurements and calibrations
- ☐ Time and location of activity
- ☐ Field observations and comments
- ☐ Deviations from the Work Plan
- ☐ Site photographs
- ☐ Site sketches (with reference i.e. "N" arrow)
- ☐ Survey and location i.e. samples or debris (GPS coordinates when possible)
- ☐ For each sample record:
  - Date, time, sampler(s)
  - Sample ID
  - Media, container(s), preservatives
  - QC (dup/MS/MSD)
  - Analysis
  - MeOH lot #
  - Tare weight



- ☐ Sample shipments (when, what, destination)
- ☐ Waste tracking (when, how much, destination)
- ☐ Daily summary of activities (i.e. # of samples collected)

LOGBOOK #1 SITE NOTES

Rite in the Rain
ALL-WEATHER WRITING PAPER

DCN
HTRW-J07-05F45902-H04-0001

Name JACOBS ENGINEERING

Address 4300 B STREET SUITE 600
ANCHORAGE AK 99503

Phone 907 563 3322

Project NE CAPE 5-YR REVIEW
05F45902

C. FELL CF
J. ORCZEWSKA
K. MAHER

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NE CAPE, 5-YR REVIEW, USACE 9/11/13

~1240 LEFT NOME FOR NE CAPE ON BERING AIR

~1400 ARRIVED AT BRISTOL ENG. CAMP ON NE CAPE

SITE ORIENTATION W/ CHUCK CROLEY

PERSONNEL (LEVEL D PPE)

JACOBS	K. MAHER	P.M.
JACOBS	J. ORCZEWSKA	BIOLOGIST
JACOBS	C. FELL	GEOLOGIST
BRISTOL	C. CROLEY	SITE SUPER
USACE	J. CRANER	QAR

1430 GOT SITUATED IN LODGING AND PREPPED SOME OF THE FIELD GEAR
- ↳ GEL ICE IN FREEZER
- ↳ ONLY 12 COOLERS → SPACE ISSUE?

NOTE / PLAN TO SPEND REMAINDER OF DAY SCOUTING SITES AND FLAGGING SAMPLING LOCATIONS

WX: MOSTLY CLOUDY TO OVERCAST SOUTH WIND 5 TO 10 MPH TEMP MID 40S

Scale: 1 square = _____

Rite in the Rain

NE CAPE
9/11/13 5-YR REVIEW USACE

1521 SITE DRIVE W/ THE CRAR (USACE)
↳SITE 8 IS THE LOW LYING AREA ALONG THE RIGHT SIDE OF THE ROAD (CAMP)
LEFT FROM CAMP ROAD
↳SITE 7 IS THE THICKLY VEGETATED HILL LEFT FROM SITE 8
↳SITE 6 IS WHERE INTERMODAL CONTAINERS ARE STAGED
↳SITE 3 IS ON THE RIGHT JUST BEFORE BEACH
↳SITE 4 IS ON THE LEFT JUST BEFORE BEACH
↳SITE 5 IS ON THE BEACH

NOTE MARK BOUNDARIES OF SITES WHERE OBSERVED OR MAKE SKETCHES

1612 ↳SITE 9 IS THE BARE AREA ON LEFT SIDE OF ROAD JUST BEFORE INTERMODAL CONTAINER STAGING AREA ON THE RIGHT
↳SITE 10 IS THE NEWLY GRADED AREA JUST PAST CONTAINER STAGING AREA.
↳SITE 11 IS THE NEWLY DISTURBED AREA JUST DOWNHILL OF THE CF 9/11/13 SITE 10
↳SITE 28 IS THE LOW AREA BELOW SITE 10
↳SITE 31 & 32 ARE UP THE ROAD TOWARD QUARRIES
→32 IS FOUNDATION AT BASE OF HILL

Scale: 1 square = _____ PAGE 2

1711 ↳SITE 16 IS ESSENTIALLY AT THE GAC STATION JUST BEFORE THE GAC STATION
* DIRECTIONS ARE BASED ON COMING FROM CAMP

1742 END OF SITE WALK

1745 to 1815 DINNER

1820 GEAR ORGANIZATION & COOLER PREP

Bottle Count

		From WP	WS 19
Coolers = 12			
250 HNO_3 Polys = 33	3	35	Filtered Unfiltered
1L HCl = 35	5	30	×10
1L No pres = ~~1240~~	50	45	
40mL HCl VOA = ~~69~~		60	

Per cooler Sample Location

Ground water + SW
- 6 x 40mL VOA
- 2 x 1L HCl AMBER
- 3 x 1L No pres AMBER
- 2 x 250mL HNO_3 [Filtered Unfiltered]

2005 END OF DAY

Scale: 1 square = _____ PAGE 3

Rite in the Rain

NE CAPE
5-YEAR REVIEW

USACE
9/12/13

0655 HEALTH AND SAFETY MEETING (BRISTOL)

0715 DAILY TAIL GATE (JACOBS)

↳ PERSONNEL (LEVEL D PPE)

JACOBS	K. MAHER	SITE LEAD
JACOBS	C. FELL	SSHO/TECH
JACOBS	J. ORCZEWSKA	TECH

WX: PARTLY TO MOSTLY CLOUDY
35°F TO 40sF
CALM TO LIGHT BREEZE

0752 DAILY OBJECTIVES:
- COMPLETE GW/SURFACEWATER SAMPLING
- SITE WALKS FOR SITE 7 & 9 (LANDFILL)

Christopher D. Fell
9/12/13

NE CAPE
5 YEAR REVIEW

USACE
9/12/13

0754 TURBIDIMETER (S/N 6192)
↳ CALIBRATED ON 9/6/13 BY TTT ENVIRO

0905 YSI (S/N 1000449) CALIBRATION VERIFICATION
↳ CALIBRATED ON 9/6/13 BY TTT ENVIRO
↳ BAROMETER CAL: 29.72 in Hg
↳ CAL VERIFICATION
→ ORP: 240mV exp. 12/17 = 256.8mV OK
→ COND: 1413 $\mu m/cm^{25°C}$ / 1020 $mm/cm^{11°C}$ = 929 OK
→ pH 7.0: 6.95 OK
→ pH 10.01: 10.01 OK
→ pH 4.01: 3.95 OK

0940 LOADED SUPPLIES IN PICKED AND TRAVELLED TO SITE 9

0945 ARRIVED AT SITE 9 LANDFILL

↳ BEGAN SAMPLING PROCEDURE AT LOCATIONS 9LF-WS01 & 9LF-WS02

0950 ADVANCED DRIVE POINT

NE CAPE
5 YEAR REVIEW

USACE
9/12/13

1000 PRIMARY & MS/MSD *SAMPLE: 13-9LF-WS01-0
↳COLLECTED WITH DEDICATED DIPPER
↳4 40ml VOAs (HCl) AK101/BTEX SW8260
unfiltered ↳1 250poly (HNO_3) SW6020 RCRA METALS SW7471 MERCURY
filtered ↳1 250poly (HNO_3) SW6020 RCRA METALS SW7471 MERCURY
CF/KM/JO ↳2 1L AMBER (HCl) AK102/AK103
↳3 1L AMBER (none) SW8270SIM/SW8082
→SURFACE WATER
X3 FOR MS/MSD
—FILTERED METALS COLLECTED W/PERISTALTIC

1000 DUPLICATE *SAMPLE: 13-9LF-WS02-0
↳COLLECTED WITH DEDICATED DIPPER
↳4 40ml VOAs (HCl) AK101/BTEX SW8260
unfiltered ↳1 250poly (HNO_3) SW6020 RCRA METALS SW7471 MERCURY
filtered ↳1 250poly (HNO_3) SW6020 RCRA METALS SW7471 MERCURY
CF/KM/JO ↳2 1L AMBER (HCl) AK102/AK103
↳3 1L AMBER (none) SW8270SIM/SW8082
→SURFACE WATER
—FILTERED METALS COLLECTED W/PERISTALTIC

1135 FINISHED SAMPLING 9LF-WS01
9LF-WS02

*SAMPLES MAINTAINED AT 4±2°C AFTER COLLECTION

Scale: 1 square = _____

PAGE 6

NE CAPE
5 YEAR REVIEW

USACE
9/12/13

1149 BEGAN SAMPLING PROCEDURE AT LOCATION 9LF-SW03

1155 *SAMPLE: 13-9LF-WS03-0
CF/KM/JO PRIMARY ↳COLLECTED WITH DEDICATED DIPPER
↳4 40ml VOAs (HCl) AK101/SW8260
unfiltered ↳1 250poly (HNO_3) SW6020 RCRA METALS SW7471 MERCURY
filtered ↳1 250poly (HNO_3) SW6020 RCRA METALS SW7471 MERCURY
↳2 1L AMBER (HCl) AK102/AK103
↳3 1L AMBER (none) SW8270SIM/SW8082
→SURFACE WATER
→FILTERED METALS COLLECTED W/PERISTALTIC

1211 FINISHED SAMPLING AT LOCATION 9LF-WS03

1212 SAMPLING LOCATIONS ARE RECORDED ON APPENDIX A FIGURES IN THE WORK PLAN (FIELD COPY) AND ON PAGE 8

1215 LEFT FOR LUNCH

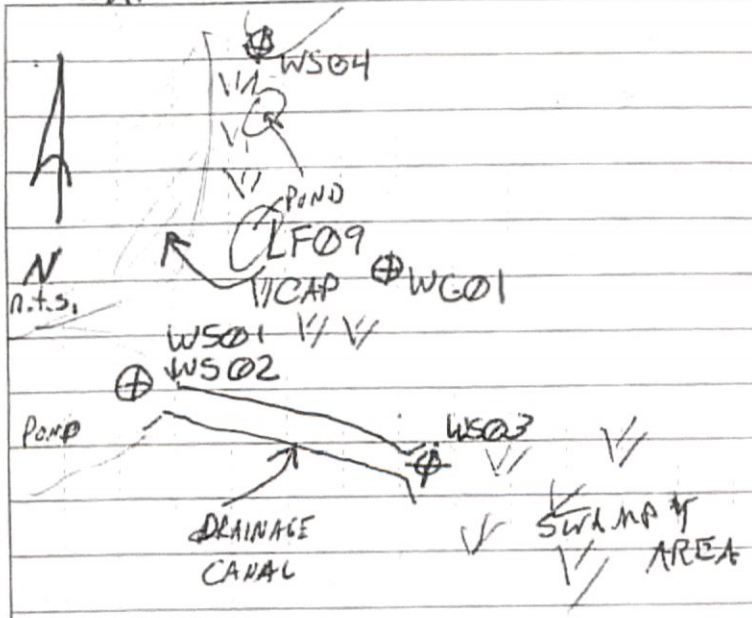
Scale: 1 square = _____

PAGE 7

Rite in the Rain

NE CAPE
5 YEAR REVIEW

USACOE
9/12/13



1305 HEADED BACK TO SITE

1310 ADVANCED DRIVE POINT AT SITE 7 LAND FILL
- ↳ REFUSAL AT APROX 4-6 INCHES BGS
- ↳ STEPPED OUT APPROX. 1FT → REFUSAL AT 6in
- ↳ STEPPED OUT APPROX 10FT NORTH → REFUSAL AT 6in
- ↳ STEPPED OUT APPROX 20FT NORTH → REFUSAL AT 30in

1340 BEGAN SAMPLING AT 9LF-WG01

1346 BEGAN SAMPLING PROCEDURE AT LOCATION 9LF-WS04

Scale: 1 square = _____

NE CAPE
5 YEAR REVIEW

USACE
9/12/13

1350 *SAMPLE: 13-9LF-WS04-0
- ↳ COLLECTED W/ DEDICATED DIPPER, FILTERED METALS COLLECTED W/ PERISTALTIC
- ↳ 4 40ml VOAs (HCL) AK101/SW8260 (BTEX)
- ↳ 2 1L AMBER (HCL) AK102/AK103

PRIMARY

FILTERED ↳ 1 250ml POLY (HNO_3) SW6020 RCRA METALS SW7471 MERCURY

UNFILTERED ↳ 1 250ml POLY (HNO_3) SW6020 RCRA METALS SW7471 MERCURY
- ↳ 3 1L AMBER (none) SW8270 SIM/SW8082
- → SURFACE WATER

1351 *SAMPLE: ~~13-9LF-WS04~~ CP 9/12

PRIMARY 13-9LF-WG01-2
- ↳ COLLECTED W/ PERISTALTIC PUMP
- 1416 ↳ 4 40ml VOAs (HCl) AK101/SW8260 (BTEX)
- 1550 FILTERED ↳ 1 250ml POLY (HNO_3) SW6020 RCRA METALS SW7471 MERCURY
- ~~↳ 250ml POLY (HNO_3)~~ CP 9/12

Christopher D Fell 9/12/13

Scale: 1 square = _____

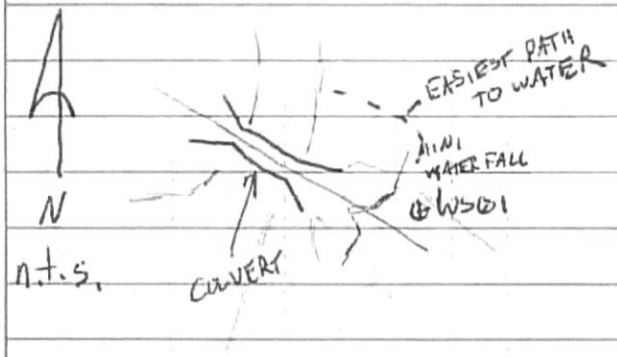
NE CAPE
5 YEAR REVIEW

USACE
9/12/13

1437 GROUNDWATER GRAB SAMPLING AT LOCATION 9LF-WG01
- WATER EXTREMELY TURBID W/ SILT/FINE SAND & ORGANICS.
- SCREEN CONTINUALLY PLUGS WITH FINE ORGANICS & SEDIMENT
- PRODUCTION RATE MUCH LOWER THAN 250ml/min
  - 4 40ml VOAs IN ONE HOUR

1450 FINISHED SAMPLING 9LF-WS04

1504 ARRIVED AT KANGUKSHAM MOUNTAIN SPRING SAMPLING LOCATION (KMS



NE CAPE
5 YEAR REVIEW

USACE
9/12/13

1516 STARTED SAMPLING PROCEDURE AT THE KANGUKSHAM MOUNTAIN SPRING

1521 *SAMPLE: 13-KMS-WS01-0
↳ COLLECTED WITH DEDICATED DIPPER, FILTERED ~~w/~~ (CF) 9/12 METALS COLLECTED WITH PERISTALTIC PUMP
PRIMARY
CF/JO
↳ 4 40ml VOAs (HCl) AK101/SW8260C(BTEX)
↳ 1 250ml Poly (HNO_3) SW6020 RCRA METALS SW 7471 MERCURY
↳ 1 250ml Poly (HNO_3) SW6020 RCRA METALS SW 7471 MERCURY
↳ 2 1L AMBER (HCl) AK102/AK103
↳ 3 1L AMBER (none) SW8270SIM/SW8082
→ SURFACE WATER

1539 FINISHED SAMPLING AT KANGUKSHAM MOUNTAIN SPRING

1550 FINISHED SAMPLING AT ~~9LF-WG01~~ (CF) 9/12
9LF-WG01-2 DUE TO EXTREMELY LOW WATER PRODUCTION FROM THE WELL POINT

1600 ARRIVED AT SITE 7 LANDFILL
↳ LAID OUT LOCATIONS

1625 STARTED SAMPLING PROCEDURE AT 7LF-WS01

1630 *SAMPLE: 13-7LF-WS01-0
PRIMARY CF/JO/KM
↳ COLLECTED W/ DEDICATED DIPPER, FILTERED METALS COLLECTED W/ PERISTALTIC PUMP
↳ 4 40ml VOAs (HCl) AK101/SW8260 (BTEX)
FILTERED ↳ 1 250ml POLY (HNO_3) SW6020 RCRA METALS SW7471 MERCURY
UNFILTERED ↳ 1 250ml POLY (HNO_3) SW6020 RCRA METALS SW7471 MERCURY
↳ 2 1L AMBER (HCl) AK102/AK103
↳ 3 1L AMBER (none) SW8270SIM/SW8082
– SURFACE WATER

1650 FINISHED SAMPLING AT 7LF-WS01

1640 STARTED SAMPLING PROCEDURE AT 7LF-WS02

1644 *SAMPLE: 13-7LF-WS02-0
PRIMARY JO/CF/KM
↳ COLLECTED W/ DEDICATED DIPPER, FILTERED METALS COLLECTED WITH PERISTALTIC PUMP
↳ 4 40ml VOAs (HCl) AK101/SW8260 (BTEX)
FILTERED ↳ 1 250ml POLY (HNO_3) SW6020 RCRA METALS SW7471 MERCURY
UNFILTERED ↳ 1 250ml POLY (HNO_3) SW6020 RCRA METALS SW7471 MERCURY
↳ 2 1L AMBER (HCl) AK102/AK103
↳ 3 1L AMBER (none) SW8270SIM/SW8082
→ SURFACE WATER

1653 STARTED SAMPLING PROCEDURE AT 7LF-WS03-0

~~PRIM~~ CF 9/12

1654 *SAMPLE: 13-7LF-WS03-0
PRIMARY JO/CF/KM
↳ COLLECTED W/ DEDICATED DIPPER, FILTERED METALS WITH PERISTALTIC PUMP
↳ 4 40ml VOAs (HCl) AK101/SW8260 (BTEX)
FILTERED ↳ 1 250ml POLY (HNO_3) SW6020 RCRA METALS SW7471 MERCURY
UNFILTERED ↳ 1 250ml POLY (HNO_3) SW6020 RCRA METALS SW7471 MERCURY
↳ 2 1L AMBER (HCl) AK102/AK103
↳ 3 1L AMBER (none) SW8270SIM/SW8082
→ SURFACE WATER

