NALEMP REMOVAL ACTION AND SITE INVESTIGATION WORK PLAN

Cooperative Agreement No: NALEMP-FY12-04
Native Village of Northeast Cape
"Northeast Cape Fish Camp"
Saint Lawrence Island, Alaska

Revision 2

September 2012

Prepared for:

Native Village of Savoonga IRA Council
P.O. Box 120
Savoonga, Alaska 99769

TABLE OF CONTENTS

SECTION **PAGE**

TABLES

FIGURES

APPENDICES

(Intentionally blank)

ACRONYMS AND ABBREVIATIONS

′	minutes
″	seconds
°	degrees
$\mu g/m^3$	micrograms per cubic meter
AAC	Alaska Administrative Code
ACM	asbestos-containing material
ADEC	Alaska Department of Environmental Conservation
AIHA	American Industrial Hygiene Association
ATVs	all-terrain vehicles
Bristol	Bristol Environmental Remediation Services, LLC
CA	Cooperative Agreement
CESQG	conditionally exempt small quantity generator
CFR	Code of Federal Regulations
CoC	chain-of-custody
CON/HTRW	Containerized Hazardous, Toxic, and Radioactive Waste
DoD	U.S. Department of Defense
DOT	U.S. Department of Transportation
DRO	diesel-range organics
EPA	U.S. Environmental Protection Agency
FUDS	formerly used defense site
GPS	Global Positioning System
GRO	gasoline-range organics
HWAP	hazardous waste accumulation point
ID	identifications
L/min	liters per minute
LBP	lead-based paint Liters per minute
LCS/LCSD	Laboratory control sample/laboratory control sample duplicate
MS/MSD	matrix spike/matrix spike duplicate
MSDSs	Material Safety Data Sheets
NALEMP	Native American Lands Environment Mitigation Program
NE Cape	Northeast Cape
NIOSH	National Institute of Occupational Safety and Health

ACRONYMS AND ABBREVIATIONS (continued)

NVG	Native Village of Gambell
NVLAP	National Voluntary Laboratory Accreditation Program
NVNC	Native Village of Northeast Cape
NVS	Native Village of Savoonga
OSHA	Occupational Safety and Health Administration
PAHs	polynuclear aromatic hydrocarbons
PCBs	polychlorinated biphenyls
PEL	permissible exposure limit
PID	photoionization detector
QA	quality assurance
QC	quality control
RA	removal action
RCRA	Resource Conservation Recovery Act
RRO	residual-range organics
Satori	Satori Group, Inc.
SI	site investigation
SIMS	selective ion monitoring system
SOPs	standard operating procedures
SPIP	Strategic Project Implementation Plan
SVOCs	semi-volatile organic compounds
TAH	total aromatic hydrocarbons
TAqH	total aqueous hydrocarbons
TCLP	Toxicity Characteristic Leaching Procedure
TDC	Transportation and Disposal Coordinator
TOC	total organic carbon
TSDF	treatment, storage, and disposal facility
UN	United Nations
USACE	US Army Corps of Engineers
VOA	volatile organic analysis
VOCs	volatile organic compounds
WMI	Waste Management, Inc.
WP	Work Plan

APPROVALS

This report was prepared under the supervision and direction of the undersigned individuals.

Robert Annogiyuk | SEPTEMBER 11, 2012

Robert Annogiyuk
Native Village of Savoonga NALEMP Project Manager
Date

Tyler S. Ellingboe | September 11, 2012

Tyler Ellingboe
Bristol Project Manager/ADEC "Qualified Person"
Date

(Intentionally blank)

1.0 INTRODUCTION

This Work Plan (WP) has been developed for the Native Village of Savoonga (NVS) for approval by the US Army Corps of Engineers®, Alaska District (USACE), as a control mechanism for work to be performed at the Native Village of Northeast Cape (NVNC). The NVNC is also referred to as the "Northeast Cape Fish Camp." Alaska Department of Environmental Conservation (ADEC) and USACE comments on the WP and Bristol responses to comments are included in Appendix A.

The purpose of this WP is to establish field procedures for conducting a Removal Action (RA) and Site Investigation (SI) at the NVNC, located at the Northeast Cape of Saint Lawrence Island, Alaska (Figures 1 through 3). The purpose of the work proposed under the Native American Lands Environment Mitigation Program (NALEMP) FY12 Cooperative Agreement (CA) is to containerize and remove identified physical and environmental hazards on Native-owned lands in and around the NVNC that have been impacted from past military activities.

A number of sites have been identified as sites of concern by the NVS and have been fully described and prioritized in the NVNC Strategic Project Implementation Plan (SPIP) (Bristol, 2010), in the NVNC SI Report under the NALEMP FY09 CA (Bristol, 2009), and in the NVNC RA Report under the NALEMP FY11 CA (Bristol, 2012).

1.1 ORGANIZATION OF THE WORK PLAN

This WP includes the following sections in order:

- Introduction,
- Site Description and History,
- Objectives and Scope,
- RA/SI Field Activities,
- Field Sampling Procedures,
- Quality Assurance and Sample Handling,
- RA/SI Draft and Final Reporting, and
- References.

(Intentionally blank)

2.0 SITE DESCRIPTION

2.1 LOCATION AND DESCRIPTION

Saint Lawrence Island is located in the Bering Sea, near the territorial waters of Russia, approximately 135 air miles southwest of Nome, Alaska (Figure 1). The NVNC site, located near the Northeast Cape of Saint Lawrence Island (NE Cape), falls between Kitnagak Bay to the northeast, Kangighsak Point to the northwest, and the Kinipaghulghat Mountains to the south (Figure 2). The site is located at 63 degrees (°) 19 minutes (′) 38.9 seconds (″) north latitude, 168° 55′ 59.3″ west longitude (NAD 83). The legal description of the site is Sections 14 and 15, Township 25 South, Range 54 West. Both sections are in the Kateel River Meridian.

The NVNC was once a year-round village site used by the Saint Lawrence Island Yupik Eskimos of Savoonga, Alaska. The NVNC has also been termed "Northeast Cape Fish Camp" and "Fish Camp" by various government agencies and past environmental contractors, although it is important to the people of Saint Lawrence Island to refer to it as the NVNC. The NVNC site at NE Cape is mainly used by the residents of the NVS as a traditional fishing, hunting, and food-gathering camp. The site is also used throughout the year as a rest stop to wait out storms and bad weather, and as a source of drinking water that is hauled to other locations in the area.

The NVNC site and surrounding areas are owned in common by Kukulget, Inc. and Sivuqaq, Inc., consisting of tribal members of the NVS and the Native Village of Gambell (NVG), respectively.

2.2 SITE BACKGROUND AND HISTORY

Located near the NVNC site is a formerly used defense site (FUDS) that contained a U.S. Air Force base and White Alice radio relay site that were operated by the military during the 1950s through the early 1970s. During and after the operation of the military base at NE Cape, various building materials were donated and salvaged for use at the NVNC. Residents of NVNC recall that military personnel gave away building materials, including lumber, paint, wiring, and insulation when the U.S. Department of Defense (DoD) abandoned the base. At the time of donation and use of the building materials, local residents were unaware of the potential danger posed by the materials. Some of the materials provided by the military have been identified as asbestos-containing material (ACM) and have been painted with lead-based paint (LBP) that is potentially harmful to current and future residents. Contamination from polychlorinated biphenyls (PCBs) has also been identified and documented at areas around the nearby NE Cape FUDS (F10AK0969) facility, raising concerns about the potential presence of PCBs, dioxins, and furans at the NVNC.

Demolition of the buildings and all other structures at the FUDS adjacent to the NVNC was completed under multiple USACE contracts (FUDS program) between 1999 and 2005. The runway, gravel roads, and concrete foundations of some of the structures remain intact.

Investigations have been performed at the Northeast Cape Site since the early 1990s. Phase I of the remedial investigation was conducted during the summer of 1994. Additional sampling was performed as part of Phase II during 1996 and 1998. Additional investigations were conducted during the 2001 and 2002 field seasons as part of Phase III. A final round of remedial investigation, Phase IV, was completed in 2004.

Contaminants that have been identified at the nearby NE Cape FUDS site include: petroleum-based fuels, volatile organic compounds (VOCs), heavy metals, and polynuclear aromatic hydrocarbons (PAHs).

The past and current presence of environmental contamination at many of the FUDS-related sites in the NE Cape area is a cause of concern to Saint Lawrence Island residents. Local residents fear that the NVNC may have environmental impacts present that have been caused by the proximity of the NVNC to the NE Cape FUDS.

2.3 Overview of Environmental Restoration Work Accomplished to Date

This is the third CA between the NVS and the DoD. The first CA developed a SPIP which covered documentation of site background and history, environmental impacts, and hazard mitigation objectives. Activities performed under the first CA, with the support of Bristol Environmental Remediation Services, LLC (Bristol) at the request of the Tribe, were: (1) preparation of the SPIP and a fieldwork planning document; (2) performance of a site investigation and an asbestos and lead-based paint Hazardous Building Materials Survey; and (3) preparation of a site investigation report.

The SPIP is the long-term planning document of the NVS for mitigation of impacts from the FUDS site located at NE Cape. Representatives from the NVS have overseen the preparation of the SPIP and will oversee any investigation and remediation activities to be conducted.

The NVS's primary objectives for the cleanup and closure of not only the NVNC site, but all NE Cape DoD impacted sites are:

- To protect and provide for the health and safety of all current and future St. Lawrence island residents and visitors, including residents of the NVNC, NVS, NVG, remote camps, and other travelers, visitors, and workers;
- To protect and enhance the environment and preserve Native culture in the NE Cape area; and
- To provide the opportunity for the Native people to use the land without the fear of environmental contamination.

The second CA included the performance of removal action activities at the NVNC site. CA activities performed at the NVNC during the 2011 field season included the following: (1) identification, packaging, and removal of asbestos-containing material; (2) collection, packaging, and removal of wood painted with lead-based paint and other painted wood debris; (3) collection and on-site burning of non-painted wood debris; (4) staging of suspect containerized hazardous, toxic, and radioactive waste for sampling, characterization, containerization; and (5) staging of metallic and non-burnable debris for removal at a later date.

2.4 SITE REGULATORY STATUS

The NVNC site does not currently generate hazardous waste and would currently be considered a conditionally exempt small quantity generator (CESQG) under Resource Conservation Recovery Act (RCRA) regulations. Planned field activities are expected to generate small volumes of waste materials. If non-exempt hazardous waste materials are generated in volumes that exceed the CESQG limit of 100 kilograms (220 pounds) during any one calendar month, then the NVNC will become either a small- or large-quantity generator based on the volume of hazardous waste generated. If the CESQG limit of hazardous waste generated at the site is exceeded, then a unique U.S. Environmental Protection Agency (EPA) identification number will be required for the site prior to off-site shipment of any hazardous waste.

3.0 OBJECTIVES AND SCOPE OF WORK

The primary focus of the scope of work, under the current FY12 CA, is to collect and stage any remaining non-hazardous and metallic debris from around the NVNC site. This debris poses various physical and environmental hazards to residents who utilize the NVNC site. Following the collection and staging of non-hazardous/metallic debris, the debris will be loaded into 20-foot open-top intermodal containers for transportation and disposal at an off-site landfill located in the Lower-48.

In addition to debris collection, staging, and removal, field personnel will properly characterize and remove buried drums, incidental stained soil related to buried drum removal, and Containerized Hazardous, Toxic, and Radioactive Waste (CON/HTRW) that have been identified at the NVNC. This task was funded under the FY11 CA, but has not yet been performed due to time constraints at the end of the 2011 field season.

The last task that will be conducted under the FY12 CA will be to perform a Comprehensive SI and environmental sampling event, including the collection of surface water, sediment, and soil samples from suspect areas throughout the NVNC site. Environmental samples will be collected by ADEC "Qualified Persons" with the support of NVS field staff. Environmental samples will be analyzed for petroleum hydrocarbons, metals, VOCs, PAHs, PCBs, pesticides/herbicides, and for dioxins/furans.

The three cabins located at the NVNC that remain in good condition and are occupied briefly each year will not be removed or abated under the current CA. Abatement and RAs may occur on these three cabins under a future CA. Figure 3 identifies the locations of the three cabins (numbered 1, 2, and 11) that will remain in place.

Personnel and equipment required for removal of the physical and environmental hazards will be mobilized to and from the site. Any additional ACM- and LBP-containing materials that are identified will be removed from the NVNC site and properly packaged for transportation and disposal. This WP, along with the attached Asbestos and Lead-Based Paint Hazard Abatement Plans (Appendix B), will be approved before field work begins.

3.1 SCOPE OF WORK

The scope of work for the RA/SI is as follows:

- Mobilization and demobilization of personnel and equipment to and from the NE Cape of Saint Lawrence Island;
- Document and map field activities and conditions at the NVNC using detailed notes, photographs, and a Global Positioning System (GPS);
- Collection, staging, and containerization of remaining non-hazardous/metallic debris from the NVNC for off-site shipment and disposal;
- Collection, staging, and containerization of any remaining ACM- and LBP-containing materials;
- Containerization and characterization of buried drums, associated soil, and CON/HTRW collected from around the NVNC site for off-site shipment and disposal; and
- Performance of a SI and comprehensive sampling event, including the collection of surface water, sediment, and soil samples from suspect areas throughout the NVNC site.

A summary of the primary activities that will be performed during the RA/SI will include:

- **Mobilization and Demobilization –** Includes transportation of all materials, personnel, and equipment to and from the site.
- **Work Plans –** Draft and final WPs will be prepared for this project.
- **Removal Action –** An RA will be performed to remove physical and environmental hazards associated with debris and CON/HTRW.
- **Site Investigation -** An SI will be performed with environmental samples to be collected from areas of suspect contamination
- **RA/SI Draft and Final Reporting –** Documents field activities and results of the RA/SI and presents the information in a detailed report.

3.2 PROJECT ORGANIZATION AND RESPONSIBILITIES

The fieldwork will be coordinated and conducted by Bristol, in cooperation with personnel from the NVS. Key personnel are described below.

3.2.1 Bristol Personnel

Project Manager

The Project Manager, Mr. Tyler Ellingboe, will be responsible for implementation of the project, and will have authority to commit the resources necessary to meet project objectives and requirements. The primary function of the Project Manager is to ensure that all technical, financial, and scheduling objectives of the project are achieved successfully. The Project Manager will be the primary point of contact for technical project-related matters.

Field Manager

The Field Manager will be responsible for managing the logistical elements of equipment and personnel mobilization, execution of field RA/SI activities, and demobilization. It is estimated that the Field Manager will be on-site for two weeks during the project. The Field Manager will provide oversight of project activities and will be responsible for health and safety of personnel while on site (Appendix C contains the Site Safety and Health Plan for this project). The Field Manager will conduct a daily safety meeting and be responsible for communication of project hazards to project personnel before work begins each day. The Field Manager will also be responsible for mapping and documentation of all field and sampling activities. Once the project is underway, personnel from the NVS will lead the field effort with support from Bristol.

Equipment Operator

Bristol will provide an equipment operator that will support field activities on an as-needed basis. It is expected that the equipment operator will aid with the collection and staging of larger debris items and will perform the loading of non-hazardous/metallic debris into intermodal shipping containers for off-site shipment.

Regulatory Compliance Manager/Transportation and Disposal Coordinator

The Regulatory Compliance Manager/Transportation and Disposal Coordinator (TDC), Mr. Tyler Ellingboe, will oversee all activities related to the collecting, manifesting, transporting, and disposing of all hazardous materials/wastes generated at the site. He will work closely with the Field Manager and waste management personnel to ensure that wastes are properly identified, packaged, transported, and disposed of.

Resumes of key Bristol personnel have been provided in Appendix D.

3.2.2 NVS Personnel

Project Manager

The Project Manager, Mr. Robert Annogiyuk, is responsible for ensuring that all tasks for the scope of work are achieved successfully. The Project Manager will coordinate the effort, and provide the necessary NVS resources to meet the project objectives and requirements.

NVS Field Representative(s)

The NVS field representative(s) will contribute his/their knowledge of the history of the DoD facility at NE Cape and will perform debris collection and removal activities under the RA. NVS Field Representatives will also support the SI effort to be performed. One NVS Field Representative will be elected and trained as the Site Safety and Health Officer and field lead for when the Bristol Field Manager is not on site.

3.2.3 Subcontractors

Subcontractors will be utilized as required, and will perform all work in accordance with this WP. TestAmerica Laboratories, Inc., will be subcontracted to perform laboratory analysis on all environmental samples collected during RA/SI events.

Satori Group, Inc. (Satori) is a State of Alaska, Licensed Asbestos Abatement Contractor may provide, if necessary, properly trained/certified/licensed abatement workers to properly identify, package, and label ACM items that are suspected or identified for off-site transportation and disposal. Satori will also conduct air monitoring and sampling for lead exposure, as required.

Depending on the outcome of RA activities, it is foreseen that additional subcontractors will include transportation and waste recycling and/or disposal companies. Selection of subcontractors will be based on the types of waste materials that are found and shipped off site. Transportation companies may include air, marine, road, and/or rail carriers. Recycling and disposal companies may include recyclers, landfills, incinerators, and/or other waste treatment facilities. All subcontractors will be in good standing with the EPA and the U.S. Department of Transportation (DOT) prior to being subcontracted by Bristol.

3.3 SCHEDULE

The work proposed under this WP will be conducted during the 2012 summer field season. The work is estimated to take approximately four and one half weeks. The actual days of work will be selected based upon weather predictions by the National Weather Service in hopes of selecting a time period during which mobilization and demobilization delays will not occur due to weather.

(Intentionally blank)

4.0 FIELD ACTIVITIES

The following subsections detail the field activities that will be performed and procedures that will be followed in support of this project.

4.1 MOBILIZATION AND DEMOBILIZATION

Bristol and subcontractor personnel (if required), equipment and materials will be mobilized to and from Anchorage, Alaska, and Nome by commercial airlines. Mobilization of NVS, Bristol, and subcontractor personnel from Savoonga and Nome, to the NE Cape site will be provided by a charter air service. Mobilization and demobilization of required heavy equipment and shipping containers will be performed by Northland Services, Inc., using a FUDS barge.

4.2 DOCUMENTATION

Field activity will be carefully documented for all tasks. All field activities will be recorded in a Rite in the Rain® all-weather field notebook. Dates, times, sample locations and identifications, field personnel, any pertinent field observations, and any pertinent information to help identify field activities, will be recorded in a field notebook. Photographs will be taken and logged in the field notebook. A Trimble GeoExplorer 2008 GeoXH Series handheld GPS will be used for marking sample locations, locations of debris, or other areas of interest, to sub-meter accuracy after post-processing. The GPS points will also be recorded in the field notebook.

4.3 REMOVAL ACTION FIELD ACTIVITIES

RA field activities will be performed to properly manage and remove previously identified hazardous and potentially hazardous waste streams from the NVNC site. In addition, items of value to NVS residents found around the NVNC site during removal activities will be turned over to on-site NVS representatives. Contractors and subcontractors will not remove native artifacts or items of value without the consent of NVS and/or NVG personnel. The following subsections detail field activities and how generated waste streams will be managed during the RA. RA activities will be documented in the RA/SI Report that will be prepared and submitted following the conclusion of the field season.

4.3.1 Debris Collection, Staging, and Removal

Remaining debris found throughout the NVNC site will be inspected for the presence of LBP. Individual items of non-hazardous/metallic debris will be transported to the non-hazardous/metallic debris staging area prior to loading into intermodal containers. Additional debris items found to contain suspected LBP will be containerized into drums, cubic yard Super Sacks®, or into an intermodal container. Although it is an option, it is not anticipated that any burning of non-hazardous wood debris will be warranted or take place. Identified debris will be transported from debris piles to staging areas by all-terrain vehicles (ATVs) and utility trailers.

Although not expected, if NVS field personnel identify suspected ACM or CON/HTRW items during debris removal activities, they will immediately contact Bristol personnel who will safely and properly remove the item(s) from the work area to reduce the potential NVS field personnel exposure. Satori may need to mobilize to the site if ACM or suspect ACM items are identified during debris removal activities.

Hand tools, including chop saws, chain saws, and saws-all type saws, may be used to make debris easier to manage. Saws will not be used to remove debris that contains painted surfaces. Debris with painted surfaces will be removed intact or with pry bars in order to reduce the potential hazard of causing LBP-containing chips to become airborne and ingested. A backhoe or small excavator may be used to break up some of the larger debris pieces into more manageable sizes, if required.

The following sections further discuss removal of non-hazardous/metallic debris, the burning of non-hazardous wood debris, the collection and removal of ACM containing items, and the removal of painted wood debris.

4.3.1.1 <u>Collection, Staging, and Removal of Non-Hazardous/Metallic Debris</u>

The majority of non-painted wood debris was burned on-site during the 2011 field effort. In addition, the majority of non-burnable/metallic debris present was collected and staged for removal during the 2012 field season. The remaining wood, non-burnable, and/or metallic debris will be collected and staged prior to containerization into intermodal containers and off-site shipment.

The intermodal containers will be 20-foot metal Conexes with removal covers. Conex covers will be removed and debris will be loaded using an excavator/loader and compacted with the bucket in order to maximize loading capacity. Once a Conex is full, the cover will be immediately secured in order to prevent rainwater from entering the container. Each Conex will be properly secured and labeled prior to off-site transportation for disposal.

4.3.1.2 Burning of Non-Hazardous Wood Debris

On-site burning of non-hazardous wood debris is not expected; however, if required, two 12-foot-diameter steel burn boxes remain in place at the NVNC and may be used for the burning of non-painted wood debris. The burn boxes are approximately 6-feet-tall with a couple feet buried below the ground surface. The burn boxes have steel bottoms that aid the collection and containerization of ash and unburned residuals. If burning does occur, forced air from a compressor-driven blower will be piped into the side of each burn box to aid combustion and to reduce smoke emissions. If non-hazardous wood requires burning, it is expected that only one burn box would require use. Non-painted wood debris will be collected and hauled to a staging area near the burn box prior to combustion.

Ash recovered from any burning operations will be containerized into drums or intermodal containers for disposal. Previous sampling of the ash waste stream has shown it to be RCRA-regulated for lead. Previous sampling results and the previously established waste profile will be used to characterize any ash that may be generated. Ash will not be comingled with other waste streams. Table 4-1 identifies anticipated waste streams that are scheduled to be removed from the NVNC site.

The burn boxes will be removed and scraped at the end of the 2012 field season, or may remain at the NVNC at the direction of the NVS Project Manager. Confirmation sampling in the footprint of burn boxes and ash containerization areas will be conducted at the conclusion of field activities to demonstrate that the areas are clean.

4.3.1.3 ACM Removal Activities

ACM containing CON/HTRW was identified, packaged, and removed during the 2011 field effort; however, the potential exists that additional ACM may be located. If encountered, ACM will be identified, removed, and packaged for off-site transportation and disposal by subcontractor personnel. NVS personnel will not participate in ACM abatement and removal activities.

If required, Satori personnel will travel to the NVNC to conduct identification, packaging, and labeling of ACM and potential ACM for proper transportation and disposal. All abatement work will be performed by a licensed asbestos abatement contractor in accordance with the most recent version of the USACE Engineers Manual EM 385-1-1. ACM items that are suspected to contain greater than one percent ACM, will be appropriately wetted, removed, packaged, and properly labeled for off-site shipment to an EPA-approved landfill. ACM items will be double bagged, marked and labeled, and hand placed into an intermodal shipping container (Conex) for shipment. There will be no visible emissions from abatement activities. Appendix B contains the Asbestos Hazard Abatement Plan that will be implemented and followed for the project.

Since this is a multi-employer work site, Satori will be responsible for conducting all ACM abatement activities and will inform all other on-site employers of the nature of the ACM work, the location of regulated areas, and requirements pertaining to those areas, and the measures that have been taken to ensure that employees of other employers are not exposed to ACM.

ACM items will not be removed from the three occupied cabins. ACM and LBP removal from these cabins may be covered under a future CA.

4.3.1.4 LBP Containing Debris

The majority of LBP containing debris was collected and removed during the 2011 field season; however, it is expected that relatively small amounts of painted wood debris may be collected and containerized for off-site transportation and disposal.

Inspection and sampling conducted during the Hazardous Building Materials Survey performed during the 2009 field season and included in the NVNC SI Report (Bristol, 2009), indicated positive concentrations of LBP greater than one milligram per square centimeter. Although the concentrations of LBP were relatively low, a determination has been made that wood containing visible painted surfaces will not be burned on site. LBP wood debris was sampled in 2011 and shown to be RCRA-regulated for lead. Previous sampling results and the previously established waste profile will be used to characterize any LBP that may be generated.

Air monitoring for lead exposure was conducted on two different occasions during the 2011 field season. Sampling results indicated that site workers were not subjected to lead concentrations over the Occupational Safety and Health Administration (OSHA) action level of 30 micrograms per cubic meter ($\mu g/m^3$) of air or above the permissible exposure limit (PEL) of 50 $\mu g/m^3$ of air, averaged over an 8-hour shift. A negative initial determination for LBP was attained by collecting two air samples per day over a two-day period. As per Title 29 Code of Federal Regulations, Part 1926.62(d)(7) [29 CFR 1926.62(d)(7)], additional air samples will be collected if site conditions change. Since air monitoring samples indicated that concentrations of LBP were below the action level, removal of remaining LBP debris can commence at a Level D personal protective equipment level without respiratory protection. Appendix B includes the Lead-Based Paint Hazard Abatement Plan that will be implemented and followed for the project.

Assuming airborne concentrations of LBP are below action levels, any remaining painted wood will be temporarily moved to a staging area prior to loading into intermodal containers for off-island transportation and disposal. Previous painted wood debris sampling results will be used to characterize the wood prior to transportation and disposal of LBP-containing debris.

Painted and non-painted wood will not be removed from the three remaining intact and inhabited structures. Removal or abatement of LBP-containing surfaces present on and within these three structures may be addressed under a future CA.

Waste streams that are expected or may be generated and managed during debris collection and removal from the NVNC site are summarized in Table 4-1.

Table 4-1 Anticipated Debris Waste Streams at the NVNC Site

Waste Stream Item No.	Waste Type	NVNC Location
1	Non-Burnable/Metallic Debris	Throughout NVNC, excluding 3 livable structures
2	ACM	Throughout NVNC, excluding 3 livable structures
3	LBP Debris	Throughout NVNC, excluding 3 livable structures
4	Burnable Non-Painted Wood Debris	Throughout NVNC, excluding 3 livable structures
5	Ash	NVNC Wood Burner Locations

Notes:
ACM = asbestos-containing material
NVNC = Native Village of Northeast Cape
LBP = lead-based paint

4.3.2 Containerized Hazardous and Toxic Waste Removal Activities

Various small items and containers of CON/HTRW have been identified at the NVNC site. Items vary from intact surface drums to small quart-sized metal containers of suspected oil-based paint or grease. Lead acid batteries have also been identified around the site.

Suspected CON/HTRW encountered during the 2011 field season remains at the NVNC site and has been documented in the 2011 Removal Action Report (Bristol, 2012). During the 2012 debris removal effort, it is expected that additional CON/HTRW may be encountered during debris removal activities. The management of CON/HTRW was funded as an option under the FY11 CA; however, the characterization and removal of CON/HTRW will occur during the 2012 field effort. The Bristol Field Manager will conduct CON/HTRW identification, sampling, characterization, packaging, marking, and labeling of CON/HTRW, as required.

Previously identified items are listed in Table 4-2. Drums and other small items will be containerized into new United Nations (UN)-approved shipping containers consisting of drums, buckets with lids, fiberboard boxes, or totes prior to shipment off site.

Table 4-2 Anticipated CON/HTRW Waste Streams at the NVNC Site

Waste Stream Item No.	Waste Type
1	Incidental Petroleum Stained Soil
2	Buried Drums
3	Surface Drums
4	Lead Acid Batteries, Intact
5	Lead Acid Batteries, Broken
6	Suspected Oil-Based Paint
7	ORC Lube Oil, Military
8	Chlorinated Dishwashing Soap, Military
9	Dried Blue Lead-Based Paint Debris

Notes:
CON/HTRW = containerized hazardous and toxic waste
ORC = Organic Rankine Cycle

4.3.2.1 Incidental Stained Soil

Areas of the NVNC with visible staining from petroleum products will be containerized in cubic yard Super Sacks® or drums, depending on volume, using either heavy equipment or hand shovels. Removal of stained soil will be limited to stained soil immediately adjacent to partially buried drums. Further removal actions may be required pending laboratory analysis results. Representative samples will be collected to properly characterize the waste streams for disposal. Soil, once containerized, will be shipped off site for disposal as either non-hazardous or hazardous waste based on sampling results. Under the current CA, stained soil found in association with buried drums will be containerized and sampled for disposal only. The location of any additional stained soil will be marked by GPS, observations and locations will be noted in the field notebook, and follow-up sampling will occur during the SI.

4.3.2.2 Partially Buried Drums

During the 2009 SI performed at the NVNC, an area was identified near the location of structures No. 2 and No. 3 that contained partially buried drums. These drums will be excavated and inspected for contents. If found to be empty, the drums will be crushed and shipped off site for either metal recycling or disposal depending on the condition of the drums. The contents from any drums found to be full, or partially full, will be consolidated with like materials into new UN-approved drums, or will be overpacked into salvage drums. Contents from full or consolidated drums will be sampled and properly characterized prior to shipment off site to a recycling or disposal facility.

4.3.2.3 Characterization and Sampling of Waste Streams

CON/HTRW identified during RA field activities will be properly containerized, sampled, and characterized. Potential contaminants will be properly characterized through laboratory analysis, use of Material Safety Data Sheets (MSDSs), and/or through previous experience prior to shipment to an off-site recycling or disposal facility. Characterization and sampling of the waste streams will be based on the nature of the waste streams and acceptance criteria of the recycling/disposal facility. It is expected that sample analyses may include flashpoint, pH, oil-burn specifications, toxicity characteristic leaching procedure (TCLP) RCRA metals, VOCs, semi-volatile organics (SVOCs), PCBs, pesticides, herbicides, and dioxins and furans. Table 4-3 lists sample analytes, test methods, and sample quantities expected to be required for the CON/HTRW RA.

Table 4-3 CON/HTRW RA Sample Collection Summary

Analytes	Test Method	No. of Samples Expected
Flashpoint, closed-cup	EPA SW1020A	6
pH	EPA SW9040	5
Oil-Burn Specifications	EPA SW9056/8082/6020	1
TCLP Metals (Ag, As, Ba, Cd, Cr, Hg, Pb, Se)	EPA SW6020/SW7471B	9
Volatile Organic Compounds	EPA SW8260B	9
Semi-volatile Organic Compounds	EPA SW8270C	9
Polychlorinated Biphenyls	EPA SW8082A	9
Pesticides	EPA SW8081B	2
Dioxins and Furans	EPA SW8290	2

Notes:
CON/HTRW = containerized hazardous and toxic waste
EPA = U.S. Environmental Protection Agency
pH = potential Hydrogen (a measure of acidity)
RA = removal action
SW = EPA Solid Waste Test Method
TCLP = Toxicity Characteristic Leaching Procedure

4.3.2.4 Waste Classification

Upon the completion of waste characterization activities, waste streams will be classified in accordance with 40 CFR 261 and 40 CFR 761. In addition, waste streams will be profiled in accordance with recycling/disposal facility acceptance criteria. Each hazardous waste will be evaluated to identify all applicable treatment standards in 40 CFR 268, Land Disposal Restrictions.

4.3.2.5 Hazardous Waste Accumulation Point

A hazardous waste accumulation point (HWAP) or container storage area will be established at the NVNC for handling containers of hazardous material and waste generated at the NVNC site. The HWAP will most likely consist of a 20-foot Conex box staged near the NVNC. The HWAP will serve as the central collection, identification, bulking, and secure storage point for any CON/HTRW encountered during the project. Waste materials will be packaged, labeled, and manifested in accordance with DOT (49 CFR 172-178) and RCRA (40 CFR 260-268) requirements. Staging areas associated with contaminants and contaminated materials will be sampled for confirmation to demonstrate that the sites are clean once field activities are completed. Staging areas will be documented in the field notebook and with a GPS; however, confirmation sampling will occur under a future CA.

4.3.2.6 Packaging

Waste materials will be stored in appropriate UN-approved containers, and incompatibles will be segregated. Containers will be compatible to wastes (49 CFR 100-177), will be in good condition, and will be marked in accordance with 40 CFR 262. If used oil is collected, it will be marked in accordance with 40 CFR 279.

4.3.2.7 Marking and Labeling

Waste containers will be marked and labeled depending on waste composition and hazard class. Unknowns will be marked, “Potential Hazardous Waste Pending Analysis,” with the date of sampling and suspected hazards. Labels will be added as required by the Hazardous Materials Table in 49 CFR 172.101. All containers to be shipped off site will be marked with non-hazardous, non-regulated, or hazardous waste markers, as appropriate, prior to shipment.

Information to be placed on markers will include generator information, manifest number, accumulation start date, DOT proper shipping name, and EPA identification number and waste codes, if applicable.

4.3.2.8 Placarding

Hazardous materials and wastes shipped off site will be placarded in accordance with 49 CFR 172(F). All four sides of the shipping container (Conex) will be placarded appropriately. Segregation of hazard classes, if required, will be in accordance with the shipment of hazardous material by marine vessel (49 CFR 176).

4.3.2.9 United States Shipping Documents

Bristol, in accordance with the requirements of 40 CFR 262, will prepare Uniform Hazardous Waste Manifests, EPA Form 8700-22, for all hazardous wastes (as defined in 40 CFR 262). Non-hazardous and/or non-regulated wastes shipped off site will be manifested on Non-Hazardous Waste Manifests. In addition, all shipping manifests will be referenced on a Bill of Lading prepared for the marine carrier prior to off-site shipment. Waste stream profiles and land disposal restriction forms will also be completed and attached to manifests, as necessary. Shipping documents will be prepared by Bristol and will be signed by a representative of the NVS.

A generator who creates 1,000 kilograms or more of hazardous waste in a calendar month and sends it to a disposal facility, must contact the transporter and/or disposal facility to determine the status of the hazardous waste if the generator has not received a copy of the signed, handwritten manifest from the designated facility owner/operator within 35 days of the date the waste was accepted by the initial transporter. . If the signed manifest is not received by the generator within 45 days, the generator must submit an Exception Report to the EPA Regional Administrator. Bristol will submit Exception Reports to the EPA, as required.

4.3.2.10 Canadian Shipping Documents

The Basel Convention prohibits the shipment of hazardous wastes across international borders without prior notification and approval. Hazardous wastes shipped from the NVNC to Washington State by marine vessel will pass through Canadian waters during transit. A

Canadian Transit Notice will be completed and approved by Canadian authorities prior to shipment. In addition, Canadian Movement Documents will be completed and will accompany the shipment during transit. The Bristol Transportation and Disposal Coordinator will sign the Canadian Movement Documents on behalf of the generator.

4.3.2.11 Transportation

Wastes generated from RA activities at the NVNC will be shipped off site as one waste shipment at the end of the 2012 NE Cape field season. Wastes will be transported by barge (marine vessel) from NE Cape to Seattle, Washington, and then by truck and/or rail to their respective recycling/disposal facilities.

4.3.2.12 Treatment, Recycling, and Disposal

CON/HTRW that is generated and shipped off-site will be placed in bulk and non-bulk containers, as necessary. Hazardous materials, hazardous wastes, and non-hazardous solid wastes removed from the NVNC site and generated during RA activities will be treated, recycled, and disposed of as listed in Table 4-4.

Table 4-4 Waste Types and Disposition

Waste Stream Code	Waste Type	Final Treatment/ Disposal	Treatment Facility/ Location
1	Non-Burnable/Metallic Debris, non-RCRA	Disposal in Subtitle D Landfill	Columbia Ridge Landfill – Arlington, OR
2	ACM, non-RCRA	Disposal in Subtitle D Landfill	Columbia Ridge Landfill – Arlington, OR
3	LBP Debris, RCRA (non-bulk small amounts)	Disposal in Subtitle C Landfill	U.S. Ecology Idaho, Inc. - Grand View, ID
4	LBP Debris, RCRA (bulk, large amounts)	Disposal in Subtitle C Landfill	Chemical Waste Management of the Northwest - Arlington, OR
5	Non-Painted Wood Burner Ash, RCRA	Disposal in Subtitle C Landfill	U.S. Ecology Idaho, Inc. - Grand View, ID
6	POL-contaminated soil, non-RCRA	Bulking prior to disposal in Subtitle D Landfill	Emerald Recycling – Seattle, WA
7	POL-contaminated soil, RCRA	Disposal in Subtitle C Landfill	U.S. Ecology Idaho, Inc. - Grand View, ID

Table 4-4 Waste Types and Disposition (continued)

Waste Stream Code	Waste Type	Final Treatment/ Disposal	Treatment Facility/ Location
8	Lead Acid Batteries, broken, RCRA	Disposal in Subtitle C Landfill	U.S. Ecology Idaho, Inc. - Grand View, ID
9	Lead Acid Batteries, intact, non-RCRA	Recycle	Emerald Services, Inc. – Tacoma, WA
10	Paint, non-RCRA	Disposal in Subtitle C Landfill	U.S. Ecology Idaho, Inc. - Grand View, ID
11	Paint, RCRA	Fuel Blending	Emerald Services, Inc. – Tacoma, WA
12	Grease, non-RCRA	Disposal in Subtitle C Landfill	U.S. Ecology Idaho, Inc. - Grand View, ID
13	Grease, RCRA	Disposal in Subtitle C Landfill	U.S. Ecology Idaho, Inc. - Grand View, ID
14	ORC Lube Oil, non-RCRA	Fuel Blending	Emerald Recycling – Seattle, WA
15	ORC Lube Oil, RCRA	Recycle	Emerald Services, Inc. – Tacoma, WA
16	Chlorinated Dishwashing Soap, non-RCRA	Disposal in Subtitle C Landfill	U.S. Ecology Idaho, Inc. - Grand View, ID
17	Chlorinated Dishwashing Soap, RCRA	Disposal in Subtitle C Landfill	U.S. Ecology Idaho, Inc. - Grand View, ID
18	Dried Paint/Lead Debris, RCRA	Disposal in Subtitle C Landfill	U.S. Ecology Idaho, Inc. - Grand View, ID

Notes:
ACM = Asbestos containing material
ID = Idaho
LBP = lead-based paint
OR = Oregon
ORC = Organic Rankine Cycle
POL = petroleum, oil, and lubricants
RCRA = Resource Conservation Recovery Act
UT = Utah
WA = Washington

All facilities used for off-site disposal have been reviewed and approved by the Defense Reutilization Marketing Service. Proposed recycling/disposal facility information is listed in Table 4-5.

Table 4-5 Proposed Recycling and Waste Disposal Facilities

Facility Name	Chemical Waste Management of the Northwest
Facility Address	17629 Cedar Springs Lane
City, State, Zip Code	Arlington, OR 97812
Phone	541-454-2030
EPA I.D. No.	ORD089452353

Table 4-5 Proposed Recycling and Waste Disposal Facilities (continued)

Facility Name	Columbia Ridge Recycling and Landfill
Facility Address	18177 Cedar Springs Lane
City	Arlington, OR 97812
Phone	541-454-2030
EPA I.D. No.	ORD987173457
Facility Name	Emerald Services, Inc.
Facility Address	1825 Alexander Avenue
City, State, Zip Code	Tacoma, WA 98421
Phone	206-832-3100
EPA I.D. No.	WAD981769110
Facility Name	Emerald Recycling
Facility Address	1500 Airport Way South
City, State, Zip Code	Seattle, WA 98134
Phone	206-832-3191
EPA I.D. No.	WAD058367152
Facility Name	U.S. Ecology, Inc.
Facility Address	20400 Lemley Road
City, State, Zip Code	Grand View, ID 83624
Phone	800-274-1516
EPA I.D. No.	IDD073114654

4.3.2.13 Waste Tracking Requirements

Bristol's TDC will track all off-site shipments on a Waste Tracking Summary Spreadsheet. A copy of the final Waste Tracking Summary Spreadsheet will be included in the final RA/SI Report.

4.3.2.14 Packaging Certifications and Exception Reporting

For any Uniform Hazardous Waste Manifests that are shipped, Bristol will verify that the generator has received a copy of the signed manifest from the treatment, storage, and disposal facility (TSDF) on or before the 35th day after transport from NE Cape. If the generator has not received a signed copy on or before the 35th day after transportation from NE Cape, Bristol will contact the transporter/facility owner to locate where in the transportation process the waste is currently located.

On the 40th day, Bristol will again verify whether the generator has received a copy of the signed manifest from the TSDF. If the generator has not received a copy of the signed manifest, Bristol will prepare an exception report to be filed with EPA Region 10 in accordance with 40 CFR 262.42.

4.3.2.15 Violations and Discrepancies

In the event that notices of noncompliance or notices of violations are issued to the NVS, Bristol and the NVS will do everything in their power to rectify the situation. All relevant documentation regarding the incident will be provided to Bristol, and any response will be coordinated through Bristol. The NVS will provide all documentation related to the issue to Bristol until the matter is resolved.

If the amount of hazardous waste designated on a manifest and the quantity of hazardous waste received at the disposal facility do not agree, a discrepancy report will be filed as required by 40 CFR 264.72. If required, Bristol will submit this report as required by the EPA.

4.3.2.16 Transportation and Disposal

To document all wastes generated and managed during this project, all transportation and disposal documentation will be tracked and provided in the final RA/SI Report. Documentation will include a summary of all wastes generated, quantities, and final disposition of the wastes. Copies of the following documentation will be provided:

- United States Uniform Hazardous Waste Manifests
- Land Disposal Restriction Forms
- Non-Hazardous Waste Manifests
- Material Safety Data Sheets
- Laboratory Results
- Canadian Manifests and Transit Notices

- Bills of Lading
- Certificates of Weight
- Certificates of Disposal
- Exception Reports and Discrepancy Reports, if applicable
- Waste Photographs

A waste tracking log will list all wastes, container numbers, weights, manifest and profile numbers, and dates for shipping and receiving.

4.4 COMPREHENSIVE SITE INVESTIGATION AND ENVIRONMENTAL SAMPLING

At the conclusion of debris and CON/HTRW removal activities, a comprehensive SI and environmental sampling event will be conducted. Soil, sediment, and surface water samples will be collected from areas throughout the NVNC site. Sampling locations will be determined in the field prior to sampling, after walking the entire NVNC site. Sampling locations will be depicted on a new figure that will be provided in the Site Investigation Report.

Field sampling procedures are detailed in Section 5.0. Details of the quality assurance (QA) program and sample handling procedures are detailed in Section 6.0. The sections below discuss the planned collection of environmental samples.

4.4.1 Soil Sampling

Soil samples will be collected from beneath the locations of former structures and debris piles. Due to a limited CA budget, a minimum of one soil sample will be collected from each documented former structure/debris pile location. Additional soil samples will also be collected from areas where distressed vegetation is evident, from areas where surface staining may be present, and from areas associated with the removal of CON/HTRW. Soil samples will be collected from directly beneath any vegetative mat which may be present. Soil samples will also be collected from beneath the two burn units and from beneath the two debris staging areas as indicated on Figure 3. Depending on soil sampling results, further investigation of former structure/debris pile locations may be warranted and may take place under a future CA.

Soil samples will be collected and may be analyzed for gasoline-range organics (GRO), VOCs, diesel-range organics (DRO)/residual-range organics (RRO), total RCRA 8 metals plus nickel, vanadium, and zinc, PAHs, PCBs, pesticides, herbicides, and for dioxins/furans. If soil/sediment samples are collected from areas containing plant or peat material, then each sample will also be analyzed using the silica gel cleanup method for DRO/RRO, and for total organic carbon (TOC) as described in ADEC Technical Memorandum 06-001 (ADEC, 2006). The locations of samples collected will be marked and mapped using a Trimble GeoExplorer 2008 GeoXH Series handheld GPS to sub-meter accuracy after post-processing. Table 4-6 shows the locations, estimated sample quantities, and analytical methods.

4.4.1.1 Cleanup Levels for Soil

The laboratory analytical results for soil samples that are collected will be compared to the ADEC Method Two Soil Cleanup Criteria for the Under 40-inch Precipitation Zone (Title 18 Alaska Administrative Code, Chapter 75, Section 341 [18 AAC 75 341] [ADEC, 2008a]). The cleanup level from Table B1 will be the applicable exposure pathway-specific cleanup levels based on direct contact, ingestion, outdoor inhalation, or migration to groundwater.

4.4.2 Sediment Sampling

Sediment samples will also be collected from along the drainage basin that runs through the NVNC site. Sediment will be defined as any loose material that is deposited within surface water flow through areas, that is not active vegetation or part of the vegetative mat. Mineral material atop a vegetative mat, or in a predominantly peat interval, will not be considered sediment.

Sediment samples will be collected at evenly dispersed locations throughout the creek drainage within the NVNC. Due to a limited CA budget, it is expected that up to 10 primary sediment samples will be collected. Depending on sediment sampling results, further investigation of sediment may be warranted and may take place under a future CA.

Table 4-6 Soil Sampling

Location	Analytical Test	Method	Unit	Primary	Duplicate	Trip Blank	Estimated Total
Former Structures and Debris Piles	TPH-GRO	AK101	each	33	3	4	40
	TPH-DRO/RRO	AK102/AK103	each	33	3		36
	TPH-DRO/RRO-SG	AK102/AK103-SG	each				0
	Total RCRA 8 Metals + Ni, V, and Zn	SW6020/7471A	each	16	1		17
	VOCs	SW8260B	each	16	1	2	19
	PAHs	8270C-SIM	each	16	1		17
	TOCs	9060	each				0
	PCBs	8082	each	33	3		36
	Pesticides	8081	each	2			2
	Herbicides	8151-Mod	each	2			2
	Dioxins and Furans	8290	each	2			2
Areas of Distress Vegetation/Staining/ CON/HTRW Removal	TPH-GRO	AK101	each	23	2	3	28
	TPH-DRO/RRO	AK102/AK103	each	23	2		25
	TPH-DRO/RRO-SG	AK102/AK103-SG	each	6	1		7
	Total RCRA 8 Metals + Ni, V, and Zn	SW6020/7471A	each	10	1		11
	VOCs	SW8260B	each	10	1	1	12
	PAHs	8270C-SIM	each	10	1		11
	TOCs	9060	each	6	1		7
	PCBs	8082	each	23	2		25

Table 4-6 Soil Sampling (continued)

Location	Analytical Test	Method	Unit	Primary	Duplicate	Trip Blank	Estimated Total
Areas of Distress Vegetation/Staining/ CON/HTRW Removal (cont.)	Pesticides	8081	each	2	1		3
	Herbicides	8151-Mod	each	2	1		3
	Dioxins and Furans	8290	each	2	1		3
Burn Pits and Debris Staging Areas	TPH-GRO	AK101	each	4	1	1	6
	TPH-DRO/RRO	AK102/AK103	each	4	1		5
	TPH-DRO/RRO-SG	AK102/AK103-SG	each				0
	Total RCRA 8 Metals + Ni, V, and Zn	SW6020/7471A	each	4	1		5
	VOCs	SW8260B	each	4	1	1	6
	PAHs	8270C-SIM	each	4	1		5
	TOCs	9060	each				0
	PCBs	8082	each	4	1		5
	Pesticides	8081	each	2			2
	Herbicides	8151-Mod	each	2			2
	Dioxins and Furans	8290	each	2			2

Note: Soil samples collected from “Former Structure and Debris Piles”, “Areas of Distress Vegetative/Staining/CON/HTRW Removal”, and “Burn Pits and Debris Staging Areas”, will be considered as one matrix (soil). Sample duplicates are included in the sampling program and will be collected at a ratio of 10 percent of the total number of soil samples. SI sampling of soil will be conducted in accordance with ADEC Draft Field Sampling Guidance (ADEC, 2010a) and ADEC Environmental Laboratory Data and Quality Assurance Requirements (ADEC, 2009).