NE CAPE
5 YEAR REVIEW

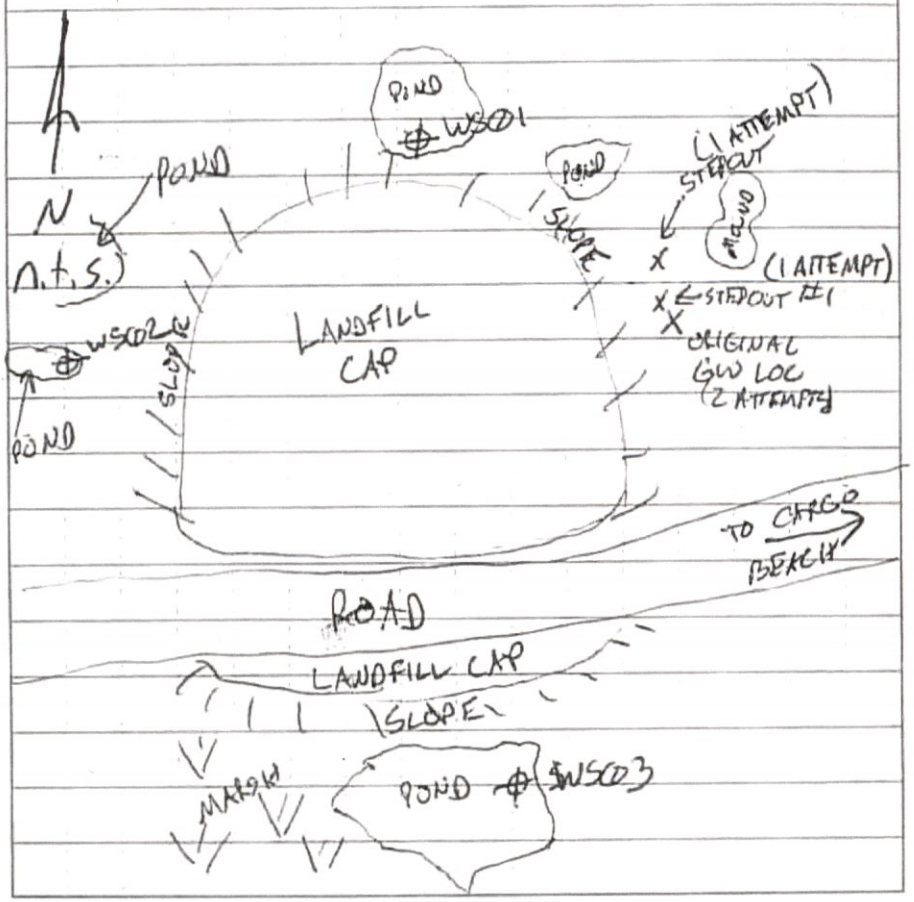
USACE
9/12/13

1720 FINISHED SAMPLING AT 7LF-WS02

1738 FINISHED SAMPLING AT 7LF-WS03

~~LEFT SITE FOR THE DAY~~ (P) 9/12

1736 7LF GW SAMPLING LOCATION

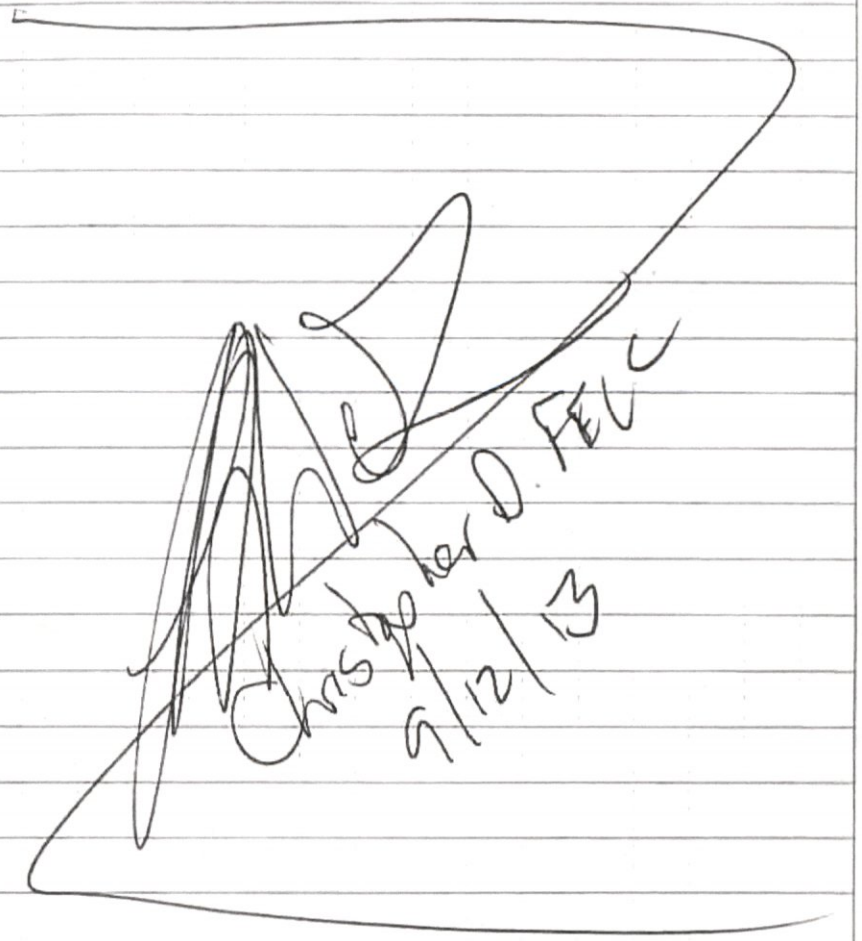


Scale: 1 square = _____

NE CAPE
5 YEAR REVIEW

USACE
9/12/13

1749 LEFT SITE FOR THE DAY
↳ TRANSFERRED SAMPLES BACK TO CAMP
↳ SAMPLING WASTE/IDW TRANSFERRED BACK TO CAMP IN 5 GALLON BUCKETS (PAGE 62)



Scale: 1 square = _____

0700 JACOBS TAILGATE

PERSONNEL

JACOBS	K. MAHER	SME LEAD
JACOBS	C. FELL	SSHO/TECH
JACOBS	J. ORCZEWSKA	TECH

→ K. MAHER DEPARTED AT APPROX 1440

WX: WINDY 10-20mph GUSTS
30sF TO 40sF
OVERCAST

0720 DAILY OBJECTIVES
- COOLER PACKING
- RENTAL DEMOBE
- 5YR REVIEW TRAINING
- BEGIN 5YR REVIEWS

0800 BRISTOL TAILGATTE

0830 TO 1140 PREPARED CHAINS OF CUSTODY FOR 8 COOLERS WITH SAMPLES COLLECTED ON 9/12/13

COOLERS
- KILO
- JULIETT
- CHARLIE
- MIKE
- ALFA
- HOTEL
- ECHO
- ROMEO

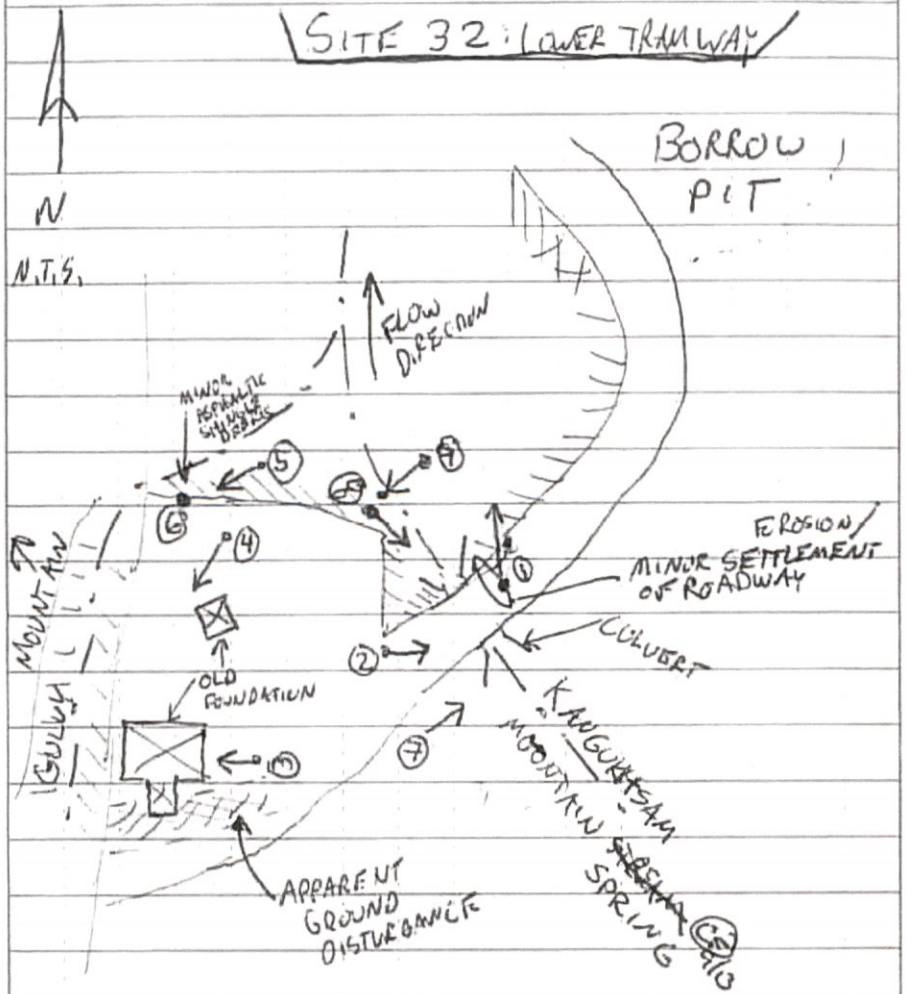
1140 5YEAR REVIEW CHECKLIST TRAINING

1200 LUNCH

1230 BACK FROM LUNCH - GOING TO START SITE WALKS.
→ K. MAHER WAITING IN CAMP FOR AIRPLANE TO NOME

1240 SITE WALK OF SITE 32 - LOWER TRAMWAY
↳ SEE CHECKLIST FOR FURTHER INFORMATION

SITE 32: LOWER TRAMWAY



1313 OBSERVED MINOR WOOD AND METAL DEBRIS ON SITE

1321 OBSERVED MINOR ASPHALTIC SHINGLE DEBRIS 1x2 FT TO 2x2 FT (APPROX) DIMENSIONS ON THE GROUND WEST OF THE OLD FOUNDATION

1325 OBSERVED APPARENT GROUN DISTURBANCE (RECENT) TO THE EAST OF THE OLD FOUNDATION, THIN VEGETATION IS GROWING ON THE EXTREMELY ROCKY SOIL

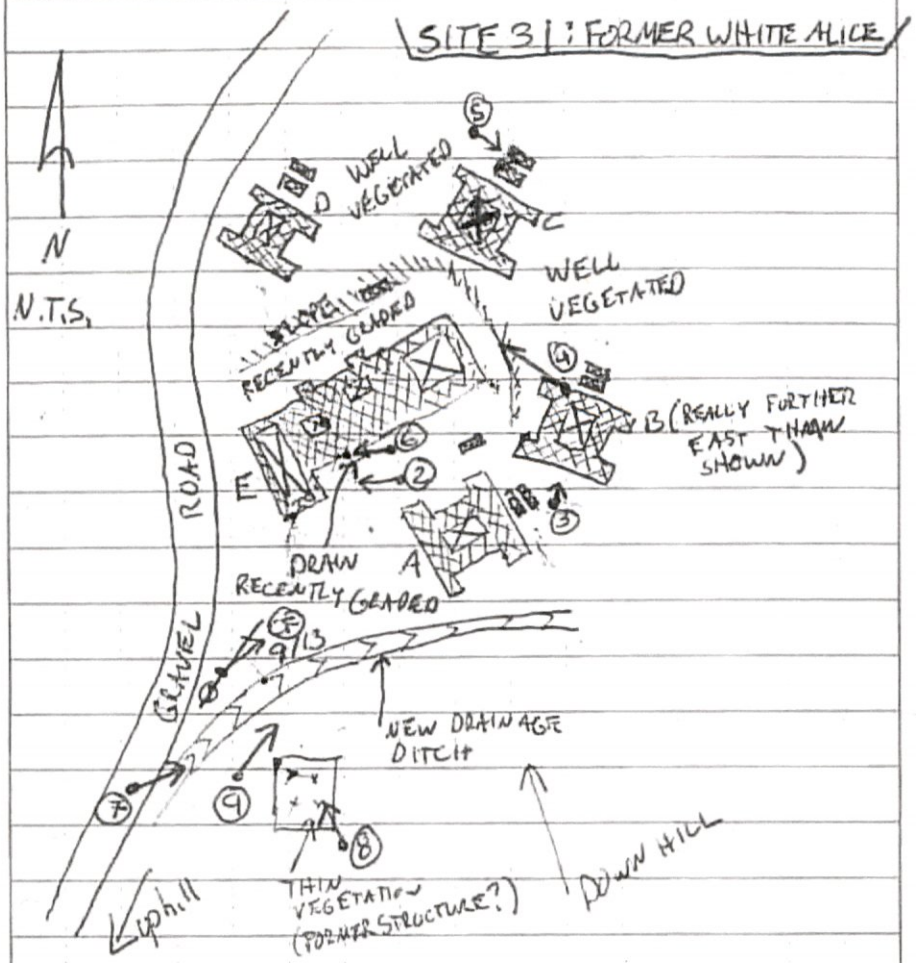
1327 NO GROUNDWATER MONITORING WELLS WERE OBSERVED

1330 CULVERT UNDER ROAD AT THE SITE IS APPROX 5 TO 6 FT IN DIAMETER

1332 ONGOING REMEDIAL ACTIVITY IS MINING BORROW FOR BACK FILL ADJACENT TO THE SITE ON THE OPPOSITE SIDE OF KANGUKITSAM MOUNTAIN SPRING

1343 LEFT SITE 32: LOWER TRAMWAY

1347 ARRIVED AT SITE 31: FORMER WHITE ALICE



1404 OBSERVED MINOR WOOD/METAL/WIRING DEBRIS NEAR ANTENNA FOUNDATION "C"

1405 OBSERVED A DRAIN COVER (RUSTED) ON THE SOUTH SIDE OF FOUNDATION "E" WITH AN UNFILLED VOID UNDERNEATH (APPROX 6 FT DEEP, 5 WIDE, 9FT LENGTH) DRAIN IS APPROX 4FT LONG & 6INCHES WIDE. SAFETY ISSUE

1415 AREA AROUND FOUNDATION "E" AND ANTENNA FOUNDATION "A" HAVE BEEN RECENTLY GRADED, COMPACTED, AND SEEDED. NEW VEGETATION IS JUST SPROUTING. AREA APPEARS TO BE GRADED TO PROMOTE POSITIVE DRAINAGE AND MITIGATE EROSION

1416 HOLES IN FOUNDATIONS HAVE BEEN FILLED WITH SOIL
↳ NO STAINING OF CONCRETE OBSERVED

1420 AREA OF STUNTED VEGETATION ~~CF~~ CF 9/13 UPHILL FROM THE WACS SITE (APPROX 20FT BY 30FT RECTANGLE)

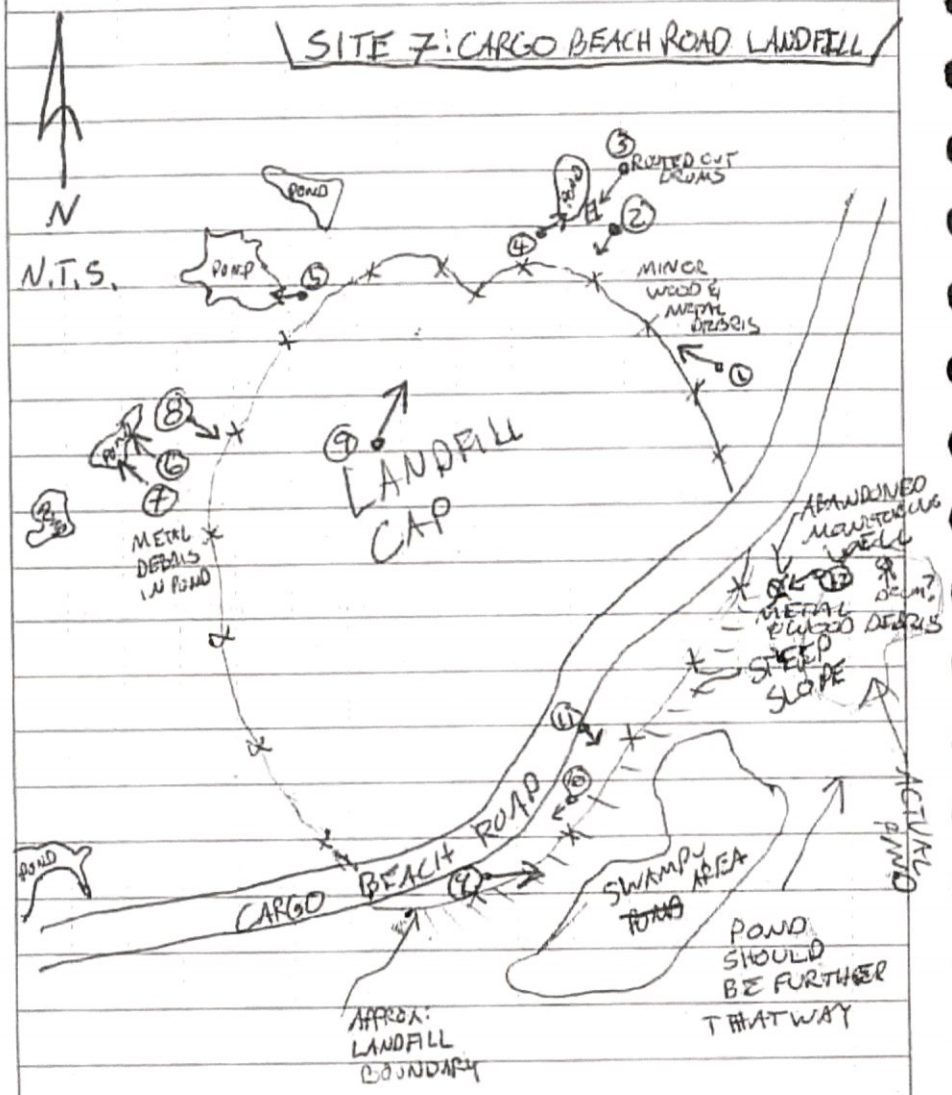
1424 NO GROUNDWATER MONITORING WELLS OBSERVED

1440 LEFT SITE 31: WHITE ALICE
↳ CHECKLIST ON SEPERATE FORM

Rita in the Rain

1509 ARRIVED AT SITE 7: CARGO BEACH ROAD LANDFILL

SITE 7: CARGO BEACH ROAD LANDFILL



1517 THE LANDFILL COVER APPEARS TO CONSIST OF FINE AND COARSE GRAVEL AT THE SURFACE WITH PATCHY GRASS COVER

1523 CARGO BEACH ROAD CROSSES THE LANDFILL CAP. NO SETTLEMENT OBSERVED GRADING/DRAINAGE APPEARS ADEQUATE

1528 WOOD DEBRIS AT PICTURE ① LOCATION (MINOR) WITH OTHER WOOD AND METAL DEBRIS NEARBY

1546 OBSERVED 2 RUSTED OUT DRUMS NEAR THE EDGE OF THE POND NEAR THE NE CORNER OF THE LANDFILL (55gal?)

1547 OBSERVED METAL/WOOD/PLASTIC DEBRIS IN THE NORTHEAST POND

1552 OBSERVED METAL DEBRIS IN THE POND AT THE NW CORNER OF THE LANDFILL WHERE PICTURE ⑤ WAS TAKEN

1553 LANDFILL CAP DOES NOT HAVE OBSERVED SIGNS OF SETTLEMENT/EROSION OR LANDFILL DEBRIS STICKING THROUGH THE CAP

1559 OBSERVED METAL DEBRIS IN THE POND TO THE WEST OF THE LANDFILL (METAL ROOFING?) → PICTURES 6 & 7

1607 RUBBER HOSE STICKING THROUGH LANDFILL CAP ALONG WITH SOME METAL DEBRIS NEAR PICTURES 10 & 11

1615 OBSERVED AN ABANDONED MONITORING WELL NEAR THE SE CORNER OF THE LANDFILL - ABANDONED WITH HYDRATED BENTONITE

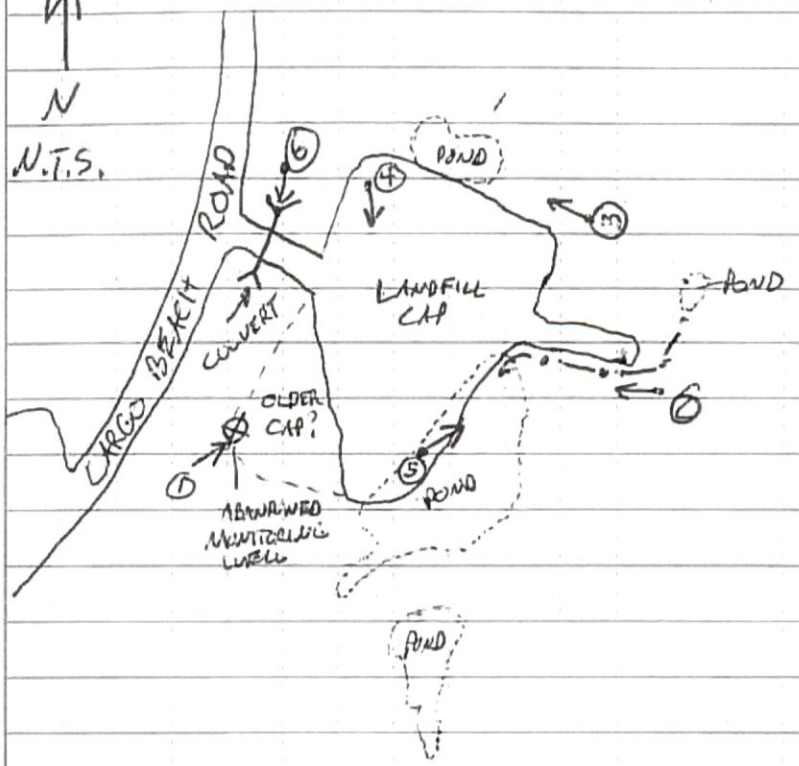
1616 OBSERVED ~~MINOR~~ METAL DEBRIS AND OTHER DEBRIS IN THE POND NEAR THE SE CORNER OF THE LANDFILL (CP 9/13)
↳ OBSERVED A SUBMERGED OBJECT W/ A ROUND OPENING (DRUM?)

1633 ITEMS OF INTEREST
- DEBRIS PROTRUDING THROUGH CAP ON SSIDE (MINOR)
- SIGNIFICANT METAL & WOOD DEBRIS IN THE SURROUNDING PONDS (INCLUDING A FEW RUSTED OUT DRUMS

1637 LEFT SITE 7 LANDFILL
↳ 5YR REVIEW CHECKLIST ON SEPERATE FORM

1640 ARRIVED AT SITE 9: HOUSING & OPERATIONS LANDFILL
↳ 5 YR REVIEW CHECKLIST INCLUDED ON A SEPERATE FORM

SITE 9: HOUSING & OPERATIONS LANDFILL



① → PICTURE LOCATION & DIRECTION
POND BOUNDARY
DIVERSION DITCH
CULVERT

1642 DRAINAGE IN EXCELLENT CONDITION ~ NO VEGETATION IN DITCH

NE CAPE
5 YEAR REVIEW

USACE
9/13/13

1649 LANDFILL CAP APPEARS TO BE IN GOOD CONDITION WITH THIN GRASSY VEGETATION. CAP IS COMPOSED OF COARSE MATERIAL (GRAVEL) THAT MAKES VEGETATIVE GROWTH DIFFICULT.

1651 EROSION & SETTLEMENT WERE NOT OBSERVED. GRADING APPEARS TO ALLOW DRAINAGE

1657 OBSERVED AN ABANDONED MONITORING WELL AT THE SW CORNER OF THE OLD LANDFILL CAP.

↳ COULD NOT FIND THE OTHER 2 MONITORING WELLS SHOWN IN THE DECISION DOCUMENT

1734 LEFT SITE 9: HOUSING & OPERATIONS LANDFILL

END OF DAY

C. Fell
Christopher 9/13/13

NE CAPE
5 YEAR REVIEW

USACE
9/14/13

0800 BRISTOL TAILGATE

0830 JACOBS TAILGATE

PERSONNEL

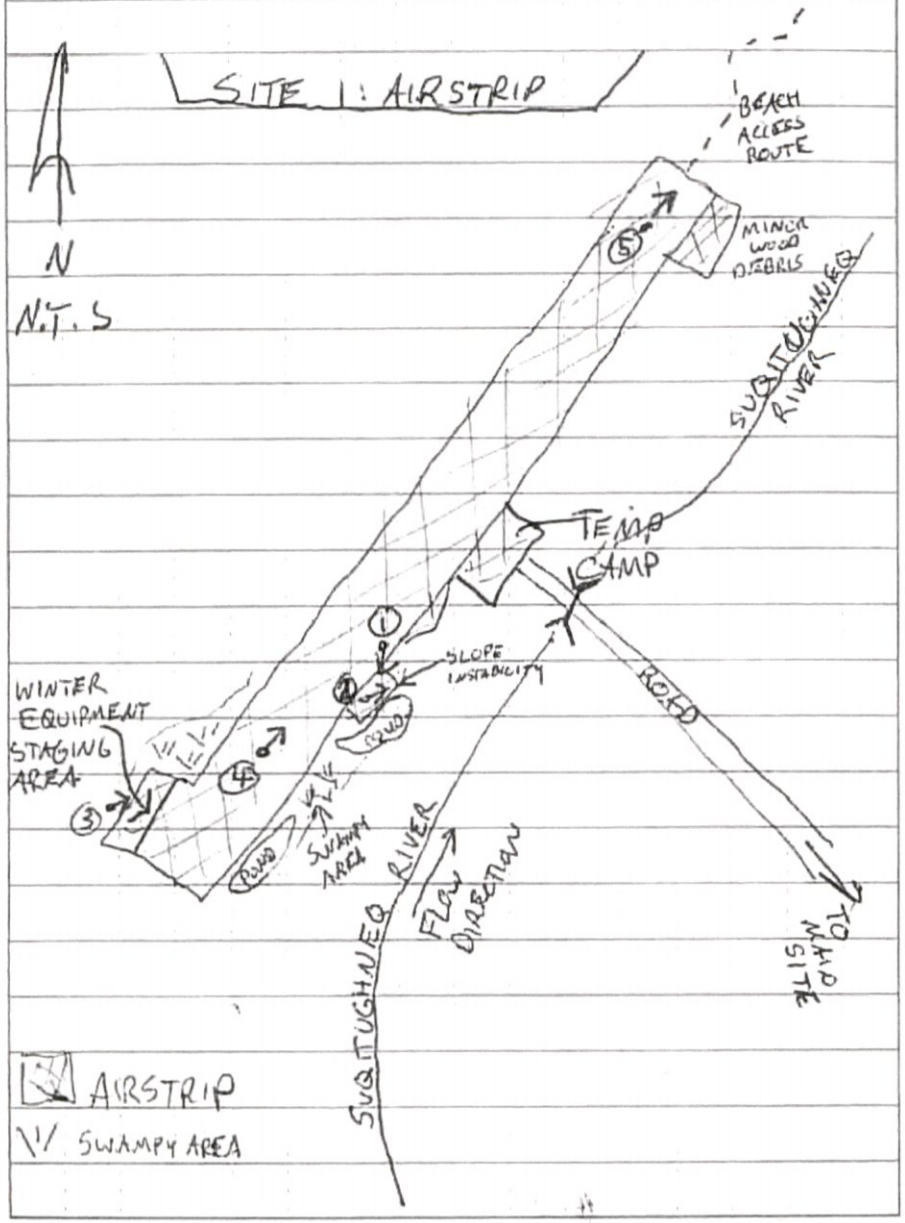
JACOBS	C. FELL	SITE LEAD
JACOBS	J. ORCZEWSKA	SSHO/TECH

WX: CALM
30s TO 40sF
OVERCAST

850 DAILY OBJECTIVES
- 5 YEAR REVIEW SITE WALKS
- PAPERWORK QC
- CONTINUE PREP FOR DEMOBE

850 TO SITE HISTORY REVIEW

0944 LEFT CAMP TO CONDUCT SITE WALK FOR SITE 1: AIRSTRIP



0955 OBSERVED 1 TO 6 INCH TENSION CRACKS IN THE SLOPE OF A SIDING OFF THE SIDE OF THE RUNWAY. THE NORTHEAST CORNER OF THE PAD HAS APPROXIMATELY 1FT OF SETTLEMENT AT THE TOP OF THE SLOPE.

↳ SLOPE INSTABILITY IS APPROX 30-40FT FROM THE EDGE OF THE RUNWAY AND WILL NOT AFFECT OPERATIONS ON THE RUNWAY

1000 RUNWAY SURFACE WAS OBSERVED TO BE IN GOOD CONDITION AND WAS FREE OF RUTTING, SETTLEMENT, OR EROSION DAMAGE

↳ SLOPES IMMEDIATELY ADJOINING THE RUNWAY SURFACE WERE GENERALLY FREE OF SIGNS OF SLOPE INSTABILITY, HOWEVER ARE SLOPED BETWEEN 1 1/2 TO 1 AND 3/4 TO 1 WHICH MAY LEAD TO EROSIVE DAMAGE OVER TIME

↳ SMALL TENSION CRACKS ON 3/4 TO 1 SECTIONS

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5 YEAR REVIEW

USACE
9/14/13

1014 A FEW SHIPPING RACKS ARE STAGED ON THE END OF THE RUNWAY AT THE WINTER STORAGE AREA
↳ NO SOIL STAINING OBSERVED AT STORAGE AREA

1033 MINOR WOOD DEBRIS NOTED ALONG THE EAST SIDE OF THE RUNWAY NEAR THE NORTH END

1038 A TRAIL HAS BEEN FORMED OFF THE NORTH END OF THE RUNWAY LEADING TO THE BEACH.

1044 LEFT SITE 1 AIRSTRIP
↳ 5 YEAR REVIEW CHECKLIST ON A SEPERATE FORM

ITEMS OF INTEREST
- MINOR SLOPE STABILITIES ISSUES ON THE RUNWAY EDGES.

Christopher D. Reed 9/14/13

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5 YEAR REVIEW

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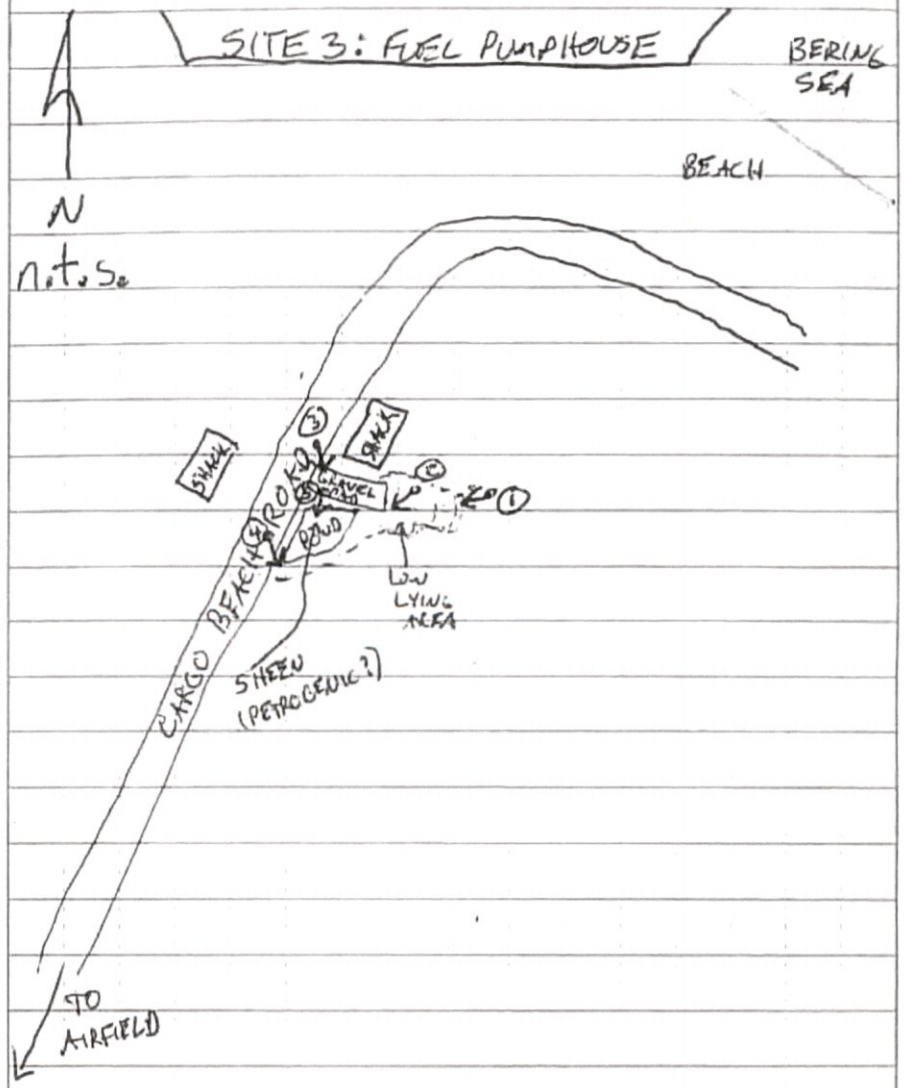
9/14/13

1055 ARRIVED AT SITE 3: FUEL PUMPHOUSE



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5 YEAR REVIEW 9/14/13

1112 OBSERVED A SALVAGED PIECE OF RUSTED OUT EQUIPMENT STAGED FOR REMOVAL

1113 EXCAVATION AREA NOTED IN THE ROD APPEARS TO NOW BE A POND

1114 BIOGENIC SHEEN (BRITTLE) NOTED ON SOME WATER IN FROM THE ROAD

1116 FORMER PIPELINE WAS NOT OBSERVED (REMOVED?) FORMER PUMPHOUSE STRUCTURE HAS BEEN REMOVED.

1119 SHEEN NOTED ON PONDED WATER NEAR THE GRAVEL PAD. SHEEN WAS NOT BRITTLE AND FLOWED BACK TOGETHER AFTER BEING DISTURBED (LIGHT SHEEN)