The sediment sampling effort will begin with a visual survey. A field scientist or geologist will visually survey the stream and ponds in the drainage basin for indications of sediment. Areas that initially appear to meet the definition of sediment as described above will be noted and further characterized by probing the sediments with an auger or other sediment/sludge sampling device to determine the thickness of the sediment and the composition of the underlying material. Sediment samples will be collected from the streams and ponds and may be analyzed for GRO, VOCs, DRO/RRO, PAHs, pesticides, herbicides, PCBs, dioxins/furans, and for total RCRA 8 metals plus nickel, vanadium, and zinc. Each sediment sample will also be analyzed using the silica gel cleanup method for DRO/RRO, and for TOC as described in ADEC Technical Memorandum 06-001 (ADEC, 2006). Sediment sampling locations will be marked and mapped using the Trimble hand-held GPS. The estimated numbers of sediment samples that will be collected and analytical methods are shown in Table 4-7.

4.4.2.1 Cleanup Levels for Sediment

The laboratory analytical results for sediment samples that are collected will be compared to the ADEC Method Two Soil Cleanup Criteria for the Under 40-inch Precipitation Zone (Title 18 Alaska Administrative Code, Chapter 75, Section 341 [18 AAC 75 341] [ADEC, 2008a]). The cleanup level from Table B1 will be the applicable exposure pathway-specific cleanup levels based on direct contact, ingestion, outdoor inhalation, or migration to groundwater.

4.4.3 Surface Water Sampling

Surface water samples will be collected from standing ponds and from along the drainage basin that runs through the NVNC site. This will include both drainage and natural spring water samples, if present. Surface water samples will be collected in an order beginning at the most downgradient location and then progressing in the upgradient direction. Since the ADEC does not have cleanup levels for DRO, GRO, and RRO in surface water, if surface water samples are collected, they will also be analyzed for total aromatic hydrocarbons (TAH) and total aqueous hydrocarbons (TAqH) using EPA Solid Waste Test Method SW-846: Methods 8260B and 8270C selective ion monitoring system (SIMS). TAH is the sum of BTEX results and TAqH is calculated by summing BTEX and PAH results. Surface water samples will also be analyzed for total RCRA 8 metals plus nickel, vanadium, and zinc, pesticides, herbicides, and PCBs. Laboratory analysis of surface water samples for dioxins/furans is not expected or planned.

The current CA budget only allows for the collection of 10 surface water samples which will include sampling of surface ponds and the creek drainage. Surface water sample locations will be evenly dispersed at areas within the NVNC or will be based on visual observations of suspected impacted areas. Depending on surface sample results, further investigation of surface ponds/creek drainage surface water may be warranted and may take place under a future CA.

ADEC's surface water cleanup criteria are based on 18 AAC 70. Any observable sheen or odor will be noted in the field logs and in the final report. Sample locations will not be determined based on avoiding sheen and/or potential contamination. If petrogenic sheen and/or odor are observed, then these locations will be prioritized for sampling. Per 18 AAC 70.020(b), Note 7, surface water samples will be collected from below the surface and away from any observable sheen."

4.4.3.1 Cleanup Levels for Surface Water

Since the NVNC site is a potential source of ground and drinking water, the criteria that will be used to determine whether the surface water is contaminated will be the groundwater cleanup levels found in Table C of the 18 AAC 75, Section 345 (ADEC, 2008b).

Table 4-7 Sediment Sampling

Location	Analytical Test	Method	Unit	Primary	Duplicate	Trip Blank	Estimated Total
Sediment Samples	TPH-GRO	AK101	each	10	1	1	12
	TPH-DRO/RRO	AK102/AK103	each	10	1	0	11
	TPH-DRO/RRO-SG	AK102/AK103-SG	each	10	1	0	11
	Total RCRA 8 Metals + Ni, V, and Zn	SW6020/7471A	each	10	1	0	11
	VOCs	SW8260B	each	10	1	1	12
	PAHs	8270C-SIM	each	10	1	0	11
	TOCs	9060	each	10	1	0	11
	PCBs	8082	each	10	1	0	11
	Pesticides	8081	each	5	1	0	6
	Herbicides	8151-Mod	each	5	1	0	6
	Dioxins and Furans	8290	each	2	1	0	3

Note: SI sampling of sediment will be conducted in accordance with ADEC Draft Field Sampling Guidance (ADEC, 2010a) and ADEC Environmental Laboratory Data and Quality Assurance Requirements (ADEC, 2009).

Table 4-8 lists the estimated quantity of surface water samples to be collected along with expected analytical methods.

Table 4-8 Surface Water Sampling

Location	Analytical Test	Method	Unit	Primary	Duplicate	Trip Blank	Estimated Total
Surface Water	Total RCRA 8 Metals + Ni, V, and Zn	SW6020/7471A	each	10	1	0	11
	VOCs (including BTEX for calculation of TAH)	SW8260B	each	10	1	1	12
	PAHs	8270C-SIM	each	10	1	0	11
	PCBs	8082	each	10	1	0	11
	Pesticides	8081	each	5	1	0	6
	Herbicides	8151-Mod	each	5	1	0	6

Note: SI sampling of surface water will be conducted in accordance with ADEC Draft Field Sampling Guidance (ADEC, 2010a) and ADEC Environmental Laboratory Data and Quality Assurance Requirements (ADEC, 2009).

5.0 FIELD SAMPLING PROCEDURES

The following sections detail the sampling procedures that will be used for the project. Additional guidance and Bristol standard operating procedures (SOPs) for field sampling, sample management, and field documentation are included in Appendix E.

5.1 ENVIRONMENTAL AIR MONITORING

Although not expected, if significant amounts of ACM or LBP are encountered, the ACM abatement subcontractor (Satori) will mobilize to the site and perform air monitoring. Air monitoring will be performed in accordance with the National Institute of Occupational Safety and Health (NIOSH) Method 7082 and in accordance with OSHA regulations found in 29 CFR 1926.62. Satori will submit lead air samples to LA Testing in California which is an American Industrial Hygiene Association (AIHA) and National Voluntary Laboratory Accreditation Program (NVLAP)-approved laboratory.

5.1.1 Air Monitoring Equipment

Satori will utilize low- and high-volume air sampling pumps, calibrated rotameters, and 37-millimeter air sampling cassettes.

5.1.2 Air Sampling Plan

Personal air samples will be collected and analyzed daily in accordance with NIOSH Method 7082. All sampling analysis shall be completed and the results provided within 48 hours after laboratory analysis is complete. The written results shall be signed by the laboratory analyst. The air sampling results shall be documented on an air-monitoring log or in the field notebook and shared with all site workers. The air-monitoring log shall contain the following information for each sample:

- Sampling and analytical method used;
- Date sample collected;
- Sample number;
- Sample type: BZ = Breathing Zone (Personal), Pre = Pre-abatement,
  E = Environmental, C = Abatement Clearance;
- Location/activity/name where sample was collected;

- Sampling pump number, beginning flow rate, end flow rate, average flow rate (in Liters per minute [L/min]);
- Calibration date, time, method, location, name of calibrator, and signature;
- Sample period (start time, stop time, elapsed time [minutes]);
- Total air volume sampled (liters);
- Laboratory name, location, and analytical method; and
- Printed name and a signature and date block for the individual who conducted the sampling.

5.1.3 Interior Abatement (Personnel Monitoring)

Painted wood debris was removed from the NVNC site during the 2011 field effort and personnel air monitoring is not expected to be required during the 2012 field effort. If required, personnel air monitoring will be performed on one worker in a work area containing LBP containing surfaces. All personnel samples will be collected from the worker's breathing zone. Personnel air samples will be collected at flow rates between 1.0 to 4.0 liters per minute. Two air cassette samples will be collected per day over a two-day period and submitted to the project laboratory for analysis. In addition, two field blanks will be submitted per day for analysis along with the primary samples.

Additional air monitoring may occur if the negative initial determination provides evidence that worker exposure is above the action level for any specific task or operation.

5.2 LBP Suspected Debris Sampling

The sampling of suspected LBP debris is not expected to be required or occur during the 2012 RA. Previous painted wood debris sampling results will be used to characterize any painted wood debris that is encountered. If sampling of painted wood debris is performed or required, debris samples may be collected through scraping, cutting, or coring the debris with hand tools that have been decontaminated. Debris samples collected will be representative of the entire waste stream. Types and sizes of debris can vary greatly as may the sample collection methods. Debris samples will be collected directly from the source to the sample container. The following sampling procedures will be used for representative debris sample collection:

1. Label appropriate glassware with sample identification, analyses, date, and time.
2. Label the sampling location.
3. Photograph the sampling location.
4. Collect representative debris sample from desired location.
5. Place debris directly into sampling containers.
6. Secure container lids.
7. Place samples in an iced cooler.
8. Record sampling information in the field notebook, including date, time, analysis to be conducted, and sampling location.
9. Decontaminate sampling equipment and change sampling gloves between each sampling location.

5.3 SOIL/SEDIMENT FIELD SCREENING

Soil and sediment samples will be field-screened for hydrocarbon contamination with the aid of a photoionization detector (PID). If no obvious hydrocarbon contamination is detected above background levels, then periodic random PID field screenings will be performed from locations around the NVNC. Any deflection or reading on the PID above background levels is indicative of contamination until proven otherwise through definitive data via laboratory analysis. Field screening for VOCs will entail filling (one-third to one-half) a small, resealable plastic bag with the sample and quickly sealing the bag. The sample will be agitated for approximately 15 seconds and allowed to warm for at least 10 minutes, and no more than one hour at a temperature of at least 40°F. The sampler will then agitate the bag for approximately 15 seconds and then will quickly open the corner of the bag and insert the tip of a calibrated PID to a point one-half of the headspace distance. The reading will be documented in the field notebook. Soil/sediment samples used for field screening will not be the same material that makes up the sample submitted for laboratory analysis.

5.4 SOIL/SEDIMENT SAMPLING

Soil/sediment samples will be collected from the following areas during the RA/SI effort:

- From containers from which petroleum-stained soil was consolidated and packaged in conjunction with the removal of CON/HTRW;
- From beneath former structures and debris piles;
- From areas of visibly distressed vegetation or where staining is present;

- From beneath the burn units and debris staging areas; and
- From inside the burn units, if burning of non-painted wood debris occurs.

Soil/sediment sampling locations will be marked with a GPS and noted in the field notebook.

Discrete surface soil and/or sediment samples will be collected using a clean, stainless-steel spoon or a clean, nitrile-gloved hand. Soil/sediment samples to be analyzed for VOCs will be containerized first in order to minimize volatilization of potential volatile contaminants during the sampling process. The following sampling procedures will be used for discrete surface soil sample collection:

1. Determine the location of the samples.
2. Label appropriate glassware with sample identification, analyses, date and time.
3. Label the sampling location.
4. Photograph the sampling location.
5. Hand-dig sampling locations to desired depth or collect soil direct from Macro-Core sampler, as appropriate.
6. Place soil directly into sampling containers.
7. Secure container lids.
8. Place samples in an iced cooler.
9. Record sampling information in the field notebook, including date, time, analysis to be conducted, and sampling location.
10. Survey the location of the sample point with the GPS unit.
11. Decontaminate sampling equipment and change sampling gloves between each sampling location.
12. Subsurface soil samples, defined as samples collected more than 1.5 feet below ground surface, may be collected from areas as determined in the field. Samples will be collected by hand-digging with a clean shovel as appropriate. The same protocols will be followed for subsurface soil sampling as for surface soil sample. The depth at which the sample was collected will be recorded in the field notebook, and as part of the sample identification (see Section 5.7).

Additional surface soil sampling procedures will be followed if a thick, matted root zone is present which will include the following:

1. If a thick, matted root zone is encountered at or near the surface, it will be removed prior to the collection of the sample.
2. Carefully remove the top layer of soil or debris to the desired sample depth with a pre-cleaned spade.
3. Using a pre-cleaned, stainless steel scoop, spoon, or trowel, remove and discard a thin layer of soil from the area that came in contact with the spade.
4. Collect samples following procedures described in the soil sampling section above.

If a hand auger is used for the collection of soil samples the following procedures will be used:

1. Insert the hand auger into the material to be samples at a 0° to 45° angle from the horizon.
2. Rotate the auger once or twice to cut a core of the material
3. Slowly withdraw the auger, with the slot facing upward.
4. Collect samples following the procedures described in the soil sampling section above.

5.4.1 Methanol Field Preservation

All soil samples analyzed for VOCs will be preserved with methanol immediately following sample collection. The following preservation procedures will be followed:

1. Place approximately 50 grams of soil into a tared jar with a Teflon®-lined septum lid. Jars should be at least 4 ounces or larger.
2. Add 25 milliliters of methanol (provided by the project laboratory) until the sample is submerged.
3. Place samples in an iced cooler.
4. Record sampling information, including date, time, analysis to be conducted, and sampling location.
5. Decontaminate sampling equipment in accordance with Section 5.9, and change sampling gloves between each sampling location.

5.5 SURFACE WATER SAMPLING

Surface water sampling will be conducted from standing ponds and from along the drainage basin that runs through the NVNC. Surface water samples will be collected from an approximate depth of 6 inches to 1 foot below the water surface. Surface samples will be collected directly from the source to the sample container. Surface water samples for VOC analysis will be collected into 40-ml volatile organic analysis (VOA) vials with zero headspace. Additional water sampling guidance is included in Appendix E.

5.6 CON/HTRW SAMPLING

Characterization and sampling of CON/HTRW waste streams will be based on the nature of the waste streams and acceptance criteria of the recycling/disposal facility. It is expected that sample analyses will include flashpoint, pH, oil-burn specifications, TCLP RCRA metals, VOCs, SVOCs, PCBs, pesticides, herbicides, and dioxins and furans. Waste samples will be placed directly into specified sample containers and will be field-preserved, as appropriate. Sample preservation requirements for analyses are listed in Table 6-1.

5.7 SAMPLE IDENTIFICATION

Samples will be identified by the sample identification system in Table 5-1 below. Samples requiring multiple analyses and/or multiple containers will use a single, sample identification number for all containers. Additional numbers/letters may be added to the end of the code. The sample identification system is shown below in Table 5-1.

Table 5-1 Sample Identification System

1.	Year (last two digits)	12	e.g., 2012	
2.	Project Identifier	NVNC	e.g., Native Village of Northeast Cape	
3.	Sample Type			
	Air Sample	AS	CON/HTRW Sample	CH
	Ash Sample	ASH	Soil/Sediment Sample	SS
	Debris Sample	DS	Surface Water Sample	SW
4.	Sample Number		01-99	

Sample numbers are assigned sequentially. For example, 12NVNCDS01, 12NVNCDS02, and 12NVNCDS03, are the first three debris samples at the NVNC site. For samples at depths, an additional two-digit number will follow the above sample identifications (IDs). For example, if 12NVNCSS04 were sampled at 0.5 and 2.5 feet, the sample ID would be 12NVNCSS04-0.5 and 12NVNCSS04-2.5. Samples sent to the laboratory will not be renumbered.

Field quality control (QC) duplicate samples will be submitted blind to the laboratory for analysis and will be annotated using the sample identification sequence as listed in Table 5-1 above. Trip blanks will be numbered sequentially for shipping container. For example, 12NVNCTB02 would be the trip blank accompanying the second cooler that is shipped to the analytical laboratory, containing volatile samples.

5.8 SURVEY SAMPLE LOCATIONS

Each sample location will be initially marked with a lath, surveyors tape, or pin flags. Bristol will write the sample identification on each corresponding sample marker. A handheld GPS will then be used to electronically mark the drum and/or soil removal location. The latitude and longitude will also be recorded in the sampler's field notebook.

5.9 DECONTAMINATION

Disposable sampling equipment will be used as much as possible to reduce the amount of supplies required for decontamination. Disposable sample scoops will be used for digging and sampling, and will be used only once. If a shovel is required for digging, the shovel will be decontaminated by spraying it with a mixture of water and Alconox® soap, until all soil is removed. The shovel will then be rinsed with deionized water. A very small amount of soapy water and rinse water will be used for decontamination. The washing will be conducted over the area that the sample was collected, and the wash water allowed to drip onto the ground. The shovel will be air dried or dried with clean paper towels.

5.10 WASTE HANDLING

As part of sampling activities, disposable sampling supplies, such as nitrile gloves, paper towels, tape, disposable sample scoops and plastic bags will be collected in trash bags or other receptacles for proper disposal.

(Intentionally blank)

6.0 QUALITY ASSURANCE AND SAMPLE HANDLING

6.1 QUALITY ASSURANCE

Sampling of CON/HTRW waste streams will be conducted for disposal purposes only. SI and confirmation sampling will be conducted when RA tasks are complete. Sample duplicates, trip blanks, and temperature blanks will not be submitted with samples of CON/HTRW.

Air monitoring samples, if collected for establishing negative initial determination for LBP, will be submitted to the project laboratory with field blanks. Primary and field blank air samples will not be submitted with quality control duplicates, trip blanks, temperature blanks, or matrix spike/matrix spike duplicates (MS/MSDs).

SI sampling of soil, sediment, and surface water for this project will be conducted in accordance with ADEC Draft Field Sampling Guidance (ADEC, 2010a) and ADEC Environmental Laboratory Data and Quality Assurance Requirements (ADEC, 2009). Sample duplicates are included in the sampling program and will be collected at a ratio of 10 percent of the total number of samples.

6.2 QUALITY CONTROL SAMPLES

The QC samples will be collected as split/duplicate samples for field duplicates and trip blanks. MS/MSDs will not be collected as part of the QC program. A discussion of each QC type is provided below.

6.2.1 Field Duplicates

Field duplicate/split samples will be collected as indicated in Tables 4-6, 4-7, and 4-8. The duplicate sample will be collected at the same location as the environmental sample, at the same time that the environmental sample is collected.

6.2.2 Trip Blanks

Trip blanks are samples of methanol or analyte-free water taken from the laboratory to the sampling site and returned with the GRO and VOC samples.

Methanol trip blanks will be placed in each cooler containing methanol-preserved GRO/VOC samples. Analyte-free water trip blanks will be placed in each cooler containing VOC samples, as well as liquid GRO samples that are not methanol preserved. Trip blanks will be stored at the laboratory with the samples and analyzed by the laboratory.

6.2.3 Matrix Spike/Matrix Spike Duplicates

Per discussions with the USACE Project Manager (Mr. Carey Cossaboom), MS/MSDs are not required to be collected in conjunction with project samples for NALEMP projects since NALEMP projects do not have to meet the analysis and reporting requirements of DoD QSM 4.2. The batch laboratory control sample/laboratory control sample duplicates (LCS/LCSDs) will be the primary measurement of batch precision and accuracy for this project. LCS/LCSD reporting will be requested by Bristol prior to submission of any samples to the project laboratory.

6.3 CALIBRATION PROCEDURES

The only field-screening instrument to be used during field activities is the PID, which will be used to screen soil samples for petroleum hydrocarbons. Procedures outlined in the owner's manual will be followed. The PID will be calibrated daily prior to field use. The calibration information will be recorded in the field notebook.

6.4 AIR MONITORING FIELD BLANKS

If required and collected, air monitoring field blanks will be submitted along with primary samples at a rate of two field blanks per day of air monitoring. If air monitoring is conducted, it is expected that air monitoring will occur over the course of two days and that two primary samples and two field blanks will be collected and submitted for analysis per day.

6.5 SAMPLE CONTAINERS

The volumes and containers required for sampling of air, debris, CON/HTRW, soil/sediment, and surface water are defined in Table 6-1. Pre-washed sample containers will be obtained from an EPA-approved source that prepares containers in accordance with EPA bottle-washing procedures. All sample containers will be maintained under chain-of-custody (CoC) procedures from the time of receipt to the time of sample analyses.

Sample labels will be completed with waterproof ink and will be affixed firmly to the sample container and protected with Mylar tape. The sample label will include the following information:

- Initials of sampler,
- Date and time of collection,
- Sample number,
- Analysis required, and
- Preservation.

Table 6-1 Sample Collection, Preservatives and Holding Times for Air/Debris/Waste

Parameter	Preparation/ Analytical Method	Container Description (Minimum)[1]	Preservation/Holding Time
Air Samples			
Lead in Air	NIOSH Method 7082	Cartridge; place in plastic or glass container	Cool 4° ± 2° C; 180 days to analysis
Lead Debris Samples			
TCLP Lead	EPA SW6020	4 oz wide-mouth amber glass jar with Teflon®-lined screw cap	Cool 4° ± 2° C; Six months to analysis
PCBs	EPA SW8082	4 oz wide-mouth amber glass jar with Teflon-lined screw cap	Cool 4° ± 2° C; 40 days to analysis of extract
Ash			
TCLP RCRA Metals	EPA SW6020/SW7471A	4 oz wide-mouth amber glass jar with Teflon-lined screw cap	Cool 4° ± 2° C; 28 days to analysis for Hg; Six months to analysis for all other metals
CON/HTRW and Soil Waste Samples			
Flashpoint	EPA SW1020A	8 oz wide-mouth amber jar with Teflon-lined scres cap	14 days to analysis
pH	EPA SW9040	8 oz wide-mouth amber jar with Teflon-lined scres cap	Immediate upon receipt
Oil-Burn Specifications	EPA SW9076/8082/6020	8 oz wide-mouth amber jar with Teflon-lined scres cap	SW9076-28 days to analysis; SW8082-14 days to analysis; SW6020-180 days to analysis
TCLP RCRA 8 Metals	EPA SW6020/SW7471A	4 oz wide-mouth amber glass jar with Teflon-lined screw cap	Cool 4° ± 2° C; 28 days (Hg) and 180 days (all other metals) for extraction and analysis

Table 6-1 Sample Collection, Preservatives and Holding Times for Air/Debris/Waste (continued)

Parameter	Preparation/ Analytical Method	Container Description (Minimum)[1]	Preservation/Holding Time
CON/HTRW and Soil Waste Samples			
Volatile Organic Compounds	EPA SW8260B	4 oz wide-mouth amber glass jar with Teflon-lined silicon rubber septum seal	Cool 4° ± 2° C; 14 days to analysis of extract
Semivolatile Organic Compounds	EPA SW8270C	4 oz wide-mouth amber glass jar with Teflon-lined screw cap	Cool 4° ± 2° C; 14 days to extraction, 40 days to analysis of extract
PCBs	EPA SW8082	4 oz wide-mouth amber glass jar with Teflon-lined screw cap	Cool 4° ± 2° C; 40 days to analysis of extract
Pesticides	EPA SW8081B	4 oz wide-mouth amber glass jar with Teflon-lined screw cap	Cool 4° ± 2° C; 14 days to extraction, 40 days to analysis of extract
Herbicides	EPA SW8151A	4 oz wide-mouth amber glass jar with Teflon-lined screw cap	Cool 4° ± 2° C; 14 days to extraction, 40 days to analysis of extract
Dioxins and Furans	EPA SW8290	4 oz wide-mouth amber glass jar with Teflon-lined screw cap	Cool 4° ± 2° C; 30 days to extraction, six months to analysis
Soil			
TPH-GRO	AK101	4 oz wide-mouth amber glass jar with Teflon-lined silicon rubber septum seal	Methanol preservative, Cool 4° ± 2°C / 28 days to analysis
TPH-DRO/RRO	AK102/AK103	8-oz wide-mouth, clear glass jar, TLC	Unpreserved, Cool 4° ± 2°C/ 14 days to extraction/ 40 days to analysis
TPH-DRO/RRO-SG	AK102/AK103-SG	Same jar as AK102/AK103	Same as AK102/AK103
Total RCRA 8 Metals plus Ni, V, and Zn	EPA SW6020/ SW7471A	4 oz wide-mouth amber glass jar with Teflon-lined screw cap	Cool 4° ± 2° C; 28 days (Hg) and 180 days (all other metals) for extraction and analysis
VOCs	EPA SW8260B	4 oz wide-mouth amber glass jar with Teflon-lined silicon rubber septum seal	Methanol preservative, Cool 4° ± 2° C; 14 days to analysis of extract.
PAHs	EPA SW8270C	4 oz wide-mouth amber glass jar with Teflon-lined screw cap	Cool 4° ± 2° C; 14 days to extraction, 40 days to analysis of extract
TOC	EPA SW9060	4-oz wide-mouth, clear glass jar, TLC	Unpreserved, Cool 4° ± 2°C/ 28 days to analysis
PCB	EPA SW8082	4 oz wide-mouth amber glass jar with Teflon-lined screw cap	Cool 4° ± 2° C; 40 days to analysis of extract

Table 6-1 Sample Collection, Preservatives and Holding Times for Air/Debris/Waste (continued)

Parameter	Preparation/ Analytical Method	Container Description (Minimum)[1]	Preservation/Holding Time
Soil			
Pesticides	EPA SW8081B	4 oz wide-mouth amber glass jar with Teflon-lined screw cap	Cool 4° ± 2° C; 14 days to extraction, 40 days to analysis of extract
Herbicides	EPA SW8151A	4 oz wide-mouth amber glass jar with Teflon-lined screw cap	Cool 4° ± 2° C; 14 days to extraction, 40 days to analysis of extract
Dioxins/Furans	EPA SW8290	4 oz wide-mouth amber glass jar with Teflon-lined screw cap	Cool 4° ± 2° C; 30 days to extraction, six months to analysis
Sediment			
TPH-GRO	AK101	4 oz wide-mouth amber glass jar with Teflon-lined silicon rubber septum seal	Methanol preservative, Cool 4° ± 2°C / 28 days to analysis
TPH-DRO/RRO	AK102/AK103	8-oz wide-mouth, clear glass jar, TLC	Unpreserved, Cool 4° ± 2°C/ 14 days to extraction/ 40 days to analysis
TPH-DRO/RRO-SG	AK102/AK103-SG	Same jar as AK102/AK103	Same as AK102/AK103
Total RCRA 8 Metals plus Ni, V, and Zn	EPA SW6020/ SW7471A	4 oz wide-mouth amber glass jar with Teflon-lined screw cap	Cool 4° ± 2° C; 28 days (Hg) and 180 days (all other metals) for extraction and analysis
VOCs	EPA SW8260B	4 oz wide-mouth amber glass jar with Teflon-lined silicon rubber septum seal	Methanol preservative, Cool 4° ± 2° C; 14 days to analysis of extract
PAHs	EPA SW8270C	4 oz wide-mouth amber glass jar with Teflon-lined screw cap	Cool 4° ± 2° C; 14 days to extraction, 40 days to analysis of extract
TOC	EPA SW9060	4-oz wide-mouth, clear glass jar, TLC	Unpreserved, Cool 4° ± 2°C/ 28 days to analysis
PCB	EPA SW8082	4 oz wide-mouth amber glass jar with Teflon-lined screw cap	Cool 4° ± 2° C; 40 days to analysis of extract
Pesticides	EPA SW8081B	4 oz wide-mouth amber glass jar with Teflon-lined screw cap	Cool 4° ± 2° C; 14 days to extraction, 40 days to analysis of extract
Herbicides	EPA SW8151A	4 oz wide-mouth amber glass jar with Teflon-lined screw cap	Cool 4° ± 2° C; 14 days to extraction, 40 days to analysis of extract
Dioxins/Furans	EPA SW8290	4 oz wide-mouth amber glass jar with Teflon-lined screw cap	Cool 4° ± 2° C; 30 days to extraction, six months to analysis

Table 6-1 Sample Collection, Preservatives and Holding Times for Air/Debris/Waste (continued)

Parameter	Preparation/ Analytical Method	Container Description (Minimum)[1]	Preservation/Holding Time
Surface Water			
Total RCRA 8 Metals plus Ni, V, and Zn	EPA SW6020/ SW7471A	1, 250 mL poly bottle	HNO3, Cool 4° ± 2°C / 28 days (Hg) and 180 days (all other metals) for extraction and analysis
VOCs	EPA SW8260B	3, 40-mL VOA vials	HCl, Cool 4° ± 2°C / 14 days to analysis
PAHs	EPA SW8270C	2, 1-Liter amber glass	Cool 4° ± 2°C / 7 days to extraction; 40 days to analysis of extract
PCB	EPA SW8082	2, 1-Liter amber glass	Cool 4° ± 2° C; 40 days to analysis of extract
Pesticides	EPA SW8081B	2, 1-Liter amber glass	Cool 4° ± 2° C; 7 days to extraction, 40 days to analysis of extract
Herbicides	EPA SW8151A	2, 1-Liter amber glass	$Na_2S_2O_3$, Cool 4° ± 2° C; 7 days to extraction, 40 days to analysis of extract

Notes:
[1]Clear glass may be substituted for amber if samples are protected from exposure to light; this exception does not apply to metals.

CON/HTRW = containerized hazardous toxic waste
EPA = U.S. Environmental Protection Agency
NIOSH = National Institute of Occupational Safety and Health
oz = ounce
PCBs = polychlorinated biphenyls
RCRA = Resource Conservation and Recovery Act
SW = EPA Solid Waste Test Method
TCLP = Toxicity Characteristic Leaching Procedure

6.6 LABORATORY REPORTING LIMITS

For waste characterization sampling the laboratory reporting limits for each compound analyzed will not exceed RCRA regulatory levels. Analytical results will be compared to regulatory levels listed in 40 CFR 261 and 40 CFR 761. For SI sampling the laboratory reporting limits for each compound analyzed will not exceed ADEC cleanup levels. Analytical results will be compared to cleanup levels and documented in the RA/SI Report at the conclusion of the project.

6.7 SAMPLE PACKAGING

Samples will be packaged carefully to avoid breakage, contamination, or cross contamination. The following sample packaging requirements will be followed:

- Sample bottle lids will not be mixed; all sample lids will remain with the original containers.
- Coolers to be shipped to the contracted analytical laboratory or laboratories will be partially filled with packing materials (bubble wrap) to prevent the bottles from moving during shipment.
- The sample bottles will be placed in the cooler in such a way as to ensure that they do not touch one another.
- Any remaining space in the cooler will be filled with inert packing material. (Under no circumstances will material such as sawdust or sand be used.)
- A CoC record will be placed in a plastic bag and taped to the inside of the cooler lid. After a container has been sealed, a minimum of two custody seals will be affixed to the sample cooler (where the top opens) and covered with strapping tape, which is applied at least three times around the cooler at each end.

6.8 COOLER LABELING

The words "This End Up" or "This Side Up" or "Fragile" will be labeled clearly on the top of the outer sample cooler; upward-pointing arrows will be placed on the sides of the package. A label that indicates the cooler should not be frozen "Do Not Freeze" will also be adhered to the sample cooler.

6.9 SAMPLE CUSTODY

This section describes procedures that will be followed for sample custody. The purpose of these procedures is to ensure that the integrity of the samples is maintained during collection, transportation, storage, and analysis.

Sample ID documents will be carefully prepared so that sample ID and CoC are maintained and sample disposition controlled. Sample identification documents include, field notebooks, sample labels, custody seals, and CoC records.

6.9.1 CoC

The primary objective of the CoC procedures is to provide an accurate, written record that can be used to trace the possession and handling of a sample from the moment of collection through analysis. A sample is in custody if it meets the following criteria:

- It is in an authorized person's physical possession;
- It is in an authorized person's view;
- It is locked up; or
- It is kept in a secure area that is restricted to authorized personnel.

6.9.2 Field Custody Procedures

The following procedures will be used by field personnel:

- As few people as possible will handle samples.
- ADEC "Qualified Persons" will collect samples and will be personally responsible for the care and custody of samples collected until they are dispatched properly under CoC protocol.
- The sample collector will record sample data (for example, date of collection, time of collection, sample number, analytical requirements and matrix) in the field notebook.

6.9.3 CoC Record

The CoC record will be fully completed in duplicate. In addition, if samples are known to require rapid turnaround in the laboratory because of project time constraints or analytical concerns (for example, extraction time, or sample retention period limitations), the person completing the CoC record will note these constraints in the "Remarks" section of the custody record.

6.10 ADEC CHECKLIST

Laboratory results will be reviewed by a Bristol chemist, and the ADEC Data Review Checklist, Version 2.7 (ADEC, 2010b), will be completed and provided with the SI Report. The ADEC Data Review Checklist is included in Appendix F.

7.0 RA/SI DRAFT AND FINAL REPORTING

After completion of the fieldwork, Bristol will submit a report to the NVS, USACE, and ADEC, on behalf of the NVS, documenting all RA/SI activities and findings. The report will include photographs, sample locations, all analytical results, copies of transportation and disposal paperwork, and conclusions. Figures submitted in the final RA/SI report will also depict wood-burning locations, staging areas, and CON/HTRW removal areas. Figures will also identify SI and confirmation sampling locations.

The final RA/SI report may also contain supplemental information collected and documented by NVS field personnel.

(Intentionally blank)

8.0 REFERENCES

Alaska Department of Environmental Conservation (ADEC) Technical Memorandum 06-001 (ADEC, 2006)

ADEC. 2008a. *Method Two Soil Cleanup Criteria for Under 40-Inch Precipitation Zone.* Title 18 Alaska Administrative Code (AAC), Chapter 75, Section 341 (18 AAC 75 341). October 9.

ADEC. 2008b. *Groundwater and Surface Water Cleanup Levels.* 18 AAC 75 345. October 9.

ADEC. 2009 (March). Environmental Laboratory Data and Quality Assurance Requirements.

ADEC. 2010a. *Draft Field Sampling Guidance*. May.

ADEC. 2010b. *Laboratory Data Review Checklist Version 2.7.* January.

Bristol Environmental Remediation Services, LLC (Bristol). 2009 (December). *Native Village of Northeast Cape Site Investigation Report. Northeast Cape, St. Lawrence Island, Alaska.* Revision 2.

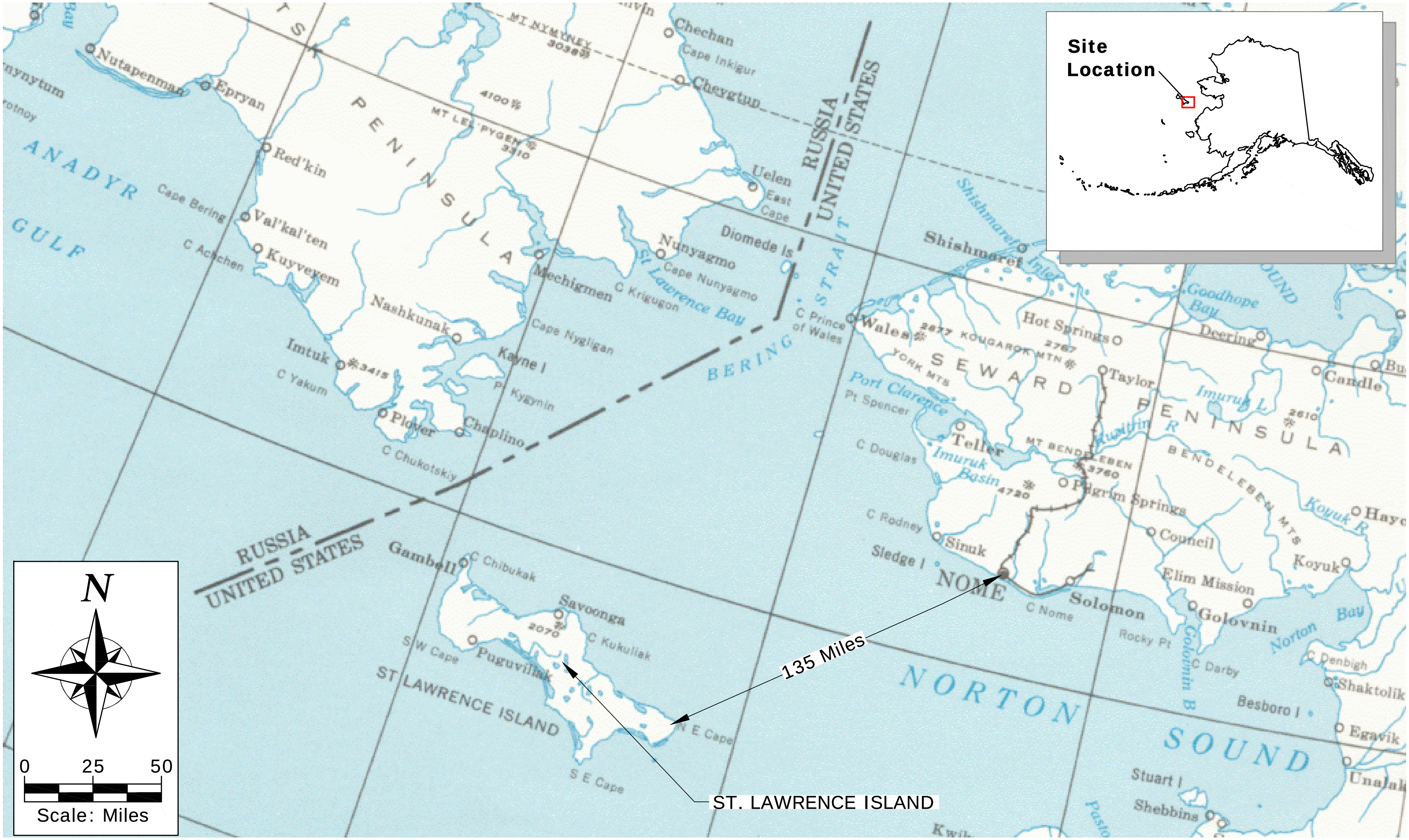
Bristol. 2010 (April). S*trategic Project Implementation Plan. Native Village of Northeast Cape "Northeast Cape Fish Camp." St. Lawrence Island, Alaska*. Revision 2.

Bristol. 2012 (April). *Native Village of Northeast Cape Removal Action Report. Northeast Cape, St. Lawrence Island, Alaska.* Revision 2.

(Intentionally blank)

FIGURES

Drawing: O:\JOBS\49029 SAVOONGA NALEMP\ACAD-ENVIRO\FIGURES\DWG\49029_FIG1_MAY09.DWG - Layout: 49029_FIG1_MAY09
User: MGARCIA May 15, 2009 - 10:05am Xrefs: - Images: NECAPE.JPG



Source: USGS National Atlas Sheet Number 42-43

FIGURE 1
NORTHEAST CAPE, ST. LAWRENCE ISLAND, ALASKA
SAVOONGA NALEMP
VICINITY MAP

Bristol ENVIRONMENTAL REMEDIATION SERVICES, LLC Phone (907) 563-0013 Fax (907) 563-6713 PROJECT NO. 49029	DATUM: NA PROJECTION: NA	DATE 05/11/09 DWN. MTG SCALE SHOWN APPRVD. TE

Drawing: O:\JOBS\49029 SAVOONGA NALEMP\ACAD-ENVIRO\FIGURES\DWG\49029_FIG2_MAY09.DWG - Layout: 49029_FIG2_MAY09
User: MGARCIA May 15, 2009 - 10:08am Xrefs: - Images: NE1.JPG

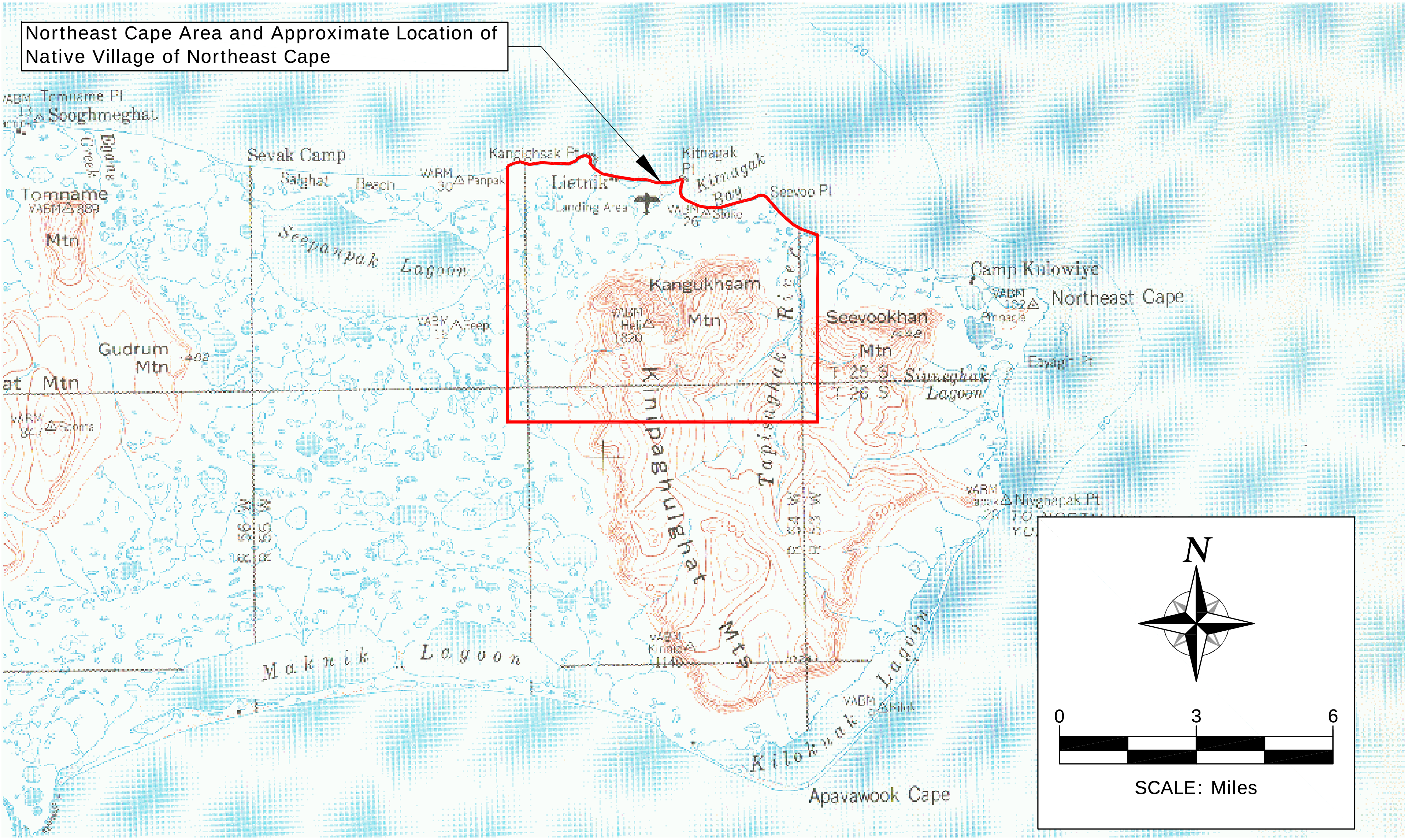
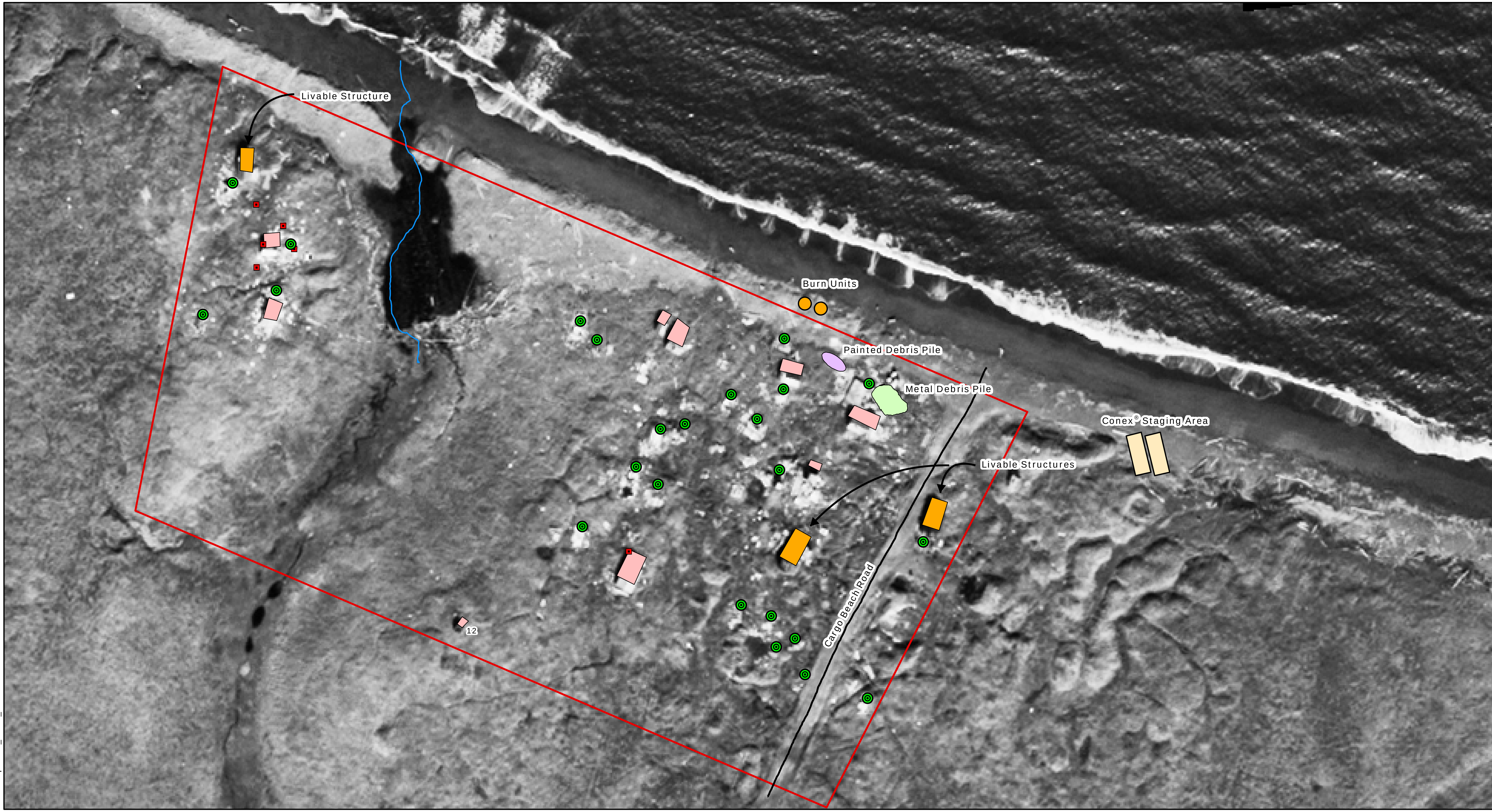


FIGURE 2
NORTHEAST CAPE, ST. LAWRENCE ISLAND, ALASKA
SAVOONGA NALEMP
SITE AREA MAP

Bristol
ENVIRONMENTAL
REMEDIATION SERVICES, LLC
Phone (907) 563-0013 Fax (907) 563-6713
PROJECT NO. 49029