1126 VEGETATION IS GROWING WELL ONSITE EXCEPT ON A NEW GRAVEL PAD

1132 LEFT SITE 3: FUEL PUMPHOUSE

1133 ARRIVED AT SITE 6: GRAVEL PAD
↳ 5 YEAR REVIEW CHECKLIST ON A SEPERATE FORM

Scale: 1 square = _____ PAGE 32

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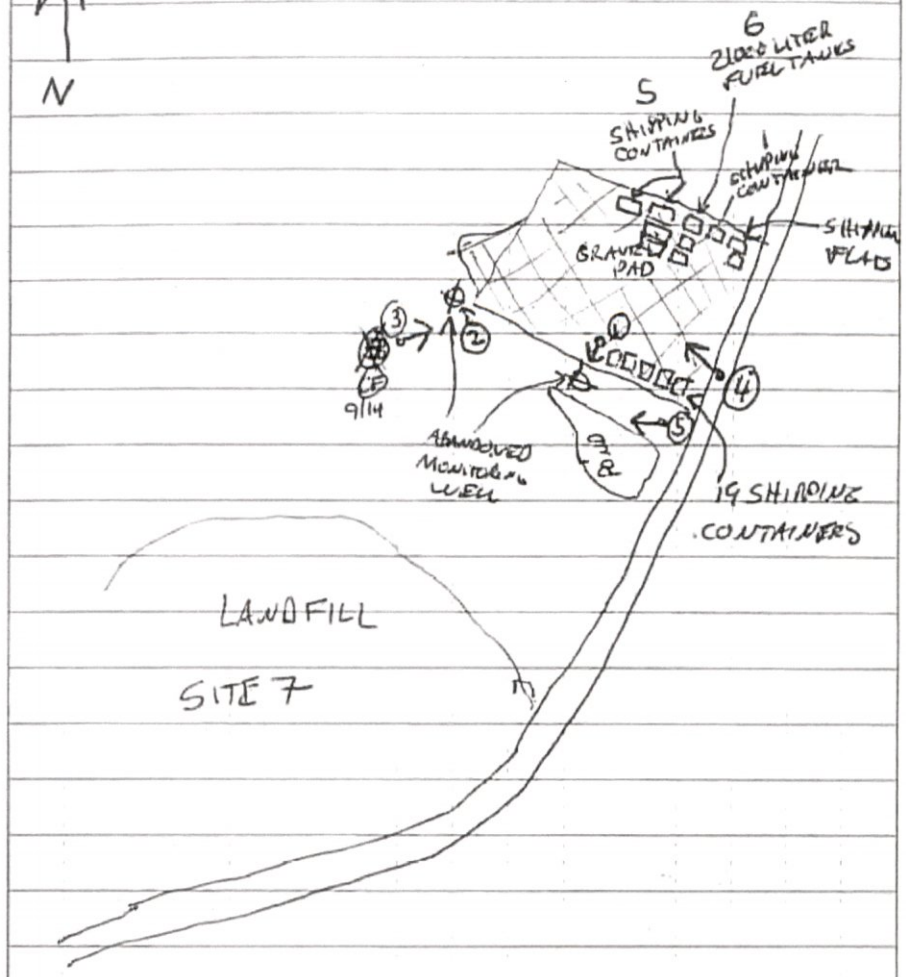
5 YEAR REVIEW 9/14/13

SITE 6: GRAVEL PAD



Scale: 1 square = _____ PAGE 33

Rite in the Rain

1140 OBSERVED AN ABANDONED MONITORING WELL ON THE SW SIDE OF THE SITE. (HYDRATED BENTONITE)

1143 A SECOND ABANDONED MONITORING WELL OBSERVED ON THE WEST CORNER OF THE PAD (HYDRATED BENTONITE)

1148 DID NOT OBSERVE STAINING ON THE NEWLY GRADED GRAVEL PAD THAT IS CURRENTLY BEING USED TO STORE SHIPPING CONTAINERS.

↳ PAD APPEARS TO HAVE BEEN RECENTLY SAMPLED
↳ GRID SAMPLING
↳ PAD GRADED TO PROMOTE DRAINAGE AND MITIGATE EROSION

1153 DID NOT OBSERVE DEBRIS OR A SHEEN IN THE POND TO THE SOUTH OF THE SITE

1155 LEFT SITE 6: GRAVEL PAD

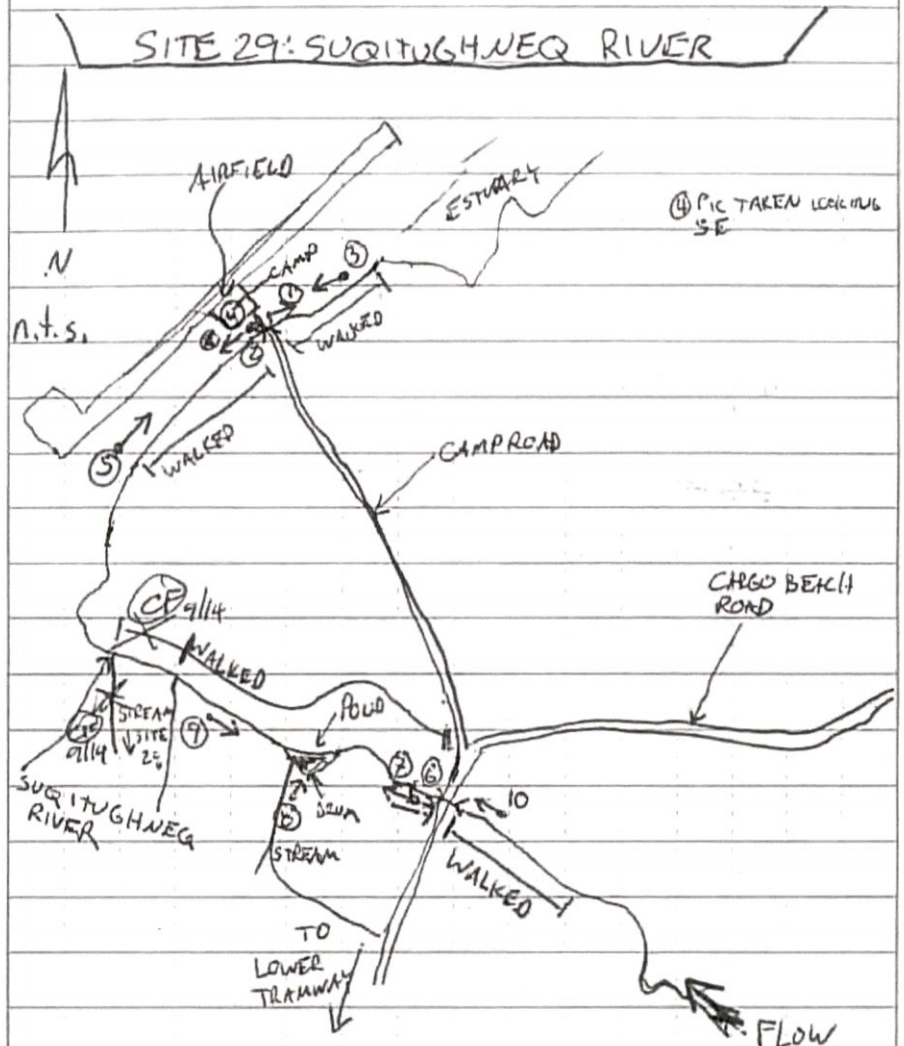
1206 LUNCH

1230 DONE WITH LUNCH

1230 to 1340 VIEWED HISTORICAL PHOTOS WITH JEREMY CRANER (USACE)

1341 SITE WALK FOR SITE 29: SUQITUGHNEQ RIVER
↳ 5 YEAR REVIEW CHECK LIST ON A SEPERATE FORM.

SITE 29: SUQITUGHNEQ RIVER



① → GR ① → PHOTO, DIRECTION

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5 YEAR REVIEW — 9/14/13

1352 WALKED THE SUQITUGHNEQ RIVER FROM CAMP ROAD TO THE ESTUARY

1357 DID NOT OBSERVE ANY DEBRIS OR (PETROGENIC) SHEEN. LOOKS LIKE A RIVER

1402 CONSTRUCTION CAMP IS PUMPING WATER FROM THE SUQITUGHNEQ RIVER FOR GENERAL USE (SOUTH OF ROAD)

1411 WALKED THE SUQITUGHNEQ RIVER FROM CAMP ROAD TO THE END OF THE RUNWAY

1412 ~~DID NOT~~ CF 9/14 DID NOT ~~OVERFLY~~ OBSERVE CEIM ANY DEBRIS OR SHEEN (PETROGENIC).

TRAVELLED UP RIVER

1426 WALKED THE SUQITUGHNEQ RIVER FROM CARGO BEACH ROAD TOWARDS THE AIRFIELD

1433 OBSERVED A DRUM IN A POND → VERY RUSTED, NO SHEEN OBSERVED

1445 DID NOT SEE DEBRIS/SHEEN (PETROGENIC) TO SOUTH OF SITE 28 DRAINAGE

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5 YEAR REVIEW — 9/14/13

1450 WALKED THE SUQITUGHNEQ RIVER FROM CARGO BEACH ROAD UPSTREAM
↳ WATER HOSE (4 inch) IN THE WATER AT THE CULVERT FOR CARGO BEACH ROAD. MAY BE IN USE AS A WATER SOURCE FOR CONSTRUCTION/REMEDIATION ACTIVITIES.

1500 DID NOT SEE DEBRIS/SHEEN (PETROGENIC) ALONG THE SUQITUGHNEQ RIVER

1512 LEFT SITE 29: SUQITUGHNEQ RIVER

1515 SITE WALK FOR SITE 8: POL SPILL
↳ 5 YEAR CHECKLIST ON A SEPERATE FORM

1522 VEGETATION IS THICK AND HEALTHY
NO ODOR OBSERVED
NO SHEEN (PETROGENIC) OBSERVED
NO DEBRIS OBSERVED

1533 LEFT SITE 8: POL SPILL

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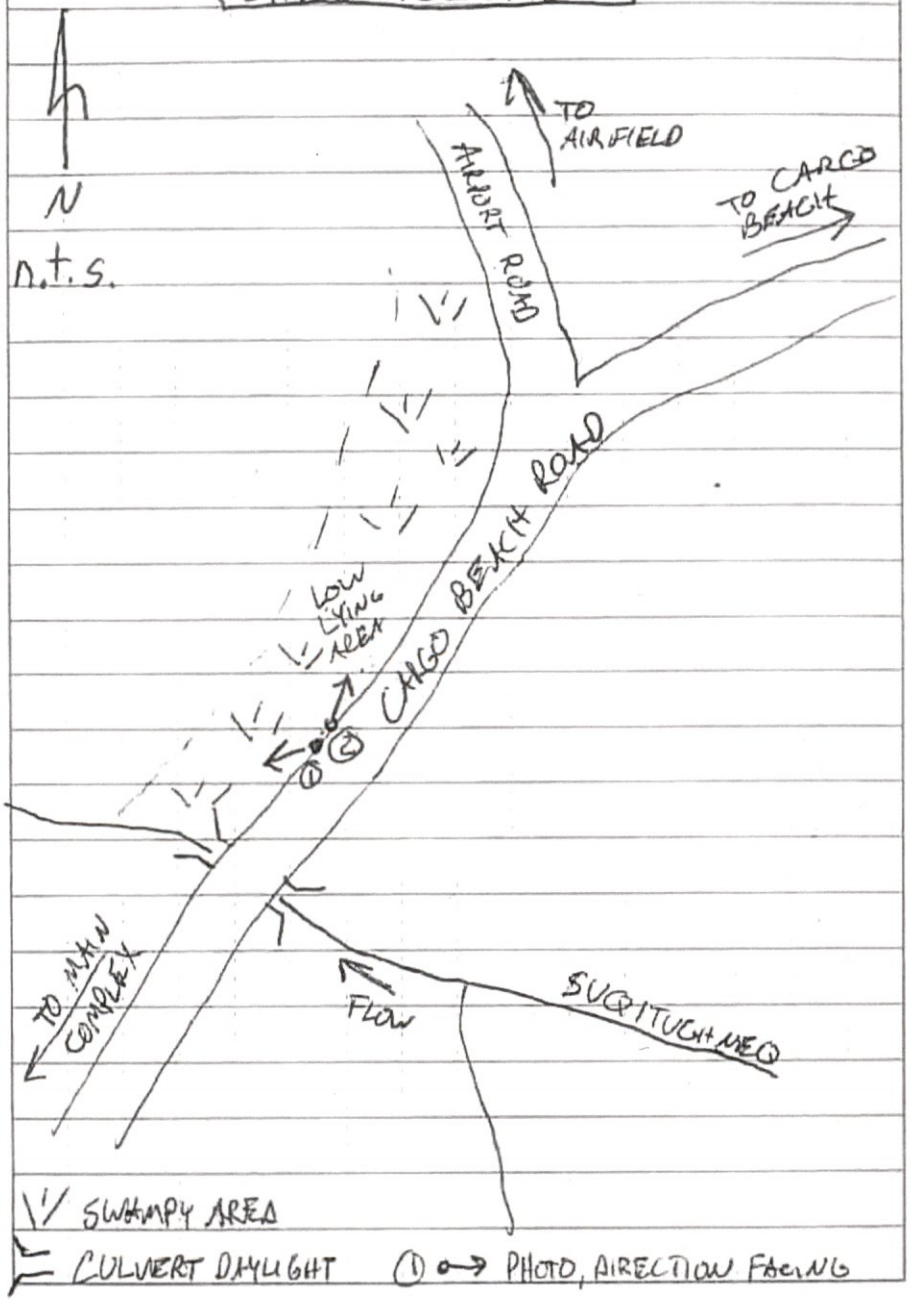
USACE
9/14/13

SITE 8: POL SPILL



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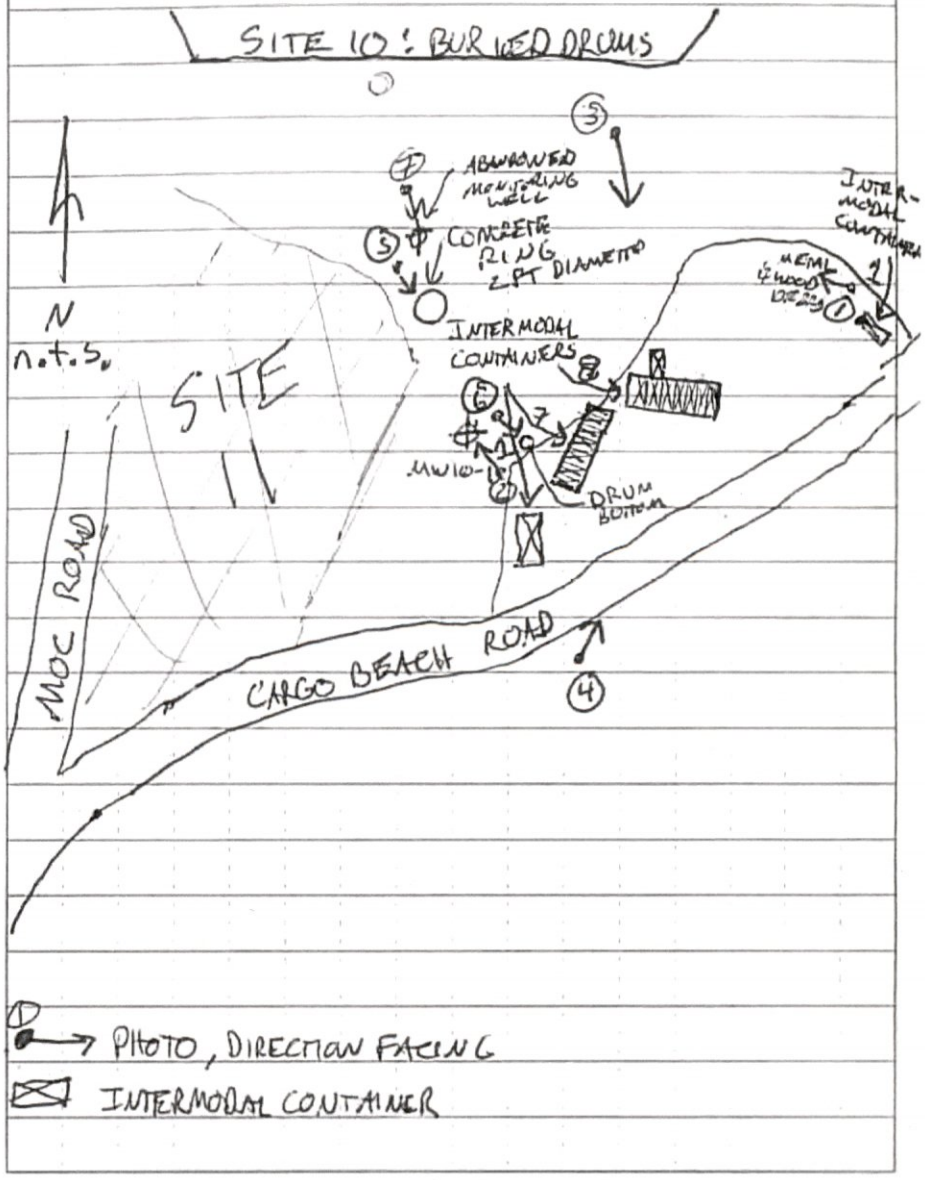
5 YEAR REVIEW

USACE
9/14/13

1534 ARRIVED AT SITE 10: BURIED DRUMS
↳ 5 YEAR REVIEW CHECKLIST ON A SEPERATIVE FORM

SITE 10: BURIED DRUMS



Scale: 1 square = _____

1547 OBSERVED WOOD AND METAL DEBRIS (MINOR) AT THE NE CORNER OF THE SITE

1550 OBSERVED MONITORING WELL 10-1. WELL CASING HAS JACKED 1 FOOT ABOVE THE PROTECTIVE STEEL CASING. NO LOCKING CAP OR PROTECTIVE BOLLARDS.