DATUM: NA
PROJECTION: NA

DATE	05/11/09
DWN.	MTG
SCALE	NTS
APPRVD.	TE



Legend

- Debris Pile
- Steel Burn Unit
- Suspect CON/HTRW
- Cargo Beach Road
- Creek Drainage
- Estimated NVNC Boundaries (Not to Scale)
- Former Site Structure
- Painted Debris Pile
- Metal Debris Pile
- Current Livable Structure

Note:
CON/HTRW = Containerized Hazardous, Toxic, and Radioactive Waste
NVNC = Native Village of Northeast Cape

0 50 100 150 200
Feet

Figure 3
Northeast Cape, St. Lawrence Island, Alaska
Native Village of Northeast Cape
Site Detail Map

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

Project No. 49029

DATUM: NAD 83	DATE 01-10-12	SHEET 1
PROJECTION: Alaska State Plane Zone 9	DWN. BERS-RJ	of
	SCALE 1:1,200	1
	APPRVD. BERS-TE	

Path: G:\Jobs\49029_Savoonga_NALEMP\Maps\Site_Detail_R2.mxd

APPENDIX A

Responses to USACE/ADEC Comments

Alaska Department of Environmental Conservation (ADEC)
Contaminated Sites Program
Document Reviewed: Draft August 2012 Northeast Cape Fish Camp NVS NALEMP SI Work Plan
Commenter: Curtis Dunkin-ADEC **Date Submitted:** September 06, 2012; **ADEC reviewed RTCs on September 10, 2012**

Comment #	Page #	Section	ADEC Comment	Response
1.	21	4.3.2.1	Regarding the proposed removal of only the stained soil that is associated w/ CON-HTRW, it should be clarified that further removal actions may be required, pending laboratory analysis results.	**Accepted-Inserted sentence stating that further removal actions may be required pending laboratory analysis results.** **ADEC-Accepted; September 10, 2012**
2.	29	4.4.1	Work plan needs to be more specific re: how many samples per structure footprint (based on footprint area?); proposed surface water and sediment sampling locations of drainage and ponds, etc.	**Accepted-Will insert text stating that "Due to a limited CA budget, a minimum of one soil sample will be collected from each documented former structure/debris pile location. Additional soil samples will be collected from suspected impacted areas within the NVNC. Depending on soil sampling results, further investigation of former structure/debris pile locations may be warranted and may take place under a future CA."** **ADEC-Accepted; September 10, 2012** **Will add text to Section 4.4.2 that "Sediment samples will be collected at evenly dispersed locations throughout the creek drainage within the NVNC. Due to a limited CA budget, it is expected that up to 10 primary sediment samples will be collected. Depending on sediment sampling results, further investigation of sediment may be warranted and may take place under a future CA."** **ADEC-Accepted; September 10, 2012** **In addition, text will be added to Section 4.4.3 to the effect that "The current CA budget only**

O:\Jobs\49029 Savoonga NALEMP\70 Submittals\Work Plans\WP 2012\Appendix A-WP Review Comments\Bristol Response to ADEC Comments 2012 NEC NALEMP WP RTCs adec rev 9-10-12.docx

				allows for the collection of 10 surface water samples which will include sampling of surface ponds and the creek drainage. Surface water sample locations will be evenly dispersed at areas within the NVNC or will be based on visual observations of suspected impacted areas. Depending on surface sample results, further investigation of surface ponds/creek drainage surface water may be warranted and may take place under a future CA." **ADEC-Accepted; September 10, 2012**
3.	30	4.4.2	The 2012 NEC RA work plan project team (Corps, ADEC, and Bristol) agreed that sediment would be defined as any loose material that is deposited within surface water flow through areas that is not active vegetation or part of the vegetative mat. This same definition of sediment should also be used for this project.	**Accept-Will amend verbiage to "Sediment will be defined as any loose material that is deposited within surface water flow through areas that is not active vegetation or part of the vegetative mat."** **ADEC-Accepted; September 10, 2012**
4.		Table 4-6	ADEC requires a duplicate sample frequency of 10%; i.e. 11 primary samples require 2 duplicate samples. Nearly all of the proposed duplicate sample frequencies need to be revised.	**Disagree-We are considering soil samples collected from "Former Structure and Debris Piles", "Areas of Distress Vegetative/Staining/CON/HTRW Removal", and "Burn Pits and Debris Staging Areas", as one matrix (soil). So for example, a total of 60 (33+23+4) Primary GRO soil samples will be collected with 6 total duplicates (3+2+1). The same is true for all other analyses. We are achieving the 10% frequency per matrix (soil and surface water) as per the ADEC Draft Sampling Guidance.** **ADEC-Accepted; September 10, 2012; Comment was based on how the data was displayed in the table; a footnote added at the bottom of the table stating the response above; Note:**

				60 primary samples are proposed for GRO, DRO, and RRO COCs; perhaps it would help clarify in the table if (of 60 total) were inserted next to the numbers 33, 23, and 4 in the primary column for those COCs and respective duplicate columns were changed to 6 and the same for other primary and duplicate columns for respective analytes. **ADEC Additional comment: why are only 16 primary samples being collected for the PAH and VOC COCs?** **Bristol-Due to a limited sampling budget some samples received less than the full suite of analyses. Depending on results of this initial SI, additional follow-up sampling may be warranted and may take place under a future CA.**
5.	33	4.4.3	Section states that surface water samples will be collected then states several times that surface samples may be collected and needs to be clarified. What is meant by the statement 'ADEC does not have cleanup levels for GRO, DRO, and RRO…'?	**Accept-Please note that due to a limited CA sampling budget, only 5 of the 10 surface water samples will be analyzed for pesticides and herbicides. That is why I used the word "may." Will change verbiage from "may" to "will" with that understanding. We will collect surface water samples according to Table 4-8.** **ADEC-Accepted; September 10, 2012** **Text will be amended to state "Since the ADEC does not have cleanup levels for DRO, GRO, RRO in surface water, surface water samples will be collected and analyzed for total aromatic hydrocarbons…….." Will add additional text that "As per 18 AAC 70.020(b) Note 7, surface water samples will be collected from below the surface and away from any observable sheen." Will also add to References Section.** **ADEC-Accepted; September 10, 2012; However note that ADEC's surface water cleanup criteria are based on 18 AAC 70. Any observable sheen or odor should be noted in the field logs and the report. Sample locations should not be determined based on avoiding sheen and/or potential contamination. If petrogenic sheen and/or odor are observed, then these locations should be prioritized for sampling.**

	38	5.1.3	Personal or Personnel? Section states both and may need to be revised.	**Accept-Change references of "personal" to "personnel"** **ADEC-Accepted; September 10, 2012**
6.	39	5.3	Clarify that the soil/sediment used for the screening will not be the same material that makes up the sample submitted for laboratory analysis. Similar to comment #2 above, what specific areas will be targeted for screening and what frequency? A new figure similar to Figure 3 that depicts the proposed sampling locations and/or areas should be included.	**Accept-Will insert text stating that "soil/sediment used for field screening will not be the same material that makes up the sample submitted for laboratory analysis."** **ADEC-Accepted; September 10, 2012** **See response to Comment #2 above.** **ADEC-Accepted; September 10, 2012** **Sampling locations will be determined in the field prior to sampling after walking the entire NVNC. Sampling locations will be depicted on a new Figure in the Site Investigation Report.** **ADEC-Accepted; September 10, 2012; state this in the work plan; Bristol-Stated in Section 4.4.**
7.	39	5.4	Similar to comment #5 above, why does this section state that soil/sediment samples 'may' be collected?	**Accept- Will change "may" to "will"** **ADEC-Accepted; September 10, 2012**
8.	40	5.4	In time twelve, 'see section 5.6' should be revised to section 5.7.	**Accept-Will amend Section 5.6 reference to Section 5.7** **ADEC-Accepted; September 10, 2012**
9.	41	5.4.1	In item 5, section 5.7 should be revised to section 5.9.	**Accept-Will amend Section 5.7 reference to Section 5.9.** **ADEC-Accepted; September 10, 2012**
10.	45	6.1	Should reference the Draft 2010 ADEC Field Sampling Guidance in this section and in the References section.	**Accept-Will add reference to ADEC Draft Field Sampling Guidance (May 2010) and add to reference section.** **ADEC-Accepted; September 10, 2012**
11.		Table 6.1	The Draft 2010 ADEC Field Sampling Guidance requires that soil, sediment, and sludge samples for VOCs be preserved w/ methanol; revise Table 6-1 and associated sections of the narrative to include this.	**Accept-Added "Methanol Preservative" for VOCs samples collected from soil and sediment.** **ADEC-Accepted; September 10, 2012** Bristol-Deleted TPH-GRO/DRO/RRO in surface water in Table 6-1 since we are not sampling for those constituents.

12.		Figure 3	Item number 12 cannot be discerned in the figure; the number should be called out to the side.	**Accept-Figure 3 will be amended to more easily discern the Structure 12 location.** **ADEC-Accepted; September 10, 2012**
13.			**End of ADEC Comments on the Draft 2012 NEC RA WP UFP-QAPP+Appen.** **End of ADEC Comments on the Draft 2012 NALEMP Removal Action and Site Investigation Work Plan**	Should read "End of ADEC Comments on the Draft 2012 NALEMP Removal Action and Site Investigation Work Plan, Native Village of Northeast Cape, St. Lawrence Island, Alaska **ADEC-Accepted; September 10, 2012**

APPENDIX B

Asbestos and Lead-Based Paint Hazard Abatement Plan

NALEMP REMOVAL ACTION COOPERATIVE AGREEMENT

ASBESTOS HAZARD ABATEMENT PLAN

NATIVE VILLAGE OF NORTHEAST CAPE
ST LAWRENCE ISLAND, ALASKA
CONTRACT # NALEMP-FY12-04

PREPARED FOR:

BRISTOL ENVIRONMENTAL REMEDIATION SERVICES, LLC.
111 W 16TH AVE, THIRD FLOOR
ANCHORAGE, AK 99501-5109

PREPARED BY:

Satori Group, Inc.
1310 E. 66th Ave., #2
Anchorage, AK 99518
Phone: 907-332-0456
Fax: 907-332-0457
www.gosatori.com

JULY 2012

Project Specific Work Plan

Project Location:	Native Village of Northeast Cape "Northeast Cape Fish Camp" Saint Lawrence Island, Alaska
Client :	POC: Tyler Ellingboe, Project Manager Bristol Environmental Services. 111 W 16th Ave, third floor Anchorage, AK 99501-5109
Abatement Contractor:	POC: Alan Caldwell, Project Manager Satori Group, Inc. 1310 E. 66th Avenue, Suite 2 Anchorage AK 99518 (907) 332-0456 Phone (907) 332-0457 Fax
Industrial Hygiene Laboratory:	Satori Group, Inc. POC: Alan Caldwell, Industrial Hygienist 1310 E. 66th Avenue, Suite 2 Anchorage, AK 99518 (907) 332-0456 Phone (907) 332-0457 Fax

ACRONYM LIST

AAC	Alaska Administrative Code
ACBM	Asbestos Containing Building Material
ACM	Asbestos Containing Materials
AHERA	Asbestos Hazard Emergency Response Act
AIHA	American Industrial Hygiene Association
AKDOL	Alaska Department of Labor
ANSI	American National Standards Institute
AS	Alaska Statutes
ASTM	American Society for Testing and Materials
BLM	Bureau of Land Management
BZ	Breathing Zone
C	Abatement Clearance
CFM	Cubic Feet per Minute
CFR	Code of Federal Regulations
CPR	Cardiopulmonary Resuscitation
DOL	Department of Labor
DOT	Department of Transportation
EPA	Environmental Protection Agency
f/cc	Fibers per cubic centimeter
FAA	Federal Aviation Administration
GFCI	Ground Fault Circuit Interrupter
HEPA	High Efficiency Particulate Air
HVAC	Heating, Ventilation, and Air Conditioning
IEA	Initial Exposure Assessment
IHT	Industrial Hygienist Technician
L/min	Liters per minute
MSDS	Material Safety Data Sheets
NAM	Negative Air Machine
NEA	Negative Exposure Assessment
NESHAP	National Emissions and Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Agency
NIOSH	National Institute for Occupational Safety and Health
NRC	National Response Center
NVLAP	National Volunteer Lab Accreditation Program
OSHA	Occupational Safety and Health Administration
PPE	Personal Protective Equipment
PCM	Phase Contrast Microscopy
PEL	Permissible Exposure Limit
PF	Protection Factor
PLM	Polarized Light Microscopy
PM	Project Manager
POC	Point of Contact
Pre	Pre-abatement
SSHP	Site Safety Health Plan
TWA	Time Weighted Average
TEM	Transmission Electron Microscopy
UL	Underwriters Laboratories

TABLE OF CONTENTS

APPENDICIES

ATTACHMENT 1: LBP HAZARD ABATEMENT PLAN

ATTACHMENT 2: AHA ASBESTOS / LBP REMOVAL

References

The latest revision of the following Standards will be followed during all hazardous materials removal activities. In any instance where adopted standards are in conflict with each other, the most stringent shall apply.

Potentially applicable publications:

CODE OF FEDERAL REGULATIONS (CFR)

OSHA Regulations

29 CFR Part 1910	Occupational Safety and Health Standards - General Industry
29 CFR Part 1910.134	Respiratory Protection
29 CFR Part 1910.141	Sanitation
29 CFR Part 1910.147	Control of Hazardous Energy (lock-out/tag-out)
29 CFR 1910.1000	Air Contaminants
29 CFR Part 1926	Occupational Safety and Health Standards for Construction
29 CFR 1910.1200	Hazard Communications

EPA Regulations

40 CFR Part 61	EPA Asbestos NESHAPS
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 270	EPA Administered Permit Programs: Hazardous Waste Permit Program
40 CFR 273	Standards for Universal Waste Management
40 CFR Part 311	Worker Protection
40 CFR 763	Asbestos Hazard Emergency Response Act

NIOSH Regulations

42 CFR Part 84	Approval of Respiratory Protective Devices

DOT Regulations

49 CFR 171	General Information, Regulations and Definitions
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information and Training Requirements
49 CFR 173	Shippers – General Requirements for Shipments and Packaging
49 CFR 178	Specifications of Packaging

ALASKA ADMINISTRATIVE CODE (AAC)

18 AAC 60	Solid Waste Management
8 AAC 61.600 - 790	Alaska Asbestos Abatement Certification
8 AAC 61	Occupational Health and Safety-Asbestos
8 AAC 61.110	Additional Hazard Communication Standards

ALASKA STATUTES (AS)

AS 45.50.447	Titles Relating to Industrial Hygiene
AS 18.31	Health and Safety – Asbestos

FEDERAL STANDARDS	
313B	Material Safety Data Sheets (MSDS)
AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)	
ANSI Z9.2	Fundamentals Governing the Design and Operation of Local Exhaust Systems
ANSI Z87.1	Errata; Z87.1a) Occupational and Educational Eye and Face Protection
ANSI Z88.2	Respiratory Protection
AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)	
ASTM D 4397	Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications
ASTM E 96	Water Vapor Transmission of Materials
ASTM E 1368	Visual Inspection of Asbestos Abatement Projects
ENVIRONMENTAL PROTECTION AGENCY	
EPA 340/1-90-018	Asbestos/NESHAP Regulated Asbestos Containing Materials Guidance
EPA 340/1-90-019	Asbestos/NESHAP Adequately Wet Guidance
EPA 560/5-85-024	Guidance for Controlling Asbestos-Containing Materials in Buildings
UNDERWRITERS LABORATORIES (UL)	
NL 586	High-Efficiency Particulate Air Filter Units
NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)	
NFPA 701	(1999) Fire Tests for Flame Propagation of Textiles and Films
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)	
NIOSH 94-113	NIOSH Manual of Analytical Methods
UNITED STATES ARMY CORPS OF ENGINEERS	
EM 385 1-1	Sept. 15 2008

BACKGROUND & PURPOSE

Bristol Environmental Services (herein Bristol) has subcontracted Satori Group, Inc. (herein Satori) for completing hazardous material abatement at the Northeast Cape Fish Camp on St. Lawrence Island, Alaska.

The purposes of this plan are as follows:

1. To protect the safety and health of the hazardous materials workers and others involved in the project.
2. To avoid contamination outside the project work area by asbestos fibers or other hazardous materials originating within the project.
3. To assure compliance with applicable federal and state regulations for asbestos, lead and hazardous materials in construction.
4. To assure compliance with requirements of the Owner generated contract.

Description of Work

Based on the scope of work, the following asbestos containing materials will be removed during the abatement action prior to building demolition:

Item Title	Quantity	Condition	Removal Method
ACM Tile/ Mastic	Unknown	Good/ Fair	Class II, HEPA Vacuum, Hand tools
ACM CAB	Unknown	Good	Class II HEPA Vacuum, Hand tools
ACM Transite Pipe	Unknown	Good	Class II HEPA Vacuum, Hand tools
Air-o-Cell pipe insulation	Unknown	Good	Class II HEPA Vacuum, Hand tools

GENERAL COMMENTS – REGULATIONS

Definitions

In the Occupational Safety and Health Administration (OSHA) regulations, “asbestos containing material” means any material containing more than 1% asbestos. Tile and mastic along with other materials installed prior to 1981 must be considered asbestos containing, unless an industrial hygienist determines that any of these materials are asbestos-free using recognized analytical techniques.

Friable: The EPA’s Asbestos Hazard Emergency Response Act (AHERA) and NESHAP regulations define the term friable as the following: a material that when dry may be crumbled, pulverized, or reduced to powder by hand pressure. This definition includes previously non-friable material after such previously non-friable material becomes damaged to the extent that when dry, it may be crumbled, pulverized, or reduced to powder by hand pressure.

Unacceptable Practices

The following work practices shall not be used:

- High-speed abrasive disc saws that are not equipped with point of cut ventilator or enclosures with HEPA filtered exhaust air.
- Compressed air used to remove asbestos containing materials, unless the compressed air is used in conjunction with an enclosed ventilation system designed to capture the dust cloud created by the compressed air.
- Dry sweeping, shoveling, or other dry clean up.
- Employee rotation as a means of reducing employee exposure to asbestos.

CONTRACTOR QUALIFICATIONS

Satori Group's personnel qualifications are summarized in the below table. Satori Group has provided environmental services throughout Alaska since 2001. In addition to being an American Industrial Hygiene Association (AIHA) laboratory, Satori Group is also an EPA certified Lead Based Paint (LBP) firm and State of Alaska recognized training provider for AHERA Contractor/Supervisor courses. Satori's project experience includes work throughout Alaska involving asbestos abatement, hazardous materials surveys, groundwater monitoring, health and safety training, LBP inspections and risk assessments and other services.

Satori Group has worked directly for several federal agencies, including, but not limited to: United States Army Corp of Engineers (USACE), Federal Aviation Administration (FAA), United States Coast Guard (USCG), Bureau of Land Management (BLM), United States Air Force (USAF). In addition, Satori Group has subcontracted with several large corporations including: Jacob's Engineering, Kiewit Construction, Neeser Construction, Weston Solutions, and others.

A summary of project personnel that will contribute to contract execution includes:

Project Staff	Position		Industry / Work Experience	Education
1 & 2	Contract/Project Manager	Alan Caldwell	9	Bachelors of Science
3	Health & Safety Manager	Alan Caldwell	9	Bachelors of Science
4	Industrial Hygiene Technicians	Multiple	Varying	Varying
5	Competent Person	Charlie Skannes	9	High School
6	Finance	Jill Lucas	8	Bachelors of Science
7	Administration	Kim King	4	Office Specialist
8	Certified 40-hr Alaska Asbestos Workers	Multiple	Varying	Varying

Project Organization

General project information and organization is provided on the work plan cover page. The following positions and responsibilities are identified for this project.

Prime Contractor Representative: POC Tyler Ellingboe. He will be responsible for contractual agreements. He will schedule and coordinate activities for the subcontractors who work at this project.

Project Staff 1&2: Satori Contract/Project Manager: Alan Caldwell, Satori. Mr. Caldwell will review and authorize contract agreements with SBC and any required subcontractors. Changes to the contract scope of work, schedule, or cost impacts will be addressed by Mr. Caldwell. In addition, project progress invoicing will reviewed, confirmed, and submitted by the Contract Manager. Mr. Caldwell has many years of environmental consulting experience and holds numerous health and safety certifications.

Project Staff 3: Health and Safety Site Manager/ Industrial Hygienist: Alan Caldwell, Satori. Mr. Caldwell will manage Industrial Hygiene Technicians (IHTs) associated with the project, insure project monitoring is protective of human health and the environment, and review health and safety hazards that may be encountered for various tasks. Mr. Caldwell has nine years of experience in the health and safety field. Mr. Caldwell is a board approved AIHA Asbestos Analyst Registry (AAR) participant, approved Alaska 40-hr Contractor/Supervisor instructor, certified EPA LBP Risk Assessor, and holds many additional health and safety certifications.

Project Staff 4: Independent Industrial Hygiene Technicians: Satori Group, Inc. will perform air monitoring during this project. All technicians will perform air monitoring in accordance with recognized industry standards and applicable regulations. All analysis of samples will be done by a certified NIOSH 582 technician.

Project Staff 5: Competent Person: Charlie Skannes, Satori. -- In addition to current State of Alaska asbestos worker certification, Mr. Skannes has over 8 years asbestos abatement experience with construction safety and health hazards, engineering controls, safe work practices and personal protective equipment. He will submit daily logs and reports to the Project Manager (PM). The competent person shall be available at all times during hazardous material abatement efforts and have the authority to stop work.

Project Staff 6: Finance: Jill Lucas, Satori. Ms. Lucas will complete certified payroll during the contract execution. She will receive, review, and confirm all project costs including vendors, subcontractors, and all other costs. Ms. Lucas has managed Satori Group finances, completed salaried and certified payroll, and provide job cost accounting since company inception.

Project Staff 7: Administration: Kim King, Satori. Ms. King will assist in several key office functions. She will complete data entry for accounting, coordinate staff logistical requirements, review all worker training requirements and expiration dates, and other key office duties. Ms. King is experienced with Satori Group's office procedures, computer programs, and nearly all office equipment operations.

Project Staff 8: Workers: Satori personnel. Each worker on the site will have a current Alaska Department of Labor (AKDOL) asbestos Certificate of Fitness, medical approval; respirator fit test, Hazwoper, and site-specific hazard communication training.

PRE-WORK NOTIFICATIONS AND SITE INSPECTIONS

Notifications

Satori will notify the Department of Labor (DOL) for all workers to fulfill the requirement under state law. Satori will provide copies of this work plan; discuss and respond to questions, record concerns, and respond to all reasonable requests within Satori's authority. The supervisors of any other construction trades present in the general area as well as the adjacent inhabitants will be notified of the abatement activity prior to starting work and of the closure of the work areas to unauthorized personnel.

At this time no USEPA notice will need to occur under the 40 CFR 61 Subpart M NESHAP standard. If threshold amounts pertaining to the notification are achieved, work will be stopped for 10 working days during which time notice to USEPA will be given in accordance with the regulation.

Schedule

The project schedule will be set with the General Contractor once submittal approval has been received. No work will commence on site until approval of submittals has been received.

Site Inspection/Unexpected Discovery of Asbestos

The Competent Person will inspect each identified work area prior to beginning any abatement efforts to determine whether conditions conform to those as indicated in the work plan. If the Competent Person identifies any condition that differs from the work plan or which presents any special problem, which should be brought to the attention of the Owner, then the Competent Person will notify Satori's Project Manager.

Site Control

For general site control, Satori shall maintain a regulated area around each abatement work area. Smoking will be strictly prohibited to a designated location outdoors. Entry to the regulated area will be limited to those people with prior clearance and who have current asbestos abatement certifications. The controlled area will be secured at the end of each work shift; however demarcated work areas may remain overnight. The entry point will be properly labeled with Asbestos Danger signs.

Site Control Log

A "Regulated Area Sign In/Out Log" will be kept on the outside of the regulated area. All personnel will be required to sign this form and provide the following information: name, organization, time of arrival, time of departure, asbestos certification card number, social security number, and the type of respiratory protection utilized. All workers entering the work area will be required to sign-in and sign-out each time they enter or leave the work area.

Entry to asbestos control areas will be restricted to only those people with prior clearance and designated representatives who have a current Asbestos Abatement Certification card from the State of Alaska.

Posting Regulatory Required Permits and Notices

At the entrance to the job site or the on-site office, the Competent Person shall post all required notices and permits, specifically, the AKDOL approval for each worker. AKDOL has been provided a list of workers on the project.

REQUIRED PERSONNEL PROTECTIVE EQUIPMENT (PPE)

Abatement personnel for Satori, asbestos consultants and any authorized visitor(s) will be provided with ½ face respirator, disposable full body protective clothing (e.g., Disposable coveralls), head coverings, and gloves prior to entering the designated work areas.

Air Purifying Respirators

For all disturbance activities, personnel will wear NORTH™ half-face air-purifying respirators equipped with HEPA filters and chemical cartridges. The respirators are National Institute for Occupational Safety and Health (NIOSH) certification as required by 29 CFR 1910.134. Satori ensures that those individuals who wear respirators receive fit testing and respiratory training initially and at least once a year thereafter. In addition, Satori ensures;

- a record of fit testing and training is maintained;
- a certification from a occupational physician is received permitting the individual to wear respiratory protection;
- employees are wearing respirators properly;
- employees care for and store their respirators per standard operating procedures.

Respirators will be visually inspected before and after each use. This inspection procedure will include inspecting for any signs of wear or warping of the face piece, defects in the valve system, and damage to straps. All respirators will be cleaned with alcohol wipes after each use, dried, and placed in plastic bags for storage after being decontaminated from usage in regulated area. Use and maintenance of respirators shall be in compliance with Satori Group, Inc.'s Respiratory Protection Plan.

Whole Body Protection

Personnel working at the project site shall be provided with whole body protection.

Coveralls

Personnel will wear disposable-breathable suits (asbestos abatement) or full body polyethylene coated disposable coveralls suits (chemical hazard abatement). These suits have hoods and booties and will afford the workers adequate protection.

Gloves

Personnel will be issued, and will be required to wear, gloves where those gloves can be reasonably expected to prevent injury. The Competent Person will maintain a supply of varying types and sizes of gloves. Leather or leather palmed gloves will be issued for most removal activities.

Foot Coverings

Personnel will wear leather steel-toed safety boots that provide ankle protection whenever working at the site. This protection will conform to ANSI Z41.1- 1969.

Protective Eye Wear

Personnel will be issued, and will be required to wear, safety glasses or goggles whenever the personnel are on site. The Competent Person will maintain an adequate supply of glasses or goggles for employee use. Eye protection will conform to ANSI Z87.1-2003.

WORKER PROTECTION

Site Specific Training

The Competent Person will provide the site-specific training prior to beginning work at the site. No site workers will be allowed to begin work on site until the site-specific training is completed and documented by the Competent Person. This training will address this Hazardous Materials Work Plan (HMWP), Site Safety and Health Plan (SSHP), and all safety and health issues, and procedures pertinent to site operations. All workers must possess a valid “Alaska Department of Labor, Certificate of Fitness” for Asbestos Abatement.

Additionally, all workers must have completed the following training and orientation:

1. Hazard Communication training as required by 29 CFR 1910.1200
2. Respiratory Protection Training as required by 29 CFR 1910.134
3. First Aid and Cardiopulmonary Resuscitation (CPR) Training (min. 2 employees)
4. Emergency response procedures
5. The site safety and health plan for this project
6. The respiratory protection program & requirements
7. The asbestos abatement work plan & procedures

Upon arrival at the site, employees will be further trained in the following areas:

- Project introduction and orientation;
- Requirements and responsibilities for accident prevention and maintaining a safe and healthful work environment;
- Hazard communication training for all hazardous materials brought on site;
- Job hazards and the means to control/eliminate those hazards including applicable activity hazard analyses located in the Site Safety and Health Plan;
- Selection and use of PPE;
- Employee and supervisor responsibilities for reporting all accidents and incidents;
- Decontamination procedures;
- Procedures for reporting and correcting unsafe conditions or practices.

Medical Surveillance

Use of respiratory protection is restricted to individuals who have been determined to be “medically fit” by a licensed physician within the preceding 12 months. Medical surveillance will be provided in accordance with 29 CFR 1926.1101(m), and as follows:

- Prior to assignment of the employee to an area where negative pressure respirators are worn;
- When the employee is assigned to an area where exposure to asbestos may be at or above the permissible exposure limit for 30 or more days per year, or engage in Class I, II, or III work for a combined total of 30 or more days per year, a medical examination will be given within 10 working days following the thirtieth day of exposure; at least annually thereafter.

All personnel working on this project are entered into Satori's Medical Surveillance program and have current medical approval for wearing respirators to conduct hazardous material abatement.

INITIAL EXPOSURE ASSESSMENT

Initial exposure assessments (IEA) in accordance with 29 CFR 1926.1101(f) (2) are provided to verify that the personnel will be wearing proper PPE on this project.

The following is the Initial Exposure Assessment for the project:

Tasks: Various Class II Removal

Reference Project #1: Satori – Galena 4 Plex Abatement
Date: 9/2010
Satori Project Number: 10526
TWA Results (8 hr) – 0.015 f/cc

Reference Project #1: Satori – Bldg 612 GWB/JC removal
Date: 02/2010
Satori Project Number: 10508
TWA Results (8 hr) – 0.015 f/cc

Pursuant to 29 CFR 1926.1101 (f) (2) (ii). *An Initial Exposure Assessment takes into consideration both the monitoring results and all observations, information or calculations which indicate employee exposure to asbestos, including any previous monitoring conducted in the workplace, or of the operations of the employer which indicate the levels of airborne asbestos likely to be encountered on the job.*

The Initial Exposure Assessment accounts for competent personnel encountering asbestos abatement projects where knowledge and experience from similar projects exists.

The Competent Person shall review exposure data immediately before or at the initiation of any operation to determine the expected exposures during the operation. This assessment will be completed in time to comply with the requirements, which are triggered by exposure data or lack of negative exposure assessment, and to assure that all control systems planned are appropriate and will work properly.

HYGIENE FACILITIES AND PRACTICES

DECONTAMINATION AREA EXIT PROCEDURES

The anticipated removal work will be done under Class II conditions. If the material becomes friable due to sanding, grinding or aggressive removal, the following procedures will be executed for Class I decontamination:

Class I Decontamination

1. Equipment/Dirty Room - This room is where employees will remove and dispose of their contaminated disposable clothing prior to leaving the work area and entering the shower room. Surfaces of the equipment room shall be wet wiped after each shift.

2. Shower Room - Shower facilities will be provided in accordance with 29 CFR 1910.141, "Sanitation." One shower will be located within each decontamination facility, hot and cold water, and soap will be made available within each shower and clean towels will be provided. If hot water service can be secured from an adjacent building a backflow protection device will be installed at the point of connection. Should sufficient hot water not be available from an adjacent building then an electric water heater will be provided. Flow and temperature controls for the shower system will be located within the shower and shall be adjustable by the user. The wastewater from the shower shall be collected and filtered to remove lead contamination. The filters and residue resulting from the shower shall be disposed of as lead contaminated material.

3. Clean Room: The clean change room is used for disrobing and donning disposable clothing and respirators prior to entering the containment area. It is also used for redressing after leaving the containment area. A container to hold personal gear shall be provided for each worker in the clean room. The floor of the clean room shall be kept dry and clean at all times. Water from the shower shall not be allowed to wet the floor in the clean room.

All water from the shower unit and any other recovered water will be filtered in a series of stages with the final filtration stage sufficient to meet discharge standard of 18 AAC 70. All filters will be properly disposed of.

Floor areas in the three-stage decontamination unit will be kept dry and clean. No equipment, bags or other miscellaneous materials will be allowed to accumulate inside the decontamination unit. Good housekeeping practices will be consistently maintained

Class II Decontamination

The following procedures will be executed for Class II operations for decontamination:

1. Each person shall HEPA vacuum thoroughly the other persons clothing before leaving the regulated area.
2. A pump sprayer with clean potable water will be staged adjacent to the regulated area exit. Workers will wash their hands, remove their respirators, and wash their faces whenever leaving the regulated area.
3. Respirators will be stored in Ziploc™ bags after cleaning.
4. The Sign in/Sign out log will be signed each time entry/egress is made into the containment.
5. Employees shall remove their protective clothing and deposit the clothing in labeled impermeable bags or container for disposal as ACM.
6. Each worker must shower at the end of the workday. This may be done at the worker's living quarters immediately after arrival.

Note: For major or life threatening injuries, the injury takes precedence over any contamination. When possible, contamination spread should be minimized through decontamination or covering the contamination.

Material and Equipment Decontamination

Equipment and surfaces of containers filled with ACM shall be cleaned prior to being removed from the regulated area. Any tools, equipment, and reusable PPE (safety glasses, hardhats) that have been used for asbestos in the regulated area shall be decontaminated before leaving the regulated area. Use the following procedures for decontamination of equipment and materials:

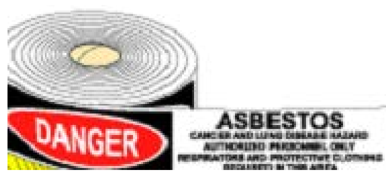
1. Equipment will be washed and scrubbed in soapy water to remove the gross contamination and wiped dry with a clean cloth. Water generated during hand washing and hand tool cleaning will be disposed of into asbestos disposal bags that contain disposable coveralls, gloves, cleaning rags, or other asbestos decontamination materials.
2. Items that cannot be fully decontaminated will to be bagged and sealed before taken out of containment.

REGULATED AREAS

Regulation of asbestos projects will be accomplished by using asbestos danger ribbon at all entryways to the work area. Within the work areas, HEPA filter equipped fan units will be used as a nuisance dust engineering control and provide airflow between the regulated area and the outside air. All entry and egress locations will have "Danger Asbestos" signs prominently placed until the area is deemed acceptable for re-entry.

Asbestos danger ribbon will contain the following text and appearance:

<u>Sign size</u>: 3" x 1000 ft
<u>Use</u>: All entrances, exits, load-outs, critical barriers and perimeter demarcations in combination with asbestos danger tape.



Signs

OSHA compliant "Danger Asbestos" signs will be posted on site. Only one entrance will be available during abatement for access to the work areas. All access to regulated areas will be restricted and strictly enforced when abatement of ACM begins.

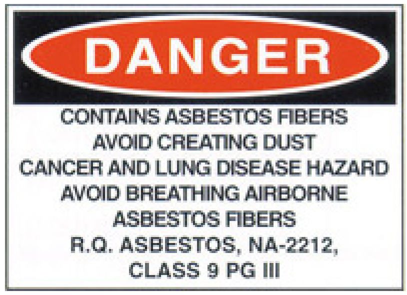
Signs at any potential entry location will contain the following text and appearance:

<u>Sign size</u>: 10" w x 14" h
<u>Use</u>: All entrances, exits, load-outs, critical barriers and perimeter demarcations in combination with asbestos danger tape.

Warning Labels

Warning labels will be affixed to each ACM danger bag containing debris. The labels will contain the following text and appearance:

<u>Sign size</u>: 3” w x 5” h
<u>Use</u>: All wrap and cut piping, wrapped storage tanks or other asbestos materials not disposed of into labeled “Danger Asbestos” bags.



Local Exhaust System

All abatement work will be done on the exterior of buildings or in locations where windows have already been removed. It is not anticipated that local exhaust will be needed for this project. If local exhaust will be required it will be provided by use of one HEPA equipped Negative Air Machines (NAM’s) conforming to ANSI Z9.2. All NAM’s will be equipped with manufacturer recommended primary filters and pre-filters. For Class I removal operations a NPE will be erected and conform with 29 CFR 1926.1101 (g) Methods of Compliance.

Tools

Only HEPA equipped vacuums will be used inside of the regulated areas. HEPA vacuums will be maintained in good working order, provide adequate negative pressure and contain the necessary attachments to thoroughly clean areas. Maintenance activities that may release asbestos fibers (bag removal) will be accomplished inside the regulated area. Vacuums will be wet wiped before leaving the regulated area, sealed at the nozzle end, and placed into clean asbestos danger bag for transport.

All hand tools, ladders, extension cords or other equipment will be vacuumed and wet wiped. Smaller hand tools and extension cords will be bagged before removal from the regulated area.

Utilities

The abatement project will require water for wetting purposes. Electrical needs will be required for high volume sampling pumps, HEPA ventilation equipment, HEPA vacuums, and electrical tools and is also available at the site. All devices and extension cords will be fitted with a Ground Fault Circuit Interrupter (GFCI) at the electrical source.

Prohibitions in the Regulated Area

Workers shall <u>**NOT**</u> eat, drink, smoke, chew tobacco or gum, or apply cosmetics in Regulated Areas.

ENGINEERING CONTROLS

If compliant practices are followed, minimal engineering controls are required to reduce fiber concentrations in the work area for worker protection and to prevent the escape of particulates from the work site during abatement work. For this abatement project, the primary engineering controls will be the use of site security, regulated area, HEPA vacuums, wet methods, immediate cleanup, and burial. HEPA equipped fan units will be used in regulated areas for control of nuisance dust.

Hazardous Materials Removal – Sequence of Operations

The abatement is divided into the following individual efforts sequenced accordingly:

- Pre-work Notification and Inspections
- Regulated Area Setup
  - Signage
  - Decontamination Supplies
- Removal of ACM using Class II Procedures
  - Removal of various ACM
- Visual clearance
- Regulated area decommissioning and breakdown
- Transport and disposal

The exact sequence will be coordinated on-site with the Satori Competent Person and the Owner's Representative in order to minimize disturbance and to expedite the completion of the project.

REMOVAL OF ASBESTOS

Unless indicated that any material is a non-asbestos product, assume it contains asbestos and treat it in the manner prescribed by the following procedures. If suspect asbestos materials are observed that are not identified in this work plan, notify the Competent Person immediately. Do not sand, dry sweep, dry scrape, drill, saw, bead blast, or mechanically chip or pulverize.

If the suspect ACM accidentally becomes disturbed during the work, stop work until the job can be evaluated by a Competent Person. Do not resume work until the job can be evaluated and supervised by a Competent Person. Additional work practices and engineering controls are required to continue work.

PRE-ABATEMENT ACTIVITIES

Inside Abatement

1. Obtain and review copies from Competent Person of:
   a. Work practice(s) to be used including required personal protective equipment
   b. Work Notification(s) (as applicable)
   c. Schedule for work
2. Review this section "WORK PRACTICES" for specific material being abated.
3. Obtain recommended tools, equipment and materials.
4. Move tools, equipment and materials to work area.
5. Secure work area, and establish controlled regulated area.
6. Put on all required personal protective equipment.
7. Sign "Regulated Area Sign In/Out Log"
8. Air monitoring begins: environmental, area and personal air monitoring.

ASBESTOS ABATEMENT ACTIVITIES

Removal Materials and Equipment

1. ½ face North 7700 respirator with P100 HEPA cartridges or PAPR.
2. Breathable full body coveralls

3. Gloves.
4. Safety glasses.
5. Rubber boots, steel-toed.
6. Water: Prior to ACM removal or disturbance of ACM, water will be used.
7. Danger Asbestos Bag: Large size heavy-duty impermeable bag made from 6 mil (0.15 mm) thick polyethylene, with a label stating, “DANGER CONTAINS ASBESTOS FIBERS. AVOID CREATING DUST, CANCER AND LUNG DISEASE HAZARD.”
8. Encapsulant.
9. HEPA Filter Vacuum Cleaners: Use wet/dry tank-type vacuum cleaner equipped with a HEPA filter and metal floor attachment (no brush).
10. Miscellaneous Equipment: Provide as needed the following equipment: hand sprayer, knives, wire brushes, spray glue, and duct tape.
11. Use a GFCI for any electrical connections in a wet environment.
12. 2,000 Cubic Feet per Minute (CFM) HEPA ventilation fan with 12” exhaust tubing for nuisance dust control.

TASK 1: REMOVAL OF VARIOUS CLASS II MATERIALS –UNKNOWN

All removal of Class II materials will be performed within regulated asbestos removal areas and under asbestos abatement conditions. The following steps will be used during removal of Class II materials

1. Personnel will don appropriate PPE inclusive of ½ Face Air Purifying Respirator with HEPA filters, sign “Regulated Area Sign In/Out Log”, enter work area and place a polyethylene sheet under the affected area to minimize final cleaning.
2. A pump sprayer will be positioned adjacent to the disturbance area to reduce the potential for visible emissions.
3. Using hand tools, remove ACM debris.
4. Clean surfaces to remove any remaining debris.
5. Place all debris and associated contaminated materials in 6 mill polyethylene labeled “Danger” bags.
6. Wet debris before closing “Danger” bag and seal appropriately.
7. Personnel will follow Decontamination Area Exit Procedures.

ENVIRONMENTAL AIR MONITORING

Satori Group, Inc will perform air monitoring for this project. Air monitoring will be performed in accordance with all applicable state, federal and local regulations.

Air Monitoring equipment

Satori will utilize low and high volume air sampling pumps, calibrated rotameters, and 25 mm PCM cassettes.

Air Sampling Plan

Asbestos air samples will be analyzed by Phase Contrast Microscopy, by the Industrial Hygienist. The IH is experienced with air sampling and has obtained the NIOSH 582 or equivalent training. Method of analysis will be NIOSH 7400 A Counting Rules. In house quality assurance procedures as required by the analytical procedures used are complete and up to date. Results will be provided within 24 hours.

NIOSH Method 7402 Transmission Electron Microscopy (TEM) will be used for confirmation of PCM results that show excessive fibers or those overloaded with dust if requested. Turn around time for TEM analysis will be 72-hours.

All sampling analysis shall be completed and the results provided within 24 hours after completion of a sampling period. The written results shall be signed by the laboratory analyst. The air sampling results shall be documented on a daily air-monitoring log. The daily air-monitoring log shall contain the following information for each sample:

a. Sampling and analytical method used;
b. Date sample collected;
c. Sample number;
d. Sample type: BZ = Breathing Zone (Personal), Pre = Pre-abatement, E = Environmental, C = Abatement Clearance;
e. Location/activity/name where sample collected;
f. Sampling pump manufacturer, model and serial number, beginning flow rate, end flow rate, average flow rate (in Liters per minute (L/min));
g. Calibration date, time, method, location, name of calibrator, signature;
h. Sample period (start time, stop time, elapsed time (minutes);
i. Total air volume sampled (liters);
j. Sample results shall be reported in fibers per cubic centimeter (f/cc);
k. Laboratory name, location, analytical method, analyst, and confidence level.
l. In addition, the printed name and a signature and date block for the individual who conducted the sampling.

Interior Abatement

- Personal Monitoring
  a. For each work area, personal air monitoring will be performed on 25% of workers, performing each task to determine an eight-hour TWA. Personal air sampling will also include daily 30-minute excursion limit sampling. Excursion limit sampling will be performed on personnel expecting to receive the highest level of exposure.

  b. All personnel samples will be collected from the worker’s breathing zone with two or more samples to determine the TWA. If overloading of samples occurs, additional samples will be collected. Personnel air samples will be collected at flow rates between 0.5 to 2.5 liters per minute.

- Area Monitoring
  a. For each work area, a minimum of two (2) air samples will be collected within the regulated areas.
  b. A target volume of 500-1,200 liters of air will be collected from each sample location on a daily basis. If background “nuisance” dusts are high, multiple cassettes may be required to keep the samples from becoming overloaded.

- Environmental Monitoring

  a. Environmental air sampling will be performed outside of the work area at the perimeter barriers. A minimum of two (2) samples will be taken outside the regulated area preferably at critical barrier locations. Environmental samples are used to determine if asbestos fibers are being contained within the work area and ensure areas outside of the work area remain uncontaminated.

a. Two (2) air samples will be collected in adjacent occupied areas.

b. One (1) sample will be collected in the decontamination area

c. One (1) samples from the waste load out area while waste load out is ongoing. No samples are necessary if no load out operation is performed.

d. A target volume of 500-1,200 liters of air will be collected at each location on a daily basis. If background “nuisance” dusts are high, multiple cassettes may be required to keep the samples from being overloaded.

e. One (1) sample located at the exhaust(s) of HEPA filtration units every other day if applicable. This sample will be placed at a sufficient distance as not to be in the main velocity air stream.

- Clearance Air Monitoring

a. It is not anticipated that clearance monitoring will be done at this time. All buildings that will be worked on will be demolished and removed.

VISUAL INSPECTION

Satori will perform a visual inspection of each abated area to confirm complete removal of hazardous materials and detailed cleaning of abated areas. A visual inspection certification form will be completed and acknowledged by the IHT and Competent Person. Once completed and before the clearances are taken, the client will be notified and allowed to have their representative on site to inspect the containment area to ensure the scope of work has been completed and removal is complete.

Clean up and Tear Down

1. Package and label asbestos waste for disposal.
2. Clean tools, equipment, and work area using wet wiping and HEPA vacuuming as appropriate and return tools and equipment to outside work area.
3. Complete visual inspection.
4. Transport waste to designated asbestos waste storage area.
5. Return decontaminated tools, equipment and remaining materials to transport vehicle.
6. Restore normal accessibility to work area.

Loading, Transport and Disposal

1. Load all adequately wetted ACM in disposal bags or leak tight containers.
2. Post warning signs as described above.
3. Carefully load containerized waste in fully appropriate vehicles for transport.
4. Do not transport un-bagged materials on open trucks.
5. Fill out required manifest for transport of material.
6. Coordinate with Bristol for waste transport to be done by Bristol.

7. Retain copies of the hazardous waste manifests and return to the CP.
8. At completion of the job, the CP shall submit copies of all waste manifests to the Owner's Representative.

Disposal Bags

6 mil (0.15 mm) thick leak-tight "Danger Asbestos" polyethylene bags.

WASTE HANDLING

Satori will confirm all ACM disposal containers that are not pre-printed with asbestos danger labels received a warning label, as specified in *Regulated Areas, Warning Labels*. Information that must be presented on every asbestos container:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD
BREATHING AIRBORNE FIBERS IS
HAZARDOUS TO YOUR HEALTH
RQ-ASBESTOS WASTE
CLASS 9
NA2212-PG III

Disposal of Asbestos Containing Material

All asbestos containing 6-mil danger bags, and/or other asbestos materials properly disposed of in leak-tight containers will be marked with a generator label prior to loading and transport. The ACM will only be disposed of at an asbestos approved facility. Labels will be affixed in prominent locations and contain the following information:

Example:

Generator:	**Native Village of Northeast Cape**
Location:	**St Lawrence Island AK**

All asbestos containing/contaminated material resulting from onsite operations will be transported by Bristol.

ADDITIONAL RESPONSIBILITIES OF SATORI GROUP

Satori Group will notify the State of Alaska DOL prior to the start of asbestos abatement activities. In addition, a list of employees will be submitted that will be involved in the asbestos abatement activities along with their State of Alaska DOL certificate of fitness identification number, expiration date, social security number, and the estimated dates the asbestos abatement activities will be performed.

Emergencies

The emergency procedures and other general safety concerns will be available and/or posted at the project job site. The listing of emergency numbers will be posted at the clean room location. Satori Group personnel will receive instructions in emergency recognition and response. Select Satori field staff personnel are also trained in Cardio Pulmonary Resuscitation (CPR) on an annual basis, in blood borne pathogen protection on an annual basis, and in standard first aid every three years. At least two First Aid and CPR/First Aid trained person will be present during any task performed onsite with the potential for exposure to safety and health hazards.

Equipment Failure
Any equipment that fails or lacks appropriate safeguards will be immediately repaired or removed from service.

Respirator Failure
If a workers respirator fails, they will immediately leave the work area, decontaminate, and inform the competent person. The respirator will then be labeled as defective and either disposed of or placed in a separate area to be fixed.

HEPA-Vacuum Failure
Any HEPA-vacuums that fail will be immediately repaired or taken out of service. If they are used as local exhaust ventilation (for glovebags or mini-enclosures) and fail, the operation will cease immediately and the openings for make-up air sealed. Work will not proceed until the problem has been corrected and the ventilation smoke tested.

Local Exhaust Failure
The operation will cease immediately and the openings for make-up air sealed. Work will not proceed until the problem has been corrected and the ventilation smoke tested.

Fire
At least one 10-pound ABC type fire extinguisher will be immediately accessible to the workers. Workers will be trained in their use and fire response procedures. If a fire cannot be immediately extinguished, workers will evacuate the work area, breaching critical barriers if necessary. Workers will then gather at the designated evacuation point for further instructions.

Potential Fiber Release Episodes
If environmental air samples collected outside the work area indicate concentrations significantly above the background concentration, the affected area will be isolated and the cause investigated. If the cause is other than interference particulate (non-asbestos dust), the affected area will be decontaminated by wet wiping, HEPA-vacuuming, and/or steam cleaning. The area will pass a visual inspection and aggressive clearance air sampling, or be re-cleaned.

Medical
If the injury requires no more than first aid, the worker will be decontaminated before leaving the work area for treatment. If emergency care is required, the worker will be removed from the work area under the care of personnel with valid first aid certification. First aid will be performed. The emergency care provider will be contacted for instructions, and informed of the possible contamination of the worker(s). In life threatening situations, the first call made should be to medical emergencies at 911.

24-hour emergency contact list

The following table provides emergency telephone numbers in the event you need to contact Satori Group and/or other agencies or services after normal work hours:

Due to the remote nature of the work the following emergency procedures will be used. All contact numbers are listed below.

- Emergencies will be handled on site by EMT III Paramedic.
- If Paramedic can not handle injury a charter flight arraigned through Bering air will occur.
- Injured person will be taken to Norton Sound Regional Hospital in Nome AK for treatment.
- If need be another charter flight will be arraigned to take person to Providence Hospital in Anchorage AK

Emergency Contact List

NAME OF CONTACT	OFFICE	CELL
Emergency (on site EMT III Paramedic		
Norton Sound Regional Hospital	907-443-3311	
Providence Hospital	907-562-2211	
National Response Center (NRC) (Federal reporting for a spill or release to water)	(800) 424-8802	
Alaska Department of Environmental Conservation	(907) 465-5340 or (800) 478-9300	
NAME OF CONTACT	**OFFICE**	**CELL**
U.S. Environmental Protection Agency	(800) 424-4372	
Satori Group Anchorage Office	(907) 332-0456	
Alan Caldwell, Project Manager	(907 332-0456	
Alan Caldwell, Health and Safety Manager	(907) 332-0456	(907) 350-9919

SIGNATURE SHEET

Contractor certifies that this submittal accurately and completely describes the coordinated project work of itself, estimated quantities of ACM to be removed, determined clearance requirements, subcontractors, and testing laboratories and that the owner can rely upon this certification.

Alan Caldwell, Project Designer
Satori Group, Inc.
AHERA Project Designer # 102-ROC698-009   Expiration: 1/11/12

Alan Caldwell, Project Manager
Satori Group, Inc.

Satori Group has no citations on record with the Federal, State, or Local agencies.

Derek Lucas, Principal
Satori Group, Inc.

ATTACHMENT 1: LBP HAZARD ABATEMENT PLAN

NALEMP REMOVAL ACTION COOPERATIVE AGREEMENT

LEAD BASED PAINT ABATEMENT PLAN

NATIVE VILLAGE OF NORTHEAST CAPE
ST LAWRENCE ISLAND, ALASKA
CONTRACT # NALEMP-FY12-04

PREPARED FOR:

Bristol ENVIRONMENTAL REMEDIATION SERVICES, LLC

BRISTOL ENVIRONMENTAL REMEDIATION SERVICES, LLC.
111 W 16TH AVE, THIRD FLOOR
ANCHORAGE, AK 99501-5109

PREPARED BY:

Satori Group, Inc.
1310 E. 66th Ave., #2
Anchorage, AK 99518
Phone: 907-332-0456
Fax: 907-332-0457
www.gosatori.com

JULY 2012

TABLE OF CONTENTS

Description of Activities

Lead based paint (LBP) has been found at the site on various painted surfaces. Satori Group will utilize OSHA and EPA approved removal methods, trained personnel, engineering controls, and waste disposal procedures during all site operations as outlined below:

a. LBP Disturbance

Unless indicated through laboratory testing that any material does not contain LBP, treat it in the manner prescribed by the following procedures. If suspect materials are observed that are not identified in this work plan, notify the Competent Person (CP) immediately. Do not sand, dry sweep, dry scrape, drill, saw, bead blast, or mechanically chip or pulverize any component that may contain LBP.

The painted wood will be removed prior to the demolition operation. If additional LBP material accidentally becomes disturbed during the work, stop work until the job can be evaluated by a CP. Do not resume work until the job can be evaluated and supervised by a Competent Person.

Additional work practices and engineering controls are required to continue work.

Pre-Cleaning

No pre-cleaning is anticipated due to the intent to remove regulated hazardous materials and demolish the structures.

Pre-Abatement Activities

1. Obtain and review copies from CP of:
   a. Work practice(s) to be used including required personal protective equipment
   b. Work Notification(s) (as applicable)
   c. Schedule for work
2. Review this section “Lead Compliance Plan”,
3. Obtain recommended tools, equipment and materials
4. Move tools, equipment and materials to work area.
5. Pre-clean work area if debris is present.
6. Secure work area and establish controlled regulated area.
7. Put on all required personal protective equipment (if required).
8. Sign “Regulated Area Sign In/Out Log”
9. Air monitoring personnel begins personal air monitoring.

b. LBP Disturbance Activities

All employees will have training as defined in 29CFR 1926.62 and any all disturbances of lead materials will be performed within demarcated areas. The following steps will be used during removal operations:

1 Personnel will don appropriate a ½ face APR with HEPA filters, enter the demarcated area.

2 Satori will monitor personnel for lead exposure during these operations and based on the analytical findings, will create an exposure assessment to discontinue the monitoring as applicable.

c. Removal Materials and Equipment

The following equipment will be used for LBP disturbance at the project site.

1. ½ face North 7700 respirator with P-100 HEPA cartridges.
2. Breathable full body coveralls.
3. Gloves.
4. Safety glasses or goggles.
5. Rubber boots, steel-toed.
6. Hard Hats.
7. Polyethylene sheeting (minimum 6-mil thick).
8. HEPA Filter Vacuum Cleaners: Use wet/dry tank-type vacuum cleaner equipped with a HEPA filter and metal floor attachment (no brush).
9. Miscellaneous Equipment: Provide as needed the following equipment: Utility or hook knife, hand sprayer, hammer or mallet, wire brush, chisel, duct tape.
10. Use a GFCI for any electrical connections in a wet environment.

d. Crew size

The crew size will vary depending on need and amount of materials to be removed. Any personnel who will be removing LBP will be trained in accordance with 29 CFR 1926.62.

Engineering Controls

Satori will use engineering controls if needed to mitigate exposures to employees who are involved in LBP disturbances. They may include:

- Local ventilation (if indoors)
- Water
- HEPA vacuums
- Regulated area

The air monitoring results will be used to assess the effectiveness of the engineering controls and to see if any additional controls are needed throughout the project.

INITIAL DETERMINATION

The Competent Person shall perform an exposure assessment immediately before or at the initiation of an operation to determine the expected exposures during the operation. This assessment will be completed in time to comply with the requirements, which are triggered by exposure data or lack of negative exposure assessment, and to assure that all control systems planned are appropriate and will work properly. The Initial Exposure Assessment (IEA) will be based on the following:

a. If feasible, the results of employee exposure monitoring; and

b. The IEA will include consideration of all observations, information or calculations, which indicate employee exposure to LBP, including any previous monitoring conducted in the workplace, or of the operations that indicate the airborne levels of lead likely to be encountered.

e. Lead Air Sampling

Lead air sampling will commence during removal operations in accordance with 29 CFR 926.62. Low volume air sampling pumps and 37-mm mixed cellulose ester (MCE) filter cassettes will be used to collect lead air samples. In addition to worker breathing zone air samples, environmental samples will be positioned on the outside of the regulated area.

TABLE 3.1-1 PROJECT-SPECIFIC AIR MONITORING REQUIREMENTS

LEAD

INSTRUMENT	TASK – TORCH CUTTING	ACTION LEVELS		FREQUENCY [1]	CALIBRATION [2]
Low Volume Air Sampling Pump with sampling train that includes 37-mm cassette.	BZ –Breathing	30 µg/m^3 OSHA 8hr "Action Level"	50 µg/m^3 OSHA 8hr PEL	Monitor 25% of workers inside regulated work area disturbing lead	Each sample collected requires a secondary calibration device (rotameter).

Notes:
[1]Air monitoring shall be conducted in accordance with NIOSH 7082 method.
[2]Calibrations of flow rates shall be completed on every sample collected.
ug/m = microgram per cubic meter of air
PEL= Permissible Exposure Limit
BZ= Breathing Zone
≤= less than
≥= greater than

All lead air samples collected will be analyzed by an approved laboratory accredited by the Environmental Lead Laboratory Accreditation Program (ELLAP). Samples will be analyzed using Atomic Absorption Spectrometry (AAS) in accordance with National Institute for Occupational Safety and Health (NIOSH) Method 7082.

Personnel Protective Equipment (PPE)

Personnel for Satori, consultants and any authorized visitor(s) will be provided with disposable full body protective clothing (e.g., Disposable coveralls), head coverings, and gloves prior to entering the designated work areas. Consultants/visitors will be required to provide their own respiratory protection (if entering areas that require respiratory protection).

f. AIR PURIFYING RESPIRATORS

For the scheduled LBP disturbance operations, personnel will wear either NORTH™ half-face air-purifying respirators equipped with HEPA filters or PAPR's as determined by the CP or SSHO. The respirators are National Institute for Occupational Safety and Health (NIOSH) certification as required by 29 CFR 1910.134. Satori ensures that those individuals who wear respirators receive fit testing and respiratory training initially and at least once a year thereafter. In addition, Satori ensures;

- a record of fit testing and training is maintained;
- a certification from a Occupational physician is received permitting the individual to wear respiratory protection;
- employees are wearing respirators properly;
- employees care for and store their respirators per standard operating procedures.

Respirators will be visually inspected before and after each use. This inspection procedure will include inspecting for any signs of wear or warping of the face piece, defects in the valve system, and damage to straps. All respirators will be cleaned with alcohol wipes after each use, dried, and placed in plastic bags for storage after being decontaminated from usage in regulated area. Use and maintenance of respirators shall be in compliance with Satori Group, Inc.'s Respiratory Protection Plan.

g. Whole Body Protection

Personnel working at the project site shall be provided with whole body protection.

h. Coveralls

Personnel will wear disposable-breathable suits (lead abatement) or full body polyethylene coated disposable coveralls suits. These suits have hoods and booties and will afford the workers adequate protection.

i. Gloves

Personnel will be issued, and will be required to wear, gloves where those gloves can be reasonably expected to prevent injury. The CP will maintain a supply of varying types and sizes of gloves. Leather or leather palmed gloves will be issued for most demolition activities.

j. Foot Coverings

Personnel will wear leather steel-toed safety boots that provide ankle protection whenever working at the site. This protection will conform to ANSI Z41.1- 1969. For work inside the regulated work area, personnel are required to wear rubber steel-toed boots.

k. Head Covering

Personnel will be issued, and will be required to wear, hardhats whenever the personnel are on the project site.

l. Protective Eye Wear

Personnel will be issued, and will be required to wear, safety glasses, goggles or tinted face shields depending on the hazards encountered. The Competent Person will maintain an adequate supply of protective eye wear equipment for employee use. Eye protection will conform to ANSI Z87.1-2003.

Prior to donning protective clothing, each garment will be visually inspected to identify defects, such as tears, cracks, holes, and delaminating, which may allow contaminants to penetrate the clothing. The surface of the clothing will also be inspected for any signs of wearing, cracking, or degradation. Any openings or possible penetration points identified in this inspection process will be sealed and/or masked. Clothing that is contaminated or discolored will be discarded. Protective clothing ensembles will also be evaluated for proper fit before being worn. Other protective equipment such as protective eyewear and goggles will be inspected for structural integrity and cleanliness. Eyewear that is severely scratched will be discarded.

m. Housekeeping procedures

All work areas will be demarcated with Lead Danger ribbon during disturbance activities. The Competent Person will inform all other trades on site about unauthorized areas. OSHA approved work methods will be used to mitigate the spread of contaminants from beyond the regulated area.

n. HYGIENE FACILITIES AND PRACTICES

All hygiene facilities and practices will be in accordance with 29 CFR 1926.62 (i) *Hygiene facilities and practices for employees*. Workers will not be allowed to eat, drink, or smoke around LBP disturbance areas. Workers will be instructed to fully wash all exposed body parts in clean water before leaving the regulated area to prevent the spread of any lead and to prevent ingestion of lead.

Administrative Controls

If compliant work practices are followed, minimal administrative controls will be needed during the project. If unacceptable levels of LBP are found in the air monitoring, Satori will implement additional administrative controls such as an employee rotation schedule in compliance with 29 CFR 1926.62 (e)(4).

Medical Surveillance

Use of respiratory protection is restricted to individuals who have been determined to be “medically fit” by a licensed physician within the preceding 12 months. Medical surveillance will be provided in accordance with 29 CFR 1926.62 (f) and (j) Medical Surveillance, and as follows:

- To any employees occupationally exposed on any day to lead at or above the action level. Initial medical surveillance consists of biological monition in the form of blood sampling and analysis for lead and zinc protoporphyrin levels.

All personnel working on this project are entered into Satori’s Medical Surveillance program and have current medical approval for wearing respirators to conduct hazardous material abatement.

Competent Person and Employee Training

o. Worker Training

All workers on site will have training in Lead Awareness in accordance with 29 CFR 1926.62 (l) *Employee Information and Training*.

Additionally, all workers must have completed the following training and orientation:

1. Hazardous Waste Operations initial, refresher and supervisor training in accordance with 29 CFR 1926.65 and 29 CFR 1910.120
2. Hazard Communication training as required by 29 CFR 1910.1200 (Site Specific)
3. Respiratory Protection Training as required by 29 CFR 1910.134
4. First Aid and Cardiopulmonary Resuscitation (CPR) Training (min. 2 employees)
5. Emergency response procedures
6. The Accident Prevention Plan for this project
7. The respiratory protection program & requirements
8. The LBP compliance plan & procedures

Site specific training to comply with Hazard Communication standard will be conducted before the start of the project and reviewed as needed at the daily safety meetings. All training will be documented and submitted with the daily reports.

Waste Generation

All waste generated from this operation will be given to Bristol. Any disposal of material will occur after a TCLP sample has been taken of the waste stream to identify if the material shall be treated as a RCRA waste for transport and disposal.

ATTACHMENT 2: AHA ASBESTOS / LBP REMOVAL

APPENDIX C

Site Safety and Health Plan

TABLE OF CONTENTS

TABLE

ATTACHMENTS

(Intentionally blank)

ACRONYMS AND ABBREVIATIONS

ACM	asbestos-containing material
AHA	Activity Hazard Analysis
ANSI	American National Standards Institute
Bristol	Bristol Environmental Remediation Services, LLC
C.I.H.	Certified Industrial Hygienist
CFR	Code of Federal Regulations
CON/HTRW	Containerized Hazardous, Toxic, and Radioactive Waste
CPR	cardiopulmonary resuscitation
EM	Engineer Manual
GI	gastrointestinal
HWAP	Hazardous Waste Accumulation Point
NE Cape	Northeast Cape
NVNC	Native Village of Northeast Cape
NVS	Native Village of Savoonga
OP	Occupational Physician
OSHA	Occupational Safety & Health Administration
PCBs	polychlorinated biphenyls
PCDDs	polychlorinated dibenzo-p-dioxins
PCDFs	polychlorinated dibenzofurans
PEL	permissible exposure limit
POLs	petroleum, oil, lubricants
PPE	personal protective equipment
QA/QC	quality assurance/quality control
RA	removal action
SI	site investigation
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
TLV	Threshold Limit Value
TWA	time-weighted average
USACE	US Army Corps of Engineers
WP	Work Plans

(Intentionally blank)

1.0 INTRODUCTION

This Site Safety and Health Plan (SSHP) has been developed as a control mechanism for the work to be performed during the former Native Village of Northeast Cape (NVNC) Removal Action (RA) and Site Investigation (SI) at Northeast Cape (NE Cape), Saint Lawrence Island, Alaska, under the Native American Lands Environment Mitigation Program. The US Army Corps of Engineers® (USACE), Alaska District, has contracted with the Native Village of Savoonga (NVS), and Bristol Environmental Remediation Services, LLC (Bristol) as its prime subcontractor, to accomplish the activities.

The work comprises the preparation of plans and reports; mobilization and demobilization; removal of surface debris; collection, sampling, and containerization of Containerized Hazardous, Toxic, and Radioactive Wastes (CON/HTRW); and the collection of soil, sediment, and surface water environmental samples as part of the SI.

Potential environmental contaminants that may be encountered during RA activities include petroleum hydrocarbons, volatile organic compounds, semivolatile organic compounds, heavy metals, polychlorinated biphenyls (PCBs), pesticides, herbicides, asbestos, and dioxins and furans.

Working safely is a condition of employment at all Bristol work sites and facilities. Bristol values the good health and safety of all workers and maintains a goal of “zero” accidents for all projects.

(Intentionally blank)

2.0 SITE DESCRIPTION AND PROJECT OVERVIEW

The general work scope activities described above will be performed at the NVNC area.

Saint Lawrence Island is located in the Bering Sea, near the territorial waters of Russia, approximately 135 air miles southwest of Nome, Alaska.

The remote location will require Bristol to charter an airplane from Nome to NE Cape. Accommodations for field personnel are expected at Bristol's field camp located at the NE Cape airstrip.

2.1 SITE DESCRIPTION

The NVNC was once a year-round village site used by the Siberian Yupik Eskimos of Saint Lawrence Island, Alaska. The NVNC has also been termed "Northeast Cape Fish Camp" and "Fish Camp" by various government agencies and past environmental contractors. The NVNC site located at the NE Cape of Saint Lawrence Island is mainly used by the residents of the NVS and the Native Village of Gambell as a traditional fishing, hunting and food-gathering camp. The site is also used throughout the year as a rest stop to wait out storms and bad weather, and as a source of drinking water that is hauled to other locations in the area.

2.2 SCOPE OF WORK

The scope of work for the RA/SI is as follows:

- Mobilization and demobilization of personnel and equipment to and from the NE Cape of Saint Lawrence Island;
- Document and map field activities and conditions at the NVNC using detailed notes, photographs, and a Global Positioning System (GPS);
- Collection, staging, and containerization of remaining non-hazardous/metallic debris from the NVNC for off-site shipment and disposal;
- Containerization and characterization of buried drums, associated soil, and CON/HTRW collected from around the NVNC site for off-site shipment and disposal; and
- Performance of a SI and comprehensive sampling event, including the collection of surface water, sediment, and soil samples from suspect areas throughout the NVNC site.

A summary of the primary activities that will be performed during the RA/SI will include:

- **Mobilization and Demobilization –** Includes transportation of all materials, personnel, and equipment to and from the site.
- **Work Plans –** Draft and final WPs will be prepared for this project.
- **Removal Action –** An RA will be performed to remove physical and environmental hazards associated with debris and CON/HTRW.
- **Site Investigation -** An SI will be performed with environmental samples to be collected from areas of suspect contamination
- **RA Draft and Final Reporting –** Documents field activities and results of the RA/SI and presents the information in a detailed report.

3.0 PROJECT ROLES AND RESPONSIBILITIES

All Bristol employees engaged in hazardous waste operations are required to maintain Occupational Safety & Health Administration (OSHA) certification under 29 Code of Federal Regulations, Part 1910.120 (29 CFR 1910.120) and 29 CFR 1926.65. This includes safety and health professionals, quality assurance/quality control (QA/QC) professionals, and all Project Managers. Employee training certifications are tracked to ensure that no employee is without current certification.

Bristol employees, NVS workers, and subcontractors assigned to this project will be expected to comply with the requirements of this SSHP and Bristol policies.

3.1 BRISTOL PERSONNEL

Project Manager, Mr. Tyler Ellingboe

Mr. Tyler Ellingboe, the Project Manager, is responsible for ensuring project tasks are completed on schedule and within budget, recommending and justifying project modifications, implementing methods of tracking materials and resources, coordinating work with subcontractors, and complying with normal safety procedures and regulatory requirements.

Safety and Health Manager, Mr. Clark Roberts, C.I.H.

Mr. Clark Roberts, Certified Industrial Hygienist (C.I.H.), will manage and implement Bristol's Safety and Health Program for this project. As the Health and Safety Manager (HSM), he will monitor project compliance with Bristol's Occupational Health and Safety Manual (Bristol Industries, 2005). Mr. Roberts works with Bristol's Site Safety and Health Officer (SSHO) assigned to individual projects to develop and implement effective SSHPs. For this project, Mr. Roberts will be responsible for the following:

- Developing, implementing, overseeing and enforcing the SSHP;
- Providing consultation as needed to ensure the SSHP is fully implemented;
- Coordinating any modification to the SSHP;
- Providing continued support for upgrading or downgrading the level of personal protection;
- Reviewing accident reports and the results of daily inspections; and

- Serving as a member of the Bristol's QA/QC staff.

Site Safety and Health Officer, TBA

The Field Manager will also serve as the SSHO and will be responsible for compliance with safety and health activities. He/she will conduct a daily safety briefing and address worker safety concerns. The SSHO will be responsible for communicating safety issues and concerns, and reporting safety incidents to the Project Manager.

Field Manager

The Field Manager will be responsible for managing the logistical elements of equipment and personnel mobilization, execution of field RA/SI activities, and demobilization. It is estimated that the Field Manager will be on-site for two weeks during the project. The Field Manager will provide oversight of subcontractors in technical activities and will be responsible for health and safety of personnel while on site. The Field Manager will also be responsible for mapping and documentation of all field and sampling activities. Once the project is underway, personnel from the NVS will lead the field effort with support from Bristol.

Equipment Operator

Bristol will provide an equipment operator that will support field activities on an as-needed basis. It is expected that the equipment operator will aid with the demolition of larger structures. The equipment operator will also move heavy equipment and shipping containers around the site as required. An additional duty of the equipment operator will be to maintain the curtain burner so that it is efficiently utilized.

Regulatory Compliance Manager/Transportation and Disposal Coordinator

The Regulatory Compliance Manager/Transportation and Disposal Coordinator, Mr. Tyler Ellingboe, will oversee all activities related to the collecting, manifesting, transporting, and disposing of all hazardous materials/wastes generated at the site. He will work closely with the Field Manager and waste management personnel to ensure that wastes are properly identified, packaged, transported, and disposed of.

First-Aid/CPR Personnel

All Bristol full-time employees who perform fieldwork are required to maintain certification in first-aid/cardiopulmonary resuscitation (CPR) from the American Red Cross. These personnel have received training in universal precautions and the use of personal protective equipment (PPE), as required by the OSHA bloodborne pathogen standard, 29 CFR 1910.1030. In addition, a medical infirmary will be located at the construction camp and will be attended by a full-time licensed Emergency Medical Technician (EMT) III/Paramedic.

3.2 NVS PERSONNEL

Project Manager

The NVS Project Manager, Mr. Robert Annogiyuk, is responsible for ensuring that all tasks for the scope of work are achieved successfully. The Project Manager will coordinate the effort, and provide the necessary NVS resources to meet the project objectives and requirements.

NVS Field Representative(s)

The NVS field representative(s) will contribute his/their knowledge of the history of the Department of Defense facility at NE Cape and will perform structure and debris removal activities under the RA. One NVS Field Representative, with support from Bristol, will be elected and trained as the SSHO and field lead for when the Bristol Field Manager is not on site.

3.3 SUBCONTRACTORS

Satori Group, Inc. (Satori) will provide State of Alaska, Licensed Asbestos Abatement Technicians (as required) to properly identify, package, and label asbestos-containing material (ACM) items for off-site transportation and disposal. Satori will also conduct air monitoring and sampling for lead exposure (as required). All subcontractors will comply with the applicable portions of this SSHP as a condition of work. Satori personnel job descriptions are discussed in the ACM and LBP Hazard Abatement Plans included as Appendix 2.

3.4 TEMPORARY CONSTRUCTION CAMP

The remote location and conditions found at the NE Cape will require Bristol to construct, staff, and maintain a temporary work camp on the island. The construction camp, including berthing facilities, mess facilities, and office space, will be located on the NE Cape airport parking area pad.

Bristol will require the camp operator to provide the following items:

- Drinking water,
- Toilets;
- Washing facilities;
- Food service;
- Waste disposal; and
- Vermin/vector control.

4.0 HAZARD ANALYSIS

This section describes the general chemical, physical and biological hazards that are associated with the sampling activities that will be conducted at the NVNC site. This section also discusses task-specific hazards and the control measures that will be instituted to manage them. To support this discussion, an Activity Hazard Analysis (AHA) table has been prepared for the task in accordance with USACE Engineer Manual (EM) 385-1-1 (USACE, 2008) and ER 385-1-92 (USACE, 2007) and is presented in Attachment 1.

4.1 GENERAL CHEMICAL HAZARDS

The building structures and debris remaining at the NVNC site may have ACM. Some of the remaining and downed structures may also be covered with paint that may contain inorganic lead pigments. During sampling of the structures and remaining debris, asbestos and lead exposures may be possible as contaminated dust is released into the ambient air. These exposures; however, will be controlled by work practices to minimize dust.

In addition, transformer oil used for fuel and cooking has been documented at the NVNC site. Sampling of stained soil areas in proximity to past transformer oil-burn areas may contain concentrations of PCBs, dioxins, and/or furans. Due to the extremely low vapor pressures of these compounds, exposure during sampling activities should be minimal, as long as PPE is worn to prevent contact.

Small quantities of CON/HTRW have been identified during previous site investigation (SI) activities conducted in 2009. The CON/HTRW present at the NVNC site includes asbestos, suspected lead-based paint debris, suspected petroleum-stained soil, buried and surface drums, lead acid batteries, small metal cans of suspected oil-based paint, grease, and or lubrication oil, and chlorinated dishwashing soap.

The types of hazardous materials that may be encountered and their health effects are discussed in the following sections.

4.1.1 Asbestos

Asbestos is a white or white-brown fibrous mineral with a high-heat capacity that has been used for decades as an insulating material for pipes, wall paneling, floor tiles, roof structures, and gaskets, among other things. Asbestos is also found as an additive to mastics and sealants. Unless disturbed, asbestos poses no health risk. If suspended in the air and inhaled, however, asbestos can cause fibrosis of the lung (a condition called asbestosis) and possibly lung cancer and/or cancer of the gastrointestinal (GI) tract. Asbestos does not pose a health hazard from routes of exposure other than inhalation or ingestion.

Wet methods are used to control airborne fiber releases whenever asbestos is removed or disturbed. The use of respiratory protection is required to control worker exposures when this material is handled. The eight-hour Permissible Exposure Limit (PEL) time-weighted average (TWA) and Threshold Limit Value (TLV) TWA for asbestos is 0.1 fibers per cubic centimeter.

Sampling of asbestos is not a planned RA/SI activity; however, some of the NVNC buildings and structures remaining on site contain ACM. Some of these buildings and structures are also covered with paint that may contain inorganic lead pigments and/or PCBs. Although asbestos and lead-based paint debris sampling is not planned for this phase of fieldwork, asbestos and lead exposures may be possible as contaminated dust is released into the ambient air. These exposures, however, will be controlled by work practices to minimize dust.

4.1.2 Inorganic Lead

Lead is a systemic poison that affects a variety of organ systems, including the nervous system, kidneys, reproductive system, hematopoietic system and GI tract. The primary route of lead exposure is through inhalation, but it can also be ingested when lead dust or unwashed hands contaminate food, drink, or cigarettes. Once in the body, lead enters the bloodstream and circulates to various organs. Lead concentrates and remains in bone for many years. The amount of lead the body stores increases as exposure continues, with possible cumulative effects.

An acute, short-term dose of lead could cause acute encephalopathy with seizures, coma, and death. However, short-term exposures of this magnitude are rare, especially in occupational settings. Reversible kidney damage can occur from acute exposure, as can anemia.

Symptoms of chronic, long-term overexposure include, appetite loss, nausea, metallic taste in the mouth, lead line on gingival tissue, constipation, anxiety, anemia, pallor of the face and the eye rounds, excessive tiredness, weakness, insomnia, headache, nervous irritability, fine tremors, numbness, muscle and joint pain, and colic accompanied by severe abdominal pain. Paralysis of wrist and, less often, ankle extensor muscles may occur after years of increased lead absorption. Kidney disease may also result from chronic overexposure, but few, if any, symptoms appear until severe kidney damage has occurred. Decreased sex drive, impotence, and sterility in men, and decreased fertility, abnormal menstrual cycles, and miscarriages in women characterize reproductive damage due to lead overexposure. Children, due to their developing organ systems, are at greatest risk for damage from lead. Potential sources of lead at the NE Cape site include releases of gasoline and building paint.

4.1.3 CON/HTRW Collection and Processing

Personal protective equipment will be worn to reduce the potential for exposure during the collection, sampling, and containerization of CON/HTRW. Workers who will help handle the removal of drums, contaminated soil, and other CON/HTRW, will be trained about the heavy equipment operator's visibility limitations. Site workers will wear reflective vests to increase their visibility. Soil removed will be dug, placed in containers for disposal off site, and drums will be transported to the Hazardous Waste Accumulation Point (HWAP) for segregation and containment prior to disposal.

Expected chemical hazards associated with the sampling, collection, and containerization of CON/HTRW include those from petroleum, oil, and lubricants (POLs), lead acid batteries, and heavy metals associated with paint products.

4.1.4 Polychlorinated Biphenyls

PCB is a generic term for a range of polychlorinated biphenyl compounds used commercially in heat transfer media and in the chemical/coatings industry. PCBs have been marketed commercially under the trade names Askarel® and Aroclor®, with a designation referring to the percent weight of chlorine.

Prolonged skin contact with PCBs may cause acne-like symptoms, known as chloracne. Irritation to eyes, nose, and throat may also occur. Acute and chronic exposure can cause liver damage and symptoms of edema, jaundice, anorexia, nausea, abdominal pain and fatigue. PCBs are a suspected carcinogen. Skin exposure may contribute to uptake of these chemicals; therefore, skin exposure will be evaluated and controlled.

The likelihood of exposure at the NE Cape site should be minimal due to the extremely low vapor pressure of PCBs, which prevents evaporation (and inhalation) of these compounds and the fact that these compounds are insoluble in water. The primary route of potential exposure for workers is anticipated to be through skin contact. Therefore, PPE to prevent contact with PCBs will be used. Workers are required to wear appropriate gloves (latex or nitrile) at a minimum when handling soil that may be contaminated with PCBs.

The PEL and TLV TWA for PCBs with 54 percent chlorine content is 0.5 milligrams per cubic meter (mg/m^3), while the PEL and TLV TWA for PCBs with 42 percent chlorine is 1.0 mg/m^3. Sources of PCBs include, fluorescent light ballasts, transformer oil, waste oil, tank sediments and transformer pads. There is also potential for PCB-contamination in some painted surfaces.

4.1.5 Dioxins and Furans

Numerous fire-related incidents involving electrical equipment containing PCBs have resulted in widespread contamination with PCBs, and, in some cases, with polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs). The reported burning of transformer oil at the NVNC site has been mentioned as a source of potential PCB, PCDD, and PCDF contamination. Emergency response personnel, maintenance or cleanup workers, or building occupants may be exposed to the compounds by inhalation, ingestion, or skin contact.

Humans exposed to PCBs, PCDDs, and PCDFs have developed chloracne, GI disturbances, elevated serum enzyme and triglyceride levels, and numbness of the extremities. Epidemiologic studies of humans exposed to PCBs or PCDDs, including 2,3,7,8-Tetrachlorodibenzo-p-dioxin are suggestive of an association between exposure to these compounds and increased incidences of cancer.

Exposure to these PCB-related compounds during sampling activities at NVNC should be minimal due to the low solubility of the compounds in water and low vapor pressures. Since airborne concentrations of PCDD and PCDF are not expected, the primary route of exposure will be through dermal contact. Level D PPE will be used and nitrile gloves will be used for collection of soil samples.

4.2 General Physical Hazards

This section provides a description of the possible physical hazards that are associated with the planned field activities.

4.2.1 Heavy Equipment and Vehicle Operation

Excavators, front-end loaders, and other heavy equipment may be used on this project to demolish structures, remove debris, and move intermodal containers. There is a potential for workers to be struck by these vehicles or to be injured by contact with exposed mechanical parts (i.e., gears and pulleys). In addition, there is a risk of vehicle accidents and of fire during refueling. To control these hazards, regulated work areas will be established around each job site, and safe distances will be maintained between workers and mechanical equipment. Mobile equipment will be equipped with backup alarms, and spotters will be used to direct equipment operators, particularly when dumping soil and rock, operating cranes, and loading haul trucks. In addition, all exposed gears and pulleys on mechanical equipment will be guarded to eliminate pinch and grab hazards. Vehicles will be equipped with fire extinguishers, and spill-control equipment will be available during refueling operations in case a fuel, hydraulic fluid, or lubricant release occurs.

All equipment and vehicles brought to the job site will be inspected for structural integrity, cleanliness, operational performance, and proper functioning of safety devices in accordance with the manufacturers' specifications before being placed into service. Equipment not conforming to operational and safety requirements will be repaired and reinspected. Inspection forms are included in Attachment 2.

4.2.2 Operator Qualifications

Equipment operators must be qualified to operate the specific type of equipment or vehicle to which each has been assigned. In addition, each operator must be proficient in the type of equipment he/she will be using. The Bristol Site Superintendent (SS) on the NE Cape formerly used defense site project will ensure that a proficiency test is administered to each operator for each type of equipment operated. Equipment operators may also be required to be certified to operate certain types of OSHA-regulated vehicles, such as forklifts. The SS will maintain a list of operators and the equipment each operator is qualified to operate.

4.2.3 Weather Hazards

Saint Lawrence Island is subject to high winds, rain and snow. On occasion, weather conditions can become severe enough as to present a danger to those working outdoors. In these situations, work will stop, and the personnel will seek protection from the wind in a building.

4.2.4 Thermal Stress

Because all planned work activities will be conducted outside where environmental conditions are typically wet, cold and windy, there is a significant risk that site workers could develop cold stress. In addition, when conditions are warm, there is a possibility that workers could develop heat stress depending on their work activities. The likelihood of such thermal illnesses occurring is dependent on environmental conditions, the level of work activity, and the personal control measures that are used to manage heat loads (work/rest cycles, use of clothing and/or cooling devices, hydration, etc.). Appropriate control measures will be taken to manage these thermal stress concerns. In addition, all site workers will be instructed in the recognition and control of thermal stress symptoms and in treatment procedures. To guard against cold injury, appropriate clothing will be required. A summary of the cold stress prevention guidelines is provided in Attachment 3.

4.2.5 Building Hazards

The buildings at the NE Cape site are in various states of disrepair due to age and weathering. In most cases, the interior walls and ceilings of these buildings have collapsed, exposing the steel, structural supports, wiring and piping that lie within. Building debris litters the floors in almost all cases, presenting a trip hazard to anyone who enters these buildings. Because of such hazards, building entry and sampling will be conducted from areas deemed safe for access. Steel insoles may be used to reduce the potential of injury from stepping on unseen sharp objects.

4.2.6 Slips, Trips and Falls

There is a potential for site personnel to fall through defective flooring in abandoned structures and to slip on debris. The work area will also have uneven surfaces that could present a trip hazard for site personnel. Also, the entire project site is subject to wet weather that makes most walking surfaces slick and increases the potential for slips and falls. The primary concern about the structures is weak flooring that could collapse underfoot.

4.3 Biological Hazards

The primary biological hazards of concern at the NE Cape site are polar bears, foxes, and bacteriological hazards.

4.3.1 Polar Bears

Polar bears may be found on Saint Lawrence Island year-round. Their presence on the island is relatively common when the ice pack is near shore. Some may become stranded on the island from late spring to fall when the ice pack retreats from the shore. Polar bears are protected under the Marine Mammal Protection Act of 1972. It is illegal to disturb a polar bear in any way without a permit. Polar bears are the largest land carnivores in the world. Adult males can weigh more than 1,500 pounds and reach a height of more than four feet at the shoulder; females are usually smaller.

Polar bears can cover hundreds of miles in a few days and cross steep slopes and rough ice at speeds of 25 miles per hour (mph) for short periods of time. They can swim at speeds of six mph. Polar bears have an excellent sense of smell and will home in on a possible food source from many miles away. Their eyesight is equal to humans.

Polar bear tracks look like human footprints, although the bear's are larger. The bear's droppings look like loose puddles of black tar. Polar bears are carnivores and are also curious. They have been known to eat things that are distinctly inedible, such as rubber, plastic, rope, engine oil, and antifreeze.

All polar bears should be treated as unpredictable. In general, they are tolerant of humans and will steer clear of people, if given the opportunity. However, polar bears tend to be more curious than brown or black bears and often approach closely to investigate people or objects. Bluff charges occur very rarely, and a charging bear should be treated as a direct attack.

A worker should play dead if attacked by a female bear with cubs. The body position to take on the ground should minimize the exposure of vital areas. Hands should be placed behind the neck with fingers interlocked, forearms and elbows should be drawn up to protect the face, and knees should be raised to a fetal position. The female bear views people as a threat to her cubs, and she will probably leave once the worker is immobilized. He or she should remain completely passive until the bears have left the area.

If a lone bear attacks, the motive is probably predation, and the worker should get away or fight for his or her life. While the odds are against an unarmed person, fighting back is something the bear is unlikely to expect. Fighting back may gain the worker valuable time, and a nearby worker may be able to help. Fieldworkers should always work in pairs.

Polar bears will investigate anything that could potentially turn up food. They will follow roads and snowmachine trails and have been attracted to industrial activity by sounds and odors. A bear watch should be maintained when people are working outside. If people are prepared and are able to detect a bear when it is at least 500 feet away, there is ample time to move to a safe location. Running or making sudden movements may cause the bear to attack, while backing away slowly is more likely to result in the bear leaving the area. The best response during any bear encounter is to move to a safe location as quickly as possible but without running if the bear is near.

To minimize the risk from polar bears, practice the following:

- Locate storage areas away from any cooking, food, or sleeping quarters. Remember that only early detection and avoidance of polar bears guarantees safety.
- Be vigilant.

- Always check outside before leaving a building. If working outside, post a lookout.
- Never carry food.
- Do not feed wildlife.
- If a bear, bear tracks, or droppings, are spotted, notify the SSHO immediately.
- Avoid bloodstains seen on ice or snow, which probably indicate the location of a polar bear kill. Notify the SSHO immediately.
- Know where the bears are and how many there are.
- Minimize potential bear hiding places (e.g., unskirted structures).
- Dispose of garbage and waste materials correctly. Keep food in a secured area in bear-proof containers. Trucks and other vehicles cannot be considered secure because polar bears looking for food have been known to break into vehicles.
- Equip one person per field area with a firearm.

4.3.2 Foxes

Rabid cross foxes may also be encountered at the NE Cape site. Extreme caution should be exercised to avoid any work activities in close proximity to a cross fox. Work in areas that cross foxes may inhabit should always be performed in pairs.

4.3.3 Bacteriological Hazards

Potential bacteriological hazards, such as salmonella, fecal coliforms, and hepatitis are associated with the landfills and septic systems at NE Cape. To avoid contamination, these areas will be entered only during sampling activities. All personnel will wear the appropriate PPE and follow the necessary decontamination procedures when entering these areas.

4.4 TASK-SPECIFIC HAZARDS

The following sections describe in greater detail the hazards associated with each specific task. Attachment 1 contains the AHA table, completed in accordance with the USACE's EM 385-1-1 (USACE, 2008), identifying the activity, potential hazards, controls and inspections, training, PPE, and monitoring required for each task.

4.4.1 Debris Removal

A significant aspect of the work will involve manually moving, handling, and disposing of drums, containers, abandoned equipment, and pieces of building debris that litter the site.

This labor-intensive work poses the risk of back injury from heavy lifting and lacerations from contact with sharp objects.

To control these hazards, workers will be instructed to use proper lifting techniques when moving heavy loads. These techniques will include using mechanical lifting devices (forklifts, etc.) whenever feasible and having others help to lift exceptionally heavy loads if mechanical lifting devices cannot be used. Workers will also wear leather or abrasive-proof gloves when handling sharp objects.

4.4.2 Sampling

Sampling activities will be performed in accordance with the sampling section of the WP. Environmental samples will be collected from different matrices. Hazards associated with sampling are primarily chemical in nature and are discussed in Section 4.1 of this SSHP. The level of PPE used will depend on the type and location of samples collected. The physical hazards include sprains and strains from improper lifting or overexertion, and cuts from sharp metal edges, as well as slips, trips and falls. Sampling crews may be required to walk on uneven or slick surfaces. Running and “horse play” will not be tolerated on site, and workers will “stop and look” when entering a new area.

4.4.3 CON/HTRW Collection and Processing

Personal protective equipment will be worn while workers collect and process surface and subsurface drums. Some of the drums are scattered about the ground surface and some are partially buried in the subsurface. The hazards associated with collecting drums are similar to those associated with the removal of miscellaneous nonhazardous debris. Some of the drums may have rough edges that can cause cuts. Leather or cut-resistant gloves will be worn to minimize the potential for cuts while handling the drums. Most of the drums are 55-gallon capacity and appear to be empty; however, drums with contents were identified during previous SI activities. Proper lifting techniques will be used to minimize the potential for back injuries.

Drums may contain unknown or uncharacterized contaminants. Drums that appear to contain liquid will be sampled in accordance with the WP. Personal protective equipment will be worn in accordance with the AHA tables in Attachment 1.

4.4.4 POL-Contaminated Soil Removal

Petroleum-, oil-, and lubricants-contaminated soil will be containerized, transported, and disposed of in accordance with the WP. Approximately 1-5 cubic yards are expected to be generated during the RA effort. Workers and operators will communicate accordingly regarding the equipment operator's visibility limitations. Level D PPE will be worn, including safety vests. Soil removed will be excavated, placed in containers for disposal off site, and will be placed at the HWAP for segregation and containment prior to disposal.

(Intentionally blank)

5.0 TRAINING REQUIREMENTS

All Bristol personnel assigned to the project will have some degree of training. All site workers will be qualified to perform their designated duties based on their experience, education, and training. Training requirements anticipated for the project are summarized in Table 5-1.

Table 5-1 Training Requirements Summary

Activity/Personnel	Training Requirement
All site personnel	Task- and site-specific training, including Hazard Communication
All personnel who enter work zones	40-hr HAZWOPER, 8-hr Refresher, 3 days of on-the-job supervision
Supervisors in work zones	8-hr HAZWOPER Supervisor
At least 1 personnel at all times	Red Cross-Certified First-aid/CPR
Asbestos abatement personnel	Worker, Supervisor, and Air Monitoring Training, as required (Identified in Asbestos Hazard Abatement Plan, Appendix 2)

Notes:

CPR = cardiopulmonary resuscitation
HAZWOPER = Hazardous Waste Operations and Emergency Response

5.1 SAFETY BRIEFINGS

A safety briefing will be conducted on the days that personnel are performing project work at the site. The Bristol field personnel/SSHO will conduct the briefing and log the discussion in the field notebook.

5.2 FIRST-AID AND CPR

All Bristol full-time employees who perform fieldwork have received first-aid and CPR training that has been taught by a certified instructor and approved by the American Red Cross. All first-aid/CPR provider certifications will be reviewed and updated prior to personnel deployment to NE Cape. Persons trained in first aid and CPR have received instruction on bloodborne pathogens in accordance with 29 CFR 1910.1030. Site-specific briefings will include information about site-specific bloodborne pathogen hazards. All personnel will be provided with bloodborne pathogen awareness training, emphasizing avoidance of contact with all body fluids. Although the risk of bloodborne pathogen contact is considered remote, bloodborne pathogen contact during administration of first-aid could occur. Any employee involved in an exposure incident will be offered a post-exposure evaluation consisting of prophylaxis and hepatitis-B virus immunization within 24 hours of exposure.

5.3 HAZARD COMMUNICATION

The SSHO, as part of the site-specific training, will provide hazard communication training for all hazardous materials on site. The purpose of a hazard communication or employee right-to-know program is to ensure that the hazards of chemicals located at the site are communicated to site personnel and visitors in accordance with 29 CFR 1926.59.

Site hazard communication pertinent to this project includes the following.

5.3.1 Asbestos

The level of asbestos training provided will depend on the type of work to be done and personnel responsibilities. All personnel involved with asbestos-related work will receive some level of training. All asbestos abatement activities will be performed by State of Alaska, Licensed Asbestos Abatement Workers.

5.3.2 Lead

All personnel who may be exposed to lead will receive training equivalent to hazard communication training for lead.

5.3.3 CON/HTRW Collection and Handling

All personnel who will be involved with CON/HTRW collection, sampling, and handling will receive training equivalent to hazard communication for drum handling.

5.3.4 Polychlorinated Biphenyls, Dioxins and Furans

All personnel who may be exposed to PCB-, dioxin-, and furan-contaminated soil will receive training equivalent to hazard communication training for PCBs, dioxins, and furans.

6.0 PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment will be provided when hazard control methods are determined to be impractical or inadequate to protect the worker. By providing for the proper selection, training, use, and maintenance of PPE, worker exposure to hazardous agents can be minimized. The PPE program will be monitored by the SSHO to determine its effectiveness. The site hazards, or potential hazards, specific to this project regarding PPE are those associated with the following:

- Dust/asbestos and lead dust;
- Slips, trips, and falls;
- Contaminated soil; and
- Heat stress and cold stress.

The level of PPE selected and used will protect employees from the hazards and potential hazards they are likely to encounter, as identified in the AHA tables (Attachment 1). Due to the nature of the tasks involved in the project, and the size of the NE Cape site, the SSHO will choose PPE on a daily basis, depending on the operation, location of the work, and the hazards involved in each task. The level of PPE protection will be upgraded or downgraded based on changes in site conditions.

Some factors that may indicate the need to reevaluate site conditions and PPE selections follow:

- Encountering or handling contaminants other than those previously identified;
- A change of weather;
- A change in a work activity that increases or decreases contact with contaminants; and
- A change in ambient levels of contaminants.

All PPE changes must be approved by the SSHO. The types of protective equipment that will be worn for each specific work activity will be selected, used, inspected and maintained in accordance with 29 CFR 1910.120(g)(5), 29 CFR 1926.65(g)(5), and 29 CFR 1910.134.