1554 ~~EVADEN~~ (2) 9/14 OBSERVED EVIDENCE OF RECENT SOIL BORINGS & SAMPLING ACTIVITY

1558 SITE IS CURRENTLY BEING USED AS A LAYDOWN AREA BY THE REMEDIAL CONTRACTOR (BRISTOL). SITE IS GRADED AND COMPACTED TO PROMOTE POSITIVE DRAINAGE AND MITIGATE EROSION

↳ NO VEGETATION PRESENT ON THE GRAVEL PAD. VEGETATION AROUND THE PAD APPEARS HEALTHY

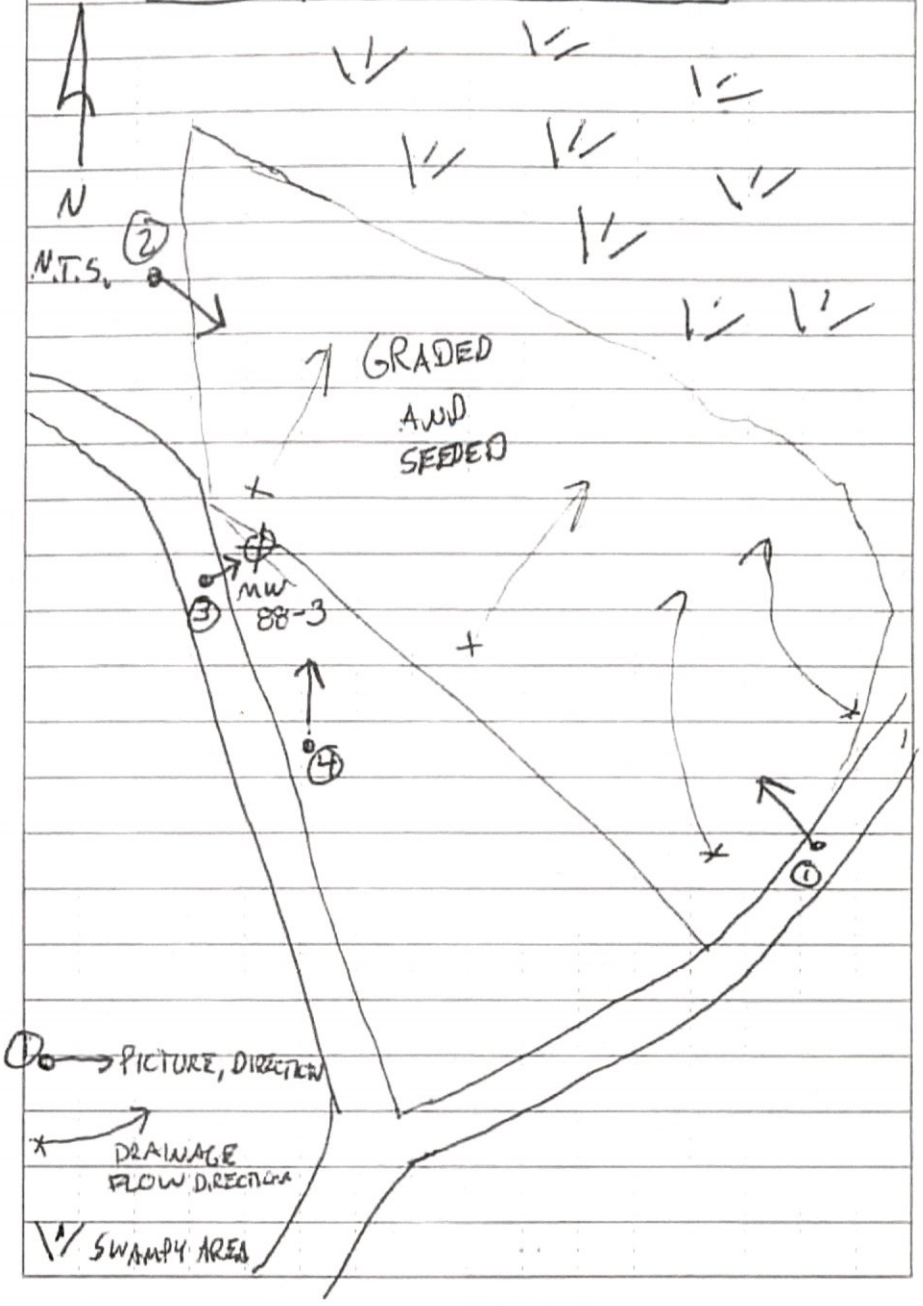
1604 OBSERVED A DRUM BOTTOM AT BASE OF SLOPE

1608 2ND MONITORING WELL SHOWN ON THE FIGURE IN THE ROD WAS NOT FOUND.

↳ JEREMY CRAMER INDICATES IT WAS DECOMMISSIONED (USACE) ↳ OBSERVED THE ABANDONED WELL

1624 LEFT SITE 10: BURIED DRUMS

SITE 11: FUEL TANKS



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5 YEAR REVIEW

USACE
9/14/13

1625 ARRIVED AT SITE ~~[illegible]~~ 6/14 11: FUEL TANKS FOR A SITE WALK
↳ 5 YEAR REVIEW CHECKLIST ON A SEPERATE FORM

1635 OBSERVED MONITORING WELL MW88-3.
↳ CASING HAS A LOCKING CAP - WITH NO LOCK
↳ FLUSH MOUNT MONUMENT DOES NOT CLOSE AS THE WELL APPEARS TO HAVE FROST JACKED

1643 SITE HAS BEEN GRADED/COMPACTED/AND SEEDED TO PROMOTE POSITIVE DRAINAGE AND MITIGATE EROSION.
↳ OBSERVED THE REMEDIAL CONTRACTOR (BRISTOL) SPREADING SEED ON THE AREA

1645 LOCATIONS OF THE FORMER ASTS ARE NOT APPARANT

1650 DEBRIS NOT OBSERVED ONSITE OR AROUND THE PERIMETER

1715 LEFT THE SITE Christopher D. Fell 9/14/13

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5 YEAR REVIEW

USACE
9/15/13

0730 PAPERWORK & SITREP
0745 BREAKFAST
0800 BRISTOL TAILGATE

0830 JACOBS TAILGATE

PERSONNEL
~~JACOBS~~ J. ORCZEWSKA SSHO/TECH
JACOBS C. FELL SITE LEAD

WX:
OVERCAST
LIGHT BREEZE
LOW 40s F

PPE: LEVEL D MODIFIED

DAILY OBJECTIVES
- SITEWALK REMAINING 7 SITES
- PREP FOR DEMOBE

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5 YEAR REVIEW

USACE
9/15/13

0931 ARRIVED AT SITE 28: DRAINAGE BASIN
↳ 5 YEAR REVIEW CHECKLIST ON A SEPERATE FORM

0950 OBSERVED 5 30 FT BY 60 FT SETTLING PONDS FOR COLLECTING WATER & SEDIMENT FROM DREDGE OPERATIONS
↳ 11 SEDIMENT COLLECTION BAGS (25FT × 6FT × 1½FT) PRESENT IN THE PONDS
↳ GAC SYSTEM BY PRO ACT BEING USED TO TREAT WATER PRIOR TO ONSITE DISPOSAL (ONTO RUN DRA)

0956 INTERMEDIATE PONDS ARE BEING USED TO LIFT WATER & SEDIMENT UPHILL WITH PUMP STATIONS

1000 A SEDIMENT TRAP (STEEL WALL, 6FT WITH 3FT LIP)

1014 A SMALL DREDGE WAS BEING USED TO REMOVE SEDIMENT (ON PONTOONS)

1017 A JUTE MAT SEDIMENT TRAP WAS AT THE MOUTH OF THE DRAINAGE, DID NOT OBSERVE SEDIMENT ESCAPING INTO THE SUQITUGHNEQ RIVER

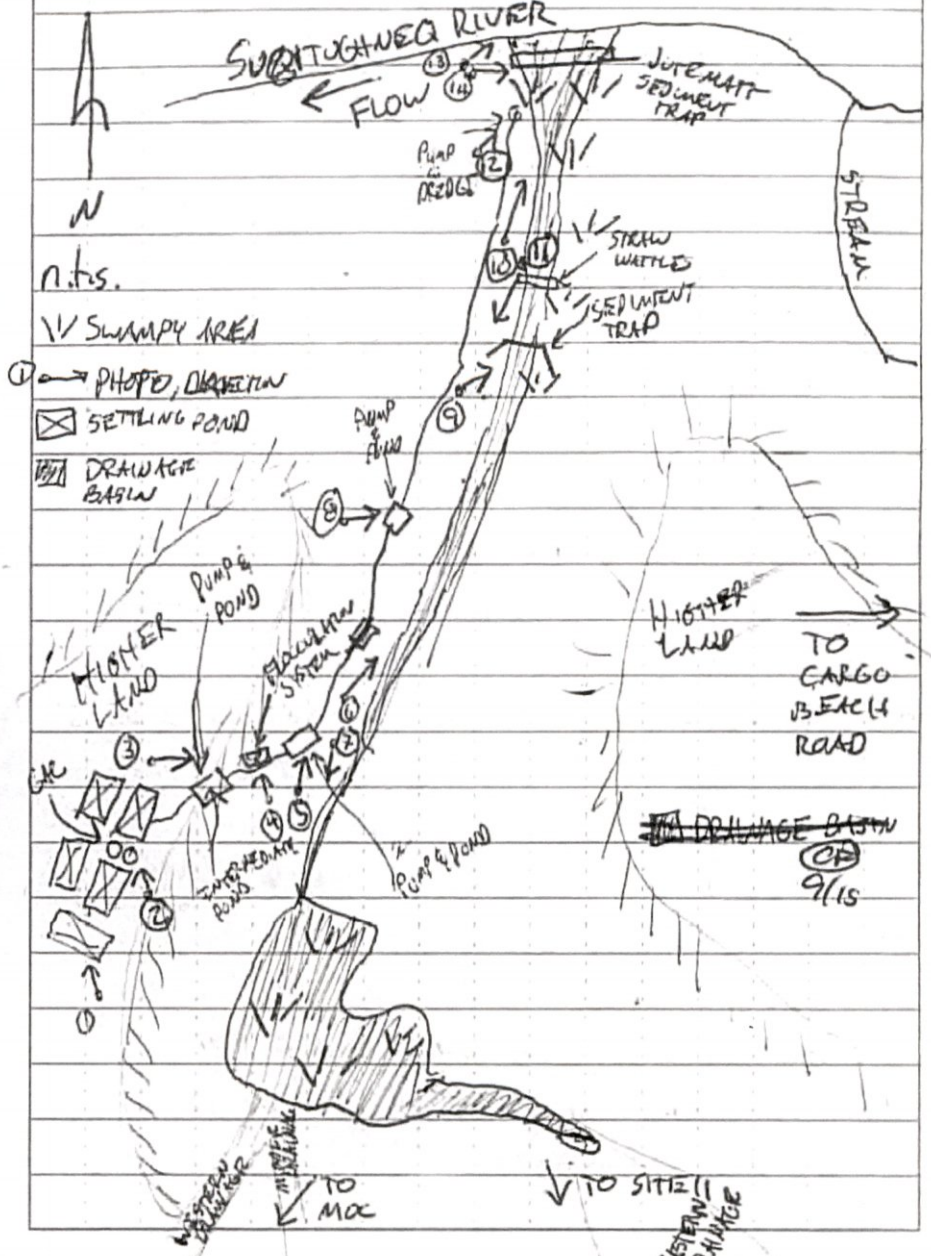
1018 DID NOT OBSERVE DEBRIS IN THE DRAINAGE

Scale: 1 square = _____

NE CAPE
5 YEAR REVIEW

USACE
9/15/13

SITE 28: DRAINAGE BASIN



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NE CAPE
5 YEAR REVIEW

USACE
9/15/13

1027 LEFT SITE 28: DRAINAGE BASIN

1030 MET W/ ECO LAND SURVEYING ABOUT SURVEY OF SAMPLING LOCATIONS FROM 9/12/13
↳ NEED TO REMARK SITE 32
↳ WILL VISIT SITE 7 & SITE 9 WITH THE SURVEYOR BEFORE LUNCH

1050 ARRIVED AT SITE 21: WASTEWATER TANK
↳ 5 YEAR REVIEW FORM ON A SEPERATE FORM

1105 OBSERVED BRISTOL (REMEDIAL CONTRACTOR) SEEDING THE GRAVEL PAD AT THE END OF THE ROAD

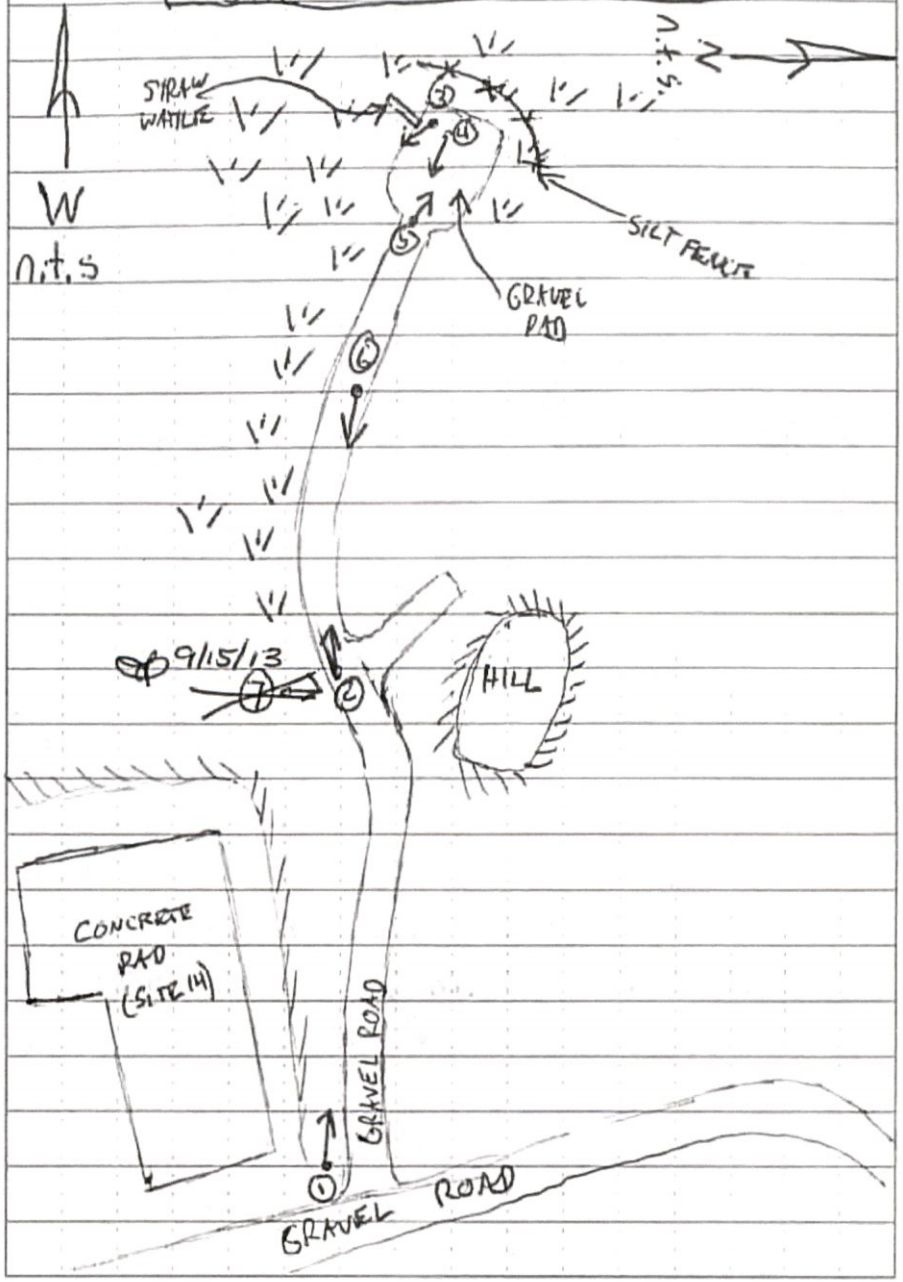
1109 GRAVEL PAD HAD BEEN AN OPEN EXCAVATION 3 DAYS AGO. NOW IS BACKFILLED WITH GRAVEL ~~WITH~~ (CF) 1/5 LITTLE SILT.
↳ A SILT FENCE IS BETWEEN THE PAD AND OPEN WATER DOWN GRADIENT

BACKFILL DOES NOT APPEAR TO HAVE BEEN COMPACTED AND IS TOO WET TO DO SO (PUMPING UNDER FOOT)