Personal protection Levels C, D, and modified D will be available for use during the planned project activities. The general PPE components that make up these levels are listed below.

Each worker will be responsible for inspecting his or her equipment for cracks, holes, and proper fitting.

6.1 LEVEL C

Level C PPE includes the following:

- National Institute for Occupational Safety & Health-approved full-face or half-mask air purifying respirator, with the appropriate cartridges;
- Chemical-resistant coveralls, with head coverings as required;
- Chemical-resistant outer and inner gloves;
- Hard hats at all times: Hard hats will comply with American National Standards Institute (ANSI) Z89.1-1969, Safety Requirements for Industrial Head Protection;
- Safety glasses at all times: Safety glasses will comply with ANSI Z87.1-1968, Practice for Occupational and Educational Eye and Face Protection; and
- Hearing protection as required.

6.2 LEVEL D

Level D PPE includes the following:

- Rubber or other water-resistant boots are required;
- Safety glasses during sampling of soil or building materials: Safety glasses will comply with ANSI Z87.1-1968, Practice for Occupational and Educational Eye and Face Protection;
- Leather gloves as required; and
- Rain gear as required.

6.3 MODIFIED LEVEL D

Modified Level D PPE will be worn when there is the risk of skin contact with chemical contaminants (e.g., oil), but with no risk of exceeding air monitoring limits. Modified Level D is the same as Level C, without the use of a respirator.

7.0 MEDICAL SURVEILLANCE PROGRAM

Bristol will comply fully with 29 CFR 1910.120(f)(6) and 29 CFR 1926.65(f)(6) at all times. The NVS does not have a medical surveillance program for their field workers, so Bristol personnel and their subcontractor Satori will handle all hazardous materials identified on site. In addition, ACM abatement personnel will have current a State of Alaska, Department of Labor ACM Certificate of Fitness, medical approval, respiratory fit test, Hazardous Waste Operations and Emergency Response (HAZWOPER), and site-specific hazard communication training.

7.1 MEDICAL PROGRAM

The medical program administered by Bristol (for Bristol personnel) includes provisions and procedures for the following:

- Pre-employment and exit physicals as required;
- Drug testing;
- Respirator fit-testing;
- Ongoing medical surveillance (see below);
- Hearing tests; and
- Vision tests.

The specific requirements for this project include all of the above. These physicals and tests will be completed before the workers begin working on site. The Occupational Physician (OP) performing the physical examinations will be given a list of known site hazards and contaminants prior to performing fit-for-work examinations and testing. A board-certified medical physician, Dr. Alexander T. Baskous, will provide the examinations.

Due to limitations on medical treatment availability at the NE Cape site, employees with certain manageable health conditions requiring special prescriptions or other needs may be medically restricted from working at the site. The OP will determine factors for employee disqualification under the medical program.

All site work will be performed in accordance with the most recent version of the EM 385-1-1.

(Intentionally blank)

8.0 SITE CONTROL MEASURES

8.1 BUDDY SYSTEM

The buddy system will be employed at all times during site activities. Employees will be required to be within the visual or aural presence of at least one other person at the project site.

8.2 COMMUNICATIONS

In case of a site emergency, workers should immediately leave a dangerous situation and inform fellow workers. The SSHO will contact the emergency personnel required to handle the emergency condition.

8.3 PREVENTION OF ALCOHOL AND DRUG USE

The use of alcohol or illicit drugs at the NVNC site is prohibited. The SSHO will immediately terminate personnel from the site who are involved in such activities.

(Intentionally blank)

9.0 DECONTAMINATION PROCEDURES

Decontamination procedures will be performed to protect people both on and off site, and to minimize the spread of contamination. Decontamination of sampling equipment, if required, will involve brushing and sweeping off the equipment, followed by a soap wash and rinse. Hand tools and other items may remain in contaminated areas until the task is complete. Disposable sampling equipment will be used wherever possible.

(Intentionally blank)

10.0 EMERGENCY PROCEDURES

In case of a site emergency, immediate action will be taken to protect life, property, and the environment. The following sections describe the response systems and the line of communications required.

10.1 MEDICAL EMERGENCIES

Medical assistance will be limited at the NVNC site. The coinciding FUDS project will provide an accessible medical clinic with a full-time, on-site Emergency Medical Technician, (EMT-III/Paramedic). The EMT will be available at all times during site work. First-aid kits will be available for field team use in on-site trucks.

If a medical emergency is beyond the capability of Bristol and island personnel, a medical evacuation will be initiated by the EMT and coordinated with the Norton Sound Regional Hospital located in Nome, Alaska, or with Providence Alaska Medical Center, located in Anchorage, Alaska.

Workers will be instructed to contact emergency assistance through company radios and satellite phones. Emergency evacuation routes will be discussed in the daily safety meetings.

10.2 SITE SECURITY DURING EMERGENCIES

Site security during emergencies and other unexpected events will be the responsibility of the SSHO. His primary responsibility will be to ensure the safe evacuation, treatment, and transport of site personnel, as warranted by the emergency.

10.3 COMMUNICATIONS

A satellite telephone will be used to communicate emergency information.

10.4 Emergency Information

Emergency information will be posted in each vehicle on site and will include the following:

Organization/Personnel	Phone Number
FUDS NE Cape EMT-III/Paramedic	On-Site Radio
Norton Sound Regional Hospital	907-443-3311
Providence Alaska Medical Center-Anchorage	907-562-2211
Bristol Project Manager – Tyler Ellingboe	907-563-0013
Safety and Health Manager – Clark Roberts	210-863-9445 (cell)

10.5 Adverse Weather or Other Environmental Conditions

In case of adverse weather or other environmental conditions, the SSHO, in consultation with the NVS Representative(s), will determine if work can continue without compromising worker health and safety. The following adverse conditions could prompt a safety review:

- High winds;
- Extreme cold;
- Heavy precipitation;
- Fog;
- Volcanic action; and/or
- Earthquakes.

11.0 REFERENCES

Bristol Industries, LLC. 2005. *Occupational Health and Safety Manual*.

US Army Corps of Engineers (USACE). 2007. *Safety and Occupational Health Requirements for Hazardous, Toxic, and Radioactive (HTRW) Activities*. Engineering Requirement (ER) 385-1-92.

USACE. 2008. *Safety and Health Requirements Manual*. Engineer Manual (EM) 385-1-1.

(Intentionally blank)

ATTACHMENT 1

Activity Hazard Analysis (AHA)

AHA No. 1 – Sampling

AHA No. 2 – Debris and Contaminated Soil Removal and Disposal

AHA No. 3 – Miscellaneous CON/HTRW Removal

Activity Hazard Analysis No. 1 Sampling		Analyzed By/Date ___________________________ Reviewed By/Date: ________________________
Principal Tasks	**Potential Hazards**	**Recommended Controls (Level D PPE site wide for all operations)**
General activity	Slips, trips, falls	• Use care during foot travel, and clear the area of slip and trip hazards • Use barricades • Use guardrails • Cover holes
	Back Injury	• Use proper lifting technique. • Buddy system for heavy lifts • Use lifting/transport equipment
	Crushing Injuries	• Use caution when setting loads • Wear required PPE
	Dropped Objects	• Use caution around equipment lift materials • Wear required PPE
	Eye Injury / Hearing Loss	• Wear required PPE
	Struck by equipment/objects	• Wear required PPE • Backup Alarms on all equipment • Traffic control and Watchman
	Contact with soils	• Wear required PPE
Equipment operations	Equipment Failure	• Inspect equipment prior to daily operation • Ensure all roll cages and guards are in place and back up alarms operate • OEM equipment modifications only • Machine guarding and enclosures

Activity Hazard Analysis No. 1 Sampling (cont.)		Analyzed By/Date ____________________________ Reviewed By/Date: _________________________
Principal Tasks	**Potential Hazards**	**Recommended Controls (Level D PPE site wide for all operations)**
Vehicle Operation	Rollover	• Stay within the speed limit specified • Follow manufacturer's recommended payload
Equipment to be Used	**Inspection Requirements**	**Training Requirements**
Trucks, Hand Tools	Daily inspection of equipment prior to operation	• Utilize only trained and experienced operators for operation of equipment • Site specific training – Toolbox safety meetings • 40 hour HAZWOPER • HazCom Training

<table>
<tr><td colspan="2">Activity Hazard Analysis No. 2
Debris and Contaminated Soil Removal and Disposal</td><td>Analyzed By/Date: ________________________ Reviewed By/Date: ____________________</td></tr>
<tr><td>Principal Tasks</td><td>Potential Hazards</td><td>Recommended Controls (Level D PPE site wide for all operations)</td></tr>
<tr><td rowspan="7">General Activity</td><td>Slips, trips, falls</td><td>• Use care during foot travel, and clear the area of slip and trip hazards
• Use barricades
• Use guardrails
• Cover holes.</td></tr>
<tr><td>Back Injury</td><td>• Use proper lifting technique.
• Buddy system for heavy lifts
• Use lifting/transport equipment</td></tr>
<tr><td>Crushing Injuries</td><td>• Use caution when setting loads.
• Machine guards/enclosures
• Wear required PPE:
o Hard Hat
o Steel Toed Boots
o Safety Glasses w/ side shields
o Reflective Vest
o Hearing Protection, as needed.</td></tr>
<tr><td>Dropped Objects</td><td>• Use caution around equipment lift materials.
• Wear required PPE.</td></tr>
<tr><td>Eye Injury / Hearing Loss</td><td>• Wear required PPE.</td></tr>
<tr><td>Struck by equipment/objects</td><td>• Wear required PPE
• Backup Alarms on all equipment
• Traffic control and Watchman</td></tr>
<tr><td>Contact with or inhalation of hazardous materials</td><td>• Limit personnel in area (site control)
• Use impermeable PPE/Level C protection as warranted</td></tr>
</table>

Activity Hazard Analysis No. 2 Debris and Contaminated Soil Removal and Disposal (cont.)		Analyzed By/Date: ______________________ Reviewed By/Date: ____________________
Principal Tasks	**Potential Hazards**	**Recommended Controls (Level D PPE site wide for all operations)**
Equipment operations	Equipment Failure	• Inspect equipment prior to daily operation. • Ensure all roll cages and guards are in place and back up alarms operate • OEM equipment modifications only. • Machine guarding and enclosures
Vehicle Operation	Rollover Material Spill/Contact	• Stay within the speed limit specified. • Follow manufacturer's recommended payload. • Inspect containers before transport • Spill Kits • Use impermeable PPE/Level C protection as warranted
Equipment to be Used	**Inspection Requirements**	**Training Requirements**
Trucks, Hand Tools, Backhoes	Daily inspection of equipment prior to operation	• Utilize only trained and experienced operators for operation of equipment. • Site specific training – Toolbox safety meetings • 40 hr Hazwoper • HazCom Training

Activity Hazard Analysis No. 3 Miscellaneous CON/HTRW Removal		Analyzed By/Date: ____________________ Reviewed By/Date: ____________________
Principal Tasks	**Potential Hazards**	**Recommended Controls (Level D PPE site wide for all operations)**
General Activity	Slips, trips, falls	• Use care during foot travel, and clear the area of slip and trip hazards • Use barricades • Use guardrails • Cover holes.
	Back Injury	• Use proper lifting technique. • Buddy system for heavy lifts • Use lifting/transport equipment
	Crushing Injuries	• Use caution when setting loads. • Machine guards/enclosures • Wear required PPE: o Hard Hat o Steel Toed Boots o Safety Glasses w/ side shields o Reflective Vest o Hearing Protection, as needed.
	Dropped Objects	• Use caution around equipment lift materials. • Wear required PPE.
	Eye Injury / Hearing Loss	• Wear required PPE.
	Struck by equipment/objects	• Wear required PPE • Backup Alarms on all equipment • Traffic control and Watchman
	Contact with or inhalation of hazardous materials	• Limit personnel in area (site control) • Use impermeable PPE/Level C protection as warranted

Activity Hazard Analysis No. 3 Miscellaneous CON/HTRW Removal (cont.)		Analyzed By/Date: ____________________________ Reviewed By/Date: ______________________
Principal Tasks	**Potential Hazards**	**Recommended Controls (Level D PPE site wide for all operations)**
Container Movement	Crushing from Container Free Movement Struck by Equipment/Objects Leak/Spill Contact Splash or Inhalation of Hazardous Materials	• Blocks/chocks • Barricades • Watchman during container movement • Wear required PPE • Backup alarms on all equipment • Traffic control and watchman • Use MSDS for guidance • Spill kits • Use chemical splash PPE/Level C protection as warranted • Limit personnel in area (site control)
Vehicle Operation	Rollover	• Stay within the speed limit specified. • Follow manufacturer's recommended payload.
	Material Spill/Contact	• Inspect containers before transport • Spill kits • Trained operators only
Equipment Operations	Equipment Failure	• Utilize only trained and experienced operators for operation of equipment • Site specific training-toolbox safety meetings • 40-hour HAZWOPER and HazCom training required
Trucks, Hand Tools, Backhoes	Daily inspection of equipment prior to operation	• Utilize only trained and experienced operators for operation of equipment. • Site specific training – Toolbox safety meetings • 40 hr Hazwoper and HazCom Training

ATTACHMENT 2

Field Forms

Toolbox Safety Meeting Record

Equipment Operator's Checklist

Bristol
ENVIRONMENTAL
REMEDIATION SERVICES, LLC

111 W. 16th Avenue, Third Floor
Anchorage, Alaska 99501-5109
907-563-0013 Phone
907-563-6713 Fax

TOOLBOX SAFETY MEETING RECORD

DATE:________________________

SUBJECTS:

1. ____________________
2. ____________________
3. ____________________
4. ____________________
5. ____________________
6. ____________________
7. ____________________
8. ____________________

	PRINTED NAME	SIGNATURE	COMPANY
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
17.			
18.			
19.			
20.			
21.			
22.			
23.			
24.			
25.			
26.			
27.			
28.			
29.			
30.			

Bristol
ENVIRONMENTAL
REMEDIATION SERVICES, LLC

Equipment Operator's Checklist

Company: ______________________ **Operator:** ______________ **Date:** __________

Equipment Type: __________________________ **Model:** ____________________

Equipment Items	Good Condition	Needs Attention	Notes:
Steering Brakes			
Wheels, Tires, Tracks			
Horn, Back-up Alarm			
Seatbelt, Safety device			
Roll over Protection			
Fire Extinguisher			
Equip. Maintenance			
Any Other Deficiency			

Site Work Inspection

Site Work Inspection	None	Yes	Notes:
Material Obstructions			
Slip, Trip, & Fall Def.			
Ruts, Holes, Hazards			
Barricades / Perimeter			
Trenches/Excavations			
Overhead Power lines			
Traffic Exposures			
Any Other Deficiency			

Safety Comments:

____

____

____

____

____

____

Signature: ______________________________ **Date:** ______________

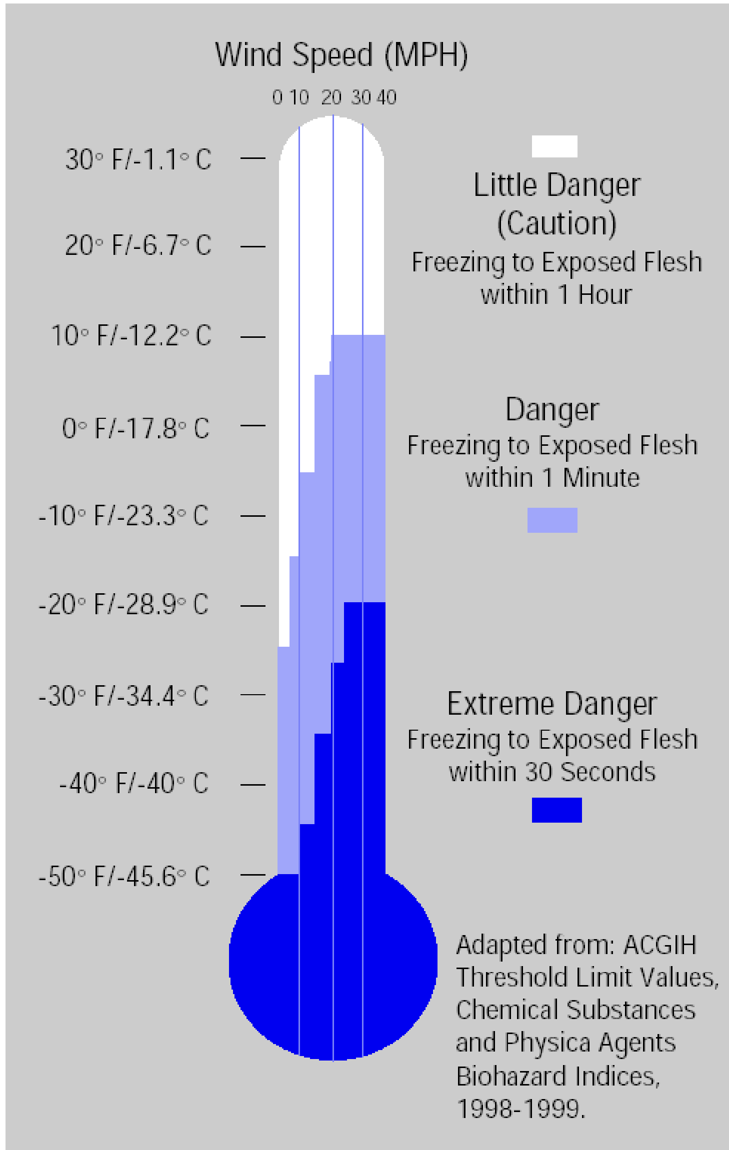
ATTACHMENT 3

Cold Stress Prevention Guidelines

THE COLD STRESS EQUATION

LOW TEMPERATURE + WIND SPEED + WETNESS = INJURIES & ILLNESS

When the body is unable to warm itself, serious cold-related illnesses and injuries may occur, and permanent tissue damage and death may result. **Hypothermia** can occur when *land temperatures* are **above** freezing or *water temperatures* are below 98.6°F/ 37°C. Cold-related illnesses can slowly overcome a person who has been chilled by low temperatures, brisk winds, or wet clothing.



OSHA 3156
1998

FROST BITE

What Happens to the Body:

FREEZING IN DEEP LAYERS OF SKIN AND TISSUE; PALE, WAXY-WHITE SKIN COLOR; SKIN BECOMES HARD and NUMB; USUALLY AFFECTS THE FINGERS, HANDS, TOES, FEET, EARS, and NOSE.

What Should Be Done: (land temperatures)

- Move the person to a warm dry area. Don't leave the person alone.
- Remove any wet or tight clothing that may cut off blood flow to the affected area.
- **DO NOT** rub the affected area, because rubbing causes damage to the skin and tissue.
- **Gently** place the affected area in a warm (105°F) water bath and monitor the water temperature to **slowly** warm the tissue. Don't pour warm water directly on the affected area because it will warm the tissue too fast causing tissue damage. Warming takes about 25-40 minutes.
- After the affected area has been warmed, it may become puffy and blister. The affected area may have a burning feeling or numbness. When normal feeling, movement, and skin color have returned, the affected area should be dried and wrapped to keep it warm. **NOTE:** If there is a chance the affected area may get cold again, do not warm the skin. If the skin is warmed and then becomes cold again, it will cause severe tissue damage.
- Seek medical attention as soon as possible.

HYPOTHERMIA - (Medical Emergency)

What Happens to the Body:

NORMAL BODY TEMPERATURE (98.6° F/37°C) DROPS TO OR BELOW 95°F (35° C); FATIGUE OR DROWSINESS; UNCONTROLLED SHIVERING; COOL BLUISH SKIN; SLURRED SPEECH; CLUMSY MOVEMENTS; IRRITABLE, IRRATIONAL OR CONFUSED BEHAVIOR.

What Should Be Done: (land temperatures)

- Call for emergency help (i.e., Ambulance or Call 911).
- Move the person to a warm, dry area. Don't leave the person alone. Remove any wet clothing and replace with warm, dry clothing or wrap the person in blankets.
- Have the person drink warm, sweet drinks (sugar water or sports-type drinks) if they are alert. **Avoid drinks with caffeine** (coffee, tea, or hot chocolate) or alcohol.
- Have the person move their arms and legs to create muscle heat. If they are unable to do this, place warm bottles or hot packs in the arm pits, groin, neck, and head areas. **DO NOT** rub the person's body or place them in warm water bath. This may stop their heart.

What Should Be Done: (water temperatures)

- Call for emergency help (Ambulance or Call 911). Body heat is lost up to 25 times faster in water.
- **DO NOT** remove any clothing. Button, buckle, zip, and tighten any collars, cuffs, shoes, and hoods because the layer of trapped water closest to the body provides a layer of insulation that slows the loss of heat. Keep the head out of the water and put on a hat or hood.
- Get out of the water as quickly as possible or climb on anything floating. **DO NOT** attempt to swim unless a floating object or another person can be reached because swimming or other physical activity uses the body's heat and reduces survival time by about 50 percent.
- If getting out of the water is not possible, wait quietly and conserve body heat by folding arms across the chest, keeping thighs together, bending knees, and crossing ankles. If another person is in the water, huddle together with chests held closely.

How to Protect Workers

- Recognize the environmental and workplace conditions that lead to potential cold-induced illnesses and injuries.
- Learn the signs and symptoms of cold-induced illnesses/injuries and what to do to help the worker.
- Train the workforce about cold-induced illnesses and injuries.
- Select proper clothing for cold, wet, and windy conditions. Layer clothing to adjust to changing environmental temperatures. Wear a hat and gloves, in addition to underwear that will keep water away from the skin (polypropylene).
- Take frequent short breaks in warm dry shelters to allow the body to warm up.
- Perform work during the warmest part of the day.
- Avoid exhaustion or fatigue because energy is needed to keep muscles warm.
- Use the buddy system (work in pairs).
- Drink warm, sweet beverages (sugar water, sports-type drinks). Avoid drinks with caffeine (coffee, tea, or hot chocolate) or alcohol.
- Eat warm, high-calorie foods like hot pasta dishes.

Workers Are at Increased Risk When…

- They have predisposing health conditions such as cardiovascular disease, diabetes, and hypertension.
- They take certain medication (check with your doctor, nurse, or pharmacy and ask if any medicines you are taking affect you while working in cold environments).
- They are in poor physical condition, have a poor diet, or are older.

APPENDIX D

Resumes of Key Bristol Personnel

Patrick Braley

Julie Clark

Tyler Ellingboe

Matthew Faust

Marty Hannah

Lyndsey Kleppin

PATRICK BRALEY

Site Supervisor / Senior Environmental Technician

Years Experience

Total: 20; Bristol: 6

Areas of Expertise

Site Supervisor/Oversight

Quality Control

Safety and Health

Underground Storage Tank (UST) removal and Site Restoration

Site Investigation/Remediation

Mobilization and Demobilization to sites in Alaska and Lower 48 states

Sampling and Monitoring

Field Logistics

Experience with multiple field screening instruments and tests

Training and Certifications

40-hr HAZWOPER; 8-hr Refresher

8-hr HAZWOPER Supervisor Training

30-hr OSHA Construction Safety and Health

USACE Contractor Quality Management for Contractors

Certified Erosion and Sediment Control Lead (AK-CESCL)

ADEC Qualified Sampler

Hazardous Materials Transportation Refresher (DOT/IATA)

CPR and First Aid for Adults / AED

NITON Analyzers LLC Manufacturer's Training Course

Education

A.S., Environmental Science, Texas State Technical College, Waco, Texas, 2000

Mr. Braley started in vertical construction in 1990 as a laborer and quickly moved through carpenter's apprentice and journeyman positions. He has worked on project sites throughout Alaska and the lower 48 states. Since 2004 he has gained invaluable experience in the areas of directing field activities, environmental site investigation and field data collection. He has supervised the excavation, cleaning and removal of USTs, associated piping, dispensers and site demolition/restoration; collected soil, sediment, air quality and water samples; tested air, water and soil quality using a variety of field screening instruments; and oversaw the installation of borings, wells, and exploration drill holes for the U.S. Environmental Protection Agency (EPA), U.S. Army Corps of Engineers (USACE), Federal Aviation Administration (FAA), and Alaska Department of Environmental Conservation (ADEC). Mr. Braley knows and understands field logistics and is adept at performing technical tasks in any area including remote locations. Mr. Braley has gained valuable experience in obtaining subcontractor quotes, agreements, scheduling and coordinating field activities / logistics.

As a Site Supervisor / Senior Environmental Technician, Mr. Braley is responsible for obtaining subcontractor, quotes and agreements; scheduling and coordinating field activities / logistics; mobilization and demobilization of gear and personnel to and from job sites; Mr. Braley is also experienced in collecting, quality control, and sample management for a variety of media including soil, air quality, sediment, surface and groundwater sample collection.

Project Experience

- **Site Supervisor/SSHO, Drakes Refinery/Rosebush EPA, Mt. Pleasant, Michigan (12/2011).** Work included a site characterization to evaluate the presence or absence of petroleum hydrocarbon contamination in soil and groundwater. Collected multiple groundwater samples from temporary wells and assisted with the collection of soil samples.

- **Site Supervisor/SSHO, Chiefs Place, EPA, White earth, Minnesota (11/2011)** Oversight for the excavation, product removal, inerting, and cleaning of a 650 gallon UST. Collected water parameters and analytical samples from temporary water wells. Assisted with soil borings and collection of analytical samples.
- **Site Supervisor/SSHO, Site Inspections and Removal Response Actions at Former Army Air Field Properties: USACE, Ft. Sumner, New Mexico (10/2011)** Excavated two former UST sites where tanks had previously been removed. Located native soils and performed HANBY field screenings to determine if contamination was present. Took analytical samples to determine site closure. Formerly Used Defense Site (**FUDS).**
- **Site Supervisor/SSHO, Savoonga, NALEMP, USACE, Native Village of North East Cape, Alaska (8/2011)** Responsible for the supervision and safety of 6 man crew on a USACE supported, NALEMP project. Work included oversight of building demolition, segregation of lead based products, petroleums, oils, lubricants. All burnable material was incenerated on site, and hazardous material was categorized and shipped to a facility for disposal.
- **Site Supervisor/SSHO, Multiple Site Assessment and Closure, Toppenish Auto, Linker Referral, Yesterdays Treasure, and Burkeybile, , EPA, Yakama Nation Reservation, Toppenish, Washington (7/2011).** Supervised the exploration and excavation of potentially contaminated soils at four former gas stations. Removed a total of two 1000 gallon UST's form one site, and a 10,000 gallon UST from another including the pumping and containment of product, inerting UST's, cleaning and disposing of UST's, and collecting soil samples at each abandoned UST sight.
- **Field Supervisor, Site Investigation, EPA, Yakama Nation, Toppenish, Washington (5/2011 – 6/2011).** Solely identified and cataloged potential Leaking Underground Storage Tanks (LUST) sites on the 1.3 million acre Yakama Nation Indian Reservation to assist the EPA in determining if an individual site meets the eligibility criteria of the EPA's LUST Trust Fund.
- **Site Supervisor/SSHO, Site Inspections and Removal Response Actions at Former Army Air Field Properties, USACE, Carlsbad, New Mexico (4/2011).** Served as Safety Officer and Field Logistics lead. Work included oversight of a Geoprobe direct push rig, assisting with the collection of soil samples and site characterization, restoration and demobilization at a Formerly Used Defense Site (FUDS).
- **Site Supervisor/SSHO, Site Inspections and Removal Response Actions at Former Army Air Field Properties, USACE, Fort Sumner, New Mexico (10/2010 – 11/ 2010).** Served as Safety Officer and supervised both Sonic and Air rotary drilling for the installation of BarCad monitoring wells at a Formerly Used Defense Site (FUDS). Worked closely with airport personel, multiple contractors, and National Aeronautics and Space Administration (NASA).
- **Site Supervisor/SSHO Site Assessment, EPA, Makah Reservation, Neah Bay, Washington (10/2010).** Supervised the excavation of a 5000 gallon UST, including the pumping and containment of product, inerting UST, cleaning and disposing of UST, and collecting soil samples at an aboned UST sight.

- **Lead Environmental Technician, Certified Erosion Control Lead, ADEC Qualified Sampler, Pipeline Location and Removal or Abandonment – Petroleum, Oil and Lubricant (POL), USACE, Alaska District, Fort Wainwright, Fairbanks, Alaska (09/2010 – 10/2010).** Supervised the installation and maintained a storm water pollution prevention plan for Canol pipeline project. Responsible for project soil sampling in accordance with ADEC and USACE procedures. Field screening and sampling of soil from excavations and stockpiles was performed to characterize site conditions and determine disposal requirements for impacted soils during the removal of an abandoned fuel supply line.
- **Environmental Technician, Groundwater Collection and Sampling, FAA, Cold Bay, Alaska (07/2010).** Developed and collected groundwater samples from monitoring wells using watera and bladder pump.. Project objectives were to determine limits of soil and groundwater contamination at six former living quarters, one duplex, the former FAA water treatment plant, and the FAA Shop Building.
- **Environmental Technician, Groundwater Collection and Sampling, EPA, Menominee Nation, Neopit, Wisconsin (05/2010 and 08/2010).**Collected groundwater samples from existing monitoring wells and sediment and surface water samples from Wolf River. Supervised the excavation and removal of petroleum contaminated soils, and collected soil samples at an abandoned fuel depot. The project also involves the repair, startup, and operation and maintenance (O&M) of an existing air sparge/soil vapor extraction remediation (AS/SVE) system, and conducting remedial cleanup activities.
- **Site Supervisor/SSHO, Site Assessment, EPA, White Earth, Minnesota (05/2010).** Supervised the excavation and removal of USTs, including the pumping and containment of product, inertion of USTs, cleaning and disposal of USTs, and soil sampling at an abandoned gas station.
- **Site Supervisor/SSHO, Site Assessment, EPA, Ferdinand, Idaho (11/2009).** Supervised the excavation and removal of contaminated soil, collected soil samples, installed soil borings and determined lithology, installed groundwater monitoring wells, and collected groundwater samples at an abandoned gas station.
- **Site Supervisor/SSHO, Site Assessment, EPA, Hoopa Reservation, California (2009).** Supervised the excavation and removal of eight USTs, including the pumping and containment of product, inerting USTs, cleaning and disposal of USTs, and soil sampling at two abandoned gas stations.
- **Site Supervisor/SSHO, Site Assessment, EPA, Menominee Reservation, Wisconsin (2010).** Supervised the excavation and removal of contaminated soil, and collected soil samples. Installed soil borings and groundwater monitoring wells, and collected groundwater samples at an abandoned fuel depot.
- **Environmental Technician, Groundwater Collection and Sampling, EPA, Souix Reservation, Pine Ridge, South Dakota (2010).** Collected groundwater samples from existing groundwater monitoring wells.

- **Environmental Technician, Groundwater Project Assistance, FAA Cold Bay, Alaska (2010).** Assisted in installation, developing, collecting and sampling of groundwater monitoring wells.
- **Site Supervisor/SSHO Site Assessment Project, EPA, Makah Reservation, Washington (6/2008).** Supervised the excavation and removal of two 10,000 gallon USTs, including the pumping and containment of product, inertion of USTs, cleaning and disposal of USTs, utilizing HANBY kits to field screen excavation before collecting confirmation soil samples and coordinating the backfill and compacting of excavation at an abandoned gas station.
- **Environmental Technician, RRS Remediation Action Project, USACE, Hoonah Island, Alaska (2006, 2007, and 2008).** Assisted in collecting soil samples, performed field screening for PCBs using Ensys test kits and assisted with the Contractor Quality Control Systems Manager duties, and In 2007 and 2008, functioned as Site Superintendent/Site Safety and Health Officer, as needed. Delineated areas of PCB soil contamination, directed soil excavation based on field laboratory results, manifested contaminated soil for transport, collected confirmation samples for laboratory analysis populating the manifests for tracking of containers containing PCB and diesel contaminated soils. The project consisted of excavating, manifesting, and transporting over 3,345 tons of polychlorinated biphenyls (PCB)-contaminated soil, collecting 320 samples for field laboratory analysis, and collecting over 522 analytical samples for fixed laboratory analysis. Assisted in the delineation to determine the extent and magnitude of PCB and diesel contamination.
- **Environmental Technician, Site Assessment, FAA, King Salmon, Aleutian Islands, Alaska (2008).** Assisted in surveying, soil sample collection, and screened soil samples using the Geoprobe® Ultraviolet Optical Screening Tool™ (UVOST).
- **Lead Environmental Technician, UST Removal, EPA, Santa Clara Pueblo, New Mexico (2008).** Assisted in the excavation and removal of USTs, performed field screening and collected soil samples.
- **Lead Environmental Technician, UST Removal, EPA project, Navajo Reservation, Arizona (2007).** Assisted in the excavation and removal of USTs, and collected soil samples at an abandoned gas station.
- **Environmental Technician, Development and Installation of Soil Borings and Monitoring Wells, EPA, Colorado River Indian Tribes Reservation South of Phoenix, Arizona (2007 - Present).** Assisted with the installation and development of soil borings and monitoring wells. Collected physical parameters and soil and water samples from the wells.
- **Environmental Technician, Treatability Study, USACE, Alaska District, Joint Base Elmendorf-Richardson, Alaska (2005, 2006 and 2007).** Assisted in the installation and sampling of groundwater monitoring wells including the installation of injection wells for the purpose of bio-remediation.
- **Environmental Technician, Landfill Removal Project, FAA, Cape Yakataga, Alaska (2006).** Assisted with the removal activities, and collected soil samples.

- **Environmental Technician, Site Investigation Project, FAA, Skwentna, Alaska (2006).** Solely performed a site investigation, which included Geophysics and test pits of an inert landfill that is encroaching into the Skwentna River
- **Environmental Technician, Puntilla Lake/Rainy Pass Project, Alaska, FAA (2006).** Performed field screenings for the presence of petroleum hydrocarbons using an Infrared Spectrometer (Horiba OCMA 350).
- **Environmental Technician, Military Working Dog Facility Excavation, USACE, Alaska District, Joint Base Elmendorf-Richardson, Alaska (2006).** Conducted field screenings for petroleum contaminants before, during, and after excavation of the Fort Richardson working dog kennel.
- **Environmental Technician, Biorka Island White Alice Site, FAA (2006).** Assisted in site investigation including test pits and trenches to determine presence of petroleum contaminated soils, and collected groundwater, soil, and sediment samples.
- **Lead Environmental Technician, Environmental Due Diligence Audit (EDDA), FAA Lake Clark, Alaska(2006).** Assisted surveyor in locating the corners for proposed FAA camera tower, and photographed the surrounding environment for impact study.
- **Environmental Technician, PenAir King Salmon Monitoring Project, PenAir, King Salmon, Aleutian Islands (2006).** Sampled existing monitoring wells.
- **Environmental Technician, PenAir Sampling Project, Dillingham, Alaska (2006).** Assisted in groundwater and soil sample collection.
- **Environmental Technician, Drum Cleanup and Disposal, Illiamna, Alaska (2005).** Supervised four team members in the classification, decontamination, and disposal of more than 1,000 drums at a site in Iliamna, Alaska.
- **Environmental Technician, Sampling Program, Northern Dynasty Mines, Inc., Illiamna, Alaska (2004).** Sampled surface water and sediment of streams and ponds, and assisted in hydrographic studies along a proposed haul road corridor for a background study for Northern Dynasty Mines, Inc., Pebble Mine gold-copper prospect.
- **Environmental Technician, Marine Life Sampling Program, Northern Dynasty Mines, Inc., Illiamna Bay and Iniskin Bay, Alaska (2004).** Worked alongside marine biologist collecting marine plant life, and biologics for a background study for Northern Dynasty Mines. Work was conducted with a 6 man crew aboard a 50 foot charter vessel for 7 days.
- **Survey technician, Kodiak Island, ADOT.** Work included staking out roadways.
- **Survey Technician Tooksok Bay, Alaska.** Work included Topographical survey for proposed road construction.
- **Survey Technician, Nome,** Alaska. Work included Topographical survey of Nome to Council HWY.
- **Survey Technician, Elim, Alaska, FAA.** Work included staking runway, roadways and slopes for the Elim airstrip extension.

- **City of Waco, Texas, Public Works, Water Department (2001 - 2003)**. Involved with water utilities plant operations and maintenance at the Riverside Treatment Plant which treats an average of 13 million gallons of water per day from Lake Waco with a maximum capacity of 24 million gallons per day, and the Mount Carmel Treatment Plant which treats an average of 28 million gallons of water per day with a maximum capacity of 42 million gallons per day. Other responsibilities include collecting an average of 430 samples every 24 hours during the water treatment process.

JULIE CLARK

Project Manager / Environmental Scientist

Years Experience

Total: 10; Bristol: 2

Areas of Expertise

Project Management Field Team Lead

Site Assessment and Characterization

Contaminated Site Remediation

Soil Boring and Monitoring Well Installation

Environmental Sampling

Quality Control

Training and Certifications

OSHA 30-hr Construction Safety and Health

Construction Quality Management for Contractors, USACE, Anchorage, Alaska

8-hr HAZWOPER Supervisor Training

EPA 40-hr HAZWOPER

EPA 8-hr HAZWOPER Refresher, current

CPR and First Aid for Adults

ADEC Field Qualified Sampler

DOT/IATA Dangerous Goods Shipper's Training; Refresher

Defensive Driving Training

Education

B.S., Natural Science, University of Alaska Anchorage, 2001

Ms. Clark is a project manager and environmental scientist with over 10 years of experience in environmental consulting. She has extensive experience in project management, leading and directing field activities, field data collection, data analysis, and data evaluation and reporting. She has worked with a variety of government and private sector clients, including US Army Corps of Engineers® (USACE), U.S. EPA, ADEC, U.S. Army, U.S. Air Force, and BP Exploration. Ms. Clark has managed leaking underground storage tank projects, HTRW site assessments, hazardous waste sampling and analysis, and property assessment and cleanup projects. She has performed as the field team lead at numerous projects and sites throughout Alaska and the lower 48, including remote locations not accessible by road, and during the winter on the arctic North Slope of Alaska. As a lifelong Alaskan resident, Ms. Clark knows and understands Alaska logistics and is adept at performing technical tasks in remote locations and challenging conditions.

Project Experience

- **Project Manager/Field Team Lead, EPA Region 5, Former Boivin Oil Company Site, Menominee Reservation, Neopit, Wisconsin (03/2010 – Present; $657K).** Prepared planning documents and periodic summary reports for a cost-reimbursable project to assess and characterize the impact from leaking USTs at a former wholesale fuel distribution and retail gasoline station site. Activities have included periodic groundwater monitoring of approximately 40 site monitoring wells, installing soil borings to assess subsurface contamination in the area of the tanks, installing permanent monitoring wells, excavating contaminated soil, and collecting surface water and sediment samples from a nearby river to evaluate potential impacts to the river. The project also involves operation and maintenance (O&M) of an air sparge/soil vapor extraction remediation (AS/SVE) system, and working closely with the EPA project manager to recommend and conduct appropriate remedial cleanup activities.

- **Project Manager/Field Team Lead, EPA Region 5, North Mobil Hub Oil Site, Isabella Indian Reservation, Mount Pleasant, Michigan (09/2010 – Present; $206K).** Managed and led the field effort for a cost-reimbursable site characterization project to evaluate the presence or absence of petroleum hydrocarbon contamination in soil and groundwater at a former Mobil gasoline station. Characterization activities included the installation of multiple soil borings and temporary wells, and the collection of soil and groundwater samples. Prepared the planning documents and the final summary report.
- **Project Manager/Field Team Lead, EPA Region 5, Chief's Place and White Earth Grocery Sites, White Earth Reservation, Mahnomen, Minnesota (03/2010 – 07/2010 and 09/2011 – Present; $200K).** Prepared planning documents and final summary report for a site assessment to evaluate the presence or absence of leaking underground storage tanks and potential hydrocarbon releases into the soil and groundwater at two former retail gasoline station sites. USTs were removed at the White Earth Grocery site in May 2010 and confirmation soil samples collected in order to assess the site and obtain site closure. Assessment activities were unable to be performed at the Chief's Place site in May 2010, so Bristol returned to the site in November 2011 to perform a site assessment and removed one UST and collected confirmation samples from the UST excavation. Performed site characterization activities, including the installation and sampling of soil borings and temporary wells to delineate the extent of contamination. Prepared the final report for assessment and characterization activities at the Chief's Place site.
- **Project Manager/Field Team Lead, EPA Region 5, Drake's Refinery and Rosebush Station Sites, Isabella Indian Reservation, Mount Pleasant, Michigan (03/2011 – Present; $186K).** Managed a cost reimbursable site characterization project at two former retail gasoline sites to evaluate the presence or absence of petroleum hydrocarbon contamination in soil and groundwater. Prepared planning documents and directed the field effort, which consisted of the installation of soil borings and temporary wells and the collection of soil and groundwater samples. Worked closely with the onsite EPA project manager to make decisions during the field activities. Wrote the final characterization report describing findings and recommendations for further action.
- **Project Manager, EPA Region 10, Former Neah Bay Resort, Makah Reservation, Neah Bay, Washington (08/2010 – 01/2011; $55K).** Prepared planning documents and final summary report for a site assessment to evaluate the presence or absence of leaking underground storage tanks and potential hydrocarbon releases into the soil and groundwater at a former resort site. USTs were removed and confirmation soil samples collected in order to perform the assessment and evaluate site conditions and obtain site closure.
- **Assistant Project Manager, USACE, Site Inspections of Kiska MMRP and Amchitka HTRW, CON/HTRW, and MMRP, Kiska and Amchitka Islands, Alaska (06/2010 – 04/2011).** Assistant Project Manger and primary author of planning documents for a MMRP project to locate and document WWII munitions on Kiska and Amchitka Islands, as well as to perform visual monitoring at approximately 20 HTRW locations on Amchitka to document current conditions at those locations. Responsibilities included participating in technical project planning (TPP) meetings with project stakeholders and the preparation of planning documents (including a Uniform Federal Policy Quality Assurance Project Plan [UFP-QAPP]).

Planning documents were prepared in compliance with the USACE Alaska District's Manual for Electronic Deliverables (MED).

- **Field Team Lead/Environmental Scientist, USACE Alaska District, NE Cape Site 28 Sampling, St. Lawrence Island, Alaska (07/2011 – Present).** Delineated soil and sediment contamination in an approximately 10-acre wetland at a remote subarctic site through the collection of over 200 soil and sediment samples. Prepared a Technical Memorandum in compliance with USACE Alaska District's MED that summarized findings from the 2011 investigation and recommended future activities. Will lead a field effort to map the sediment areas in the wetland during the summer of 2012.
- **Field Team Lead/Environmental Scientist, EPA Region 9, Painted Desert Inn, Navajo Reservation, Navajo, Arizona (07/2010).** Conducted field activities to characterize petroleum hydrocarbon contamination at a leaking UST site. Duties included the installation and sampling of soil borings and monitoring wells, as well as oversight of the drilling, environmental, and laboratory subcontractors. .
- **Field Team Lead/Environmental Scientist, EPA Region 9, Newcomb Trading Post, Navajo Reservation, Newcomb, New Mexico (07/2010).** Lead field activities to characterize petroleum hydrocarbon contamination at a former trading post and leaking UST site. Characterization activities included the installation and sampling of soil borings and monitoring wells. Oversaw the drilling, environmental, and laboratory subcontractors.
- **Field Team Lead/Environmental Scientist, EPA Region 9, Sweetwater Trading Post, Navajo Reservation, Sweetwater, Arizona (07/2010).** Characterized petroleum hydrocarbon contamination at a former trading post and leaking UST site. Characterization activities included the installation of soil borings and monitoring wells, collecting soil and groundwater samples, and overseeingthe drilling, environmental, and laboratory subcontractors.

Professional Experience

- **Environmental Scientist, OASIS Environmental, Anchorage, Alaska (06/2006 – 01/2010). Managed seve**ral projects and performed numerous investigations as the field team technical leader. Involved in all phases of an environmental investigation, including preparing planning documents, logistical planning and scheduling, collecting environmental samples of various media, managing subcontractors, analyzing and interpreting data, preparing summary reports, and client interaction.
  - Brownfield Assessment at the Copper Valley School, Alaska Department of Environmental Conservation (ADEC) Tazlina, Alaska (2009). Conducted a site visit to determine potential hazardous environmental conditions at the site, a debris inventory, and interviews with persons in the community with knowledge about the site. Primary author of a cleanup plan and general cost estimate to address issues identified during the site visit. Responsible for resource and regulatory agency coordination, budget management of the fixed price contract, and invoicing.
  - Project Manager/Field Team Lead, Additional Assessment Activities, U.S. Army Corps of Engineers (USACE), King Salmon Air Station (2008 - 2009). Drilled soil borings and collected samples to further delineate historical contaminated areas throughout the base.

Performed field screening to assist in real-time decision making, such as selecting appropriate locations for the installation of permanent monitoring wells. Responsible for client coordination and interaction, scheduling, invoicing, and tracking of the scope and fixed-price budget.

- Assistant Project Manager/Field Team Lead, Monitoring in Support of a Base-wide Contaminant Plume Analysis, US Air Force, Elmendorf Air Force Base in Anchorage, Alaska (2008 - 2009). Led multiple field efforts in the collection of groundwater, surface water, and soil samples for the long-term monitoring of management areas. Performed operation, maintenance, and monitoring of a wetlands remediation system and a biovent system. Developed project work plans and summary reports.
- Field Team Lead, Release Investigation of a Former Dry Cleaning Facility, ADEC, Fairbanks, Alaska (2007 - 2009). Drilled and sampled over 70 test borings for source identification and characterization of the chlorinated solvent plume at dry cleaning facility. Performed field screening using the Color-Tec® Method for real-time monitoring of chlorinated compounds in soil and groundwater. Sampled existing monitoring wells and oversaw the installation of new monitoring wells. Assisted the project manager with the preparation of project reports, including a statistical analysis of the data.
- Field Team Lead, Release Investigation of a Former Dry Cleaning Facility, ADEC, Fairbanks, Alaska (2008 - 2009). Drilled and collected samples from 45 test borings to identify and characterize the source of a chlorinated solvent plume. Performed field screening using the Color-Tec Method for the detection of chlorinated compounds in soil and groundwater. Installed, developed, and sampled new monitoring wells. Managed all waste generated during the investigation as F-listed hazardous waste. Assisted with the preparation of summary reports.
- Site Lead/Field Team Lead, Reserve Pit Excavation, BP Exploration, Prudhoe Bay, Alaska (2006 - 2009). Provided a wide variety of support at numerous exploration pads on Alaska's North Slope to obtain closure with ADEC. Duties included the direction of excavation, segregation and proper disposal or treatment of soils from exploration drill sites throughout Greater Prudhoe Bay, as well as determining the adequate removal of contaminated material through the collection of confirmation samples. Since many exploration sites are not connected to the Prudhoe Bay road system, work was performed in arctic conditions during the winter months to minimize damage to the fragile tundra.
- Site Lead/Field Team Lead, Compliance Monitoring, BP Exploration, Prudhoe Bay, Alaska (2006 - 2009). Performed solid waste facility compliance monitoring work on numerous project sites, conducting site inspection and water/soil sampling throughout the Greater Prudhoe Bay area.
- Field Team Lead, Big Lake Water Quality Sampling, ADEC, Big Lake, Alaska (2009). Collected water samples and water quality readings from 12 locations on Big Lake, which was classified by ADEC in 2006 as an impaired water body under the federal Clean Water Act. Samples were collected on 13 different days of low, moderate, and high watercraft activity (including Memorial Day, Independence Day, and Labor Day weekends) to document petroleum contaminant concentrations, determine whether or not the lake continued to exceed water quality standards, and investigate the relationship between motorized watercraft usage and petroleum hydrocarbon loading to the lake.

- Environmental Scientist/ADEC-Qualified Sampler, Thermal Treatment of Petroleum Contaminated Soil, USACE FUDS Remediation Project, Umiat, AK (2006). Responsible for sampling thermally remediated petroleum-contaminated soil at a remote site. Obtained post-treatment MULTI INCREMENT® confirmation samples for field screening with an IR analyzer and laboratory analytical testing; performed stockpile and burn-pad footprint field screening and MULTI INCREMENT® sampling; and performed waste disposal sampling. Coordinated shipment of samples to the project laboratory.

♦ **Environmental Scientist, North Wind, Inc., Anchorage, Alaska (03/2002 – 05/2006).** Staff environmental scientist performing field work, chemical sampling, data analysis, and reporting for environmental investigations. Quickly gained knowledge and experience to become a primary field team leader and project manager for several small projects.

- Project Manager, Hazardous Waste Sampling, U.S. Army Garrison in Alaska (2005 - 2006). The project consisted of the characterization of hazardous waste at a number of military sites across Alaska. Samples were collected from drums at centralized hazardous waste accumulation facilities or oil/water separators and underground storage tanks at various buildings to characterize the waste for proper transportation and disposal. Supervised the day-to-day performance of the contract, including client coordination, scheduling, and budget tracking. In charge of data evaluation and reporting, as well as subcontractor management.
- Project Manager, Surface Water Quality Sampling, Matanuska-Susitna Borough, Palmer, Alaska (2004 - 2006). Investigation was conducted to provide background information prior to proposed development in the Hatcher Pass area. Collected surface water quality samples from the Little Susitna River three times a year. Responsible for measuring and recording physical parameters of the river and collecting analytical samples. Managed subcontractors and wrote and submitted letter reports to the client after each sampling event.
- Field Team Lead/Task Manager, Field Data Collection, USACE, Fort Wainwright, Alaska (2003 - 2006). Performed data collection and associated reporting at several CERCLA sites. Scope of work included investigation of hydrocarbons in soil and groundwater, semi-annual monitoring of over 100 monitoring wells, routine monitoring of seven air sparging/soil vapor extraction (AS/SVE) systems, routine monitoring of a water supply well, and periodic reporting of results. Authored comprehensive annual reports to document the results of field efforts, as well as intermediate reports provided to the client for each site after every sampling event.
- Field Team Lead, Soil Sample Collection at the Taku Gardens Area, USACE, Fort Wainwright, Alaska (2005 - 2006). Supervised field samplers to characterize the extent and concentration of PCB contamination on this 54-acre housing site. Performed field tests to determine the PCB concentration using ENSYS test kits, and depending on the results, sent samples to the laboratory for analysis. Responsible for sample collection and shipping, and interfacing with the analytical laboratory. Assisted with the preparation of periodic reports submitted to the client.
- Field Team Member, Columbia Space Shuttle Recovery, Lufkin, Texas (2003). Participated in the emergency response after the Columbia space shuttle disaster. Field screened potentially hazardous debris to determine if it posed a risk to human health or the environment, and collected GPS coordinates of debris for location mapping, which contributed to refining the daily debris search areas.

TYLER ELLINGBOE

Project Manager / Senior Waste Specialist

Years Experience

Total: 16; Bristol 2.5

Areas of Expertise

Project Management

Hazardous/Nonhazardous Waste Materials Management

Regulatory Compliance

Logistics

Sampling

Training and Certifications

40-hr Hazardous Waste Operation & Emergency Response (HAZWOPER)

HAZWOPER Refresher

HAZWOPER Site Worker and Supervisor Training

RCRA Hazardous Waste Regulations/Land Disposal Restrictions

Hazardous Materials Transportation (49CFR 172.700-704) / IATA and Refresher

HAZCAT® Chemical Identification System Training

Physical Sampling for Hazardous Materials and Contaminants Training

Toxic Substances Control Act Training (TSCA)

Education

M.S., Engineering and Science Management – Science Option, University of Alaska Anchorage, Alaska, 2007

B.S., Biological Sciences-Fish and Wildlife Management Option, Montana State University, Bozeman, Montana, 1994

Mr. Ellingboe's education and specialized training have allowed him to develop skills in project management, chemical identification and characterization, and logistics over the previous 16 years. He has served as project manager for clients ranging from small privately-owned businesses to larger corporations, and from municipal and borough household waste programs to federal projects and contracts. His knowledge of the WAC, OSHA, RCRA, CERCLA, DOT, IATA, and TSCA regulations have been crucial to timely job completion while maintaining regulatory compliance. Mr. Ellingboe is a State of Alaska Qualified Sampler, and has extensive experience in sampling, identification, consolidation, labeling, lab-packing, packaging, profiling, manifesting, and transporting of hazardous / nonhazardous waste materials. Supervision and direction of project staff and the handling of personnel and equipment scheduling have also been his primary responsibilities. He has been accountable for regulatory and contract compliance, waste tracking, and reporting requirements. His various projects have led to a wide range of experiences in both local and remote, arctic areas and conditions.

Project Experience

- **Project Manager/Senior Waste Specialist, Groundwater and Landfill Gas Monitoring, Joint Base Elmendorf Richardson (JBER) Landfill, USACE, Alaska (01/2012 – current).** Providing support for environmental monitoring activities at the JBER Landfill including the performance of annual groundwater sampling and analysis from existing groundwater monitoring wells and quarterly landfill gas monitoring from existing gas probes. Preparing annual groundwater monitoring reports and quarterly landfill gas monitoring technical memorandums.
- **Project Manager/Senior Waste Specialist, UST Corrective Action Hot Tanks, USACE, Alaska District, Joint Base Elmendorf-Richardson (JBER), Alaska (09/2010 – current).** Preparing planning documents to guide and support UST corrective action procedures at

seven sites. Field work is scheduled for the 2012 field season. Corrective actions to be performed include excavation and disposal of contaminated soil, backfilling of excavations with clean soil, installation of soil borings using air rotary drilling methods, installation of groundwater monitoring wells, and collection of soil and groundwater samples for laboratory analysis. Upon conclusion of corrective action activities, a Corrective Action Report will be prepared and will include a risk assessment using the ADEC Method 4 Risk Calculator.

- **Project Manager/Senior Waste Specialist, Class V Underground Injection Control (UIC) Closure – Building 722, USACE, Alaska District, Joint Base Elmendorf-Richardson, Alaska (06/2010 – 12/2010; $273K).** Prepared planning and final reporting documents. Performed the excavation and removal of a 1940s era septic tank and cesspool. Conducted soil sampling for site characterization, confirmation, and wastestream disposal. Performance evaluation sampling was a required part of the project. Excavated, transported, and removed approximately 170 tons of petroleum hydrocarbon impacted soil. Prepared all required waste stream profiling and manifesting paperwork and coordinated all subcontractors.
- **Senior Waste Specialist, Removal of Polychlorinated Biphenyl (PCB)-Containing Transformers at a Formerly Used Defense Site (FUDS), USACE, Albuquerque District, Deming, New Mexico (04/2010 – 11/2010; $640K).** Project was at the former Deming Army Airfield. Oversaw the preparation of all waste material profiling and manifesting paperwork required for proper disposal. Supervised the subcontractor and the removal, packaging, transportation, and disposal of Toxic Substances Control Act (TSCA)-regulated PCB waste from the site to the disposal/recycling facility.
- **Senior Waste Specialist, NE Cape In Situ Chemical Oxidation (Phase I ISCO) and Intrusive Drum Removal/Landfill Cap Project, USACE, Alaska District, Northeast Cape of St. Lawrence Island, Alaska (04/2009 – 12/2010; $13.8M).** Supported the preparation of waste management planning documents. Responsible for proper characterization, containerization, and profiling of waste streams for disposal. This project also required the preparation of non-hazardous and uniform hazardous waste manifests and Canadian transit notices and movement documents. The shipping of RCRA and Non-RCRA waste by barge from a remote site in an Alaskan subarctic setting presented a series of logistical challenges.
- **Project Manager, Native American Lands Environmental Mitigation Program (NALEMP) Site Investigation, Removal Action, and Site Investigation, Native Village of Savoonga (NVS), Native Village of Northeast Cape, St. Lawrence Island, Alaska (01/2009 –current; $62K).** Prepared the planning documents, conducted a reconnaissance of all the sites, performed a hazardous materials building survey, and collected samples from areas of concern. Prepared the Reconnaissance Report and helped the NVS plan the next phase of work. Project site was the Native Village of Northeast Cape “Fish Camp” located at the Northeast Cape of St. Lawrence Island, Alaska. The NALEMP was developed by the Department of Defense (DoD) to address environmental issues from past DoD activities on Indian lands. The NVS obtained funding under the NALEMP Program from the USACE to identify and mitigate military impacts to Native land. Bristol subcontracted to the NVS to assist them in conducting the first phase of the Site Investigation/Removal Action at several areas of concern and supported the tribe with the preparation of Fiscal Year 2009 -2012 Facilitated Cooperative Agreement documents between the tribe and the USACE. In 2011, coordinated the on-site combustion of non-hazardous building debris and the collection and subsequent

shipment of lead-based paint containing construction debris and asbestos-containing material off-site. For 2012, scheduled field activities include the collection and management of remaining debris, the off-site shipment of non-burnable, non-hazardous debris, the off-site shipment of hazardous materials found on-site during the site investigation, and the performance of a site investigation including the collection of surface water, sediment, and soil samples for laboratory analysis.

- **Project Manager, Native American Lands Environmental Mitigation Program (NALEMP) Site Reconnaissance, Debris Removal, and Investigation, Native Village of Tetlin (NVT), Lucy David and Lulu David Native Allotments, Tetlin, Alaska (09/2009 – current).** Prepared the planning documents including the Strategic Project Implementation Plan and Work Plans. Fieldwork conducted in 2011 included the performance of a subsurface investigation utilizing a Geoprobe direct-push drilling rig, the installation of temporary well points, and the collection of groundwater and subsurface and surface soil samples. est pits and trenches were also excavated near debris fields to assess whether buried metal and/or debris were present and to facilitate the collection of additional soil samples for laboratory analysis. Background surface soil samples were also collected from each allotment and analyzed for Resource Conservaton and Recovery Act (RCRA) metals. The field work also included the identification, containerization, and removal of hazardous and non-hazardous environmental hazards, including drums and debris. Logistical challenges included the coordination of mobilization/demobilization to the site, the removal and transport of non-hazardous debris to the local landfill, and the removal, transport, and disposal of hazardous materials to properly permitted treatment, storage, and disposal facilities (TSDFs).
- **Project Manager, Leaking Underground Storage Tank Investigations and Remediation, EPA, Region 8, Several States (09/2008 – 09/2011; $1.2M).** This was a three-year contract with EPA to investigate and remediate leaking underground storage tank sites on Indian Lands in Colorado, Montana, North and South Dakota, Utah, and Wyoming. Supervised the performance of site assessments / characterizations and/or remedial actions 12 sites on 5 reservations. Projects have included installing soil borings and groundwater monitoring wells, collecting analytical samples, evaluating and upgrading existing remediation systems, and designing and installing remediation systems. Removal actions including soil excavation and removal and groundwater monitoring well pumping and removal have also occurred. Responsible for contracts, budgets and invoices, monthly progress reports to the EPA, and oversight of all field activities and reports.
- **Task Manager / Senior Waste Specialist, NALEMP Site Investigation and Removal Action, Gulkana, Alaska (09/2008 – 07/2009; $80K).** The NALEMP was developed by the Department of Defense (DoD) to address environmental issues from past DoD activities on Indian lands. The Village of Gulkana, Alaska, obtained funding under the NALEMP Program from the U.S. Army Corps of Engineers (USACE) to identify and mitigate military impacts to Native land. Bristol subcontracted to the Gulkana Village Council (GVC) to assist them in conducting the first phase of a Site Investigation/Removal Action at several areas of concern. Bristol prepared the planning documents, conducted a reconnaissance of all the sites, and collected samples from areas of concern. Bristol prepared the Reconnaissance Report and is working with the GVC to plan the next phase of work.

Professional Experience

- **Contract Manager, Emerald Alaska, Inc. (02/2001 – 09/2008).** Played a vital role on the DLA/DRMO contract that Emerald held for the military in the State of Alaska. Ensured that all contract requirements were fulfilled accurately and within specified time constraints. With support from the team, ensured that all service requests for hazardous waste management from the U.S. Army, U.S. Air Force (USAF), and Coast Guard and National Guard were completed correctly, according to all RCRA/DOT/TSCA regulations.
  - Primary responsibilities included project and contract oversight, interpreting data, decision making, and preparation of all necessary paperwork to properly manage and transport all hazardous and nonhazardous wastes to final disposal facilities. Also supervised environmental specialists and other project personnel on a variety of commercial customer projects, both locally and in remote locations.
- **Transportation Manager, Emerald Alaska, Inc. (February 2001 – September 2008).**
  - Primary responsibility was to coordinate and provide all proper documentation for shipping hazardous and nonhazardous wastes from Anchorage to the Lower 48 via road, rail, air, and marine systems. Some of the documentation prepared included the following: bill of ladings, hazardous and nonhazardous waste manifests, Canadian manifests, and transit notices. Coordinated inbound and outbound loads to maximize efficiency, reduce costs, and remain compliant with transfer facility waste storage times. In 2004, managed the incident-free transportation of over 12 million pounds of hazardous and nonhazardous wastes to both intrastate and interstate destinations.
- **Philip Services Corp., Anchorage, Alaska (03/1995 – 02/2001).**
  - Environmental Specialist II for Foster Wheeler, St. Lawrence Island, Alaska (May - October 2000). Served as the on-site regulatory specialist on a remedial action and demobilization project for the USACE. Directly responsible for all regulatory compliance in regards to the following agencies: EPA, Alaska Department of Environmental Conservation (ADEC), CERCLA, and TSCA. Guided field personnel in the characterization, consolidation, sampling, and shipment off site of all hazardous and nonhazardous waste materials off site.
  - Environmental Specialist II for Linder Construction, Pedro Dome, Alaska. (May - August 1999). Directly responsible for the shipment of all TSCA-regulated wastes off site during a PCB excavation and removal project for the USACE. He prepared and submitted all related and required paperwork to Linder and the USACE representative for review and approval. Labeled, marked, and placarded all waste containers for shipment and coordinated all waste loading and off-loading activities between each waste transporter.
  - Environmental Specialist II for UIC Construction, Barrow and Kotzebue, Alaska (May - July 1999). Supervised the removal of hazardous and nonhazardous wastes from the borough landfills. Prepared and completed all required paperwork and properly containerized, labeled, marked, and shipped all wastes off site.
  - Environmental Specialist II for Phillips Alaska, Inc. / British Petroleum (BP). Prudhoe Bay and Kuparuk Oilfields, Alaska (March 1999 - February 2001). Served as the project manager for the ongoing waste management contracts with Phillips/BP. Responsible for properly containerizing, labeling, marking, and shipping of all waste materials off site.

Primary responsibility was the preparation of all required paperwork to properly manage and transport all hazardous and nonhazardous wastes off site and to final disposal facilities according to all applicable laws and regulations.

- Environmental Specialist II for Bristol Environmental Services (BES), Togiak and Alaska Peninsula National Wildlife Refuges, Alaska (October 1998). Responsible for the remote waste cleanup of a radio antenna site and the cleanup of abandoned drums along the Bristol Bay coastline. Daily transportation was via helicopter. Also responsible for properly containerizing, labeling, marking, and shipping all waste materials off site.
- Environmental Specialist II for Jacobs Engineering Group, Inc. Cape Chiniak, Kodiak, Alaska (September 1998). Conducted environmental sampling of soil stockpiles and excavations at an interim remedial action project at Little Navy Annex and Cape Chiniak Tracking Station. Also responsible for the proper characterization, labeling, loading, placarding, and manifesting of hazardous waste shipments off site.
- Environmental Specialist II for BES/Nugget Joint Venture, King Salmon, Alaska (June - July 1998). Worked on a remedial action cleanup at Rapids Camp for the USAF. Various duties included the proper containerizing, labeling, marking, and shipping of all waste materials off site. Conducted environmental sampling of a soil excavation, abandoned drums, and soil at various other sites. Held accountable for maintaining records and reporting all findings to the JV, the USAF representatives, and the ADEC.
- Environmental Laborer for Linder Construction, Adak Naval Station, Alaska (February - April 1998). Worked as a laborer on a tank cleaning and fuel pipeline pigging project. Participated in the cleaning and purging of six large-volume fuel tanks and a 10-inch gasoline fuel line.
- Environmental Specialist II for BES/Nugget JV, King Salmon, Alaska (July - October 1997). Conducted sampling of unknown hazardous waste drums that had been excavated from a barrel dumpsite at a remedial action cleanup at the local USAF base. Conducted air, liquid, and soil sampling using various field-screening techniques and equipment. Photoionization detectors (PIDs), immunoassay test kits, and the HAZCAT® Chemical Identification System were employed. Directed a crew of laborers in the maintenance of the drum accumulation pad. Responsible for maintaining records and for reporting all findings to the JV, the USAF representatives, and the ADEC.
- Environmental Specialist II for Oil Spill Consultants, National Park Service, Alaska. (July - October 1997). Responsible for the cleanup and disposal of hazardous and nonhazardous wastes generated from six national parks around the State of Alaska. Directly responsible for the proper identification, packaging, marking, labeling, and loading for shipment of all wastes.
- Environmental Specialist for CET, Grand Forks, North Dakota (May – June 1997). Worked on the Red River Flood Disaster Relief. Supervised the collection, handling, transportation, and disposal of household hazardous waste collected during the relief effort.
- Environmental Specialist for City of Kodiak, Dog Bay Harbor (May 1997). Active participant in the inerting and removal of a 6,000-gallon used oil underground storage tank. Assisted in the removal of the tank and the screening of the surrounding soil using

qualitative methods such as visual, olfactory and PIDs. Participated in the collection of confirmation and characterization soil samples from the excavation and excavated soil stockpile.

- Site Supervisor/Project Manager for Kenai Peninsula Borough, City and Borough of Kodiak Island, and City of Juneau, Alaska (May 1997 - February 2001). Site Supervisor / Project Manager in the successful management of the household hazardous waste (HHW) contracts that Phillips held with the cities and boroughs. Site Supervisor during the completion of HHW/ Conditionally Exempt Small Quantity Generator (CESQG) collection events and industrial waste pick-ups for the three cities and boroughs. Primary responsibilities included: developing health and safety plans, project schedules, budgeting, consolidation, labpacking, and preparation of monthly and semi-annual reports.
- Facility Supervisor/Project Manager for Municipality of Anchorage, Anchorage Regional Landfill, Alaska (April 1996 - April 1997). Managed the facility crew at a year-round HHW/CESQG collection facility. Completed billing and month-end reports and acted as the liaison between the public, the Municipality of Anchorage, and Philip Services. Acted as the facility safety and spill contingency coordinator and as the regulatory compliance officer. Kept inventories of volume of wastes in storage and supplies on hand. Directly responsible for all waste shipments off site. Hired temporary employees during peak business months.
- Chemist/Environmental Specialist/Lead Technician for Municipality of Anchorage, Anchorage Regional Landfill (March 1995 - April 1996). Sampled and identified unknown hazardous materials and performed QA/QC on the various facility waste streams. Primary duties included: labpacking chemicals for shipment and disposal, record keeping, and supervision of the facility crew. Directly responsible for the accepting and checking in all waste into the facility received from the public, as well as the proper and safe consolidation of these wastes. Also held accountable for all waste shipments out of the facility and ensuring that these shipments complied with all DOT/EPA regulations. Conducted facility inspections, led safety meetings, and acted as the facility manager during the manager’s absence.

- **Laboratory Technician for Northwest Technical Services, Prudhoe Bay, Alaska (Summer 1991).** Temporary employee contracted to ARCO to work in the Prudhoe Bay Oil Field. Stationed at Flow Station 2 in the post-water treatment laboratory and performed qualitative analysis on the water and oil streams throughout the plant. Conducted oil/water extraction techniques and reported his findings to plant operators and to the main lab.
- **Laboratory Technician for Northwest Technical Services. Kuparuk Oil Field, Alaska. (Summers of 1989, 1990, and 1992).** Temporary employee contracted to ARCO to work in the Kuparuk Oil Field. Stationed at the Seawater Treatment Plant. Foremost responsibility was to conduct qualitative analyses on the various water streams throughout the plant. Tests conducted included: TSS, pH, salinity, and residual chlorine. Reported findings to the plant operators and to the field’s head chemist. Also aided the plant operators with the basic operations of the plant when called upon.
- **Fish and Wildlife Technician I for State of Alaska Department of Fish and Game, Anchorage/Fairbanks, Alaska (06/1994 – S09/ 1994).** Monitored and sampled the commercial fishery on the lower Yukon River. Duties included: scale sampling, age/sex/length determinations, and heavy interaction with the local fishing population.

Interpretation of data was also one of his main duties. Also worked on a remote sonar project on the upper Yukon drainage performing remote camp maintenance and the collection of biological data

Additional Training and Certifications

Confined Space Awareness

Powered Industrial Lift Truck Training

Permit Required Confined Space Training

Performance Management, Planning, and Development Training

FEMA IS-195 Basic Incident Command System Training

First Aid and CPR for Adults, MEDIC FIRST AID® International

Essentials of Communication Training

Lead-based Paint Renovator Initial

MATTHEW E. FAUST, PG

Geologist

Years Experience

Total: 9; Bristol: 8

Areas of Expertise

Project Management

Installation of Soil Borings and Monitoring Wells

Contaminated Site Assessments / Remediation

Sampling and Monitoring

Geologic Diagrams and Research

Environmental Documentation and Permitting

Licenses

Professional Geologist, State of Alaska (No. 662)

Affiliations

Member, American Institute of Professional Geologists (AIPG)

Training and Certifications

Certified PG, AIPG

40-hour and HAZWOPER Supervisor

Hazardous Materials Transportation (DOT & IATA)

Sampling for Defensible Environmental Decisions

24-hour RCRA Hazardous Waste for Supervisors

30-hour OSHA Construction Safety and health Training

Education

B.S., Geosciences, Honors, Pacific Lutheran University, Tacoma, Washington, 2002

M.S., Geoscience, University of Nevada, Las Vegas, 2005

Mr. Faust is a geologist who has gained invaluable experience in environmental investigations, exploration geology, and geologic studies since he began his career in 2002. His background is fortified by his work experience as project manager and as field lead, including contracting, budgeting, and directing field activities. His expertise includes collecting rock, sediment, groundwater, surface water, and vegetation samples; testing water quality; logging drill core and soil borings; and supervising the installation of borings, wells, and exploration drill holes. He has extensive experience in the removal, transport, and disposal of petroleum underground storage tanks as well as contaminated soil. He has performed various roles (including Field Lead and Contractor Quality Control Systems Manager) on Formerly Used Defense Sites (FUDS) in New Mexico as well as served as Project Manager for remote Alaska FUDS projects that are off of the road system and not accessible year round. He has managed projects for clients that include the US Environmental Protection Agency (EPA) and the US Army Corps of Engineers - Alaska District, and has coordinated projects with regulators that include the EPA and the Alaska Department of Environmental Conservation. In addition, Mr. Faust has extensive experience in writing environmental documents, including site assessment plans, site assessment reports, site characterization reports, technical memorandums, Phase I Site Assessments, Environmental Assessments (EAs), and Findings of No Significant Impact (FONSIs), as well as Accident Prevention Plans and Site Safety and Health Plans following the guidance of Engineers Manual 385-1-1. He has also constructed diagrams such as geologic maps, well diagrams, and cross sections.

Project Experience

- **Technical Lead, Ramah Ranch Remedial Investigation (RI) and Interim Removal Action (IRA), USACE, Albuquerque District (9/2011 – Present; $924K).** Responsibilities include participating in technical project planning (TPP) meetings and preparation of planning documents (including a Uniform Federal Policy Quality

Bristol

ALLIANCE OF COMPANIES™

Assurance Project Plan [UFP-QAPP]), providing technical guidance to the project manager, serving as field lead for the RI and IRA phases of the project, and participating in the preparation of reports. The work will include a site characterization/RI and an IRA at a rocket propellant impact site in New Mexico. The work completed to date includes preparation of TPP meeting materials.

Project Manager, Caines Head Site Inspection (SI), USACE Alaska District, Resurrection Bay, Alaska (6/2010 – Present; $365K). Project management responsibilities include interacting with the client and project stakeholders, organizing TPP meetings, overseeing the preparation of planning documents (including a UFP-QAPP) and reports, and managing subcontractors and Bristol field staff. During the field portion of the project responsibilities will include serving as field lead and directing SI activities. The Caines Head site is near Seward, Alaska but is only accessible by boat. The SI will involve locating 14 petroleum storage tank site and verifying their presence or absence, as well as collecting soil, groundwater, and surface samples at various locations across the site to verify the presence or absence of contamination.

- **Project Manager, Liberty Bell Baseline Environmental Sampling 2010, Metallica Resources Alaska, Inc. (Metallica), Ferry, Alaska (4/2010 – 12/2010; $24K).** Planned and conducted two surface water sampling events as part of a baseline environmental study at the Metallica Resources Liberty Bell Mine project near Ferry, Alaska. Tasks included managing the project, selecting the laboratory and the analytes, selecting sample locations, and collecting and filtering samples. Wrote a report summarizing field activities, comparing the analytical results to the relevant water quality criteria, and providing recommendations for future environmental studies.
- **Technical Lead, Site Inspections and Removal Response Actions at Former Army Air Field Properties: Hobbs, Carlsbad, Deming & Fort Sumner, New Mexico; and at Former Air Force Station Properties: Las Cruces and Tierra Amarilla, New Mexico (10/2009 – Present; $4.8M).** Responsibilities include participating in TPP meetings and preparation of planning documents, including a UFP-QAPP, providing technical guidance to the project manager, serving as field lead for most the SI phases of the project, and participating in the preparation of reports. Work includes site inspections, removal response actions, and final closure response actions at six formerly used defense sites (FUDS) in New Mexico. The work completed to date includes a removal action at Tierra Amarilla including site restoration, a final closure response action for two underground storage tank sites at the Las Cruces FUDS, and site inspections and removal response actions at the Deming FUDS.
- **Project Manager, Former Skelly Tier 2 Assessment and Corrective Action, EPA, Winnebago, Nebraska (09/2009 – 08/2011; $120K).** Project management responsibilities included interacting with the client and subcontractors, overseeing the preparation of planning documents and reports, and managing the field staff. The site assessment phase of the project involved delineating the extent of soil contamination at a LUST site. The corrective action phase of the project included removal of USTs and the removal and proper disposal of over 500 tons of contaminated soil.

- **Project Manager, Liberty Bell Baseline Environmental Sampling 2009, Metallica Resources Alaska, Inc., Ferry, Alaska (03/2009 – 12/2009; $25K).** Planned and conducted two surface water sampling events as part of a baseline environmental study at the Metallica Resources Liberty Bell Mine project near Ferry, Alaska. Tasks included managing the project, selecting the laboratory and the analytes, selecting sample locations, and collecting and filtering samples. Wrote a report summarizing field activities, comparing the analytical results to the relevant water quality criteria, and providing recommendations for future environmental studies.
- **Field Supervising Geologist, Region Nine LUST Site Assessment & Corrective Action, Environmental Protection Agency, Arizona and New Mexico (09/2008 – 10/2009; $1.6M).** The project consisted of site assessments and site characterizations multiple sites on Indian Lands for the EPA Region 9. Sites were located on the Hopi Reservation in Arizona, and on the Navajo Nation in New Mexico. Tasks included supervising the removal of USTs, installing soil borings and monitoring wells, and collecting soil and groundwater samples.
- **Project Manager, 1005 Site Assessment Review, EPA, Winnebago and Omaha Reservations, Nebraska (09/2008 - 12/2008; $7.6K).** Reviewed existing site assessment reports for five leaking underground storage tank (LUST) sites on the two Reservations in Nebraska. Reviewed reports to determine whether Nebraska Department of Environmental Quality (NDEQ) requirements for Tier 1 Site Assessments had been met, whether action levels had been exceeded, and whether a Tier 2 Site Assessment would be required for each of the five sites. Other tasks included interacting with the EPA project manager, creating a budget for the project, conducting the site assessment reviews, and writing the report.
- **Project Manager, 1004 Former Skelly Site Assessment, U.S. EPA, Winnebago Reservation, Nebraska (08/2008 - 04/2009; $65K).** Conducted a site assessment at a potential LUST site on the Reservation following NDEQ guidelines for a Tier 1 Site Assessment. Tasks included setting up subcontracts and budgets, writing the work plan, installing soil borings and monitoring wells, collecting soil and groundwater samples, and writing a technical memorandum summarizing the results of the site assessment, including recommendations for future site work.
- **Project Manager, Gambell Monitoring Well Decommissioning Project, USACE, Alaska District, Gambell, Alaska (06/2008 - 12/2008; $38K).** Managed the project, wrote the work plan, directed field activities, and wrote the final technical memorandum. Project was the decommissioning of 17 monitoring wells according to Alaska Department of Environmental Conservation guidelines near Gambell on Saint Lawrence Island.
- **Project Manager, Liberty Bell Baseline Environmental Sampling 2008, Metallica, Ferry, Alaska (06/2008 – 12/2008; $22K).** Planned and conducted two surface water sampling events as part of a baseline environmental study at the Metallica Resources Liberty Bell Mine project near Ferry, Alaska. Tasks included managing the project, selecting the laboratory and the analytes, selecting sample locations, and collecting and filtering samples. Wrote a report summarizing field activities, comparing the analytical results to the relevant water quality criteria, and providing recommendations for future environmental studies.

- **Field Team Leader, Hoonah Radio Relay Station (RRS) Remedial Action Phase II, USACE, Hoonah, Alaska (2008; $4M).** Assisted with writing work plans, functioned as the Contractor Quality Control Systems Manager, delineated areas of PCB soil contamination, directed soil excavation based on field laboratory results, manifested contaminated soil for transport, collected confirmation samples for laboratory analysis, and assisted with writing the final report. The project consisted of excavating, manifesting, and transporting over 3,345 tons of polychlorinated biphenyls (PCB)-contaminated soil, collecting 320 samples for field laboratory analysis, and collecting over 522 analytical samples for fixed laboratory analysis.
- **Project Manager, B-6 Winnebago Review, Environmental Protection Agency, Winnebago Reservation, Nebraska (2008; $8.5K).** Responsibilities included interacting with the EPA project manager, creating a budget for the project, conducting the site assessment reviews, and writing the report. Project consisted of reviewing existing site assessment reports for a LUST site on the Reservation. Reports were reviewed to determine whether NDEQ requirements for Tier 1 Site Assessments had been met, whether action levels had been exceeded, and whether a Tier 2 Site Assessment would be required.
- **Field Supervising Geologist, B-2 Region Nine LUST Sites, Environmental Protection Agency, Arizona and New Mexico (12/2007 – 09/2008; $1.5M).** The project consisted of site assessments and site characterizations at six sites on Indian Lands for the EPA Region 9. Sites were located on the Colorado River Indian Tribes Reservation and the Hopi Reservation in Arizona, and on the Navajo Nation in New Mexico. Tasks included supervising the removal of petroleum underground storage tanks (USTs), installing soil borings and monitoring wells, and collecting soil and groundwater samples.
- **Geologist, Newhalen Groundwater Monitoring Project, Newhalen Tribal Council, Newhalen, Alaska (2007; $32K).** Responsibilities included supervising the installation of the monitoring wells, collecting soil and groundwater samples, training local Tribal personnel in groundwater sampling procedures, and assisting in writing the final report. The project consisted of installing two monitoring wells near the Newhalen Landfill site, and one monitoring well at the Old Fuel Spill site.
- **Lead Environmental Sampler, Hoonah Radio Relay Station (RRS) Remedial Action, USACE, Hoonah, Alaska (2007; $1.8M).** Responsibilities included assisting with writing work plans, conducting EnSys PCB field screening, directing soil excavation based on field screening results, manifesting contaminated soil for transport, collecting confirmation samples for laboratory analysis, and assisting with writing the final report. The project consisted of excavating, manifesting, and transporting over 1,550 tons of PCB-contaminated soil, conducting 360 field screening analyses, and collecting over 280 laboratory analytical samples.
- **Geologist, Liberty Bell Mine Environmental Sampling 2007, Metallica, Ferry, Alaska (2007; $14K).** Planned and conducted a sampling event of surface water as part of a baseline environmental study. Tasks included selecting the laboratory and the analytes, selecting sample locations, and collecting and filtering samples. Wrote a report summarizing field activities, comparing the analytical results to the relevant water quality criteria, and providing recommendations for future environmental studies.

- **Geologist, SUN Property Environmental Sampling Project, Andover Ventures, Brooks Range, Alaska (2007; $15K).** Planned and conducted a helicopter-supported sampling event of surface water as part of a baseline environmental study. Responsibilities included selecting the laboratory and the analytes, selecting sample locations, and collecting and filtering samples. Wrote a report summarizing field activities, comparing the analytical results to the relevant water quality criteria, and providing recommendations for future environmental studies. Work was conducted out of a remote exploration camp on the flanks of the Brooks Range in northern Alaska.
- **Field Supervising Geologist, B-11 Region 6 Site Assessments, EPA, Laguna and Santa Domingo Pueblos, New Mexico (2007; $500K).** Responsibilities included supervising the removal of petroleum underground storage tanks (USTs), installing soil borings and monitoring wells, and collecting soil and groundwater samples. The project consisted of site assessments and site characterizations at five sites on Indian Lands for the EPA Region 6.
- **Geologist, B-6 EPA Site Assessments, EPA, Tohono O'odham Reservation and the Navajo Nation in Arizona and New Mexico (2006 - 2007; $1.3M).** Tasks included supervising the removal of USTs, installing soil borings and monitoring wells, collecting soil and groundwater samples, and writing Site Assessment and Site Characterization Reports describing field activities, analytical results, and providing recommendations for future assessment and remediation on the sites. Conducted site assessments and site characterizations at nine sites on the two Reservations. Field Supervising Geologist on three of the nine sites.
- **Geologist, Pebble Mine Geological Project, Northern Dynasty Mines, Inc. (Northern Dynasty), near Iliamna, Alaska (2006).** Conducted downhole acoustic and caliper logging of exploration drill holes at Northern Dynasty's Pebble gold-copper prospect.
- **Geologist, Site Assessment, PenAir, Dillingham, Alaska Project (2006; $50K).** Conducted a site assessment of a contaminated site, including the installation of soil borings and the collection of soil and groundwater samples. Wrote a Site Assessment Report summarizing the results of the fieldwork and providing recommendations for future remediation at the site.
- **Geologist, Baseline Environmental Sampling, Alaska Earth Sciences, Bee Creek Prospect, near Chignik Bay, Alaska (2006; $9.2K).** Planned and conducted a helicopter-supported sampling event of surface water as part of a baseline environmental study at the Full Metal Minerals/Metallica Resources joint venture Bee Creek Prospect. Tasks included selecting the laboratory and the analytes, selecting sample locations, collecting and filtering samples, and training a local hire in the sampling process. Wrote a report summarizing field activities, comparing the analytical results to the relevant water quality criteria, and providing recommendations for future environmental studies.
- **Geologist, Hatchery Feasibility Study, Choggiung Ltd, East Creek Hatchery, near Nunavaugaluk Lake, Dillingham, Alaska (2006).** Conducted a site visit, including the collection of groundwater and soil samples. Wrote a Characterization Report summarizing the results of the site visit and providing recommendations for future remediation at the site.

- **Geologist, Groundwater and Surface Water Sampling, PenAir, King Salmon, Alaska (2006).** Sampled groundwater and surface water during biannual sampling events at the PenAir contaminated site in King Salmon, Alaska. Wrote reports summarizing the sampling events.
- **Geologist, Huslia Landfill Road Project, Alaska Department of Transportation and Public Facilities (ADOT&PF), Huslia, Alaska (2006).** Conducted research for, and wrote a Phase I Environmental Due Diligence Audit (EDDA) for the construction of a landfill access road by the ADOT&PF at Huslia, Alaska.
- **Geologist, Phase I EDDAs, Federal Aviation Administration (FAA), Huslia, Selawik, and Adak, Alaska (2003 - 2006).** Conducted research for and wrote Phase I EDDAs for the installation of navigational aids by the FAA at remote Alaska sites.
- **Geologist, Pebble Road Project, Northern Dynasty, near Iliamna, Alaska (2004 -2006).** Sampled surface water, stream and pond sediment, and vegetation along a proposed haul road corridor for a background study for the Pebble gold-copper prospect.
- **Geologist, CAMPTEX Mineral Prospect Review, Bristol Bay Native Corporation, Bristol Bay Region (2004).** Conducted research for and wrote prospect summaries for several promising mineral prospects located in the Bristol Bay region. Summaries were to be used in marketing the prospects to exploration companies.
- **Geologist, Anaconda Collection Indexing, Alaska Minerals at Risk Program, (2003).** Supervised a group of four indexers in digitizing and indexing a large collection of material, including reports, maps, and other documents, that were generated by the now-defunct Anaconda Minerals Company while working in partnership with Cook Inlet Region Incorporated (CIRI). The Anaconda Collection was donated by CIRI to the University of Alaska, and the indexing was funded by the Alaska Minerals at Risk Program.
- **Geologist, Digital Index Development, Bristol Bay Native Corporation, Anchorage, Alaska (2003).** Created a digital index of all reports, maps, documents, and other material owned by Bristol Bay Native Corporation, related to mineral, oil, and gas resources of the Bristol Bay region.
- **Geologist, Phase I EDDA, Bristol Bay Housing Authority, Dillingham, Alaska (2003).** Conducted research for and wrote a Phase I EDDA for the Bristol Bay Housing Authority for a proposed Boys and Girls Club at Dillingham, Alaska.
- **Geologist, EAs and FONSI Projects, FAA, Numerous Locations throughout Alaska (2002 - 2004).** Conducted research for and helped write EAs and FONSI for the installation of navigational aids by the FAA at remote Alaska sites in St. George, Buckland, Savoonga, Ambler, Anvik, Cape Yakataga, Emmonak, Hooper Bay, Huslia, Noatak, Selawik, and Togiak.
- **Geologist, EAs for Road Projects, Bureau of Indian Affairs (BIA), Remote Alaska Sites (2002 - 2004).** Conducted research for and helped write EAs for the BIA-funded road design projects for remote Alaska sites in Chenega Bay, Andreafski, Emmonak, Ugashik, and Koliganek.

Additional Training and Certifications

Defensive Driving Training

CPR and First Aid for Adults, MEDIC FIRST AID® International

8-Hour HAZWOPER Training, Bristol Industries

Hazardous Materials Transportation – (DOT/IATA) Section 1.5 IATA Compliance

Hazardous Materials Transportation – (DOT/IATA) 49 CFR 172.700-704 Compliance

EnviroStat, Inc., Sampling for Defensible Environmental Decisions

30-Hour OSHA Construction Industry Outreach Training Program, OSHAcampus.com™

MARTY HANNAH

Environmental Scientist / Project Chemist

Years Experience

Total: 19; Bristol: 2.5

Areas of Expertise

Environmental Chemistry

Toxicology

Environmental Site Investigations

Quality Assurance/Quality Control

Site Remediation

Laboratory Data Reduction and Evaluation

Training and Certifications

EPA 40-hour HAZWOPER

EPA 8-hour HAZWOPER refresher, current

CPR and First Aid for Adults

DOT/IATA Dangerous Goods Shipper's Training

USAF Flight Line Training-Elmendorf AFB

BP North Slope Red Book Training for handling waste generated on the North Slope

Smith Safe Driving Course-Provided by BP Exploration A

Education

B.S., Biology, Emphasis in Toxicology, Chemistry and Emergency Medicine, Mankato State University, Mankato, Minnesota 1992

M.S., Environmental Quality Science, Emphasis on Remedial Feasibility Studies, University of Alaska Anchorage, 2005

Mr. Hannah has worked in the environmental field since 1992. He became part of Bristol's environmental remediation team in 2009. His expertise encompasses environmental chemistry, data management, site assessment and remediation projects, site investigations, and quality assurance /quality control (QA/QC) requirements. He has worked on projects for private clients,as well as federal and state agencies and is familiar with the standards and procedures for compliance with these agencies. Mr. Hannah's expertise includes management and transportation of hazardous waste materials at remote arctic project sites. He has extensive experience performing EPA analyses in environmental laboratories and managing mobile laboratories. In addition, he has served as Research Professional/Laboratory Manager for the University of Alaska, Anchorage School of Engineering, and has been responsible for all aspects of a scientific field equipment business as the sole proprietor of Hannah Instrumentation.

As an Environmental Scientist/Project Chemist for Bristol Environmental Remediation Services, LLC, Mr. Hannah is responsible for initial project proposal and attention to cost control preparation of site-specific DQOs with SAP and QAPP documentation, contract negotiation, master service agreements, invoice tracking and coordination of field teams, providing oversight of sample collection and laboratory data reduction, and presentation of the site contamination and risk-based calculations, data validation QA/QC effort, including ADEC and DoD electronic submittals. Mr. Hannah provided these services on all of the Bristol projects below.

Project Experience

- **Field Chemist, Mercury in Soil Delineation, Nova Gold, Nome, Alaska (08 – 09/2009; $120K).** Performed environmental assessment of mercury and arsenic contamination at a former gold processing facility. Duties **included creation of a work plan, sample and analysis plan,** and procedures for field analysis of mercury (mobile laboratory). Performed analysis of soil samples on site to delineate the extent and concentration of mercury contamination. Directed drillers on continued sample collection based on field analytical results. Wrote project report for submittal to the ADEC.

- **Environmental Scientist, Spill Response, Iliamna Development Corporation, near the Iliamna River, Alaska (06/2009 – Present; $165K).** Provided support to client in response to fuel spills near the Iliamna River and Lake Iliamna. Oversaw removal and treatment of fuel contaminated soil. Coordinated client personnel in spill response-containment and determined the best methods for remediation of contaminated soil and proper waste disposal. Coordinated the development and operation of a land farm to remediate fuel contaminated soil. Collected soil and surface water samples and installed monitoring wells. Advised client on regulatory requirements and submittals to State agencies, as well as development of remedial methods for reduction of contaminants in impacted soils. Primary author of spill reports submitted to State agencies. Designed a passive fuel collection system for winter operation at this remote site.
- **Project Chemist, former White Alice Site, USACE, Alaska District, Northeast Cape, St. Lawrence Island, Alaska (06/2009 – present; $30M).** Provided support to field activities at Northeast Cape for remedial pilot tests and removal of contaminants at a Formerly Used Defense Site (FUDS). Operated an on-site mobile laboratory for analysis of fuels and PCBs in soil as well as monitored natural attenuation. Coordinated the submittal of samples and evaluated laboratory data for quality and representativeness to the site. Functioned as the primary point of contact for fixed lab, project managers, and field personnel regarding procedures and submittal of samples for analyses. Responsible for data quality/data review, laboratory reports and electronic data deliverables.
- **Environmental Scientist/Project Chemist, USACE, Omaha District, Tinker Air Force Base, Oklahoma City, Oklahoma. (10/2010 – Present).** Collected soil-gas samples and evaluated an aircraft refueling system to determine if fuels had leaked from the system. Coordinated with base personnel and contractors in the gathering of information about site conditions and the determination of the extent of fuel contamination. Prepared documents and coordinated with sub-contractors for the next phases of the site investigation.
- **Environmental Scientist/Remediation Specialist, Various Base-Wide Remediation Projects, USACE, Alaska District, Joint Base Elmendorf-Richardson (09/2006 – 05/2009; $1.8M).** Supported monitoring, and operation and maintenance of a variety of remedial systems, including sites located within the active airfield and numerous other sites on the installation. Responsible for dig permits, well installation and decommissioning, soil borings, sample collection and soil gas vapor analysis, along with operation and maintenance of bioventing systems and constructed remediation wetlands.
- **Field Chemist/Environmental Scientist, POL-Contaminated Soil Remediation Project, USACE, Alaska District, Umiat, Alaska (06 – 09/2006; $1.8M).** Collected field and confirmation soil samples using multi-incremental sampling (MIS) on thermal infrared (IR)-treated soil at a remote formerly used defense site. Developed and prepared the methods, testing, instrumentation, and environmental controls for field analysis of samples by U.S. Environmental Protection Agency (EPA) Method 1664. Coordinated the shipping of rush samples, equipment, and materials to and from this remote arctic site

- **Environmental Scientist, QA/QC Officer, Environmental Data Manager, Site Assessment and Remediation Contracts, BP Exploration (Alaska) North Slope, Alaska (04/2006 – 05/2009; $5+M).** Provided QA and procedural input in the development and release of an extensive overhaul of BP's environmental Quality Assurance Program Plan. Reviewed laboratory data and prepared quality assurance verification reports for all related environmental projects. Designed and developed procedures for remediation systems and remote sensing at various arctic sites throughout BP lease areas.
- **Field Scientist, Monitoring and Remedial Action, Chevron, Anchorage and Fairbanks, Alaska (10/2006 – 05/2009; $800KM).** Performed monitoring and remedial action on former and existing Chevron gasoline stations and bulk fuel plants. Performed as Field Lead on soil, groundwater, and surface water sampling events. Supported implementation and operation of remedial systems. Responsible for operation and maintenance of existing remedial systems. Treatment technologies included soil vapor extraction, air sparging, granular activated carbon water treatment, and free-product recovery using high-vacuum extraction.

Professional Experience

- **Project Chemist, Environmental Scientist, HM & DG Shipping Specialist, Field Equipment Manager, OASIS Environmental, Anchorage, Alaska (2006 - 2009).** Responsible for Quality Assurance Program Plans, standard field procedures, and management of laboratory data. Managed, shipped, and serviced all scientific monitoring instrumentation and support equipment for OASIS' five offices. Equipment included photoionization detectors (PIDs)/flame-ionization detectors, multi-gas meters, water quality multi-meters, pumps, and a wide variety of other field equipment.
  - Project Chemist, various projects. Responsible for laboratory data management, QA program plans, final review and validation of laboratory data on numerous Alaska Department of Environmental Conservation (ADEC), Federal, and private projects. Additional responsibilities included completion of ADEC laboratory data checklists, quality of analytical data reviews, flagging of tabulated data and application of matrix concentrations to various site cleanup goals.
- **Owner-Sole Proprietor, Hannah Instrumentation, Anchorage, Alaska (1998 - 2009).** Responsible for all aspects of a scientific field equipment business that leased PIDs, multi-gas meters, water quality multi-meters, pumps and other equipment used by environmental personnel performing site investigations, and monitoring and remediation services. Provided analytical equipment and chemical analysis support for mobile laboratory operations using gas chromatographs, IR spectrophotometers, and other field instrumentation for quantifying a wide variety of contaminants of concern.
- **Client Services Coordinator, North Creek Analytical, Anchorage, Alaska1999 – 2004).** Duties included support for clients and laboratories for all aspects of environmental sampling and analyses for contaminants of concern. Performed tasks such as filling client bottle orders, receiving samples, and forwarding them to the proper laboratories within specified temperature and packing regulations. He also provided support to NCA mobile laboratories in Amchitka, Adak, Prudhoe Bay, and Livengood, Alaska.