NE CAPE
5 YEAR REVIEW

USACE
9/15/13

SITE 21 : WASTEWATER TANK



NE CAPE — USACE

5 YEAR REVIEW — 9/15/13

1121 LEFT SITE 21: WASTEWATER TANK

1123 ARRIVED AT SITE 16: ~~HEAT & POWER PLANT~~ PAINT & DOPE STORAGE (CP) 9/15
↳ 5 YEAR REVIEW FORM ON A SEPERATE FORM

1125 MET WITH SURVEYORS TO SHOW WHERE
TO SAMPLING LOCATIONS ARE
1155

1155 LEFT SITE FOR LUNCH

1230 LEFT CAMP FOR SITE

1241 ARRIVED ON SITE 16: ~~HEAT & POWER PLANT~~ PAINT & DOPE STORAGE (CP) 9/15

1251 OBSERVED AN ABANDONED MONITORING WELL
THAT WAS NEAR THE SW CORNER OF THE
FORMER BUILDING

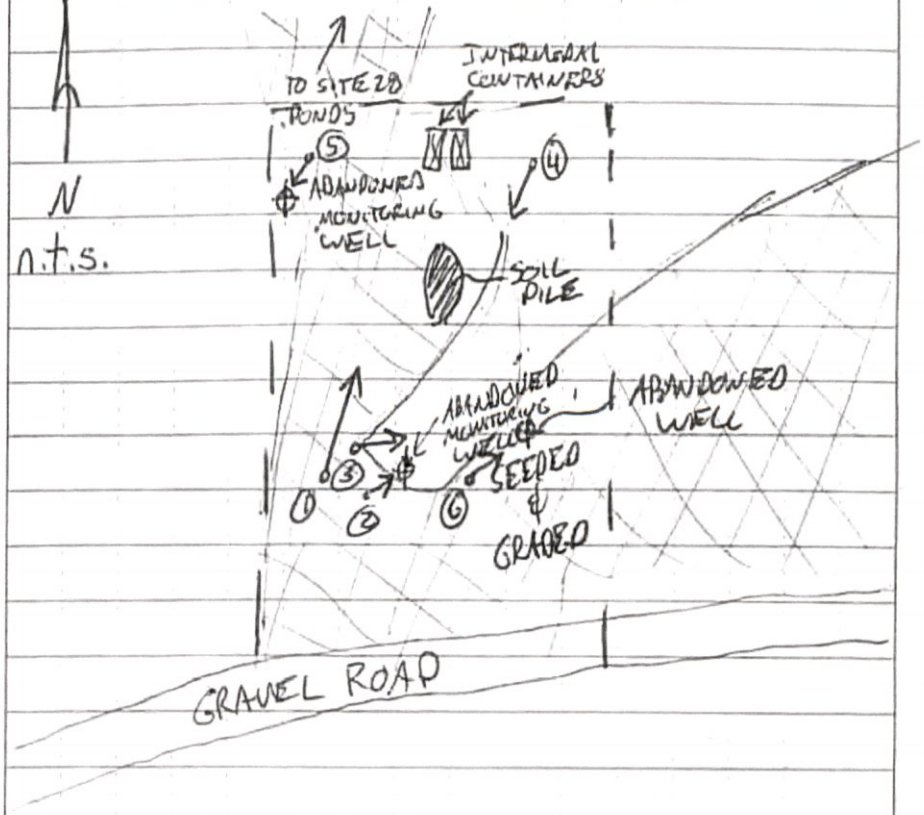
1257 OBSERVED AN ABANDONED MONITORING WELL THAT
WAS NEAR THE NW CORNER OF THE SITE.
↳ SURFACE WAS FILLED WITH NATIVE MATERIAL
SOME OF THE CONCRETE FROM THE SURFACE
COMPLETION

1300 SITE HAS BEEN RECENTLY GRADED AND SEEDED
ON THE SE PORTION

NE CAPE — USACE

5 YEAR REVIEW — 9/15/13

SITE 16: ~~HEAT & POWER PLANT~~ PAINT & DOPE STORAGE (CP)



- - - APPROX SITE BOUNDARY

⊕ ABANDONED MONITORING WELL

▨ DISTURBED GROUND / GRADED AREA

⑥ TAKEN AFTER PICTURE 11 AT MOC SITE (PG 51)

NE CAPE
5 YEAR REVIEW

USACE
9/15/13

1301 MUCH OF THE WESTERN PORTION OF THE SITE IS BEING USED TO ACCESS SITE 28 OR AS AN EQUIPMENT STORAGE AREA - AN APPROX 3 YD PILE OF SOIL IS ON SITE

1302 GRADING OF THE SITE APPEARS TO PROMOTE POSITIVE DRAINAGE AND MITIGATE EROSION

1307 LEFT SITE 16! PAINT & ROPE STORAGE

1313 ONSITE (13, 15, 19, 27) FOR SITE WALKS
↳ 5 YEAR REVIEW CHECKLIST ON SEPERATE FORMS

1325 MONITORING WELL "X" (CP 9/15) MW88-10 → OK CONDITION (NEEDS BETTER)
- WELL MONUMENT (FLUSH) CLOSES BUT NOT BOLTED
- WELL CASING IS OK AND FITTED WITH LOCKING CAP THAT IS NOT LOCKED

1332 MONITORING WELL MW 88-1 → POOR CONDITION
- WELL MONUMENT (FLUSH) DOES NOT CLOSE
- WELL CASING HAS FROST JACKED AND THE CAP IS NOT LOCKED

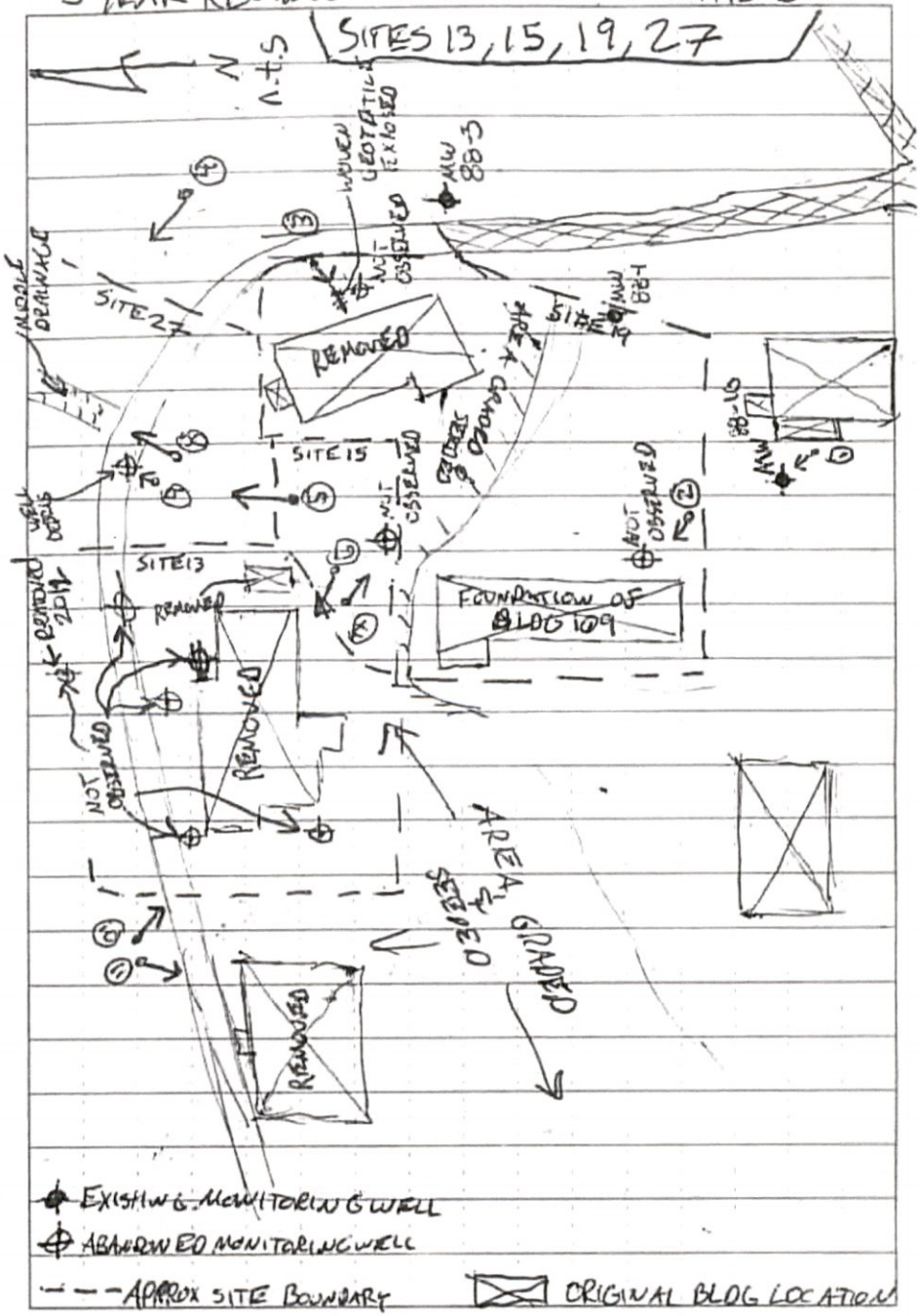
1335 MONITORING WELL MW88-3 → POOR CONDITION
- WELL MONUMENT (FLUSH) DOES NOT CLOSE
- WELL CASING HAS FROST JACKED AND THE CAP IS NOT LOCKED

Scale: 1 square = _____ PAGE 50

NE CAPE
5 YEAR REVIEW

USACE
9/15/13

SITES 13, 15, 19, 27



Scale: 1 square = _____ PAGE 51

Rite in the Rain

NE CAPE
5 YEAR REVIEW

USACE
9/15/13

1350 BUILDING AT SITE 13 HAS BEEN REMOVED ALONG WITH THE FOUNDATION

1353 BUILDING & FOUNDATION ON THE NW PORTION OF SITE 19 HAS BEEN REMOVED. THE FOUNDATION FOR THE BUILDING ON THE SW PORTION OF SITE 19 REMAINS.

1355 SITES 13, 15, & 27 HAVE BEEN RECENTLY GRADED, AND SEEDED TO PROMOTE POSITIVE DRAINAGE AND MITIGATE EROSION ALONG WITH THE NORTHERN HALF OF SITE 19

1356 MONITORING WELLS IN THE CENTRAL PORTION OF THE MAIN OPERATIONS COMPLEX (MOC) WERE NOT OBSERVED
↳ LIKELY DECOMMISSIONED OR REMOVED DURING EXCAVATION

1400 LEFT SITE
1415 BACK AT CAMP

Scale: 1 square = _____ PAGE 52

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5 YEAR REVIEW

USACE
9/15/13

1415 5 YEAR REVIEW PAPERWORK
to and QC
1800

End of Day

9/15/13

Scale: 1 square = _____ PAGE 53

Rite in the Rain

NE CAPE USACE

5 YEAR REVIEW 9/16/13

Personnel: C. FELL
J. ORCZEWSKA

Weather: Rain, 30-40°F
light wind

PPE: Mod. Level D

Objectives: - Prep site for Demobe
- QC paperwork
- Interview QAR for any remaining questions

~~CF~~ 9/16/13
~~0800~~ 0755: Bristol Tailgate

0800: Jacobs Tailgate

0830: Continue site paperwork and QC.

~~1300~~ CF 9/16/13

1030 - Prep gear for Demob

~~1415 - FLIGHT TO NOME~~ CF 9/16/13

1300 - INTERVIEW W/ J. CRANER (USACE)

↳ SITE 28 SEDIMENTATION POND(S)
- PLAN TO NOT CONSTRUCT AS SEDIMENT LOAD IN THE DRAINAGE IS LOW AND CONSTRUCTION WOULD LIKELY INCREASE RISK OF SPREADING CONTAMINATED SEDIMENT

↳ SITES W/ MNA REMEDIES
- PLAN TO REPAIR WELLS NEXT SEASON
- PLAN TO AUGMENT NETWORK TO PROVIDE SUFFICIENT MONITORING NEXT YEAR

1415 - DEMOBE TO NOME
2000 - DEMOBE TO ANC
2130 - END OF DAY

Christopher D. Fell 9/16/13

NE CAPE 5 YEAR REVIEW — USACE PHOTO LOG

CONTINUED FROM PG 61

Date	Photo #	Dir.	Description
9/14/13	070	N/A	Site 29 Drum in Pond
	071	SE	Site 29 Sugi River
	072	NW	Site 29 Sugi River
	073	SW	Site 8 South overview
	074	NE	Site 8 North Overview
	075	W	Site 10 Debris
	076	N/A	Site 10 Monitoring well
	077	S	Site 10 Bristol Staging
	078	N	Site 10 Bristol Staging
	079	N/A	Site 10 Concrete Ring
	080	N/A	Site 10 drum lid
	081	N/A	Site 10 abandoned well
	082	NW	Site 11 overview
	083	SW	Site 11 overview
	084	N/A	Site 11 monitoring well
9/14/13	085	N	Site 11 seeding
9/15/13	086	N	Site 28 Sedim Pond
	087	W	Site 28 Water filters
	088	NW	Site 28 Sediment Tubes
	089	E	Site 28 Intermed Pond
	090	N	Site 28 Floculate add
	091	N	Site 28 Intermed Pond
9/15/13	092	NE	Site 28 overview.

Scale: 1 square = _____

NE CAPE 5 YEAR REVIEW — USACE PHOTO LOG

Date	Photo #	Dir	Description
9/15/13	093	SW	Site 28 Overview
	094	E	Site 28 Water Pump
	095	E	Site 28 Sediment Trap
	096	N	Site 28 Bristol Demob
	097	S	Site 28 Overview
	098	S	Site 28 Dredge
	099	E	Site 28 Drainage to Sugi
	100	E	Site 28 Wattles before Sugi
	101	W	Site 21 Road
	102	W	Site 21 Road
	103	SE	Site 21 Backfill
	104	E	Site 21 Backfill
	105	W	Site 21 Silt Fence
	106	S	Site 21 Seeding
	107	E	Site 21 Road
	108	N	Site 11 Overview S28 Access
	109	N/A	Site 11 Abandoned well
	110	E	Site 11 Overview
	111	S	Site 11 Overview
	112	N/A	Site 11 abandoned well
	113	N	Site 11 Abandoned well
	114	N	MOC Overview
9/15/13	115	N	MOC Overview

Scale: 1 square = _____

5 year Review
NE CAPE

USACE
PHOTO LOG

Date	Photo #	Dir.	Description
9/15/13	116	N	Site 19 Monitoring well
	117	W	Site 19 GeoTek
	118	W	MOC Overview
	119	~~W~~ N	~~MOC~~ Site 15 Overview
	120	N	Site 13 overview
	121	SE	Site 15 Overview
	122	N	Site 27 drainage
	123	N	Site 27 Well debris
	124	E	MOC Overview
9/15/13	125	S	MOC Overview

Scale: 1 square = _____ PAGE 58

NE CAPE
5-YR REVIEW

USACE
PHOTO LOG

DATE	PHOTO #	DIRECTION FACING	DESCRIPTION
9/12/13	001	S	CALIBRATION YSI
9/12/13	002	S	SITE KMS SAMPLING
9/12/13	003	N	SITE OVERVIEW
9/12/13	004	N	7LF GW SAMPLING LOCATION
9/12/13	005	NE	9LF GW SAMPLING
9/12/13	006	n/a	9LF GW TURBIDITY
9/13/13	007	N	GW attempts 7LF @ 9/13/13
9/13	008	N	Site 32 Road ~~debris~~ depression
9/13	009	WE	@ 9/13 Site 32 ~~lower roadway~~ Roadway @
9/13	010	SW	@ 9/13 Site 32 ~~Old foundation~~ paper tramway @
9/13	011	WS	@ 9/13 Site 32 ~~Debris~~ Old foundation @
9/13	012	W	Site 32 Debris
9/13	013	N/A	Site 32 Asphaltic debris
9/13	014	N	Site 32 culvert
9/13	015	E	Site 32 culvert
9/13	016	S	Site 32 metal debris
9/13	017	W	Site 31 Recent grading
9/13	018	N	Site 31 Antenna foundation
9/13	019	W	Site 31 Antenna foundation
9/13	020	E	Site 31 Metal debris
9/13	021	N/A	Site 31 Drain
9/13	022	N	Site 31 Drainage
9/13/13	023	N	Site 31 Depression

Scale: 1 square = _____ PAGE 59

Rite in the Rain

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5-YR REVIEW PHOTO LOG

DATE	PHOTO #	DIRECTION FACING	DESCRIPTION
9/13/13	Ø24	N	Site 31 Foundations A/E
	Ø25	N	Site 7 Debris
	Ø26	N/A	Site 7 Metal Debris
	Ø27	N/A	Site 7 Metal Debris
	Ø28	N	Site 7 Rusted Drums
	Ø29	N	Site 7 debris in Ponds
	Ø30	W	Site 7 landfill cap
	Ø31	N	Site 7 Debris in Pond
	Ø32	NW	Site 7 Debris in Pond
	Ø33	W	Site 7 Debris in Pond
	Ø34	E	Site 7 landfill cap
	Ø35	E	Site 7 top of cap
	Ø36	E	Site 7 Armored rock
	Ø37	N/A	Site 7 Debris
	Ø38	S	Site 7 Debris
	Ø39	N/A	Site 7 Abandoned well loc.
	Ø40	S	Site 7 Debris in Pond
	Ø41	N/A	Site 7 Possible Drum
	Ø42	N/A	Site 9 Abandoned well loc
	Ø43	W	Site 9 Diversion trench
	Ø44	W	Site 9 landfill cap
	Ø45	E	Site 9 Vegetation
9/13/13	Ø46	N	Site 9 Pond near cap

Scale: 1 square = _____ PAGE 60

NE CAPE USACE

5-YR REVIEW PHOTO LOG

DATE	PHOTO #	DIRECTION FACING	DESCRIPTION
9/13/13	Ø47	S	Site 9 Culvert
9/14/13	Ø48	S	Site 1 Pond
	Ø49	E	Site 1 cracking on edge
	Ø50	E	Site 1 Loading equip.
	Ø51	NE	Site 1 Runway
	Ø52	NE	Site 1 4-wheel trail off runway
	Ø53	W	Site 3 Overview
	Ø54	SW	Site 3 Pond onsite
	Ø55	S	Site 3 Pond onsite
	Ø56	SE	Site 3 Recent excavation
	Ø57	N/A	Site 3 Sheen in Pond
	Ø58	N/A	Site 6 Abandoned well
	Ø59	N/A	Site 6 Abandoned well
	Ø60	E	Site 6 Bristol Staging
	Ø61	NW	Site 6 BRISTOL Staging
	Ø62	E	Site 6 Nearby Pond
	Ø63	E	Site 29 Overview from Off Road
	Ø64	W	Site 29 Overview from Road
	Ø65	E	Site 29 Sugi River
	Ø66	SE	Site 29 BRISTOL Water Intake
	Ø67	E	Site 29 Sugi River
	Ø68	E	Site 29 Culvert
9/14/13	Ø69	W	Site 29 Sugi River