- **Organic Chemist/GC Analyst, Semivolatiles for Columbia Analytical Services, Anchorage, Alaska (I993 – 1998).** Performed analyses of environmental samples on various matrices for contaminants of concern such as fuels, poly-chlorinated biphenyls (PCBs), pesticides and PAHs. Performed maintenance and repair of gas chromatographs and data systems. Managed waste stream and led effort to reduce the hazardous waste generation. Other duties included supporting laboratory personnel in compliance with Federal, state and municipal regulations for safety and other code compliance.
- **Organic Chemist/GC Analyst, Analytica Alaska (1992 – 1993).** Performed analyses on soils and waters for Alaska and EPA methods AK101 and EPA 8021B (GRO/BTEX).
- **Research Professional-Laboratory Manager, University of Alaska Anchorage, School of Engineering (1998 – 2005).** Responsible for all aspects of physical and research laboratories, including all health, safety, and environmental (HSE) policies and procedures in teaching and research laboratories. Maintained chemical inventories and instructed researchers and graduate students in proper handling of chemicals and operation of various physical and analytical systems and instrumentation. Performed numerous tasks either solely or in support of environmental remediation feasibility studies on contaminated soils and waters.
- **Assistant Laboratory Manager, Applied Science and Engineering Technology (ASET) Laboratory, University of Alaska Anchorage (2002 - 2005).** Utilized state-of-the-art instrumentation in support of chemistry, biology, and engineering research. Duties included selection, procurement, installation and operation of the instrumentation, as well as ancillary personal protective equipment. Prepared Standard Operating Procedures for the operation of analytical instrumentation and analysis using a wide variety of analytical methods used in the laboratory.

Publications

Extent and Variability of Biogenic Interference in Cold Regions Soils. Journal of Cold Regions Engineering, September 1999. C.R. Woolard, D.M. White, J.L. Walworth, M.E. Hannah.

LYNDSEY KLEPPIN

Geologist

Years Experience

Total: 4; Bristol 4

Areas of Expertise

Environmental Sampling

Risk Assessment

Geologic Research

Borehole Geophysical Logging

Training and Certifications

OSHA 30-hourConstruction Safety and Health

USACE Construction Quality Management (CQM) for Contractors

USACE Quality Control System (QCS)

Northwest Environmental Training Center Contaminant Chemistry and Monitored Natural Attenuation Workshop

40-Hour Hazardous Waste Operations and Emergency Response (HAZWOPER)

8-Hour HAZWOPER Refresher

Hazardous Materials Transportation, (DOT/IATA) 49 CFR 172.700-704 and Section 1.5 IATA Compliance

Alaska Department of Environmental Conservation 8-Hour Soil Vapor Intrusion Course

CPR and First Aid with current 4-Hour Refresher

Rigging and Slinging

Education

B.A., Geology, Carleton College, Northfield, Minnesota 2004

Ms. Kleppin began her career in 2007 and specializes in exploration geology and geophysical investigations at contaminated sites throughout Alaska. She is proficient in producing geologic maps, well diagrams, cross sections and reports. Ms. Kleppin has several years of experience in the environmental field performing surface water, groundwater, soil and sediment sampling, as well as administrative and technical support, field logistics, instrumentation, risk assessment, and technical writing.

Project Experience

- **Environmental Scientist, Northeast Cape Hazardous, Toxic, and Radioactive Waste Remediation, USACE, Alaska District, St. Lawrence Island, Alaska (06/2010 - 09/2010).** Conducted soil, groundwater and surface water sampling, directed UVOST investigation and generated boring logs for petroleum and PCB impacted sites. Interpreted and reported UVOST and laboratory analytical data to create guidance for future excavation activities. The project objective was to perform debris and soil removal actions at 10 sites across the project area; construct a landfill cap at one site; and initiate a natural attenuation monitoring program at another.
- **Environmental Scientist, Puntilla Lake Phase 2 Release Investigation, Federal Aviation Administration, Rainy Pass, Alaska (06/2010 - 10/2010).** Assisted field activities including UVOST probe advancement, soil and groundwater sampling, sample packing and shipment and monitoring well installation for characterization of a petroleum-impacted site. The project objective was to determine the extent soil and groundwater impacts resulting from petroleum releases at three former USTs.

- **Field Scientist, Native American Lands Environmental Mitigation (NALEMP) Site Assessment, Unalakleet, Alaska (05/2010 - 07/2010).** Conducted preliminary site assessment and assisted in preparation of the Strategic Project Implementation Plan (SPIP) for submittal to the USACE. NALEMP was developed by the Department of Defense (DoD) to address environmental issues from past DoD activities on Indian lands.
- **Project Scientist, Investigation and Remediation of Leaking Underground Storage Tank (LUST) Sites on Indian Lands, U.S. Environmental Protection Agency (EPA) Contract, Idaho (11/2009 - 03/2010).** Conducted Idaho Department of Environmental Quality Risk Evaluation Phase 2 for a petroleum-impacted site. Authored report presenting results of the RE-2. The project consisted of evaluating LUST-eligible sites; performing site assessments and remedial investigations; developing risk-based decision documents; conducting remediation activities; and providing other technical support to EPA as required to ensure that LUSTs located on Indian Lands no longer pose a threat to human health and the environment.
- **Field Manager, Native American Lands Environmental Mitigation (NALEMP) Site Assessment, Tetlin, Alaska (10/2009 - 02/2010).** Conducted preliminary site assessment and prepared the Strategic Project Implementation Plan (SPIP) for submittal to the USACE. NALEMP was developed by the Department of Defense (DoD) to address environmental issues from past DoD activities on Indian lands.
- **Field Manager, Monitoring Well Inventory Project, USACE, Alaska District, Fort Richardson, Alaska (07/2009 - 03/2010).** Conducted background research and field investigations of 250+ points using a Trimble GPS unit to create a comprehensive, SDSFIE compatible monitoring well database for USACE. The database included determination of active/inactive status based on sampling event records and location within active operable units or POL release sites. The project objective was to evaluate existing monitoring well databases and maps and conduct field inspections at each well location to create a database of existing wells and provide recommendations for database management and well decommissioning at Fort Richardson.
- **Environmental Scientist, Groundwater Sampling-Operating Unit 3, Fairbanks Environmental Services, Fort Wainwright, Alaska (04/2009 - 05/2009).** Collected low-flow groundwater samples for DRO, GRO, VOC, EDB, PAH, iron (II), lead, and sulfate analysis. The objective of the project was to provide field assistance for FES's USACE Alaska District contract to conduct groundwater sampling at Fort Wainwright.
- **Geologist, Investigation and Remediation of Leaking Underground Storage Tank (LUST) Sites on Indian Lands, U.S. Environmental Protection Agency (EPA) Contract, (01/2009 - 042009).** Created soil boring logs and collected analytical soil samples. Generated lithologic cross sections and well diagrams for Region 9 Navajo sites using gINT Geotechnical software and produced technical memos reporting remedial investigations; developing risk-based decision documents; conducting groundwater monitoring events. The project consisted of evaluating LUST-eligible sites; performing site remediation activities; and providing other technical support to EPA as required to ensure that LUSTs located on Indian Lands no longer pose a threat to human health and the environment.

- **Geologist, BBNC Responsible Resource Development, Bristol Bay Native Corporation Land Department, Anchorage (01/2009 - 02/2009).** Researched and prepared historical and geologic background summary of land in the vicinity of the Agulowak River. The project objective was to provide background data to assist mineral appraisal for a prospective land exchange area.
- **Field Manager, Borehole Geophysical Logging Program, Pebble Partnership, Iliamna, Alaska (02/2008 - 12/2008).** Developed site-based Standard Operating Procedure for ABI Acoustic Televiewer, 2PCA-100 Caliper, Full Wave Sonic Sonde and 4WNA Winch; revised procedures to optimize data quality and downhole tool recovery; performed maintenance and repairs on equipment; trained operators and provided regular reports to site staff; coordinated and managed downhole geophysical surveys for boreholes exceeding 6,000 feet in depth. The objective of the project was to provide geotechnical field support for exploration activities at the prospect.
- **Field Geologist, Pebble Project Support, Northern Dynasty, Iliamna, Alaska (05/2007 - 12/2008).** Conducted borehole geophysical surveys with and provided general field support for Northern Dynasty's Pebble Cu-Au-Mo prospect near Iliamna, Alaska. Additional activities included surface water and soil sampling, ground topographic surveying, corelogging, geotechnical logging, and logistical support. The objective of the project was to provide geologic field support for exploration activities at the prospect.

Professional Experience

- Weekend Programs Lead Teacher for the Pacific Science Center in Seattle, Washington (2006 to 2007). Taught interactive science lessons and assisted in curriculum development.
- Assistant to the Director for Osservatorio Geologico di Coldigioco in Italy (2005 to 2006). Provided winter logistics and maintenance for geologic observatory.
- Adjunct Chemistry Instructor for University of Alaska Anchorage (2005). Duties included laboratory instruction, creating and grading chemistry exams.
- Field Studies Instructor for 3D Education and Adventure, Isle of Wight, England (2004). Activity and field studies instructor at outdoor education camp for schoolchildren.
- Prudhoe Bay summer hire for NANA Corporation, Prudhoe Bay, Alaska (2001). Seasonal laborer at field camp facility in the Prudhoe Bay oilfield.

APPENDIX E

Bristol Field Sampling SOPs

BERS-01	Soil Sampling
BERS-02	Groundwater Sampling
BERS-03	Sample Management
BERS-04	Field Measurement Test Equipment
BERS-05	Equipment Decontamination
BERS-09	Investigation-Derived Waste (IDW) Management
BERS-11	Field Documentation
BERS-17	Trimble GeoXH Global Positioning Systems

BRISTOL ENVIRONMENTAL REMEDIATION SERVICES, LLC

SOIL SAMPLING

STANDARD OPERATING PROCEDURE BERS-01

Record of Changes

Revision No.	Date	Prepared by	Approved by
0	01/15/08	B. Allen	S. Ruth
1	10/14/09	L. Maserjian	P. Curl
2	02/17/10	L. Maserjian	B. Allen

SOIL SAMPLING

STANDARD OPERATING PROCEDURE

Summary: Soil samples may be collected using a variety of methods and equipment. The methods and equipment used are dependent on the depth of the desired sample, the type of the sample required, and the soil type. Manual techniques and equipment, such as hand augers, are usually used for surface or shallow, subsurface soil sampling. Power-operated equipment is usually associated with collecting deep samples, but this equipment can also be used for collecting shallow samples.

Soil samples collected for volatile organic compound (VOC) analysis are handled in a manner that minimizes the loss of contaminants due to volatilization and biodegradation. Where required to meet project objectives, field extraction and preservation with methanol are performed to ensure sample integrity and representativeness during sample handling and transport.

Health and Safety: Sampling activity should only be conducted in accordance with an approved Site Health and Safety Plan.

Personnel Qualifications: Sampling personnel will be trained and certified as hazardous site workers per Title 29 Code of Federal Regulations, Part 1910.120(e) [29 CFR 1910.120(e)]. If applicable, additional qualification requirements will be specified in the site Quality Assurance Project Plan (QAPP) and will be met.

Equipment and Materials: Prior to deployment in the field, the requisite sampling equipment and materials will be identified, secured, and inspected for signs of damage or potential contamination. Sampling equipment will be selected to preserve the chemical and physical integrity of the samples. Equipment selection will be based on the depth of the samples to be collected and, to a certain extent, the characteristics of the material being sampled. Equipment used for sampling trace contaminants should be constructed of inert materials, such as Teflon® or stainless steel. Ancillary equipment, such as auger flights, post hole diggers, etc., may be constructed of other materials if this equipment does not come in contact with the samples. However, plastic, chromium, galvanized, painted, or rusted equipment should not be used for routine soil sampling operations.

- Sample containers for collecting samples using the methanol extraction and preservation method must be prepared and weighed in advance by the laboratory performing the analysis. Required equipment may include disposable plastic syringes and a clean, sharp utility knife.
- Surface soil is generally classified as soil between the ground surface and 6 inches below ground surface (bgs). Surface soil sampling equipment typically consists of spoons, shovels, hand-augers, push tubes, and post-hole diggers.

- Subsurface soil is generally soil that is at least 6 inches bgs, and can be collected using manual or powered sampling devices. Manual sampling devices consist of hand augers, push tubes, and post-hole diggers. Powered devices typically consist of power augers; split-spoon samplers, which are driven with a drill rig drive-weight assembly or hydraulically pushed using drill rig hydraulics; continuous split-spoon samplers; specialized hydraulic cone penetrometer rigs; and/or backhoes.
- In addition to soil sampling equipment, sampling support equipment may include Global Positioning System (GPS) or survey equipment for locating sample points, organic vapor analyzer with a photoionization detector (PID), tape measures, survey stakes or flags, stainless steel buckets/bowls or disposable aluminum pie pans, canvas/plastic sheet, pre-cleaned sample containers, decontamination supplies and equipment, safety equipment, logbooks, camera, chain-of-custody forms, and supplies for sample labeling, packaging, and shipping.
- Sample containers will be of the type and size specified in the governing QAPP.

Field Screening

Field-screening samples are typically collected either before or concurrently with laboratory analytical samples. Field screening before sample collection can help guide the selection of the most appropriate location to collect a laboratory analytical sample. Collecting field-screening samples concurrently with laboratory samples can help establish a correlation between screening and analytical results at a particular site. Field screening is commonly performed using an organic vapor analyzer, such as a PID.

Headspace PID Screening

Headspace PID screening samples are collected by filling a resealable Ziploc® bag approximately one-third to one-half full of freshly exposed or uncovered soil, and immediately sealing the bag. The soil should be agitated and then allowed to warm for approximately five minutes to an hour, to allow the headspace vapors to develop. After the headspace vapors have developed, insert the tip of a calibrated PID into the void headspace of the bag, and record the highest reading.

In-Situ PID Screening

In some instances, where a limited volume of soil is available for field screening, such as soil cores from a direct-push rig or split spoon, using the headspace method may use up material that potentially could be used for a laboratory analytical sample. In these cases, field screening of the soil may be performed by making small divots approximately every 6 inches along the length of the core, and inserting the calibrated PID tip just above the freshly exposed divot, taking care not to touch the material. Record the highest reading at each location in the field logbook or field form.

Surface Soil Sampling

1. If a thick, matted root zone is encountered at or near the surface, remove it before collecting the sample.
2. Carefully remove the top layer of soil or debris to the desired sample depth with a pre-cleaned spade.
3. Using a pre-cleaned, stainless steel scoop, spoon, or trowel, remove and discard a thin layer of soil from the area that came in contact with the spade.
4. Collect samples following procedures described in the General Soil Sampling Procedures Section.

Subsurface Soil Sampling: Subsurface samples can be collected using hand or power augers, Geoprobes®, split-spoon samplers, or from backhoes.

- Augering is the most common method used to collect shallow subsurface samples. The auger is used to bore a hole to the desired sampling depth. VOC samples are generally collected directly from the sampling device. Non-VOC samples are collected after thorough mixing. If a core sample is required, the auger tip is replaced with a thin wall tube sampler, and the system is lowered into the borehole and driven to the required sample depth. The system is withdrawn and the core is collected from the thin wall tube sampler.
- Geoprobe sampling uses a direct-push system that employs percussion power to essentially "hammer" sampling equipment (Macro-Core® samplers) into the subsurface to extract soil for laboratory analysis. The advantage of using a Geoprobe is that there is a much smaller hole diameter and minimal soil cuttings. The Macro-Core sampler is a solid barrel that is pushed into the subsurface for collecting continuous core samples of unconsolidated materials at depth. The Macro-Core soil samples are collected in a 4 to 5 foot long Teflon, polyvinyl chloride (PVC), or polyethylene terephalate glycol (PETG) liner; the samples can be obtained by splitting the liner or capped to it to preserve the samples for future analysis.
- On underground storage tank or contaminated soil excavation sites, a backhoe bucket is commonly used for collecting soil for samples. When a trench or excavation is deeper than four feet, the bucket of the backhoe or excavator will be used to collect soil, so that personnel do not climb into an unprotected hole.
- Power hand augers are commonly used to aid in the collection of subsurface soil samples at depths where hand augering is impractical. This equipment is a sampling aid, and not a sampling device; the typical lower depth range available with these devices is 20 to 25 feet. The power auger is used to advance a hole to the required sampling depth, at which point a hand auger is usually used to collect the sample.
- Split-spoon sampling provides for the collection and extraction of undisturbed soil cores of 18 or 24 inches in length. A series of consecutive cores may be extracted to

give a complete soil column profile, or an auger may be used to drill down to the desired depth for sampling. The split spoon is then driven to the sampling depth through the bottom of the augered hole, and the core is extracted. When used in conjunction with drilling, split-spoon samplers are usually driven either inside a hollow-stem auger or inside an open borehole after the rotary or cable tool drilling equipment has been temporarily removed.

- When split spoon or Macro-Core sampling is performed to gain geologic information, sampling will be performed in accordance with SOP BERS-06 Borehole Logging.
- Continuous split-spoon samplers may be used to obtain five-foot-long, continuous samples, approximately 3 to 5 inches in diameter. These devices are placed inside a five-foot section of hollow-stem auger and advanced with the auger during drilling. As the auger advances, the central core of soil moves into the sampler.
- Cone Penetrometer Rigs use a standard split spoon that is modified with a releasable tip to keep the spoon closed during the sampling push. Upon arrival at the desired depth, the tip can be remotely released and the push continued. During the subsequent push, the released tip floats freely up the inside of the sample barrel as the soil core displaces it. Split-spoon soil samples, therefore can be collected without drilling by simply pushing the device to the desired depth. This technique is particularly beneficial at highly contaminated sites, because cuttings are not produced as with drill rigs. This results in limited investigation-derived waste (IDW) and minimal exposure to sampling personnel.

Sampling using a Hand Drill with an Auger Attachment

1. Attach the auger bit to a drill-rod extension, and attach the “T” handle to the drill rod.
2. Clear the area to be sampled of any surface debris (e.g., twigs, rocks, and litter). It is generally advisable to remove the first three to six inches of surface soil.
3. Begin augering, periodically removing the auger from the hole and depositing accumulated soils onto a plastic sheet spread near the hole.
4. After reaching the desired depth, slowly and carefully remove the auger from the boring.
5. Remove auger tip from drill rods and replace with a pre-cleaned, thin-wall tube sampler. Install the proper cutting tip.
6. Carefully lower the tube sampler down the borehole. Gradually force the tube sampler into the soil. Take care to avoid scraping the borehole sides. Avoid hammering the drill rods to facilitate coring as the vibrations may cause the boring walls to collapse.
7. Remove the tube sampler and unscrew the drill rods.
8. Remove the cutting tip and the core from the device.
9. Discard approximately 1 inch off the top of the core. Place the remaining core into a labeled sample container without mixing.

10. Collect samples following procedures described in the General Soil Sampling Procedures Section.
11. If another sample is to be collected in the same hole, but at a greater depth, reattach the auger bit to the drill and assembly and follow steps 3 through 10, making sure to decontaminate the auger and tube sampler between samples.
12. Abandon the hole according to applicable state regulations and corporate procedures.

Sampling using a Geoprobe with a Macro-Core Attachment

1. Clear the area to be sampled of any surface debris (e.g., twigs, rocks, and litter). It is generally advisable to remove the first three to six inches of surface soil.
2. Begin hammering the Geoprobe.
3. After hammering the depth of the Macro-Core (either 4 or 5 feet in length), slowly and carefully remove the Macro-Core from the hammer.
4. Open the Macro-Core tubing using a two-razor tool designed for the Macro-Core.
5. Use a pre-cleaned stainless steel spoon or knife to obtain soil from the core at selected locations, based on PID field screening.
6. Collect samples following procedures described in the General Soil Sampling Procedures Section. The Macro-Core is not reusable. Remove any soil on the core material, place the used core in a plastic trash bag (with as many used cores as will fit), tie the ends of the plastic bag, and dispose of it in a trash receptacle.
7. Abandon the hole according to applicable state regulations and corporate procedures.

Sampling with a Hand Auger

1. Insert the hand auger into the material to be sampled at a 0° to 45° angle from the horizon.
2. Rotate the auger once or twice to cut a core of material.
3. Slowly withdraw the auger, with the slot facing upward.
4. Collect samples following the procedures described in the General Soil Sampling Procedures Section.

Sampling with a Split Spoon

1. Assemble the sampler by aligning both sides of barrel, then screw the drive shoe on the bottom and the headpiece on top.
2. Place the sampler perpendicular to the material sampled.
3. Using a well ring, drive the tube. Do not drive the tube past the bottom of the head piece, or the sample may be compressed.

4. Record the length of the tube used to penetrate the material being sampled, and the number of blows required to obtain this depth in the site logbook or on field data sheets.
5. Withdraw the sampler and open by unscrewing the bit and head, and splitting the barrel. Record the amount of recovery and soil type on the boring log. If a split sample is required, use a clean stainless steel knife to divide the tube contents in half, lengthwise.
6. Without disturbing the core, collect samples following the procedures described in the General Soil Sampling Procedures Section.

Sampling from a Backhoe

1. If backhoe buckets are not cleaned in between sample locations, collect samples from material in the center of the bucket.
2. Prior to collecting samples from soil in the backhoe bucket, dress the surface with a stainless steel shovel, spatula, knife, or spoon, to remove at least six inches of surface layer of soil, which may have been smeared across the trench wall as the bucket passed.
3. Be aware of "sluff" material in the bucket that is not representative of the specified sample depth.
4. Collect samples following procedures described in the General Soil Sampling Procedures Section.

General Soil Sampling Procedures:

1. If the QAPP requires field screening for VOCs using a PID, follow the procedures described in the Field Screening Section.
2. Collect samples in appropriate containers in order of volatility, with the most volatile samples collected first. Containers should be either pre-labeled or labeled immediately after sample collection. Follow the procedures for collecting volatile samples described in the following section.
3. For non-VOC samples, place the material into the appropriate container.
4. If a composite non-VOC sample is required, place the material from the designated sampling intervals or locations into a mixing bowl, mix thoroughly, and collect the sample from the mixture into the appropriate container.
5. If non-VOC duplicate, split, duplicate, or other quality assurance/quality control (QA/QC) samples are required, collect twice the routine amount of sample material, mix thoroughly, and fill two identical sets of sample containers.
6. Fill sample containers to the top with measures taken to prevent soil from remaining in the lid threads prior to being sealed.
7. After sample containers are filled, immediately seal them, chill them, and process them for shipment to the laboratory.

Volatile Sample Collection – Sample Collection for Methanol or other Preservative Extraction

General procedures for all volatile sample collection:

- Soil samples for volatile analysis can be collected using any of the sampling methods described above.
- When collecting soil for volatile sample analysis, always submit a separate non-preserved sample for moisture analysis/dry weight calculation, unless already submitting non-volatile samples from the same location.
- Never composite VOC samples.
- If VOC duplicate, split, or other QA/QC samples are required, collect and containerize samples that are co-located, not composited.
- If VOC samples are required, transfer the sample into a labeled sample container with a stainless steel laboratory spoon, or equivalent, and secure the cap tightly.
- Avoid placing pebbles or other large particles into the sample. To the extent practical, the sample should consist of sand, silt, or clay, with care to avoid rocks or pebbles.
- Ensure that the threads on the sample container and cap are free of soil particles. Wipe with a clean brush or paper towel if needed. The sample container should be open for the shortest time possible to prevent evaporation of the methanol and surrogate solution.
- After soil is placed in methanol or other preservative, it should be gently agitated or swirled so that the soil is immersed in the preservative. Do not shake the sample, as it may cause undue volatilization.

The different methods of collecting volatile samples with field extraction, using methanol or another preservative, are described in general below. Refer to the project QAPP for site-specific information on specific soil and methanol volumes required for the appropriate analytical method:

<u>Measuring 10 grams of soil into a VOA vial containing methanol</u>:

1. "Zero" one 40-milliliter volatile organic analyte (VOA) vial containing 10 milliliters of methanol on a small scale.
2. Use a disposable scoop to collect soil.
3. Very gently, transfer the soil into the vial until 10 grams of soil is weighed. Try not to let any soil drop outside the sample container onto the scale. Immediately cap the vial.
4. Ensure that the methanol does not splash. If methanol splashes or spills from the sample container, discard the container and re-sample.
5. Record the tare weight onto the sample sheet or label.

6. Repeat the process for the second VOA vial containing methanol.
7. Place the samples in a protective sleeve and store on ice until delivery to the laboratory.

Using a sampling coring device to collect soil for VOC analysis:

1. Coring devices (for example, En Core® or Terracore®) are disposable, and are not to be reused after each sample.
2. Push the core sampler into freshly exposed soil until the sample chamber is filled. Most of these devices deliver approximately 5 grams of soil.
3. Once the core is filled with soil, retrieve the coring device from the soil.
4. Wipe all soil from outside of the sampler. The soil plug should be flush with the mouth of the sampler.
5. If the QAPP requires using a preservative (for example methanol or sodium bisulfate), use the following preservation procedure:
    a. Place the mouth of the sampler into a pre-tared VOA vial containing the appropriate preservative, and extrude the sample by pushing the plunger down. Immediately cap the VOA vial.
    b. Place the labeled sample in protective padding and on ice.
6. If the QAPP requires freezing the samples unpreserved, use the following procedure:
    a. Place the mouth of the sampler into a pre-tared VOA vial containing exactly 5 milliliters of deionized water, and extrude the sample by pushing the plunger down.
    b. Cap the VOA vial and be sure the soil is below the water level. Gently swirl the vial.
    c. Repeat the process to collect a second soil vial.
    d. Immediately place the labeled sample in protective padding and on ice.
    e. As soon as practical, freeze sample in a freezer or by placing in a cooler containing dry ice.
    f. When freezing the soil vials, it is recommended that the vials be placed at a 45° angle to reduce the likelihood of vial breakage due to freezing.
7. If the QAPP requires submitting unpreserved, unfrozen samples that were collected using an EnCore device, use the following procedure:
    a. Immediately place the cap on the open end of the core. Place the capped core inside the foil sample bag. Make sure that the sample bag is labeled.
    b. Place the sample bag on ice for shipment to the laboratory for analysis within 48 hours.

Quality Control:

The following procedures apply:

- Samples will be packaged, handled, and shipped in accordance with SOP BERS-03 *Sample Management Procedures.*
- Equipment will be operated and used in accordance with the manufacturer's instructions, unless otherwise specified in the site QAPP.
- Equipment examination activities should occur prior to field deployment, and they should be documented.
- An equipment rinsate blank is generally required per matrix, and for each sampling event, to evaluate the potential of cross contamination from sampling equipment. Equipment rinsate blanks will be collected by pouring analyte-free water over the decontaminated sampling equipment.
- Depending on the needs of the project, a field blank may be required per matrix and for each sampling event to evaluate whether contaminants have been introduced into the samples during the sampling process. Field blank samples will be obtained by pouring analyte-free water into a sampling container at the sampling point.

Interferences and Potential Problems:

There are two primary problem areas associated with soil sampling: cross-contamination and improper sample collection.

Cross-contamination can be eliminated or minimized through the use of dedicated sampling equipment. If this is not possible or practical, field personnel will decontaminate sampling equipment as described in the site Sampling and Analysis Plan (SAP). Improper techniques may include using contaminated equipment, disturbing the matrix, compacting the sample, and inadequate homogenization of the samples, any of which can produce non-representative samples.

To safeguard against collecting non-representative soil samples, the following guidelines and techniques should be adhered to during sampling:

- Samples for VOC analysis should be collected before other samples are collected, and should be transferred immediately from the sampling device into the sample container to reduce volatilization. Step-by-step instructions for field extraction and preservation with methanol are described above.
- Anytime a vertical or near vertical surface, such as that which is achieved when shovels or backhoes are used for subsurface sampling, the surface should be dressed to remove the outer smear zone. This is necessary to minimize the effects of cross contamination due to smearing of materials from other levels.

- It is extremely important that soil samples intended for non-VOC analyses be mixed as thoroughly as possible to ensure that each sample is representative of the material sampled. The most common method of mixing is referred to as quartering. Where required by the QAPP, quartering will be performed as follows:

  a. Divide the material in the sample pan into quarters and mix each quarter individually.

  b. Mix two quarters to form halves.

  c. Mix the two halves to form a homogenous matrix.

  d. Repeat this procedure until the sample is adequately mixed.

  e. If round bowls are used for sample mixing, stir the material in a circular fashion, reversing direction, and occasionally turning the material over.

- One trip blank per cooler is generally required when submitting samples for VOC analysis. Trip blanks are prepared and sealed by the laboratory. They are transported to the field and returned, unopened, to the laboratory in the same cooler as the samples collected for VOC analysis.

- Methanol blanks may also be required when soil samples designated for VOC analysis are preserved with methanol.

- Blanks will be collected at the frequency and locations specified in the site QAPP. Blanks will be analyzed for the same target analytes as the associated field samples. Each blank will be assigned a unique sample number, and submitted blind to the laboratory.

BRISTOL ENVIRONMENTAL REMEDIATION SERVICES, LLC

GROUNDWATER SAMPLING

STANDARD OPERATING PROCEDURE BERS-02

Record of Changes

Revision No.	Date	Prepared by	Approved by
1	10/14/09	B. Allen	L. Maserjian
2	02/16/2010	J. Clark	B. Allen/ J. Clark

GROUNDWATER SAMPLING

STANDARD OPERATING PROCEDURE

Summary: Groundwater samples are usually obtained from either temporarily or permanently installed groundwater monitoring wells. In order to obtain a representative groundwater sample, the stagnant water in the well casing and the water immediately adjacent to the well are purged before sample collection. Depending on the needs of the project, purging can be performed either by traditional methods (purging several full well volumes), or by the low stress/low flow method. Once purging is complete, samples are collected using a sampling device that does not affect the integrity or representativeness of the sample.

Health and Safety: Sampling activity should only be conducted in accordance with an approved Site Health and Safety Plan. Electric generators must be grounded to prevent possible electrical shock.

Interferences and Potential Problems: The primary problems associated with groundwater sampling are the collection of non-representative samples, and sample contamination from equipment or the environment. These can be eliminated or minimized through implementation of strict well purging and sample collection and handling procedures, and by the use of qualified personnel.

To safeguard against collecting non-representative stagnant water, the following guidelines and techniques should be adhered to during sampling:

- Monitoring wells should be pumped or bailed prior to sampling. This should be done in a manner that minimizes alterations to the water chemistry.
- The well should be sampled as soon as possible after purging and stabilization of indicator field parameters.
- Analytical parameters typically dictate whether the sample should be collected through the purging device or through separate sampling equipment.
- Portions of water that have been tested with a field meter probe will not be collected for chemical analysis.
- Excessive pre-pumping of the well should be avoided.

Personnel Qualifications: Sampling personnel will be trained and certified as hazardous site workers per Title 29 Code of Federal Regulations, Part 1910.120e [29 CFR 1910.120(e)]. If applicable, additional qualification requirements will be specified by the Bristol Quality Control Manager prior to any on-site sampling activity.

Equipment and Materials: Prior to deployment in the field, the requisite sampling equipment and materials will be identified, secured, and inspected for signs of damage or potential contamination.

- Ideally, purging and sample withdrawal equipment should be completely inert, economical, easily cleaned, reusable, able to operate at remote sites in the absence of power resources, and capable of delivering variable rates for sample collection. Adjustable rate, submersible and peristaltic pumps are preferred. Peristaltic pumps are only effective if groundwater depths are approximately 25 feet below the ground surface or shallower. When sampling for volatile contaminants, a pump that minimizes or eliminates volatilization should be selected. The use of inertial pumps is discouraged because of their tendency to cause greater disturbance during purging and sampling.
- Sampling and purging equipment (e.g., bailers, bladders, pumps, and tubing) should be made from stainless steel, Teflon®, polypropylene, or glass.
- The use of 1/4 or 3/8-inch inner diameter tubing is preferred. Clean, pharmaceutical grade tubing should be used in drawing and sampling groundwater. Water level measuring devices should be capable of measuring to 0.01-foot accuracy.
- In addition to groundwater sampling equipment, sampling support equipment may include water level indicators, depth sounder, water quality meter (such as YSI), keys for well caps, organic vapor screening device (such as photoionization detector [PID]), plastic sheeting, tubing, pre-cleaned sample containers, sample preservatives, decontamination supplies and equipment, safety equipment, logbooks, field forms, camera, chain- of-custody forms and seals, coolers and ice packs, and labeling, packaging, and shipping supplies. Sample containers will be of the type and size specified in the governing Quality Assurance Project Plans (QAPPs).

Field Preparation: Perform the following steps before any purging or sampling activities:

1. Pre-label and ready all the required sample containers.
2. To the extent known, plan to sample wells in order of increasing contamination.
3. Check the well for security damage or evidence of tampering, and record observations.
4. Record location, time of day, and date in field notebook.
5. Remove locking well cap and well casing cap.
6. Screen well headspace with a PID or equivalent, to determine the presence or absence of volatile organic compounds. Record instrument readings in the field logbook or field form.
7. Lower a water-level measuring device into the well until water surface is encountered and the instrument alarms.

8. Measure distance from water surface to reference measuring point on well casing or protective barrier post, and record in the field logbook or on the field form. If there is no reference point, measure from the top of the steel casing, top of PVC riser pipe, from ground surface, or some other position on the wellhead, and note in the field logbook or field form.
9. Measure the total depth of the well and record in the field logbook or field form. Measure well depth either the day before sampling or after all sampling in that well has been completed. Take care to minimize disturbance of the water column.
10. Calculate the volume of water in the well using the following calculations and data reduction:

    Well volume: $V = 0.041d^2h$

    V = volume of one well casing of water in *gallons*

    d = inner diameter of the well casing in *inches*

    h = total height of the water column in *feet*

    Based on this equation, one well volume can be calculated simply by multiplying the height of the water column in feet by the appropriate conversion factor, which is based on the casing diameter as follows:

Diameter	2-inch	3-inch	4-inch	5-inch	6-inch
Volume (gal/ft.):	0.1632	0.3672	0.6528	1.02	1.4688

11. Select the appropriate purging and sampling equipment based on requirements in the site-specific QAPP.

Purging: To ensure that a representative groundwater sample is collected, a well is typically purged prior to sample collection. Well purging is accomplished either by using low-flow procedures or removing a prescribed volume of water from the well (usually a minimum of three to five well volumes). During both purging methods, water quality parameters should be monitored for stabilization.

Purging may be performed by using bailers or pumping mechanisms. In general, a pump is preferred over a bailer for purging and sampling because it will not stress the well like dropping a bailer into the well. If using a pump, select a low removal rate in order to not stress the well. Tubing should remain filled with water, so as to minimize possible changes in water chemistry upon contact with the atmosphere.

If possible, avoid purging wells to dryness by slowing the purge rate. If the well has a poor recharge rate and is purged dry, sample the well once the water level has recovered sufficiently to collect the appropriate volumes for all required analyses. Record in the field logbook or on the field form that samples were collected, even though water quality parameters did not stabilize or the required volume of water was not removed.

If water quality parameters have not stabilized after 1 hour of purging, options include continued purging until stabilization is achieved, or collecting samples although stabilization has not been achieved. Record all actions taken in the field logbook or field form.

Once the purging requirements have been met, the groundwater sample can be collected. Collect and dispose of purge water and solid investigation-derived waste (IDW) as prescribed in the site-specific QAPP.

These procedures are used for sampling events that require purging prior to sampling. For some projects, sampling may be performed without purging the well first. Refer to the non-purge sampling procedures.

Low-flow purging

For low-flow purging and sampling, the Region 1 U.S. EPA Low Flow Guidance Document [*Low Stress (low flow) Purging and Sampling Procedure for the Collection of Ground Water Samples from Monitoring Wells*, July 30, 1996, Revision 2] will be followed, and is summarized below.

1. After the water level and total well depth have been measured, lower the submersible pump or tubing (Teflon, polyethylene, or other approved material) for peristaltic pump slowly (to minimize disturbance) into the well to the middle of the submerged, screened interval of the well, or appropriate depth based on site-specific conditions. Placing the pump or tubing in this manner will reduce the risk of drawing down the water table to below the pump intake, thus preventing the introduction of air into the sample tubing.
2. Before starting the pump, measure the water level and record it on the Groundwater Low Flow Purging Form.
3. Start the pump at its lowest speed setting and slowly increase the speed until discharge occurs. Check water level. Adjust pump speed until there is little or no water level drawdown (less than 0.3 feet). If the minimal drawdown that can be achieved exceeds 0.3 feet, but remains stable, continue purging until indicator field parameters stabilize (described in Number 5, below).
4. Monitor and record water level and pumping rate every 3 to 5 minutes during purging. If a flow rate meter is present, record the pumping rate every 3 to 5 minutes as well. Record any pumping rate adjustments (both time and flow rate). Pumping rates should, as needed, be reduced to the minimum capabilities of the pump to ensure stabilization of indicator parameters. Adjustments are best made in the first 15 minutes of pumping. The final purge volume must be greater than the stabilized drawdown, plus the extraction tubing volume.
5. Monitor indicator field parameters every 3 to 5 minutes during purging, with a calibrated combination type meter (i.e., YSI, etc.). The following field parameters will be monitored: turbidity, temperature, specific conductance, pH, oxidation-

reduction potential (ORP), and dissolved oxygen (DO). All measurements, except turbidity, must be obtained using a flow-through cell. Transparent flow-through cells are preferred. This allows the field personnel to watch particulate buildup within the cell. If the cell needs to be cleaned during purging, continue pumping and disconnect the cell for cleaning. Then reconnect and continue monitoring.

6. Groundwater samples can be collected after the field parameters stabilize within the following limits:
    - Turbidity: +/- 10% for values greater than 1 nephelometric turbidity units (NTUs)
    - DO: +/- 10 %. Note: DO may not stabilize unless using a flow-thru cell. If not using a flow-thru cell, disregard this parameter for the purpose of establishing stability
    - Specific conductance: +/- 3%
    - Temperature: +/- 3%
    - pH: +/- 0.1 pH units
    - ORP: +/- 10 millivolts

Purging is considered complete and sampling may begin when all of the above indicator field parameters have stabilized. Do not change the flow rate of the pump prior to sampling. Remove the flow through cell prior to collecting the groundwater samples, and collect directly from the pump discharge.

General well purging – removing specified volume of water

During general well purging, a specified minimum volume of water (usually three to five well casing volumes) should be purged prior to sampling. Water temperature, pH, turbidity, DO, ORP, and specific conductance should be periodically measured during purging using a calibrated combination type meter (i.e., YSI, etc.). These parameters should be measured and recorded approximately every three to five minutes, or after each well volume is removed. The sample can be collected after the required volume of water has been purged and the parameters have stabilized within the limits described above in Number 6 of the low-flow purging section.

Purging Methods

Pumping mechanisms – peristaltic pumps, submersible pumps, non-contact gas bladder pumps, and suction pumps, etc.

1. Assemble the pumping unit. For more information on pump assembly and operation, refer to the specific user’s manual for the type of pump used.
2. Lower the tubing (peristaltic pump) or pump/tubing assembly (submersible pumps)

into the well to the midpoint of the zone to be sampled. If possible, keep the tubing or pump intake at least 2 feet above the bottom of the well, to minimize mobilization of particulates present in the bottom of the well.

3. Attach a water quality meter to the outlet tubing to monitor water quality parameters.
4. If required, attach a flow meter to the outlet tubing to measure the volume and rate of water purged.
5. Attach the power supply (typically a battery, generator, etc.). Use a ground fault circuit interrupter (GFCI), or ground the generator to avoid electric shock.
6. Start the pump at its lowest speed setting and slowly increase the speed until discharge occurs. Adjust the pump speed until there is little or no water level drawdown (less than 0.3 feet). If the minimal drawdown that can be achieved exceeds 0.3 feet, but remains stable, continue purging until indicator field parameters stabilize.
7. During purging, monitor water quality parameters and water level drawdown.
8. After water parameters have stabilized, disconnect the water quality meter and flow meter, then collect sample.

Bailer purging

1. Attach the line to the bailer and slowly lower until completely submerged, be careful not to drop the bailer to the water, which would cause turbulence and the possible loss of volatile contaminants.
2. Pull bailer out, while ensuring that the line either falls onto a clean area of the plastic sheeting or that it never touches the ground.
3. Empty the bailer into a pail of known volume (for example, a five-gallon bucket, preferably graduated). Use the volume of the pail to estimate the amount of water removed.
4. During purging, monitor water quality parameters.
5. Remove the required amount of water.
6. If water quality parameters have stabilized, the sample can be collected. If parameters have not stabilized, continue purging until stabilization has been achieved, or collect sample if directed to do so by the project manager.

Sampling: Sampling may be accomplished using pumping mechanisms or bailers. Care must be exercised during the use of bailers because of their tendency to disturb sediment, leading to increased turbidity.

General procedures

1. If using a pumping mechanism, do not change the flow rate maintained during purging.
2. Remove the water quality and flow rate meters, if used.
3. If using a pumping mechanism, collect non-filtered samples directly from the outlet tubing into the sample bottle. For filtered samples, connect the pump outlet tubing directly to the filter unit. The pump pressure should remain decreased so that the pressure buildup on the filter does not blow out the pump bladder, or displace the filter.
4. For certain projects, sampling may be performed without purging the well first, typically using a bailer. It is preferable to record the water quality parameters (turbidity, DO, specific conductance, temperature, pH, and ORP) before the sample is collected. Non-purge sampling will be performed in accordance with the steps below.
5. If using a bailer, lower the bailer slowly and gently into the well, taking care not shake the casing sides or to splash the bailer into the water. Stop lowering at a point adjacent to the screen. Allow the bailer to fill and then slowly and gently retrieve the bailer from the well, avoiding contact with the casing, so as not to knock flakes of rust or other foreign materials into the bailer. If the bailer comes with a Bottom Emptying Devise (BED), place the BED into the bottom of the bailer. Fill the sample containers from the BED. A specific BED for volatile samples is recommended because it reduces the outflow to a very low laminar rate. This device is typically purchased separately from the bailers.
6. Collect samples in appropriate containers in order of volatility, with the most volatile samples collected first. Containers should be either pre-labeled or labeled immediately after sample collection. For collecting volatile samples using the zero-headspace procedure, follow procedures specified at the end of this section.
7. Fill containers slowly (avoid turbulence).
8. Filter and preserve samples as specified in the site-specific QAPP.
9. If duplicate samples, split samples, or other quality assurance/quality control (QA/QC) samples are required, collect them at the same time as the primary sample.
10. Cap sample containers tightly and place into a sample cooler. Samples must be chilled and maintained at a temperature of 4 degrees Celsius. Do not allow samples to freeze.
11. Replace the well cap.
12. Log all samples in the field notebook or on field forms.
13. Package samples and complete requisite paperwork.
14. Dispose of all liquid and solid IDW in accordance with project planning documents.

Volatile sampling using zero-headspace procedure

1. Open the sample vial, set cap in clean place, and fill the vial just to overflowing. Do not rinse the vial or allow excessive overflowing. There should be a meniscus on the top of the filled vial.
2. Check that the cap has not been contaminated and carefully cap the vial. Slide the cap directly over the top and screw down firmly. Do not over tighten because the cap may break.
3. Invert the vial and tap gently. It is imperative that no air is entrapped in the sample vial. If an air bubble appears that is smaller than approximately 1.0 millimeter, the sample is still viable. If the bubble(s) are larger, discard the sample and begin again.
4. Place the vial in a protective foam sleeve, and then place into the cooler.

Quality Control: The following procedures apply:

- Samples will be packaged, handled, and shipped as prescribed in BERS-03 *Sample Management Standard Operating Procedure.*
- Equipment will be operated and used in accordance with the manufacturer's instructions, unless otherwise specified in the site-specific QAPP.
- Equipment examination activities should occur prior to field deployment, and they should be documented. It is especially important to check that the correct number and type of sample bottles are being sent/taken to the field prior to starting the field activities.
- Depending on the needs of the project, if using non-disposable equipment, collect an equipment rinsate blank to evaluate the potential for cross contamination from the purging or sampling equipment. Collect equipment rinsate blanks by pouring analyte-free water over the decontaminated sampling equipment.
- Depending on the needs of the project, a field blank may be required per matrix and for each sampling event to evaluate whether contaminants have been introduced into the samples during the sampling process. Field blank samples will be obtained by pouring laboratory-grade, certified organic-free water (for organics) or deionized water (for metals) into a sampling container at the sampling point.
- One trip blank per cooler is required when submitting samples for volatile organic analysis. Trip blanks for water and soil samples are prepared and sealed by the laboratory. They are transported to the field and returned, unopened, to the laboratory in the same cooler as the samples collected for volatile organic compound (VOC) analysis.
- Blanks will be collected at the frequency and locations specified in the site-specific QAPP. Blanks are analyzed for the same target analytes as the associated field samples. Each blank receives a unique sample number and is submitted blind to the laboratory.

BRISTOL ENVIRONMENTAL REMEDIATION SERVICES, LLC

SAMPLE MANAGEMENT

STANDARD OPERATING PROCEDURE BERS-03

Record of Changes

Revision No.	Date	Prepared by	Approved by
0	01/15/08	B. Allen	S. Ruth
1	2/23/2010	M. Faust	B. Allen

SAMPLE MANAGEMENT

STANDARD OPERATING PROCEDURE

Method Summary: To ensure the quality and integrity of analytical data, samples will be managed in accordance with rigorous sample handling, shipping, and custody protocols at all times. Pertinent protocols will be determined prior to initiation of field sampling activity and will apply to sampling, transport, and analysis activities.

Health and Safety: Sampling activity should only be conducted in accordance with an approved Site Health and Safety Plan.

Interferences and Potential Problems: Improper sample management may result in a number of problems, including, but not limited to:

- Inability to collect samples during the field event due to lack of appropriate sample containers and/or preservatives.
- Contamination and/or loss of samples or sample constituents through improper storage and handling, tampering, or breakage.
- Inability to validate resulting data.
- Development of erroneous conclusions regarding site contamination based on inaccurate data and/or problems correlating data and sample locations at the site.
- Mishandling of residual sample material following analysis.

Personnel Qualifications: Sample management personnel will be trained and certified as hazardous site workers per Title 29 Code of Federal Regulations, Part 1910.120(e) [29 CFR 19 10.120(e)] and trained in applicable DOT sample shipping regulations of 49 CFR Part 172, Subpart H. If applicable, additional qualification requirements will be specified in the site-specific Quality Assurance Project Plan (QAPP) and met by designated personnel.

Equipment and Materials: Equipment selection will be based on the objectives of the sampling program and the analytes of concern. Prior to deployment in the field, the requisite sampling equipment and materials will be identified, secured, and inspected for signs of damage or potential contamination.

Sample Identification and Labeling: Sample identification and labeling protocols will follow the procedures specified in the governing program QAPP.

Each collected sample will be assigned a unique sample identification number. The designated sample number will be included on the sample label and referenced on associated sample tags, field logbooks, chain-of-custody forms, analysis request forms, and all data reports related to the samples.