* CONTINUED ON PAGE 56 *

Scale: 1 square = _____ PAGE 61

NE CAPE

5 YR REVIEW

USACE

WASTE TRACKING

CONTAINER ID	GEN DATE	CONTENTS	CONTAINER TYPE / DESCRIPTION
13NECAPE-B1	9/12/13	DECON/PURGE H2O/CAL WASTE	5-gallon bucket NON-HAZ
			↳ SHIPPED TO NUME 9/13/13
13NECAPE-B2	9/12/13	IDW/PPE WASTE	5-gallon bucket NON-HAZ
			↳ ADDED TO BRISTOL'S

Scale: 1 square = _____

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Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
9LF-WS-01	GRAB SAMPLING	n/a	05F15902
Weather Conditions	**PID Readings of Total VOCs (ppm)**	**Date**	**Sampler Initials**
Overcast, Slight Breeze	Ambient n/a Breathing Zone n/a In Well N/A	9/12/13	KM/JO/CF

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
Good Fair Poor n/a	n/a	PVC SS n/a	n/a 1 / 0.041 2 / 0.163 4 / 0.653 6 / 1.469
Depth to Product (ft)	**Depth to ~~SWL~~ (ft btoc)**	**Total Depth of Casing (ft btoc)**	**Product Thickness (ft) and Volume Recovered (mL)**
n/a	Approx: n/a	n/a (final)	n/a

Max purge volume (3 well casing volumes) = [previous† total depth of casing (ft) – depth to water (ft)] * gallons per linear foot of casing * 3

SHOW WORK Max Purge Volume = (N/A † ft – SURFACE WATER ft) • _____ gal/ft • 3 = _____ gal • 3.785 L/gal = _____ L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1000	1135		Dipper Bailer Peristaltic Pump Submersible Pump

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
Clear Cloudy Brown Other:	None Moderate Faint Strong	Yes No	Yes No	YSI Multi Meter Hach Turbidimeter

Purging reached: ~~Stability~~ Max Vol. Purge-water was: ~~Treated~~ Stored ~~Other~~ Note: DECON H2O FOR OFFSITE DISPOSAL

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			± 0.2 °C	± 3%	± 10% or 0.2 mg/L (whichever is greater)	± 0.1	± 10 mV	<10 NTU and ±1 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L) %	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
10:00	N/A	N/A	6.09	36	90.1	5.4	203.8	19.27	0.0

Christopher D. Felt 9/12/13

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1000	1135 / 9/12/13	0.2 N/A	Dipper Peristaltic Pump Submersible Pump
SAMPLE ID: 13-9LF-WS01-D		QC: Dup MS/MSD	Ferrous Iron (Fe^{2+}) (mg/L) = N/A per work plan

Container/Preservative	Analysis Requested	Notes
See logbook pg. 6		

"____" = not measured "✓" = stable "+" = rising "-" = falling "" = all parameters stable ____ Additional observations on back

N/A = Not Applicable

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
9LF-WS-03	GRAB SAMPLING	—	05F45902
Weather Conditions	**PID Readings of Total VOCs (ppm)**	**Date**	**Sampler Initials**
sunny, slight breeze	Ambient — Breathing Zone — In Well —	9/12/13	KM/JD/CF

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
~~Good~~ ~~Fair~~ ~~Poor~~	NA	PVC SS	~~1 / 0.041~~ ~~2 / 0.163~~ ~~4 / 0.653~~ ~~6 / 1.469~~
Depth to Product (ft)	**Depth to GW (ft btoc)**	**Total Depth of Casing (ft btoc)**	**Product Thickness (ft) and Volume Recovered (mL)**
NA		NA (final)	NA

Max purge volume (3 well casing volumes) = [previous† total depth of casing (ft) – depth to water (ft)] * gallons per linear foot of casing * 3

SHOW WORK Max Purge Volume = (——† ft – —— ft) * —— gal/ft * 3 = —— gal * 3.785 L/gal = —— L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
~~1144~~ 1149	~~1214~~ 1153	NA	Bailer Peristaltic Pump Submersible Pump

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
Clear Cloudy Brown Other:	None Moderate Faint Strong	Yes No	Yes No NA	YSI Multi Meter ~~Hach Turbidimeter~~

Purging reached: Stability ~~Max Vol.~~ | Purge water was: Treated Stored Other Note:

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			± 0.2 °C	± 3%	± 10% or 0.2 mg/L (whichever is greater)	± 0.1	± 10 mV	<10 NTU and ±1 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO ~~(mg/L)~~ %	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1149			6.07	38	96.8	6.02	172.2	0.54	0

9/12/13

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1155	1211	—	DIPPER Peristaltic Pump Submersible Pump
SAMPLE ID: 13-9LF-WS03-0		QC: Dup MS/MSD	Ferrous Iron (Fe^{2+}) (mg/L) = ~~N/A per~~ work plan

Container/Preservative	Analysis Requested	Notes
see logbook		

"——" = not measured "✓" = stable "+" = rising "-" = falling "*" = all parameters stable

____ Additional observations on back

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
9LF-WS04	GRAB SAMPLING	NA	05P15902
Weather Conditions	**PID Readings of Total VOCs (ppm)**	**Date**	**Sampler Initials**
Sunny; 8% slight breeze	Ambient — Breathing Zone — In Well —	9/12/13	KM/JO/CF

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
Good Fair Poor	n/a	~~PVC~~ ~~SS~~	~~1/0.041~~ ~~2/0.163~~ ~~4/0.653~~ ~~6/1.469~~
Depth to Product (ft)	**Depth to GW (ft btoc)**	**Total Depth of Casing (ft btoc)**	**Product Thickness (ft) and Volume Recovered (mL)**
n/a	n/a	n/a (final)	—

Max purge volume (3 well casing volumes) = [previous† total depth of casing (ft) – depth to water (ft)] * gallons per linear foot of casing * 3

SHOW WORK Max Purge Volume = (NA † ft – _____ ft) * _____ gal/ft * 3 = _____ gal * 3.785 L/gal = _____ L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1345	1350	—	~~Bailer~~ Peristaltic Pump ~~Submersible Pump~~

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
Clear Cloudy Brown Other:	None Moderate Faint Strong	Yes No	Yes ~~No~~	YSI Multi Meter MICRO ~~Hach~~ Turbidimeter

Purging reached: Stability Max Vol. | Purge water was: Treated Stored Other Note:

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			± 0.2 °C	± 3%	± 10% or 0.2 mg/L (whichever is greater)	± 0.1	± 10 mV	<10 NTU and ±1 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO ~~(mg/L)~~ %	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1345	—	—	7.96	106	86.8	10.34	150.9	210.2	—

Christopher D Sell 9/12/13

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1350	1450	n/a —	DIPPER Peristaltic Pump Submersible Pump
SAMPLE ID: 13-9LF-WS04-0	QC: Dup MS/MSD	Ferrous Iron (Fe^{2+}) (mg/L) =	N/A per work plan

Container/Preservative	Analysis Requested	Notes
see logbook		

"—" = not measured "✓" = stable "+" = rising "-" = falling "*" = all parameters stable

____ Additional observations on back

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
SITE 9 LANDFILL	GW GRAB SAMPLE	9LF-WG01	05F4S902
Weather Conditions	**PID Readings of Total VOCs (ppm)**	**Date**	**Sampler Initials**
P. CLOUDY	Ambient n/a Breathing Zone n/a In Well n/a	9/12/13	KH/CF/JO

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
(Good) Fair Poor	1.5	~~PVC~~ (SS)	(1 / 0.041) ~~2 / 0.163~~ ~~4 / 0.653~~ ~~6 / 1.469~~
Depth to Product (ft)	**Depth to GW (ft ~~btoc~~ bgs)**	**Total Depth of Casing (ft btoc) (final)**	**Product Thickness (ft) and Volume Recovered (mL)**
n/a	2.8 bgs	4' 9/12/13	n/a

Max purge volume (3 well casing volumes) = [previous† total depth of casing (ft) – depth to water (ft)] * gallons per linear foot of casing * 3

SHOW WORK Max Purge Volume = (n/a † ft – n/a ft) * n/a gal/ft * 3 = n/a gal * 3.785 L/gal = n/a L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft ~~btoc~~ bgs)	Equipment Used for Purging
1351		3.3 FT bgs	~~Bailer~~ (Peristaltic Pump) ~~Submersible Pump~~

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
Clear Cloudy (Brown) Other:	(None) Moderate Faint Strong	Yes (No)	(Yes) No	(YSI Multi Meter) ~~Hach~~ MICRO TPW Turbidimeter

Purging reached: Stability Max Vol. | Purge water was: Treated Stored Other Note:

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			± 0.2 °C	± 3%	± 10% or 0.2 mg/L (whichever is greater)	± 0.1	± 10 mV	<10 NTU and ±1 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1351	N/A	N/A	6.22	132	5.90	5.44	177	OVERRANGE	dry

9/12/13

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft ~~btoc~~ bgs)	Equipment Used for Sampling
1351	15:50	2.8 bgs	DIPPER (Peristaltic Pump) ~~Submersible Pump~~
SAMPLE ID: 13-9LF-WG01-2		QC: Dup MS/MSD	Ferrous Iron (Fe^{2+}) (mg/L) = (N/A per work plan)

Container/Preservative	Analysis Requested	Notes

See logbook page for Notes

Regarding poor water production for temp wellpoint

"——" = not measured "✓" = stable "+" = rising "-" = falling "*" = all parameters stable

____ Additional observations on back

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
KMS ~~KMS~~-WS01-0 (CP 9/12)	GRAB SAMPLING	—	OSF45902
Weather Conditions	**PID Readings of Total VOCs (ppm)**	**Date**	**Sampler Initials**
Sunny Slight Breeze	Ambient n/a Breathing Zone n/a In Well n/a	9/12/13	CP/JOF

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
~~Good~~ ~~Fair~~ n/a ~~Poor~~	— n/a	~~PVC~~ ~~SS~~	n/a ~~1 / 0.041~~ ~~2 / 0.163~~ ~~4 / 0.653~~ ~~6 / 1.469~~
Depth to Product (ft)	**Depth to GW (ft btoc)**	**Total Depth of Casing (ft btoc)**	**Product Thickness (ft) and Volume Recovered (mL)**
— n/a	— n/a	— n/a (final)	n/a —

Max purge volume (3 well casing volumes) = [previous† total depth of casing (ft) – depth to water (ft)] * gallons per linear foot of casing * 3

SHOW WORK Max Purge Volume = (n/a † ft – n/a ft) • n/a gal/ft • 3 = n/a gal • 3.785 L/gal = n/a L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)		Equipment Used for Purging
1505	1516	—		~~Bailer~~ Peristaltic Pump ~~Submersible Pump~~
Color	**Odor**	**Sheen**	**Purged Dry**	**Meter Used During Purging**
Clear ~~Cloudy~~ ~~Brown~~ ~~Other:~~	None ~~Moderate~~ ~~Faint~~ ~~Strong~~	Yes No	~~Yes~~ ~~No~~	YSI Multi Meter ~~Hach~~ Micro Turbidimeter

Purging reached: Stability ~~Max Vol.~~ Purge water was: Treated Stored ~~Other~~ Note: FOR OFFSITE DISPOSAL

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			± 0.2 °C	± 3%	± 10% or 0.2 mg/L (whichever is greater)	± 0.1	± 10 mV	<10 NTU and ±1 NTU	Drawdown < 0.8 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	~~DO (mg/L)~~ DO %	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1516	n/a	n/a	4.24	32	~~11.3~~ 113.0	6.31	186.2	0.54	n/a

Christopher D Foll 9/12/13

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1521	1539	n/a	DIPPER ~~Peristaltic Pump~~ ~~Submersible Pump~~
SAMPLE ID: 13-KMS-WS01-0		QC: ~~Dup~~ ~~MS/MSD~~	Ferrous Iron (Fe^{2+}) (mg/L) = N/A per work plan

Container/Preservative	Analysis Requested	Notes
SEE LOG BOOK		

"——" = not measured "✓"= stable "+" = rising "-" = falling "*" = all parameters stable

____ Additional observations on back

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
7LF-WS01	GRAB SAMPLING	n/a	05F45902
Weather Conditions	**PID Readings of Total VOCs (ppm)**	**Date**	**Sampler Initials**
sunny, slight breeze	Ambient n/a Breathing Zone n/a In Well n/a	9/12/13	CF/KM/SO

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
~~Good~~ ~~Fair~~ ~~Poor~~ n/a	n/a	~~PVC~~ ~~SS~~ n/a	1 / 0.041 2 / 0.163 4 / 0.653 6 / 1.469
Depth to Product (ft)	**Depth to GW (ft btoc)**	**Total Depth of Casing (ft btoc)**	**Product Thickness (ft) and Volume Recovered (mL)**
n/a	n/a	n/a (final)	n/a —

Max purge volume (3 well casing volumes) = [previous† total depth of casing (ft) – depth to water (ft)] * gallons per linear foot of casing * 3

SHOW WORK Max Purge Volume = (n/a † ft – n/a ft) • n/a gal/ft • 3 = n/a gal • 3.785 L/gal = n/a L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1625	1626	—	~~Bailer~~ Peristaltic Pump ~~Submersible Pump~~

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
~~Clear~~ ~~Cloudy~~ ~~Brown~~ ~~Other:~~	None ~~Moderate~~ ~~Faint~~ ~~Strong~~	Yes (No)	NA ~~Yes~~ ~~No~~	YSI Multi Meter Hach Turbidimeter

Purging reached: Stability Max Vol. | Purge water was: Treated Stored Other Note:

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			± 0.2 °C	± 3%	± 10% or 0.2 mg/L (whichever is greater)	± 0.1	± 10 mV	<10 NTU and ±1 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	~~DO (mg/L)~~ %	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1625	—	—	11.42	42	98.6	6.06	179.9	106.2	—
					JTO 9/12/13				

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1630	1650	n/a	DIPPER Peristaltic Pump Submersible Pump
SAMPLE ID: 13-7LF-WS01-01		QC: Dup MS/MSD	Ferrous Iron (Fe^{2+}) (mg/L) = N/A per work plan

Container/Preservative	Analysis Requested	Notes
SEE LOG BOOK		

"—" = not measured "✓" = stable "+" = rising "-" = falling "*" = all parameters stable

____ Additional observations on back

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
7LF-WS02	GRAB SAMPLING	n/a	285459002
Weather Conditions 40sF	**PID Readings of Total VOCs (ppm)**	**Date**	**Sampler Initials**
SUNNY/SLIGHT BREEZE	Ambient n/a Breathing Zone n/a In Well n/a	9/12/13	CF/KA/JO

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
~~Good~~ ~~Fair~~ n/a ~~Poor~~	n/a	n/a ~~PVC~~ ~~SS~~	~~1 / 0.041~~ ~~2 / 0.163~~ ~~4 / 0.653~~ ~~6 / 1.469~~
Depth to Product (ft)	**Depth to GW (ft btoc)**	**Total Depth of Casing (ft btoc)**	**Product Thickness (ft) and Volume Recovered (mL)**
n/a	n/a	n/a (final)	n/a

Max purge volume (3 well casing volumes) = [previous† total depth of casing (ft) – depth to water (ft)] * gallons per linear foot of casing * 3

SHOW WORK Max Purge Volume = (n/a † ft – n/a ft) • n/a gal/ft • 3 = n/a gal • 3.785 L/gal = n/a L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1710	1712	n/a	Bailer Peristaltic Pump Submersible Pump

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
Clear Cloudy Brown Other:	~~None~~ Moderate Faint Strong	~~Yes~~ No	~~Yes~~ ~~No~~	YSI Multi Meter ~~Hach Turbidimeter~~

Purging reached: ~~Stability~~ ~~Max Vol.~~ Purge water was: Treated Stored Other Note: FOR OFFSITE DISPOSAL

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			± 0.2 °C	± 3%	± 10% or 0.2 mg/L (whichever is greater)	± 0.1	± 10 mV	<10 NTU and ±1 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	~~DO (mg/L)~~ %	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1710	n/a	n/a	12.77	45	96.8	6.10	160.0	33.4	n/a

9/12/13

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1644	1720	n/a	DIPPER ~~Peristaltic Pump~~ ~~Submersible Pump~~
SAMPLE ID: 13-7LF-WS02-0		~~QC: Dup~~ ~~MS/MSD~~	Ferrous Iron (Fe^{2+}) (mg/L) = N/A per work plan

Container/Preservative	Analysis Requested	Notes
SEE LOG BOOK		

"——" = not measured "✓"= stable "+" = rising "-" = falling "*" = all parameters stable ____ Additional observations on back

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
FLF-WS03	GRAB SAMPLING	n/a	05F45902
Weather Conditions 40s F SUNNY SLIGHT BREEZE	**PID Readings of Total VOCs (ppm)** Ambient n/a Breathing Zone n/a In Well n/a	**Date** 9/12/13	**Sampler Initials** CP/JO/KG

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
Good ~~Fair~~ ~~Poor~~ n/a	n/a	~~PVC~~ ~~SS~~ n/a	~~1 / 0.041~~ ~~2 / 0.163~~ ~~4 / 0.653~~ ~~6 / 1.469~~
Depth to Product (ft)	**Depth to GW (ft btoc)**	**Total Depth of Casing (ft btoc)**	**Product Thickness (ft) and Volume Recovered (mL)**
n/a	n/a	n/a (final)	n/a

Max purge volume (3 well casing volumes) = [previous† total depth of casing (ft) – depth to water (ft)] * gallons per linear foot of casing * 3

SHOW WORK Max Purge Volume = (n/a † ft – n/a ft) • n/a gal/ft • 3 = n/a gal • 3.785 L/gal = n/a L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1654	1654	n/a	~~Bailer~~ Peristaltic Pump ~~Submersible Pump~~

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
Clear Cloudy Brown Other:	None Faint Moderate Strong	Yes No	~~Yes~~ ~~No~~	YSI Multi Meter ~~Hach Turbidimeter~~

Purging reached: Stability Max Vol. | Purge water was: Treated Stored Other Note:

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			± 0.2 °C	± 3%	± 10% or 0.2 mg/L (whichever is greater)	± 0.1	± 10 mV	<10 NTU and ±1 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L) %	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1654			11.59	35	110.2	6.64	127.3	2.67	—

JTO 9/12/13

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1654	1738	n/a	DIPPER Peristaltic Pump ~~Submersible Pump~~
SAMPLE ID: 13-FLF-WS03-0		~~QC: Dup MS/MSD~~	Ferrous Iron (Fe^{2+}) (mg/L) = N/A per work plan

Container/Preservative	Analysis Requested	Notes
SEE LOG BOOK		

"——" = not measured "✓" = stable "+" = rising "-" = falling "" = all parameters stable

____ Additional observations on back

APPENDIX D

Photograph Log

PHOTOGRAPH LOG
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Photo Number **Page**

Photo No. 1 – 12 September 2013 Calibrating the YSI water quality meter. Facing south. 1

Photo No. 2 – 12 September 2013 Sampling at Kangukhsam Mountain Spring. Facing south. 1

Photo No. 3 – 12 September 2013 Overview of Northeast Cape. Photograph taken facing north. 2

Photo No. 4 – 12 September 2013 Attempted groundwater grab sampling locations at Site 7. Facing north. 2

Photo No. 5 – 12 September 2013 Measuring surface water quality parameters prior to sampling at Site 9. Facing northeast. 3

Photo No. 6 – 21 September 2013 Sampling surface water at Site 9. Facing northeast 3

Photo No. 7 – 12 September 2013 Recording sampling efforts in the field logbook. Facing south. 4

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Northeast Cape Sampling – St. Lawrence Island, Alaska

Photo No. 1 – 12 September 2013
Calibrating the YSI water quality meter. Facing south.

Photo No. 2 – 12 September 2013
Sampling at Kangukhsam Mountain Spring. Facing south.

Photo No. 3 – 12 September 2013
Overview of Northeast Cape. Photograph taken facing north.

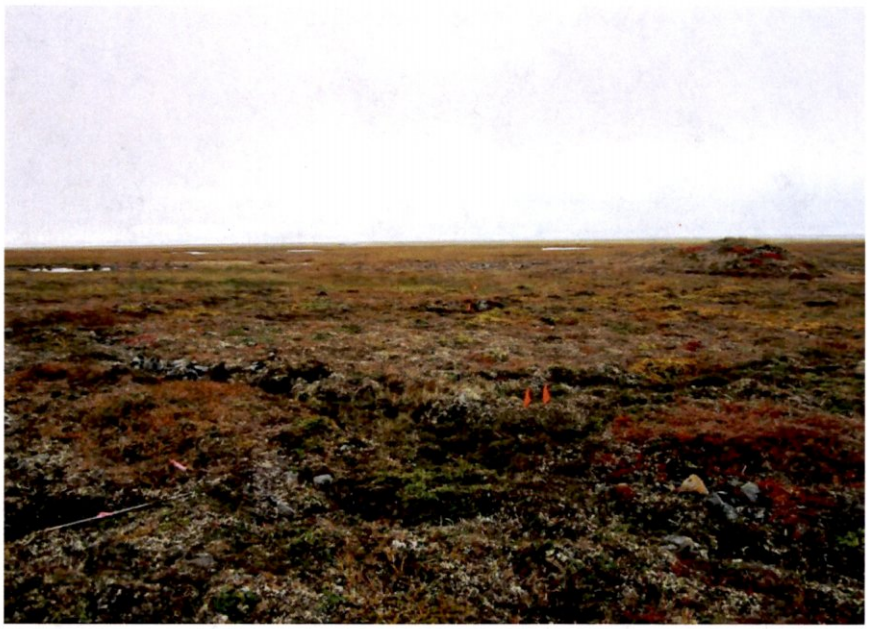

Photo No. 4 – 12 September 2013
Attempted groundwater grab sampling locations at Site 7. Facing north.

Photo No. 5 – 12 September 2013
Measuring surface water quality parameters prior to sampling at Site 9. Facing northeast.

Photo No. 6 – 21 September 2013
Sampling surface water at Site 9. Facing northeast

Photo No. 7 – 12 September 2013
Recording sampling efforts in the field logbook. Facing south.

APPENDIX E

Waste Tracking

CERTIFICATE OF DISPOSAL/RECYCLE

GENERATOR: USACE
NE CAPE - ST LAWRENCE ISLAND
SAVOONGA AK 99769

DISPOSAL FACILITY: EMERALD ALASKA, INC.
2020 VIKING DRIVE
ANCHORAGE AK 99501

EPA ID NUMBER: AKO000228395
MANIFEST/DOCUMENT #: NEC-1
DATE OF DISPOSAL/RECYCLE: 09/27/2013

LINE	WASTE DESCRIPTION	CONTAINERS	TYPE	QUANTITY	UOM
1	DECON WATER	1	DF05	5	P

I certify, on behalf of the above listed treatment facility, that to the best of my knowledge, the above described waste was managed in compliance with all applicable laws, regulations, permits, and licenses on the date listed above.

PREPARED BY: JOHN PEREZ

SIGNATURE: _____ **DATE:** 9/27/2013

NON-HAZARDOUS WASTE MANIFEST

AK 20514 (RP)

Please print or type (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No: AK 8000228395

Manifest Document No: NEC-1

2. Page 1 of 1

3. Generator's Name and Mailing Address
USACE, Po Box 6898, JBER, AK, 99506
CEPOA-EN-EE

4. Generator's Phone (907) 753-2628

5. Transporter 1 Company Name: Alaska Airlines

6. US EPA ID Number: Exempt

A. State Transporter's ID

B. Transporter 1 Phone: (907) 243-3322

7. Transporter 2 Company Name: Jacobs Engineering 24 Group

8. US EPA ID Number: Exempt

C. State Transporter's ID

D. Transporter 2 Phone: (907) 563-3322

9. Designated Facility Name and Site Address
Emerald ~~Alaska Services~~ Alaska
~~2020 Ship Creek Avenue~~ Vikings Drive
ANCH, AK, 99501 99-24

10. US EPA ID Number: AKR000004184

E. State Facility's ID

F. Facility's Phone

11. WASTE DESCRIPTION	Containers No.	Containers Type	13. Total Quantity	14. Unit Wt./Vol.
a. Material not regulated By Dot	1	DF	5	P
b.				
c.				
d.				

G. Additional Descriptions for Materials Listed Above
Rinse water from equipment decontamination
AK02908

H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
NONE

16. GENERATOR'S CERTIFICATION: I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name	Signature	Date Month	Day	Year
Jeremy Craer	Jeremy Craer on behalf DoD	09	13	13

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date Month	Day	Year
Transporter Refused to Sign. JP.				

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date Month	Day	Year
* Kevin Mosher Agent for Jacobs	*	9	24	13

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of the waste materials covered by this manifest, except as noted in item 19.

Printed/Typed Name	Signature	Date Month	Day	Year

NON-HAZARDOUS WASTE

GENERATOR

TRANSPORTER

FACILITY

APPENDIX F

Survey Data

ECO-LAND, LLC

Surveying & Mapping

P.O. Box 1444 Nome, Alaska 99876
(907) 443-6068
www.eco-land-llc.com

Northeast Cape Project 2013
September 17, 2013

Jacob's Engineering
Water Sample Locations
Alaska State Plane Zone 9

Point Number,Northing,Easting,Elevation,Sample ID

39391,3406023.04,1814169.89,51.9,7LFWS03
39392,3406532.21,1813851.12,53.1,7LFWG01-1
39393,3406532.88,1813851.41,52.9,7LFWG01-2
39394,3406557.94,1813820.25,51.9,7LFWG01-3
39395,3406576.07,1813802.30,51.4,7LFWG01-4
39396,3406398.38,1813380.95,48.2,7LFWS01
39397,3406135.59,1813156.81,50.8,7LFWS02
39399,3404131.67,1812013.37,62.6,9LFWS04
39400,3404076.75,1812169.64,66.7,9LFWG01
39401,3403970.29,1812209.87,68.1,9LFWS03
39402,3403934.10,1812058.57,71.9,9LFWS01/WS02
39403,3399356.33,1812480.49,385.6,KMSWS01

ECO-Land, LLC

Jamison L. Allan,
Senior Field Party Chief

Table F-1
Sampling Points

Point number	Northing	Easting	Elevation	Sample ID
39392	3406532.21	1813851.12	53.1	7LFWG01-1
39393	3406532.88	1813851.41	52.9	7LFWG01-2
39394	3406557.94	1813820.25	51.9	7LFWG01-3
39395	3406576.07	1813802.3	51.4	7LFWG01-4
39396	3406398.38	1813380.95	48.2	7LFWS01
39397	3406135.59	1813156.81	50.8	7LFWS02
39391	3406023.04	1814169.89	51.9	7LFWS03
39400	3404076.75	1812169.64	66.7	9LFWG01
39402	3403934.1	1812058.57	71.9	9LFWS01/WS02
39401	3403970.29	1812209.87	68.1	9LFWS03
39399	3404131.67	1812013.37	62.6	9LFWS04
39403	3399356.33	1812480.49	385.6	KMSWS01

APPENDIX G

Response to comments

Alaska Department of Environmental Conservation (ADEC)
Contaminated Sites Program
Document Reviewed: Draft November 2013 Northeast Cape Five-year Review Supplemental Site Investigation Report
Commenter: Curtis Dunkin-ADEC **Date Submitted:** December 18, 2013

#	Page #	Section	ADEC Comment	Response
1.		Document Title	The title of the document should be revised to clarify that this field effort was specifically associated with the first Five-year Review of sites 7 and 9. Note the work plan was titled 'Supplement to the NEC HTRW Remedial Actions Work Plan'.	Accepted The report title will be changed to the following: "2013 SAMPLING CONDUCTED IN CONJUNCTION WITH THE 2013 FIVE YEAR REVIEW AT NORTHEAST CAPE"
2.	ES-1	Executive Summary	Revise the second sentence by omitting the latter half beginning with 'associated' as this part of the sentence doesn't make sense (it is assumed that samples were collected 'where sampling occurred'). Also state here that only one of 5 attempts to collect groundwater samples was successful at sites 7 and 9 due to refusal. Also state wherever applicable throughout the document what the cause of refusal was (i.e. rock, bedrock, permafrost, etc.). Note that the work plan stated that refusal due to permafrost was expected at two feet bgs. Please briefly state in the executive summary and elsewhere in the document where applicable (objectives, etc.) that the field team also conducted site inspections of all sites being evaluated as part of the first Five-year Review. ADEC realizes that the results and observations of these inspections will be provided in the draft Five-year review report and that the subject report is intended to detail the sampling efforts and results. However all efforts conducted as a part of the mobilization associated with this sampling event and/or the Five-year review should be stated in this report.	Accepted The text of the Executive Summary was updated for clarity.

3.	1-2	1.2	Second paragraph of this section (and elsewhere throughout the document) please replace 'Record of Decision' with 'Decision Document'. Revise the third sentence of the second paragraph of this section to clarify that the site-specific sampling conducted at sites 7 and 9 in 2013 was not part of the DD, rather determined in 2013 to be necessary to facilitate the 5-year Review Report.	Accepted All references to "Record of Decision" will be updated to "Decision Document." Noted. The text of the second paragraph of Section 1.0 has been updated as follows: "Site-specific sampling was requested by community members at the two landfill sites and the seasonal drinking water source Kangukhsam Mountain Spring (Figure A-3). Sampling activities coincided with five-year review site inspections."
4.	1-2	1.3	Add a sentence in the beginning of this section to clarify that in respect to groundwater, one of the objectives was to determine if groundwater was present within the targeted sampling zone at the time of the investigation.	The QAPP supplement used to complete the fieldwork does not define establishing the presence or absence of groundwater in the targeted sampling zone an objective.
5.	3-4	3.2	Site 9: Please explain how it was determined as stated in the second sentence of the first paragraph that 'groundwater was encountered at 2.8 feet bgs' when this well only produced 2.5 mL/min. The second paragraph should be revised and should further explain the issue why the analyses were not conducted due to the stated low groundwater production rate. Did this well point experience refusal at 2.8 feet bgs? Please revise the last sentence of this subsection to clarify that only the analytes which were analyzed did not exceed cleanup levels.	The text of section 2.3 will be updated to provide additional details regarding Cargo Beach Road Landfill (Site 7) Text regarding Cargo Beach Road Landfill (Site 7) will be deleted from the results Section 3.2
6.	4-1	4.0	Per the comments in # 5 above, the conclusions section should briefly elaborate on the potential data gaps which potentially exist as a result of 1) all well points except for one hitting refusal given that groundwater was encountered within the targeted sampling depth for the one well; and	Noted. The Five Year Review report will elaborate on any potential data gaps identified from the comprehensive review of site information. The Sampling Data Report only represents a single event and as

			2) the hydrogeological dynamic associated with and specific to each of the site 7 and 9 landfills not being well characterized/understood.	such those conclusions are not appropriate for this report.
7.		Figure A-2	The site location of NEC is incorrectly depicted (too far east/northeast).	Accepted. Figure A-2 has been updated.
8.		Figure A-3	Please state Site 7 and 9 within the respective call out box for each site. Please add 'boundary' to the reference of landfill in the legend.	Accepted. Figure A-3 has been updated.
9.		Figures A-3 and A-4	The previous surface and groundwater sampling locations which have been discussed in both this report and its associated ADEC-approved final work plan should be depicted in these figures. Please apply revision requests stated in comment # 8 above to these figures.	Accepted. Historical sampling locations referenced in this report have been added to the appropriate figures.
10.	B1	1.0	Please explain why the field team didn't or couldn't collect enough sample volume to run all of the planned analysis of analytes.	Accepted. The narrative regarding limited groundwater and why planned samples were not collected is now present in Sections 2.3.
11.	1-6	Analytical Data Table	Surface Water: The narrative of the data quality assessment should explain why so many of the analytes in many of the samples are depicted as 'no criteria/not analyzed'.	Noted. The surface water samples with analytes depicted as 'no criteria/not analyzed' correlate with the column adjacent. The samples were analyzed for dissolved metals and total metals; in order to distinguish between the two an "F" was added to the lab sample ID for dissolved metals analysis. The USACE MED requires lab sample ID to be present in the header information; therefore, the analysis for the sample was split in two columns.
12.	1	Analytical Data Table	Groundwater: Why are man of analytes/COCs not listed in this table?	Noted. See response to comment 11 as it also applies to groundwater.
13.			**End of ADEC Comments**	

Visual Inspection Checklist (Post-Closure)
Site 9 Landfill

This form is to be filled out annually for 5 years after landfill closure.

Name of Inspector: Jeremy Cranor Date: 3 AUG 2014

Weather conditions: Sunny w/ few clouds Precipitation ☐ Yes ☒ No

Temperature: 65 °F Prevailing Wind Direction: SW Speed: 5 mph

Photographs Taken: YES

Landfill Post-Closure Monitoring Items	Y	N	COMMENTS
Evidence of settlement or frost jacking within or on surface of landfill?		X	
Ponded water within, against or on surface of landfill?			Adjacent ponds. No. WATER ON SURFACE CAP
Evidence of surface erosion on disposal area walls or on exterior berms?		X	
Erosion of access roads?		X	
Discoloring of vegetation downslope?		X	
Any evidence of leakage or escape of waste from cells?		X	
Airborne ash or dust particles?		X	
Evidence of wildlife or birds present? Include number and type of birds on site.		X	
Windblown litter in cells or along access roads or adjacent ponds?		X	
Landfill odors?		X	
Fire or combustion in the waste?		X	
Damage to the structural integrity of a dike wall, culvert, or erosion control feature, if present?		X	Diversion ditch functioning well.
Is revegetation occurring?	X		Might be in seed stage.
Estimated Percent Vegetative Cover: On Cap Surface 25% On Sideslopes: 75% Comments:			

General Comments: Structural integrity of landfill cap in great condition. Vegetative cover in seed phase and/or struggling to become establish in coarse surface cap material.

Corrective Actions Taken: NONE.

(Use additional pages if necessary)

F10AK096903_07.11_0505_p
F10AK096905_07.11_0504_p
200-1f


Photo 1: View of landfill cap surface looking toward road, facing NW.
Photo 2: View of landfill cap surface, facing north toward Site 7 landfill (in background).


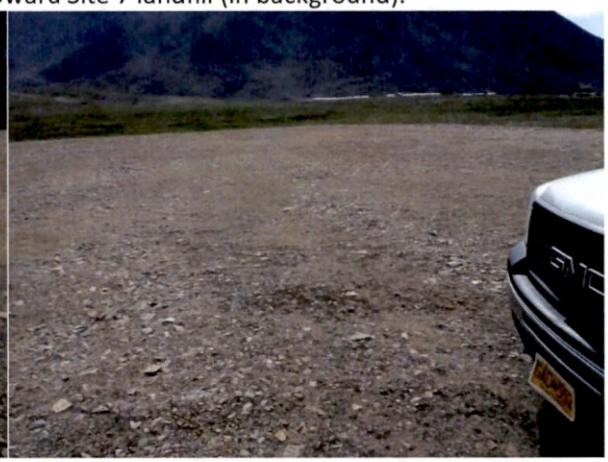

Photo 3: Surface of landfill cap, facing west.
Photo 4: Surface of landfill cap, facing SW.


Photo 5: View of diversion ditch, functioning very well, facing NE.
Photo 6: East side of landfill cap surface water pond, facing south.