To prevent misidentification of samples, the field team will affix legible labels to each sample container. The labels will be sufficiently durable, and an indelible pen will be used to record data on the labels, so that sample identification information remains legible even when wet. Markers should never be used for sample labeling, as they can be a source of volatile compounds and potential contamination of the sample. Additional labeling requirements will be presented in the site-specific QAPP.

Information that is generally included on the container label and/or sample tag includes:

- Sample identification number;
- Sample collector's name or initials;
- Date and time of sample collection;
- Chemical/physical preservatives used;
- Type of sample (composite, grab, filtered); and
- Analytical parameters requested

Sample Containers and Coolers: Sample containers will be selected, prepared, cleaned, and controlled in accordance with EPA Office of Solid Waste and Emergency Response (OSWER) Directive #9240.0-05A *Specifications and Guidance for Contaminant-Free Sample Containers* (EPA *540/R-93/05* 1, December 1992), and as specified in the governing program QAPP. In advance of each sampling event, the subcontract laboratory should prepare a complete set of precleaned sample containers.

Prior to field activity, field personnel will implement the following steps:

1. Check all sample containers against the specifications of the site-specific QAPP. Ensure that the sample containers and caps are in good condition and free of obvious contamination, constructed of the appropriate material (i.e., plastic or glass), contain appropriate preservative solutions, and will hold sufficient volume for planned analyses, if specified.
2. Verify that sample identification labels are properly affixed to each container.
3. Verify that an adequate quantity of each type and volume of sample container is available for the anticipated environmental and quality control samples. Verify that extra containers are readily available to field staff as contingency for damaged or potentially contaminated containers, and for collecting samples of opportunity.
4. Ensure that containers and coolers are stored in clean areas to prevent exposure to fuels, solvents, and other potential contaminants.

Sample Collection: Field personnel will collect samples as prescribed in the governing QAPP. Samples should be transferred in the field from the sampling equipment directly into a container that has been specifically prepared for that sample (based on the analytes of concern, preservation requirements, and the type of analysis to be performed).

To minimize the potential for cross-contamination and loss of sample constituents, sample fractions should be collected and containerized in the order of volatilization sensitivity of the analytes of interest. The following sample collection order is recommended:

- Volatile organic compounds (VOCs)
- Purgeable organic carbon
- Purgeable organic halogens
- Total organic halogens
- Total organic carbon
- Extractable organic compounds
- Metals
- Phenols
- Cyanide
- Sulfate and chloride
- Turbidity
- Nitrate and ammonia
- Radionuclides
- Ignitability
- Corrosivity
- Reactivity

As the samples are being collected, or immediately thereafter, the field sampling team will document the date and time of sample collection, pertinent field information (e.g., sampling depth), and the identity of sampling personnel, on each container label. Additional detail on the sampling event may be documented in the site logbook as appropriate.

Sample Custody: BERS will ensure the integrity and security of all samples under their control, using a stringent chain-of-custody protocol. This will be supplemented as needed to meet all work assignment requirements.

During the sampling event, field personnel will prepare a chain-of-custody form documenting each sample collected as follows:

- Sample numbers, date and time of collection, sampling location, name of the person who collected the samples, preservatives used, and the analyses requested.
- Document each sample transfer on the custody sheet. Ensure that this form remains with the samples until they arrive at, and are processed by, the laboratory.
- When samples are relinquished to a commercial carrier for transport to the laboratory, sign the chain-of-custody form under "Relinquished By," enter the name of the carrier organization under "Received By," and document the date and time of transfer. Upon receipt of the samples, the laboratory sample custodian will similarly sign and date the chain-of-custody form.

Under no circumstance is there to be a break in custody.

Sample Packaging: Unless otherwise specified in the site-specific QAPP, field personnel will implement the following steps when packaging environmental samples for shipment:

- Tighten all sample lids. Verify that all containers are labeled and intact. Verify that all container labels are secure, legible, and complete.
- Bag samples individually in appropriate-sized plastic bags (e.g., Ziploc®) and seal. Up to 3 VOC vials may be packed together in container bags.
- Secure and tape the drain plug on the cooler with fiber or duct tape.
- Spread inert packing material (rubber foam, air pillows, or "bubble" wrap) in the bottom of the bag inside the cooler and place sample bags on top of the packing material.
- Include a temperature blank (a small container filled with water) to be used by the laboratory to determine the internal temperature of the cooler upon receipt at the laboratory.
- Place ice packs (e.g., blue ice) into cooler. If ice packs are unavailable, place ice into doubled heavy-duty polyethylene bags and seal with tape. Put double-bagged ice on top of, and in between, samples. Fill in remaining space with packing material.
- Place the chain-of-custody record into a plastic sealable bag (e.g., Ziploc), seal the bag, and tape it to the inside of the cooler lid.
- Close the cooler and tape the top of the cooler shut. Affix custody seals to the top and sides of the cooler, such that the cooler cannot be opened without breaking at least one seal.
- Mark the cooler with "This End Up" and arrows to indicate the proper upward position.
- Tape a label containing the name and address of the destination to the outside of the cooler.

Sample Scheduling, Delivery, and Holding Times: In work assignments where analytical services are procured from a subcontractor laboratory, the laboratory will be required to designate a point of contact (POC) for both normal business hours, and for emergency situations during off-hours. In addition, the laboratory will be required to designate a sample custodian, who will be notified by the BERS field sampling supervisor each time samples are shipped.

Unless otherwise approved, samples will be delivered to, and received by, the laboratory within 24 hours of collection.

Sample holding time tracking begins with the collection of samples, and continues until the analysis is complete. The site-specific QAPP will specify holding time requirements for each analyte of interest to the project.

Quality Control: No additional QC procedures apply.

Data Management and Records Management: Sampling records will be generated and maintained as prescribed in this procedure and the governing QA plans. Sampling data will be documented on field data sheets or in the logbooks.

(Intentionally blank)

BRISTOL ENVIRONMENTAL REMEDIATION SERVICES, LLC

FIELD MEASUREMENT AND TEST EQUIPMENT

STANDARD OPERATING PROCEDURE BERS-04

Record of Changes

Revision No.	Date	Prepared by	Approved by
0	01/15/09	B. Allen	L. Maserjian
1	2/5/10	M. Hannah	B. Allen

FIELD MEASUREMENT AND TEST EQUIPMENT

STANDARD OPERATING PROCEDURE

Summary: Various types of instruments are used to measure the physical and chemical characteristics of a sample in the field. In general, field measurement and test equipment (M&TE) are maintained and operated according to the manufacturer's instructions specific to each instrument. Field M&TE are inspected for function and damage on a regular basis and prior to each use. All findings are recorded in the appropriate logbook. Field M&TE are calibrated in accordance with the manufacturer's specifications. Calibrations are checked on a regular basis and prior to and after use in the field. When daily calibrations are required, calibrations and/or checks are performed at the beginning and end of the day, and the results are recorded in the field logbook. When daily calibrations are not required during field use, checks against appropriate standards are performed.

Health and Safety: Field activities will only be conducted in accordance with an approved Site Health and Safety Plan.

Interferences and Potential Problems: When multiple measurements are taken from the same sample material, the order in which the measurements are made becomes very important. Conductivity may be affected by temperature of the measured solution; therefore, temperature of the sample should be read first, so that appropriate adjustments can be made in accordance with the manufacturer's instructions.

Personnel Qualifications: Field personnel will be trained and certified as hazardous site workers per Title 29 Code of Federal Regulations, Part 1910.120(e) [29 CFR 1910.120(e)]. If applicable, additional qualification requirements will be specified in the site Quality Assurance Project Plan (QAPP).

Equipment and Materials: Prior to deployment in the field, the appropriate equipment and materials will be identified, secured, and inspected for signs of damage or potential contamination. Manufacturer's instructions and specifications for each instrument used will be maintained in the project files. Materials used for calibration of instrumentation, such as standard solutions, must be traceable to relevant, recognized performance standards.

Planning Considerations: Procedures used for the maintenance and use of field equipment, including those performed by subcontractors and suppliers, will be outlined preceding field activities and in accordance with the procedures outlined in this SOP. Equipment must be inspected prior to use in the field for damage and function. Calibration and maintenance of field equipment will be performed according the manufacturer's instructions for that particular instrument. The required frequency of calibration varies between instruments. While some instrumentation must be calibrated only annually or semi-annually, other instrumentation must be calibrated daily during use in the field. Instrumentation that does not require field calibration usually requires a check against a standard. Attention should be paid to specific requirements for each instrument used in the field, and it is important to remember that the requirements for each instrument may differ.

Instructions for the Maintenance and Use of Field Equipment: Refer to the following sections for instructions on the proper calibration, maintenance, and use of field instrumentation used to measure physical/chemical properties of sample material:

Multi-parameter Water Quality Meter: Many water quality meters are capable of measuring several parameters, such as temperature, conductivity, pH, dissolved oxygen (DO), and oxygen reduction potential (ORP). The following sections provide general instructions for calibrating each parameter. The field personnel will adhere to the calibration instructions for the each instrument used.

Temperature

Temperature, defined as a measure of hotness or coldness on a defined scale, is measured using a thermometer. Three types of thermometers are commercially available: digital (thermocouple) thermistor; glass bulb, mercury-filled thermometer; and bi-metal strip dial indicator thermometer.

Calibration

Thermometers will be calibrated in accordance with the manufacturer's instructions or calibrated semi-annually against a National Institute of Standards and Technology (NIST)-certified thermometer. Thermistors should be checked against a mercury bulb thermometer in water prior to use, and should agree within ± 0.5° degree Celsius (°C).

Maintenance

All thermometers should be inspected regularly and prior to use for leaks, cracks, and function.

Use

Measurements should be made in situ, when possible. To measure the temperature of sample material, perform the following steps:

1. Clean the probe with deionized water, and immerse into the sample.
2. Swirl the thermometer in the sample.
3. Allow the thermometer to equilibrate with the sample.
4. Suspend the thermometer away from the sides and bottom to observe the reading.
5. In a logbook, record the reading to the nearest 0.5° C.
6. Report results to the nearest 0.5° C.

Conductivity: Conductivity, the quality or power of conducting or transmitting, is typically measured using the Wheatstone bridge meter. Conductivity is measured in millisiemens per centimeter (mS/cm) at 25° C. While the sample temperature may be lower, nearly all conductivity meters will convert specific conductance (which is not corrected for temperature) to conductivity.

Calibration

Conductivity will be calibrated in accordance with the manufacturer's instructions. During use in the field, checks against a one-point standard will be performed to ensure the accuracy of the meter, and results will be recorded in a field logbook. The following steps will be implemented both before and after use of the meter to measure the conductivity of sample material in the field:

1. Check and record the temperature of the standard solutions.
2. Rinse the probe with analyte-free water before immersing it in the standards solution.
3. Turn the probe on, immerse it in the standard solution, and record the results.
4. If the meter is not accurate to within ± 10% of the standards, correct the problem before proceeding.

Maintenance

All conductivity meters should be inspected regularly and prior to use for damage and function. Conductivity sensors may become fouled with minerals or other materials, and may require cleaning in the field. Cleaning is accomplished by passing a nylon brush along the sensor surface in a light scrubbing motion, until a metallic shine appears on the sensor. Follow up the cleaning with a fresh or deionized water rinse. DO NOT use a metal brush to clean the sensor surface.

Use

1. Collect the sample and record its temperature.
2. Correct the instrument's temperature adjustment to the temperature of the sample (if necessary).
3. Immerse the probe in the sample. Keep the probe away from the sides and bottom of the container, and ensure that the sensor is in full contact with the sample.
4. Record the results in a logbook.
5. Rinse the probe.
6. Report results to the nearest ten units for readings below 1,000 mS/cm at 25° C and the nearest one hundred units for readings above 1000 mS/cm at 25° C.

Hydrogen Ion Concentration (pH): The pH of a solution is defined as the negative logarithm of the effective hydrogen ion concentration in gram equivalents per liter. The pH is used to measure acidity and alkalinity on a scale ranging from 0 to 14, with 7 representing neutrality. Orion and YSI Water Quality Monitoring System meters are examples of commercially available meters used to measure the pH of liquid-state material.

Calibration

Any pH meter will be calibrated in accordance with the manufacturer's instructions. During use in the field, a two-point or three-point standard will be used to ensure the accuracy of the meter. Results will be recorded in a field logbook. The expected pH of the sample to be collected, estimated from either historical data or by using four-color pH paper, should fall between the two buffering points. Both prior to and after use in the field, the following procedures should be followed as a minimum:

1. Remove the meter from storage and allow it to equilibrate to ambient temperature.
2. Select either pH 4 and pH 7, or pH 7 and pH 10, as the appropriate standard solutions as described above.
3. Use a thermometer to determine the temperature of the buffering solutions, and record the temperature.
4. Rinse the probe with analyte-free water, and immerse it into the pH 7 buffer and set the meter to 7. If the solution temperature is not at 25°C, a table with corrected pH values can be found on the calibration solution bottle or in the operations manual.
5. Rinse the probe with analyte-free water and immerse it into the second buffer, and record the reading.
6. Rinse and store the probe in a container filled with analyte-free water.

Maintenance

All pH meters should be inspected for damage and function regularly and prior to use. During use, periodically check the calibration of the meter by rinsing it with analyte-free water and immersing it into the pH 7 buffer solution.

Use

Follow these steps when measuring the pH of a sample:

1. If measuring temperature, record temperature prior to measuring pH.
2. Immerse the probe in the sample, keeping it away from the sides and bottom of the container. Allow the probe to equilibrate with the sample material.
3. With the probe suspended away from the container surface, record the pH.
4. Rinse the probe with analyte-free water and store in a container filled with analyte-free

water until the next sample is ready.

5. Record results to the nearest 0.1 Standard Unit (SU).

Storage

After use, rinse the unit with fresh water or Alconox®, followed by fresh water, at contaminated sites. Leave a small amount (20mL) of pH 4 solution in the storage cup before sealing the unit in order to keep the pH sensor moist during storage.

Dissolved Oxygen (DO): The membrane/electrode (ME) is the most commonly used instrument for measuring the dissolved oxygen present in a sample.

Calibration

Calibrate the DO probe according to the manufacturer's instructions, either in air-saturated water, or in a water-saturated air environment.

Maintenance

The DO probe should be inspected regularly and prior to use for damage and function. The membrane of the DO meter should be inspected for air bubbles, holes, and dryness. If the membrane is dry, replace and soak it in analyte-free water prior to calibration of the meter. If the metallic sensor is discolored, or does not appear shiny, use the fine-grit sandpaper (supplied with the DO sensor replacement kit) and buff the metal surface in a circular pattern until the surface shines. Rinse the sensor with deionized water before installing a new membrane.

Use

When measuring DO in situ with a field probe, follow these steps:

1. Allow the DO reading to stabilize.
2. Read the dial to the nearest 0.1 mg/L, and record the measurement.

Oxygen Reduction Potential (ORP): ORP, also known as redox potential, is the tendency of a chemical species to acquire electrons and thereby be reduced. Each species has its own intrinsic reduction potential; the more positive the potential, the greater the species' affinity for electrons and tendency to be reduced.

Calibration

Calibrate the ORP probe according to the manufacturer's instructions in a standardized calibration solution. The ORP is affected by temperature. Refer to the calibration solution or operations manual to correct for temperature during calibration.

Maintenance

The ORP probe should be inspected regularly and prior to use for damage and function.

Use

When measuring ORP in situ with a field probe, follow these steps:

1. Immerse the probe in the sample, keeping it away from the sides and bottom of the container. Allow the probe to equilibrate with the sample material.
2. With the probe suspended away from the container surface, record the ORP to the nearest 1.0 millivolt.
3. Rinse the probe with analyte-free water and store in a container filled with analyte-free water until the next sample is ready. Do not store the unit in deionized water.

Turbidity Meter: A nephelometer/turbidmeter is used to measure the turbidity of a liquid sample by determining how much light can pass through it. The Hach® Turbidimeter is the most commonly used commercially available meter for measuring the turbidity of a sample. Turbidity is measured in nephelometric turbidity units (NTUs).

Calibration

Calibration of turbidity meters will be performed in accordance with manufacturer's instructions. Any turbidity meter must be calibrated at both the beginning and end of the day during use in the field, and results will be recorded in a field logbook. The following procedures will be used to calibrate a turbidity meter in the field:

1. Turn the meter "ON" and allow 2 minutes for the lamp to stabilize.
2. Rinse the sample cell with organic-free or deionized water.
3. To "zero" the calibration, fill the cell to the fill line with organic-free or deionized water and then cap the cell.
4. Use lens paper to wipe off excess water and streaks from the outside of the cell.
5. Open the cover and insert the cell (arrow to the front) into the unit and close the cover.
6. Press "Blank" and wait for the "light bulb" icon to go off. Record the reading.
7. Hach turbidity meters require calibration with known standards. Refer to the operations manual for information on calibrating the meter.
8. Using the Gelex Turbidity Standards, repeat steps 4, 5, and 6. Record all findings.

Maintenance

Turbidity meters should be inspected regularly and prior to use for damage and function. During use, periodic checks should be performed using the standards to ensure continued proper calibration of the instrument. If error codes appear on the unit display, refer to the owner's manual to resolve the error.

Use

Follow these steps to measure the turbidity of a sample:

1. Pour sample material into the cell to the fill line and replace the cap on the cell.
2. Wipe excess water and any streaks from the outside of the cell with lens paper.
3. Place the cell inside the measurement chamber with the arrow towards the front and close the cover.
4. Press "READ" and wait for the "light bulb" icon to turn off
5. Record the reading.
6. Empty the cell and rinse with organic or analyte-free water.

Quality Control: The following procedures apply:

- Equipment will be operated and used in accordance with the manufacturer's instructions, unless otherwise specified in the site-specific work plan or its equivalent.
- Equipment examination activities will occur prior to field deployment, and they should be documented.

Calculations and Data Reduction: Does not apply.

Data Management and Records Management: Equipment calibration and maintenance records will be generated and maintained as prescribed in the governing QAPPs.

(Intentionally blank)

BRISTOL ENVIRONMENTAL REMEDIATION SERVICES, LLC

EQUIPMENT DECONTAMINATION

STANDARD OPERATING PROCEDURE BERS-05

Record of Changes

Revision No.	Date	Prepared by	Approved by
1	10/14/09	B. Allen	L. Maserjian
2	2/23/10	L. Maserjian	B. Allen

EQUIPMENT DECONTAMINATION

STANDARD OPERATING PROCEDURE

Summary: Disposable tools and equipment should be used when possible. However, where non-disposable items are used, appropriate decontamination will be accomplished according to the type of equipment being used and the type of samples being collected. In general, field equipment will be decontaminated by means of the following steps:

1. Perform non-phosphate detergent and tap water wash, using a brush if necessary.
2. Perform tap-water rinse.

When sampling for trace organic compounds, the following step will be added:

3. Perform deionized/distilled water rinse.

Health and Safety: Field activities should only be conducted in accordance with an approved Site Health and Safety Plan. Decontamination hazards and precautions include the following:

- Hazardous substances may be incompatible with decontamination materials. For example, the decontamination solution may react with contaminants to produce heat, explosion, or toxic products. Also, vapors from decontamination solutions may pose a direct health hazard to workers by inhalation, contact, fire, or explosion. The Site Health and Safety Plan will provide procedures and identify responsibilities to ensure that incompatible materials are identified and segregated from each other.
- The Site Health and Safety Plan will specify the use of personal protective equipment (PPE) that is appropriate for both the contaminants of concern and the decontamination chemicals used. The PPE selection will take into account that decontamination materials may degrade protective clothing or equipment, and that some solvents can permeate protective clothing.
- Solvent rinsing operations will be performed in well-ventilated areas.
- Investigation-derived waste (IDW) generated from decontamination activities will be managed as prescribed in SOP BERS-09: *IDW Management.*
- Material Safety Data Sheets (MSDS) will be kept with all decontamination solvents or solutions as required by the Hazard Communication Standard.
- Phosphate-containing detergents will not be used in jurisdictions where they are banned.

Interferences and Potential Problems: Potential problems related to equipment decontamination can be eliminated by the use of appropriate materials, reagents, and techniques.

- The use of distilled and/or deionized water commonly available from commercial vendors may be acceptable for decontamination of sampling equipment.

- The use of an untreated potable water supply is not an acceptable substitute for tap water. Tap water may be used from any municipal or industrial water treatment system.
- If acids or solvents are utilized in decontamination, they raise health and safety and waste disposal concerns.
- Washing complex and sophisticated sampling equipment with acids or solvents can damage the equipment.
- If not used immediately, cleaned equipment will be stored to prevent recontamination.
- PVC and plastic items will not be rinsed with solvents.

Personnel Qualifications: Field personnel will be trained and certified as hazardous site workers per Title 29 Code of Federal Regulations, Part 1910.120(e) [29 CFR 1910.120(e)]. If applicable, additional qualification requirements will be specified in the site Quality Assurance Project Plan (QAPP).

Equipment Requirements: Prior to deployment in the field, the requisite sampling equipment and materials will be identified, secured, and inspected for signs of damage or potential contamination. Decontamination equipment, materials, and supplies are generally selected based on availability. Other considerations include the ease of decontaminating or disposing of the equipment.

The following standard materials and equipment are recommended for decontamination activities:

- Non-phosphate detergent.
- Tap water.
- Distilled/deionized water
- Pesticide grade solvent
- Long- and short-handled brushes
- Bottle brushes
- Drop cloth/plastic sheeting
- Paper towels
- Plastic or galvanized tubs or buckets
- Pressurized sprayers (H_20)
- Solvent sprayer with Teflon nozzle
- Aluminum foil
- Plastic sheeting

- PPE
- Trash bags
- Trash containers
- 55-gallon drums
- Metal/plastic buckets/containers for storage and disposal of decontamination solutions.

The appropriate materials and equipment will be selected as needed on a site-specific basis.

Planning Considerations: Equipment decontamination activities, including those performed by subcontractors and suppliers, will be planned in advance of field activities and in consultation with program health and safety personnel.

Decontamination: Depending on the nature of the work, field equipment requiring decontamination may include heavy equipment, downhole equipment, sampling equipment, and groundwater pumping equipment.

Heavy Equipment Decontamination: Heavy equipment includes the drilling rig and backhoe. Field personnel will implement the following steps to decontaminate heavy equipment:

1. Set up a decontamination pad that is large enough to fully contain the equipment to be cleaned. Use one or more layers of heavy plastic sheeting to cover the ground surface.
2. Spray areas of the equipment that may have been exposed to contaminated soils using steam or high-pressure sprayer and detergent. Be sure to spray down all surfaces, including the rear area of the undercarriage.
3. Rinse the equipment with potable water.
4. Remove equipment from the decontamination pad and allow to air dry.

Downhole Equipment Decontamination: Downhole equipment includes hollow-stem augers and drill pipes. Well casings and screens will be decontaminated as decribed under "Sampling Equipment". Field personnel will implement the following steps to decontaminate downhole equipment:

1. Set up a centralized decontamination area, if possible. This area should be set up to contain contaminated rinse waters, and to minimize the spread of airborne spray.
2. Set up a "clean" area upwind of the decontamination area to receive cleaned equipment for air drying. At minimum, clean plastic sheeting must be used to cover the ground, tables, or other surfaces where decontaminated equipment is to be placed.
3. Wearing the required PPE, use a high-pressure sprayer or steam unit and detergent to clean the contaminated equipment. Aim downward to avoid spraying outside the decontamination area. Be sure to spray inside corners and gaps. If necessary, use a brush to dislodge dirt or debris.

4. Rinse the equipment using potable water.
5. Remove the equipment from the decontamination area and place in the clean area to air dry.
6. Cover the equipment to prevent contamination if the equipment is not used immediately.
7. Collect all contaminated waters, plastic sheeting, and disposable gloves, boots, and clothing in the designated containers. Receptacles containing contaminated items must be properly labeled for disposal. Containerize liquids and solids separately.

Sampling Equipment Decontamination: Sampling equipment includes split spoon samplers, spatulas, compositing bowls, and other utensils that come into direct contact with samples.

Field personnel will collect disposable sampling equipment in the designated containers and dispose of them as prescribed in the Site Health and Safety Plan and SOP BERS-09: *IDW Management.* Field personnel will implement the following steps to decontaminate non-disposable equipment:

1. Set up a decontamination line on plastic sheeting. The decontamination line should progress from dirty to clean, and end with an area for drying decontaminated equipment. At minimum, use clean, plastic sheeting to cover the ground, tables, or other surfaces on which decontaminated equipment will be placed. Set up a containment system for collecting wash/rinse waste.
2. Wash the item thoroughly in a bucket of soapy water. Use a stiff-bristle brush to dislodge dirt or debris. Before washing, disassemble items that might trap contaminants internally. Do not re-assemble until decontamination is complete.
3. Rinse the item in potable water. Rinse water should be replaced as needed, generally when cloudy.
4. Allow to air dry.
5. Collect all contaminated waters, plastic sheeting, and disposable gloves, boots, and clothing in the designated containers. Receptacles containing contaminated items must be properly labeled for disposal. Liquids and solids must be drummed separately.

Groundwater Sampling Pumping Equipment Decontamination: Field personnel will implement the following steps to decontaminate sampling pumps:

1. Set up a decontamination area and a separate clean storage area using plastic sheeting to cover the ground, tables, and other porous surfaces where decontaminated equipment will be placed. Set up three clean containers of the appropriate size and shape for immersing the pump assembly. Fill the first container with dilute, non-foaming soapy water, and the second with potable water. Use the third container for waste discharge.

2. If decontaminating an electric submersible pump (e.g., Grundfos® Redi-Flo), remove the bottom screw plug to flush the cooling water. Replace this water with deionized water after the decontamination process is complete.
3. Set up the pump assembly in the same configuration as used for sampling. Submerge pump intake and all downhole wetted parts (tubing, piping, and foot valve) in the soapy water container. Place the discharge outlet in the waste container above the level of wastewater. Pump soapy water through the pump assembly until it discharges to the waste container.
4. Move the pump assembly to the rinse water container while leaving discharge outlet in the waste container. Ensure that all downhole wetted parts are immersed in the potable water rinse. Pump potable water through the pump assembly until it runs clear.
5. Pump a sufficient amount of analyte-free water through the hose to flush out the tap water, then purge with the pump in reverse mode. Rinse the outside of the pump using analyte-free water. Decontaminate the discharge outlet by hand following the steps for decontamination of sampling equipment.
6. Remove the decontaminated pump assembly to the clean area and allow to air-dry.
7. Cover intake and outtake orifices with aluminum foil to prevent the entry of airborne contaminants or particles.
8. Place pump in clean plastic bag.

Quality Control: The following procedures apply:

- Equipment will be operated and used in accordance with the manufacturer's instructions, unless otherwise specified in the site-specific work plan or its equivalent.
- Equipment examination activities should occur prior to field deployment, and should be documented.
- After decontamination activities, the field personnel should make a record of the equipment type, date, time, and method of decontamination in the field logbook.
- If sampling equipment requires the use of plastic tubing, dispose of it as contaminated. Replace with clean tubing before conducting additional sampling.

Calculations and Data Reduction: Does not apply.

Data Management and Records Management: Generate and maintain decontamination records as prescribed in the governing QAPPs.

(Intentionally blank)

BRISTOL ENVIRONMENTAL REMEDIATION SERVICES, LLC

INVESTIGATION-DERIVED WASTE (IDW) MANAGEMENT

STANDARD OPERATING PROCEDURE BERS-09

Record of Changes

Revision No.	Date	Prepared by	Approved by
0	01/15/09	B. Allen	L. Maserjian
1	02/23/10	L. Maserjian	B. Allen

IDW MANAGEMENT

STANDARD OPERATING PROCEDURE

Summary: Investigation-derived waste (IDW) includes any material discarded after use during a field investigation at a hazardous waste site, and it includes personal protective equipment (PPE), disposable equipment, such as sampling equipment, drilling mud, soil cuttings, purge, or well-development water. IDW is classified as either hazardous or nonhazardous, depending on the properties of the waste. Whenever feasible, all IDW will be disposed of on site at active facilities.

If IDW is suspected to be hazardous, the material will be tested for proper classification. If the test determines the material to indeed be hazardous, it will be stored on site no longer than 90 days and then disposed of at a permitted treatment or disposal facility. Alternatively, it will be placed in the facility's waste treatment system, if appropriate. Whenever possible, nonhazardous IDW will be disposed of in the facility's Dumpster, waste treatment system, or on the ground in or near the source area, as appropriate. If on-site disposal is not feasible, nonhazardous IDW will be disposed of in a Dumpster or landfill.

Health and Safety: Field activities should only be conducted in accordance with an approved Site Health and Safety Plan.

Interferences and Potential Problems: Care should be taken to ensure segregation of hazardous 1DW from nonhazardous materials. The volume of spent solvent generated from field equipment decontamination procedures should be kept to a minimum, by applying only the minimum amount of solvent necessary and capturing it separately from the wash water. All hazardous waste will be containerized. Project planning will address procedures and responsibilities for the proper handling and disposal of project IDW.

Personnel Qualifications: Field personnel will be trained and certified as hazardous site workers per Title 29 Code of Federal Regulations, Part 1910.120(e) [29 CFR 19 10.120(e)]. If applicable, additional qualification requirements will be specified in the site Quality Assurance Project Plan (QAPP) and will be met.

Equipment and Materials: Prior to deployment in the field, the materials necessary for the management of IDW wastes in the field, such as 55-gallon drums and 5-gallon buckets, will be identified and secured.

Types of IDW: Materials which may become IDW include, but are not limited to, the following:

- PPE, including disposable coveralls, gloves, booties, respirator canisters, splash suits, etc.

- Disposable equipment, including plastic ground and equipment covers, aluminum foil, conduit pipe, composite liquid waste samplers, tubing, and broken or unused sample containers, sample container boxes, or tape, etc.
- Soil cuttings from drilling or hand augering activities.
- Drilling mud or water used for water rotary drilling.
- Groundwater obtained through well development or well purging.
- Cleaning fluids, such as spent solvents and wash water.

Management of Hazardous IDW: The site QAPP will specify disposal practices for hazardous or suspected hazardous IDW. If appropriate, these wastes will be disposed of on site by placement into the facility's waste treatment system, or they will be disposed of in the source area from which they originated, if doing so does not endanger human health or the environment. If on-site disposal is not possible, appropriate tests will be performed to characterize the waste for proper disposal. If the wastes are determined to be hazardous, they will be properly contained and labeled, and then stored on site for a maximum of ninety days before they are manifested and shipped to a permitted treatment or disposal facility.

The generation of hazardous IDW will be kept to a minimum. Nonhazardous materials will be segregated from hazardous materials to prevent cross-contamination. The most commonly produced type of IDW will probably be spent solvent from decontamination procedures and purged groundwater. Segregating the solvent from the wash water during equipment decontamination procedures will minimize the volume of spent solvent IDW generated during field activities.

Field personnel will implement the following procedures when managing hazardous IDW from specific practices:

- Disposable PPE – Containerize in 5-gallon bucket with tight-fitting lid. Identify and leave on site with permission of site operator. Otherwise, arrange for proper off-site disposal.
- Reusable PPE – Decontaminate following procedures described in the SOP BERS-05: *Equipment Decontamination*. Otherwise, follow procedures for disposable PPE.
- Spent Solvents – Containerize in original containers with contents clearly identified. Leave on site with permission of site operator.
- Soil Cuttings – Containerize in 55-gallon drum with a tight-fitting lid. Identify and leave onsite with permission of site operator.
- Groundwater – Containerize in 55-gallon drum with a tight-fitting lid. Identify and leave on site with permission of site operator. Otherwise, arrange for testing and proper off-site disposal.

- Decontamination Water – Containerize in 55-gallon drum with a tight-fitting lid. Identify and leave on site with permission of site operator. Otherwise, arrange for testing and proper off-site disposal.
- Disposable Equipment – Containerize in 55-gallon drum or 5-gallon bucket with a tight-fitting lid. Identify and leave on site with permission of site operator. Otherwise, arrange for testing and proper off-site disposal.

Management of Nonhazardous IDW: The site QAPP will specify disposal practices for nonhazardous IDW. If the waste site is active, permission will be sought from the site operator for on-site disposal of nonhazardous PPE, disposable equipment, and/or paper/cardboard wastes in the facility's Dumpsters. If on-site disposal is not feasible, the materials will be taken to a nearby permitted landfill.

If the facility is active, permission will be sought to place nonhazardous IDW, including drill cuttings, purge or well-development water, decontamination wash water, and drilling mud, etc., in the facility's waste treatment system. When appropriate, nonhazardous drill cuttings will be spread around the borehole, or, if they were removed for a temporary well, they will be placed back into the borehole. Otherwise, cuttings, purge water, and development water will be placed in a pit in or near the source area. Nonhazardous monitoring well purge or development water may also be poured onto the ground downgradient of the monitoring well. Purge water from functioning private potable wells will be discharged directly onto the ground surface. If on-site disposal is not feasible, these items will be placed into a unit with an environmental permit, such as a landfill or sanitary sewer. These types of materials will not be placed in Dumpsters.

Field personnel will implement the following procedures when managing nonhazardous IDW from specific practices:

- Disposable PPE – Place waste in double bag, and place in site Dumpster, with permission of site operator. Otherwise arrange for testing and disposal.
- Reusable PPE - Decontaminate following procedures described in the SOP BERS-05: *Equipment Decontamination.*
- Soil Cuttings – Containerize in 55-gallon drum with a tight-fitting lid. Identify and leave on site with permission of site operator. Otherwise, arrange for testing and disposal.
- Groundwater – Containerize in 55-gallon drum with a tight-fitting lid. Identify and leave on site with permission of site operator. Otherwise, arrange for testing and disposal.
- Decontamination Water – Containerize in 55-gallon drum with a tight-fitting lid. Identify and leave on site with permission of site operator. Otherwise, arrange for testing and disposal.
- Disposable Equipment – Containerize in 55-gallon drum or 5-gallon bucket with tight-fitting lid. Identify and leave on site with permission of site operator. Otherwise, arrange for testing and disposal.

- Trash – Place waste in double bag, and place in site Dumpster with permission of site operator. Otherwise, arrange for proper disposal.

Quality Control: The following procedures apply:

- Proper handling and disposal activities will be planned prior to commencement of field activities. All planning decisions will be documented in the site QAPP.
- IDW will be handled, stored, and disposed of in accordance with the site QAPP and relevant facility plans.

Calculations and Data Reduction: N/A

Data Management and Records Management: Records concerning the management of IDW will be generated and maintained as prescribed in the governing QA plans.

BRISTOL ENVIRONMENTAL REMEDIATION SERVICES, LLC

FIELD DOCUMENTATION

STANDARD OPERATING PROCEDURE BERS-11

Record of Changes

Revision No.	Date	Prepared by	Approved by
0	01/05/10	L. Maserjian	B. Allen

FIELD DOCUMENTATION

STANDARD OPERATING PROCEDURE

Method Summary: To ensure the quality and integrity of field and analytical data, field activities will be documented in the project field notebook. In the event that more than one person is working on the site and performing different activities, more than one field notebook will be designated for the site. When the field notebook is filled, a new notebook will be started. Pertinent protocols for documenting field activities are provided below.

Notebook Cover: The cover of each field notebook will contain the following information:

- Job title
- Job number
- Name of company
- Name of personnel in charge of notebook
- Date of field activities covered in the notebook.

First Page of Each Day: The following information must be provided in the beginning of each day of work:

- Job title
- Names of all personnel on site
- Weather conditions
- Location, if multiple sites
- Health and Safety meeting notes.

Each Page of Notebook: The following information must be provided on each page of the field notebook:

- Date
- Initials or signature of person taking notes (bottom of page)
- Location, if you have changed during the day
- Page number, if not on the notebook.

Required General Information for Field Notebooks:

- Do not erase mistakes/errors – draw a line through the deletion and initial it.
- Do not leave pages blank. If a page is skipped, draw a diagonal line across the page and initial the line.
- Record persons arriving and leaving site (guests to site, clients, regulatory agency personnel).
- Record health and safety issues that arise (close calls or accidents should also be documented on required forms).
- Note photographs taken and direction in which photograph was taken.
- Take an overview photograph of site before digging/drilling, etc.
- Include a photograph of the site after it is restored (if applicable).

Required Documentation for Sample Collection Activities:

- Instrument name;
- Calibration record (when, by whom, results, gas type);
- Sampling location map with North arrow (field-screening and analytical samples);
- Sample ID, with description of soil material;
- Duplicate information;
- Sample time, each sample;
- Sample depth;
- List what analyses sample will be analyzed for;
- Field-screening measurements;
- Type of machinery used if not already recorded on field forms (Macro-Core sampler, split spoon, pumps, sampling meters);
- If Global Positioning System (GPS) is used, make note of where it was used;
- Delivery or pick-up information (airway bill #, Fed Ex tracking #, Fed Ex pick up information).

Required Documentation for Underground Storage Tank (UST)/Aboveground Storage Tank (AST) Removal Activities:

- UST or AST dimensions;
- Dimensions of tank excavations, depth to groundwater, and depth of excavation;

- Footage of fuel piping (how many feet from dispenser to tanks);
- Where vent lines, fill ports, dispensers and pipe runs are located;
- Location of piping joints;
- Amount of sludge/water removed from tanks prior to decommissioning;
- Amount of contaminated soil/media (cubic yards of stockpiles);
- Amount of contaminated soil or debris hauled from site (number of truckloads);
- Amount of clean fill brought to the site;
- Type of machinery used.

Required Documentation for Monitoring Well/Soil Boring Activities (This list does not include the documentation that will be provided on a boring log and groundwater sample collection form.):

- Always collect swing-tie measurements to monitoring wells (even if you have a GPS);
- If drillers add water during well installation, note how much was added;
- Well screen slot size;
- Well filter sand pack size;
- Depth of top and bottom of well screen;
- Total depth of well;
- Amount of well construction materials used for each well (e.g., bags of silica sand, concrete, amount of screened casing, and amount of blank casing);
- Location of sand filter pack, bentonite seal, and grout used;
- Amount of water removed during development (unless you are using a well development form);
- Drill rig type;
- Changes in level of the water table/ aquifer.

Interferences and Potential Problems: Improper documentation of field activities may result in a number of problems, including, but not limited to:

- Inability to find sample collection locations that is needed for maps or finding areas for further assessment/excavation;
- Inability to create an as-built map;
- Inability to legally support data due to poor documentation;

- Development of erroneous conclusions regarding site contamination based on inaccurate data and/or problems correlating data and sample locations at the site;
- Difficulty in writing thorough reports due to poor documentation.

BRISTOL ENVIRONMENTAL REMEDIATION SERVICES, LLC

TRIMBLE GEOXH® GLOBAL POSITIONING SYSTEMS

STANDARD OPERATING PROCEDURE BERS-17

Record of Changes

Revision No.	Date	Prepared by	Approved by
0	01/04/2010	R. James	
1	01/24/2011	R. James	M. Faust

TRIMBLE GEOXH® GLOBAL POSITIONING SYSTEMS

STANDARD OPERATING PROCEDURE

Summary: The Global Positioning System (GPS) is a satellite-based navigation system consisting of satellites placed into a precise orbit around Earth. GPS receivers/units provide the means to communicate with the orbiting satellites in order to determine one's position through triangulation. GPS satellites are continuously transmitting signals which take time to travel to space and arrive at a GPS unit. A GPS unit compares the time a signal was transmitted by the satellite to the time it was received by the unit and determines a distance between the satellite and the GPS unit. By locking on to multiple satellite signals, the unit can determine its 3-dimensional location (latitude, longitude, and altitude). Additional information regarding the principles behind GPS technology can be found at the following website: http://www.trimble.com/gps/index.shtml.

Although there are a variety of different GPS units at the company's disposal, this Standard Operating Procedure (SOP) will focus on the Trimble GeoXH®. Bristol Environmental Remediation Services, LLC (Bristol) primarily utilizes Trimble GeoXH units for the purpose of capturing positional data on a variety of features including environmental sample locations, excavation boundaries, general site locations/boundaries, natural or anthropogenic site features (e.g. shorelines, building corners, monuments, outcrops, etc.), and any other features deemed necessary by the Bristol team, its subcontractors and/or clients. Resulting data are often used in Geographic Information System (GIS) software for digital mapping purposes. In some instances, Bristol will utilize Trimble GeoXH units for navigational purposes.

Health and Safety: GPS activities should be conducted in accordance with an approved Site Health and Safety Plan.

Personnel Qualifications: GPS personnel will have knowledge on how to properly operate the Trimble GeoXH data logger and all necessary software required for the successful capture of GPS positions. Two pieces of software, in particular TerraSync™ and GPS Pathfinder ® Office, are utilized for the successful collection, subsequent download and processing of GPS data, the manuals for which can be obtained on Bristol's network in the following directory: O:\Common\BERS EQUIPMENT\Equipment Manuals.

Pre-project Planning: A Bristol Project Manager (PM) or field team leader should consult a member of the GIS department regarding requisition of the Trimble GeoXH unit. At this point, GPS project objectives can be determined and the GIS department can setup the unit as necessary to most suitably achieve those objectives. It is recommended that during this stage, the PM or field team leader request a customized data dictionary. A data dictionary is an electronic field form used to control the collection of features and attributes. The data dictionary contains a list of features that will be collected in the field as well as the attribute data associated with each feature. It can be structured to fit the needs of any project in order to streamline the data collection process and ensure data integrity. For example, Spatial Data Standards for

Facilities, Infrastructure and Environment (SDSFIE) compliant data can be established in a data dictionary prior to field work, thus minimizing time spent processing the data following collection.

It is very important during the planning stages to ensure that the appropriate datum and projection are set in the field software. This should remain consistent between projects, but it is recommended that GIS personnel double check the coordinate system setup in the Terrasync software. In most cases data will be collected in the World Geodetic System dating from 1984 (WGS 84) with geographic coordinates expressed in latitude and longitude. Although the unit can be setup to display/collect in different coordinate systems, using this standard should help eliminate error and confusion.

Post-Processing – Following the completion of field activities and GPS collection, the data must be post-processed by Bristol's GIS personnel in order to achieve the highest possible accuracy. The unit should be returned to the GIS department for the completion of post-processing. Post-processing will be performed using GPS Pathfinder Office software. Data collected with the Trimble GeoXH unit can be manipulated and exported to a variety of formats via GPS Pathfinder Office software.

Equipment and Materials: Prior to deployment in the field, the GeoXH unit, ancillary equipment and materials will be identified, secured, and inspected for signs of damage. The unit should be inspected to ensure that the appropriate software is installed and functioning properly. Equipment and materials include:

- **Trimble GeoXH -** The Trimble GeoXH unit should be fully charged and all appropriate software should be installed prior to field deployment.
- **Secure Digital (SD) Flash Memory Card –** Bristol currently maintains a 16 Gigabyte (GB) SD card for storing GPS or project related data (i.e. aerial imagery, background files, reference files, etc.)
- **Cradle/Dock –** The GPS unit requires a docking station/cradle in order to charge the battery and to transfer data to the computer. This is included in the unit's carrying case.
- **Universal Serial Bus (USB) Cable –** One end of the USB cable plugs into the cradle while the other end plugs into the computer. This cable is used to transfer data from the unit to the computer and should be included with the unit in the carrying case. The Trimble GeoXH unit must be docked in the cradle in order to transfer data to the field or office computer.
- **Power Cord –** The power cable plugs into an electrical outlet and supplies power to the cradle. When the unit is docked in the cradle while the power supply is plugged in, the battery will charge.
- **User Guides and Manuals –** User manuals for Terrasync and GPS Pathfinder Office reside on the Bristol network in the following directory: O:\Common\BERS EQUIPMENT\Equipment Manuals. The user guide for the series of units into which the

Trimble GeoXH falls can be found online at the following Trimble website: http://trl.trimble.com/docushare/dsweb/Get/Document-414964/GeoExpl2008_100C_%20UserGde_ENG.pdf. This document can also be found alongside the software manuals located on Bristol's network in the equipment manuals' directory. Manuals can be viewed electronically or printed at the field personnel's convenience.

- **Carrying Case –** The Trimble GeoXH units are housed in hard-cover cases. Within the case will reside all of the above listed equipment.

Battery Charging

The batteries should be charged the day prior to field deployment and each night following a day's use. Charge the battery by docking the GPS unit in the cradle, plugging the power cord into an electrical outlet and attaching the power chord to the cradle. For additional information consult the Geoexplorer 2008 Series Quick Start Guide located at Trimble's website: http://trl.trimble.com/docushare/dsweb/Get/Document-414960/GeoExplorer_2008_QSG_ENG_Ltr.pdf. Or consult the GeoExplorer 2008 series User Guide located at Trimble's website: http://trl.trimble.com/docushare/dsweb/Get/Document-414964/GeoExpl2008_100C_%20UserGde_ENG.pdf. These documents are also located on Bristol's network in the following directory: O:\Common\BERS EQUIPMENT\Equipment Manuals.

Troubleshooting

For troubleshooting issues, please consult Bristol's GIS department or refer to Section D of the Terrasync software Getting Started Guide. This document is located on Bristol's network in the following directory: O:\Common\BERS EQUIPMENT\Equipment Manuals\TerraSyncGettingStartedGuide.pdf.

Maintenance

The Trimble GeoXH is designed to withstand the elements. It has an operating temperature that falls between -4 degrees Fahrenheit (°F) and 140 °F. The casing is dust-proof, shock resistant to 4 feet, and resistant to heavy wind-driven rain. Bristol will maintain a screen protector on the color liquid crystal display (LCD) touch screen to protect from scratches and other damage. The units will be stored within foam-lined, hard plastic cases when not in use.

Accessories

The Trimble GeoXH is equipped to handle a range of optional accessories such as laser range finders and external antennae. All accessories will be connected according to manufacturer's instruction/recommendations.

(Intentionally blank)

APPENDIX F

ADEC Laboratory Data Review Checklist

Laboratory Data Review Checklist

Completed by:

Title: Date:

CS Report Name: Report Date:

Consultant Firm:

Laboratory Name: Laboratory Report Number:

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:

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:

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 acceptance range, insufficient or missing samples, etc.?

○ Yes ○ No ○ NA (Please explain) Comments:

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

Comments:

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:

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:

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:

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? (Please explain)

Comments:

6. QC Samples

a. Method Blank

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

◯ Yes ◯ No ◯ NA (Please explain) Comments:

ii. All method blank results less than PQL?

◯ Yes ◯ No ◯ NA (Please explain) Comments:

iii. If above PQL, what samples are affected? Comments:

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

○ Yes ○ No ○ NA (Please explain) Comments:

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

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:

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/DMSD, 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:

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

○ Yes ○ No ○ NA (Please explain) Comments:

vii. Data quality or usability affected? (Please explain) Comments:

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:

d. Trip Blank - Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): <u>Water and Soil</u>

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:

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

Comments:

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:

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:

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

○ Yes ○ No ○ NA (Please explain) Comments:

f. Decontamination or Equipment Blank (if applicable)

○ Yes ○ No ○ NA (Please explain) Comments:

i. All results less than PQL?

○ Yes ○ No ○ NA (Please explain) Comments:

ii. If above PQL, what samples are affected?

Comments:

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

Comments:

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

a. Defined and appropriate?

○ Yes ○ No ○ NA (Please explain) Comments: